MERSİN-ADANA-GAZİANTEP HIGH STANDARD RAILWAY PROJECT

TERRESTRIAL FLORA-FAUNA SUPPLEMENTARY SURVEY REPORT

NOVEMBER 2021

ANKARA

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1. INTRODUCTION

Transportation is an indispensable need of human beings. Depending on this situation, the need for transportation types is increasing day by day. The most important of these transportation types is rail transportation. Railway transportation, which is used for both freight and human transportation, is developing technologically every day. In addition to this development, railway line construction works are increasing at the same rate.

In line with these needs, the Mersin-Adana-Gaziantep (MAG) High Standard Railway Project has been developed by the General Directorate of Infrastructure Investments (AYGM) of the Ministry of Transportation and Infrastructure (MoTI). Different parts or sections of the Project route had been already awarded to some contractors other than Rönesans Uluslararası İnşaat Yatırım Sanayi ve Ticaret A.Ş. (REC) which has been recently contracted for the certain lines' construction works and installation of electromechanical systems.

During the construction and operation phases of the MAG High Standard Railway Project, there might be impacts on the ecological components. In ordert to assess these impacts and indentify the mitigation measures, an Environmental and Social Impact Assessment (ESIA) study had been conducted and ESIA Report had been prepared by Assystem Envy Enerji ve Çevre Yatırımları A.Ş. The ESIA Report has been reviewed in the scope of an Environmental and Social Due Diligence (ESDD) study by the International Environmental and Social Consultant (i.e., Ramboll) of the Lenders which are planning to provide finance to the Project. In the context of the ESDD study, a Gap Analysis with respect to the international standards (i.e., IFC Performance Standards and EBRD Performance Requirements) was carried out and one of the gaps identified is a need for a supplementary ecological studies including site survey and reporting of these baseline surveys, preparation of Biodiversity Management Plan and Critical Habitat Assessment Report in line with IFC PS6 requirements.

This Report as part of the Supplementary Lender Information Package (SLIP), presents the findings of the supplementary or additional terrestrial ecological surveys whereas aquatic biodiversity survey has been covered within a stand alone report since in the ESIA Report aquatic survey has not been conducted.

High standard or high speed railway projects are crucial in terms of potential impacts on birds and bats due to the risk of bird collusion as a result of high travel speeds. Thus, ornithological survey is one of the important additional suveys conducted in the scope of these additional studies. It is important to know the reactions of bird species that will be exposed to these impacts and the precautions to be taken. For this purpose, all living groups at the determined survey stations were examined and the effects and precautions to be taken were determined. Habitat survey is another important additional survey completed in these supplementary studies. Fauna survey was also conducted in the same context to provide primary data from the Project route and its associated facilities (e.g., quarries, disposal areas). As there are ongoing construction activities carried out by other contractors, our ecology team made visits

to these construction sites in addition to the visits to the proposed routes of the lines which are in the resposibility of REC.

The following chapters of this additional baseline terrestrial ecology report cover the existing biodiversity conditions at the visited survey stations determined by our team members from different disciplines including ornithologist (Assist. Prof. Safak Bulut), habitat and flora specialist (Haşim Altonözlü) and fauna expert (Prof. Dr. Şakir Önder Özkurt).

2. FLORA

2.1. Methodology

Supplementary field survey was carried out between October 14 and 18, 2021 within the scope of SLIP studies. Although there is a seasonal limitation on the survey due to the fact that October is not a productive period in terms of vegetation season, the identification process was possible to a certain extent and carried out from dry samples, as being familiar to the region closely from similar studies and benefiting from previous works done by our experts.

In this study, the dominant plant species were determined in a 1,000 m wide corridor (i.e., 500 m on each side of the centreline of the route). The EUNIS codes of the habitats identified in the study area have been defined. The EUNIS code of the habitat is given in the floristic list created for each study area (sometimes referred as survey stations in the report). The “endemic and critical species” identified within the scope of the biodiversity study, performed by Assystem Envy, i.e., Consultant of the existing ESIA Report, and the “distribution of endemic plant species” identified by our experts and the “habitats preferred by the species” are also given. Invasive species in the Project area and the precautionous work to be done to prevent their spread are detailed. The coordinates of the endemic species, identified during the fieldwork carried out between October 14 and 18, 2021, are presented in tabular forms in this supplementary survey report. In order to prevent the endemic plant species detected in the study area from being affected by the construction works and to continue their generation, the recommended protection measures to be taken during the works have been determined. In the floristic lists created for the study areas, the station number in the first column, the station name in the second column, the coordinate in the third column, the height (m) in the fourth column, the name of the taxon in the fifth column, the endemism status of the taxon in the sixth column, the danger category (IUCN compliant) according to the Turkish Plants Red Book in the seventh column), the EUNIS code of the habitat, in which the taxon was detected, in the eighth column and the explanation part in the ninth and last column are provided in the Tables. If there is a suggestion for the habitat or any other work to be done, it is detailed in the explanation part. The pictures of the stations studied in the field studies were taken and added to this report.

2.2. Habitats Observed at the Survey Stations along the Route

The existing ESIA Report prepared for the MAG High Standard Railway Project was used to define the habitats. In the Project area, the following five major habitats were observed at the ecological survey stations along the route and around the associated facilities visited:

1- *Pinus brutia* forest
2- Oak forests
3- Maquis
4- Step vegetation
5- Riparian vegetation

It should be noted that the all habitats (i.e., a total of 27 different types) along the entire route and around the associated facilities are presented in the Critical Habitat Assessment Report which is also a stand alone document.

- ***Pinus brutia Forests***

EUNIS Code: G3.75 (Pinus brutia Forests)

Red pine (Pinus brutia) forests are the most characteristic habitat type of the Mediterranean phytogeographical region. Although they are heterogeneous in the western and eastern foothills of Nurdağı, they generally have a homogeneous appearance in the upper parts (see. Figure 2-1).

Red pine (Pinus brutia) communities were observed at approximately 300-1,100 meters around Nurdağı. Red pine forests, which have a fragmented appearance in the lower parts due to the agricultural areas and settlements, start from the Bahçe District and become more widespread towards the upper parts. This homogeneous appearance is disturbed by plateau settlements, small agricultural areas and roads in certain places. Red pine (*Pinus brutia*) forest is a “closed” (getting no light) habitat type, so it has lower species diversity than open habitat types. 172 species and subspecies were identified in this habitat. Most of these taxa prefer openings within habitat. Widespread species among them are *Pinus brutia* Ten., *Juniperus oxycedrus* L. subsp. *oxycedrus*, *Drimia maritima* (L.) Stearn, *Hedera helix* L., *Cistus creticus* L., *Trifolium arvense* L. var. *arvense, Myrtus communis* L. subsp. *communis*, *Jasminum fruticans* L., *Rosa canina* L., *Daphne gnidioides* Jaub. & Spach, *Dactylis glomerata* L. subsp. *hispanica* (Roth) Nyman and *Oryzopsis coerulescens* (Desf.) In anthropogenic habitats which are very widespread along the route, 450 species and subspecies were identified. *Prosopis farcta* (Banks & Sol.) J.F.Macbr., *Ecballium elaterium* (L.) A.Rich. *Artedia squamata* L., *Cynodon dactylon* (L.) Pers. subsp. *dactylon, Conyza bonariensis* (L.) Cronquist, *Cephalaria syriaca* (L.) Schrad. ex Roem. & Schult., *Crepis sancta* (L.) Bornm., *Heliotropium europaeum* L., *Lactuca saligna* L. and *Scandix pecten-veneris* L.

As a result of field surveys and literature review, 12 endemic plant species have been identified in this habitat. According to IUCN Red List criteria, Sideritis cilicica is in “EN” category, *Bupleurum lophocarpum, Cytisus drepanolobus, Glycyrrhiza flavescens, Lactuca fenzlii* and *Lathyrus spathulatus* subsp. *elongatus* are in “NT” category, *Alkanna aucheriana, Alkanna kotschyana, Colchicum balansae*, *Galium adhaerens, Gladiolus anatolicus* and *Stachys sparsipilosa* are in “LC” category (ESIA Report for the MAG Project, 2021).

Figure 2-1. Pinus brutia Forest

- ***Quercus sp.* Forests (Oak Forests)**

EUNIS Code: G5.72 (Young broadleaf evergreen plantings)

The Oak (Quercus sp.) Forest can be observed in patches after approximately 900 meters of Nurdağı and Sof Mountain. The habitat type with Red pine (Pinus brutia) observed in Nurdağı, has been fragmented with steppe on Sof Mountain. On the other hand, these forests have solid distribution on the northern and eastern slopes that are relatively humid (see. Figure 2-2). A total of 238 species and subspecies were identified in the habitat type. The identified number of taxa is higher when compared to Red pine forests since Quercus forests has more open areas. Widespread species among identified species are *Quercus cerris* L., *Quercus ithaburensis* Decne. subsp. *macrolepis* (Kotschy) Hedge & Yalt., *Quercus brantii* Lindl., *Osyris alba* L., *Jasminum fruticans, Anagyris foetida* L., *Pinus brutia*, *Rosa canina* and *Veronica macrostachya* Vahl subsp. *macrostachya.*

Oak (Quercus sp.) forests are relatively sparser than red pine forests. Open spaces, usually including rocky areas, are common in the habitat. As a result of field surveys and literature review, 13 endemic species were identified in this habitat. According to IUCN Red List criteria, Muscari babachii “CR” category, *Symphytum aintabicum* “VU” category, *Allium gayi*, *Helleborus vesicarius*, *Ornithogalum alpigenum* and *Lathyrus spathulatus* subsp. *elongatus* “NT” category, *Alkanna aucheriana, Alkanna kotschyana, Astragalus densifolius* subsp.

densifolius, *Galium adhaerens*, *Gladiolus anatolicus, Ranunculus reuterianus* and *Trigonella kotschyi* "LC" category (ESIA Report for the MAG Project, 2021).

Figure 2-2. Oak Forests

- **Maquis**

EUNIS Code: F5.2 (Maquis)

Maquis is the dominant habitat type in the region located between Mersin Province and western foothills of Nurdağı. However, the most of this habitat has been converted into agricultural land. Therefore, the natural maquis habitat can be observed in narrow areas between agricultural lands and gardens (see. Figure 2-3). A total of 385 species and subspecies were identified in maquis habitat, which is the most common natural habitat type of the project route. Widespread species among identified species are *Quercus coccifera* L., *Phillyrea latifolia* L.*, Paliurus spina-christi* Mill., *Olea europaea* L. var. *europaea, Rhamnus lycioides* L. subsp. *graeca* (Boiss. & Reut.) Tutin, *Jasminum fruticans, Calicotome villosa* (Poir.) Link, *Daphne sericea* Vahl subsp. *sericea, Drimia maritima, Cistus creticus, Ruscus aculeatus* L., *Lithodora hispidula* (Sm.) Griseb. subsp. *hispidula* and Rosa *canina*.

Due to its relatively sparse appearance compared to Red Pine (Pinus brutia) and Oak (Quercus sp.) Forests, the number identified endemix taxa is higher. Solution 26 endemic species were identified in this habitat. According to IUCN Red List criteria, Heptaptera cilicica and *Sideritis cilicica* "EN" category, *Allium gayi, Astragalus lycius, Bellevalia modesta, Centaurea lycopifolia, Helleborus vesicarius, Glycyrrhiza flavescens, Lathyrus spathulatus* subsp. *elongatus*, *Kotschyella cilicica* and *Trifolium aintabense* "NT" category, *Alcea apterocarpa*,

Alkanna aucheriana, *Alkanna kotschyana, Arabis aubrietioides, Astragalus densifolius* subsp. *densifolius, Bupleurum zoharii, Colchicum balansae, Crocus cancellatus* subsp. *cancellatus*, *Dorycnium pentaphyllum* subsp. *haussknechtii, Galium adhaerens, Gladiolus anatolicus, Iris sari, Ophrys cilicica, Thymus cilicicus* and *Trigonella kotschyi* are in "LC" category (ESIA Report for the MAG Project, 2021).

Figure 2-3. Scrub vegetation

- **Step Vegetation**

EUNIS Code: E2.1 (Persistent mesotrophic grassland and post-harvest grazing)

The area from the eastern foothills of Nurdağı to the Sof Mountain consists of almost completely anthropogenic habitats. Natural areas are observed only between the east of Nurdağı district center and Kömürler-Tüllüce villages. Secondary steppe habitat is dominant in these areas and Sof Mountain. It can be said that thousands of years of anthropogenic activities and climate change are effective in transforming these parts, which were covered with the Quercus brantii forest in the past, into secondary steppes at present (see. Figure 2-4). Sof Mountain, where the steppe habitat is dominant, has generally rocky areas. Sparse *Quercus brantii* communities are observed in the upper parts of Sof Mountain and on the relatively humid northern slopes. The steps are the second largest habitat types along the project route. Since it has rocky areas, most of them cannot be used as agricultural land. A total of 400 species and subspecies were identified in steppe habitat. Widespread species among identified species are *Acantholimon venustum* Boiss. subsp. *venustum*, *Aegilops*

triuncialis L. subsp. *triuncialis, Allium scorodoprasum* L. subsp. *rotundum* (L.) Stearn, *Anthemis pseudocotula* Boiss., *Bromus japonicus* Thunb. subsp. *japonicus*, *Bromus tectorum* L., *Centaurea urvillei* DC. subsp. *urvillei, Crataegus orientalis* Pall. ex M. Bieb. subsp. *orientalis*, *Cruciata taurica* (Pall. ex Willd.) Ehrend., *Genista albida* Willd., *Geranium tuberosum* L. subsp. *tuberosum, Helianthemum ledifolium* (L.) Mill., *Hypericum pallens* Sol., *Juniperus oxycedrus* L. subsp. *oxycedrus, Koeleria macrantha* (Ledeb.) Schult., *Paronychia kurdica* Boiss., *Phleum subulatum* (Savi) Asch. & Graebn. subsp. *subulatum, Poa bulbosa* L., *Prunus orientalis* (Mill.) Koehne*, Quercus brantii* Lindl., *Teucrium chamaedrys* L. subsp. *tauricola* Rech.f., *Teucrium polium* L. subsp. *polium*, *Veronica syriaca* Roem. & Schult., *Xeranthemum annuum* L. and *Ziziphora te*nuior L..

As a result of field surveys and literature review, 22 endemic species were identified in this habitat. Most ofendemic taxa prefer the upper parts of Sof Mountain and the steppe areas among *Quercus brantii* openings. EN" category, *Symphytum aintabicum* "VU" category, *Allium gayi, Astragalus lycius, Bupleurum lophocarpum, Cytisus drepanolobus, Helleborus vesicarius, Ornithogalum alpigenum* and *Kotschyella cilicca* "NT" category, *Acanthus hirsutus* subsp. *syriacus, Arabis aubrietioides, Astragalus densifolius* subsp. *densifolius*, *Colchicum balansae, Crocus cancellatus* subsp. *cancellatus*, Dorycnium pentaphyllum subsp. *haussknechtii, Galium scabrifolium, Hedysarum pogonocarpum, Iris sari, Rosularia globulariifolia*, *Tanacetum argenteum* subsp. *argenteum* and *Trigonella kotschyi* are in "LC" category (ESIA Report for the MAG Project, 2021).

Figure 2-4. Step Vegetation

- **Riparian Vegetation**

EUNIS Code: C2.3

The proposed Railway route passes over the Seyhan and Ceyhan rivers, which are two important surface water resources, within the borders of Adana Province. Apart from these two large rivers, it completes the route by passing near small and medium-sized water sources. Most of the small and medium-sized water resources are used as irrigation channels and are of great importance for agricultural lands.

A total of 152 species and subspecies taxa were identified in riparian habitats observed on project route. The widespread species are *Phragmites australis* (Cav.) Trin. ex Steud., *Typha domingensis* Pers., *Juncus inflexus*, L., *Epilobium parviflorum* Schreb., *Alnus orientalis* Decne. subsp. *orientalis, Xanthium orientale* L. subsp. *italicum* (Moretti) Greuter, *Rumex sanguineus* L., *Senecio aquaticus* Hill subsp. *erraticus* (Bertol.) VAMatthews, *Vitex agnus-castus* L., *Platanus orientalis* L., *Ranunculus arvensis* L., *Potentilla reptans* L., *Salix alba* L., *Veronica anagallis-aquatica* L., *Tamarix smyrnensis* Bunge, *Bolboschoenus maritimus* Palla subsp. *maritimus, Carex distans* L., *Cyperus longus* L. subsp. *longus, Juncus gerardii* Loisel. subsp. *gerardii* and *Sorghum halepense* (L.) Pers. subsp *halepense* No endemic species was observed among these species (ESIA Report for the MAG Project, 2021).

Figure 2-5. Riparian Vegetation

2.3. Endemic Plant Species

In the ESIA Report for the MAG Project, 45 endemic plant species were identified in the study and literature review in the project area. However, in our study and the distribution and final taxonomic status of these species in Turkey were investigated, *Alcea apterocarpa, Astragalus densifolius* subsp. *densifolius, Colchicum baslansae, Gladiolus anatolicus, Rosularia globulariifolia, Acanthus hirsutus* Boiss. subsp. subsp. *syriacus* (Boiss.) Brummitt and *Thymus cilicicus* species are not endemic or their endemism has decreased since they were registered in other countries (https://bizimbitkiler.org.tr/yeni/demos/technical/). According to the last evaluation, the number of species was updated as 38 in the study named Mersin-Adana-Gaziantep High Standard Railway Project Environmental and Social Impact Assessment Report. On 14-18.10.2021, the endemic Onosma mutabilis taxon was detected in the field study carried out by us in the project area. The danger category of *Onosma mutabilis*, one of these species, is "LC". According to the latest updated list in the project area, 39 endemic plants were recorded from the route according to studies and literature. The species name of the taxon Thlaspi cilicium (Boiss.) has been updated to Kotschyella cilicica (Boiss.) Hayek. The current endemic plant list is given in Table 2-1.

Table 2-1. List of Endemic Species and conservatiomn statuses according the IUCN Red List

No	Coordinate		Altitude (m)	Taxon	IUCN Red List
	x	y			
1.	Not Observed			*Muscari babachii* Eker & Koyuncu	CR
2.	Not Observed			*Astragalus aintabicus* Boiss.	EN
3.	Not Observed			*Centaurea huassknechtii* Boiss.	EN
4.	Not Observed			*Heptaptera cilicica* (Boiss. & Balansa) Tutin	EN
5.	662188	4092776	246	*Sideritis cilicica* Boiss. & Balansa	EN
6.	Not Observed			*Symphytum aintabicum* Hub.-Mor. & Wickens	VU
7.	Not Observed			*Allium gayi* Boiss.	NT
8.	Not Observed			*Astragalus lycius* Boiss.	NT
9.	Not Observed			*Bellevalia modesta* Wendelbo	NT
10.	Not Observed			*Bupleurum lophocarpum* Boiss. & Balansa	NT
11.	Not Observed			*Centaurea calcitrapa* L. subsp. cilicica (Boiss. & Balansa) Wagenitz	NT
12.	Not Observed			*Centaurea lycopifolia* Boiss. & Kotschy	NT
13.	Not Observed			*Cytisus drepanolobus* Boiss.	NT
14.	Not Observed			*Glycyrrhiza flavescens* Boiss.	NT
15.	339387	4118663	952	*Helleborus vesicarius* Aucher ex Boiss.	NT
16.	Not Observed			*Lactuca fenzlii* N.Kilian & Greuter	NT
17.	Not Observed			*Lathyrus spathulatus* Čelak. subsp. *elongatus* (Bornm.) Ponert	NT
18.	Not Observed			*Ornithogalum alpigenum* Stapf	NT

No	Coordinate		Altitude (m)	Taxon	IUCN Red List
	x	y			
19.	Not Observed			*Kotschyella cilica* (Boiss.) Hayek	NT
20.	Not Observed			*Trifolium aintabense* Boiss. & Hausskn.	NT
21.	Not Observed			*Alkanna aucheriana* A.DC.	LC
22.	Not Observed			*Alkanna kotschyana* A.DC.	LC
23.	Not Observed			*Anthemis arenicola* Boiss. var. *arenicola*	LC
24.	670277	4102374	273	*Onosma mutabilis* Boiss. & Hausskn.	LC
25.	Not Observed			*Arabis aubrietioides* Boiss.	LC
26.	Not Observed			*Beta vulgaris* L. subsp. *adanensis* (Pamukçu.) Ford-Lloyd & J.T. Williams	LC
27.	Not Observed			*Bupleurum zoharii* Snogerup	LC
28.	Not Observed			*Crocus cancellatus* Herb. subsp. cancellatus	LC
29.	Not Observed			*Dorycnium pentaphyllum* Scop. subsp. haussknechtii (Boiss.) Gams	LC
30.	Not Observed			*Galium adhaerens* Boiss. & Balansa	LC
31.	Not Observed			*Galium scabrifolium* (Boiss.) Hausskn.	LC
32.	Not Observed			*Hedysarum pogonocarpum* Boiss.	LC
33.	Not Observed			*Iris sari* Schott ex Baker	LC
34.	Not Observed			*Ophrys cilicica* Schltr.	LC
35.	Not Observed			*Ranunculus reuterianus* Boiss.	LC
36.	Not Observed			*Scrophularia cryptophila* Boiss. & Heldr.	LC
37.	Not Observed			*Stachys sparsipilosa* R.Bhattacharjee & Hub.-Mor.	LC
38.	Not Observed			*Tanacetum argenteum* (Lam.) Willd. subsp. *argenteum*	LC
39.	Not Observed			*Trigonella kotschyi* Fenzl	LC

Distribution of endemic plant species in Turkey, flowering period, preferred habitat, altitude and distribution maps in Turkey are given below.

- *Muscari babachii* (Eker & Koyuncu)

Muscari babachii (Eker & Koyuncu) species is a perennial herbaceous. Flowering period is between 5th and 6th months. It is found in Quercus bottoms and rocky areas as habitat types. It spreads in Hatay province in Turkey. Distribution map in Turkey is given in Figure 2-6 below. According to the Turkish Plants Red Book, the danger category is CR.

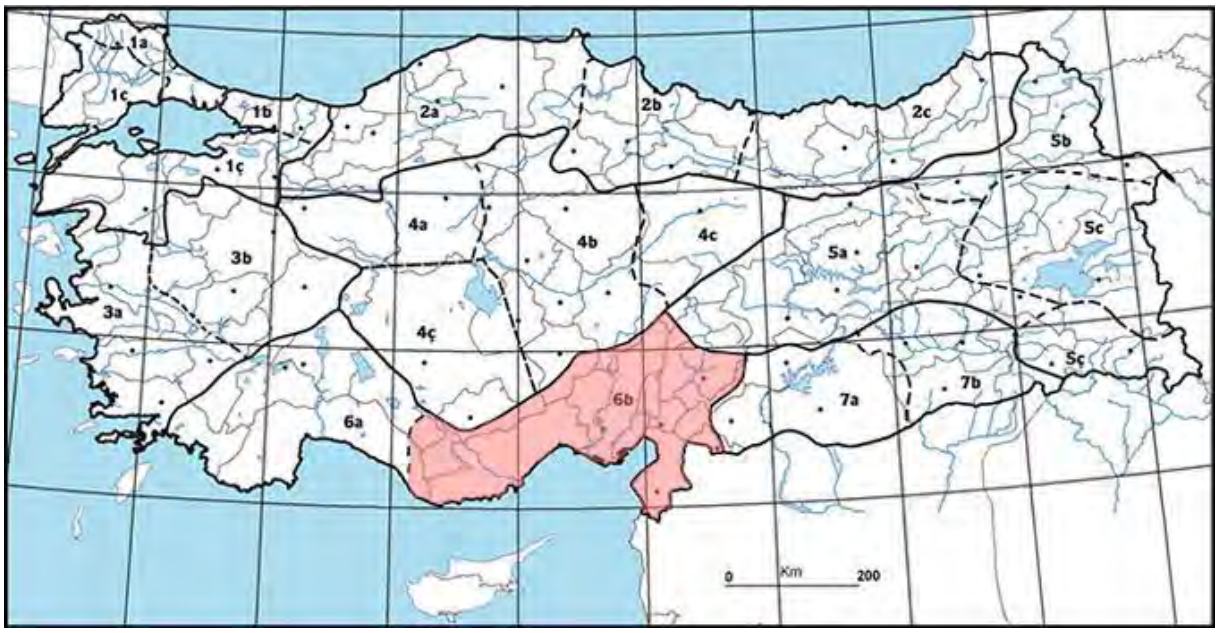

Figure 2-6. Distribution map of Muscari babachii species in Turkey https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Astragalus aintabicus* (Boiss).

Astragalus aintabicus (Boiss.) The type is perennial, shrub. Flowering period is between 5th and 7th months. As a habitat 750-1,300 m. It prefers areas such as fallow fields and hill skirts. It spreads in Gaziantep, Kilis and İçel in Turkey. Distribution map in Turkey is given in Figure 2-7 below. According to the Red Book of Turkish Plants, the hazard category is EN.

Figure 2-7. Astragalus aintabicus distribution map of the species in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Centaurea hausknechtii* (Boiss).

Centaurea hausknechtii (Boiss) species is herbaceous perennial. Flowering period is between 6th and 7th months. As a habitat, it is 1,070 m. It prefers limestone pastures. It spreads only in Gaziantep province in Turkey. Distribution map in Turkey is given in Figure 2-8 below. According to the Red Book of Turkish Plants, the hazard category is EN.

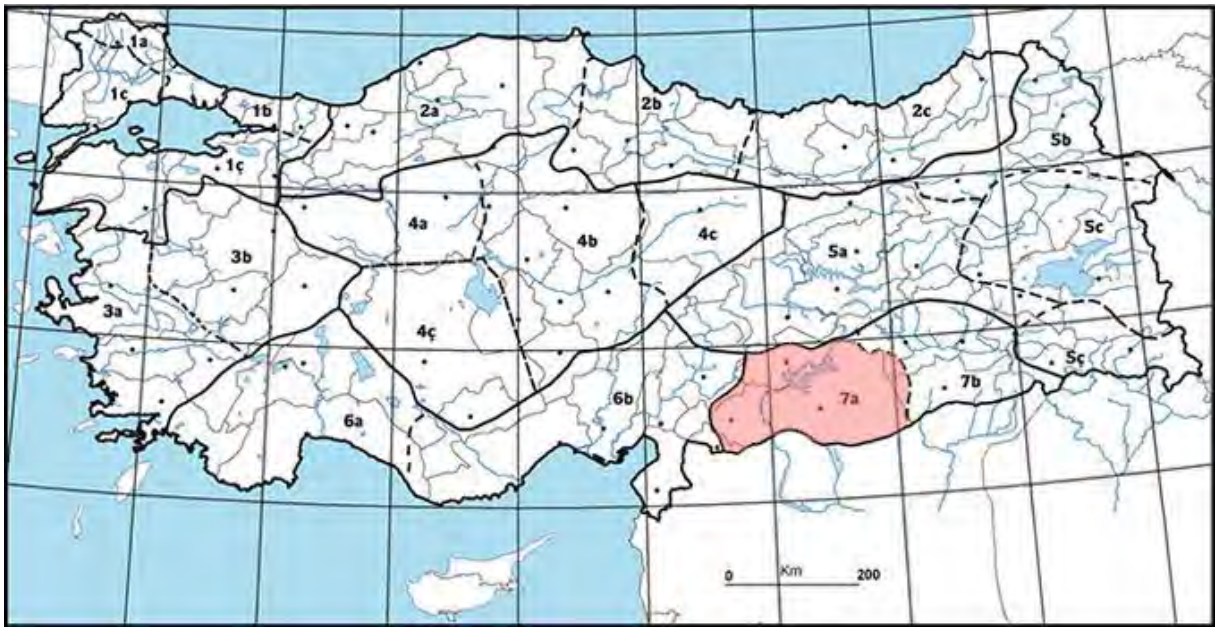

Figure 2-8. Centaurea hausknechtii distribution map of the species in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Heptaptera cilicica* (Boiss. & Balansa) (Tutin)

Heptaptera cilicica (Boiss. & Balansa) Tutin is a perennial shrub. Flowering period is between 5th and 7th months. As a habitat, it is found on hill slopes up to 500 m. It spreads in Adana and Mersin provinces in Turkey. Distribution map in Turkey is given in Figure 2-9 below. According to the Red Book of Turkish Plants, the hazard category is EN.

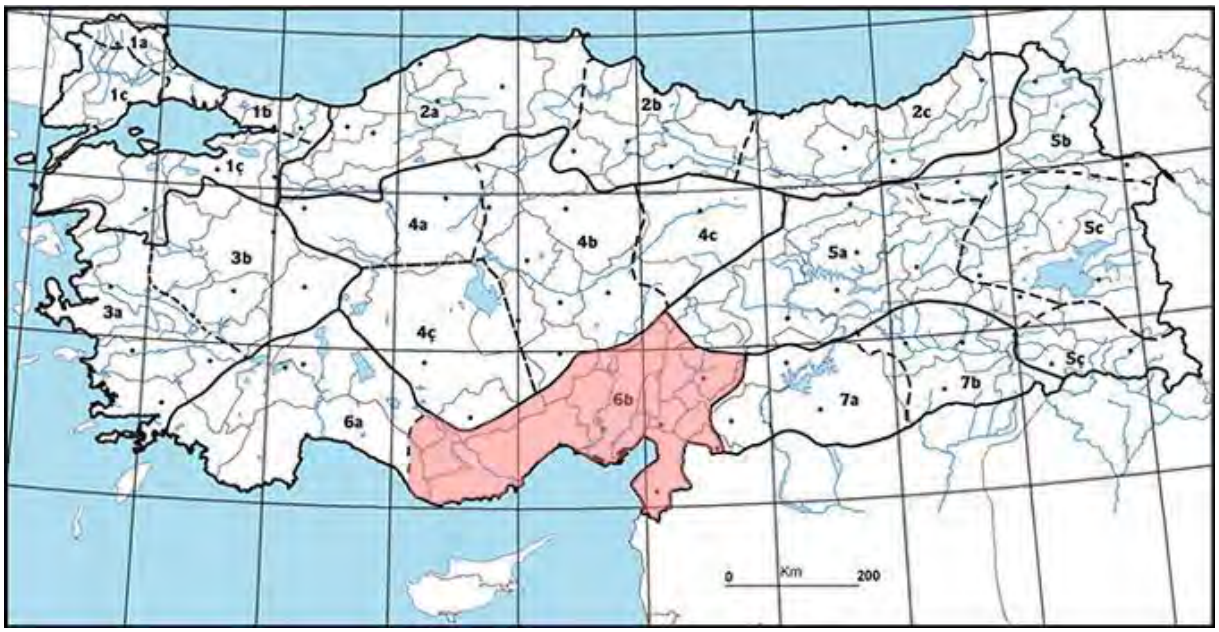

Figure 2-9. Distribution map of Heptaptera cilicica in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Sideritis cilicica* (Boiss. & Balansa)

Sideritis cilicica (Boiss. & Balansa) type is perennial, herbaceous. Flowering period is between 6th and 7th months. As habitat, it is found in areas such as Pinus brutia forest clearings, limestone slopes and maquis between 600 and 950 m. It is also found in Adana and Mersin in Turkey. Distribution map in Turkey is given in Figure 2-10 below. The danger category is EN according to the Red Book of Plants of Turkey.

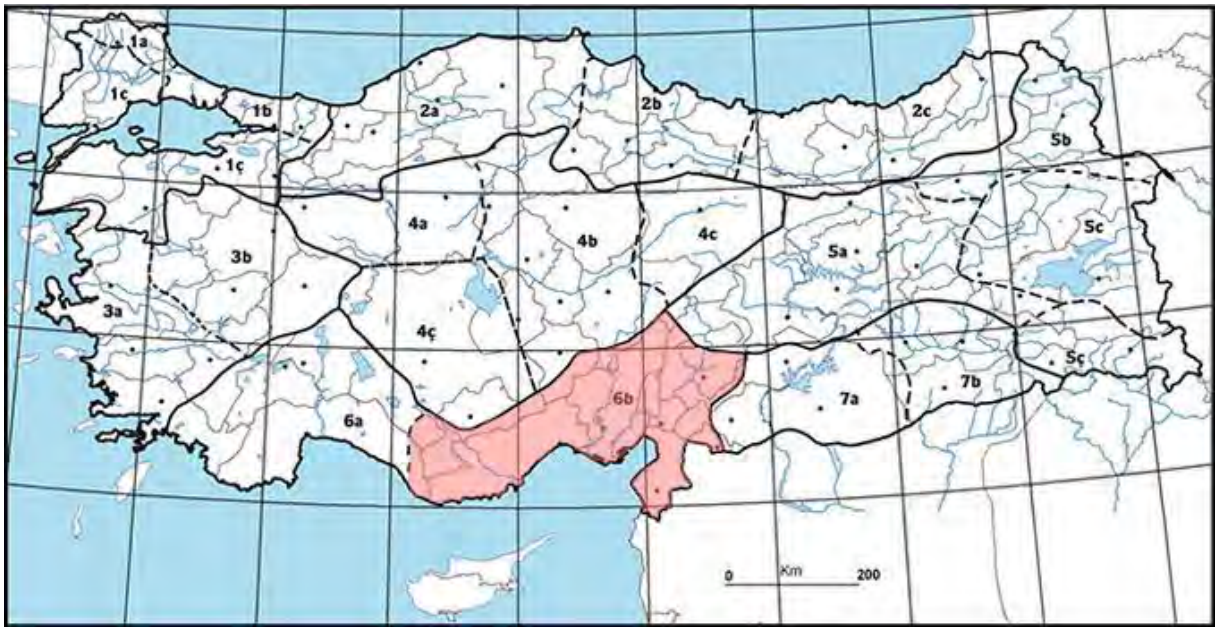

Figure 2-10. Sideritis cilicica distribution map of species in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Symphytum aintabicum* (Hub.-Mor. & Wickens)

Symphytum aintabicum (Hub.-Purple. & Wickens) type is perennial, herbaceous. Flowering period is between 4th and 5th months. It is found in shady woods and limestone cliffs between 900-1700 m as habitat. It spreads in Gaziantep in Turkey. Distribution map in Turkey is given in Figure 2-11 below. According to the Red Book of Plants of Turkey, the danger category is VU.

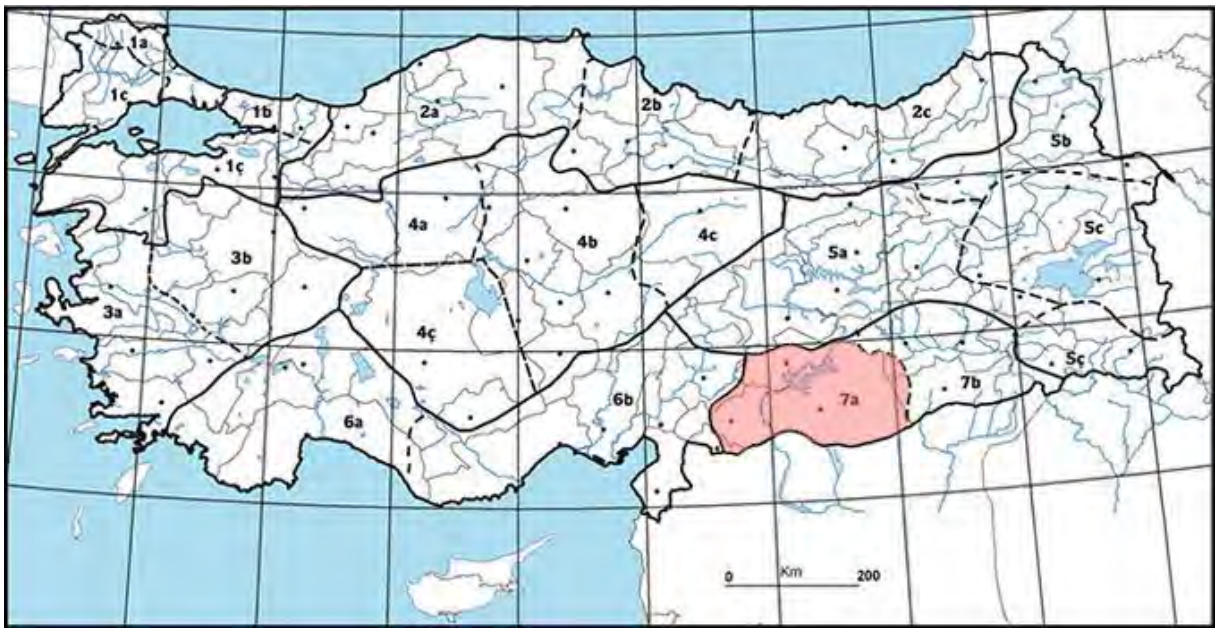

Figure 2-11. Symphytum aintabicum Hub.-Purple. Distribution map of & Wickens species in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Allium gayi* (Boiss.)

Allium gayi (Boiss.), the species is herbaceous perennial. Flowering period is between 4th and 5th months. As a habitat 0-1,800 m. It is found on rocky slopes, sandy Quercus, Juniperus fields and fallow fields. It spreads in Adana, Osmaniye and Mersin in Turkey. Distribution map in Turkey is given in Figure 2-12 below. According to the Red Book of Turkish Plants, the danger category is NT.

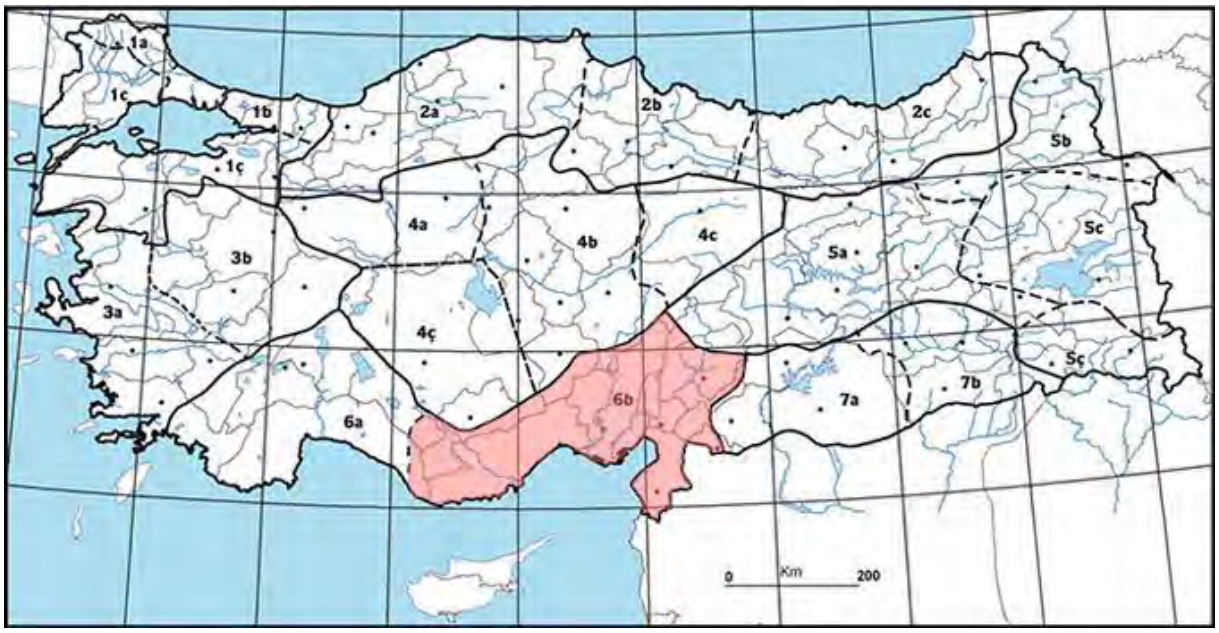

Figure 2-12. Distribution map of Allium gayi species in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Astragalus lycius* (Boiss.)

Astragalus lycius (Boiss.), the species is perennial, herbaceous. Flowering period is between 5th and 6th months. As habitat, it is found in limestone slopes and oak scrub areas up to 400-1,800 m. In Turkey, it spreads in Gaziantep, Çankırı, Ankara, Antalya, Burdur, Kayseri, Kırşehir, Niğde, Sivas and Tokat. Distribution map in Turkey is given in Figure 2-13 below. According to the Red Book of Turkish Plants, the danger category is NT.

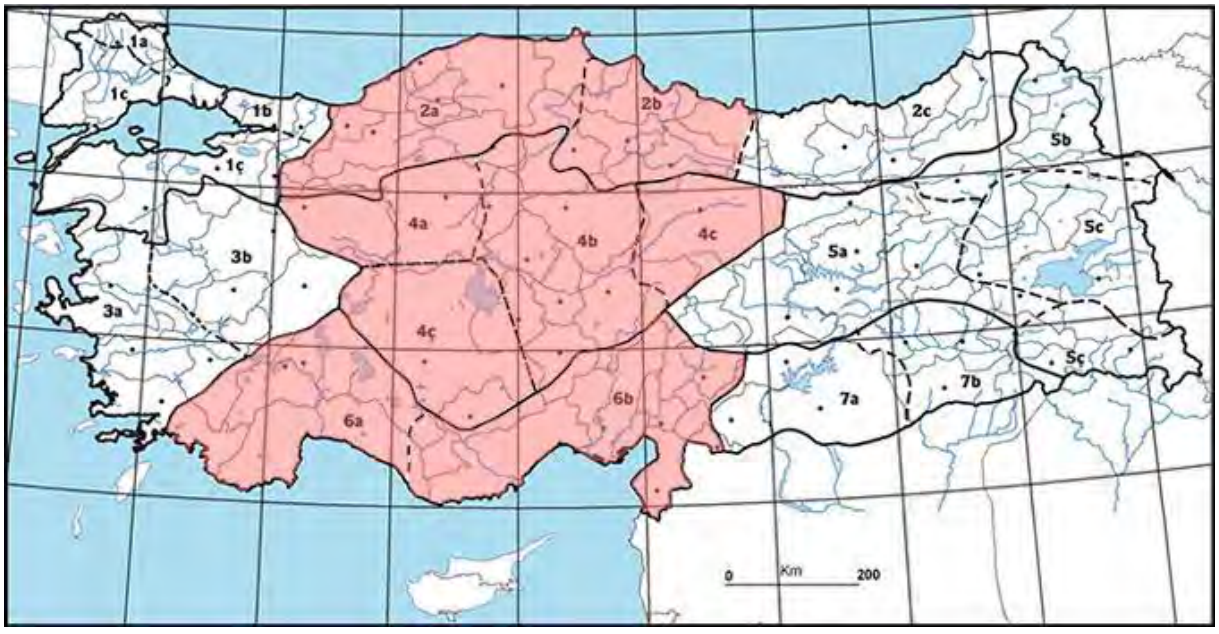

Figure 2-13. Astragalus lycius distribution map of the species in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Bellevalia modesta* (Wendelbo)

Bellevalia modesta Wendelbo species is a perennial herbaceous. Flowering period is between 3rd and 4th months. As habitat, it spreads on clays up to 240-1,600 m, barren sweats, meadows and maquis. It also spreads in Mersin in Turkey. Distribution map in Turkey is given in Figure 2-14 below. According to the Red Book of Turkish Plants, the danger category is NT.

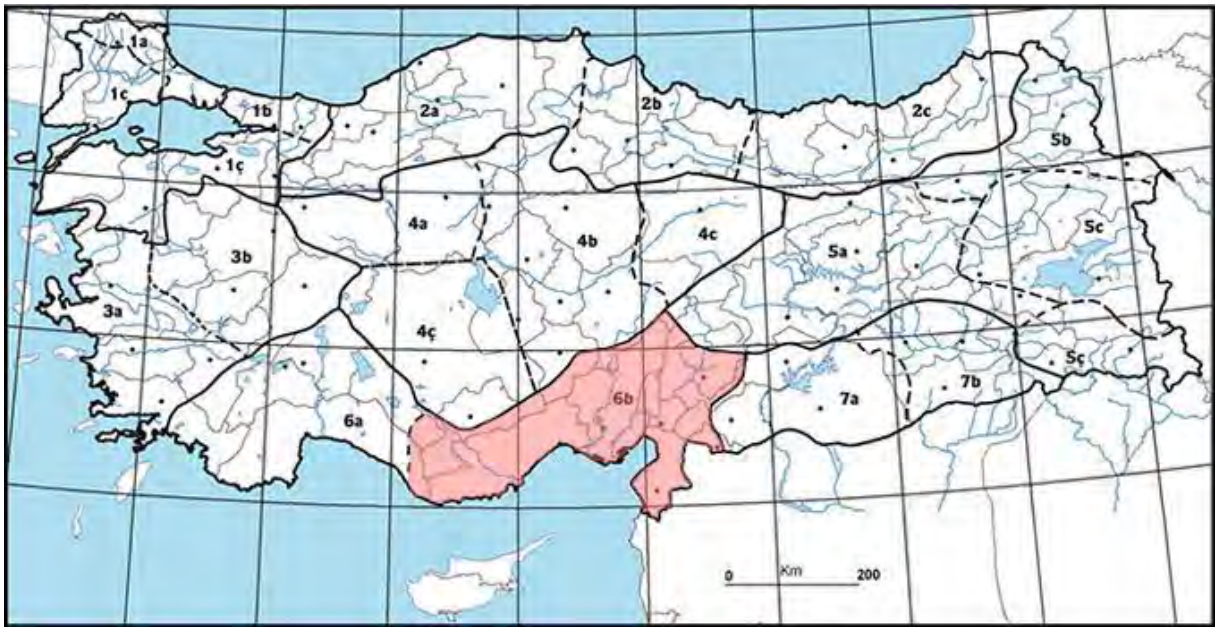

Figure 2-14. Distribution map of Bellevalia modesta species in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Bupleurum lophocarpum* (Boiss. & Balansa)

Bupleurum lophocarpum (Boiss. & Balansa) type is annual, herbaceous. Flowering period is between 6th and 7th months. As a habitat, it is found in pine forests, prairies and rocks up to 500-1,250 m. It spreads in Adana, Hatay, Mersin, Konya and Kahramanmaraş provinces in Turkey. Distribution map in Turkey is given in Figure 2-15 below. According to the Red Book of Turkish Plants, the danger category is NT.

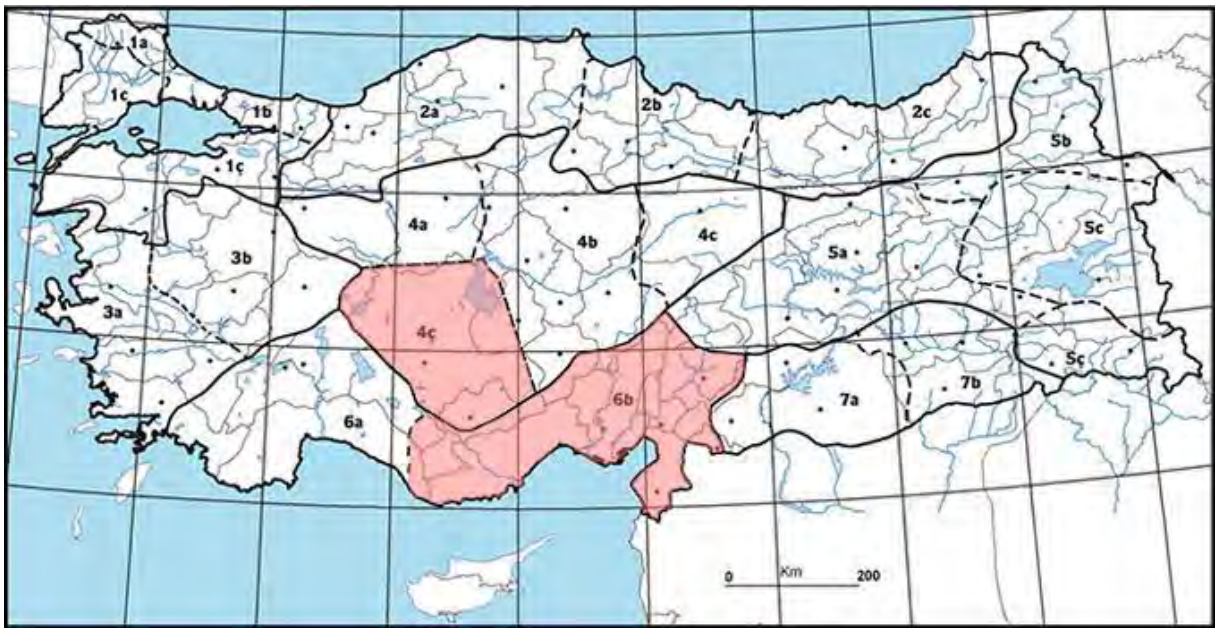

Figure 2-15. Bupleurum lophocarpum distribution map of type in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Centaurea calcitrapa* L. subsp. *cilicica* (Boiss. & Balansa) Wagenitz

Centaurea calcitrapa L. subsp. cilicica (Boiss. & Balansa) Wagenitz species is a single, biennial, perennial, herbaceous. It is found in fields, roadsides and empty areas at an altitude of 400 m as a habitat. It spreads in Adana, Osmaniye and Mersin in Turkey. Distribution map in Turkey is given in Figure 2-16 below. According to the Red Book of Turkish Plants, the danger category is NT.

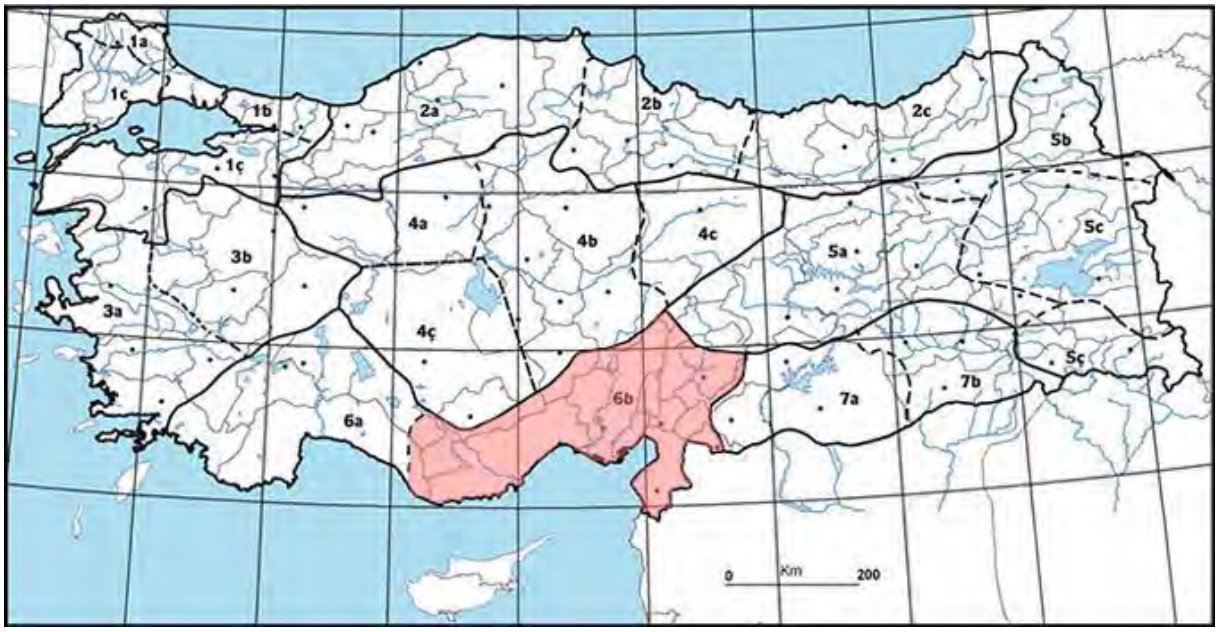

Figure 2-16. Centaurea calcitrapa L. subsp. Cilicica distribution map of Wagenitz species in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Centaurea lycopifolia* (Boiss. & Kotschy)

Centaurea lycopifolia (Boiss. & Kotschy) type is herbaceous perennial. Flowering period is between 5th and 7th months. As a habitat, the maquis, which is at an altitude of 50-1,800 m, is found in bushes and rocky areas. It spreads in Adana, Osmaniye, Gaziantep and Hatay in Turkey. Distribution map in Turkey is given in Figure 2-17 below. According to the Red Book of Turkish Plants, the danger category is NT.

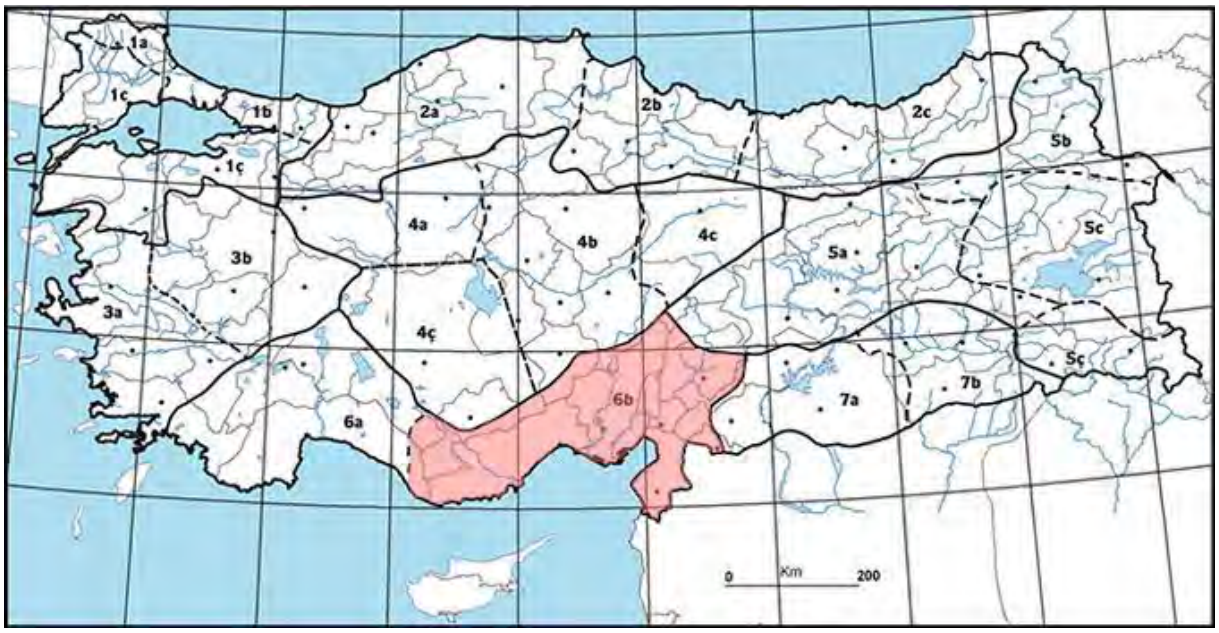

Figure 2-17. Centaurea lycopifolia distribution map of species in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Cytisus drepanolobus* (Boiss.)

Cytisus drepanolobus (Boiss.) type perennial, shrub. Flowering period is between 4th and 6th months. As a habitat, it is found on calcareous steep slopes and sparse woods in mountainous areas at altitudes up to 700-1,000 m. It spreads in Adana, Hatay and Mersin in Turkey. Distribution map in Turkey is given in Figure 2-18 below. According to the Red Book of Turkish Plants, the danger category is NT.

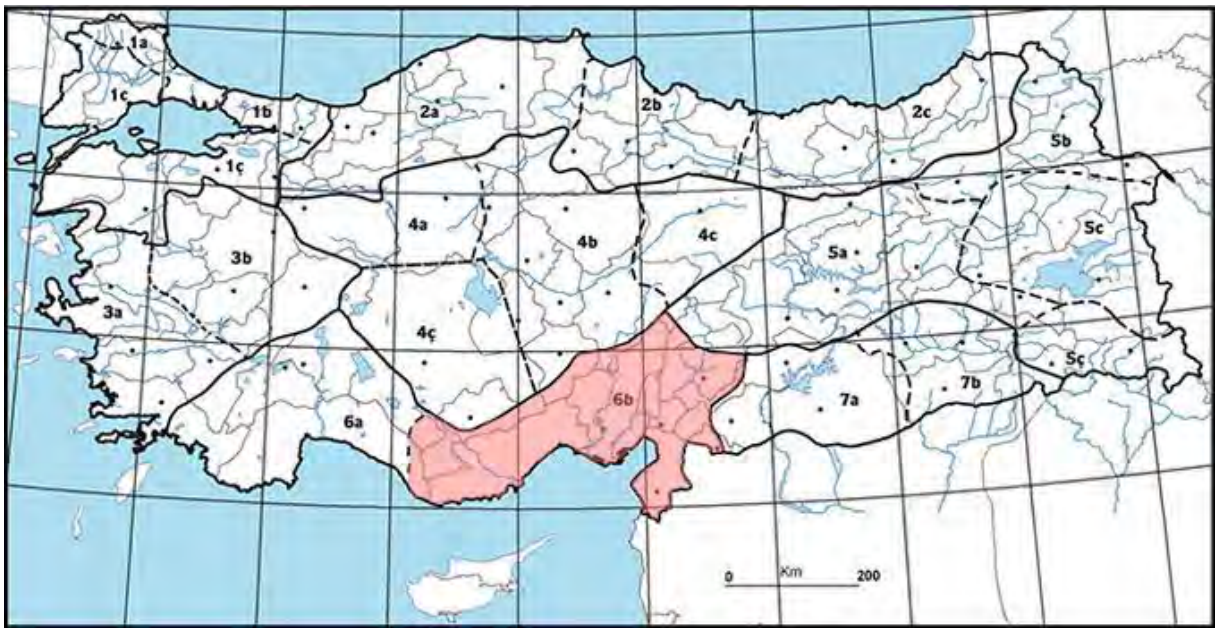

Figure 2-18. Cytisus drepanolobus distribution map of the species in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Glycyrrhiza flavescens* (Boiss.)

Glycyrrhiza flavescens (Boiss.), the species is perennial, herbaceous. The flowering period is the 4th month. As a habitat, it is found in grain fields, maquis and Arbutus-Styrax forests up to 0-500 m. It spreads in Adana, Osmaniye, Hatay and Mersin in Turkey. Distribution map in Turkey is given in Figure 2-19 below. According to the Red Book of Turkish Plants, the danger category is NT.

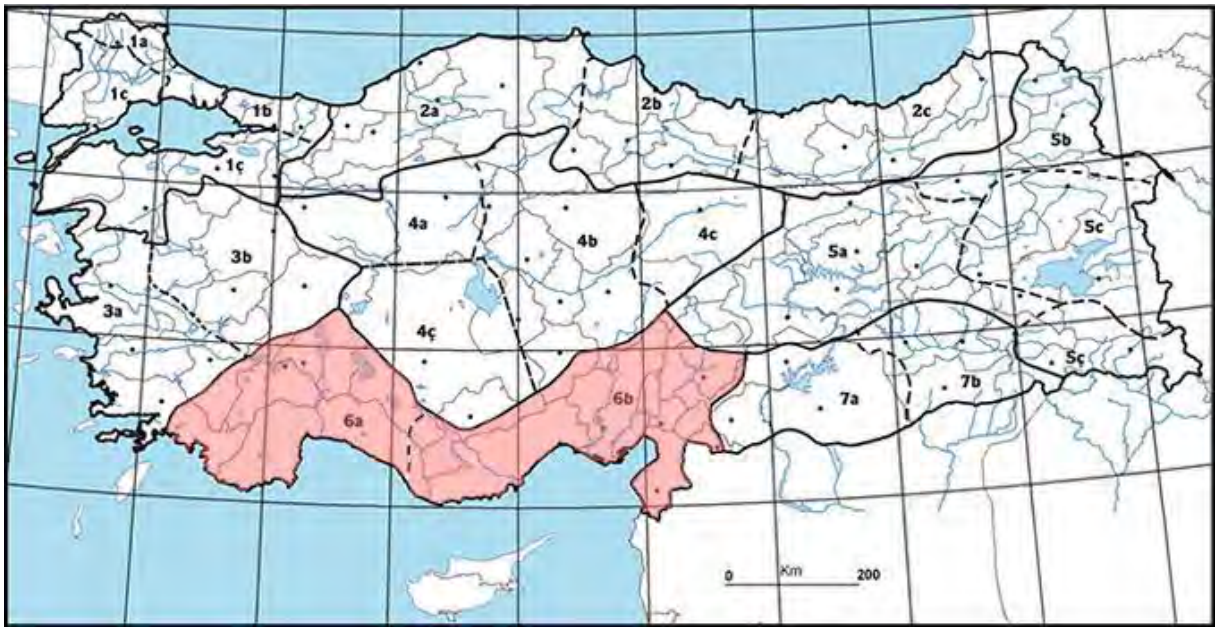

Figure 2-19. Glycyrrhiza flavescens distribution map of the species in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Helleborus vesicarius* (Aucher ex Boiss.)

Helleborus vesicarius (Aucher ex Boiss.), the species is perennial, herbaceous. Flowering period is between 3rd and 5th. between months. It is found in bushes and slopes up to 550-1,300 m as habitat. It spreads in Osmaniye, Gaziantep, Adıyaman, Hatay and Kahramanmaraş in Turkey. Distribution map in Turkey is given in Figure 2-20 below. According to the Turkish Plants Red Book, the danger category is NT.

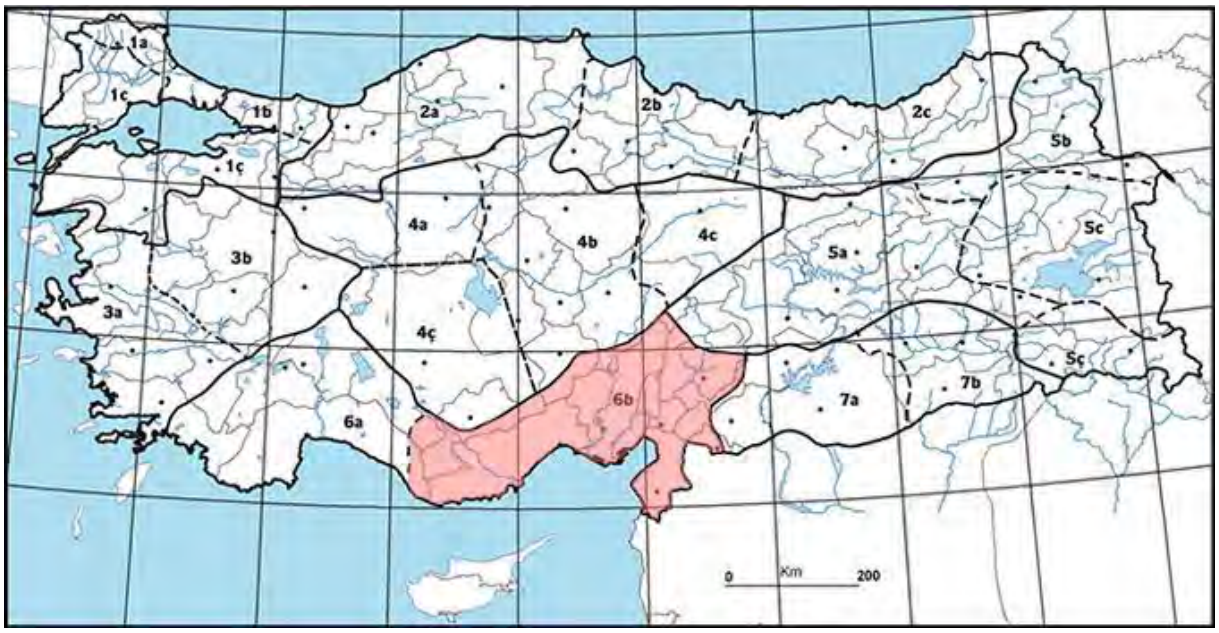

Figure 2-20. Helleborus vesicarius distribution map of the species in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Lactuca fenzlii* (N.Kilian & Greuter)

Lactuca fenzlii (N.Kilian & Greuter) is biennial or perennial, herbaceous. Flowering period is between 4th and 5th months. It is found in the forest openings of Pinus brutia up to 300-400 m in habitat. It spreads in Antalya and Mersin in Turkey. The distribution distribution map in Turkey is given in Figure 2-21 below. According to the Red Book of Turkish Plants, the danger category is NT.

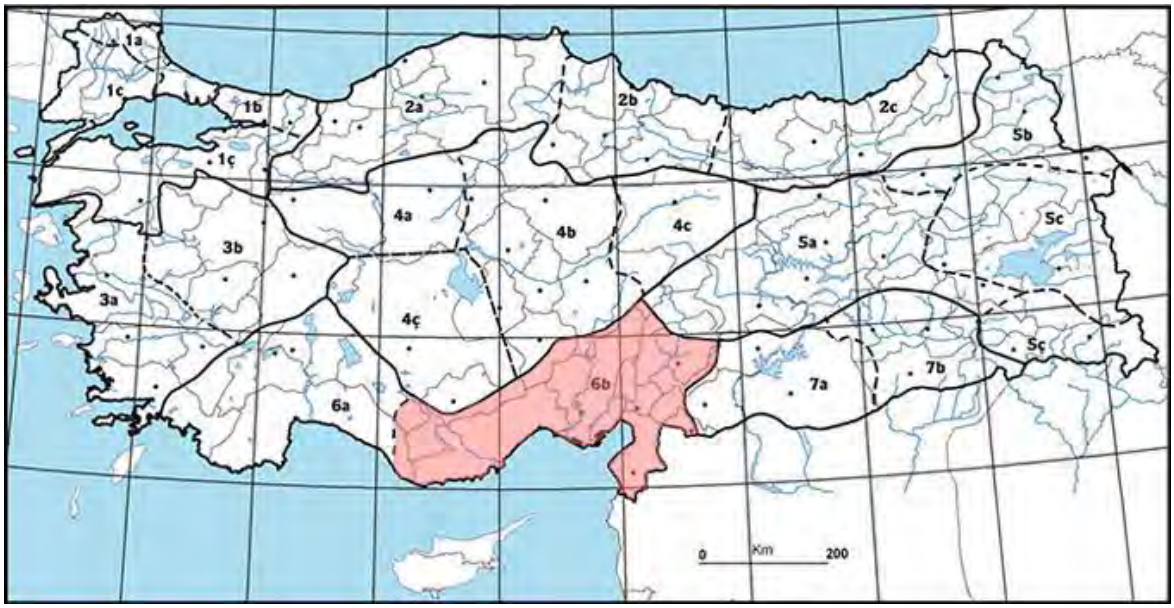

Figure 2-21. Distribution map of Lactuca fenzlii in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- ***Lathyrus spathulatus* Čelak. subsp. *elongatus* (Bornm.) Ponert**

Lathyrus spathulatus Čelak. subsp. elongatus (Bornm.) Ponert species is a perennial herbaceous. Flowering period is between 4th and 5th months. As a habitat, it is found in areas such as Pinus brutia forest, deciduous forests and Quercus coccifera scrub at an altitude of 400-1,520 m. It spreads in Osmaniye, Hatay, Kayseri and Kahramanmaraş in Turkey. Distribution map in Turkey is given in Figure 2-22 below. According to the Red Book of Turkish Plants, the danger category is NT.

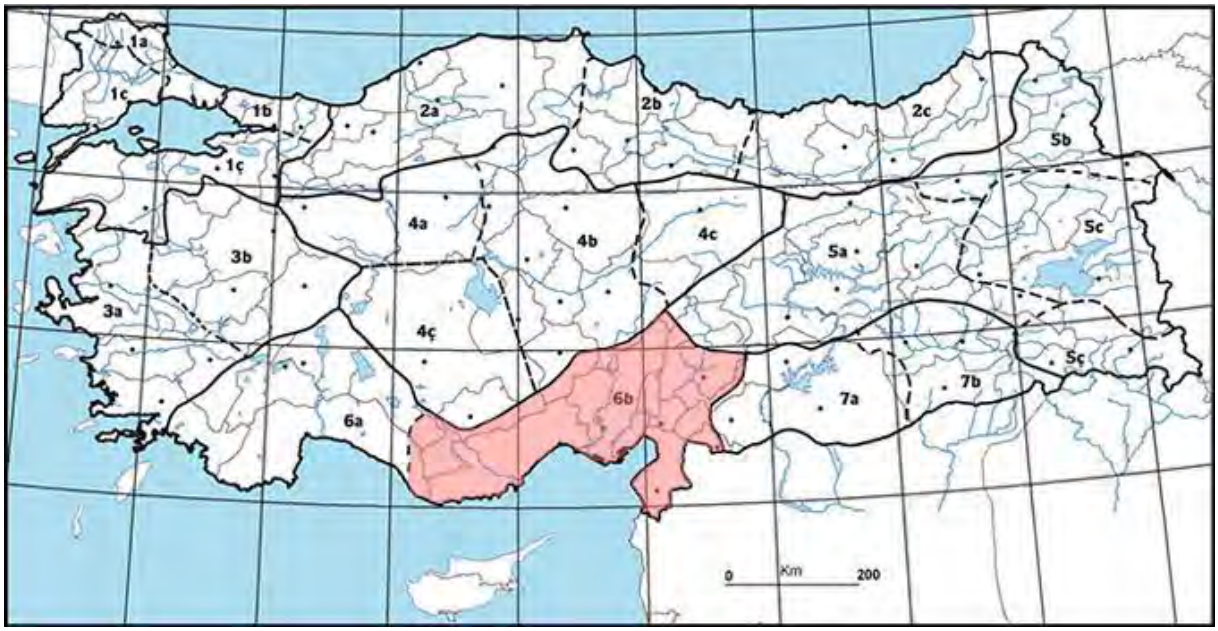

Figure 2-22. Lathyrus spathulatus subsp. elongatus distribution map of in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Ornithogalum alpigenum* (Stapf)

Ornithogalum alpigenum Stapf species is a perennial herbaceous. Flowering period is between 4th and 7th months. As a habitat, it is found in hills, steppes and forest areas up to 0-2,300 m. It spreads in Adana, Antalya, Denizli, Eskişehir, Mersin, Kahramanmaraş, Muğla and Sivas in Turkey. Distribution map in Turkey is given in Figure 2-23 below. According to the Red Book of Turkish Plants, the danger category is NT.

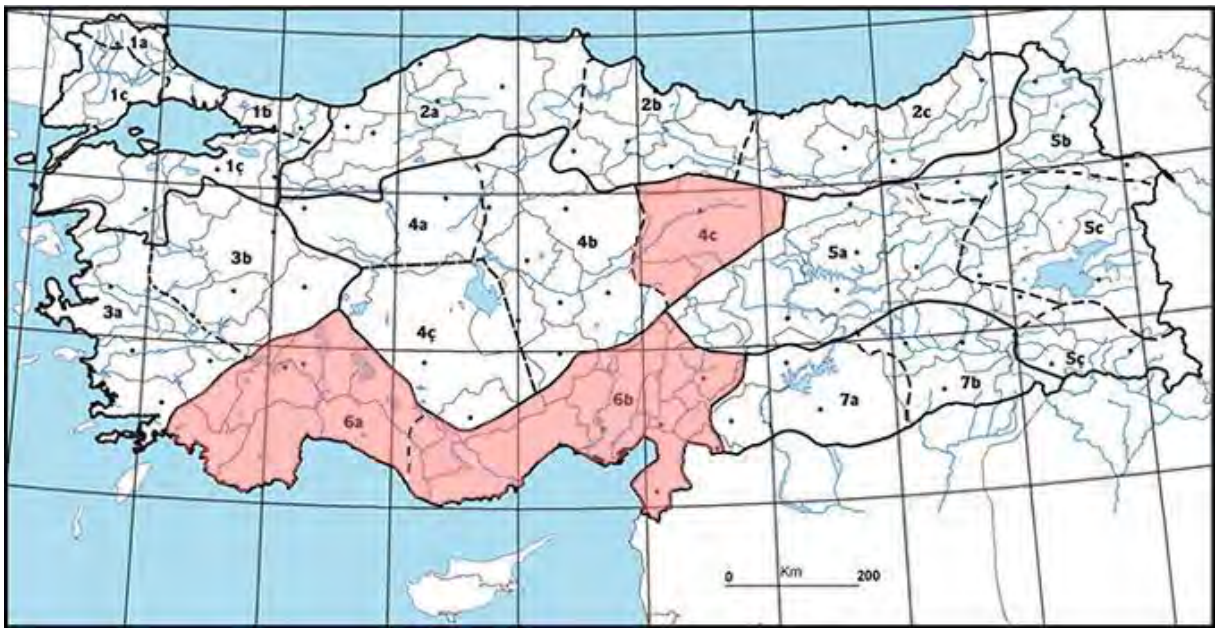

Figure 2-23. Distribution map of Ornithogalum alpigenum in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Kotschyella cilica* (Boiss.) Hayek

Kotschyella cilica (Boiss.) Hayek species is a perennial herbaceous. Flowering period between 4th and 5th months. As a habitat, it is found in mountain slopes and forest areas up to 600-2,130 m. It spreads in Mersin and Kahramanmaraş in Turkey. Distribution map in Turkey is given in Figure 2-24 below. According to the Red Book of Turkish Plants, the danger category is NT.

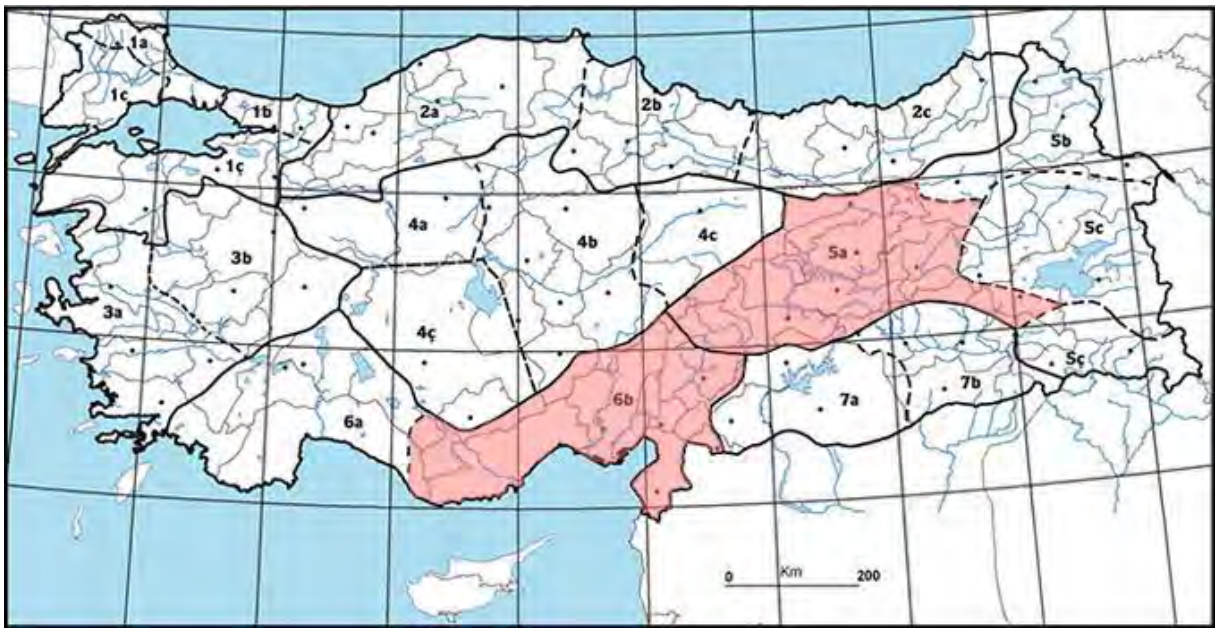

Figure 2-24. Distribution map of Thlaspi cilicium in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Trifolium aintabense* (Boiss. & Hausskn.)

Trifolium aintabense (Boiss. & Hausskn.) the species is annual, herbaceous. Flowering period is between 4th and 5th months. As a habitat, it is found among the bushes of 0-1,800 m, on the edge of the fields. It spreads in Adana, Gaziantep, Bingöl, Hatay and Mersin in Turkey. Distribution map in Turkey is given in Figure 2-25 below. According to the Red Book of Turkish Plants, the danger category is NT.

Figure 2-25. Trifolium aintabense distribution map of in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Alkanna aucheriana* (A.DC.)

Alkanna aucheriana (A.DC.), the species is perennial, herbaceous. Flowering period is between 3rd and 6th months. As habitat, it is found in the crevices of limestone cliffs, Quercus and Pinus forest, gariks up to 280-1,300 m. It spreads in Adana, Antalya, Mersin and Karaman in Turkey. Distribution map in Turkey is given in Figure 2-26 below. According to the Turkish Plants Red Book, the danger category is LC.

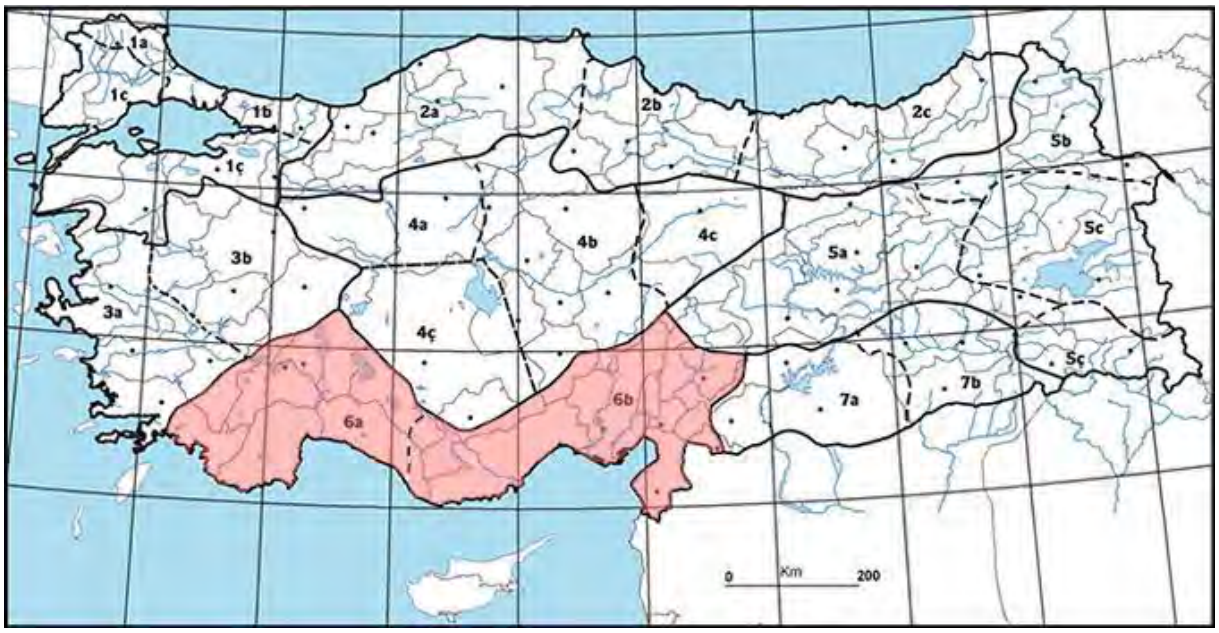

Figure 2-26. Alkanna aucheriana distribution map of in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Alkanna kotschyana* (A.DC.)

Alkanna kotschyana (A.DC.), the species is perennial, herbaceous. The flowering period is between the 4th and 7th months. It is found in the rocky limestone slopes of 0-1,450 m, Pinus forest, Quercus thicket as habitat. It spreads in Osmaniye, Siirt, Antalya and Mersin in Turkey. Distribution map in Turkey is given in Figure 2-27 below. According to the Turkish Plants Red Book, the danger category is LC.

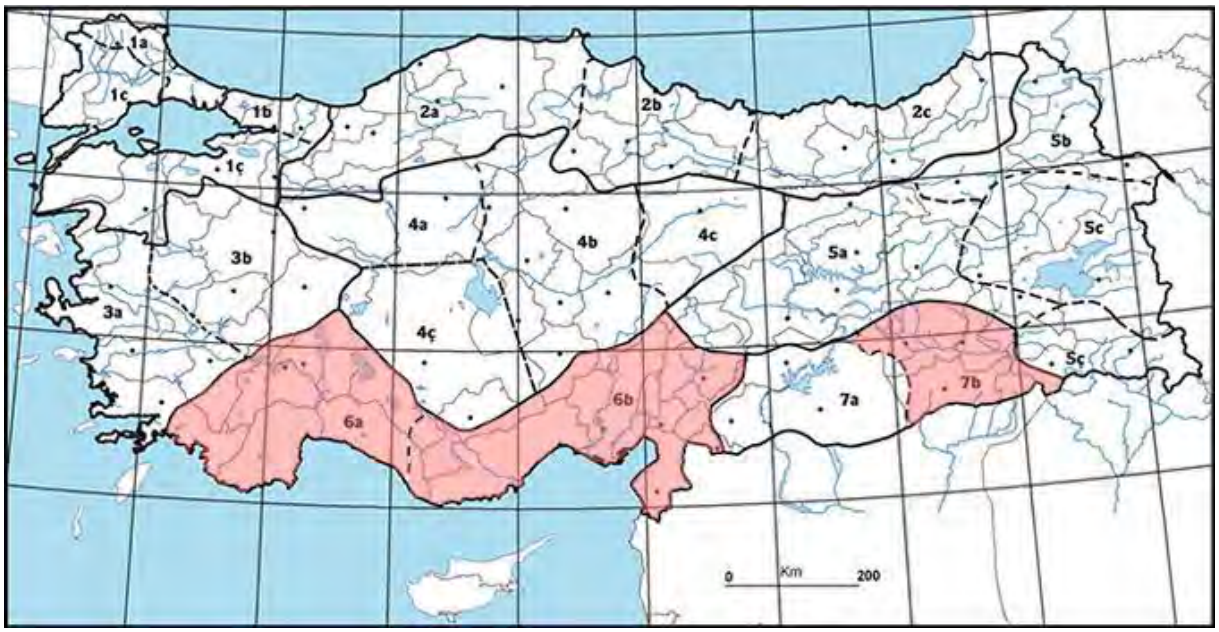

Figure 2-27. Alkanna kotschyana distribution map of in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Anthemis arenicola* Boiss. var. *arenicola*

Anthemis arenicola Boiss. var. *arenicola* species is annual, herbaceous. Flowering period is between the 4th and 7th months. As a habitat, it is found in fields, sandy beaches, basalt rock crevices up to 100-1,200 m. It spreads in Adana, Osmaniye and Mersin in Turkey. Distribution map in Turkey is given in Figure 2-28 below. According to the Turkish Plants Red Book, the danger category is LC.

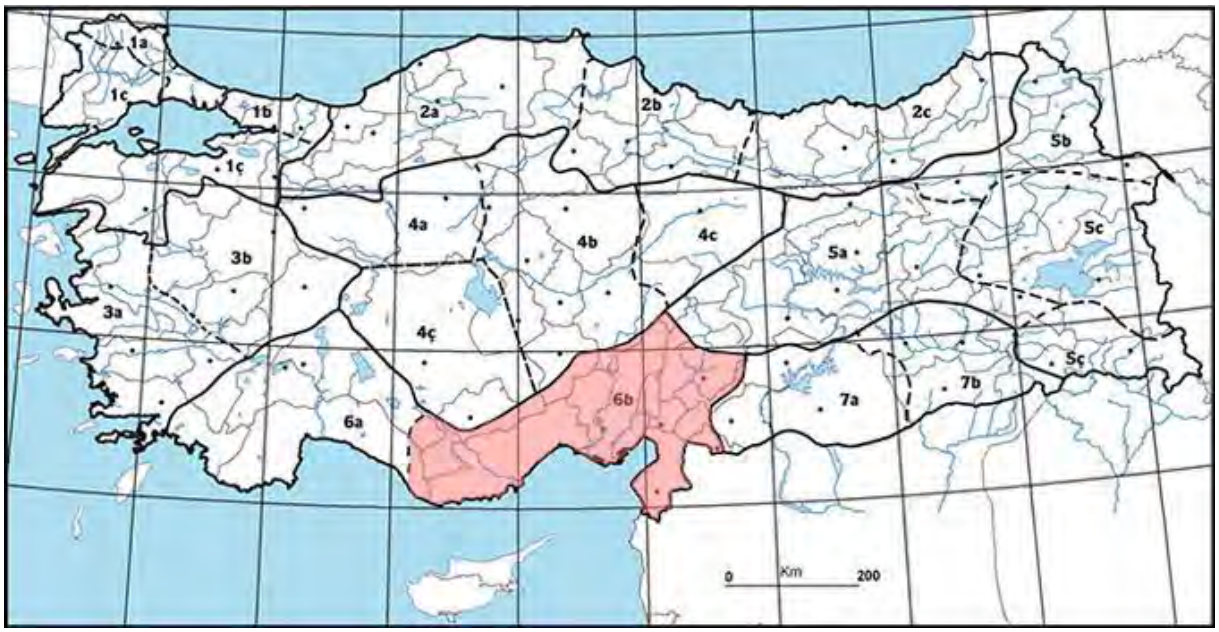

Figure 2-28. Anthemis arenicola distribution map of in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Arabis aubrietioides* (Boiss.)

Arabis aubrietioides (Boiss.), the species is perennial, herbaceous. Flowering period is between the 4th and 6th months. As habitat, it is found on rock edges up to 900-2,400 m. It spreads in Adana, Mersin, Kahramanmaraş, Niğde and Karaman in Turkey. Distribution map in Turkey is given in Figure 2-29 below. According to the Turkish Plants Red Book, the danger category is LC.

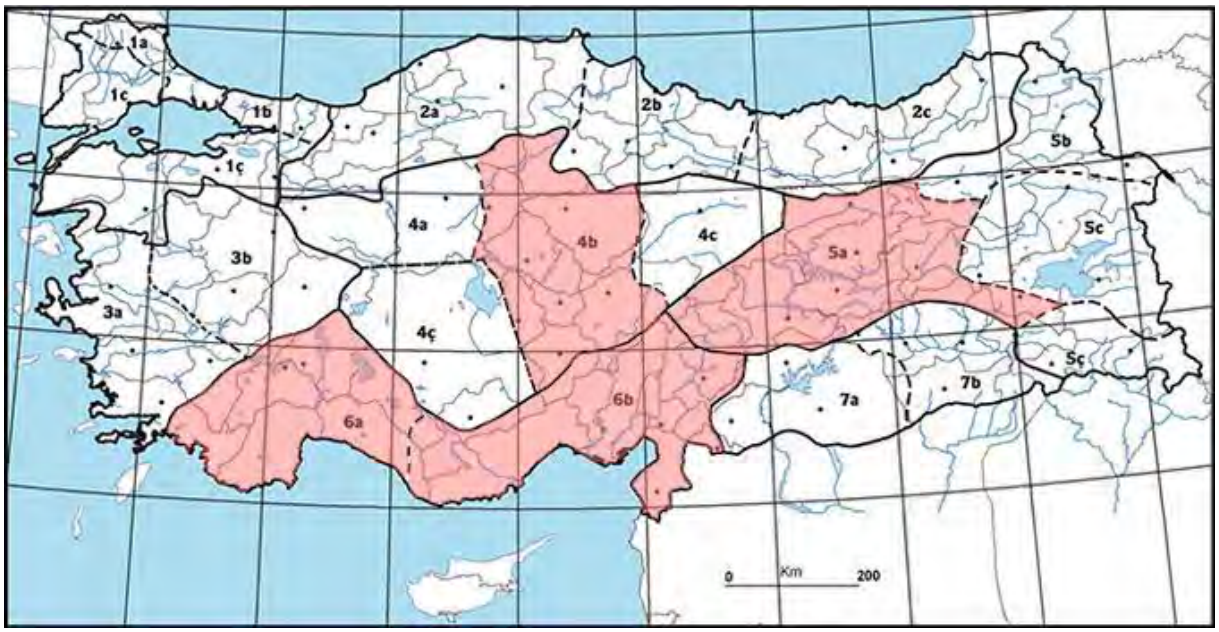

Figure 2-29. Distribution map of the species Arabis aubrietioides in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Beta vulgaris* L. subsp. *adanensis* (Pamukçu.) Ford-Lloyd & J.T. Williams

Beta vulgaris L. subsp. adanensis (Cotton.) (Ford-Lloyd & J.T. Williams) species is annual or biennial, herbaceous. Flowering period is between the 6th and 7th months. It is found in steppe areas as habitat. It spreads in Adana in Turkey. Distribution map in Turkey is given in Figure 2-30 below. According to the Turkish Plants Red Book, the hazard category is LC. This species is *not* endemic.

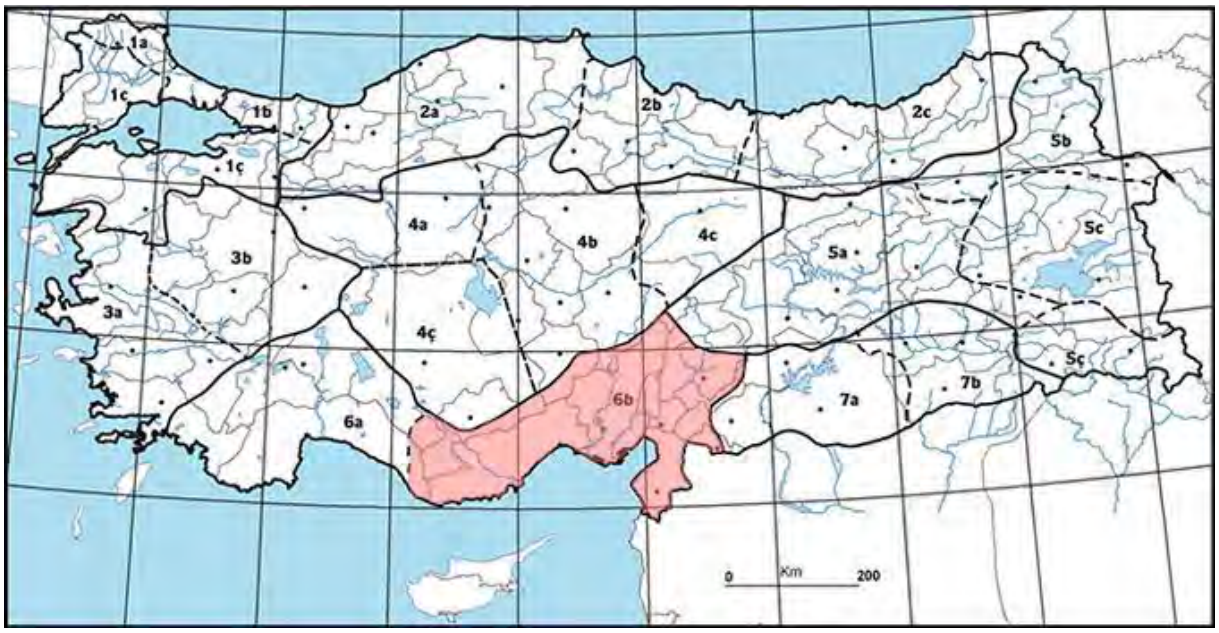

Figure 2-30. Beta vulgaris L. subsp. adanensis distribution map of in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Bupleurum zoharii* (Snogerup)

The species *Bupleurum zoharii* (Snogerup) is an annual herbaceous. Flowering period is between the 6th and 8th months. As a habitat, maquis up to 0-1,200 m are found in fields and roadsides. It spreads in Adana, Hatay and Mersin in Turkey. Distribution map in Turkey is given in Figure 2-31 below. According to the Turkish Plants Red Book, the danger category is LC.

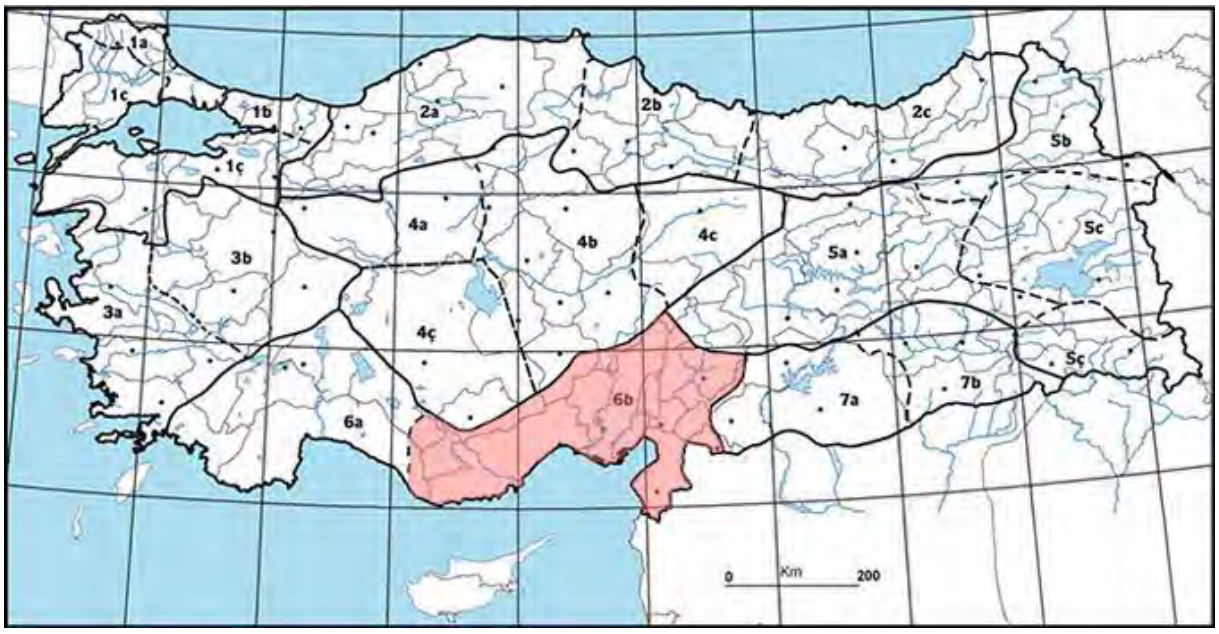

Figure 2-31. Distribution map of Bupleurum zoharii species in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Crocus cancellatus* Herb. subsp. *cancellatus*

Crocus cancellatus Herb. subsp. *cancellatus* species is a perennial herbaceous. Flowering period is between the 9th and 12th months. It is found in rocky slopes, scattered groves and scrub areas up to 50-2,400 m in habitat. It spreads in Adana, Hatay, Mersin and Konya in Turkey. Distribution map in Turkey is given in Figure 2-32 below. According to the Turkish Plants Red Book, the danger category is LC.

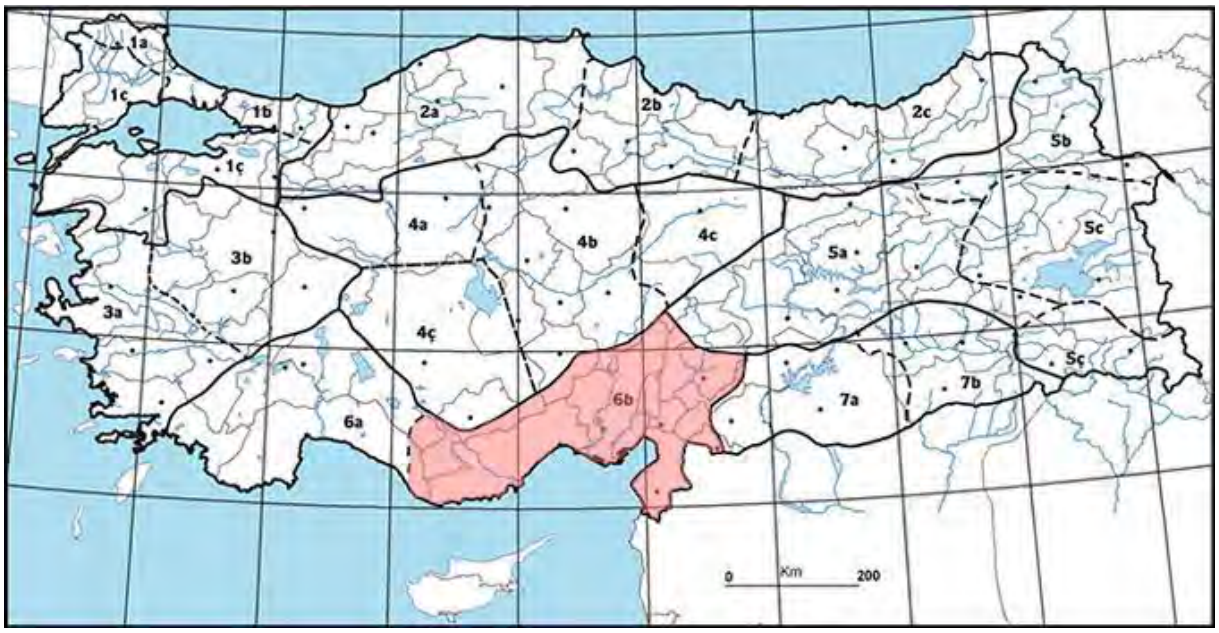

Figure 2-32. Crocus cancellatus subsp. cancellatus distribution map of the species in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Dorycnium pentaphyllum* Scop. subsp. *haussknechtii* (Boiss.) Gams

Dorycnium pentaphyllum Scop. subsp. haussknechtii (Boiss.) Gams type perennial, herb or radius. Flowering period is between the 5th and 8th months. It is found as habitat in limestone slopes up to 200-1,650 m, Quercus coccifera scrub, coniferous forests and Pinus brutia forests. It spreads in Osmaniye, Kilis, Siirt, Afyonkarahisar, Antalya, Hatay, Mersin, Kahramanmaraş and Muş in Turkey. Distribution map in Turkey is given in Figure 2-33 below. According to the Turkish Plants Red Book, the danger category is LC.

Figure 2-33. Dorycnium pentaphyllum subsp. Distribution map of haussknechtii species in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Galium adhaerens* Boiss. & Balansa

Galium adhaerens (Boiss. & Balansa) type is annual, herbaceous. Flowering period is between the 4th and 6th months. As habitat, margins of 300-1,300 m, bush clearings and shady meadows are also found. It spreads in Adana, Antalya and Mersin in Turkey. Distribution map in Turkey is given in Figure 2-34 below. According to the Turkish Plants Red Book, the danger category is LC.

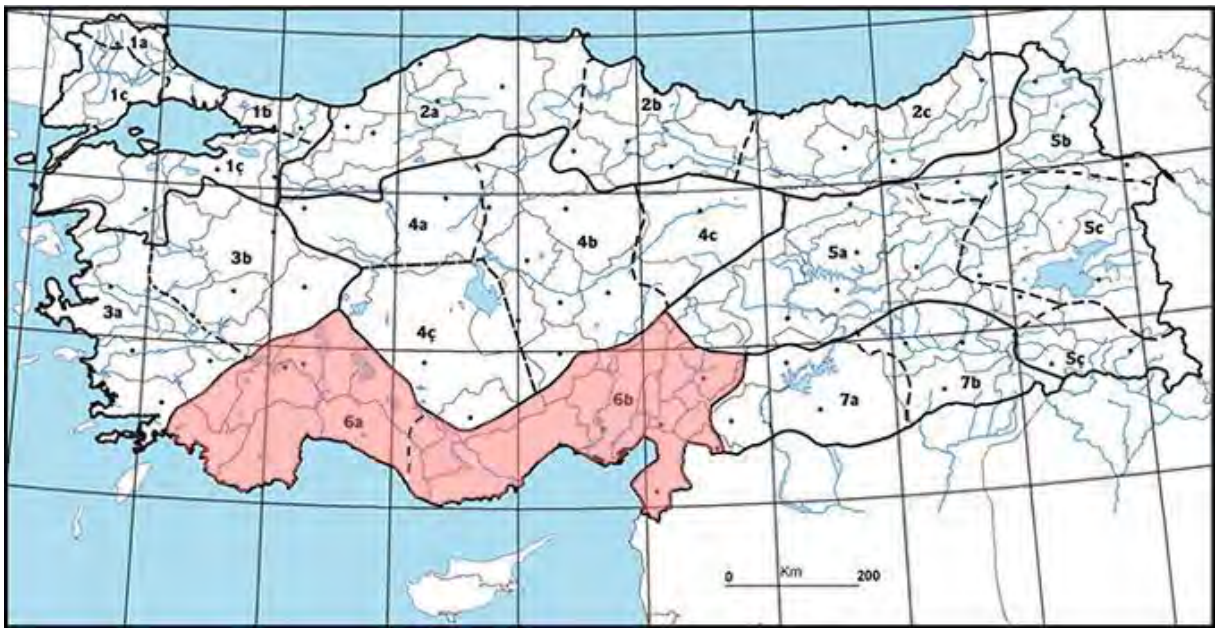

Figure 2-34. Galium adhaerens Distribution map of type in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Galium scabrifolium* (Boiss.) Hausskn.

Galium scabrifolium (Boiss.) Hausskn., the species is perennial, semi-shrub. Flowering period is between the 6th and 7th months. It is found in mountain steppe and rocky areas up to 400-2,600 m as habitat. It spreads in Osmaniye, Gaziantep and Mersin in Turkey. Distribution map in Turkey is given in Figure 2-35 below. According to the Turkish Plants Red Book, the danger category is LC.

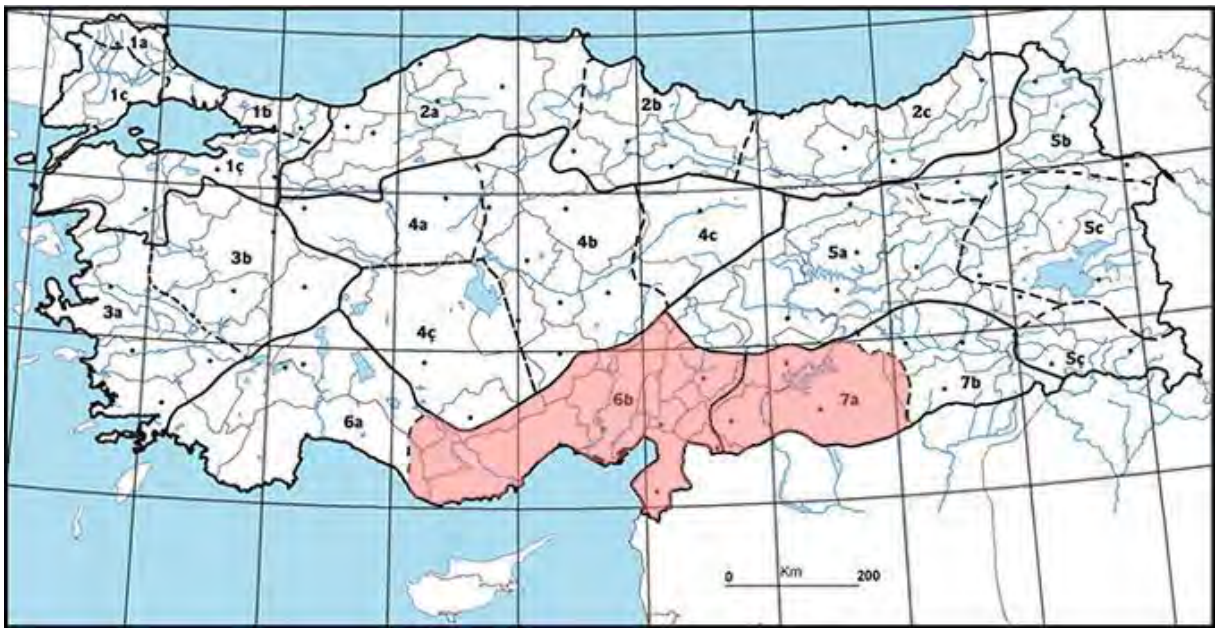

Figure 2-35. Galium scabrifolium distribution map of the species in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Hedysarum pogonocarpum* (Boiss.)

Hedysarum pogonocarpum (Boiss.), the species is perennial, herbaceous. Flowering period is between the 4th 6th months. As habitat, it is found on rocky limestone and volcanic slopes up to 750-1,700 m. It spreads in Gaziantep, Amasya, Elazig, Hatay, Malatya, Kahramanmaraş and Sivas in Turkey. Distribution map in Turkey is given in Figure 2-36 below. According to the Turkish Plants Red Book, the danger category is LC.

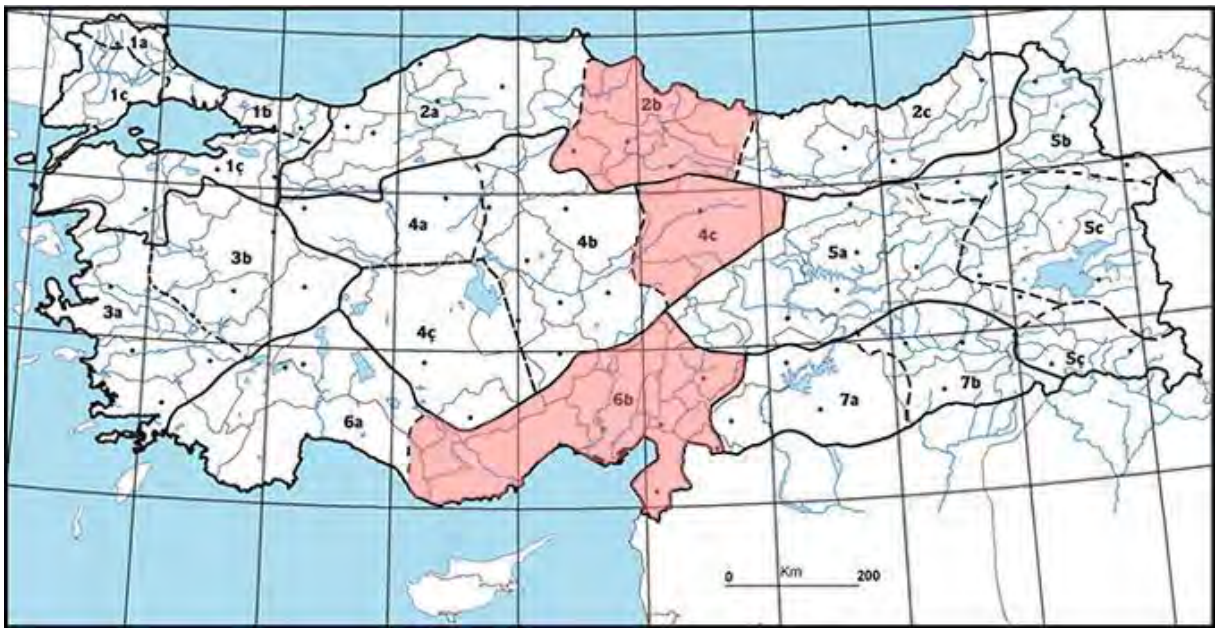

Figure 2-36. Hedysarum pogonocarpum distribution map of the species in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Iris sari* (Schott ex Baker)

Iris sari (Schott ex Baker) is a perennial herbaceous. Flowering period is between the 4th and 6th months. As a habitat, it is found on dry stony or sandy hills and rocky mountain slopes up to 900-2,700 m. It is distributed in Gaziantep, Çankırı, Amasya, Elazığ, Erzurum, Kayseri, Niğde and Bayburt in Turkey. Distribution map in Turkey is given in Figure 2-37 below. According to the Turkish Plants Red Book, the danger category is LC.

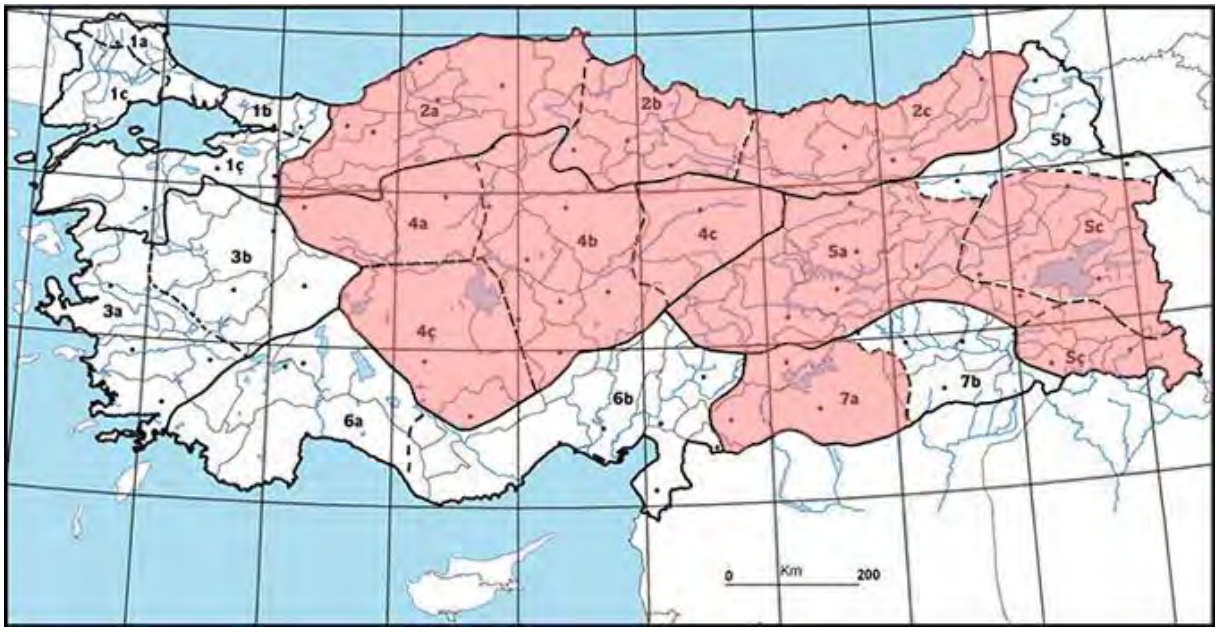

Figure 2-37. *Distribution map of Iris sari species in Turkey* (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Ophrys cilicica* (Schltr.)

Ophrys cilicica (Schltr.), the species is perennial, herbaceous. Flowering period between the 4th and 5th months. As a habitat, it is found in wet meadows, prairies, Quercus coccifera scrubs, grassy and calcareous places up to 500-1,250 m. It spreads in Adana, Siirt, Antalya, Diyarbakir, Hatay and Mersin in Turkey. Distribution map in Turkey is given in Figure 2-38 below. According to the Turkish Plants Red Book, the danger category is LC.

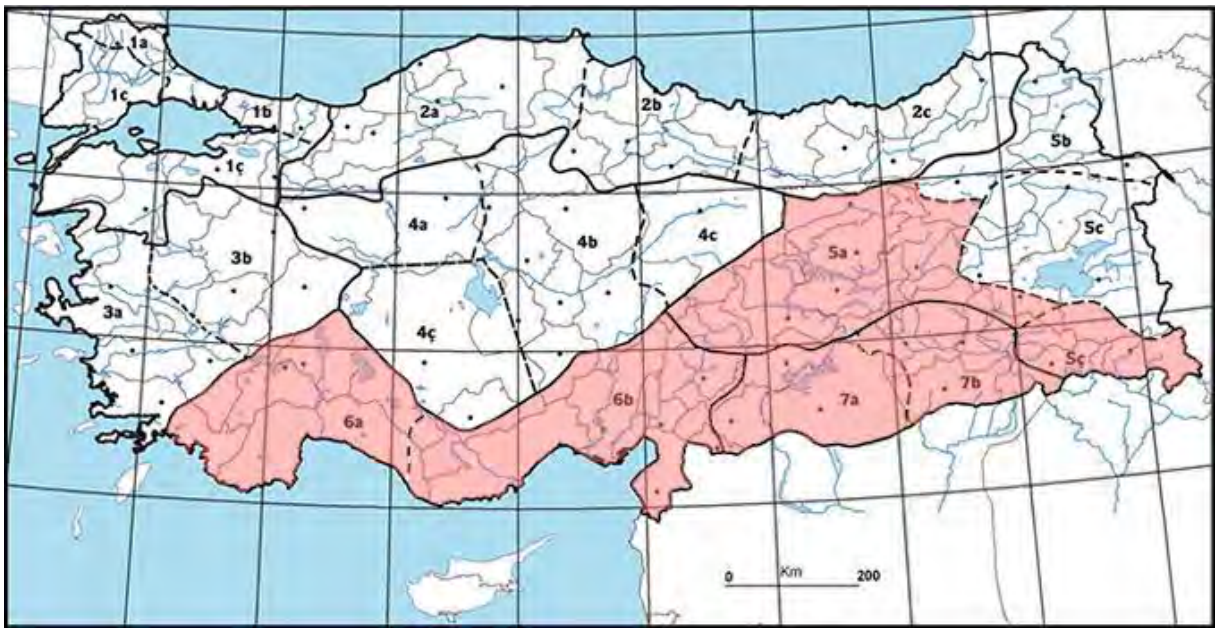

Figure 2-38. *Ophrys cilicica* distribution map of the species in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Ranunculus reuterianus* (Boiss.)

Ranunculus reuterianus (Boiss.), the species is perennial, herbaceous. Flowering period is between the 5th and 6th months. It is found in stony slopes and Pinus nigra forests up to 880-2,000 m as habitat. It spreads in Çankırı, Ankara, Antalya, Aydın, Çanakkale, İzmir, Kütahya, Kahramanmaraş, Muğla and Niğde in Turkey. Distribution map in Turkey is given in Figure 2-39 below. According to the Turkish Plants Red Book, the danger category is LC.

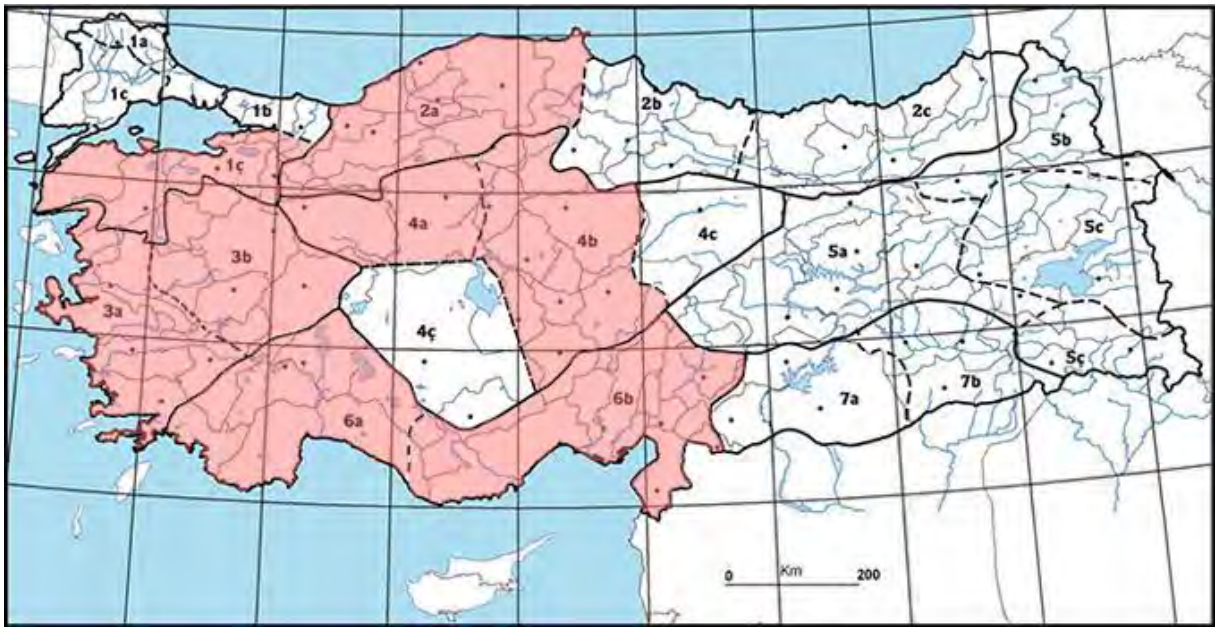

Figure 2-39. Ranunculus reuterianus distribution map of the species in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Scrophularia cryptophila* (Boiss. & Heldr.)

Scrophularia cryptophila (Boiss. & Held.), the species is perennial, herbaceous. Flowering period is between the 6th and 8th months. As habitat, it is found in shady rocky terraces and limestone cliffs, barren places and ruins up to 600-2,050 m. In Turkey, it spreads in Istanbul, Ankara, Antalya, Eskişehir, Isparta, Mersin, İzmir, Konya and Muğla. Distribution map in Turkey is given in Figure 2-40 below. According to the Turkish Plants Red Book, the danger category is LC.

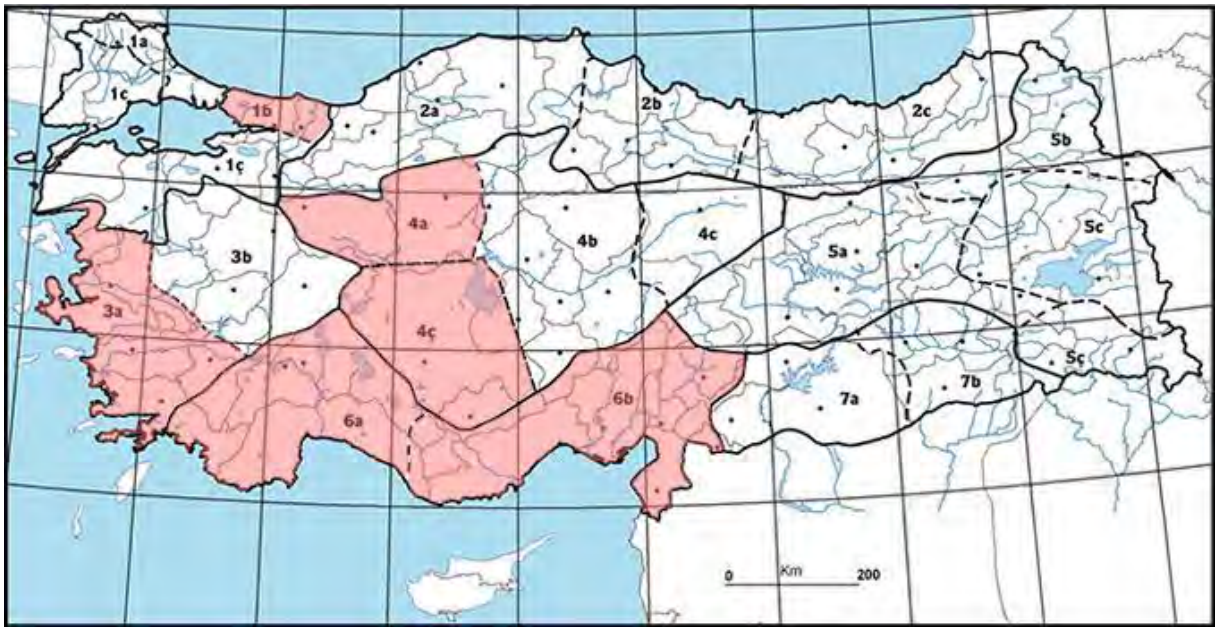

Figure 2-40. Scrophularia cryptophila distribution map of the species in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Stachys sparsipilosa* (R.Bhattacharjee & Hub.-Mor.)

Stachys sparsipilosa (R.Bhattacharjee & Hub.-Pur.), the species is a perennial, woody grass. Flowering period is between the 5th and 7th months. As a habitat, steep, calcareous slopes up to 400-1,300 m are found under Pinus brutia forests. It spreads in Adana, Osmaniye, Mersin and Kayseri in Turkey. Distribution map in Turkey is given in Figure 2-41 below. According to the Turkish Plants Red Book, the danger category is LC.

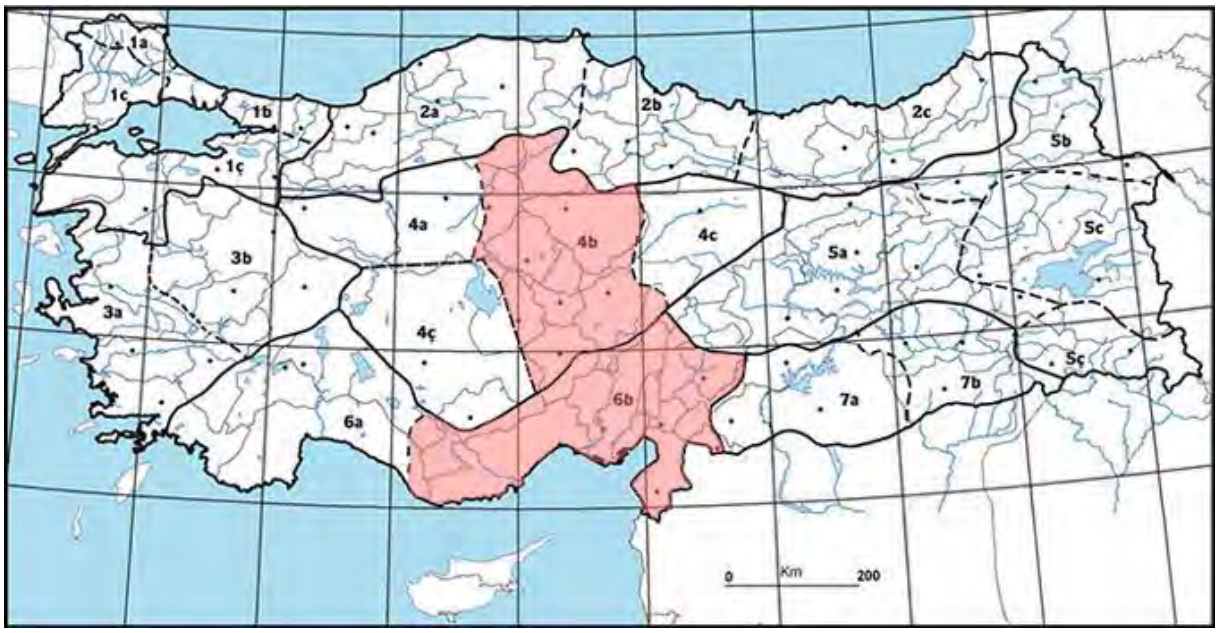

Figure 2-41. Distribution map of Stachys sparsipilosa in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Tanacetum argenteum* (Lam.) Willd. subsp. *argenteum*

Tanacetum argenteum (Lam.) Willd. subsp. *argenteum* species is perennial, herbaceous. Flowering period is between the 6th and 8th months. It is found as habitat in limestone cliff cavities and shady rock cavities up to 1,220-2,100 m. It spreads in Mersin, Konya and Karaman in Turkey. Distribution map in Turkey is given in Figure 2-42 below. According to the Turkish Plants Red Book, the danger category is LC.

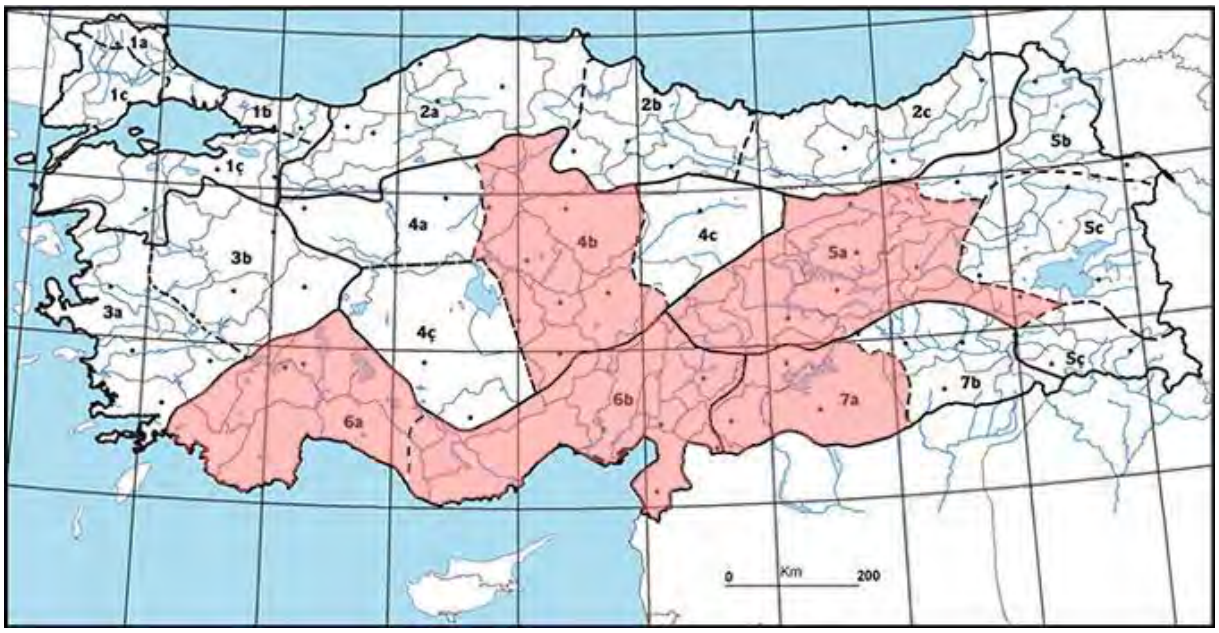

Figure 2-42. Tanacetum argenteum subsp. argenteum distribution map of species in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Trigonella kotschyi* Fenzl

Trigonella kotschyi Fenzl species is an annual herbaceous. Flowering period is between the 4the and 6th months. Habitatally, it is found in rocky limestone slopes, fallow fields and oak bushes up to 0-2,000 m. It spreads in Adana, Osmaniye, Elazig, Hatay, Mersin, Malatya, Kahramanmaraş and Niğde in Turkey. Distribution map in Turkey is given in Figure 2-43 below. According to the Turkish Plants Red Book, the danger category is LC.

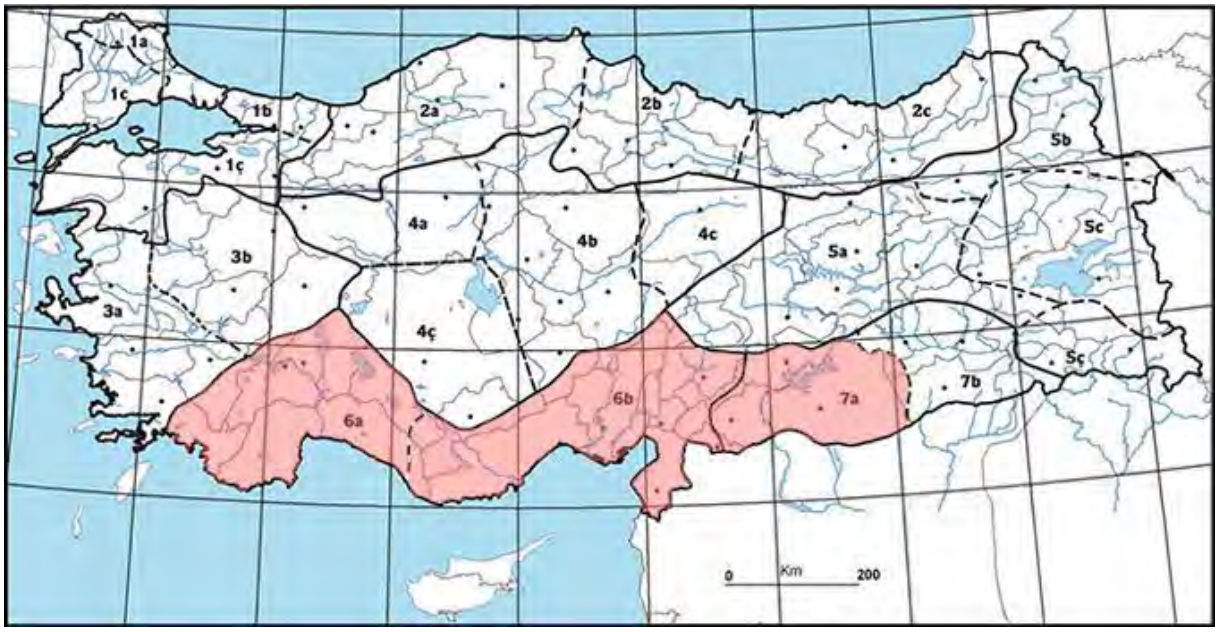

Figure 2-43. Distribution map of Trigonella kotschyi species in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

- *Onosma mutabilis* (Boiss. & Hausskn.)

Onosma mutabilis (Boiss. & Hausskn.), the species is perennial, herbaceous. Flowering period is between the 5th and 8th months. As a habitat, it is found in moving rocks, limestone cliffs, eroded schist edges and steppes up to 1,000-2,740 m. It spreads in Adana, Bolu, Mardin, Karabük, Kastamonu, Adıyaman, Kahramanmaraş, Ordu and Van in Turkey. Distribution map in Turkey is given in Figure 2-44 below. According to the Turkish Plants Red Book, the danger category is LC.

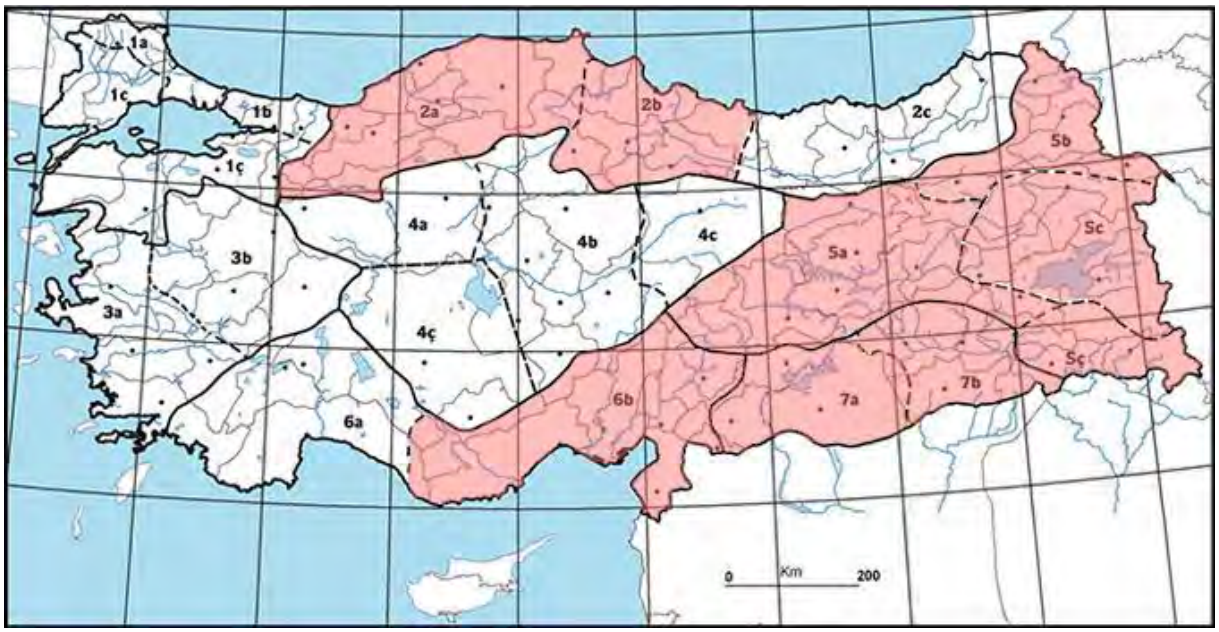

Figure 2-44. Onosma mutabilis. distribution map of the species in Turkey (https://bizimbitkiler.org.tr/yeni/demos/technical/)

2.4. Critical Habitat Assessment

Muscari babachii (Eker & Koyuncu), *Astragalus aintabicus* (Boiss.), *Centaurea huassknechtii* (Boiss.), *Heptaptera cilicica* (Boiss. & Balansa) Tutin and *Sideritis cilicica* (Boiss.) and the areas where the balance taxa are found are candidate for "Critical Habitat". However, since the coordinates of these species were not provided in the ESIA Report, it was not possible to draw the boundaries of the area to be defined as critical habitat. Furthermore, these species locations must be visited in during vegetation season, i.e., Spring 2022, in order to exactly locate the boundaries of their spread. Nevertheless, estimated critical habitat boundaries were drawn by considering only the habitat preferences of these species. During the supplementary field surveys done in between October 14 and 18, 2021, the coordinates of the Sideritis cilicica (Boiss.) & Balansa taxon could be determined. In the determined coordinates, the borders of the critical habitat can be re-evaluated with the proposed studies to be carried out between April and June in the vegetation period of 2022 as mentioned above. The coordinates and widths deemed appropriate as critical habitats in the addiitonal field studies carried out on in October 2021 are given in Table 2-2 below.

Table 2-2. Areas Candidate for Critical Habitats in the Supplementary Field Studies.

Station Number	Coordinate		Altitude (m)	Width/Definition of Field
	X	y		
8 (Taş Ocağı)	662188	4092776	246	3000 m^2
15 (Bozdoğan-B) Quarry	764433	4090017	88	The entire area planned as a Quarry
21 (T2 Tunnel exit)	265506	4116956	220	500 m wide 3 km long area from the right and left of the tunnel
23 (Nurdağı Tunnel exit)	296649	4116169	505	Rocky habitats in the upper part of the tunnel
27 (Km 116+200 Tunnel exit	337872	4119870	950	The parts of the maquis area around the tunnel within the impact area
28 (Route-7)	342100	411666	978	The maquis areas within the 500 m zone along the route
29 (Km 120+300)	339170	411777	980	The maquis areas within the 500 m zone along the route

The proposed locations for critical habitat are further evaluated together with other possible critical habitat candidates in line with the criteria, provided in IFC PS6, within the Critical Habitat Assessment Report which was prepared in the scope of the SLIP studies.

2.5. Invasive Species

In the existing ESIA Report for the MAG Project, an assessment could not be made on invasive species because a floristic list was not provided. However, the invasive species observed in the supplementary ecological field study conducted in between October 14 and 18, 2021 and the precautions to be taken are given in Table 2-3.

Table 2-3. Project area Invasive Species

Survey Station Name	Invasive Species	Coordinate		Suggested Precautions
		x	y	
Route-1	*Ailanthus altissima*	659630	4082065	The current population on the route should be cleared
Route -3		669103	4089121	
T4 tunnel exit		272396	4120454	
Route -2	*Eucalyptus camaldulensis*	665273	4085541	The current population on the route should be cleared
Route -3		669103	4089121	
Route -4		680281	4092978	
Airport connection line junction point		684897	4089382	
Concrete Plant	*Acacia cyanophylla*	665455	4085227	The current population on the route should be cleared

2.6. Findings and Assessments

Supplementary ecological survey team covered the following locations during their field visits:

- Observation Locales along the Route,
- Main quarries (numbered from 1 to 5 in the text) defined as major sources for infrastructure material supply and alternative quarries (included in this report without any numbering), concrete batching plants, tunnels under construction or nearly completed, and
- Dump sites.

A total of 31 survey stations was visited in the scope of this supplementary terrestrial ecology survey. Flora expert has presented his findings in the following sub-sections of the report whereas fauna expert has provided his findingd in the very same survey stations in the appendix of the Report.

Dump Site

The area planned to be used as a dump site area had been used as a quarry in previous years (see Figure 2-45 and Figure 2-46). This area has lost its natural structure and the plant species identified from this area are cosmopolitan species.

Figure 2-45. Dump site

Figure 2-46. Dump site

Table 2-4. Dump site Floristic Species

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
1	Dump site	632122	4074494	198	*Pinus brutia*	–	–	J6.6
					Inula viscosa	–	–	
					Amaranthus albus	–	–	
					Rumex tuberosus	–	–	
					Verbascum sinuatum	–	–	
					Conyza bonariensis	–	–	
					Centaurea calcitrapa subsp. *calcitrapa*	–	–	
					Ficus carica	–	–	
					Nerium oleander	–	–	
					Daucus carota	–	–	
					Chrysopogon gryllus	–	–	
					Nepeta italica	–	–	
					Datura stramonium	–	–	
					Ptilostemon chamaepeuce	–	–	
					Miromeria myrtifolia	–	–	
					Galium cassium	–	–	
					Alyssum strigosum subsp. *strigosum*	–	–	
					Chrozophora tinctoria	–	–	
					Michauxia campanuloides	–	–	

Limestone Quarry-2

The quarry, which is planned to be used for supply of limestone, is in operation. In the impact area of the quarry, maquis vegetation is dominant (see Figure 2-47 and Figure 2-48). The plant species identified in this area are given in

Table 2-5 below.

Figure 2-47. Limestone Quarry

Figure 2-48. Limestone Quarry

Figure 2-49. *Colchicum balansae* Planch.

Table 2-5. Limestone Quarry-2 Floristic Species

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
2	**Limestone Quarry-2**	643731	4086901	222	*Pinus brutia*	_	_	J6.6, F5.2
					Inula viscosa	_	_	
					Phillyrea latifolia	_	_	
					Cercis siliquastrum	–	–	
					Calicotome villosa	–	–	
					Chrysopogon gryllus	–	–	
					Phleum subulatum subsp. *subulatum*	–	–	
					Heliotropium europaeum	–	–	
					Xanthium strumarium	–	–	
					Picnomon acarna	–	–	
					Conyza canadensis	–	–	
					Phragmites australis	–	–	
					Polygonum lapathifolium	–	–	
					Tamarix smyrnensis	–	–	
					Ceratonia siliqua	_	_	

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
					Colchicum balansae	–	–	
					Myrtus communis subsp. *communis*	–	–	
					Smilax excelsa	–	–	
					Michauxia camapnuloides	–	–	
					Campanula lyrata subsp. *lyrata*	–	–	
					Onosma albo-roseum subsp. *sanguinoletum*	–	–	
					Capparis spinosa	–	–	
					Arbutus andrachne	–	–	
					Micromeria myrtifolia	–	–	
					Polygonum arenastrum	–	–	
					Echinops galaticus	–	–	

Limestone Quarry-1

The quarry, which is planned to be used for supply of limestone, is in operation. In the impact area of the quarry, maquis vegetation, almost bare rocks containing limestone, *Pinus sylvestris* (Scotch pine) woodlands and open-air mineral mines including quarries are dominant (see Figure 2-50 and Figure 2-51). The plant species identified in this area are given in Table 2-6 below.

Figure 2-50. Limestone Quarry-1

Figure 2-51. Limestone Quarry-1

Table 2-6. Limestone Quarry-1 Floristic Species

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
3	**Limestone Quarry-1**	643407	4086088	228	*Pinus brutia*	–	–	F.5.2, J.3.2, H.3.6, G.3.4
					Paliurus spina-christi	–	–	
					Phillyrea latifolia	–	–	
					Daucus carota	–	–	
					Chrysopogon gryllus	–	–	
					Carduus nutans	–	–	
					Calicotome villosa	–	–	
					Inula viscosa	–	–	
					Picnomon acarna	–	–	
					Capparis spinosum	–	–	

Route-1

The Mersin-Adana-Gaziantep High Standard Railway Project Route was also studied at selected points on the route. These areas have been referred with a title 'ROUTE' and numbered. There are agricultural areas, industrial and residential areas in this area. Since the area studied as Route-1 is planned as parallel to the existing route, natural areas are almost non-existent in these areas. The pictures taken during the fieldwork carried out in these areas are given in Figure 2-52 and Figure 2-53. The plant species identified from these areas are given in Table 2-7.

Figure 2-52. Route-1

Figure 2-53. Route-1

Table 2-7. G-1 route Floristic Species

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
4	**G-1 route**	659630	4082065	35	*Tamarix smyrnensis*	–	–	I.1.2, J.1.1, J.4.1
					Typha domingensis	–	–	
					Conyza bonariensis	–	–	
					Inula viscosa	–	–	
					Chrysopogon gryllus	–	–	
					Ailanthus altissima	–	–	
					Ficus carica	–	–	
					Morus alba	–	–	
					Citrus sinensis	–	–	

Concrete Plant

The area planned as a concrete batching plant remains in the landscape area organized inside the highway island (see Figure 2-54 and Figure 2-55). Most of the plants identified in this area are species planted for landscaping purposes. The plant species identified from this area are given in Table 2-8.

Figure 2-54. The area planned as a Concrete Plant

Figure 2-55. The area planned as a Concrete Plant

Table 2-8. Concrete Plant Floristic Species

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
5	Concrete Plant	665455	4085227	19	*Pyracantha coccinea*	–	–	I2.21
					Phragmites australis	–	–	
					Phoenix dactylifera	–	–	
					Acacia cyanophylla	–	–	
					Raphanus raphanistrum	–	–	
					Ficus carica subsp. *rupestris*	–	–	
					Echium angustifolium	–	–	
					Pinus sp.	–	–	

Route-2

There are hardly any natural areas in these areas since the area studied as Route-2 is planned in parallel with the existing route. The picture taken during the fieldwork carried out in these areas is given in Figure 2-56. The plant species identified from these areas are given in Table 2-9.

Figure 2-56. Route-2

Table 2-9. Route-2 Floristic Species

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
6	Route-2	665273	4085541	18	*Eucalyptus camaldulensis*	–	–	I.1.2, J.1.1, J.4.1
					Nerium oleander	–	–	
					Typha domingiensis	–	–	
					Tamarix smyrnensis	–	–	
					Polygonum arenastrum	–	–	
					Rubus sanctus	–	–	
					Cirsium arvense subsp. *vestitum*	–	–	
					Xanthium strumarium subsp. *cavanillesii*	–	–	

Route-3

The area studied as Route-3 was chosen because it is within the working zone taken 500 m from the right and left of the route. The picture taken during the fieldwork carried out in these areas is given in Figure 2-57. The plant species identified from these areas are given in Table 2-10.

Figure 2-57. Tarsus Waterfall Route-3

Table 2-10. Route-3 Floristic Species

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
7	**Route-3 (Tarsus Waterfall**	669103	4089121	20	*Platanus orientalis*	–	–	I2.11
					Ficus carica subsp. *rupestris*	–	–	
					Morus alba	–	–	
					Parietaria judaica	–	–	
					Hedera helix	–	–	
					Conyza bonariensis	–	–	
					Pittosporum tobira nana	–	–	
					Eucalyptus camaldulensis	–	–	
					Ailanthus altissima	–	–	
					Pinus pinea	–	–	
					Phragmites australis	–	–	
					Laurus nobilis	–	–	
					Cupressus sempervirens	–	–	
					Laythrum hyssoifolia	–	–	
					Salix alba	–	–	
					Lapsana communis subsp. *intermedia*	–	–	

Tarsus Stone Quarry

This quarry, which is planned to be used, is in operation. In the impact area of the quarry, maquis vegetation, agricultural areas where modern methods are not used and single crops are grown, and weed communities in transportation networks and other built hard surface areas are dominant (see Figure 2-58 and Figure 2-59). The plant species identified in this area are given in Table 2-11 below. *Sideritis cilicica* endemic species was detected in the maquis vegetation remaining in the quarry area. The picture of this species taken during the field study is given in Figure 2-60. The population of *Sideritis cilicica* is endangered if the existing quarry, which is planned to be used, increases its capacity to provide material. This habitat has been identified as a candidate for critical habitat.

Figure 2-58. Quarry

Figure 2-59. The maquis vegetation around the Quarry

Figure 2-60. *Sideritis cilicica* detected in the Quarry and its surroundings

Table 2-11. Stone Quarry Floristic Species

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
8	**Stone Quarry**	661937	4092966	243	*Olea europea* var. *europea*	–	–	F5.2, J3.2, I.1.3, H3.4
					Picnomon acarna	–	–	
					Asphodelus aestivus	–	–	
					Verbascum sinuatum var. *sinuatum*	–	–	
					Eryngium campestre var. *virens*	–	–	
					Alyssum strigosum subsp. *strigosum*	–	–	
					Trigonella spruneriana var. *spruneriana*	–	–	
					Anthemis cretica subsp. *pontica*	–	–	
					Allium neopolitanum	–	–	
					Phillyrea latifolia	–	–	
					Calicotome villosa	–	–	
					Osyris alba	–	–	

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
					Cistus salviifolius	–	–	
					Helianthemum racemosum	–	–	
					Pistacia lentiscus	–	–	
					Teucrium polium	–	–	
					Quercus coccifera	–	–	
					Daphne sericea	–	–	
					Corydothymus capitatus	–	–	
					Heliotropium europaeum	–	–	
		662188	4092776	246	*Sideritis cilicica*	Endemik	EN	F5.2

Alaca Stone Quarry

The quarry, which is planned to be used as material supply for construction, is in operation. Maquis vegetation and dry rock habitat are dominant in the impact area of the quarry (see. Figure 2-61 and Figure 2-62). The plant species identified from this area are given in Table 2-12 below.

Figure 2-61. Quarry

Figure 2-62. Quarry

Table 2-12. Stone Quarry Floristic Species

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
9	**Stone Quarry**	670228	4102405	267	*Nerium oleander*	–	–	F5.2, J3.2, H3.6
					Inula viscosa	–	–	
					Verbascum sinuatum var. *sinuatum*	–	–	
					Asphodelus aestivus	–	–	
					Picnomon acarna	–	–	
					Ficus carica subsp. *rupestris*	–	–	
					Inula graveolens	–	–	
					Anchusa azurea	–	–	
					Phillyrea latifolia	–	–	
					Galium canum subsp. *canum*	–	–	
		670277	4102374	273	*Onosma mutabilis*	Endemic	LC	H3.6
					Ceratonia siliqua	–	–	
					Cruciata articulata	–	–	
					Dianthus strictus var. gracijior	–	–	
					Calamintha sylvatica	–	–	
					Laurus nobilis	–	–	

Route-4

Since the area studied as Route-4 is planned parallel to the existing route, there are hardly any natural areas in these areas. The picture taken during the fieldwork carried out in these areas is given in Figure 2-63 and Figure 2-64. The plant species identified from these areas are given in Table 2-13.

Figure 2-63. Route-4

Figure 2-64. Route-4

Table 2-13. Route-4 Floristic Species

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
10	**Route-4**	680281	4092978	31	*Ononis spinosa* subsp. *antiquorum*	–	–	J4.3, J1.2
					Eucalyptus camaldulensis	–	–	
					Vitis vinifera	–	–	
					Polygonum arenastrum	–	–	
					Morus alba	–	–	
					Cupressus sempervirens	–	–	
					Pinus brutia	–	–	
					Phoenix dactylifera	–	–	
					Populus canadensis	–	–	
					Cynodon dactylon var. *villosus*	–	–	
					Prosopis farcta	–	–	
					Rubus sanctus	–	–	
					Polygonum lapathifolium	–	–	

Airport Connection Line Junction Point

The airport connection road passes entirely through agricultural areas as can be seen in Figure 2-65 and Figure 2-66. The plant species identified from these areas are given in Table 2-14. Since these areas are completely agricultural areas, the identified species are cosmopolitan species.

Figure 2-65. Agricultural areas at the airport connection point

Figure 2-66. Agricultural areas at the airport connection point

Table 2-14. Airport Connection Floristic Species

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
11	**Airport Connection**	684897	4089382	15	*Phragmites australis*	–	–	I1.1
					Chondrilla juncae var. *juncea*	–	–	
					Eucalyptus camaldulensis	–	–	
					Urospermum picroides	–	–	
					Echinops viscosus subsp. *bithynieus*	–	–	
					Carduus nutans ssp. *nutans*	–	–	
					Slybum marianum	–	–	
					Sonchus asper subsp. *glaucescens*	–	–	
					Citrus sinensis	–	–	

Dump Site

The area chosen as the dump site consists of densely unmixed fields used by local governments as construction waste and rubble dumping site, and the area used as a tent pitching area by seasonal workers (see Figure 2-67 and Figure 2-68). The plant species identified from this area are given in Table 2-15.

Figure 2-67. General vegetation structure of the dump site

Figure 2-68. The use of the area selected as the dump area as a tent area by seasonal agricultural workers

Table 2-15. Dump Area Floristic Species

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
12	Dump Area	735343	4094856	73	*Asphodelus aestivus*	–	–	J6.2, J4.2, I1.1
					Verbascum sinuatum	–	–	
					Conyza bonariensis	–	–	
					Heliotropium europaeum	–	–	
					Carlina corymbosa	–	–	
					Verbena officinalis	–	–	
					Aster subulatus	–	–	
					Convolvulus lineatus	–	–	
					Picnomon acarna	–	–	
					Anchusa azurea	–	–	
					Echium angustifolium	–	–	
					Inula graveolens	–	–	
					Inula viscosa	–	–	
					Silybum marianum	–	–	
					Dainthus zonatus var. *zonatus*	–	–	
					Capparis spinosa var. *Spinosa*	–	–	
					Ficus carica subsp. *carica*	–	–	
					Echinops viscosus subsp. *bithynieus*	–	–	

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
					Nerium oleander	_	_	
					Raphanus raphanistrum	_	_	

QUARRY-4

Quarry-4 has been previously used for material purchase. The dominant habitat is maquis. In addition, there is a dry rock habitat and heavily unmixed agricultural areas in this area (see Figure 2-69 and Figure 2-70). The plant species identified from this area are given in Table 2-16.

Figure 2-69. Quarry-4 area

Figure 2-70. Quarry-4 area

Table 2-16. Quarry-4 Floristic Species

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
13	**Quarry-4**	743069	4098315	33	*Cynanchum acutum*	–	–	H3.6, F5.2, J3.2, I1.1
					Prosopis farcta	–	–	
					Heliotropium europaeum	–	–	
					Cupressus sempervirens	–	–	
					Nerium oleander	–	–	
					Verbascum sinuatum var. *sinuatum*	–	–	
					Cynododn dactylon	–	–	
					Chrysopogon gryllus subsp. *gryllus*	–	–	
					Michauxia campanuloides	–	–	
					Sanguisorba minor subsp. *magnolii*	–	–	
					Anchusa azurea var. *azurea*	–	–	
					Dianthus zonatus	–	–	
					Echinops viscosus subsp. *bithynieus*	–	–	
					Conyza bonariensis	–	–	
					Lactuca intricata	–	–	

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
					Convolvulus lineatus	–	–	
					Asphodelus aestivus	–	–	
					Eryngium campestre var. *virens*	–	–	
					Micromeria myrtifolia	–	–	
					Teucrium polium	–	–	
					Scilla autumnalis	–	–	
					Galium canum subsp. *canum*	–	–	
					Urginea maritima	–	–	

Yılanlıkaya Limestone Quarry

Yılanlıkaya Limestone Quarry is a quarry in operation. As can be seen Figure 2-71 and Figure 2-72, maquis communities, dry rock habitat and dense unmixed fields were identified at the boundaries of the impact area. The plant species identified from these areas are given in Table 2-17.

Figure 2-71. Yılanlıkaya Limestone Quarry

Figure 2-72. Yılanlıkaya Limestone Quarry

Table 2-17. Yılanlıkaya Limestone Quarry Floristic Species

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
14	**Yılanlıkaya Limestone Quarry**	743025	4098319	33	*Cynanchum acutum*	_	_	H3.6, F5.2, J3.2, I1.1
					Prosopis farcta	_	_	
					Heliotropium europaeum	–	–	
					Cupressus sempervirens	–	–	
					Nerium oleander	_	_	
					Verbascum sinuatum var. *sinuatum*	–	–	
					Cynododn dactylon	_	_	
					Chrysopogon gryllus subsp. *gryllus*	–	–	
					Michauxia campanuloides	–	–	
					Sanguisorba minor subsp. *magnolii*	–	–	
					Anchusa azurea var. *azurea*	–	–	
					Dianthus zonatus	_	_	
					Echinops viscosus subsp. *bithynieus*	–	–	
					Conyza bonariensis	_	_	
					Lactuca intricata	_	_	
					Convolvulus lineatus	_	_	
					Asphodelus aestivus	_	_	
					Alcea apterocarpa			

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
					Eryngium campestre var. *virens*	–	–	
					Micromeria myrtifolia	_	_	
					Teucrium polium	_	_	
					Scilla autumnalis	_	_	
					Galium canum subsp. *canum*	–	–	
					Rhamnus libanoticus	_	_	
					Urginea maritima	_	_	

Bozdoğan-B Quarry

Bozdogan Stone Quarry is a completely natural area where there is no anthropogenic activity. Maquis vegetation is dominant. Non-concentrated fields were detected at the boundaries of the impact area. Since this area is a completely natural maquis area, detailed field studies should be carried out in this area in the vegetation period of 2022. The photographs, taken from the Bozdoğan-B Quarry and its impact area, are given in Figure 2-73 and Figure 2-74. The plant species identified from this area are given in Table 2-18.

Figure 2-73. Maquis vegetation of Bozdoğan-B Quarry

Figure 2-74. Maquis vegetation of Bozdoğan-B Quarry

Table 2-18. Bozdoğan-B Quarry Floristic Species

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
15	Bozdoğan-B quarry	764433	4090017	88	*Pistacia lentiscus*	_	_	F5.2, J4.1, I1.1
					Quercus coccifera	_	_	
					Phlomis grandiflora	_	_	
					Inula viscosa	_	_	
					Cistus salviifolius	_	_	
					Centaurea spicata	_	_	
					Ephedra campylopoda	–	–	
					Calicotome villosa	_	_	
					Trifolium physodes	_	_	
					Smilax excelsa	_	_	
					Linum sp.	_	_	
					Scilla autumnalis	_	_	
					Asparagus acutifolius	–	–	
					Ostrya carpinifolia	_	_	
					Clematis vitalba	_	_	
					Myrtus communis subsp. *communis*	–	–	
					Phillyrea latifolia	_	_	
					Dianthus zonatus var. *zonatus*	–	–	
					Micromeria myrtifolia	–	–	
					Phleum pratense	_	_	
					Colchicum cilicium	_	_	

Quarry-5 Basalt Quarry

There are two locations adjacent to each other as potential basalt supply quarry areas. On of them is baren and not started to be used and the other one is in operation. It is not recommended to use the area, if possible, in order to preserve its natural structure seen in Figure 2-75 and Figure 2-76. The plant species identified from this area are given in Table 2-19. The existing basalt quarry numbered as Quarry-5 and in operation can be used.

Figure 2-75. The area planned as Quarry -5 (Basalt Quarry)

Figure 2-76. The area planned as Quarry -5 (Basalt Quarry)

Table 2-19. Quarry -5 (Basalt Quarry) Floristic Species

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
16	**Quarry - 5 (Basalt Quarry)**	240187	4111577	49	*Asphodelus aestivus*	–	–	H3.6
					Melica minuta	–	–	
					Capparis spinosa var. *Spinosa*	–	–	
					Euphorbia peplus	–	–	
					Heliotropium europaeum	–	–	
					Vincetoxicum canescens subsp. *canescens*	–	–	
					Carthamus dentatus	–	–	
					Scilla autumnalis	–	–	
					Oxalis corniculata	–	–	
					Paliurus spina-christi	–	–	
					Eryngium falcatum	–	–	
					Tribulus terrestris	–	–	
					Urginea maritima	–	–	
					Amaranthus retroflexus	–	–	
					Echinops viscosus subsp. *bithynicus*	–	–	
					Teucrium polium	–	–	
					Smilax aspera	–	–	
					Quercus coccifera	–	–	
					Micromeria myrtifolia	–	–	
					Styrax officinalis	–	–	
					Muscari parviflorum	–	–	

Şenyıl-B Quarry

Şenyıl-B quarry is currently in use. Since it has been in business for many years, the natural structure has completely deteriorated as seen in Figure 2-77 and Figure 2-78. The plant species identified from this area are cosmopolitan and are given in Table 2-20.

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Figure 2-77. Şenyıl-B Quarry

Figure 2-78. Şenyıl-B Quarry

Table 2-20. SENYIL-B QUARRY Floristic Species.

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
17	Şenyıl-B Ocağı	241453	4111887	84	*Carduus nutans*	_	_	I1.1, J3.2
					Capparis spinosa subsp. *spinosa*	_	_	
					Amaranthus albus	_	_	
					Silybum marianum	_	_	
					Echinops spinosissimus subsp.*bithynicus*	_	_	
					Melica cupani	_	_	
					Heliotropium europaeum	_	_	

Concrete Plant

The facility to be used as a concrete plant is a ready-made facility operated by OYAK Concrete. Since this facility has been operated for a long time, it is surrounded by protection fences and its natural structure has been completely destroyed. Landscape arrangements have been made in and around the facility as can be seen in Figure 2-79 and Figure 2-80. Since the natural structure has deteriorated in this area, no floristic studies have been carried out.

Figure 2-79. Concrete Plant

Figure 2-80. Landscape work around the Concrete Plant

Escape Tunnel

It is planned as the escape tunnel of Tunnel 5. There is maquis vegetation and dry rock habitat in the areas where the escape tunnel is located (see Figure 2-81 and Figure 2-82). The plants detected in these areas are given in Table 2-21.

Figure 2-81. Tunnel 5, escape tunnel scrub vegetation

Figure 2-82. Tunnel 5, escape tunnel scrub vegetation

Table 2-21. Tunnel-5 (Escape Tunnel) Floristic Species.

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
18	**Tunnel-5 (Escape Tunnel)**	273566	4117246	387	*Centaurea iberica*	–	–	F5.2, H3.6
					Capparis spinosa var. *spinosa*	–	–	
					Alyssum minus var. *minus*	–	–	
					Inula viscosa	–	–	
					Echinops viscosus subsp. *bithynicus*	–	–	
					Quercus coccifera	–	–	
					Dianthus zonatus var. *zonatus*	–	–	
					Phillyrea latifolia	–	–	
					Micromeria myrtifolia	–	–	
					Scilla autumnalis	–	–	
					Pinus brutia	–	–	
					Smilax aspera	–	–	
					Urginea maritima	–	–	

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
					Themeda triandra	–	–	
					Osyris alba	–	–	
					Nepeta flavida	–	–	
					Crucianella angustifolia	–	–	
					Stachys cretica subsp. cassia	–	–	
					Stachys pumila	–	–	

T5 Tunnel Entrance-Exit

T5 entrance maquis, plantation areas and uncondensed fields have been identified (see Figure 2-83). T5 exit is located between highway networks, maquis and the existing railway (see Figure 2-84). Plant species determined from these areas are given in Table 2-22.

Figure 2-83. T5 Tunnel Entrance

Figure 2-84. T5 Tunnel Entrance

Table 2-22. Tunnel-5 Floristic Species

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
19	T5 Entrance	272559	4118945	427	*Inula viscosa*	–	–	F5.2, G3.7, I1.1
					Quercus coccifera	–	–	
					Pinus brutia	–	–	
					Phillyrea latifolia	–	–	
	T5 Exit	276889	4117711	511	*Anchusa azurea* var. *azurea*	–	–	J4.2, J4.3, F5.2
					Carthamus dentatus	–	–	
					Daucus carota	–	–	
					Xanthium spinosum	–	–	
					Paliurus spina-christi	–	–	
					Quercus coccifera	–	–	
					Colchicum clicicum	–	–	

T4 Tunnel Entrance-Exit

The T4 entrance consists of maquis, highway side and Pinus brutia afforestation area seen in Figure 2-85. The T4 exit consists of non-concentrated agricultural areas, maquis and residential areas seen in Figure 2-86. The plant species determined from these areas are given in Table 2-23.

Figure 2-85. T4 Tunnel Entrance

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Figure 2-86. T4 Tunnel Exit

Table 2-23. Tunnel-4 Floristic Species

Station No	Station Name	Coordinate x	Coordinate y	Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
20	**T4 Entrance**	272829	4122243	384	*Inula viscosa*	_	_	F5.2, G3.7, I1.1
					Pinus brutia	_	_	
					Phillyrea latifolia	_	_	
					Cistus salviifolius	_	_	
					Paliurus spina-christi	–	–	
					Citrus sinensis	_	_	
					Osyris alba	_	_	
					Pistacia lentiscus	_	_	
					Cupressus sempervirens	–	–	
					Anchusa azurea var. *azurea*	–	–	
					Inula vulgaris	_	_	
					Calicotome villosa	_	_	
					Echinops viscosus subsp. *bithynicus*	–	–	
					Quercus coccifera	_	_	
					Asparagus acutifolius	–	–	
					Ruscus aculeatus	_	_	
					Crataegus monogyna subsp. *monogyna*	_	_	
					Pistacia terebinthus subsp. *palaestina*	_	_	
					Heliotropium europaeum	–	–	
	T4 Exit	272396	4120454	423	*Platanus orientalis*	_	_	F5.2, G3.7, I1.1
					Morus alba	_	_	
					Rubus sanctus	_	_	
					Melia azedarach	_	_	
					Tilia argentea	_	_	
					Crataegus monogyna subsp. *monogyna*	_	_	
					Carthamus dentatus	–	–	
					Chondrilla junca var. *juncea*	–	–	
					Portulaca oleracea	_	_	
					Echinops viscosus subsp. *bithynicus*	–	–	
					Ficus carica var. *carica*	–	–	
					Vitis vinifera	_	_	
					Ailanthus altissima	_	_	

T1 Tunnel Entrance-Exit and T2 Tunnel Entrance-Exit

Tunnel T1's entrance and exit and Tunnel T2's entrance and exit are planned one after the other. Since they are located in the same habitat, they were evaluated together. At the entrance and exit of the T1 and T2 tunnels, mixed areas of the gruit and vegetable gardens and plantation areas were determined (see Figure 2-87 and Figure 2-88). The plant species identified from these areas are given in Table 2-24.

The maquis vegetation in the T2 Exit area is a natural area, and it would be beneficial to study this area in detail in the 2022 vegetation period. This habitat has been identified as a candidate for critical habitat.

Figure 2-87. T1-T2 Tunnel

Figure 2-88. T2 Tunnel exit

Table 2-24. Tunnel 1-2 Floristic Species

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
21	**T1-2 Entrance**	265451	4116311	241	*Pinus brutia*	–	–	F5.2, G3.7, I1.2
					Olea europaea var. *europaea*	–	–	
					Olea europaea var. *sylvestris*	–	–	
					Inula graveolens	–	–	
					Inula viscosa	–	–	
					Urginea maritima	–	–	
					Capparis spinosa var. *spinosa*	–	–	
					Quercus coccifera	–	–	
	T2 Exit	265506	4116956	220	*Pinus brutia*	–	–	
					Myrtus communis subsp. *communis*	–	–	
					Conyza bonariensis	–	–	
					Inula viscosa	–	–	
					Phillyrea latifolia	–	–	
					Heliotropium europaeum	–	–	
					Quercus coccifera	–	–	
					Pistacia terebinthus subsp. *paleastina*	–	–	
					Asparagus acutifolius	–	–	
					Ruscus hypoglossum	–	–	
					Smilax aspera	–	–	
					Themeda triandra	–	–	
					Salvia tomentosa	–	–	
					Muscari sp.	–	–	
					Genista anatolica	–	–	
					Vitex agnus-castus	–	–	

T3 Tunnel Entrance-Exit

Unconcentrated agricultural areas, small groves and young plantation areas and maquis vegetation were detected in Tunnel T3's entrance and impact area (see Figure 2-89). Intensive unmixed fields were detected in Tunnel T3's exit area and impact area (see Figure 2-90). List of plant species identified from this area is given in Table 2-25.

Figure 2-89. T3 Tunnel Entrance

Figure 2-90. T3 Tunnel Exit

Table 2-25. Tunnel 3 Floristic Species

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
22	T3 Entrance	2654129	4117812	240	*Pinus brutia*	–	–	F5.2, G3.7, I1.2
					Quercus coccifera	–	–	
					Paliurus spina-christi	–	–	
					Rubus sanctus	–	–	
					Smilax aspera	–	–	
					Arundo donax	–	–	
					Arachis hypogaea	–	–	
					Themeda triandra	–	–	
	T3 Exit	262089	4119765	300	*Paliurus spina-christi*	–	–	I1.2
					Olea europaea	–	–	
					Arachis hypogaea	–	–	
					Typha angustifolia	–	–	

Nurdağı Tunnel Entrance-Exit

Nurdağı tunnel entrance is located under the existing road and non-concentrated agricultural areas have been detected in the impact area as seen in Figure 2-91. Nurdağı tunnel exit has maquis, bare rocky areas and settlements. The plants detected in these areas are given in Table 2-26.

Figure 2-91. Nurdağı Tunnel Entrance

Figure 2-92. Nurdağı Tunnel Exit

Table 2-26. Nurdağı Tunnel Floristic Species

İstasyon No	İstasyon Adı	Koordinat		Yükseklik (m)	Taxon	End. Durumu	Türkiye Kırmızı Bitkileri Kitabına Göre Tehlike Kategorisi	EUNIS Habitat Code
		x	y					
23	**Nurdağı Tunnel Entrance**	286102	4118883	602	*Inula viscosa*	–	–	J4.2, J1.2, I1.1
					Tamarix smyrnensis	–	–	
					Platanus orientalis	–	–	
					Salix alba	–	–	
					Juglans regia	–	–	
	Nurdağı Tunnel Exit	296649	4116169	505	*Quercus coccifera*	–	–	F5.2, H3.6, J1.2
					Paliurus spina-christi	–	–	
					Pistacia lentiscus	–	–	
					Phillyrea latifolia	–	–	
					Cistua salviifolius	–	–	

Tunnel Entrance-Exit AT KM 80+500

At Km 80+500, dense unmixed fields and afforestation areas were detected at the entrance and exit of the tunnel (see Figure 2-93 and Figure 2-94). The plant species identified in these areas are given in Table 2-27.

Figure 2-93. Km 80+500 Tunnel Entrance

Figure 2-94. Afforestation areas identified in the Km 80+500 Tunnel impact area

Table 2-27. Km 80+500 Tunnel Floristic Species

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
24	**Km 80+500 Tunnel**	302676	4117159	510	*Pinus brutia*	–	–	J4.2, G3.7, I1.1
					Cupressus sempervirens	–	–	
					Anchusa arvensis subsp. *orientalis*	–	–	
					Echium italicum	–	–	
					Echinops spinosissimus subsp. *bithynicus*	–	–	
					Heliotropium europaeum	–	–	
					Amygdalus graeca	–	–	
					Sanguisorba minor	–	–	
					Asphodelus aestivus	–	–	
					Scilla autumnalis	–	–	

Tunnel Entrance (Satırhöyük Location)

The tunnel entrance at Satırhöyük location is under the influence of steppe vegetation as can be senn in Figure 2-95. There are non-concentrated agricultural areas and maquis in the impact area.

Figure 2-95. Tunnel Entrance to Satırhöyük location

Figure 2-96. Steppe vegetation of Satırhöyük locality

Table 2-28. Satırhöyük Locality Tunnel Floristic Species

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
25	**Satırhöyük Locality Tunnel**	320718	4120026	745	*Picnomon acarna*	–	–	F5.2, I1.1
					Verbascum sp.	–	–	
					Chondrilla juncea var. *juncea*	–	–	
					Inula graveolens	–	–	
					Aegilops umbellulata	–	–	
					Heliotropium europaeum	–	–	

Route-6

The point that works as G-6 on the Mersin-Adana-Gaziantep High Standard Railway Project route is within the borders of Gaziantep Province. The working point on this route passes through non-concentrated agricultural areas and residential areas as seen in Figure 2-97 and Figure 2-98. The plant species identified from these areas are given in Table 2-29.

Figure 2-97. Route-6 residential areas

Figure 2-98. Route-6 agricultural areas

Table 2-29. Route-6 Floristic Species

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
26	**Route-6**	318951	4119012	684	*Picnomon acarna*	–	–	J1.2, I1.1
					Chondrilla juncea var. *juncea*	–	–	
					Olea europea var. *europea*	–	–	
					Amygdalus communis	–	–	
					Vitis vinifera	–	–	
					Sanguisorba minor	–	–	
					Paliurus pina-christi	–	–	
					Ficus carica subsp. *carica*	–	–	
					Geranium tuberosum	–	–	
						–	–	

Başpınar-K Quarry

Başpınar-K quarry is an existing quarry in operation. It is an area that has been completely surrounded by the heath and its natural structure has been disturbed as seen in Figure 2-99 and Figure 2-100. The floristic list is not given because the natural structue has completely deteriorated in this area.

Figure 2-99. Başpınar-K Quarry

Figure 2-100. Başpınar-K Quarry

Tunnel Exit at Km 116+200

There are maquis vegetation at the tunnel exit at km 116+200 and non-concentrated agricultural areas at the boundaries of the impact area as seen in Figure 2-101 and Figure 2-102. The plant species identified from this area are given in Table 2-30.

These areas are potential areas that contain endemic species. For this reason, it has been identified as a candidate for critical habitat. It should be studied in detail in the vegetation period of 2022.

Figure 2-101. Km 116+200 Tunnel Exit

Figure 2-102. Km 116+200 maquis vegetation

Table 2-30. Km 116+200 TUNNEL EXİT Floristic Species

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
27	**Km 116+200 Tünel Çıkışı**	342100	4116663	978	*Quercus coccifera*	–	–	F5.2, I1.1
					Phillyrea latifolia	–	–	
					Onosma albo-roseum	–	–	
					Micromeria myrtifolia	–	–	
					Verbascum sp.	–	–	
					Pistacia terebinthus	–	–	
					Stachys cretica	–	–	
					Stachys pumila	–	–	
					Jasminum fructicans	–	–	

Route-7

In Route-7 survey station, maquis vegetation and non-concentrated agricultural areas were detected (see Figure 2-103 and Figure 2-104). The plant species identified from these areas are given in Table 2-31.

These areas are potential areas that contain endemic species. For this reason, it has been identified as a candidate for critical habitat. It should be studied in detail in the vegetation period of 2022.

Figure 2-103. Route-7 scrub vegetation

Figure 2-104. Route-7 scrub vegetation

Table 2-31. Route-7 Floristic Species

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
28	**Güzergah-7**	342100	4116663	978	*Quercus coccifera*	–	–	F5.2, I1.1
					Phillyrea latifolia	–	–	
					Chrysopogon gryllus subsp. *gryllus*	–	–	
					Onosma albo-roseum	–	–	
					Gundelia tournefortii	–	–	
					Jasminum fructicans	–	–	
					Helianthemum ledifolium	–	–	
					Micromeria myrtifolia	–	–	
					Picnomon acarna	–	–	
					Stachys pumila	–	–	
		339387	4118663	952	*Helleborus vesicarius*	Endemik	NT	F5.2

Tunnel Entrance at Km 120+300

Tunnel entrance at Km 120+300, maquis vegetation and agricultural areas were identified. Figure 2-105 and Figure 2-106. The plant species identified from these areas are given in Table 2-32.

These areas are potential areas that contain endemic species. For this reason, it has been identified as a candidate for critical habitat. It should be studied in detail in the vegetation period of 2022.

Figure 2-105. Km 120+300 Tunnel Entrance

Figure 2-106. 120+300 maquis vegetation

Table 2-32. Km 120+300 Tunnel Entrance Floristic Species

Station No	Station Name	Coordinate		Altitude (m)	Taxon	Endemism Status	Hazard Category According to the Turkish Red Plants Book	EUNIS Habitat Code
		x	y					
29	**Km 120+300 Tünel Girişi**	339170	411777	980	*Quercus coccifera*	–	–	F5.2, I1.1
					Phillyrea latifolia	–	–	
					Chrysopogon gryllus subsp. *gryllus*	–	–	
					Onosma albo-roseum	–	–	
					Gundelia tournefortii	–	–	
					Jasminum fructicans	–	–	
					Helianthemum ledifolium	–	–	
					Micromeria myrtifolia	–	–	
					Picnomon acarna	–	–	

2.7. Conclusion

According to the field observations, literature information and habitat suitability evaluations made in October 2021 in the railway line, its immediate surroundings, quarries and stream crossing areas

Of the 39 endemic plant species only three species observed due to seasonal limitations. These species were observed at project facilities rather than railway route. These are; *Sideritis cilicica, Helleborus vesicarius, Onosma mutabilis.* In addition, during the field studies three invasive flora species also observed. These are; *Ailanthus altissima, Eucalyptus camaldulensis, Acacia cyanophylla.*

Considering that the railway line is quite long and passes through many different regions and habitats, the number of identified flora species in October 2021 might be higher in Spring season and hence, it is clear that additional studies should be carried out in Spring season.

3. FAUNA (AMPHIBIAN, REPTILES AND MAMMALS)

Regarding the Mersin-Adana-Gaziantep (MAG) High Standard Railway Project, which is planned to be built, this report was prepared by carrying out field studies on the project route area and relevant impact areas considering the associated facilities. Field vists were conducted on October 14, 15 and 16, 2021. While planning the visits and study scope, comments of IESC, Ramboll, in the "Gap Analysis Report" were taken into account.

3.1. Purpose and Scope of the Supplementary Fauna Survey

In this vertebrate fauna survey, the very same suvey stations of flora survey, which were outlined in Section 2.5 of this Report were studied. Before the fieldwork was carried out, some objectives were determined for the study.

The following IFC Performance Standards were taken as the requirements to be followed during the survey and the pertinent reportings afterwards:

- IFC PS6-6,1: Baseline Surveys
- IFC PS6-6,2: Biodiversity Impact Assessment
- IFC PS6-6,3: Critical Habitat Assessment
- IFC PS6-6,4: Legally Protected and Internationally Recognized Areas
- IFC PS6-6,5: Management of Ecosystem Services
- IFC PS6-6,6: Invasive species management

The current report has been prepared by carrying out field studies for the requirements.

3.2. Methodology

In line with the purposes of the study, faunistic field studies were carried out in October 2021. Number of stations where faunistic works are carried out include the Project route and associated facilities (including R: Railway Line; BP: Concrete/batching Plant Q: Quarries; B: Basalt Quarries), nearby settlements, Coordinates, EUNIS habitat codes-types and from within the railway line and/ Details of Protected (Wildlife Development Area, National Park, Areas of National Importance) and Important Biodiversity Areas are presented in Figures 3-1 and 3.2

The GPS information of the survey points/stations, where the study was carried out along the project route which can be seen in Figure 3-1 and Figure 3-2 are given in Table 3-1 and the habitat photos are given in Appendix 5. In addition, the GPS tracks created during the field studies are given in Figure 3-3, Figure 3-4, Figure 3-5 and Figure 3-6.

Table 3-1. Stations where Terrestrial Vertebrate Fauna Studies are Carried Along the Railway Line, Railway Line (R), Quarries (Q), Material Purchase Area (B), EUNIS Habitat Codes

STATION NO	RAILWAY ROUTE /QUARRIES / RAILWAY/ QUARRIES	LOCATION	KOORDİNAT COORDINATE 36 S and ELEVATION	EUNIS HABİTAT CODE	APPLICATION
MERSİN-ADANA-GAZİANTEP					
1	Waste dump site (existing)	KarahacılıVilage	632122 4074494 198 m	F.5.2 J.6.6 H.3.6	
2	Limestone quarry (existing) (numbered as Quarry-2 in Contractor's quarry list)	Karakütüktepe	643731 4086901 222m	F.5.2 J.3.2 G.3.5	
3	Limestone quarry (existing) (Quarry-1)	Camili Village	643407 4086088 228 m	F.5.2 J.3.2 H.3.6 G.3.4	
4	Route-1	Adnan Menderes köyü	659630 4082065 35m	I.1.2 J.1.1 J.4.1	
5	Concrete plant	Ring Road Intersection	665455 408522 19 m	I2.21	
6	Route-2		665278 4085542 18m	I.1.2 J.1.1 J.4.1.	
7	Route-3 (near Tarsus waterfall)	Tarsus	669124 4089146 21m	I2.11	
8	Quarry	Sucular Village	661925 4092961 200 m	f.5.2 J3.2 I.1.3 H.3.6	
9	Quarry	Gürlü Village	671378 4103099 263 m	F.5.2 J.3.2 H.3.6 G.3.4 (bu habitat yok orda)	
10	New train station (Route-4)	43rd km of the existing railway	680278 4092997 33 m	J 4. 3 J.1.2	
11	Airport Connection Line	Kargılı Village	684905 4089374 15 m	I 1.1	
12	Waste dump site		735340 4094850 76 m	J 6.2 J 4.2 I 1.1	
13	Quarry	Yılankaya	742997 4098357 57 m	H3.6 F5.2 J3.2 I 1.1	
14	Limestone quarry (Quarry-4)		743129 4098319 63 m	H3.6 F5.2 J3.2 I 1.1	
15	Bozdoğan B-Quarry		764432 4090017 107 m	F5.2 I 1.1 J.4.1	

STATION NO	RAILWAY ROUTE /QUARRIES / RAILWAY/ QUARRIES	LOCATION	KOORDİNAT COORDINATE 36 S and ELEVATION	EUNIS HABİTAT CODE	APPLICATION
16	Quarry-5 (Basalt quarry)		240445 4111503 55 m	H 3.6	Basalt cliffs. A special habitat for terrestrial fauna should therefore not be used. The currently active Şenyıl B material quarry should be used (i.e., 500 meters ahead).
17	Şenyıl B-quarry		241443 4111888 66 m	I 1.1 J3.2	
18	Concrete plant	Currently operating plant	253566 4111179 97 m		
19	Escape tunnel (of Tunnel 5)	Existing construction site	273560 4117239 408 m	F 5.2 H3.6	
20	Tunnel-5 entrance	Existing construction site	272559 4118945 427 m	F 5.2 I 1.1 G3.7	
21	Tunnel-4 exit	Existing construction site	272400 4120464 423 m	I 1,1 J 1.2 F 5.2	
22	Tunnel-4 entrance	Existing construction site	272831 4122255 415 m	F 5.2 J 1.2 G 3.7	
23	Tunnel-1 entrance and exit	Existing construction site	265451 4116311 241 m	I 1.2 G 3.7 F5.2	
24	Tunnel-2 exit	Existing construction site	265505 4116950 220 m	G 3.7 I 1.2	
25	Tunnel-3 entrances	Existing construction site	265132 4117817 239 m	I 1.1 F5.2 G3.7	
26	Tunnel-3 exits	Existing construction site	262095 4119763 300 m	I 1.1	
27	Tunnel-5 exit	Existing construction site	276886 4117709 513	J 4.2 J 4.3 F5.2	
28	Nurdağı tunnel entrance	Existing construction site	286102 4118883 602 m	J 4.2 J 1.2 I 1.1	
29	Nurdağı Tunnel exit	Existing construction site	296647 4116171 515 m	F 5.2 H 3.6 J 1.2	
30	Entrance and exit of tunnel at 80.5 km	Existing construction site	302789 4117045 533 m	J 4.2 I 1.1 G 3.7	
31	Tunnel entrance	Satırhöyük Village	320718 4120026 745 m	I 1.1 F.5.2	
32	Route-6		318951 4119012 684 m	I 1.1 J 1.2	
33	Başpınar limestone quarry	Existing Quarry	33966 4115557 993 m	J 3.2	

STATION NO	RAILWAY ROUTE /QUARRIES / RAILWAY/ QUARRIES	LOCATION	KOORDİNAT COORDINATE 36 S and ELEVATION	EUNIS HABİTAT CODE	APPLICATION
34	Tunnel exit at 116 km		342100 4116663 978 m	F 5.2 H 3.6 J 3.2	
35	Route-7	Üçgöze Village	339435 4118736 948 m	I 1.1 F 5.2	
36	Tunnel entrance at 120 km		340976 411777 980 m	F 5.2 I 1.1	
37	Tunnel exit at 120 km		337872 4119870 950 m	F 5.2 I 1.1	-
	Quarry 10 Waste dump area 2 Railway route 22 Concrete plant 2				-

R: Railway Line**; Q:** Quarry**; B-**Material purchasing area**; CAMP-**Camp area**;**

Figure 3-1. Mersin-Adana-Gaziantep High Standard Railway Project Mersin Osmaniye part Google image.

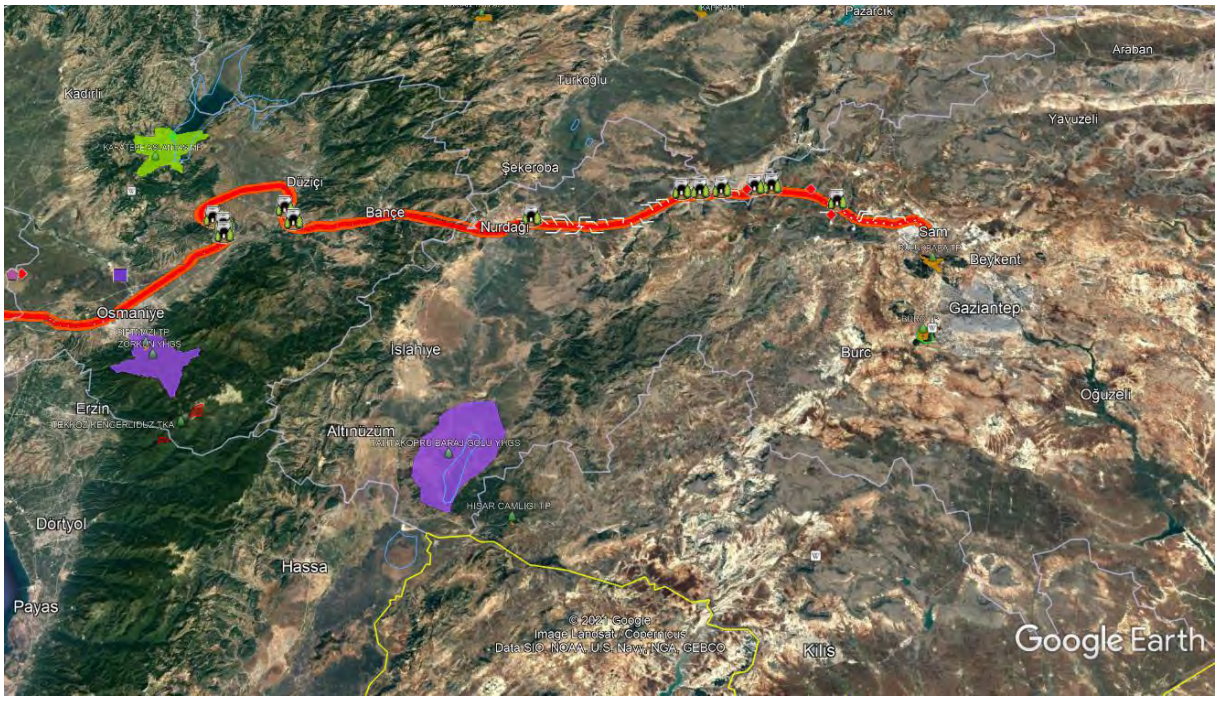


Figure 3-2. Google view of Mersin-Adana-Gaziantep High Standard Railway Project Osmaniye Gaziantep part.

Figure 3-3. GPS track of survey on 14th of October 2021 (Fieldwork theme 1 seen as blue lines).

Figure 3-4. GPS track of survey on 14th of October 2021 (Fieldwork theme 2 seen as blue lines).

Figure 3-5. GPS track of survey on 15th of October 2021 (Fieldwork pattern seen as blue lines).

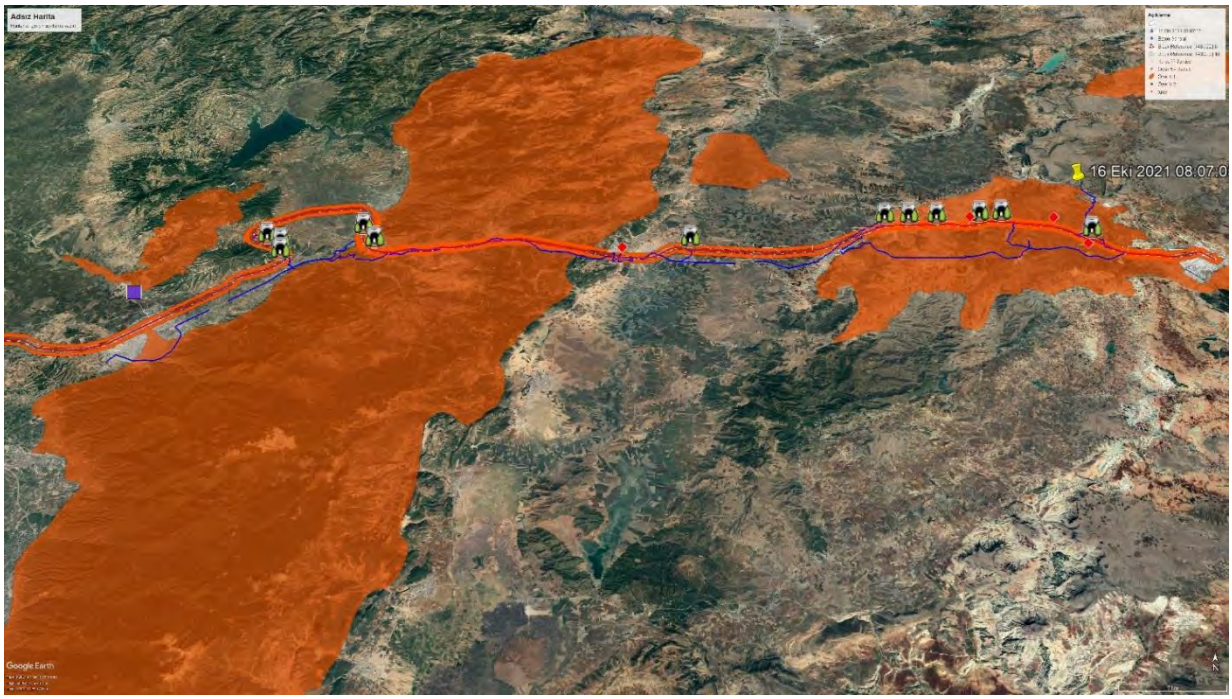


Figure 3-6. The plot of the fieldwork on October 16, 2021 (blue lines).

Technics applied and procedures followed during the survey are outlined below:

- The faunistic works carried out along the railway line within an area or corridor having a width of 1 km (i.e., 500 m on each side of the centreline of the route).
- The studies were carried out at stations with different terrestrial fauna habitats selected in the railway line-quarries-river crossings and its close vicinity, in areas with different vegetation and habitat types that have important breeding, feeding, sheltering features for fauna elements and data obtained from previous faunistic studies.
- During the field studies, nearby areas that may be suitable for fauna along the railway were included in the study.
- Most of the terrestrial fauna species identified and included in the lists are included in the lists according to the literature and habitat suitability.
- According to the findings and assessments, 5 areas were evaluated as critical/key biodiversity areas (KBA). It has been suggested that more detailed faunistic studies should be carried out in the later-appropriate (spring-autumn) periods in KBAs.
- Considering the area of influence in the immediate vicinity of the railway line, from the centre line of the route, using optical devices (teleobjective) to cover an area of 500 meters on the right and left side, walkover survey for 1,000 meters or for at least 30 minutes in each survey station considering the topography-vegetation conditions has been made.
- Numbers and bio-ecological activities (feeding, reproduction, socialization) of observed or heard faunistic species were recorded.

- The data obtained at the transect points were added to the faunistic field records.
- In order to determine the fauna species, the existence of habitats preferred by fauna elements according to previous studies and literature data, and the traces of fauna species (nests-cubs, footprints and excrement, identifiable bone fragments) and feeding signs in these determined habitats were also used.
- Interviews and surveys were conducted with the local people and the hunters in the region for the species that could not be determined in the observations in the study areas but whose existence was determined in previous studies.
- In the terrestrial vertebrate species list tables prepared, the cytomatic categories (Team-Family) scientific names and Turkish-English names of each fauna species are given in detail.
- Decisions of the Central Hunting Commission 2021-2022 were used as a source in determining the fauna species and national hazard categories.
- Following the installation of structures such as underpass and overpass planned to be built along the planned railway line, monitoring has been suggested.
- IUCN Red List, Bern Convention and CITES will be used as sources for the determination of fauna species and international hazard categories.

The data obtained from all these studies were evaluated together with the existing literature and 2 basic fauna lists based on two sections along the route were prepared for the MAG High Standard Railway Project. These lots were evaluated as to be Mersin-Osmaniye section and Osmaniye-Gaziantep section along the proposal railway and its immediate surroundings. While making this determination, general habitat characteristics were taken into consideration, and the railway route between Mersin and Osmaniye generally consists of residential and agricultural areas, and quarries are ecosystem parts with natural habitats around the structures that are currently in operation. Osmaniye-Gaziantep section, on the other hand, mostly passes through tunnels and natural habitats; however, there are natural habitats at the tunnel entrances and exits, and especially in the Gaziantep approach, some parts of the railway pass through natural habitats.

- All data were evaluated together and training predictions, precautions and monitoring predictions were presented to be included in the Biodiversity Management Plan in order to minimize the effects of project implementations.

3.3. Findings and Assessments

The findings obtained from the field and literature studies are presented in this section. The tables and figures of the faunistic findings of the railway line, its immediate surroundings, quarries, findings and evaluations are presented at the end of the section.

- **Faunal Biodiversity**

The faunal biodiversity, determined for the Mersin-Osmaniye section of the line, according to the field observations, literature information and habitat suitability assessments made during supplementary studies in October 2021 at the railway line and its vicinity as well as associated facilities like quarries, and river crossing areas, consists of 6 frogs, 25 reptiles and 26 mammals (57 in total). The faunal biodiversity determined for the Osmaniye-Gaziantep section of the line consists of 7 frogs, 36 reptiles and 54 mammals (97 in total).

The systematic categories (order-Family), scientific, Turkish and English names of these identified fauna species are shown in Appendix-A.

The faunal biodiversity distribution of terrestrial vertebrate fauna species in Mersin-Osmaniye section of the line is given in Appendix-A according to the observations made in each study area and previously prepared report data, literature (L) and habitat suitability (H) evaluations. The faunal biodiversity of Mersin-Osmaniye section mostly consists of species adapted to anthropogenic areas. The faunal biodiversity distribution of the Osmaniye-Gaziantep section of the line is given in Appendix-A. The faunal biodiversity of the Osmaniye Gaziantep section consists of species that can form niches in the natural habitats where the line passes, mostly in the northern part of the Amanos Mountains.

When the EUNIS codes of the workstations are examined in Appendix-A, the most common habitat type is Maquis and it constitutes the habitat of many terrestrial vertebrate species. There are forest areas and agricultural areas in another habitat type application area for fauna. Plantation forest and natural forest habitats are included in the project application areas as another faunal habitat type.

The presence of internationally and nationally endangered fauna species at the study points was used as the basic parameters in the evaluation of these areas as KBAs. KBAs, which are considered critical in line with these findings, are presented in more detail under the heading "Key Biodiversity Areas" in the following sections of the report.

Some of the faunal species identified and included in the lists are included in the lists according to the literature and habitat suitability. Because the field studies were carried out in the autumn period of October 2021.

For this reason, more data will be obtained from the observations to be made in Spring 2022 winter period, especially in the areas where the line is located.

While the faunal biodiversity determined in Mersin-Osmaniye section is 57 species, it increases to 97 species in the section between Osmaniye-Gaziantep. In fact, considering that the railway line passes through many different regions and habitats, it ensures that the number of faunal species detected is at a high level, especially in the Osmaniye-Gaziantep section.

In addition, it has been determined that there are KBAs at certain kilometers in some areas where the route passes and that there are/may be critical fauna species in this area, and the findings, evaluations and recommendations regarding these areas are presented in the following sections of the report.

During the observations made in October 2021, it was determined that the population density of fauna species might be less than those in the spring period. For this reason, faunistic studies should be carried out in the spring and summer periods, especially in habitats where critical fauna species are found.

- **Treat/Conservation Categories of Terrestrial Vertebrate Species**

For Mersin-Osmaniye section, according to IUCN, Spur-thighed Tortoise (*Testudo graeca*), Wild Goat (*Capra aegagrus*); VU: Vulnarable species are in the endangered category. Other species are not included in the danger categories. The vast majority of faunal species are in the "Least Concern (LC: Least Concern)" category and are not endangered. In this context, it gives the idea that there are/may be very few bird species that fall into the IUCN hazard categories in the areas where the railway line route and quarries are located.

For the Osmaniye-Gaziantep section, according to IUCN, Spur-thighed Tortoise (*Testudo graeca*), Mehelyi's Horseshoe Bat (*Rhinolophus mehelyi*), Long-fingered Bat (*Myotis capaccinii*), Schreiber's Bent-winged Bat (*Miniopterus schreibersie* European cat), *Vormela peregusna*), Brown Bear (*Ursus arctos*), Wild Goat (*Capra aegagrus*); VU: Vulnarable species are in the endangered category. Other species are not included in the danger categories. The vast majority of faunal species are in the "Least Concern (LC: Least Concern)" category and are not endangered. In this context, it gives the idea that there are/may be very few bird species that fall into the IUCN hazard categories in the areas where the railway line route and quarries are located.

Table 3-2. Number of fauna species with endangered/protected status Mersin- Osmaniye section.

	Protection categories	Number of fauna species
	VU	*Testudo graeca,, Capra aegagrus*
Bern Convention	EK II	17
	EK III	23
CITES	EK I	
	EK II	1
Central Hunting Commission	EK I	
	EK II	2

17 of the fauna species detected in Mersin-Osmaniye region are listed as strictly protected species in Annex-II of the European Agreement on Wild and Nature Habitats (Bern Agreement). In addition, 23 species have been placed on Annex-III list of the Bern Convention, including most of the species not included in Appendix II, with a few exceptions. The remaining species are not included in any protection class of the Bern Convention (see. Table 3-3). From this point of view, 40 of the 57 fauna species identified in the area are protected according to the Bern Convention criteria. Approximately 50% of the birds detected in the surveyed areas are species that should be protected according to the Bern Convention.

Table 3-3. Number of fauna species with endangered/protected status Osmaniye-Gaziantep section.

	Protection categories	Number of fauna species
	VU	*Testudo graeca, Rhinolophus mehelyi, Myotis capaccinii, Miniopterus schreibersii, Vormela peregusna , Ursus arctos, Capra aegagrus*
Bern Convention	EK II	38
	EK III	33
CITES	EK I	
	EK II	
Central Hunting Commission	EK I	
	EK II	4

38 of the fauna species detected in Osmaniye-Gaziantep section are listed as strictly protected species in Annex-II of the European Convention on Wild and Nature Habitats (Bern Convention). In addition, 33 species have been placed in Annex-III list of the Bern Convention, including most of the species not included in Appendix II, with a few exceptions. The remaining species are not included in any protection class of the Bern Convention. From this point of view, 38 of the 97 fauna species identified in the area are protected according to the Bern Convention criteria. Approximately 50% of the birds detected in the surveyed areas are species that should be protected according to the Bern Convention.

Turkey is not as high at risk as in the European faunistic system, as it has diverse climatic characters with rich ecosystems and diverse habitats for fauna, and most of the diversity and density of the Western Paleartic fauna population.

According to CITES (Convention on Trade in Endangered Species of Wild Fauna and Flora), the terrestrial vertebrate species *Testudo graeca* (Spur-thighed Tortoise), *Lepus europaeus* (European Hare), *Meles meles* (European Badger), *Herpestes ichneumon* (Eyptian Mongoose), *Sus scrofa* (Wild Boar) App2 (Appendix 2): Species not necessarily threatened with extinction, but their trade must be controlled to avoid utilization incompatible with their survival. It has been evaluated.

According to the decisions of the Central Hunting Commission of the Ministry of Agriculture and Forestry, General Directorate of Nature Conservation National Parks (2021-2022), 4 mammal species in the project area and its area of influence are in the category of mammals in ANNEX-II (whose hunting is allowed in certain periods by the Central Hunting Commission).

Areas Considered as Critical/KBA

Within the scope of the study, 37 stations representing different habitat types located on the railway line, quarries and river crossings and areas where terrestrial faunal species can use as breeding, feeding and sheltering places according to previous studies and habitat suitability, were surveyed in October 2021.

As a result of the assessment of information, obtained as a result of these studies, it has been concluded that a total of 1 nationaly and 4 internationally important areas, where the negative effects of the construction and operation activities of this project may occur, can be considered as "Critical/Key Biodiverty Area (KBA)".

On the railway line, the areas with the following parameters were evaluated as "Critical/KBA":

- Presence of endangered (global- EN-VU- and national scale; A.1.2, A.2, A.3) bird species and their habitats,
- Presence of narrowly distributed (global and national scale) bird species and habitats,
- Crossing of the railway line, quarries, protected areas (such as Important Biodiversity Areas, Wildlife Development Areas, Wetlands of National Importance, National Parks)
- Presence of fauna species that are densely (herd) in the mentioned areas at certain periods of their lives.
- Being a core breeding and wintering area for fauna species
- Being a gene center for fauna species and the area where they continue their evolutionary processes.
- Crossing of the railway line, quarries, protected areas (such as Important Biodiversity Areas, Wildlife Development Areas, Wetlands of National Importance, National Parks)

3.4. Mitigation Measures

In order to ensure the existence and sustainability of the populations of vertebrate species in the area, the precautions to be taken during the installation and operation phases of the project implementation were evaluated.

- All implementation personnel should be informed (via meetings and trainings) about the Vertebrate species identified in the project implementation area.
- All drivers who will work in the project should be trained on Vertebrate species and should be informed about what to do when they encounter Vertebrate species while driving.
- Any activity that may endanger vertebrate species by creating an odor and food source in the project area should be controlled. For example, food scraps or puddles in the area where flies and insects can breed.

Pre-Construction

1 First of all, the construction area should be kept as minimum as possible to minimize disturbance on the vertabrate species. Before the machine activity, the surface cleaning work in the area where the application will be made should be surrounded by flash bands and the limit of the activity area should be determined. Workers should definitely be prevented from leaving this area.

2. Vertebrate species existing in the application area should be removed from the area before the surface is cleaned of vegetation in the area to be applied.

3. If there is a natural water source in the application areas, it should be prevented from drying out and its flow should be ensured.

4. In any field use process, regardless of the size of the area to be used, all existing stones should be removed and the Vertebrate species under them should be allowed to move away (people who will do this application should wear gloves).

5. Especially when the Tortoise is seen, it should be given time to leave the area.

6. Insectivorous species nesting in the under leaves or humus deposits in the area should be removed by striking the surface before starting the excavation in order not to be damaged during the excavation works for construction.

7. In case of encountering any vertebrate species during any area use, the creature should be allowed to leave the area on its own without intervention.

9. Noise, vibration, lighting and other disturbing effects that may occur during construction work should be minimized.

10. Existing roads in the application area should be used whenever possible.

11. The roads to be used should be limited by marking them so that everyone can perceive them.

12. The roads should be formed in such a way that they do not produce dust and accumulate water.

13. By placing signs on the roads, drivers should be warned that they may encounter Vertebrate species (especially in spring and summer; frogs, hedgehogs and snakes).

Construction Phase

1. Vehicle drivers should be trained on Vertebrate species, and they should be informed about the species they may encounter frequently in the area, and what to do when they encounter these species.

2. All outputs (sound, light, exhaust gas, etc.) of the vehicles to be used in transportation should be checked periodically and minimized.

3. Always use low beam headlights in vehicles, especially at night driving.

4. After loading the vehicles, the vehicle's chassis must be covered to prevent the material from spreading to the environment.

5. The maximum speed in the entire area must not exceed 30 km.

6. The facility should be operated by minimizing sound generation during operation.

7. The light sources used by the vehicles should be oriented and non-LED light sources, especially in night operation, so that they do not illuminate the Vertebrate living areas around them.

- **Ecological restoration**

For the minimization of degradation or change in ecosystem services in all kinds of human activities to be carried out in ecosystems;

1. To minimize habitat loss, habitat degradation and habitat fragmentation,

2. To ensure that the species that carry out their niches in the activity area remain in the nearest niche-forming areas = their habitats, not to cut off the connection between the niche-forming areas=habitats of the neighboring populations and the activity area,

3. To restore ecosystem services,

These are the most basic precautions to be taken.

These 4 phenomena are dependent on each other, so applications should be planned, carried out and measures should be taken by considering these 4 ecological facts from the planning to the implementation of the activity and during the operation process. All these processes should be carried out under the supervision and monitoring of experts.

1. Fauna scanning should be done in the area before surface scraping
2. The vegetable soil that comes out of the surface stripping should be specially stocked.
3. Stocked vegetable soil should be used in all surface covering operations.
4. It is a necessary and sufficient condition to use the vegetation in the nearest habitats for planting.
5. Minimization should be a priority in all areas of use
6. Ways of use should be determined.
7. Road edges should be limited.
8. New roads should not be created as much as possible.
9. Restoration should be started by collecting seeds from plant species that have rapid development and ground cover properties from the natural habitats around the area on the roadside and planting them,

- **Training**

All project personnel should receive training on living in harmony with nature (guest host) before project implementations begin.

- **Monitoring Suggestions**

In the planning phase, during the installation and operation process, the studies suggested above should be followed and guided by the fauna specialist.

Before the activity, especially after the areas to be used by surface scraping are determined, abduction and transport-transfer studies should be carried out by scanning the area in order to prevent damage to vertebrate species. Especially in the spring = breeding period, this study should definitely be done and should be done under the supervision of a vertebrate specialist who has at least a doctorate degree.

Table 3-4. Terrestrial Vertebrate Fauna Monitoring Program Table

	Pre-Construction	Construction Process	Operational Phase
Purpose	Revealing the Current Situation. Creating the monitoring program. Performing field training. To carry out fauna scanning in	To remove particularly sensitive species and other fauna elements from the application area before any activity and to prevent their damage.	Monitoring the existence of existing fauna and the continuity of their populations in the ecotone/adjacent regions of the project implementation area during the operation process. Monitoring of ecological

	Pre-Construction	Construction Process	Operational Phase
	areas where surface scraping will be done.		restoration and faunal succession.
Period	2 days on site before field work begins.	2 days in the field during the field use process.	2 days in the field 2 times a year (Spring and autumn)
Practitioner	Fauna Specialist	Fauna Specialist	Fauna Specialist
Method	Fieldwork	Fieldwork	Fieldwork
Report	Weekly and/or Monhtly Reporting depending on the duration of this period.	Daily Field Reports, Monthly Reports	Semi-annual reports

3.5. Conclusion

According to the field observations, literature information and habitat suitability evaluations made in October 2021 in the railway line, its immediate surroundings, quarries and stream crossing areas, it has been determined that there are/may be 57 terrestrial fauna species in the Mersin-Osmaniye section and 97 in the Osmaniye-Gaziantep section.

Considering that the railway line is quite long and passes through many different regions and habitats, the number of identified fauna species in October 2021 might be higher in Spring season and hence, it is clear that additional studies should be carried out in Spring and even Summer season.

Of the 37 stations studied, a total of 5 areas where the negative effects of the construction and operation activities of this project can be seen on the railway line and its immediate surroundings were evaluated as national and international "Critical/Important KBAs".

It was also determined that there are 7 endangered fauna species (Testudo graeca, *Rhinolophus mehelyi*, *Myotis capaccinii, Miniopterus schreibersii, Vormela peregusna , Ursus arctos, Capra aegagrus* IUCN-VU -Sensitive) listed in the IUCN Red List.

Construction activities REC have been started and being continued in areas where there exist contractors other than along these two sections which were named as Mersin-Osmaniye and Osmaniye-Gaziantep. Faunistic studies should be carried out in the spring, summer and autumn periods of 2022 in KBAs in order to determine the effects of construction activities on fauna and to propose mitigation measures, especially in areas that are considered critical/important for fauna, and at least 1 year in the spring-autumn period during the construction period and during the operation period. It is necessary to carry out faunistic monitoring during the periods, to determine the impacts and to determine/implement mitigation measures.

4. AVES (BIRDS)

4.1. Introduction

Migratory Behavior in Birds

About half of more than ten thousand bird species living in the world are dependent on climatic conditions for foraging, breeding, etc. They regularly change their habitats due to their behavior. As they encounter a situation that will negatively affect their feeding and reproduction due to the change in climatic conditions in the habitats they live in, they migrate in line with the following main purposes:

- Reaching richer food sources as a result of deterioration of feeding areas,
- Reaching suitable accommodation environments due to the deterioration of shelter areas,
- To be able to meet the needs of their high metabolism,
- Increasing their competitiveness,
- Reducing resistance to disease agents and parasitic agents,
- To be able to resist predation pressure,
- To produce offspring under better conditions.

The origin of the migration movement dates back to ancient times. It is known that even 150 million years ago, when the first birds appeared, migration to the north and south took place. Regarding this, three hypotheses are put forward;

1. *Major climate changes on our planet*: It is thought that birds migrated northwards in order to find new settlements and food sources in parallel with the retreat of glaciers during the last ice age, which took place between 5 and 15 million years ago.

2. *The search for an unrivaled environment*: Terns living today are cited as an example of this hypothesis. Terns fly from the British Isles to South Africa to spend the winter. This is because they prefer South Africa as a more unrivaled environment.

3. *Continental movements*: Over time, the continents moved away from each other and formed huge inland seas. However, it is thought that the birds continue to travel to and from the regions where they have become accustomed despite the great distances between them. As an example of this, the little aurora reaches Africa from the island of Greenland by crossing the Atlantic Ocean in between.

Migratory bird populations are known to be more advantageous over non-migratory ones. The advantages of birds with their migratory behavior are as follows;

- They prevent the occurrence of high population pressure in a particular region.
- They can benefit from foods with different densities in different regions at different times.
- They are minimally affected by changing environmental conditions.

Birds often return to their previous nests after this inconvenient period, when reproduction usually ceases, has passed. In addition to the above-mentioned advantages, the migration movement also brings some disadvantages for birds. These can be listed as follows;

- Bad weather conditions
- Predators
- Hunters
- Tiredness
- Hunger

Although it causes great losses as a result of such factors, migration is necessary in order to increase the chance of continuation of the species.

Some Migratory Birds and Migratory Types

Birds prefer night or day flight during their migration, depending on their morphology, lifestyle and flight types they use. Large predators such as vultures, eagles, falcons and similar large species such as storks, which do not prefer to fly constantly flapping their wings due to their weight, gain altitude through rising heat waves called thermal, and then travel long distances by gliding, therefore have to continue their migration during daylight hours. Apart from these, bee-eaters and ebabil birds, despite their small size, still fly by using these air currents. Smaller species such as quail, which show active flight by constantly flapping their wings, and nocturnal birds such as owls and night swallows prefer night flight during their migration. One reason why small birds generally prefer nocturnal migration is protection from predators. Some bird species such as starlings, larks and ducks are both day and nocturnal migrants. Since thermals occur only on land, birds such as storks that use this road choose roads with less oversea crossings. Many birds use Gibraltar and the Bosphorus as a gateway while migrating from Europe to Africa.

Some species migrate very close distances. Mountain quails, snow sparrows and great mountain nightingales descend from mountain peaks to the lower parts to escape harsh winter conditions and find food. Most ducks, grebes and loons fly ashore when their breeding lakes freeze.

In many species, only a fraction of the population migrates. The remainder are joined by migrants of the same species, who, at certain times of the year, usually come from further north. The native finches in southern Europe are joined by migrants from the north in winter. Others fly further south, to areas where they only stay in the winter.

Although some bird species were migratory before, it has been observed that they lost their migratory behavior and became completely local species as the living conditions in the regions where they incubated became suitable. As an example, we can give the starlings that were brooding in the Central Anatolian Region in our country and then migrated to the south for wintering. This species has become local to the Central Anatolia Region today. Sometimes the opposite can be seen as well. Small iskete (Serinus serinus) has become a migratory species since it cannot live in these regions continuously, although it spreads to the north.

Migration Height and Speed

During migration, flight altitude varies depending on factors such as whether the air is open or closed, wind direction and speed, atmospheric pressure and landforms. Generally, small birds fly low and large birds fly high. This altitude varies between 100 m and 10000 m. For example, spoonbill ducks (*Anas clypeata*) fly from 3900-4000 m, and geese fly from 10000 m when crossing the Himalayas. *Columba palumbus* prefers an altitude of 2400 m, *Corvus frugilegus* 2500 m and *Grus grus* 4300 m for migration. The bird, which was detected at an altitude of 12000 m during migration and holds the height record, is the Rüppell's Vulture living in Africa.

Birds' visibility also increases in direct proportion to the flight altitude. The theoretical visibility of a flying bird in the open air is 42 km at an altitude of 100 m. This distance increases up to 113 km at an altitude of 1000 m.

The flight speeds of migratory birds during migration are formulated by comparing them with the speeds of vehicles such as cars, airplanes, and helicopters traveling in parallel directions at the same time, and associating them with various angular values. In order to calculate the flight speed of migratory birds and the length of their migration path, it is necessary to know the exact places of hatching and wintering. Radar observations have generally shown that the speed of most birds varies between 30 and 70 km/h when passing over land. The record in this regard belongs to a sandpiper, which an observer in a glider traveling at 150 km/h in 1942 found to be traveling at 180 km/h.

Direction finding

How birds find their way while traveling long distances is still not fully understood. Although it is known that some species acquire their habits of migration routes from birth (instinct), it is thought that there are various methods apart from this. Some species may use more than one of these methods. Diurnal nomads, such as swallows, follow landforms such as mountains and rivers or the sun. The sun is like a compass for birds. They can see ultraviolet and polarized rays emitted from the sun. They can also hear low-frequency sounds emanating from refracting

solar waves. When the sky is covered with clouds, they may have to interrupt their migration movements. Experiments in planetariums in which artificial night skies are animated have shown that some species use the positions of the Moon and stars for migration. Some species, such as the dove, can migrate even on cloudy nights. It is thought that these birds sense the earth's magnetic field and use it to navigate in combination with gravity. In a study conducted in England in 1957, 11,000 starlings were caught by researchers in the Netherlands, transported hundreds of kilometers away to Switzerland and released. Young individuals continued their movements in the direction they had before they were caught and reached Southern France and Spain, unlike traditional wintering areas. Older individuals, on the other hand, re-orientated, compensated for the effect of displacement, and reached their traditional wintering grounds.

Birds do not always follow the same and straight route during their migration. This route changes constantly depending on climatic conditions, wind and air currents. Small passerines such as sparrows have to take a break or die as a result of extreme exhaustion, even if they are in very unfavorable areas, when they encounter adverse wind currents. It has also been observed that migratory birds completely change their migration routes due to climatic conditions. For example, it is known that in some years, because of the negative winds on the Atlantic Ocean, shorebirds settle on the East American coasts or North America instead of coming to Europe.

Some man-made factors cause many birds to die during migration by surprise. Light sources such as airports or lighthouses attract these animals and cause mass deaths in nocturnal bird species. In addition, many birds die by crashing into high towers.

Tracking and Counting Migratory Birds

Birds are tracked and counted with the naked eye or binoculars in sunny and clear weather, radar and radio in slow-flying aircraft and helicopters, individual markings and remote sensing systems. In addition, the movements of the birds can be monitored using various marking techniques.

If you live near a pond, lake or wetland, changes in bird species and individual numbers can be detected within a year. When the birds are counted weekly or monthly and the data is recorded on the tables, it can be observed that migratory species join the native birds for several months.

Importance of Turkey in terms of Bird Migrations

Turkey is an intersection center between the Old World Continents called Asia, Europe and Africa. The strategic importance of Turkey's geographical location was discovered by birds before mankind. Many bird species that brood in Northern and Eastern Europe either come to Anatolia to spend the winter or descend to Africa via Anatolia. During their flight from Central Africa to the north, most of the birds flying very high follow the Nile River to the Eastern

Mediterranean Coast Region, Anatolia and Thrace to reach their breeding grounds in Europe and Asia. However, Turkey provides suitable conditions for migratory birds. Another name for the Anatolian Peninsula is Asia Minor. In other words, it has the characteristics of the Asian Continent on a smaller scale. Ecological variations in different regions of Turkey are extraordinary. Annual precipitation varies approximately tenfold between humid and arid regions.

Birds migrating through Turkey have two main migration routes. Their bottleneck points are the Çoruh Valley in the east and the Bosphorus in the west.

a) **Northeast-South Migration Route (Çoruh Valley):** This route enters Turkey from the Eastern Black Sea Region. It creates a real bottleneck right after the starting point in Turkey. This section is the Borcka – Artvin part of the Coruh River Valley. Between the last week of August and the second week of October, more than 200,000 raptors fly over the Coruh River. This is the largest raptor migration in the Western Palearctic Region. Millions of songbirds fly the same route during this seven-week period. Few storks and very few waterfowl join the others on this path. After Artvin, migratory birds leave the Coruh River Valley and spread to Eastern Anatolia. While some groups head towards Lake Van and Yüksekova, larger groups curve towards the southwest in the direction of Kahramanmaraş and Antakya. Naturally, birds going further south use this route.

b) **Northwest-South Migration Route (Bosphorus):** Compared to the entrance of the Northeast–South migration route, this route is much wider. All of Thrace channels the birds towards the Bosphorus. Only in the south of Thrace very few birds cross the Dardanelles. The migration of white storks over the Bosphorus is one of the most spectacular bird movements in the world. In a three-week period, approximately 250,000 white storks reach Anatolia from Thrace by crossing the Bosphorus. Inseparable flocks of 200-700 can be observed these days, and even larger flocks of white storks can be found. The best spot to observe this beautiful flight of white storks is Camlica Hill. Thermal air currents rising from the slope of Çamlıca hills help storks to rise. Birds of prey also use the Bosphorus for migration. Their migration period is much longer than that of storks. It starts in late August and ends in mid-October. During an autumn, 50 to 60 thousand raptors fly over Çamlıca. Many of these are great shouting eagles and bee hawks.

c) **North–South Migration Route:** Some birds do not migrate long distances because they do not need certain territorial characteristics. They fly easily over large bodies of water. Ducks, geese and swans are the best examples of these types. Some songbird species can also make this type of migration. However, one of the most interesting bird species that can fly over the sea is quail. This small bird of prey can cross the entire Black Sea in one go. Quails start their autumn migration from the Ukrainian coast of Russia and ceaselessly. It reaches the Black Sea coast of Turkey. There are also some non-intercontinental bird migrations. However, the region is also of great importance.

An example of this is the migration of flamingos. Flamingos make short migrations between the central and coastal regions of Turkey. They move to the salty lakes region in the contents in the warm seasons such as mid-spring, and to the lagoons in the Aegean and Mediterranean Regions in the summer, autumn and winter seasons.

4.2. Purpose and Scope

In this study, carried out between Mersin-Gaziantep provinces within the scope of the Mersin Adana Gaziantep (MAG) High Standard Railway Project, ornithological surveys were conducted in October on the route and in the vicinity (see Figure 4-1).

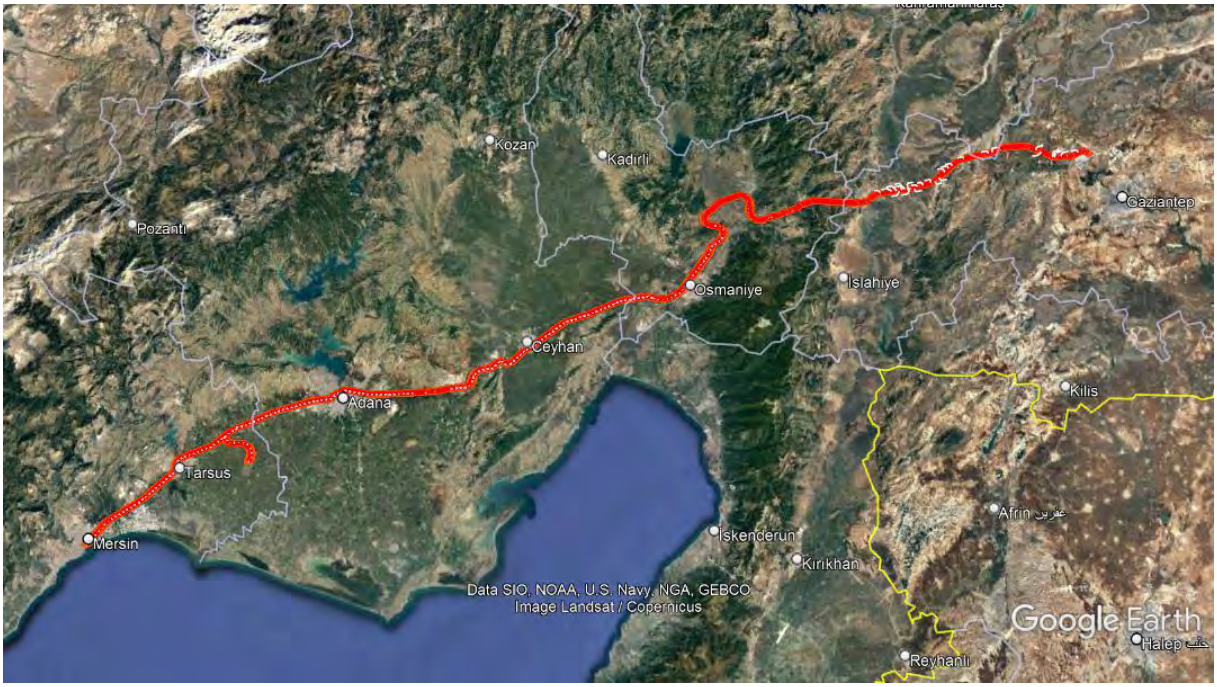


Figure 4-1. Route view of the Railway line.

There are some important bird areas along the proposed high standard railway route between Mersin and Gaziantep provinces. These areas have the potential to be used by migrating birds in spring and autumn. In addition, the Southern assembly point of Turkey's bird migration routes passes over the railway line (see Figure 4-2).

Figure 4-2. Migration routes and railway line view (Railway route = Red line)

Kastabala Valley, Amanos Mountains, Gavur Lake and Yeşilce Protection areas, which are on the railway line and in its vicinity, are on the main migration route. Therefore, the ornithological observations carried out in this project are extremely important for the continuity and protection of the bird population. For this reason, some objectives were determined for the study before the fieldwork was carried out along the railway line. These purposes are;

- To determine the bird species in the project areas and the population densities of the identified species,
- To identify critical/important bird areas for birds in the project areas and to evaluate the relationship of these areas with existing protected areas (National Park, Wildlife Development Area, Important Biodiversity Areas, Wetlands of National Importance, etc. lakes and ponds, rivers-creeks),
- To determine the biological activities of bird species in these areas such as breeding, wintering, accommodation during migration with desktop studies.
- Identifying the areas of breeding, feeding and sheltering at different times of the year with desktop Works.
- Identifying rare, endangered critical bird species that are protected internationally (IUCN, Bern Convention, CITES Convention) and nationally (Turkey Birds Red List, Central Hunting Commission Lists),
- To determine and evaluate the impact (spatial and temporal) of bird species in the project areas during the construction and operation phases of the project,
- To determine the necessary measures to be taken to reduce the possible effects of project activities (during construction and operation periods), especially on breeding,

migratory and wintering bird species, and to determine the ornithological-monitoring study areas and times that should be done in the future periods.

4.3. Methodology

For the purposes of the study, ornitho-faunistic and ornitho-ecological field studies were carried out in October 2021.

The numbers of the Stations where ornithological studies are carried out along the railway line, the stations where the studies are carried out, kilometers, nearby settlements, mid-Coordinates, EUNIS habitat codes-types, and the Protected (Wildlife Development Area, National Park, Nationally Important) Wetland) and Important Biodiversity Areas are presented in Table 4-1.

Table 4-1. Stations where Terrestrial Vertebrate Fauna Studies are Carried Along the Railway Line, Railway Line (R), Quarries (Q), Material Purchase Area (B), EUNIS Habitat Codes

STATION NO	RAILWAY ROUTE /QUARRIES RAILWAY / QUARRIES	LOCATION	COORDINATE	EUNIS	APPLICATION
MERSİN-ADANA-GAZİANTEP					
1	Waste dump site (existing)	KarahacılıVillage	36S 632122 - 4074494 198 m	F.5.2 J.6.6 H.3.6	
2	Limestone quarry (existing) (numbered as Quarry-2 in Contractor's quarry list)	Karakütük tepe	36S 643731 - 4086901 222m	F.5.2 J.3.2 G.3.5	
3	Limestone quarry (existing) (Quarry-1)	Camili Village	36S 643407 - 4086088 228 m	F.5.2 J.3.2 H.3.6 G.3.4	
4	Route-1	Adnan Menderes Village	36S 659630 - 4082065 35m	I.1.2 J.1.1 J.4.1	
5	Concrete plant	ring road junction	36S 665455 - 408522 19 m	I2.21	
6	Route-2		36S 665278 - 4085542 18m	I.1.2 J.1.1 J.4.1.	
7	Route-3 (near Tarsus waterfall)	Tarsus	36S 669124 - 4089146 21m	I2.11	
8	Quarry	Sucular Village	36S 661925 - 4092961 200 m	f.5.2 J3.2 I.1.3 H.3.6	
9	Quarry	Gürlü Vilage	36S 671378 - 4103099 263 m	F.5.2 J.3.2 H.3.6	
10	New train station (Route-4)	railway 43th km	36S 680278 - 4092997 33 m	J 4. 3 J.1.2	

STATION NO	RAILWAY ROUTE /QUARRIES RAILWAY / QUARRIES	LOCATION	COORDINATE	EUNIS	APPLICATION
11	Airport Connection Line	Kargılı Village	36S 684905 - 4089374 15 m	I 1.1	
12	Waste dump site		36S 735340 - 4094850 76 m	J 6.2 J 4.2 I 1.1	
13	Quarry	Yılan kaya	36S 742997 - 4098357 57 m	H3.6 F5.2 J3.2 I 1.1	
14	Limestone quarry (Quarry-4)		36S 743129 - 4098319 63 m	H3.6 F5.2 J3.2 I 1.1	
15	Bozdoğan B-Quarry		36S 764432 - 4090017 107 m	F5.2 I 1.1 J.4.1	
16	Quarry-5 (Basalt quarry)		37S 240445 - 4111503 55 m	H 3.6	Basalt cliffs. A special habitat for terrestrial fauna should therefore not be used. The currently active Şenyıl B material quarry should be used 500 meters ahead.
17	Şenyıl B-quarry		37S 241443 - 4111888 66 m	I 1.1 J3.2	
18	Concrete plant	concrete plant	37S 253566 - 4111179 97 m		
19	Escape tunnel (of Tunnel 5)	worksite	37S 273560 - 4117239 408 m	F 5.2 H3.6	
20	Tunnel-5 entrance	worksite	37S 272559 - 4118945 427 m	F 5.2 I 1.1 G3.7	

STATION NO	RAILWAY ROUTE /QUARRIES RAILWAY / QUARRIES	LOCATION	COORDINATE	EUNIS	APPLICATION
21	Tunnel-4 exit	worksite	37S 272400 - 4120464 423 m	I 1,1 J 1.2 F 5.2	
22	Tunnel-4 entrance	worksite	37S 272831 - 4122255 415 m	F 5.2 J 1.2 G 3.7	
23	Tunnel-1 entrance and exit	worksite	37S 265451 - 4116311 241 m	I 1.2 G 3.7 F5.2	
24	Tunnel-2 exit	worksite	37S 265505 - 4116950 220 m	G 3.7 I 1.2	
25	Tunnel-3 entrances	worksite	37S 265132 - 4117817 239 m	I 1.1 F5.2 G3.7	
26	Tunnel-3 exits	worksite	37S 262095 - 4119763 300 m	I 1.1	
27	Tunnel-5 exit	worksite	37S 276886 - 4117709 513	J 4.2 J 4.3 F5.2	
28	Nurdağı tunnel entrance	worksite	37S 286102 - 4118883 602 m	J 4.2 J 1.2 I 1.1	
29	Nurdağı Tunnel exit	worksite	37S 296647 - 4116171 515 m	F 5.2 H 3.6 J 1.2	
30	Entrance and exit of tunnel at 80.5 km	worksite	37S 302789 - 4117045 533 m	J 4.2 I 1.1 G 3.7	
31	Tunnel entrance	Satırhöyük village	37S 320718 - 4120026 745 m	I 1.1 F.5.2	
32	Route-6		37S 318951 - 4119012 684 m	I 1.1 J 1.2	
33	Başpınar limestone quarry	quarry	37S 33966 - 4115557 993 m	J 3.2	

STATION NO	RAILWAY ROUTE /QUARRIES RAILWAY / QUARRIES	LOCATION	COORDINATE	EUNIS	APPLICATION
34	Tunnel exit at 116 km		37S 342100 - 4116663 978 m	F 5.2 H 3.6 J 3.2	
35	Route-7	Üçgöze village	37S 339435 - 4118736 948 m	I 1.1 F 5.2	
36	Tunnel entrance at 120 km		37S 340976 - 411777 980 m	F 5.2 I 1.1	
37	Tunnel exit at 120 km		37S 337872 - 4119870 950 m	F 5.2 I 1.1	-
Seyhan	Adana Central Train Station		36S 707628 - 4098388	C2.2	
Ceyhan	limestone quarry	Yılan kaya	36S 743851 - 4099149	C2.2	

R: Railway Line**; Q:** Quarry**; B-**Material purchasing area**; CAMP-**Camp area**;**

GPS information and habitat photos of the points where the study was carried out along the railway line are given in Table A-2.

Since the railway line passes over and around many specially protected areas, it is aimed to identify many observation stations. For this purpose, a total of 39 different ornithological study areas were determined along the railway line. Observations were made in 11 of these study areas, which were determined as quarries, 2 as Dump areas, 22 as railway lines and 2 as concrete batching plants.

- Ornithological studies carried out along the railway line were carried out in areas 500 meters away from the right and left sides of the line.
- The studies were carried out at stations with different bird habitats, selected in areas with different vegetation and habitat types, which are important breeding, feeding, sheltering areas for birds and data obtained from previous ornithological studies, in and around the railway line-quarries-special protection areas and its close vicinity.
- Since there are important protection areas for birds along and around the railway line, areas close to the railway line that may be suitable for birds along the line were included in the study during field studies.
- Most of the bird species detected and included in the lists are included in the lists according to the literature and habitat suitability. However, less birds than expected were observed at the observation stations since the October-2021 autumn period, during which field studies were carried out, was the last time of the autumn migration. Therefore, the period in which the study was conducted is a period in which native bird species migrated to the south with the autumn migration were observed. In addition to this situation, it will be clearer to observe the migratory and native bird species that use the area for migration purposes and stay in the area during the winter months.
- According to the findings and evaluations, 18 areas on the railway line and in its immediate vicinity were evaluated as critical/important bird areas. More detailed ornithological studies have been proposed in these areas in the advancing-appropriate (spring-autumn) periods (see. Figure 4-3).

Figure 4-3. Critical/important bird areas on and around the railway line.

- The "**line-transect method**" was applied to determine bird species and population densities in the project area and its immediate surroundings. In the study areas, observations were made with the "**point transsect method**" at 37 different points on the 500-meter line in both directions along the railway line on the protection area from the intersection of the mid-line and the line and the special protection areas, and bird species were recorded.
- Considering the area of influence in the immediate vicinity of the railway line, from the midpoint of the route, using optical devices (binoculars, telescope and tele-lens) to cover an area of 500 meters to the right and left, by walking 1000 meters or at least in each area according to the topography-vegetation conditions. 30 minutes of bird watching and listening to bird sounds were made.
- Species and numbers of birds observed or heard, their bio-ecological activities (feeding, reproduction, wintering) were recorded.
  - ✓ Observer's Name-Surname
  - ✓ Observation Date-Time (start-end)
  - ✓ Locality-Km-Coordinate of the Observation Station
  - ✓ Weather (Cloudy-Rainy-Windy-Clear)
  - ✓ Habitat information of the stations and their immediate surroundings (agricultural area-grassland-pasture-grassland-grove-forest-wetland etc.)
  - ✓ Number of observed bird species-individuals

- ✓ Biological activity of the observed species (wintering, flight, feeding, shelter, reproduction etc.)
- ✓ Presence of breeding colonies (crows, swallows, herons, etc.)
- ✓ Number of nests

- In order to determine bird species, the existence of habitats preferred by birds according to previous studies and literature data, and traces of birds (nests-cubs, feathers, footprints, vomit and feces, identifiable bone fragments) and feeding signs in these determined habitats were also used.
- Interviews and surveys were conducted with the local people and the hunters in the region for the species (related to ornithofauna elements) that could not be determined in the study areas, but whose existence was determined in previous studies in the area.
- • In the prepared bird species list tables, systematic categories (Order-Familya) scientific names and Turkish-English names of each bird species are given in detail.
- Central Hunting Commission Decisions 2020-201 were used as sources for the determination of bird species and national hazard categories.
- The IUCN Red List and the Bern Convention, CITES and European Union Bird Directives will be used as sources for the determination of bird species and international hazard categories.
- Advanced optical instruments (Binocular binoculars and Monocular telescopes) were used in field studies.
- • In addition, some of the birds observed in the field were photographed. For this purpose, Canon 7D-SRL-Mark II, 400 mm telephoto lens was used and photographs of birds that could be taken in the field were attached to the report. The photographs of some bird species that could not be observed but included in the lists according to the literature and habitat suitability were taken from the archive.
- Areas that are endangered nationally and/or internationally and are suitable breeding, sheltering and feeding areas for birds have been evaluated as "Critical/important bird areas".

4.4. Findings and Assessments

The findings obtained from the field and literature studies are presented in this section. Tables and figures, Findings and Evaluations of the ornithological findings of the transition areas on the railway line- its immediate surroundings, quarries and protection areas are presented at the end of the section.

Bird Species

According to the field observations, literature information and habitat suitability assessments made in October 2021, in the railway line / its vicinity, quarries and river crossing areas (project areas) and important protection areas, it has been determined that there are / may be a total of 262 bird species belonging to 18 Order, 52 Families. Of the 262 bird species identified, 65 were added to the list as migratory, and the remaining 197 as native bird species determined from the literature and interviews with the local people in the surrounding area. The systematic categories (Order-Family), scientific, Turkish and English names of these identified bird species are shown in Table 4-2.

Table 4-2. Systematic Categories of Bird Species (Team, Family, Species) Detected According to Field Observations, Literature and Habitat Suitability at the Railway Line, Quarries, Material Receiving Area, Bird Observation Station and -Campground Sites in October 2021, Scientific, Turkish and English Names

#	ORDO	FAMILIA	*SPECIES*	TURKHISH NAME	ENGLISH NAME
1	Podicipediformes	Podicipedidae	*Tachybaptus ruficollis*	Küçük Batağan	Little Grebe
2	Podicipediformes	Podicipedidae	*Podiceps cristatus*	Bahri	Great Crested Grebe
3	Podicipediformes	Podicipedidae	*Podiceps nigricollis*	Kara Boyunlu Batağan	Black-Necked Grebe
4	Suliformes	Phalacrocoracidae	*Phalacrocorax carbo*	Karabatak	Great Cormorant
5	Suliformes	Phalacrocoracidae	*Microcarbo pygmaeus*	Küçük Karabatak	Pygmy Cormorant
6	Pelecaniformes	Pelecanidae	*Pelecanus onocrotalus*	Ak Pelikan	White Pelican
7	Pelecaniformes	Ardeidae	*Botaurus stellaris*	Balaban	Eurasian Bittern
8	Pelecaniformes	Ardeidae	*Ixobrychus minutus*	Küçük Balaban	Little Bittern
9	Pelecaniformes	Ardeidae	*Nycticorax nycticorax*	Gece Balıkçılı	Black-crowned Night Heron
10	Pelecaniformes	Ardeidae	*Ardeola ralloides*	Alaca Balıkçıl	Squacco Heron
11	Pelecaniformes	Ardeidae	*Bubulcus ibis*	Sığır Balıkçılı	Cattle Egret
12	Pelecaniformes	Ardeidae	*Egretta garzetta*	Küçük Ak Balıkçıl	Little Egret
13	Pelecaniformes	Ardeidae	*Ardea alba*	Büyük Ak Balıkçıl	Great White Egret
14	Pelecaniformes	Ardeidae	*Ardea cinerea*	Gri Balıkçıl	Grey Heron
15	Pelecaniformes	Ardeidae	*Ardea purpurea*	Erguvani Balıkçıl	Purple Heron
16	Ciconiiformes	Ciconiidae	*Ciconia nigra*	Kara Leylek	Black Stork
17	Ciconiiformes	Ciconiidae	*Ciconia ciconia*	Leylek	White Stork
18	Pelecaniformes	Threskiornithidae	*Plegadis falcinellus*	Çeltikçi	Glossy Ibis
19	Pelecaniformes	Threskiornithidae	*Platalea leucorodia*	Kaşıkçı	Eurasian Spoonbill
20	Phoenicopteriformes	Phoenicopteridae	*Phoenicopterus roseus*	Flamingo	Greater Flamingo
21	Anseriformes	Anatidae	*Tadorna ferruginea*	Angıt	Ruddy Shelduck
22	Anseriformes	Anatidae	*Tadorna tadorna*	Suna	Shelduck
23	Anseriformes	Anatidae	*Mareca penelope*	Fiyu	Wigeon
24	Anseriformes	Anatidae	*Anas crecca*	Çamurcun	Teal
25	Anseriformes	Anatidae	*Anas platyrhynchos*	Yeşilbaş	Mallard
26	Anseriformes	Anatidae	*Anas acuta*	Kılkuyruk	Pintail

#	ORDO	FAMILIA	*SPECIES*	TURKHISH NAME	ENGLISH NAME
27	Anseriformes	Anatidae	*Spatula querquedula*	Çıkrıkçın	Garganey
28	Anseriformes	Anatidae	*Spatula clypeata*	Kaşıkgaga	Shoveler
29	Anseriformes	Anatidae	*Netta rufina*	Macar Ördeği	Red-Crested Pochard
30	Anseriformes	Anatidae	*Aythya ferina*	Elmabaş Patka	Pochard
31	Anseriformes	Anatidae	*Aythya nyroca*	Pasbaş Patka	Ferruginous Duck
32	Anseriformes	Anatidae	*Oxyura leucocephala*	Dikkuyruk	White-Headed Duck
33	Accipitriformes	Accipitridae	*Pernis apivorus*	Arı Şahini	Honey Buzzard
34	Accipitriformes	Accipitridae	*Milvus migrans*	Kara Çaylak	Black Kite
35	Accipitriformes	Accipitridae	*Haliaeetus albicilla*	Ak Kuyruklu Kartal	White-Tailed Eagle Sea-eagle
36	Accipitriformes	Accipitridae	*Gypaetus barbatus*	Sakallı Akbaba	Lammergeier, Bearded Vulture
37	Accipitriformes	Accipitridae	*Neophron percnopterus*	Küçük Akbaba	Egyptian Vulture
38	Accipitriformes	Accipitridae	*Gyps fulvus*	Kızıl Akbaba	Griffon Vulture
39	Accipitriformes	Accipitridae	*Aegypius monachus*	Kara Akbaba	Black Vulture
40	Accipitriformes	Accipitridae	*Circaetus gallicus*	Yılan Kartalı	Short-Toed Eagle
41	Accipitriformes	Accipitridae	*Circus aeruginosus*	Saz Delicesi	Marsh Harrier
42	Accipitriformes	Accipitridae	*Circus cyaneus*	Gökçe Delice	Hen Harrier
43	Accipitriformes	Accipitridae	*Circus macrourus*	Bozkır Delicesi	Pallid Harrier
44	Accipitriformes	Accipitridae	*Circus pygargus*	Çayır Delicesi	Montagu's Harrier
45	Accipitriformes	Accipitridae	*Accipiter gentilis*	Çakırkuşu	Goshawk
46	Accipitriformes	Accipitridae	*Accipiter nisus*	Atmaca	Sparrowhawk
47	Accipitriformes	Accipitridae	*Accipiter brevipes*	Yoz Atmaca	Levant Sparrowhawk
48	Accipitriformes	Accipitridae	*Buteo buteo*	Şahin	Buzzard
49	Accipitriformes	Accipitridae	*Buteo rufinus*	Kızıl Şahin	Long-Legged Buzzard
50	Accipitriformes	Accipitridae	*Clanga pomarina*	Küçük Orman Kartalı	Lesser Spotted Eagle
51	Accipitriformes	Accipitridae	*Clanga clanga*	Büyük Orman Kartalı	Greater Spotted Eagle
52	Accipitriformes	Accipitridae	*Aquila nipalensis*	Bozkır Kartalı	Steppe Eagle
53	Accipitriformes	Accipitridae	*Aquila heliaca*	Şah Kartal	Imperial Eagle
54	Accipitriformes	Accipitridae	*Aquila chrysaetos*	Kaya Kartalı	Golden Eagle

#	ORDO	FAMILIA	*SPECIES*	TURKHISH NAME	ENGLISH NAME
55	Accipitriformes	Accipitridae	*Hieraaetus pennatus*	Küçük Kartal	Booted Eagle
56	Accipitriformes	Pandionidae	*Pandion haliaetus*	Balık Kartalı	Osprey
57	Falconiformes	Falconidae	*Falco naumanni*	Küçük Kerkenez	Lesser Kestrel
58	Falconiformes	Falconidae	*Falco tinnunculus*	Kerkenez	Kestrel
59	Falconiformes	Falconidae	*Falco eleonorae*	Ada Doğanı	Eleonorae's Falcon
60	Falconiformes	Falconidae	*Falco vespertinus*	Ala Doğan	Red-Footed Falcon
61	Falconiformes	Falconidae	*Falco columbarius*	Boz Doğan	Merlin
62	Falconiformes	Falconidae	*Falco subbuteo*	Delice Doğan	Hobby
63	Falconiformes	Falconidae	*Falco peregrinus*	Gök Doğan	Peregrine
64	Galliformes	Phasianidae	*Alectoris chukar*	Kınalı Keklik	Chukar
65	Galliformes	Phasianidae	*Ammoperdix griseogularis*	Kum Kekliği	See-See Partridge
66	Galliformes	Phasianidae	*Francolinus francolinus*	Turaç	Black Francolin
67	Galliformes	Phasianidae	*Coturnix coturnix*	Bıldırcın	Quail
68	Gruiformes	Rallidae	*Gallinula chloropus*	Sutavuğu	Moorhen
69	Gruiformes	Rallidae	*Porphyrio porphyrio*	Sazhorozu	Purple Gallinule
70	Gruiformes	Rallidae	*Fulica atra*	Sakarmeke	Coot
71	Gruiformes	Gruidae	*Grus grus*	Turna	Crane
72	Charadiiformes	Haematopodidae	*Haematopus ostralegus*	Poyrazkuşu	Eurisan Oystercatcher
73	Charadiiformes	Recurvirostridae	*Himantopus himantopus*	Uzunbacak	Black-Winged Stilt
74	Charadiiformes	Recurvirostridae	*Recurvirostra avosetta*	Kılıçgaga	Avocet
75	Charadiiformes	Burhinidae	*Burhinus oedicnemus*	Kocagöz	Stone Curlew
76	Charadiiformes	Glareolidae	*Glareola pratincola*	Bataklıkkırlangıcı	Collared Pranticole
77	Charadiiformes	Charadriidae	*Charadrius dubius*	Halkalı Küçük Cılıbıt	Little Ringed Plover
78	Charadiiformes	Charadriidae	*Charadrius hiaticula*	Halkalı Cılıbıt	Ringed Plover
79	Charadiiformes	Charadriidae	*Charadrius alexandrinus*	Akça Cılıbıt	Kentish Plover
80	Charadiiformes	Charadriidae	*Pluvialis apricaria*	Altın Yağmurcun	Golden Plover
81	Charadiiformes	Charadriidae	*Pluvialis squatarola*	Gümüş Yağmurcun	Grey Plover
82	Charadiiformes	Charadriidae	*Vanellus spinosus*	Mahmuzlu Kızkuşu	Spur-Winged Plover

#	ORDO	FAMILIA	*SPECIES*	TURKHISH NAME	ENGLISH NAME
83	Charadiiformes	Charadriidae	*Vanellus vanellus*	Kızkuşu	Lapwing
84	Charadiiformes	Scolopacidae	*Calidris canutus*	Büyük Kumkuşu	Knot
85	Charadiiformes	Scolopacidae	*Calidris alba*	Ak Kumkuşu	Sanderling
86	Charadiiformes	Scolopacidae	*Calidris minuta*	Küçük Kumkuşu	Little Stint
87	Charadiiformes	Scolopacidae	*Calidris ferruginea*	Kızıl Kumkuşu	Curlew Sandpiper
88	Charadiiformes	Scolopacidae	*Calidris alpina*	Kara Karınlı Kumkuşu	Dunlin
89	Charadiiformes	Scolopacidae	*Calidris pugnax*	Döğüşkenkuş	Ruff
90	Charadiiformes	Scolopacidae	*Gallinago gallinago*	Su Çulluğu	Snipe
91	Charadiiformes	Scolopacidae	*Limosa limosa*	Çamurçulluğu	Black-Tailed Godwit
92	Charadiiformes	Scolopacidae	*Numenius arquata*	Kervançulluğu	Curlew
93	Charadiiformes	Scolopacidae	*Tringa erythropus*	Kara Kızılbacak	Spotted Redshank
94	Charadiiformes	Scolopacidae	*Tringa totanus*	Kızılbacak	Redshank
95	Charadiiformes	Scolopacidae	*Tringa stagnatilis*	Bataklık Düdükçünü	Marsh Sandpiper
96	Charadiiformes	Scolopacidae	*Tringa nebularia*	Yeşilbacak	Greenshank
97	Charadiiformes	Scolopacidae	*Tringa ochropus*	Yeşil Düdükçün	Green Sandpiper
98	Charadiiformes	Scolopacidae	*Tringa glareola*	Orman Düdükçünü	Wood Sandpiper
99	Charadiiformes	Scolopacidae	*Actitis hypoleucos*	Dere Düdükçünü	Common Sandpiper
100	Charadiiformes	Scolopacidae	*Arenaria interpres*	Taşçeviren	Turnstone
101	Charadiiformes	Laridae	*Larus ichthyaetus*	Büyük Karabaş Martı	Great Black-Headed Gull
102	Charadiiformes	Laridae	*Larus melanocephalus*	Akdeniz Martısı	Mediterranean Gull
103	Charadiiformes	Laridae	*Larus canus*	Küçük Gümüş Martı	Little Gull
104	Charadiiformes	Laridae	*Larus ridibundus*	Karabaş Martı	Black-Headed Gull
105	Charadiiformes	Laridae	*Larus genei*	İnce Gagalı Martı	Slender-Billed Gull
106	Charadiiformes	Laridae	*Larus armenicus*	Van Gölü Martısı	Armenian Gull
107	Charadiiformes	Laridae	*Larus michahellis*	Gümüş Martı	Yellow-legged Gull
108	Charadiiformes	Laridae	*Gelochelidon nilotica*	Gülen Sumru	Gull-Billed Tern
109	Charadiiformes	Laridae	*Hydroprogne caspia*	Hazar Sumrusu	Caspian Tern
110	Charadiiformes	Laridae	*Thalasseus sandvicensis*	Kara Gagalı Sumru	Sandwich Tern

#	ORDO	FAMILIA	*SPECIES*	TURKHISH NAME	ENGLISH NAME
111	Charadiiformes	Laridae	*Sterna hirundo*	Sumru	Common Tern
112	Charadiiformes	Laridae	*Chlidonias hybridus*	Bıyıklı Sumru	Whiskered Tern
113	Charadiiformes	Laridae	*Chlidonias niger*	Kara Sumru	Black Tern
114	Charadiiformes	Laridae	*Chlidonias leucopterus*	Ak Kanatlı Sumru	White-Winged Black Tern
115	Pterocliformes	Pteroclidae	*Pterocles orientalis*	Bağırtlak	Black-Bailled Sandgrouse
116	Columbiformes	Columbidae	*Columba livia*	Kaya Güvercini	Rock Dove
117	Columbiformes	Columbidae	*Columba oenas*	Gökçe Güvercin	Stock Dove
118	Columbiformes	Columbidae	*Columba palumbus*	Tahtalı	Woodpigeon
119	Columbiformes	Columbidae	*Streptopelia decaocto*	Kumru	Collared Dove
120	Columbiformes	Columbidae	*Streptopelia turtur*	Üveyik	Turtle Dove
121	Columbiformes	Columbidae	*Spilopelia senegalensis*	Küçük Kumru	Laughing Dove
122	Cuculiformes	Cuculidae	*Clamator glandarius*	Tepeli Guguk	Great Spotted Cuckoo
123	Cuculiformes	Cuculidae	*Cuculus canorus*	Guguk	Cuckoo
124	Strigiformes	Tytonidae	*Tyto alba*	Peçeli Baykuş	Barn Owl
125	Strigiformes	Strigidae	*Otus scops*	İshakkuşu	Scops Owl
126	Strigiformes	Strigidae	*Bubo bubo*	Puhu	Eagle Owl
127	Strigiformes	Strigidae	*Athene noctua*	Kukumav	Little Owl
128	Strigiformes	Strigidae	*Strix aluco*	Alaca Baykuş	Tawny Owl
129	Strigiformes	Strigidae	*Asio otus*	Kulaklı Orman Baykuşu	Long-Eared Owl
130	Caprimulgiformes	Caprimulgidae	*Caprimulgus europaeus*	Çobanaldatan	Nightjar
131	Caprimulgiformes	Apodidae	*Apus apus*	Ebabil	Swift
132	Caprimulgiformes	Apodidae	*Apus pallidus*	Boz Ebabil	Pallid Swift
133	Caprimulgiformes	Apodidae	*Tachymarptis melba*	Ak Karınlı Ebabil	Alpine Swift
134	Coraciiformes	Alcedinidae	*Halcyon smyrnensis*	İzmir Yalıçapkını	White-Breasted Kingfisher
135	Coraciiformes	Alcedinidae	*Alcedo atthis*	Yalıçapkını	Kingfisher
136	Coraciiformes	Alcedinidae	*Ceryle rudis*	Alaca Yalıçapkını	Pied Kingfisher
137	Coraciiformes	Meropidae	*Merops persicus*	Yeşil Arıkuşu	Blue-Cheeked Bee-Eater
138	Coraciiformes	Meropidae	*Merops apiaster*	Arıkuşu	Bee-Eater

#	ORDO	FAMILIA	*SPECIES*	TURKHISH NAME	ENGLISH NAME
139	Coraciiformes	Coraciidae	*Coracias garrulus*	Gökkuzgun	Roller
140	Bucerotiformes	Upupidae	*Upupa epops*	İbibik	Eurasian Hoopoe
141	Piciformes	Picidae	*Jynx torquilla*	Boyunçeviren	Wryneck
142	Piciformes	Picidae	*Picus viridis*	Yeşil Ağaçkakan	Green Woodpecker
143	Piciformes	Picidae	*Dendrocopos major*	Orman Ağaçkakanı	Great-Spotted Woodpecker
144	Piciformes	Picidae	*Dendrocopos syriacus*	Alaca Ağaçkakan	Syrian Woodpecker
145	Piciformes	Picidae	*Dendrocopos medius*	Ortanca Ağaçkakan	Middle Spotted Woodpecker
146	Piciformes	Picidae	*Dendrocopos minor*	Küçük Ağaçkakan	Lesser Spotted Woodpecker
147	Passeriformes	Alaudidae	*Melanocorypha calandra*	Boğmaklı Toygar	Calandra Lark
148	Passeriformes	Alaudidae	*Melanocorypha bimaculata*	Küçük Boğmaklı Toygar	Bimaculated Lark
149	Passeriformes	Alaudidae	*Calandrella brachydactyla*	Bozkır Toygarı	Short-Toed Lark
150	Passeriformes	Alaudidae	*Calandrella rufescens*	Çorak Toygarı	Lesser Short-Toed Lark
151	Passeriformes	Alaudidae	*Galerida cristata*	Tepeli Toygar	Crested Lark
152	Passeriformes	Alaudidae	*Lullula arborea*	Orman Toygarı	Woodlark
153	Passeriformes	Alaudidae	*Alauda arvensis*	Tarlakuşu	Skylark
154	Passeriformes	Hirundinidae	*Riparia riparia*	Kum Kırlangıcı	Sand Martin
155	Passeriformes	Hirundinidae	*Hirundo rupestris*	Kaya Kırlangıcı	Crag Martin
156	Passeriformes	Hirundinidae	*Hirundo rustica*	Kır Kırlangıcı	Swallow
157	Passeriformes	Hirundinidae	*Hirundo daurica*	Kızıl Kırlangıç	Red-Rumped Swallow
158	Passeriformes	Hirundinidae	*Delichon urbicum*	Ev Kırlangıcı	House Martin
159	Passeriformes	Motacillidae	*Anthus campestris*	Kır İncirkuşu	Tawny Pipit
160	Passeriformes	Motacillidae	*Anthus pratensis*	Çayır İncirkuşu	Meadow Pipit
161	Passeriformes	Motacillidae	*Anthus cervinus*	Kızıl Gerdanlı İncirkuşu	Red-Thorated Pipit
162	Passeriformes	Motacillidae	*Anthus spinoletta*	Dağ İncirkuşu	Water Pipit
163	Passeriformes	Motacillidae	*Motacilla flava*	Sarı Kuyruksallayan	Yellow Wagtail
164	Passeriformes	Motacillidae	*Motacilla citreola*	Sarı Başlı Kuyruksallayan	Citrine Wagtail
165	Passeriformes	Motacillidae	*Motacilla cinerea*	Dağ Kuyruksallayanı	Grey Wagtail
166	Passeriformes	Motacillidae	*Motacilla alba*	Ak Kuyruksallayan	Pied Wagtail

#	ORDO	FAMILIA	*SPECIES*	TURKHISH NAME	ENGLISH NAME
167	Passeriformes	Pycnonotidae	*Pycnonotus xanthopygos*	Arap Bülbülü	Yellow-Vented Bulbul
168	Passeriformes	Troglodytidae	*Troglodytes troglodytes*	Çıtkuşu	Wren, Winter Wren
169	Passeriformes	Muscicapidae	*Erythropygia galactotes*	Çalı Bülbülü	Rufous Bush Robin
170	Passeriformes	Muscicapidae	*Erithacus rubecula*	Kızılgerdan	Robin
171	Passeriformes	Muscicapidae	*Luscinia luscinia*	Benekli Bübül	Thrush Nightingale
172	Passeriformes	Muscicapidae	*Luscinia megarhynchos*	Bülbül	Nightingale
173	Passeriformes	Muscicapidae	*Luscinia svecica*	Mavigerdan	Bluethroat
174	Passeriformes	Muscicapidae	*Irania gutturalis*	Taş Bülbülü	White-Thorated Robin
175	Passeriformes	Muscicapidae	*Phoenicurus ochruros*	Kara Kızılkuyruk	Black Redstart
176	Passeriformes	Muscicapidae	*Phoenicurus phoenicurus*	Kızılkuyruk	Redstart
177	Passeriformes	Muscicapidae	*Saxicola rubetra*	Çayır Taşkuşu	Whinchat
178	Passeriformes	Muscicapidae	*Saxicola torquata*	Taşkuşu	Stonechat
179	Passeriformes	Muscicapidae	*Oenanthe isabellina*	Boz Kuyrukkakan	Isabellina Wheatear
180	Passeriformes	Muscicapidae	*Oenanthe oenanthe*	Kuyrukkakan	Northern Wheatear
181	Passeriformes	Muscicapidae	*Oenanthe hispanica*	Kara Kulaklı Kuyrukkakan	Black-Eared Wheatear
182	Passeriformes	Muscicapidae	*Oenanthe finschii*	Ak Sırtlı Kuyrukkakan	Finsch's Wheatear
183	Passeriformes	Muscicapidae	*Monticola solitarius*	Gökardıç	Blue Rock Thrush
184	Passeriformes	Turdidae	*Turdus merula*	Karatavuk	Blackbird
185	Passeriformes	Turdidae	*Turdus pilaris*	Tarla Ardıcı	Fieldfare
186	Passeriformes	Turdidae	*Turdus philomelos*	Öter Ardıç	Song Thrush
187	Passeriformes	Turdidae	*Turdus viscivorus*	Ökse Ardıcı	Mistle Thursh
188	Passeriformes	Sylviidae	*Cettia cetti*	Kamış Bülbülü	Cetti's Warbler
189	Passeriformes	Cisticolidae	*Cisticola juncidis*	Yelpazekuyruk	Fan-Tailed Warbler
190	Passeriformes	Cisticolidae	*Prinia gracilis*	Dikkuyruklu Ötleğen	Graceful Warbler
191	Passeriformes	Sylviidae	*Acrocephalus melanopogon*	Bıyıklı Kamışçın	Moustached Warbler
192	Passeriformes	Sylviidae	*Acrocephalus schoenobaenus*	Kındıra Kamışçını	Sedge Warbler
193	Passeriformes	Sylviidae	*Acrocephalus palustris*	Çalı Kamışçını	Marsh Warbler
194	Passeriformes	Sylviidae	*Acrocephalus scirpaceus*	Saz Kamışçını	Reed Warbler

#	ORDO	FAMILIA	*SPECIES*	TURKHISH NAME	ENGLISH NAME
195	Passeriformes	Sylviidae	*Acrocephalus arundinaceus*	Büyük Kamışçın	Great Reed Warbler
196	Passeriformes	Sylviidae	*Hippolais pallida*	Ak Mukallit	Olivaceous Warbler
197	Passeriformes	Sylviidae	*Hippolais olivetorum*	Zeytin Mukallidi	Olive-Tree Warbler
198	Passeriformes	Sylviidae	*Sylvia cantillans*	Bıyıklı Ötleğen	Subalpine Warbler
199	Passeriformes	Sylviidae	*Sylvia melanocephala*	Maskeli Ötleğen	Sardinian Warbler
200	Passeriformes	Sylviidae	*Sylvia rueppelli*	Kara Boğazlı Ötleğen	Rüppel's Warbler
201	Passeriformes	Sylviidae	*Sylvia hortensis*	Ak Gözlü Ötleğen	Orphean Warbler
202	Passeriformes	Sylviidae	*Sylvia curruca*	Küçük Ak Gerdanlı Ötleğen	Lesser Whitethroat
203	Passeriformes	Sylviidae	*Sylvia communis*	Ak Gerdanlı Ötleğen	Whitethroat
204	Passeriformes	Sylviidae	*Sylvia borin*	Boz Ötleğen	Garden Warbler
205	Passeriformes	Sylviidae	*Sylvia atricapilla*	Kara Başlı Ötleğen	Blackcap
206	Passeriformes	Sylviidae	*Phylloscopus bonelli*	Boz Çıvgın	Eastern Bonelli's Warbler
207	Passeriformes	Sylviidae	*Phylloscopus collybita*	Çıvgın	Chiffchaff
208	Passeriformes	Sylviidae	*Phylloscopus trochilus*	Söğütbülbülü	Willow Warbler
209	Passeriformes	Reguliidae	*Regulus regulus*	Çalıkuşu	Goldcrest
210	Passeriformes	Reguliidae	*Regulus ignicapillus*	Sürmeli Çalıkuşu	Firecrest
211	Passeriformes	Muscicapidae	*Muscicapa striata*	Benekli Sinekkapan	Spotted flycatcher
212	Passeriformes	Muscicapidae	*Ficedula parva*	Küçük Sinekkapan	Red-breasted flycatcher
213	Passeriformes	Timaliidae	*Panurus biarmicus*	Bıyıklı Baştankara	Bearded Tit
214	Passeriformes	Aegithalidae	*Aegithalos caudatus*	Uzun Kuyruklu Baştankara	Long-Tailed Tit
215	Passeriformes	Paridae	*Parus lugubris*	Ak Yanaklı Baştankara	Sombre Tit
216	Passeriformes	Paridae	*Parus ater*	Çam baştankarası	Coal Tit
217	Passeriformes	Paridae	*Parus caeruleus*	Mavi Baştankara	Blue Tit
218	Passeriformes	Paridae	*Parus major*	Büyük Baştankara	Great Tit
219	Passeriformes	Sittidae	*Sitta krueperi*	Anadolu Sıvacısı	Krüper's Nuthatch
220	Passeriformes	Sittidae	*Sitta europaea*	Sıvacı	Nuthatch
221	Passeriformes	Sittidae	*Sitta tephronota*	Büyük Kaya Sıvacısı	Eastern Rock Nuthatch
222	Passeriformes	Sittidae	*Sitta neumayer*	Kaya Sıvacısı	Rock Nuthatch

#	ORDO	FAMILIA	*SPECIES*	TURKHISH NAME	ENGLISH NAME
223	Passeriformes	Certhiidae	*Certhia familiaris*	Orman Tırmaşıkkuşu	Tree Creeper
224	Passeriformes	Certhiidae	*Certhia brachydactyla*	Bahçe Tırmaşıkkuşu	Short-Toed Tree Creeper
225	Passeriformes	Remizidae	*Remiz pendulinus*	Çulhakuşu	Penduline Tit
226	Passeriformes	Oriolidae	*Oriolus oriolus*	Sarıasma	Golden Oriole
227	Passeriformes	Laniidae	*Lanius collurio*	Kızıl Sırtlı Örümcekkuşu	Red-Backed Shrike
228	Passeriformes	Laniidae	*Lanius minor*	Kara Alınlı Örümekkuşu	Lesser Grey Shrike
229	Passeriformes	Laniidae	*Lanius senator*	Kızıl Başlı Örümcekkuşu	Woodchat Shrike
230	Passeriformes	Laniidae	*Lanius nubicus*	Maskeli Örümcekkuşu	Masked Shrike
231	Passeriformes	Corvidae	*Garrulus glandarius*	Alakarga	Jay, Eurasian Jay
232	Passeriformes	Corvidae	*Pica pica*	Saksağan	Magpie, Black-billed Magpie
233	Passeriformes	Corvidae	*Corvus monedula*	Küçük Karga	Jackdaw, Eurasian Jackdaw
234	Passeriformes	Corvidae	*Corvus frugilegus*	Ekin Kargası	Rook
235	Passeriformes	Corvidae	*Corvus cornix*	Leş Kargası	Hooded Crow
236	Passeriformes	Corvidae	*Corvus corax*	Kuzgun	Raven
237	Passeriformes	Sturnidae	*Sturnus vulgaris*	Sığırcık	Starling
238	Passeriformes	Sturnidae	*Sturnus roseus*	Alasığırcık	Rose-Coloured Starling
239	Passeriformes	Passeridae	*Passer domesticus*	Serçe	House Sparrow
240	Passeriformes	Passeridae	*Passer hispaniolensis*	Söğüt Serçesi	Spanish Sparrow
241	Passeriformes	Passeridae	*Passer moabiticus*	Küçük serçe	Dead Sea Sparrow
242	Passeriformes	Passeridae	*Passer montanus*	Ağaç Serçesi	Tree Sparrow
243	Passeriformes	Passeridae	*Carpospiza brachydactyla*	Boz Serçe	Pale Rock Sparrow
244	Passeriformes	Passeridae	*Petronia xanthocollis*	Sarı Boğazlı Serçe	Yellow-Throated Sparrow
245	Passeriformes	Passeridae	*Petronia petronia*	Kaya Serçesi	Rock Sparrow
246	Passeriformes	Fringillidae	*Fringilla coelebs*	İspinoz	Chaffinch
247	Passeriformes	Fringillidae	*Serinus serinus*	Küçük İskete	Serin
248	Passeriformes	Fringillidae	*Carduelis chloris*	Florya	Greenfinch
249	Passeriformes	Fringillidae	*Carduelis carduelis*	Saka	Goldfinch
250	Passeriformes	Fringillidae	*Carduelis spinus*	Karabaşlı İskete	Siskin

#	ORDO	FAMILIA	*SPECIES*	TURKHISH NAME	ENGLISH NAME
251	Passeriformes	Fringillidae	*Carduelis cannabina*	Ketenkuşu	Linnet
252	Passeriformes	Fringillidae	*Rhodopechys obsoletus*	Boz Alamecek	Desert Finch
253	Passeriformes	Fringillidae	*Coccothraustes coccothraustes*	Kocabaş	Hawfinch
254	Passeriformes	Emberizidae	*Emberiza citrinella*	Sarı Kirazkuşu	Yellowhammer
255	Passeriformes	Emberizidae	*Emberiza cirlus*	Bahçe Kirazkuşu	Cirl Bunting
256	Passeriformes	Emberizidae	*Emberiza cia*	Kaya Kirazkuşu	Rock Bunting
257	Passeriformes	Emberizidae	*Emberiza cineracea*	Boz Kirazkuşu	Cinereous Bunting
258	Passeriformes	Emberizidae	*Emberiza hortulana*	Kirazkuşu	Ortolan
259	Passeriformes	Emberizidae	*Emberiza caesia*	Kızıl Kirazkuşu	Cretzschmar's Bunting
260	Passeriformes	Emberizidae	*Emberiza schoeniclus*	Bataklık Kirazkuşu	Reed Bunting
261	Passeriformes	Emberizidae	*Emberiza melanocephala*	Karabaşlı Kirazkuşu	Black-Headed Bunting
262	Passeriformes	Emberizidae	*Miliaria calandra*	Tarla Kirazkuşu	Corn Bunting

The bird species/numbers at the study stations and the presence of internationally and nationally endangered species of these bird species were used as the basic parameters in evaluating the area in question as a critical/important bird area.

Some of the bird species identified and included in the lists are included in the lists according to the literature and habitat suitability. Because the field studies are carried out in the autumn period of October 2021, it consists of native birds that use the area for rest and feeding during the autumn migration period and are constantly in the area.

There are approximately 500 bird species registered in the Turkish ornithofauna. At this stage, migratory and native bird species (262 bird species) that are/may be in the project areas represent 1/2 of Turkey's ornithofauna. In fact, it was considered normal that the number of bird species detected was somewhat low, given that the railway line is quite long and passes through many different regions and habitats, and also because it is in the late autumn migration period.

In addition, certain kilometers of critical bird habitats and critical bird species in certain areas were determined in some areas where the line passes, and determinations, evaluations and recommendations regarding these areas are presented in the following sections of the report.

In the observations made in the autumn period of October 2021 in the study areas, it was determined that the population density of bird species may be less compared to the spring period. For this reason, ornithological studies should be carried out in the spring and autumn migration periods, especially in habitats where critical bird species are present in terms of project activities.

Threatened/Protection Categories of Bird Species

The international and national threatened/protection categories and statuses of the bird species determined according to the literature and habitat suitability with the field observations made in the railway line, quarries, river crossings and important protection areas are presented in Table 4-3. Explanations about the abbreviations used in Table 4-3 are shown in Appendix - G

Table 4-3. International and National Threatened/Conservation Categories and Status of Detected Bird Species

SPECIES	IUCN	BERN	CITES	EU Bird Directive	STATUS	MAK
Tachybaptus ruficollis	LC	Annex-II			Y	
Podiceps cristatus	LC	Annex-III			Y	
Podiceps nigricollis	LC	Annex-II			Y	
Phalacrocorax carbo	LC	Annex-III			Y	Annex-I
Microcarbo pygmaeus	LC	Annex-II			Y	
Pelecanus onocrotalus	LC	Annex-II		Annex-I	Y	
Botaurus stellaris	LC	Annex-II		Annex-I	Y	

SPECIES	IUCN	BERN	CITES	EU Bird Directive	STATUS	MAK
Ixobrychus minutus	LC	Annex-II		Annex-I	Y	
Nycticorax nycticorax	LC	Annex-II		Annex-I	Y	
Ardeola ralloides	LC	Annex-II		Annex-I	Y	
Bubulcus ibis	LC	Annex-II			Y	
Egretta garzetta	LC	Annex-II		Annex-I	Y	
Ardea alba	LC	Annex-II		Annex-I	Y	
Ardea cinerea	LC	Annex-III			Y	Annex-I
Ardea purpurea	LC	Annex-II		Annex-I	Y	
Ciconia nigra	LC	Annex-II	Annex-II	Annex-I	GY	
Ciconia ciconia	LC	Annex-II		Annex-I	GY	
Plegadis falcinellus	LC	Annex-II		Annex-I	Y	
Platalea leucorodia	LC	Annex-II	Annex-II	Annex-I	Y	
Phoenicopterus roseus	LC	Annex-II	_		Y	
Tadorna ferruginea	LC	Annex-II		Annex-I	Y	
Tadorna tadorna	LC	Annex-II			Y	
Mareca penelope	LC	Annex-III		Annex-II-A,Annex-III-B	Y	Annex-II
Anas crecca	LC	Annex-III		Annex-II-A,Annex-III-B	Y	Annex-II
Anas platyrhynchos	LC	Annex-III		Annex-II-A, Annex-III-A	Y	Annex-II
Anas acuta	LC	Annex-III		Annex-II-A,Annex-III-B	Y	Annex-II
Spatula querquedula	LC	Annex-III		Annex-II-A	Y	Annex-II
Spatula clypeata	LC	Annex-III		Annex-II-A,Annex-III-B	Y	Annex-I
Netta rufina	LC	Annex-III		Annex-II-B	Y	Annex-II
Aythya ferina	VU	Annex-III		Annex-II-A,Annex-III-B	Y	Annex-II
Aythya nyroca	NT	Annex-III		Annex-I	Y	
Oxyura leucocephala	EN	Annex-II	Annex-II	Annex-I	Y	
Pernis apivorus	LC	Annex-II	_	Annex-I	Y	
Milvus migrans	LC	Annex-II	_	Annex-I	Y	
Haliaeetus albicilla	LC	Annex-II	Annex-I		Y	
Gypaetus barbatus	NT	Annex-II	_	Annex-I	Y	
Neophron percnopterus	EN	Annex-II	_	Annex-I	Y	
Gyps fulvus	LC	Annex-II	_	Annex-I	Y	
Aegypius monachus	NT	Annex-II	_	Annex-I	Y	
Circaetus gallicus	LC	Annex-II	_	Annex-I	Y	
Circus aeruginosus	LC	Annex-II	_	Annex-I	Y	
Circus cyaneus	LC	Annex-II	_	Annex-I	Y	
Circus macrourus	NT	Annex-II	_	Annex-I	Y	
Circus pygargus	LC	Annex-II	_	Annex-I	G	
Accipiter gentilis	LC	Annex-II	_	Annex-I	Y	
Accipiter nisus	LC	Annex-II	_	Annex-I	Y	
Accipiter brevipes	LC	Annex-II	_	Annex-I	Y	
Buteo buteo	LC	Annex-II	_		Y	

SPECIES	IUCN	BERN	CITES	EU Bird Directive	STATUS	MAK
Buteo rufinus	LC	Annex-II	_	Annex-I	Y	
Clanga pomarina	LC	Annex-II	_	Annex-I	G,T	
Clanga clanga	VU	Annex-II	_	Annex-I	K	
Aquila nipalensis	EN	Annex-II	_		Y	
Aquila heliaca	VU	Annex-II	Annex-I	Annex-I	Y	
Aquila chrysaetos	LC	Annex-II	_	Annex-I	Y	
Hieraaetus pennatus	LC	Annex-II	_	Annex-I	Y	
Pandion haliaetus	LC	Annex-II	_	Annex-I	Y	
Falco naumanni	LC	Annex-II	_	Annex-I	Y	
Falco tinnunculus	LC	Annex-II	_		Y	
Falco eleonorae	LC	Annex-II	_	Annex-I	Y	
Falco vespertinus	NT	Annex-II	_	Annex-I	T	
Falco columbarius	LC	Annex-II	_	Annex-I	K	
Falco subbuteo	LC	Annex-II	_		Y	
Falco peregrinus	LC	Annex-II	Annex-I	Annex-I	Y	
Alectoris chukar	LC	Annex-III		Annex-II-B	Y	Annex-II
Ammoperdix griseogularis	LC	Annex-III			G	Annex-II
Francolinus francolinus	LC	Annex-III		Annex-II-B	Y	
Coturnix coturnix	LC	Annex-III		Annex-II-B	Y	Annex-II
Gallinula chloropus	LC	Annex-III		Annex-II-B	Y	Annex-I
Porphyrio porphyrio	LC	Annex-II			Y	
Fulica atra	LC	Annex-III		Annex-II-A,Annex-III-B	Y	Annex-II
Grus grus	LC	Annex-II	_	Annex-I	Y,T	
Haematopus ostralegus	NT	Annex-III		Annex-II-B	G,T	Annex-I
Himantopus himantopus	LC	Annex-II		Annex-I	Y	
Recurvirostra avosetta	LC	Annex-II		Annex-I	Y	
Burhinus oedicnemus	LC	Annex-II		Annex-I	G,Y	
Glareola pratincola	LC	Annex-II		Annex-I	G,Y	
Charadrius dubius	LC	Annex-II			Y	
Charadrius hiaticula	LC	Annex-II			T,K	
Charadrius alexandrinus	LC	Annex-II		Annex-I	Y	
Pluvialis apricaria	LC	Annex-III		Annex-II-B,Annex-III-B	K	Annex-I
Pluvialis squatarola	LC	Annex-III		Annex-II-B	K	Annex-I
Vanellus spinosus	LC	Annex-II			G	
Vanellus vanellus	NT	Annex-III		Annex-II-B	Y	Annex-I
Calidris canutus	NT	Annex-III		Annex-II-B	T,K	Annex-I
Calidris alba	LC	Annex-II			K	
Calidris minuta	LC	Annex-II			K	
Calidris ferruginea	NT	Annex-II			K	
Calidris alpina	LC	Annex-II		Annex-I	K	
Calidris pugnax	LC	Annex-III		Annex-II-B	T,K	Annex-I
Gallinago gallinago	LC	Annex-III		Annex-II-A,Annex-III-B	K	Annex-II

SPECIES	IUCN	BERN	CITES	EU Bird Directive	STATUS	MAK
Limosa limosa	NT	Annex-III		Annex-II-B	K	Annex-I
Numenius arquata	NT	Annex-III		Annex-II-B	K	Annex-I
Tringa erythropus	LC	Annex-III			K	Annex-I
Tringa totanus	LC	Annex-III		Annex-II-B	Y	Annex-I
Tringa stagnatilis	LC	Annex-II			K,T	
Tringa nebularia	LC	Annex-III		Annex-II-B	K,T	Annex-I
Tringa ochropus	LC	Annex-II			K,T	
Tringa glareola	LC	Annex-II		Annex-I	T	
Actitis hypoleucos	LC	Annex-III			G	
Arenaria interpres	LC	Annex-II			T	
Larus ichthyaetus	LC	Annex-III			K	Annex-I
Larus melanocephalus	LC	Annex-II		Annex-I	Y	
Larus canus	LC	Annex-II		Annex-I	K	
Larus ridibundus	LC	Annex-III		Annex-II-B	Y	Annex-I
Larus genei	LC	Annex-II		Annex-I	K	
Larus armenicus	NT	Annex-III			Y	Annex-I
Larus michahellis	LC	Annex-III			Y	Annex-I
Gelochelidon nilotica	LC	Annex-II		Annex-I	Y	
Hydroprogne caspia	LC	Annex-II		Annex-I	Y	
Thalasseus sandvicensis	LC	Annex-II		Annex-I	Y	
Sterna hirundo	LC	Annex-II		Annex-I	Y	
Chlidonias hybridus	LC	Annex-II		Annex-I	Y	
Chlidonias niger	LC	Annex-II		Annex-I	Y	
Chlidonias leucopterus	LC	Annex-II			Y	
Pterocles orientalis	LC	Annex-II		Annex-I	Y	Annex-I
Columba livia	LC	Annex-III		Annex-II-A	Y	Annex-II
Columba oenas	LC	Annex-III		Annex-II-B	Y	Annex-I
Columba palumbus	LC	-		Annex-II-A,Annex-III-A	Y	Annex-II
Streptopelia decaocto	LC	Annex-III		Annex-II-B	Y	Annex-I
Streptopelia turtur	VU	Annex-III		Annex-II-B	G	Annex-II
Spilopelia senegalensis	LC	Annex-III			Y	Annex-I
Clamator glandarius	LC	Annex-II			G	
Cuculus canorus	LC	Annex-III			G	
Tyto alba	LC	Annex-II	_		Y	
Otus scops	LC	Annex-II	_		Y	
Bubo bubo	LC	Annex-II	_	Annex-I	Y	
Athene noctua	LC	Annex-II	_		Y	
Strix aluco	LC	Annex-II	_		Y	
Asio otus	LC	Annex-II	_		Y	
Caprimulgus europaeus	LC	Annex-II		Annex-I	G	
Apus apus	LC	Annex-III			G	
Apus pallidus	LC	Annex-II			G	
Tachymarptis melba	LC	Annex-II			G	

SPECIES	IUCN	BERN	CITES	EU Bird Directive	STATUS	MAK
Halcyon smyrnensis	LC	Annex-II			Y	
Alcedo atthis	LC	Annex-II		Annex-I	Y	
Ceryle rudis	LC	Annex-II			Y	
Merops persicus	LC	Annex-III			G	
Merops apiaster	LC	Annex-II			G	
Coracias garrulus	LC	Annex-II		Annex-I	G	
Upupa epops	LC	Annex-II			G	
Jynx torquilla	LC	Annex-II			G	
Picus viridis	LC	Annex-II			Y	
Dendrocopos major	LC	Annex-II		Annex-I	Y	
Dendrocopos syriacus	LC	Annex-II		Annex-I	Y	
Dendrocopos medius	LC	Annex-II		Annex-I	Y	
Dendrocopos minor	LC	Annex-II			Y	
Melanocorypha calandra	LC	Annex-II		Annex-I	Y	
Melanocorypha bimaculata	LC	Annex-II			Y	
Calandrella brachydactyla	LC	Annex-II		Annex-I	Y	
Calandrella rufescens	LC	Annex-II			Y	
Galerida cristata	LC	Annex-III			Y	Annex-I
Lullula arborea	LC	Annex-III		Annex-I	Y	Annex-I
Alauda arvensis	LC	Annex-III		Annex-II-B	Y	Annex-I
Riparia riparia	LC	Annex-II			G	
Hirundo rupestris	LC	Annex-II			G	
Hirundo rustica	LC	Annex-II			G	
Hirundo daurica	LC	Annex-II			G	
Delichon urbicum	LC	Annex-II			G	
Anthus campestris	LC	Annex-II		Annex-I	G	
Anthus pratensis	NT	Annex-II			G	
Anthus cervinus	LC	Annex-II			G	
Anthus spinoletta	LC	Annex-II			Y	
Motacilla flava	LC	Annex-II			G	
Motacilla citreola	LC	Annex-II			G,Y	
Motacilla cinerea	LC	Annex-II			Y	
Motacilla alba	LC	Annex-II			Y	
Pycnonotus xanthopygos	LC	Annex-III			Y	
Troglodytes troglodytes	LC	Annex-II		Annex-I	Y	
Erythropygia galactotes	LC	Annex-II			G	
Erithacus rubecula	LC	Annex-II			Y	
Luscinia luscinia	LC	Annex-II			G,T	
Luscinia megarhynchos	LC	Annex-II			G	
Luscinia svecica	LC	Annex-II		Annex-I	G,Y	
Irania gutturalis	LC	Annex-II			Y	
Phoenicurus ochruros	LC	Annex-II			R	
Phoenicurus phoenicurus	LC	Annex-II			Y	
Saxicola rubetra	LC	Annex-II			Y	

SPECIES	IUCN	BERN	CITES	EU Bird Directive	STATUS	MAK
Saxicola torquata	LC	Annex-II			Y	
Oenanthe isabellina	LC	Annex-II			Y	Annex-I
Oenanthe oenanthe	LC	Annex-II			G	Annex-I
Oenanthe hispanica	LC	Annex-II			G	
Oenanthe finschii	LC	Annex-II			G,Y	
Monticola solitarius	LC	Annex-II			Y	
Turdus merula	LC	Annex-III		Annex-II-B	Y	Annex-II
Turdus pilaris	LC	Annex-III		Annex-II-B	K	Annex-I
Turdus philomelos	LC	Annex-III		Annex-II-B	Y	Annex-II
Turdus viscivorus	LC	Annex-III		Annex-II-B	Y	Annex-I
Cettia cetti	LC	Annex-III			Y	
Cisticola juncidis	LC	Annex-III			Y	
Prinia gracilis	LC	Annex-III			Y	
Acrocephalus melanopogon	LC	Annex-III		Annex-I	G	
Acrocephalus schoenobaenus	LC	Annex-III			G	
Acrocephalus palustris	LC	Annex-III			G	
Acrocephalus scirpaceus	LC	Annex-III			G	
Acrocephalus arundinaceus	LC	Annex-III			G	
Hippolais pallida	LC	Annex-III			G	
Hippolais olivetorum	LC	Annex-III		Annex-I	G	
Sylvia cantillans	LC	Annex-II			G	
Sylvia melanocephala	LC	Annex-II			Y	
Sylvia rueppelli	LC	Annex-II		Annex-I	G	
Sylvia hortensis	LC	Annex-II			G	
Sylvia curruca	LC	Annex-II			G	
Sylvia communis	LC	Annex-II			G	
Sylvia borin	LC	Annex-II			T	
Sylvia atricapilla	LC	Annex-II			G	
Phylloscopus bonelli	LC	Annex-II			Y	
Phylloscopus collybita	LC	Annex-II			Y	
Phylloscopus trochilus	LC	Annex-II			G	
Regulus regulus	LC	Annex-II			Y	
Regulus ignicapillus	LC	Annex-II			Y	
Muscicapa striata	LC	Annex-II			G	
Ficedula parva	LC	Annex-II		Annex-I	T	
Panurus biarmicus	LC	Annex-II			Y	
Aegithalos caudatus	LC	Annex-III			Y	Annex-I
Parus lugubris	LC	Annex-II			Y	
Parus ater	LC	Annex-II		Annex-I	Y	
Parus caeruleus	LC	Annex-II			Y	
Parus major	LC	Annex-II			Y	
Sitta krueperi	LC	Annex-II			Y	
Sitta europaea	LC	Annex-II			Y	

SPECIES	IUCN	BERN	CITES	EU Bird Directive	STATUS	MAK
Sitta tephronota	LC	Annex-II			Y	
Sitta neumayer	LC	Annex-II			Y	
Certhia familiaris	LC	Annex-II			Y	
Certhia brachydactyla	LC	Annex-II		Annex-I	Y	
Remiz pendulinus	LC	Annex-III			Y	Annex-I
Oriolus oriolus	LC	Annex-II			G	
Lanius collurio	LC	Annex-II			G	Annex-I
Lanius minor	LC	Annex-II		Annex-I	G	
Lanius senator	LC	Annex-II			Y	
Lanius nubicus	LC	Annex-II			G	
Garrulus glandarius	LC	–			Y	Annex-II
Pica pica	LC	-			Y	Annex-II
Corvus monedula	LC	-			Y	Annex-II
Corvus frugilegus	LC	-			Y	Annex-II
Corvus cornix	LC	-			Y	Annex-II
Corvus corax	LC	Annex-III			Y	Annex-I
Sturnus vulgaris	LC	-			Y	Annex-I
Sturnus roseus	LC	Annex-II			G	
Passer domesticus	LC	-			Y	Annex-II
Passer hispaniolensis	LC	Annex-III			Y	Annex-I
Passer moabiticus	LC	Annex-III			Y	Annex-I
Passer montanus	LC	Annex-III			Y	Annex-I
Carpospiza brachydactyla	LC	Annex-III			G	
Petronia xanthocollis	LC	Annex-III			G	Annex-I
Petronia petronia	LC	Annex-II			Y	
Fringilla coelebs	LC	Annex-III			Y	Annex-I
Serinus serinus	LC	Annex-II			Y	
Carduelis chloris	LC	Annex-II			Y	
Carduelis carduelis	LC	Annex-II			Y	
Carduelis spinus	LC	Annex-II			Y	
Carduelis cannabina	LC	Annex-II			Y	
Rhodopechys obsoletus	LC	Annex-III			G	Annex-I
Coccothraustes coccothraustes	LC	Annex-II			Y	
Emberiza citrinella	LC	Annex-II			Y,G	
Emberiza cirlus	LC	Annex-II			Y	
Emberiza cia	LC	Annex-II			Y	
Emberiza cineracea	NT	Annex-II		Annex-I	Y	
Emberiza hortulana	LC	Annex-III			G	Annex-I
Emberiza caesia	LC	Annex-II		Annex-I	G	
Emberiza schoeniclus	LC	Annex-II			Y	
Emberiza melanocephala	LC	Annex-II			G	
Miliaria calandra	LC	Annex-III			Y	Annex-I

According to IUCN, *Aythya nyroca, Gypaetus barbatus, Aegypius monachus, Circus macrourus, Falco vespertinus, Haematopus ostralegus, Vanellus vanellus, Calidris canutus, Calidris ferruginea, Limosa limosa, Numenius arquata, Larus armenicus, Anthus pratensis, Emberiza cineracea* (NT) species are near threatened, *Oxyura leucocephala*, *Neophron percnopterus*, *Aquila nipalensis* (EN) species are endangered and *Pelecanus crispus* (VU), *Aythya ferina* (VU), *Clanga clanga* (VU), *Streptopelia turtur* (VU=Vulnerable) species are Vulnarable categorise.

Table 4-3. Number of bird species with endangered/protected status

	Danger/Protection categories	Number of bird species
IUCN	VU	*(4) Aythya ferina, Clanga clanga, Aquila heliaca Streptopelia turtur*
	EN	*(3) Oxyura leucocephala, Neophron percnopterus Aquila nipalensis*
	NT	*(14) Aythya nyroca, Gypaetus barbatus, Aegypius monachus, Circus macrourus, Falco vespertinus, Haematopus ostralegus, Vanellus vanellus, Calidris canutus, Calidris ferruginea, Limosa limosa, Numenius arquata, Larus armenicus, Anthus pratensis, Emberiza cineracea*
Bern	Annex II	181
	Annex III	73
CITES	Annex I	*(3) Aquila heliaca, Haliaeetus albicilla, Falco peregrinus*
	Annex II	*(3) Ciconia nigra, Platalea leucorodia, Oxyura leucocephala*
Central Hunting Commission	Annex I	43
	Annex II	23

181 of the bird species identified in the study area are listed as strictly protected bird species in Annex-II of the European Convention on Wild and Nature Habitats (Bern Convention). In addition, 73 species have been placed on the Annex-III list of protected bird species, which includes, with a few exceptions, most of the species not included in Appendix 9. The remaining 8 species are not included in any protection class of the Bern Convention (see. Table A-5). From this point of view, 254 of the 262 bird species identified in the area are protected according to the Bern Convention criteria. Approximately 96% of the birds detected in the surveyed areas are species that should be protected according to the Bern Convention. However, according to the Bern Convention, 90% of the Turkish ornithofauna were determined as species that should be protected. This is because the Bern Agreement aims at strict conservation of bird species against the risk of a decline in bird populations in Europe.

Turkey is not as high at risk as in the European ornithological system, as it has rich ecosystems, major and secondary migration routes, different climatic characteristics and diverse habitats for birds, and most of the diversity and density of the Western Paleartic bird population.

According to CITES (Convention on Trade in Endangered Species of Wild Fauna and Flora), three bird species *Haliaeetus albicilla*, *Falco peregrinus* and *Aquila heliacaare* in Annex-1 category (includes species under threat of extinction and prohibited from trade).

It has been evaluated that these species may be in the Balıkdamı wetland and Wildlife Development area of the railway line. These species only use the areas on the railway line as active feeding grounds. For this reason, it has been evaluated as a species to be addressed in monitoring studies.

According to the decisions of the Republic of Turkey Ministry of Agriculture and Forestry General Directorate of Nature Conservation National Parks Central Hunting Commission (2020-2021), 43 bird species and their effects in the project area according to hunting status Annex-I (game birds whose hunting is strictly prohibited), 23 bird species Annex-II It is in the category of birds allowed to be hunted by the Central Hunting Commission in Turkey. The railway line and quarries do not pass through hunting (fishing) areas and/or in a small part of them they pass through officially protected areas where hunting is also prohibited.

Areas Considered as "Critical/Important Bird Areas"

Within the scope of the study, 37 study areas representing different habitat types located on the railway line, quarries and river crossings and where bird species can be used as breeding, feeding and sheltering areas according to the previous studies and habitat suitability, where they can be found in flocks or colonies, were determined. Ornithological observations were made in these areas in the 2021 period.

As a result of the information, findings and evaluations obtained as a result of these studies, it has been evaluated that a total of 5 areas where the negative effects of the construction and operation activities of this project can be seen on the railway line and its immediate vicinity may be "Critical/Important Bird Areas"

On the railway line, the areas with the following parameters were considered as "Critical/Important Bird Areas".

- Presence of endangered (globally- EN-VU) bird species and their habitats,
- Presence of narrowly distributed (global and national scale) bird species and habitats,
- Presence of endemic bird species and habitats,
- Crossing of the railway line, quarries, protected areas (such as Important Biodiversity Areas, Wildlife Development Areas, Wetlands of National Importance, National Parks)
- Presence of bird species that are dense (colony-swarm) in the said areas during certain periods of their lives.
- Being a core breeding and wintering area for bird species

- Being a gene center for bird species and an area where they continue their evolutionary processes.
- Crossing of the railway line, quarries, protected areas (such as Important Biodiversity Areas, Wildlife Development Areas, Wetlands of National Importance, National Parks)

Accordingly, the list of areas considered as “Critical/Important Bird Areas” with the above parameters, along with their km, midpoint coordinates, and nearby settlements, are presented in Table A-6. In addition, in all tables in which data on critical SPCs are presented within the scope of this report, SPC areas are shown with red text and fills.

In Appendix D, tables containing the following details for each "Critical/Important Bird Area" have been prepared.

- GPS-Satellite image,
- Habitat photo
- EUNIS habitat code - type,
- Bird species detected in October 2021,
- Bird species that may be in this area at different times of the year according to the literature (L) and habitat suitability (H),
- Assessments in terms of critical habitat and species
- Possible impacts, suggested measures to mitigate these impacts
- Future studies (especially ornithological monitoring)
- Photos of critical bird species

The information of 8 Critical/Important Bird Areas areas where more detailed ornithological studies will be conducted are presented below.

IBA-1: 13th km, Foundry Site (station 1)

IBA-2: 69th km, 4-5 km south of Seyhan dam lake

IBA-3: Yılankale important birs areas (station 13, 14 and Ceyhan)

IBA-4: Yeşilce importent bird area (station 31-37)

IBA-5: Amanos Mountains important bird areas and Stations 7 km away (station 19-28)

Five observation points determined out of 37 stations determined during the field studies were evaluated as critically important bird areas. theree of these areas are located in special protection areas (see. Figure 4-4 - Figure 4-6).

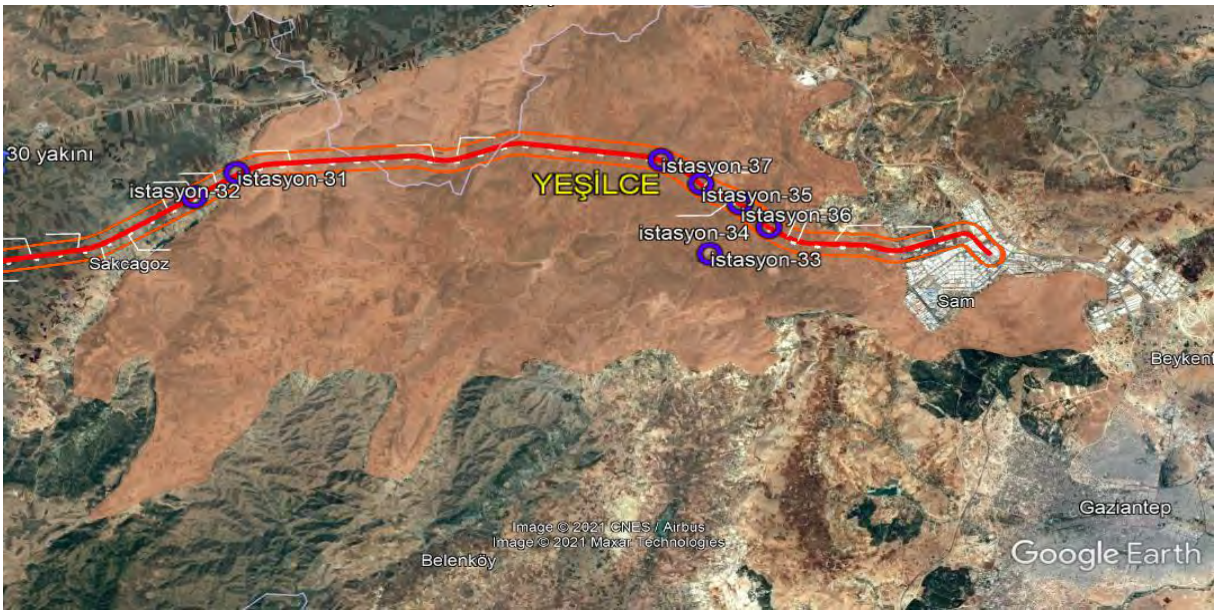


Figure 4-4. Observation stations within Yeşilce Specially Protected Areas-**IBA 4**

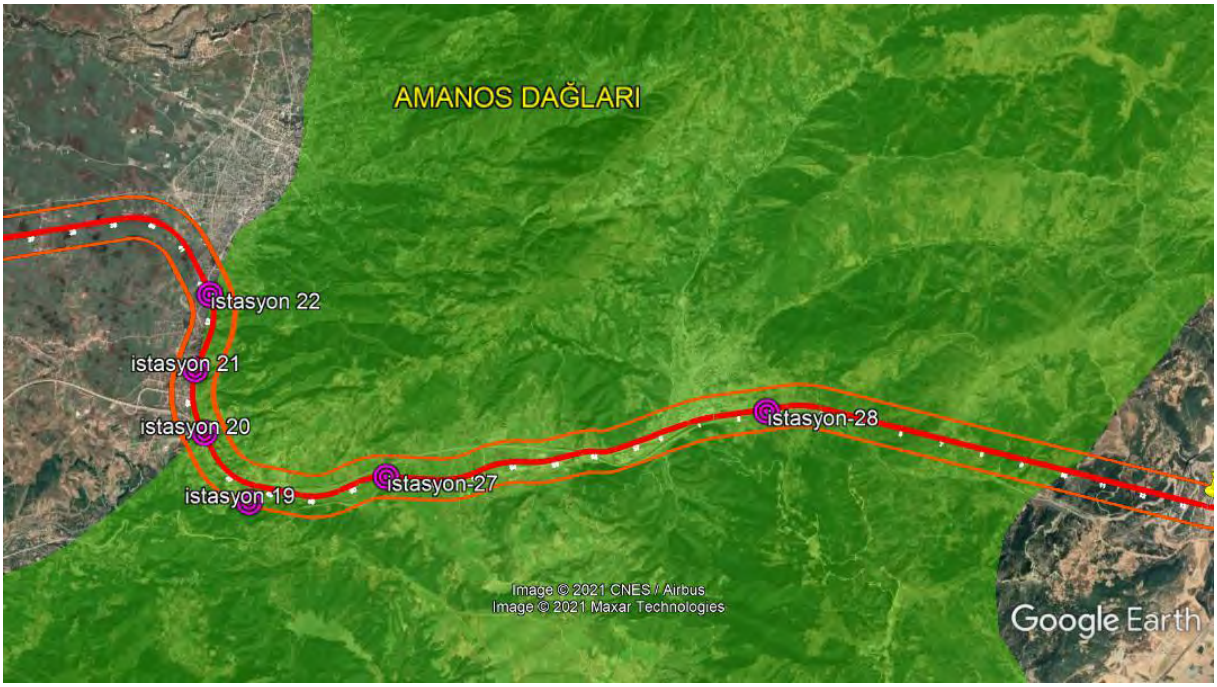


Figure 4-5. Observation stations within the Amanos Mountains Specially Protected Areas-**IBA 5**

Figure 4-6. Observation stations within the Yılankale Hills Specially Protected Areas-**IBA 3** (station 13, 14)

The reasons for the critical/important bird areas of these areas and the related ornitho-ecological evaluations are presented below.

IBA-1: Observation station number 1, which is determined as critically important areas, is located within the Protection area called Mersin Hills and is used as a dump site during the railway line construction activities. In addition, there is Bolkar Mountains Protection Area in the North of Mersin Hills Protection Area. It consists of a series of valleys located just northwest of Mersin province and the hills surrounding these valleys. The main water sources forming valleys in the area are Kızıldere, Mezitli and Sandal streams. Just north of the conservation area is another important natural area, the Bolkar Mountains. As a result of the immigration and continuous expansion of Mersin province, the construction in the area is increasing. It is also the promenade and secondary residence of the province. The area is located on the nomadic roads leading to the plateaus in Bolkarlar. Bunny (*Hieraaetus fasciatus*) and rainbow (*Coracias garrulus*) bird species breed in the valleys of the area.

IBA-2: The shores of the Seyhan Dam Lake, which is determined as a critically important area, are located 4-5 km north of the railway line that passes through Adana province. Since it is a wetland, this area is extremely important for bird species**.**

IBA-3: Stations 13 and 14, which are determined as critically important areas, are located on the protection area called Yılankale Hills. The protection area, named after the historical ruin called Yılanlıkale, located at the seventh kilometer of the Ceyhan-Adana highway, is surrounded by the Ceyhan River in the west and the agricultural fields in the district of Yumurtalık in the east and south. It draws attention as an elevation in the middle of Çukurova

and intensive agriculture is practiced around the area. Due to the altitude of the area, it has steep cliffs and these areas are important breeding grounds for small baboon (*Apus affinis*) and rainbow raven (*Coracias garrulus*).

IBA-4: Stations 33-37 (5 stations) determined as critically important areas are located within the Yeşilce special protection area and there are 7 tunnels in this area. This area includes the northern part of the Sof (Western) Mountains extending to the west and northwest of Gaziantep province and the hills near the city center. Gray gin (*Emberiza cinerecea*) and red snapper (*Oenanthe xanthoprymna*), which need to be protected on a regional scale, are bird species that meet the protection criteria and cause many observers to visit the area. In addition, *Emberiza cinerecea* breeding areas are located in this region. In addition to these species, Red-backed shrike (*Lanius collurio*) and Barnacle (*Pterocles orientalis*) are seen in this area. *Pterocles orientalis* is among the endangered species in the IUCN Red List (EN= Endangered), while *Emberiza cineracea* species (NT= Near Threatened) is among the endangered species. Stations where observations were made for these two species were evaluated as critical/important bird areas.

IBA-5: Stations 22, 23, 24 and 25 of the stations 19, 20, 21, 22, 23, 24, 25, 26, 27 and 28, which are determined as critically important areas, are located 4-5 km west of the Amanos Mountains protection area, while the other stations are Amanos. The mountains are located within the boundaries of the protected area. In addition, T4 and T5 tunnels on the railway route are located on this area. Amanos Mountains is an internationally important area in terms of the important bird species it hosts, as it is on the migration route of predatory and soaring bird species. Migrating stork (*Ciconia ciconia*), white pelican (*Pelecanus onocrotalus*), black stork (*Ciconia nigra*), spoonbill (*Platalea leucorodia*), crane (*Grus grus*), clumsy (*Anser albifrons*), gray goose (*Anser anser*), hawk (*Buteo buteo*), bee hawk (*Pernis apivorus*), black kite (*Milvus migrans*), little vulture (*Neophron percnopterus*), sedge weevil (*Circus aeruginosus*), wild hawk (*Accipiter brevipes*), small forest eagle (*Aquila pomarina*), snake eagle (*Circaetus) gallicus*), great forest eagle (*Aquila clanga*), little eagle (*Hieraaetus pennatus*) and steppe eagle (*Aquila nipalensis*) are observed. *Neophron percnopterus* and *Aquila nipalensis* species that can be seen in the area are among the endangered species in the IUCN red list (EN= Endangered), and *Aquila clanga* (VU= vulnerable) is among the vulnerable species. For this reason, it has been evaluated as a critical/important bird area.

In the IBA areas (see Table A-7 for details), ornithological studies should be carried out for at least 2 years, in the spring (end of May) and autumn, during the ongoing construction and operation period of the project, the potential negative impacts of the project activities should be determined and mitigation measures should be determined and should be implemented and monitored.

According to future studies at IBAs, if critical bird species and habitats are identified at different kilometers, the study areas and IPA borders should be expanded and the relevant kilometers should be revised again.

Table 4-4. Kilometers and Coordinates of Areas Considered as Important Bird Habitats with Critical Bird Species at Railway Lines, Quarries and River Crossings; Nearby Settlements

IBA No	Area Code	Kilometers of Important/Critical Bird Areas	Nearby Settlement	Coordinate
1	Station-1	Within the protected area	Karahacili Village	36S - 632122 - 4074494
2	Seyhan Dam	Adana Railway route 4-5 Km bird flight distance	Adana Center	36S - 703944- 4106172
3	Station-13	Within the protected area	Yılan Rock	36S- 742997 - 4098357
	Station-14	Within the protected area	Yılan Rock	36S- 742997 - 4098357
	Ceyhan	Within the protected area	Yılan Rock	36S 743851 - 4099149
4	Station-31	3 km from the border of the Yesilce Conservation Conservation Area		37S 320718 - 4120026
	Station-32	Within the boundaries of Yesilce Conservation Area		37S 318951- 4119012
	Station-33	Within the boundaries of Yesilce Conservation Area	Existing quarry	37S- 33966 - 4115557
	Station-34	Within the boundaries of Yesilce Conservation Area		37S- 342100 - 4116663
	Station-35	Within the boundaries of Yesilce Conservation Area	Üçgöze village	37S- 339435 - 4118736
	Station-36	Within the boundaries of Yesilce Conservation Area		37S- 340976 - 411777
	Station-37	Within the boundaries of Yesilce Conservation Area	existing construction site	37S- 337872 - 4119870
5	Station-19	Within the Amanos Mountains Conservation Area	existing construction site	37S- 273560 - 4117239
	Station-20	Within the Amanos Mountains Conservation Area	existing construction site	37S- 272559 - 4118945
	Station-21	Within the Amanos Mountains Conservation Area	existing construction site	37S- 2400 - 4120464
	Station-22	At the border of the Amanos Mountains Conservation Area	existing construction site	37S- 272831 - 4122255
	Station 23	3 km from the border of the Amanos Mountains Conservation Area	existing construction site	37S- 265451 - 4116311
	Station-24	4 km from the border of the Amanos Mountains Conservation Area	existing construction site	37S- 265451 - 4116311
	Station-25	6 km from the border of the Amanos Mountains Conservation Area	existing construction site	37S- 265132 - 4117817
	Station- 26	9 km from the border of the Amanos Mountains Conservation Area	existing construction site	37S 262095 - 4119763
	Station-27	Within the Amanos Mountains Conservation Area	existing construction site	37S- 276886 - 4117709
	Station-28	Within the Amanos Mountains Conservation Area	existing construction site	37S- 286102 - 4118883

4.5. Mitigation Measures

1- In the ornithological studies of the High Standart Railway, environmental factors should be taken into consideration from the railway line design phase to the commissioning phase of the line. In line planning studies for each line, the possible effects on the natural habitat should be evaluated separately. Studies on bird species along the railway line should be evaluated differently from other groups.

2- It is known that birds acquire their migration routes and the routes they follow experientially and do not prefer shorter routes or suitable crossings if they do not experience them. Therefore, it is not possible to completely change the flight routes of birds. For this reason, flight routes can be partially changed with some precautions to be taken along the railway line.

3- Gradual barrier application, which will provide a positive improvement in terms of bird species, can be preferred as a precaution so that train collisions do not occur when birds cross the railway line.

4- It should be taken into account that collisions are not the only problem in the lines that will pass through the adjacent area of the route (areas outside the municipality borders) where bird activity is intense, but also that the noise and vibration-induced effects that will occur during the train crossing have direct and indirect effects on the habitat, reproduction and mobility of the birds.

5- There are many critical protection areas along the railway line. The most important of these are the Amanos Mountains and the Yeşilce Conservation areas. However, it is as important as these areas in other protected areas. In spring and autumn migration periods, train speeds should be reduced in order to avoid collisions with birds at tunnel entrances and exits where there are intense bird flights.

6- In order to determine the effects of the power line of the railway line on bird species and to make an effective assessment, observations should be made during migration periods with the line being put into operation.

4.6. Conclusion

According to the field observations, literature information and habitat suitability assessments made in October 2021 in the railway line- its immediate surroundings, quarries and stream crossing areas (project areas), it has been determined that there are/may be a total of 262 bird species belonging to 18 Order and 52 Families.

Considering that the railway line is quite long and passes through many different regions, habitats and protection areas, it is thought that more species can be detected in the applications to be made in the spring and autumn periods than the observation made in

October. The fact that the study period is in the months after the autumn migration period is one of the reasons why the number of birds in the area is not high. However, the fact that a large part of the line passes through important bird areas, and the line generally passes through mountainous areas, stream edges and forest areas can be counted among the reasons for the higher number of bird species.

In the observations made in the summer period of October 2021 in the study areas, the population density of bird species was generally determined to be moderate. However, it is expected that the number of species and the number of individuals will increase in the spring and autumn migration periods. For this reason, ornithological studies should be carried out in the spring and autumn migration periods, especially in habitats where critical bird species are present in terms of project activities.

It has been evaluated that a total of 18 areas where the negative effects of the construction and operation activities of this project can be seen on the railway line and its immediate surroundings, out of 37 areas studied, may be “Critical/Important Bird Areas” (IBA).

Appendix - A

Fauna Survey Findings (birds excluded)

HABITATS AND PHOTOS

Station 1- F.5.2-J.6.6- H.3.6 (Existing Dump Area); 632122- 4074494-198 m

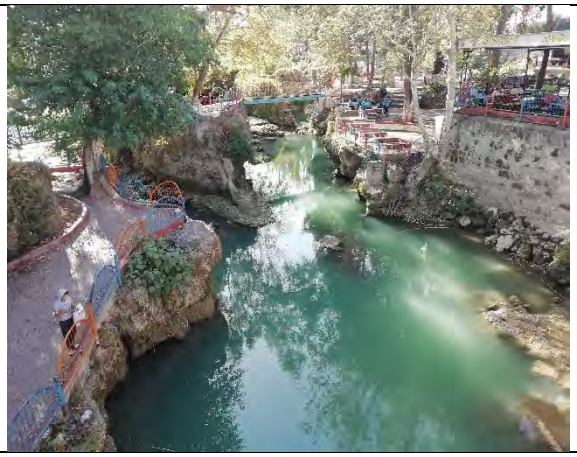
Station 2- F.5.2-J.3.2-H.3.6-G.3.4 **(**Limestone Quarry Existing Quarry**)** 643407-4086088-228 m

Station 3- F.5.2-J.3.2-H.3.6-G.3.4 **(**Limestone Quarry, Existing Quarry**)** 643407-4086088-228 m

Station 4- I.1.2-J.1.1-J.4.1 **(**Railway route**)** 659630-4082065-35m

Station 5- I2.21 **(**concrete plant**),** 665455-408522-19 m

Station 6- I.1.2-J.1.1-J.4.1. **(**23.4 km railway) 665278-4085542-18m

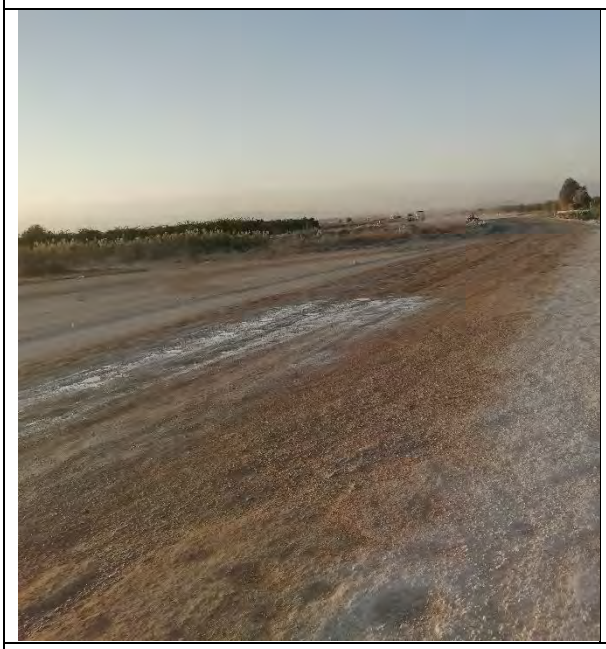


Station 7- I2.11 **(**Tarsus waterfall) 665455-408522-19 m

Station 8 – F.5.2-J3.2-I.1.3-H.3.6 **(**Quarry) 661925-4092961-200 m

Station 9- F.5.2-J.3.2-H.3.6-G.3.4 (Quarry) 671378-4103099 -263 m

Station 10- J 4. 3-J.1.2 **(**Train station= existing railway 43 . km**)** 680278-4092997-33 m

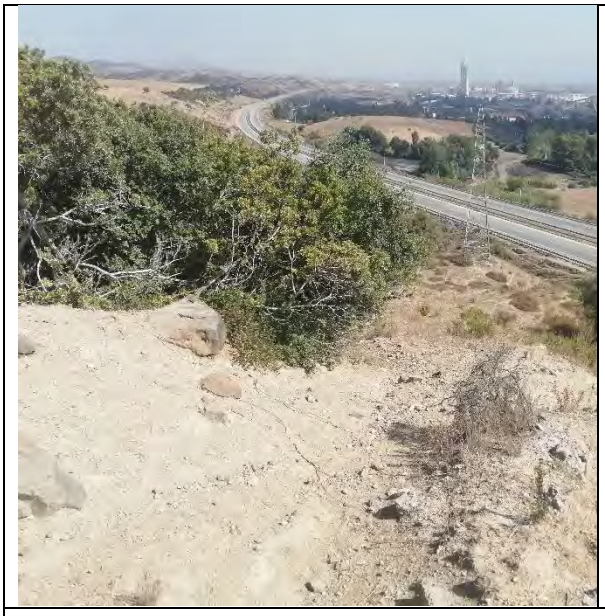


Station 11- I 1.1 **(**Airport connection **)** 684905-4089374-15 m

Station 12- J 6.2-J 4.2-I 1.1 **(**Dump site) 735340-4094850-76 m

Station 13- H3.6-F5.2-J3.2-I 1.1 (Quarry) 742997-4098357-57 m

Station 14- H3.6-F5.2-J3.2-I 1.1 **(**Quarry) 743129-4098319-63 m



Station 15- F5.2-I 1.1-J.4.1 **(**Bozdoğan B Quarry**)** 764432-4090017-107 m

Station 16- H 3.6 **(**basalt quarry) 240445-4111503-55 m

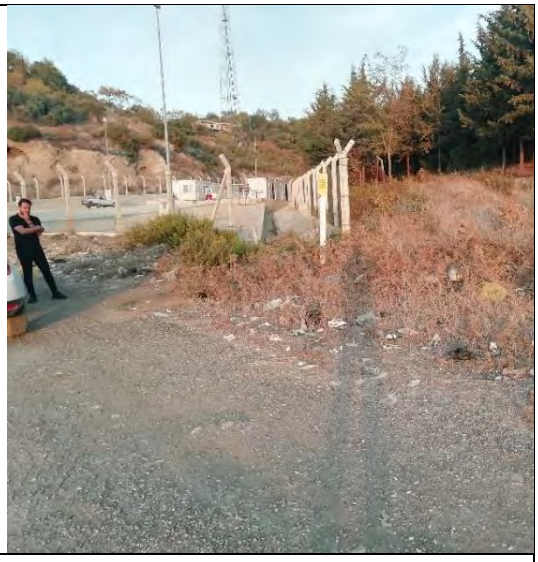
Station 17- I 1.1-J3.2 (Şenyıl b quarry) 241443-4111888-66 m

Station 18 **(**Concrete batching plant No. 9 Currently active concrete batching plant**)** 253566-4111179-97 m

Station 19. F 5.2-H3.6 **(**Tunnel 5 escape tunnel**)** 273560-4117239-408 m

Station 20 F 5.2-I 1.1-G.3 **(**Tunnel 5 entrances**)** 272559-4118945-427 m

Station 21 I 1,1-J 1.2-F 5.2 **(**Tunnel 4 exits**)** 272400-4120464-423 m



Station 22 F 5.2-J 1.2-G 3.7 **(**Tunnel 4 entrances**)** 272831-4122255-415 m

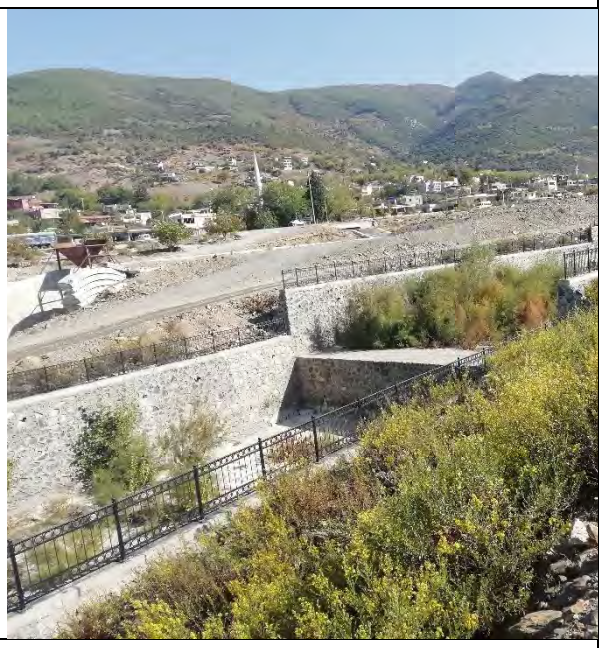
Station 23 I 1.2-G 3.7-F.5.2 **(**Tunnel 1 entrance and exit**)** 265451-4116311-241 m

Station 24 G 3.7-I 1.2 **(**Tunnel 2 exits**)** 265505-4116950-220 m

Station 25 I 1.1-F5.2 -G3.7 **(**Tunnel 3 entrances**)** 265132-4117817-239 m

Station 26 I 1.1 **(**Tunnel 3 exits**)** 262095-4119763-300 m

Station 27 J 4.2-J 4.3-F.5.2 **(**Tunnel 5 exit**)** 276886-4117709-513

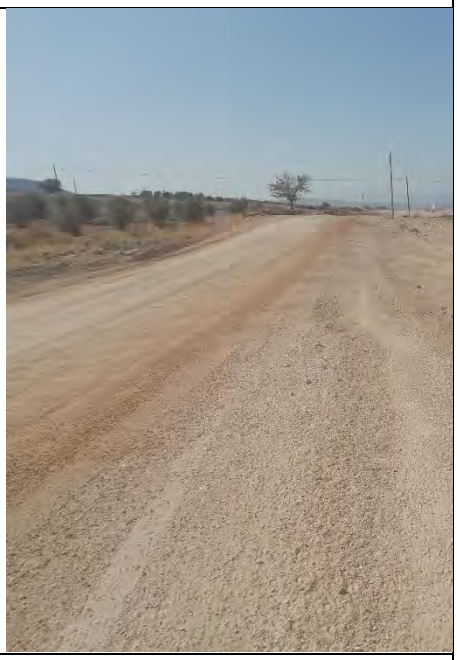


Station 28 J 4.2-J 1.2-I 1.1 **(**Nurdağı tunnel entrance**)** 286102-4118883-602 m

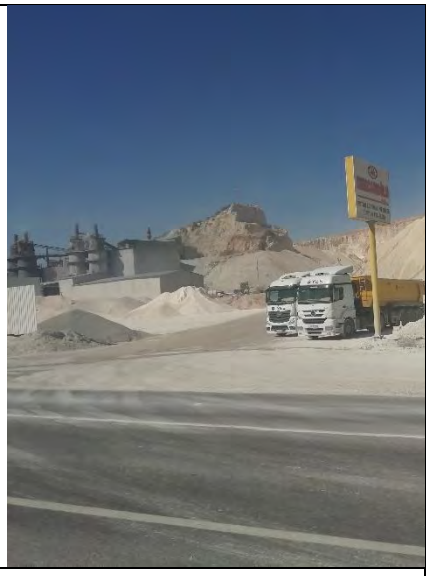
Station 29. F 5.2-H 3.6-J 1.2 **(**Nurdağı Tunnel exit) 296647-4116171-515 m

Station 30. J 4.2-I 1.1-G 3.7 **(**80. 5 km entrance and exit tunnel**)** 302789-4117045-533 m

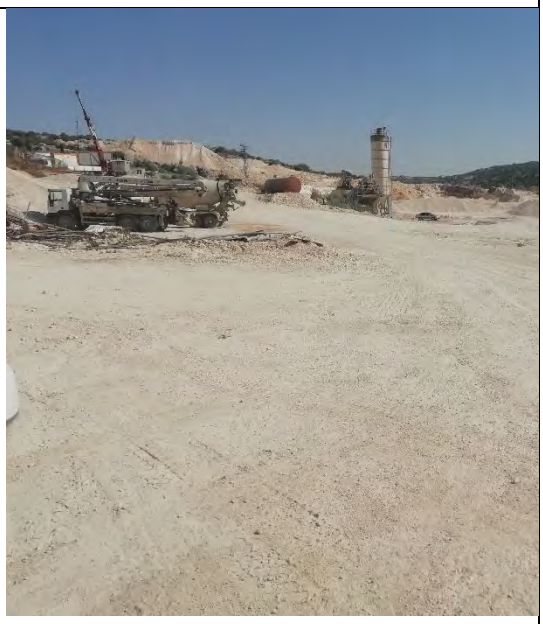
Station 31. F 2.5-I 1.1 **(**tunnel entrance) 320718-4120026-745 m



Station 32. I 1.1-J 1.2 **(**Railway route) 318951-4119012-684 m



Station 33. J 3.2 **(**Baspinar limestone quarry**)** 33966-4115557-993 m



Station 34. F 5.2-H 3.6-J 3.2 **(**railway route 12. Km, Tunnel exit, Quarry) 342100-4116663-978 m

Station 35- I 1.1-F 5.2 **(**railway route , 118.5 km**);** 339435-4118736-948 m

Station 36- F 5.2-I 1.1 **(**tunnel entrance 120 km**)** 340976-411777-980 m

Station 37 - F 5.2-I 1.1 **(**tunnel exit 116. 2 km**)** 337872-4119870-950 m

Systematic Categories of Terrestrial Vertebrate Species Identified According to Field Observations, Literature and Habitat Suitability in the Period of July 20021 at Mersin-Adana-Gaziantep 1st Region (Mersin-Osmaniye) Railway Line, Quarries, Material Receiving Areas, Bird Observation Station and -Campground Locations (Team, Family, Species), Scientific, Turkish and English Names.

VERTEBRATES (VERTEBRATA)

Species from tree classes of the terrestrial vertebrates were determined, namely mammals (MAMMALIA), reptiles (REPTILIA) and frogs (AMPHIBIA).

Frogs (AMPHIBIA)

The number of amphibian species detected on site is 6. The number of species and individual is low due to the limited number of wetlands at the area. The information on the amphibian species is given inTable A-1.

Protection Status of the Amphibian Species detected at the Project area

According to IUCN Red List;

In accordance to the results of assessment of the Red List (www.redlist.org) prepared and updated by IUCN, among the amphibian species recorded at the project area and its vicinity, 5 species are listed in LC (Least Concern) and 1 species is listed in NT category.

According to BERN Convention

As a consequence of the studies carried out, one of the amphibian species is in the Protection List in Appendix-II (Strictly Protected Fauna Species) of Bern Convention; 5 species are listed in Appendix-III (Protected Fauna Species).

Table A-1. Frog (AMPHIBIAN) Species Identified between Mersin-Osmaniye route

ORDER	Familia	Species	Turkish Name	English Name	IUCN	BERN	CITES
CAUDATA	Salamandridae	*Triturus vittatus (=Ommatotriton vittatus)*	Şeritli Semender	Southern Banded Newt	LC	App-III	EK-II
CAUDATA	Salamandridae	*Salamandra infraimmaculata*	Türk Lekeli Semenderi	Near Eastern Fire Salamender	NT	App-III	
ANURA	Bufonidae	*Pseudepidalea variabilis*	Gece Kurbağası	Green Toad	LC	App-III	
ANURA	Bufonidae	*Bufo bufo*	Siğilli kurbağa	Common Toad	LC	App-III	
ANURA	Bufonidae	*Hyla savignyi*	Ağaç Kurbağası	Oriental Tree Frog	LC	App -II	
ANURA	Ranidae	*Pelophylax bendriagae*	Levanten Kurbağası	Levanten Marsh Frog	LC	App - III	

Reptiles (REPTILIA)

24 species belonging to two order of this group are detected. Two of them belong to turtles (TESTUDINES); while the others belong to scaly reptiles (SQUAMATA) order. Reptile species are given in Table A-2.

Protection Status of the Reptile Species detected at the Project area

According to IUCN Red List

In accordance to the results of assessment of the Red List (www.redlist.org) prepared and updated by IUCN, among the reptile species detected at the project area and its vicinity, 14 species is in "LC" (Least Concern) in low risk categories, 7 species are Not Evaluated (NE) and only one species is in VU (Vulnerable) category. This species is *Testudo graeca* (Spur-thighed Tortoise) and by listing as vulnerable (VU) species by IUCN, it is considered as endangered species. However, the population status of the species is rather good in the region and in Turkey and this category of IUCN is thought to be only valid for Europe.

According to BERN Convention

9 reptile species, whose distribution on site is determined through studies, are included in the Protection Lists of Appendix-II of Bern Convention (Strictly Protected Fauna Species), 10 reptile species are listed in Appendix-III (Protected Fauna Species).

According to CITES Convention

The studies revealed that only *Chamaeleo chamaeleon* are included in Appendix-II of CITES Convention and the trade of these species trade should be closely controlled.

Table A-2. Reptile (REPTILIA) Species Identified between Mersin-Osmaniye route

ORDER	Familia	*Species*	Turkish Name	English Name	IUCN	BERN	CITES
TESTUDINES	Testudinidae	*Testudo graeca*	Yaygın Tosbağa	Spur-thighed Tortoise	**VU**	App-II	
TESTUDINES	Geoemydidae	*Mauremys rivulata*	Balkan çizgili kaplumbağası	Balkan Pond Turtle	NE	App-III	
SQUAMATA	Gekkonidae	*Hemidactylus turcicus*	Geniş Parmaklı Keler	Mediterranean House Gecko			
SQUAMATA	Gekkonidae	*Cyrtopodion kotschyi*	İnce parmaklı keler	Kotschy's Gecko	LC	App-II	
SQUAMATA	Agamidae	*Trapelus lessonae*	Bozkır keleri	Steppe Agama	LC	App-III	
SQUAMATA	Agamidae	*Laudakia stellio*	Dikenli Keler	Stellion	NE	App-II	
SQUAMATA	Scincidae	*Trachylepis vittata*	Şeritli Kertenkele	Bridled Mabuya	LC	App-III	
SQUAMATA	Scincidae	*Trachylepis aurata*	Tıknaz kertenkele	Levant Skink	LC	App-III	
SQUAMATA	Scincidae	*Ablepharus chernovi*	Çernov Kertenkelesi	Chernov's Snake-eyed Skink	LC	App-III	
SQUAMATA	Scincidae	*Eumeces schneiderii*	Sarı Kertenkele	Schenider's Skink	NE	App-III	
SQUAMATA	Lacertidae	*Ophisops elegans*	Tarla Kertenkelesi	Snake-eyed Lizard	NE	App-II	

ORDER	Familia	*Species*	Turkish Name	English Name	IUCN	BERN	CITES
SQUAMATA	Lacertidae	*Anatololacerta danfordi*	Toros Kertenkelesi	Danford's Lizard	LC	App-III	
SQUAMATA	Lacertidae	*Lacerta media*	Sivas Kertenkelesi	Three-lined Lizard	LC	-	
SQUAMATA	Lacertidae	*Phoenicolacerta laevis*	Hatay kertenkelesi	Lebanon Lizard	LC	-	
SQUAMATA	Amphisbaenidae	*Blanus strauchi*	Kör Kertenkele	Anatolian Worm Lizard	LC	App-III	
SQUAMATA	Anguidae	*Pseudopus apodus*	Oluklu kertenkele	Sheltopusik	NE	App-II	
SQUAMATA	Boidae	*Eryx jaculus*	Mahmuzlu Yılan	Sand Boa	NE	App-III	
SQUAMATA	Colubridae	*Eirenis modestus*	Uysal Yılan	Ring-Headed Drawf Snake	LC	App-III	
SQUAMATA	Colubridae	*Eirenis aurolineatus*	Bolkar Yılanı	Glossy-bellied Racer	LC	EK-III	
SQUAMATA	Colubridae	*Natrix natrix*	Küpeli Su Yılanı	Grass Snake	LC	App-III	
SQUAMATA	Colubridae	*Dolichophis caspius*	Hazer yılanı	Caspian Whipe Snake	NE	App-II	
SQUAMATA	Colubridae	*Dolichophis jugularis*	Karayılan	Large Whipe Snake	LC	App-II	
SQUAMATA	Viperidae	*Macrovipera lebetina*	Koca Engerek	Lebetine Viper	NE	App-II	

Mammals (MAMMALIA)

A total of 26 mammal species were detected during the site surveys. Among them, one belongs to hedgehog (ERINACEIMORPHA) order, two of them belong to insectivor (SORICOMORPHA) four of them belong to bats (CHIROPTERA) order, two belong to rabbits (LAGOMORPHA), ten belong to rodents (RODENTIA), five of them belong to carnivore (CARNIVORA) and two of them are even-toed (ARTIODACTYLA) order and the information on them are given in Table A-3.

Protection Status of the Mammalian Species detected at the Project area

According to IUCN Red List

In accordance to the results of assessment of the Red List (www.redlist.org) prepared and updated by IUCN, among the mammalian species detected at the project area and its vicinity, only ***Capra aegagrus*** (Wild Goat) is listed in Vulnerable (VU) category.

According to BERN Convention

As a consequence of evaluation of BERN lists, among the 26 mammalian species detected on site, 7species are listed in Bern List Appendix-II (Strictly Protected Fauna Species), 6 mammalian species are listed in Bern List Appendix-III (Protected Fauna Species) and 13 species are not listed in any lists.

According to CITES Convention

No mammalian species is included in the mammalian species lists as per CITES Convention.

Table A-3. Mammalian (MAMMALIA) Species Identified between Mersin-Osmaniye route

ORDER	Familia	Species	Turkish Name	English Name	IUCN	BERN	CITES	MAK
ERINACEOMORPHA	Erinaceidae	*Erinaceus concolor*	Kirpi	Eastern Hedgehog	LC	-		
SORICOMORPHA	Soricidae	*Crocidura suaveolens*	Küçük Beyazdişli Böcekçil	Lesser Shrew	LC	App-II		
SORICOMORPHA	Soricidae	*Crocidura leucodon*	Çiftrenkli Böcekçil	Bicolored Shrew	LC	App-III		
CHIROPTERA	Rhinolophidae	*Rhinolophus ferrumequinum*	Büyük Nalburunlu Yarasa	Greater Horseshoe Bat	LC	App-II	-	-
CHIROPTERA	Rhinolophidae	*Rhinolophus hipposideros*	Küçük Nalburunlu Yarasa	Lesser Horseshoe Bat	LC	App-II	-	-
CHIROPTERA	Rhinolophidae	*Rhinolophus euryale*	Akdeniz Nalburunlu Yarasası	Mediterranean Horseshoe Bat	NT	App-II	-	-
CHIROPTERA	Rhinolophidae	*Pipistrellus pipistrellus*	Cüce Yarasa	Common Pipistrelle	LC	App-III	-	-
CHIROPTERA	Rhinolophidae	*Rhinolophus ferrumequinum*	Büyük Nalburunlu Yarasa	Greater Horseshoe Bat	LC	App-II	-	-
LAGOMORPHA	Leporidae	*Lepus europaeus*	Yabani Tavşan	European Hare	LC	App-III	-	App-II
RODENTIA	Sciuridae	*Sciurus anomalus*	Sincap	Persian Squirel	LC	App-II	-	
RODENTIA	Cricetidae	*Microtus guentheri*	Gunther Faresi	Günther's Vole	LC	-	-	
RODENTIA	Muridae	*Apodemus flavicollis*	Sarıboyunlu Ormanfaresi	Yellow-Neck Mouse	LC	-	-	
RODENTIA	Muridae	*Apodemus mystacinus*	Kayalık faresi	Broad-Tothed Field Mouse	LC	-	-	
RODENTIA	Muridae	*Rattus rattus*	Sıçan	Black Rat	LC	-	-	
RODENTIA	Muridae	*Rattus norvegicus*	Göçmen sıçanı	Brown rat	LC	-	-	
RODENTIA	Muridae	*Mus macedonicus*	Sarı Evfaresi	Balkan Short Tailed Mouse	LC	-	-	
RODENTIA	Muridae	*Meriones tristrami*	Anadolu çölfaresi	Tristram's jird	LC	-	-	
RODENTIA	Spalacidae	*Nannospalax xanthodon*	Anadolu Körfaresi	Anatolian Mole-Rat	DD			
RODENTIA	Hystricidae	*Hystrix indica*	Oklukirpi	Indian Porcupine	LC			
CARNVORA	Canidae	*Vulpes vulpes*	Tilki	Red Fox	LC	-	-	
CARNVORA		*Felis silvestris*	Yaban kedisi	Wild Cat	LC	App-II	-	
CARNVORA	Mustelidae	*Martes foina*	Kaya Sansarı	Beech Marten	LC	App-III	-	
CARNVORA	Mustelidae	*Meles meles*	Porsuk	European Badger	LC	App-III	-	
CARNVORA	Mustelidae	*Mustela nivalis*	Gelincik	Least Weasel	LC	App-III	-	
ARTIODACTYLA	Suidae	*Sus scrofa*	Yabandomuzu	Wild Boar	LC	-	-	App-II
ARTIODACTYLA	Bovidae	*Capra aegagrus*	Yabankeçisi	Wild Goat	**VU**	App-II	-	-

Systematic Categories of Terrestrial Vertebrate Species Identified According to Field Observations, Literature and Habitat Conformity in Mersin-Adana-Gaziantep 2nd Region (Osmaniye-Gaziantep) Railway Line, Quarries, Material Receiving Areas, Bird Watching Station and -Camping Area During July 20021 (Team, Family, Species), Scientific, Turkish and English Names

AMPHIBIA= FROGS

7 species of Frog were identified in the study area, these species are in the NT=1, LC=6 category according to IUCN, there are 2 species in Annex-II and 5 species in Annex-III according to BERN (see. Table A-4).

Table A-4. Frog (AMPHIBIA) Species Identified between Osmaniye-Gaziantep route

TAKIM	FAMİLYA	TÜR	TÜRKÇE	English Name	IUCN	BERN
CAUDATA	Salamandridae	*Triturus vittatus (=Ommatotriton vittatus)*	Şeritli Semender	Southern Banded Newt	LC	Ek-III
CAUDATA	Salamandridae	*Salamandra infraimmaculata*	Türk Lekeli Semenderi	Common Fire Salamander	NT	Ek-III
ANURA	Pelobatidae	*Pelobates syriacus*	Toprak Kurbağası	Eastern Spadefoot	LC	EK-II
ANURA	Bufonidae	*Pseudepidalea variabilis*	Gece Kurbağası	Green Toad	LC	EK-II
ANURA	Bufonidae	*Bufo bufo*	Siğilli Kurbağa	Common Toad	LC	Ek-III
ANURA	Hylidae	*Hyla savignyi*	Yeşil Ağaçkurbağası	Savign's Frog	LC	Ek-III
ANURA	Ranidae	*Pelophylax ridibundus*	Ova Kurbağası	Marsh Frog	LC	Ek-III

Reptiles (REPTILIA)

36 reptile species were identified in the study area. Table A-5. Their IUCN evaluations are LC 22, VU 1, NE 13. BERN categories are Annex-II 13 and Annex-III 23. There is 1 species in CITES categories ANNEX-II.

Tablo A-5. Reptile (REPTILIA) Species Identified between Osmaniye-Gaziantep route

TAKIM	FAMİLYA	TÜR	TÜRKÇE	English Name	IUCN	BERN	CITES
TESTUDINES	TESTUDINIDAE	*Testudo graeca*	Yaygın Tosbağa	Spur-thighed Tortoise	VU - A1cd	EK-II	Ek-II
TESTUDINES	GEOEMYDIDAE	*Muaremys rivulata*	Balkan Çizgili Kaplumbağası	Balkan Pond Turtle	NE	Ek-III	
SQUAMATA	GEKKONIDAE	*Cyrtopodion (=Mediodactylus) kotschyi*	İnce Parmaklı Keler	Kotschy's Gecko	LC	EK-II	
SQUAMATA	GEKKONIDAE	*Hemidactylus turcicus* (	Geniş Parmaklı Keler	Mediterranean House Gecko	LC	Ek-III	
SQUAMATA	AGAMIDAE	*Agama = Laudakia) stellio*	Dikenli Keler	Stellion	NE	EK-II	
SQUAMATA	CHAMAELEONIDAE	*Chamaeleo chamaeleon*	Bukalemun	Common Chameleon	NE	EK-II	
SQUAMATA	ANGUINIDAE	*Pseudopus apodus*	Oluklu Kertenkele	Sheltopusik	NE	EK-II	
SQUAMATA	SCINCIDAE	*Ablepharus budaki*	Budak Kertenkelesi	Budak Lizard	LC	Ek-III	
SQUAMATA	SCINCIDAE	*Ablepharus chernovi*	Çernov Kertenkelesi	Chernov's Snake-eyed Skink	LC	Ek-III	

TAKIM	FAMİLYA	TÜR	TÜRKÇE	English Name	IUCN	BERN	CITES
SQUAMATA	SCINCIDAE	*Chalcides ocellatus*	Benekli Kertenkele	Ocellated skink	NE	EK-II	
SQUAMATA	SCINCIDAE	*Eumeces schneideri*	Sarı Kertenkele	Schneideri's skink	NE	Ek-III	
SQUAMATA	SCINCIDAE	*Trachylepis (=Mabuya) aurata*)	Tıknaz Kertenkele	Levant Skink	LC	Ek-III	
SQUAMATA	SCINCIDAE	*Trachylepis (=Mabuya) vittata*	Şeritli Kertenkele	Bridled Mabuya	LC	Ek-III	
SQUAMATA	LACERTIDAE	*Ophisops elegans*	Tarla Kertenkelesi	Snake-eyed Lizard	NE	EK-II	
SQUAMATA	LACERTIDAE	*Lacerta (=Phoenicolacerta) laevis*	Hatay Kertenkelesi	Lebanon Lizard	LC	Ek-III	
SQUAMATA	LACERTIDAE	*Lacerta (=Phoenicolacerta) cyanisparsa*	Mavi Benekli Kertenkele	Antep Lizard	LC	Ek-III	
SQUAMATA	LACERTIDAE	*Lacerta (=Apathya) cappadocica*	Kayseri Kertenkelesi	Anatolian Lizard	LC	Ek-III	
SQUAMATA	LACERTIDAE	*Lacerta media*	Doğu Yeşil Kertenkelesi, Ortanca Yeşil Kertenkele	Three-lined Lizard	LC	Ek-III	
SQUAMATA	AMPHISBAENIDAE	*Blanus strauchi*	*Kör Kertenkele*	Anatolian Worm Lizard	LC	Ek-III	
SQUAMATA	TYPHLOPIDAE	*Typhlops vermicularis*	Kör Yılan		NE	Ek-III	
SQUAMATA	LEPTOTYPHLOPIDAE	*Leptotyphlops macrorhynchus*	İpliksi Yılan	Hooked thread snake	NE	Ek-III	
SQUAMATA	BOIDAE	*Eryx jaculus*	Mahmuzlu Yılan	Sand Boa	NE	Ek-III	
SQUAMATA	COLUBRIDAE	*Eirenis barani*	Baran		LC	Ek-III	
SQUAMATA	COLUBRIDAE	*Eirenis levantinus*	Levant cüce yılanı	Levantine dwarf snake	LC	Ek-III	
SQUAMATA	COLUBRIDAE	*Eirenis lineomaculatus*	Bodur Yılan	Eirenis dwaftr snake	LC	Ek-III	
SQUAMATA	COLUBRIDAE	*Eirenis decemlineata (= E. decemlineatus)*	Çizgili Yılan	naroow-striped dwarf snake	LC	Ek-III	
SQUAMATA	COLUBRIDAE	*Eirenis rothii*	Kudüs Yılanı	Roth's dwarf snake	LC	Ek-III	
SQUAMATA	COLUBRIDAE	*Zamenis hohenackeri (=Elaphe hohenackeri)*	Kafkas Yılanı	Tarnscaucasian Ratsnake	LC	Ek-III	
SQUAMATA	COLUBRIDAE	*Dolichophis jugularis*	Kara Yılan	black whip snake	LC	EK-II	
SQUAMATA	COLUBRIDAE	*Platyceps najadum*	İnce Yılan	Dahl's whip snake	LC	EK-II	
SQUAMATA	COLUBRIDAE	*Platyceps collaris*	Toros Yılanı, Ok Yılanı	Taurus whip snake	LC	EK-II	
SQUAMATA (PULLU SÜRÜNGENLER)	COLUBRIDAE	*Hemorrhois nummifer*	Sikkeli Yılan	Asian racer	NE	Ek-III	
SQUAMATA (PULLU SÜRÜNGENLER)	COLUBRIDAE	*Natrix natrix*	Yarı Sucul Yılan, Küpeli Su Yılanı	Grass Snake	LC	Ek-III	
SQUAMATA (PULLU SÜRÜNGENLER)	COLUBRIDAE	*Natrix tessellata*	Su Yılanı	Dice Snake	NE	EK-II	
SQUAMATA (PULLU SÜRÜNGENLER)	COLUBRIDAE	*Telescopus fallax*	Kedi Gözlü Yılan	Soosan Snake	LC	EK-II	
SQUAMATA (PULLU SÜRÜNGENLER)	VIPERIDAE	*Macrovipera lebetina*	Koca Engerek	The blunt-nosed viper	NE	EK-II	

MAMMALIA=Mammals

When the observation, recording and habitat suitability were evaluated together by using the field studies and literature data, the existence of 53 species included in the Mammal group was determined in the project study area.

Rodents, which are generally known for their high ecological tolerance and ecological preferences based on not leaving spaces in habitats, are represented by 14 species in the area. Bats, which can eat thousands of insects at night due to their flying abilities, are present in all kinds of habitats with their visits for feeding, even if they do not nest in the area. Rabbits can be found at the edges of agricultural fields in clearings in the higher parts of the field. There are 12 species of carnivores, which are primarily found to feed and nest in all areas where meat, insects, crustaceans and some fruits are found to provide them with energy. The study area, which includes maquis and rocky habitats, offers various alternative nesting and feeding areas for carnivores. Wild boar is one of the mammals with high ecological tolerance. In general, wild boars, which are active at night, visit very large areas in order to find food, and their traces have been found in the area. It was determined that 3 of these species included in the Insectivores group, 3 of them are in the Annex-III category according to the BERN convention, and 4 of them are in the LC category according to the IUCN assessment.

It was determined that 18 of the 18 species included in the bats group are in the category of Annex-II according to the BERN convention, and 14 of them are in the category of LC, 2 NT, 2 VU according to the IUCN assessment.

1 species included in the group of rabbits is in the category of Annex-III according to the BERN convention, 1 of them is in the category of LC according to the IUCN evaluation, in 2021-2022 MAK. It has been determined that 1 species is included in Annex-I according to the decisions made.

It was determined that 14 species included in the rodents group were classified as 11 LC, 1 NE and 1 DD according to the IUCN assessment.

Of the 8 species included in the carnivores group, 3 of them are in the ANNEX-III, 3 in the ANNEX-II category according to the BERN convention, 11 are in the LC, 1 in the DD and 1 in the NE category according to the IUCN evaluation, and 1 in the ANNEX-II category according to the CITES convention. It is in category I, 2021-2022 MAK. According to their decisions, it has been determined that there are 10 species in Annex-I and 2 species in Annex-II.

2021-2022 MAK. According to their decisions, it was determined that there are 3 species in Annex-I and 1 species in Annex-III.

No endemic mammal species specific to the area have been identified.

Tablo A-6. Mammalian (MAMMALIA) Species Identified between Osmaniye-Gaziantep route

TAKIM	FAMİLYA	LATİNCE TÜR	TÜRKÇESİ	English Name	IUCN	BERN	CITES	MAK
ERINACEOMORPHA	*Erinaceidae*	*Erinaceus concolor*	*Kirpi*	Eastern Hedgehog	*LC*	-		
SORICOMORPHA	*Soricidae*	*Suncus etruscus*	*Etrusk Sivriburunlufaresi*	Pygmy White-toothed Shrew	*LC*	*Ek-III*		
SORICOMORPHA	*Soricidae*	*Crocidura leucodon*	*Sivriburunlu Tarlafaresi*	Bicolored Shrew	*LC*	*Ek-III*		
SORICOMORPHA	*Soricidae*	*Crocidura suaveolens*	*Sivriburunlu Bahçefaresi*	Lesser Shrew	*LC*	*Ek-III*		
SORICOMORPHA	TALPIDAE	*Talpa davidiana*	Acem Köstebeği	Père David's Mole	DD	-		
LAGOMORPHA	*Leporidae*	*Lepus europaeus*	*Yabani Tavşan*	European Hare	*LC*	*Ek-III*		EK-II
RODENTIA	Cricetidae	*Cricetulus migratorius*	Cüce Avurtlak	Gray Dwarf Hamster	LC	-	EK-I	
RODENTIA	Cricetidae	*Meriones tristrami*	Anadolu Çölfaresi	Tristram's jird	LC	-		
RODENTIA	Cricetidae	*Microtus mystacinus*	Tarlafaresi		LC	-		
RODENTIA	Cricetidae	*Microtus guentheri*	Akdeniz Tarlafaresi	Günther's Vole	LC	-		
RODENTIA	Cricetidae	*Arvicola terrestris (=Arvicola amphibius)*	Susıçanı	European Water Vole	LC	-		
RODENTIA	Muridae	*Apodemus mystacinus*	Kaya Faresi	Broad-Tothed Field Mouse	LC	-		
RODENTIA	Muridae	*Apodemus flavicollis*	Sarıboyunlu Ormanfaresi	Yellow-Neck Mouse	LC	-		
RODENTIA	Muridae	*Rattus rattus*	Sıçan	Black Rat	LC	-		
RODENTIA	Muridae	*Rattus norvegicus*	Göçmen Sıçan	Brown rat	LC	-		
RODENTIA	Muridae	*Mus domesticus*	Evfaresi	Macedonian Mouse	LC	-		
RODENTIA	Muridae	*Mus macedonicus*	Sarı Evfaresi	Balkan Short Tailed Mouse	LC	-		
RODENTIA	Spalacidae	*Nannospalax ehrenbergi*	Sarıdişli Körfares	Palestine Mole Rat	DD	-		
RODENTIA	Dipodidae	*Allactaga williamsi*	Araptavşanı	William's Jerboa	LC	-	EK-I	
RODENTIA	Hystricidae	*Hystrix indica*	Oklukirpi	Indian Porcupine	LC	-		
CHIROPTERA	Pteropodidae	*Rousettus aegyptiacus*	*Meyveyarasası*	Egyptian Fruit Bat	LC	EK-II		
CHIROPTERA	Rhinolophidae	*Rhinolophus ferrumequinum*	Büyük Nalburunlu Yarasa	Greater Horseshoe Bat	LC	EK-II		
CHIROPTERA	Rhinolophidae	*Rhinolophus hipposideros*	Küçük Nalburunlu Yarasa	Lesser Horseshoe Bat	LC	EK-II		
CHIROPTERA	Rhinolophidae	*Rhinolophus euryale*	Akdeniz Nalburunlu Yarasası	Mediterranean Horseshoe Bat	NT	EK-II		
CHIROPTERA	Rhinolophidae	*Rhinolophus blasii*	Blasius Nalburunlu Yarasası	Blasius's Horseshoe Bat	LC	EK-II		
CHIROPTERA	Rhinolophidae	*Rhinolophus mehelyi*	Mehely'in Nalburunlu Yarasası	Mehelyi's Horseshoe Bat	**VU - A4c**	EK-II		
CHIROPTERA	Vespertilionidae	*Myotis myotis*	Büyük Farekulaklı Yarasa	Greater Mouse-eared Myotis	LC	EK-II		
CHIROPTERA	Vespertilionidae	*Myotis blythii*	Küçük Farekulaklı Yarasa	Lesser Mouse-eared Myotis	LC	EK-II		

TAKIM	FAMİLYA	LATİNCE TÜR	TÜRKÇESİ	English Name	IUCN	BERN	CITES	MAK
CHIROPTERA	Vespertilionidae	*Myotis capaccinii*	Uzunayaklı Yarasa	Long-fingered Bat	**VU - A4bc e**	EK-II		
CHIROPTERA	Vespertilionidae	*Myotis mystacinus*	Bıyıklı Siyah Yarasa	Whiskered Myotis	LC	EK-II		
CHIROPTERA	Vespertilionidae	*Myotis emarginatus*	Kirpikli Yarasa	Geoffroy's Myotis	LC	EK-II		
CHIROPTERA	Vespertilionidae	*Myotis nattereri*	Saçaklı Yarasa	Natterer's Myotis	LC	EK-II		
CHIROPTERA	Vespertilionidae	*Pipistrellus pipistrellus*	Cüce Yarasa	Common Pipistrelle	LC	Ek-III		
CHIROPTERA	Vespertilionidae	*Pipistrellus kuhlii*	Beyazseritli Yarasa	Kuhl's Pipistrelle	LC	EK-II		
CHIROPTERA	Vespertilionidae	*Hypsugo savii*	Savi'nin Cüce Yarasası	Savi's Pipistrelle	LC	EK-II		
CHIROPTERA	Vespertilionidae	*Plecotus kolombatovici*	Balkan Uzunkulaklı Yarasası	Kolombatovic's Long-eared Bat	LC	EK-II		
CHIROPTERA	Miniopteridae	*Miniopterus schreibersii*	Uzunkanatlı Yarasa	Schreiber's Bent-winged Bat	VU	EK-II		
CHIROPTERA	Molossidae	*Tadarida teniotis*	Buldog Yarasa	European Free-tailed Bat	LC	EK-II		
CARNIVORA	Canidae	*Canis lupus*	Kurt	Gray Wolf	LC	EK-II	Ek-II	
CARNIVORA	Canidae	*Canis aureus*	Çakal	Golden Jackal	LC	-		
CARNIVORA	Canidae	*Vulpes vulpes*	Tilki	Red Fox	LC	-		
CARNIVORA	Mustelidae	*Mustela nivalis*	Gelincik	Least Weasel	LC	Ek-III		
CARNIVORA	Mustelidae	*Vormela peregusna*	Alaca Sansar	European Marbled Polecat	**VU - A2c**	EK-II		
CARNIVORA	Mustelidae	*Martes foina*	Kaya Sansarı	Beech Marten	LC	Ek-III		
CARNIVORA	Mustelidae	*Meles meles*	Porsuk	European Badger	LC	Ek-III		EK-II
CARNIVORA	Mustelidae	*Lutra lutra* (Linnaeus, 1758)	Su Samuru	Eurasian Otter	NT	EK-II	EK-1	
CARNIVORA	Ursidae	*Ursus arctos*	Bozayı	Brown Bear	VU - C2a(i)	EK-II	Ek-II	
CARNIVORA	Herpestidae	*Herpestes ichneumon*	Kuyruksüren	Eyptian Mongoose	LC	Ek-III		EK-II
CARNIVORA	Hyaenidae	*Hyaena hyaena*	Çizgili Sırtlan	Striped Hyaena	NT	-		
CARNIVORA	Felidae	*Lynx lynx*	Vaşak	Eurasian Lynx	LC	Ek-III	Ek-II	
CARNIVORA	Felidae	*Felis silvestris*	Yaban Kedisi	Wild Cat	LC	EK-II	Ek-II	
ARTIODACTYLA	Suidae	*Sus scrofa*	Yabandomuzu	Wild Boar	LC	-		EK-II
ARTIODACTYLA	Cervidae	*Capreolus capreolus*	Karaca	European Roe Deer	LC	Ek-III		
ARTIODACTYLA	Bovidae	*Capra aegagrus*	Yabankeçisi	Wild Goat	**VU - A2cd**	EK-II		

Appendix - B

Legally Protected Areas

Pursuant to Article 4 of the Land Hunting Law No. 4915 published on 11 July 2003, it was declared as a "Wildlife Development Area" with the Council of Ministers Decision dated 07.09.2005 and numbered 2005/9453 (published in the Official Gazette dated 16.10.2005 and numbered 25968). The total surface area of the area is 3,889.85 ha and its height above sea level varies between 150-1523 m. Zorkun Wildlife Development Area: 3.889.85 ha, starting from the southern part of the city of Osmaniye Central District and extending to Zorkun Plateau. forested area has been declared as Zorkun Wildlife Development Area. Roe deer (*Capreolus capreolus*) breeding and reproduction is ensured in the field and hunting is prohibited.

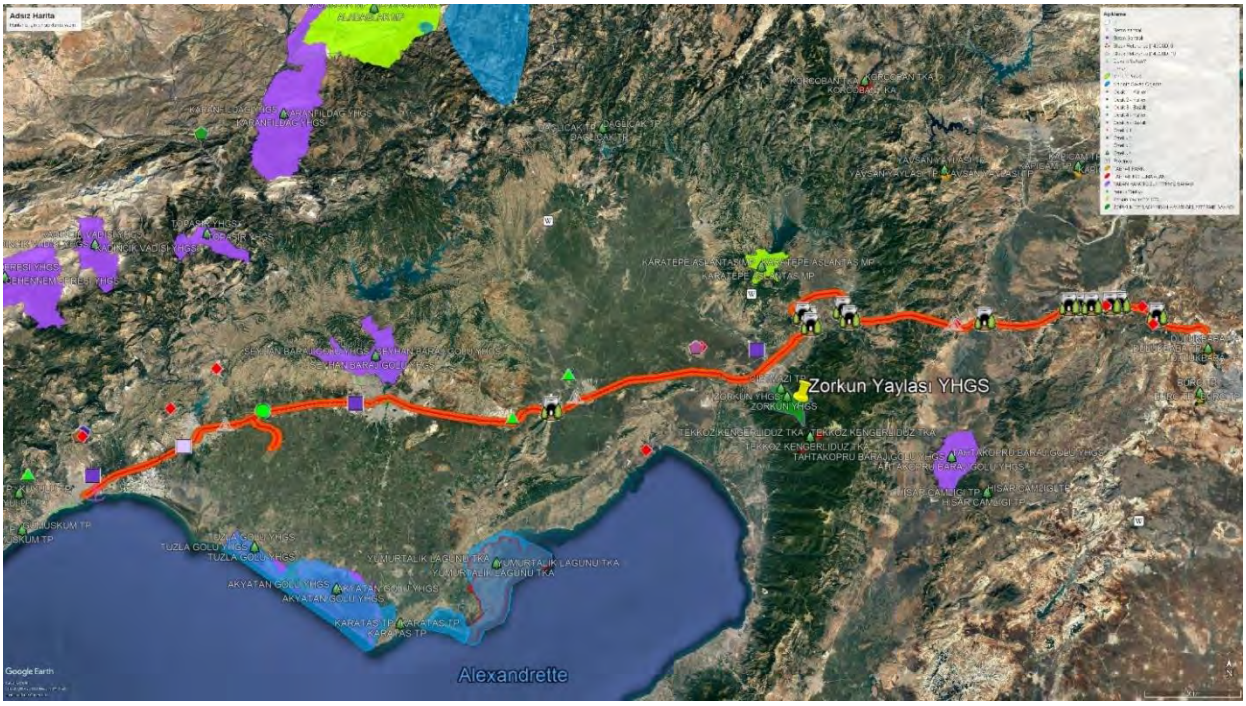


Figure B-1. Legally protected areas around the Mersin-Adana-Gaziantep High Standard Railway Project line application area.

Appendix - C

Key Biodiversity Areas (KBA)

Figure C-1. KBA= Key Biodiversity Areas located around the Mersin-Adana-Gaziantep High Standard Railway Project line application area.

Mersin Hills KBA

KBA status: Global/ Regional to be determined

Taxonomic Group	Scientific name	Common name	IUCN Red List Category	KBA Criteria	Legacy Criteria
Reptiles	*Eirenis aurolineatus*	Bolkar Yılan?	LC		Y
Reptiles	*Testudo graeca*	Spur-thighed Tortoise	VU		Y

Rationale for qualifying as KBA: Global/ Regional KBA status to be determined: a KBA of international significance identified using previously established criteria and thresholds and that has not yet been reassessed using the revised KBA criteria and thresholds set out in the Global Standard.

KBA identified in the CEPF Ecosystem Profile of the Mediterranean Hotspot (2017). Taxonomy, nomenclature and global threat category follow the 2016 IUCN Red List.

Global KBA criteria:
Year of assessment: 2017
National site name: Mersin Hills
Central coordinates: Lat: 36.89 Long: 34.44
System: Terrestrial
Altitude (m): 0 to 0

Area of KBA (ha): 46,239
Protected area coverage (%): 0

Yılanlıkale Hills KBA

KBA status: Global/ Regional to be determined

Taxonomic Group	Scientific name	Common name	IUCN Red List Category	KBA Criteria	Legacy Criteria
Invertebrates	*Gomphus davidi*	Levant Clubtail	LC		Y
Plants	*Hyacinthella lazulina*				Y

Rationale for qualifying as KBA: Global/ Regional KBA status to be determined: a KBA of international significance identified using previously established criteria and thresholds and that has not yet been reassessed using the revised KBA criteria and thresholds set out in the Global Standard.

KBA identified in the CEPF Ecosystem Profile of the Mediterranean Hotspot (2017). Taxonomy, nomenclature and global threat category follow the 2016 IUCN Red List.

Global KBA criteria:
Year of assessment: 2017
National site name: Yılanlıkale Hills
Central coordinates: Lat: 36.93 Long: 35.68
System: Terrestrial
Altitude (m): 0 to 0
Area of KBA (ha): 9,654
Protected area coverage (%): 0

Amanos Mountains KBA

KBA status: Global

Taxonomic Group	Scientific name	Common name	IUCN Red List Category	KBA Criteria	Legacy Criteria
Invertebrates	*Brachythemis fuscopalliata*	Dark-winged groundling	VU		Y
Invertebrates	*Ceriagrion georgifreyi*	Turkish Red Damsel	EN		Y
Invertebrates	*Coenagrion syriacum*	Syrian Bluet	NT		Y
Invertebrates	*Gomphus davidi*	Levant Clubtail	LC		Y
Invertebrates	*Onychogomphus macrodon*	Levant pincertail	VU		Y
Invertebrates	*Parnassius apollo*	Apollo	VU		Y
Mammals	*Capra aegagrus*		NT		Y
Mammals	*Monachus monachus*	Mediterranean Monk Seal	EN		Y
Mammals	*Myotis capaccinii*	Long-fingered Bat	VU		Y
Mammals	*Talpa davidiana*	Père David"s Mole	DD		Y
Reptiles	*Eirenis barani*	Adana Yılanı	LC		Y
Reptiles	*Eirenis levantinus*	Levanten Yılanı	LC		Y

Rationale for qualifying as KBA: Global: a KBA of international significance that meets the thresholds for at least one criterion described in the Global Standard for the Identification of KBAs.

Priority for re-assessment against the Global KBA Standard.

KBA identified in the CEPF Ecosystem Profile of the Mediterranean Hotspot (2017). Taxonomy, nomenclature and global threat category follow the 2016 IUCN Red List.

For further details on this site and its significance as an Important Bird and Biodiversity Area, see here.

Global KBA criteria: D1a
Year of assessment: 2004
National site name: Amanos Mountains
Central coordinates: Lat: 36.82 Long: 36.28
System: Terrestrial, Freshwater, Marine
Altitude (m): 0 to 2,262
Area of KBA (ha): 373,180
Protected area coverage (%): 0

Yeşilce KBA

KBA status: Global/ Regional to be determined

Taxonomic Group	Scientific name	Common name	IUCN Red List Category	KBA Criteria	Legacy Criteria
Birds	*Emberiza cineracea*	Cinereous Bunting	NT		Y

Rationale for qualifying as KBA: Global/ Regional KBA status to be determined: a KBA of international significance identified using previously established criteria and thresholds and that has not yet been reassessed using the revised KBA criteria and thresholds set out in the Global Standard.

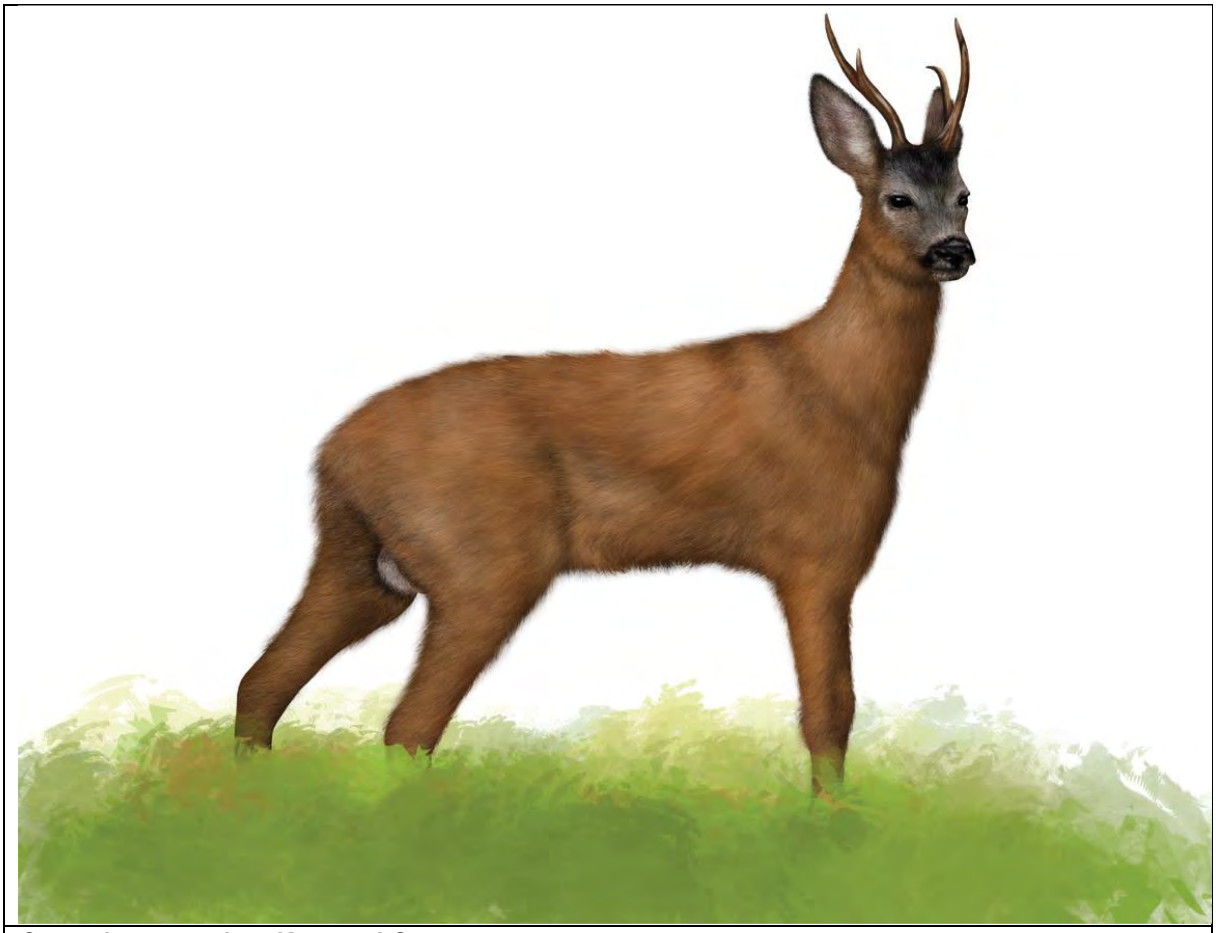
KBA identified in the CEPF Ecosystem Profile of the Mediterranean Hotspot (2017). Taxonomy, nomenclature and global threat category follow the 2016 IUCN Red List.

For further details on this site and its significance as an Important Bird and Biodiversity Area, see here.

Global KBA criteria:
Year of assessment: 2017
National site name: Yeşilce
Central coordinates: Lat: 37.17 Long: 37.20
System: Terrestrial
Altitude (m): 495 to 930
Area of KBA (ha): 5,463
Protected area coverage (%): 0

KBA areas and resource values determined along the Mersin-Adana-Gaziantep High Standard Railway Project line.

Protected area and resource value at national scale Roe= *Capreolus capreolus*	
Zorkun YHGS **Osmaniye**	It is located 3.2 km south of the railway route. Osmaniye province is located between the line and the Zorkun YHGS.

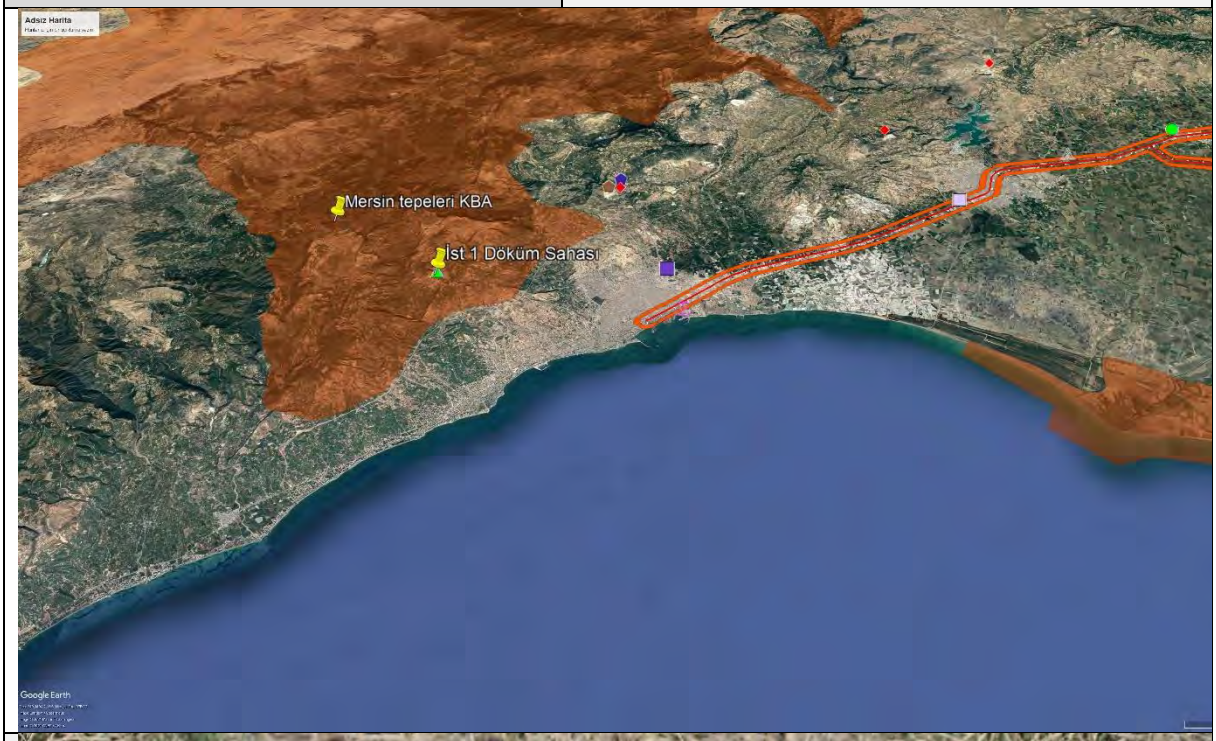


***Capreolus capreolus*= Karaca, LC**	
Measures and Recommendations	Traning Protection/Avoidance Monitoring

Internationally recognized area and resource value Yılan kale KBA *Gomphus davidi* Levant Clubtail LC	
Yılan kale KBA **Adana**	The railway route passes through the Yılan kale KBA.

Measures and Recommendations	Traning Protection/Avoidance Monitoring

Internationally recognized area and resource value *Eirenis aurolineatus* = *Glossy-bellied Racer LC* *Testudo graeca*= Spur-thighed Tortoise *VU*	
Mersin tepeleri KBA **Mersin**	Dump area; Existing dump area; Mersin tepeleri are within the KBA area.



Eirenis aurolineatus = *Glossy-bellied Racer LC*

Testudo graeca= Spur-thighed Tortoise *VU*

Measures and Recommendations	Traning Protection/Avoidance Monitoring

Internationally recognized area and resource value			
Amanos Mountains KBA			
Taxonomic Group	**Scientific name**	**Common name**	**IUCN Red List Category**
Invertebrates	*Brachythemis fuscopalliata*	Dark-winged groundling	VU
Invertebrates	*Ceriagrion georgifreyi*	Turkish Red Damsel	EN
Invertebrates	*Coenagrion syriacum*	Syrian Bluet	NT
Invertebrates	*Gomphus davidi*	Levant Clubtail	LC
Invertebrates	*Onychogomphus macrodon*	Levant pincertail	VU
Invertebrates	*Parnassius apollo*	Apollo	VU
Amfibians	*Salamandra infraimmaculata*	Common Fire Salamander	NT
Reptiles	*Eirenis barani*	Adana Yılanı	LC
Reptiles	*Eirenis levantinus*	Levanten Yılanı	LC
Reptiles	*Testudo graeca*		
Mammals	*Talpa davidiana*	Père David"s Mole	DD
Mammals	*Myotis capaccinii*	Long-fingered Bat	VU
Mammals	*Rhinolophus mehelyi*	Mehelyi's Horseshoe Bat	VU
Mammals	*Vormela peregusna*	European Marbled Polecat	VU
Mammals	*Hyaena hyaena*	Striped Hyaena	NT
Mammals	*Capra aegagrus*	Wild Goat	VU
Mammals	*Capreolus capreolus*	European Roe Deer	LC

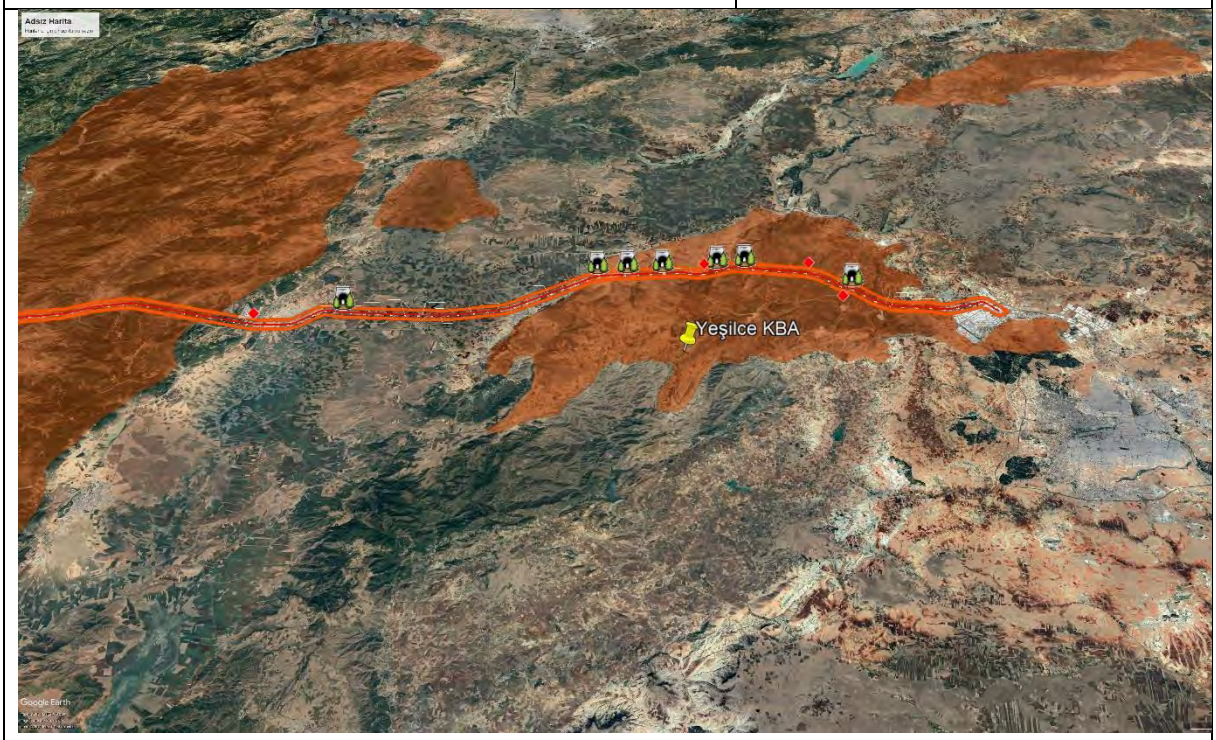
Amanos Mountains KBA **Osmaniye -Gaziantep**	The railway route passes through the Amanos Mountains KBA.

Myotis capaccinii Long-fingered Bat

Hyaena hyaena Striped Hyaena

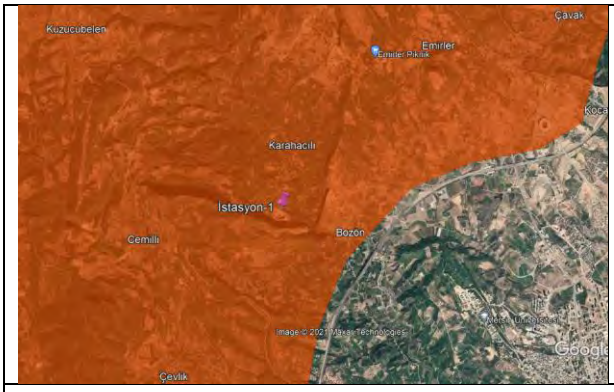
Capra aegagrus Wild Goat

Measures and Recommendations	Traning Protection/Avoidance Monitoring

Internationally recognized area and resource value Yeşilce KBA *Emberiza cineracea* Cinereous Bunting NT	
Yeşilce KBA **Gaziantep**	Railway route passes through Yeşilce KBA .
	
Measures and Recommendations	Traning Protection/Avoidance Monitoring

Appendix - D

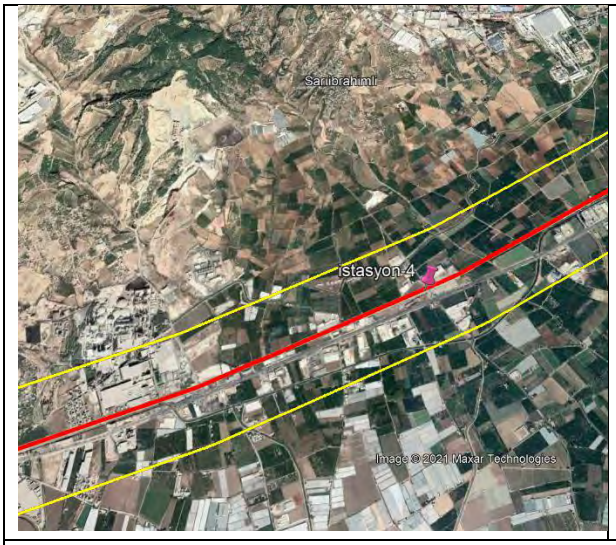
Habitats and Gps Screen Photos



Station 1- Dump Site, Existing Dump Site (Special Biological Site)

Station 2- Limestone Quarry, Existing Stone Quarry

Station 3- Limestone Quarry, Existing Quarry



Station 4- Railway route, Adnan Menderes village

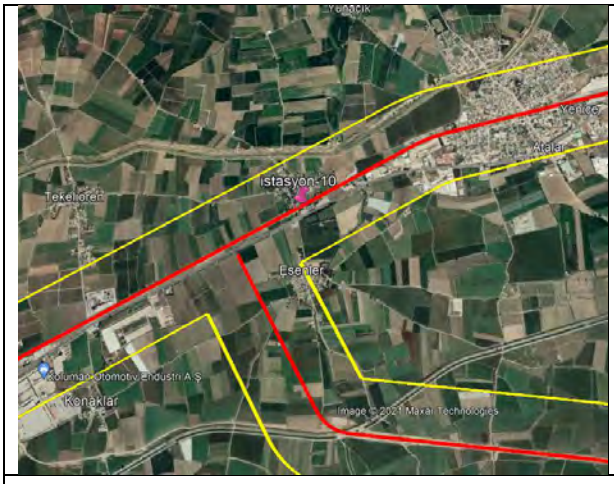
Station 5- Concrete plant, Ring road junction

Station 6- 23.4 km railway

Station 7- Tarsusu waterfall

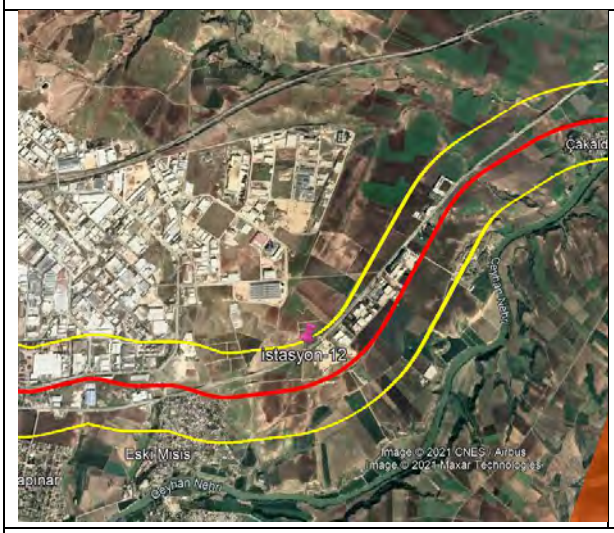
Station 8- Quarry, Sucular village

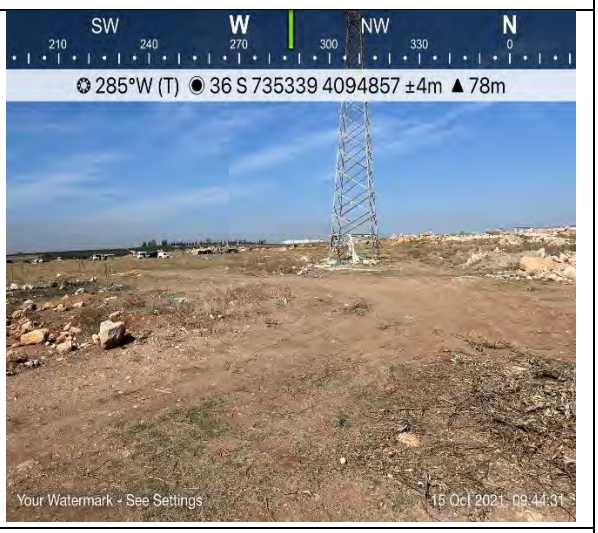
Station 9-Material quarry, Gürlü village



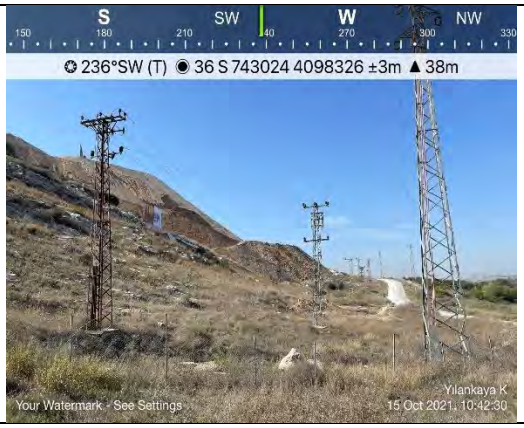
Station 10-New railway station, currently railway 43th km

Station 11-Airport connection, Kargılı village





Station 12- Dump area



Station 13-Quarry, Snake rock

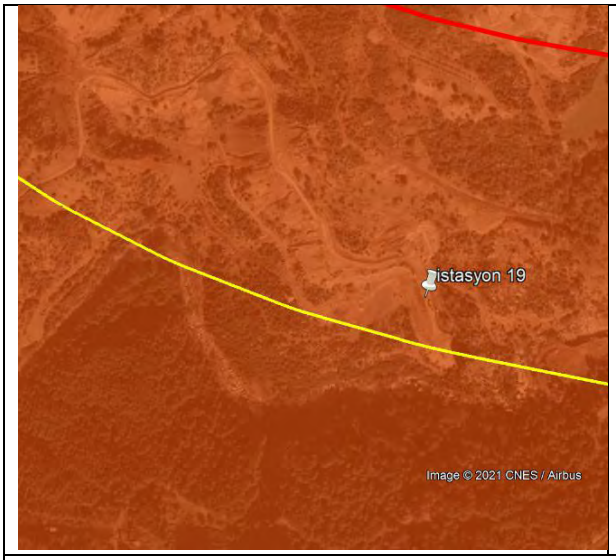
Station 14- Quarry 4 Limestone quarry

Station 15- Bozdoğan B quarry

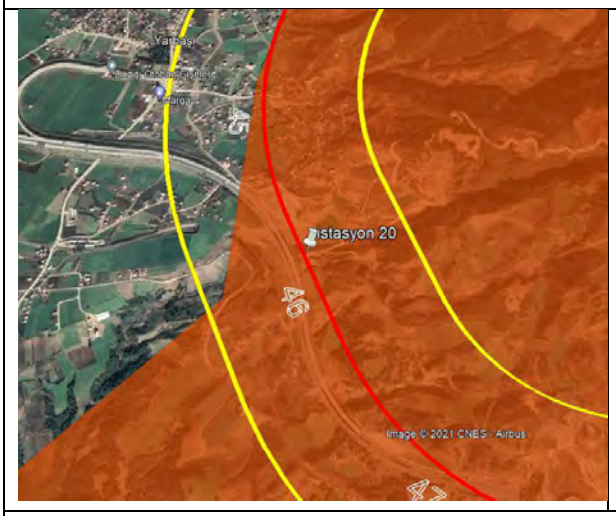
Station 16- Basalt quarry

Station 17- material quarry

Station 18- 9 Concrete plant site



Station 19- Escape tunnel



Station 20- Tunnel 5 entrance

Station 21-Tunnel 4 exit

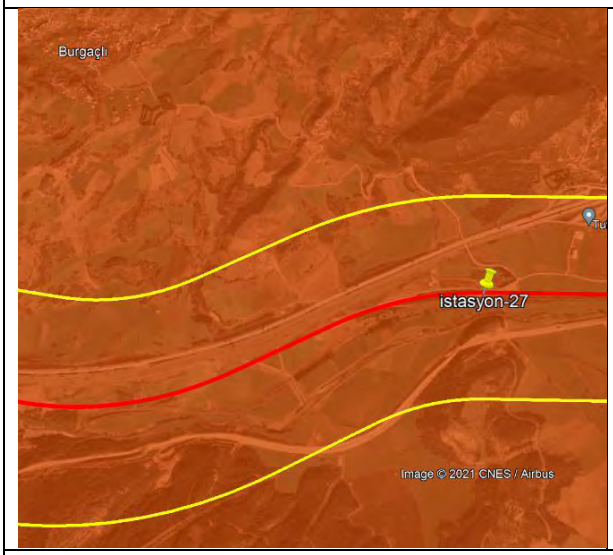
Station 22- Tunnel 4 entrance

Station 23- Tunnel 1 entrance and exit Existing construction site, Tunnel 1 and Tunnel 2 are combined

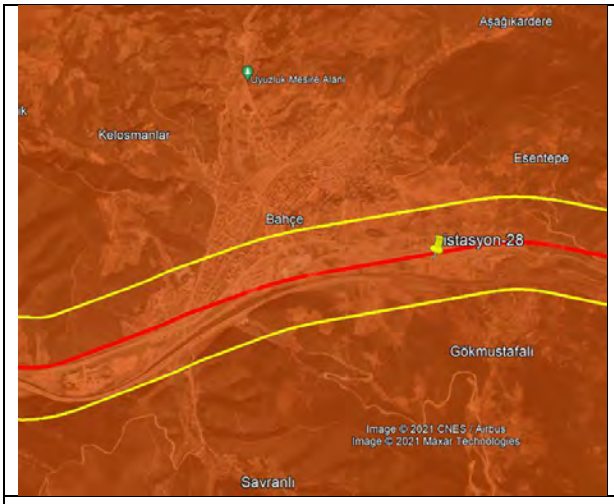
Station 24-Tunnel 2 exit, Existing construction site

Station 25-Tunnel 3 entrances, Existing construction site

Station 26- Tunnel 3 exit, Existing construction site



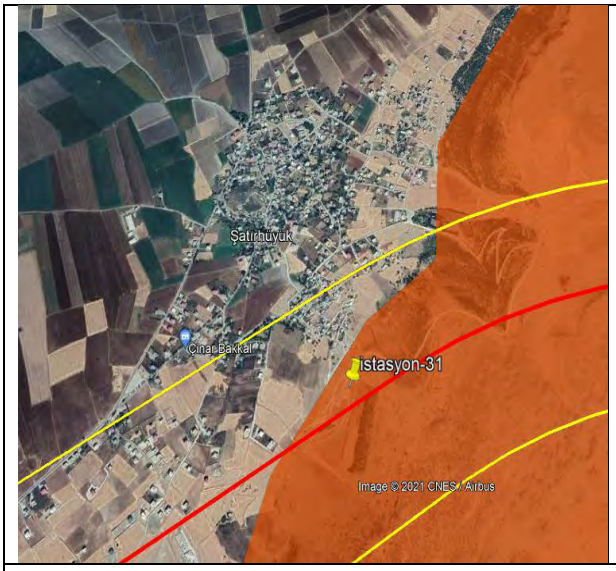
Station 27-Tunnel 5 exit, Existing construction site (important protection area)



Station 28-Nurdağı tunnel entrance, Existing construction site (Important protection area)

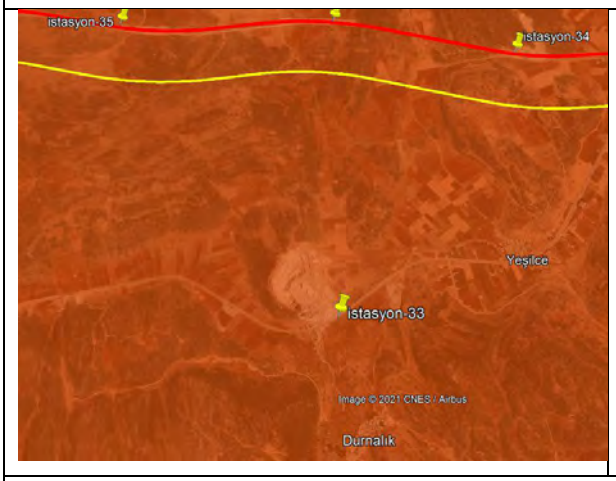
Station 29-Nurdagi Tunnel exit, Existing construction site

Station 30- 80. 5 km Entrance and exit tunnel, Existing construction site

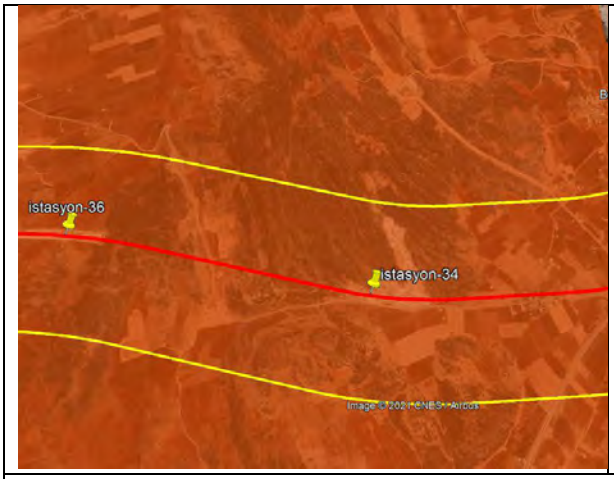


Station 31- Tunnel entrance, Şatırhüyük village

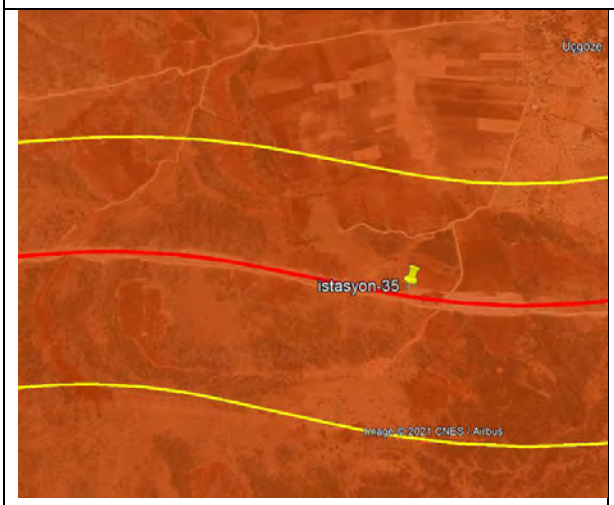
Station 32- Railway route



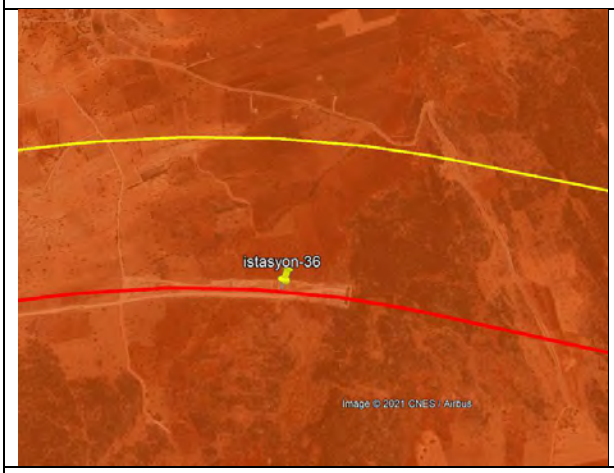
Station 33-Baspinar limestone quarry, existing quarry



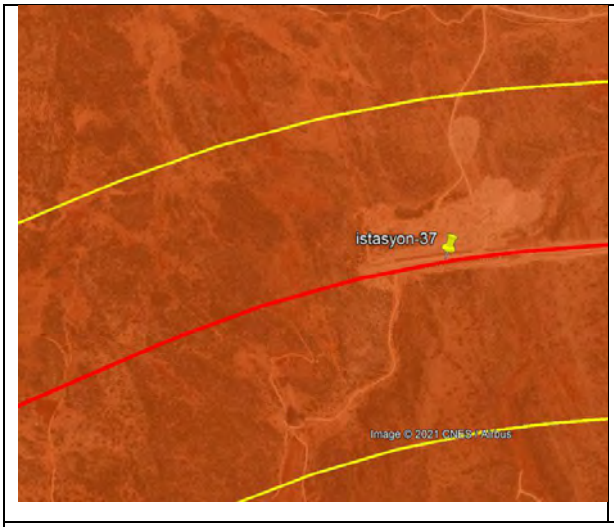
Station 34- Railway route 12th Km, Tunnel exit, quarry



Station 35-Railway route 118.5 km, Üçgöze village



Station 36- Tunnel entrance, 120th km



Station 37- Tunnel exit, 116.2th km

Appendix - E

Bird Survey Findings

Table E-1. The bird species and individual numbers determined according to the study points) in the field studies carried out in October 2021.

Bilimsel Adı	1	2-3	4	5-6	7	8	9	10	11	Seyhan	12	13-14	Ceyhan	15	16	17	18	19	20	21	22	23-24-25	26	27	28	29	30	31-32	33-34-35-36-37	Literature
Tachybaptus ruficollis										x			x																	
Podiceps cristatus										x																				
Podiceps nigricollis										x																				
Phalacrocorax carbo					x					x																				
Microcarbo pygmaeus										x																				
Pelecanus onocrotalus										x														x		x				
Botaurus stellaris																														**x**
Ixobrychus minutus																														**x**
Nycticorax nycticorax										x															x					
Ardeola ralloides																														**x**
Bubulcus ibis									x																					
Egretta garzetta					x					x			x																	
Ardea alba					x					x			x																	
Ardea cinerea					x					x			x												x					
Ardea purpurea																														**x**
Ciconia nigra												x	x											x	x	x				
Ciconia ciconia									x	x		x	x	x									x	x	x	x			x	
Plegadis falcinellus																														**x**
Platalea leucorodia																														**x**
Phoenicopterus roseus																														**x**
Tadorna ferruginea																														**x**
Tadorna tadorna										x																				
Mareca penelope																														**x**
Anas crecca													x																	
Anas platyrhynchos										x																				
Anas acuta													x																	
Spatula querquedula													x																	
Spatula clypeata													x																	

Bilimsel Adı	1	2-3	4	5-6	7	8	9	10	11	Seyhan	12	13-14	Ceyhan	15	16	17	18	19	20	21	22	23-24-25	26	27	28	29	30	31-32	33-34-35-36-37	Literature
Netta rufina																														x
Aythya ferina																														x
Aythya nyroca																														x
Oxyura leucocephala										2.Feb.2013 (3)																				x
Pernis apivorus																										x			x	
Milvus migrans									x		x	x			x								x		x	x	x	x	x	
Haliaeetus albicilla																														x
Gypaetus barbatus																														x
Neophron percnopterus																										x				
Gyps fulvus																														x
Aegypius monachus																													x	
Circaetus gallicus	x						x					x			x							x	x	x			x	x	x	
Circus aeruginosus													x																	
Circus cyaneus																							x							
Circus macrourus																														x
Circus pygargus																														x
Accipiter gentilis																										x				
Accipiter nisus	x	x	x		x		x	x		x		x	x	x	x	x	x	x		x	x	x	x	x	x	x			x	
Accipiter brevipes																													x	
Buteo buteo	x	x			x	x	x		x		x	x		x	x	x	x	x	x			x	x	x	x	x			x	
Buteo rufinus										x		x	x		x	x		x				x	x			x	x	x	x	
Clanga pomarina												x	x									x	x			x				
Clanga clanga																								x						
Aquila nipalensis																														x
Aquila heliaca																														x
Aquila chrysaetos																														x
Hieraaetus pennatus															x							x							x	
Pandion haliaetus																														x
Falco naumanni																													x	

Bilimsel Adı	1	2-3	4	5-6	7	8	9	10	11	Seyhan	12	13-14	Ceyhan	15	16	17	18	19	20	21	22	23-24-25	26	27	28	29	30	31-32	33-34-35-36-37	Literature
Falco tinnunculus	x	x			x	x				x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	
Falco vespertinus																														x
Falco columbarius																														x
Falco eleonorae																													x	
Falco subbuteo																													x	
Falco peregrinus		x							x									x		x				x	x	x			x	
Alectoris chukar	x					x	x					x		x	x			x	x							x	x	x	x	
Ammoperdix griseogularis																														x
Francolinus francolinus																							x							
Coturnix coturnix										x								x					x							
Gallinula chloropus										x																				
Porphyrio porphyrio																														x
Fulica atra										x																				
Grus grus																								x		x				
Haematopus ostralegus																														x
Himantopus himantopus																														x
Recurvirostra avosetta																														x
Burhinus oedicnemus																														x
Glareola pratincola																														x
Charadrius dubius					x								x												x					
Charadrius hiaticula					x																									
Charadrius alexandrinus																														x
Pluvialis apricaria																														x
Pluvialis squatarola																														x
Vanellus spinosus																														x
Vanellus vanellus																														x
Calidris canutus																														x
Calidris alba																														x
Calidris minuta													x																	

Bilimsel Adı	1	2-3	4	5-6	7	8	9	10	11	Seyhan	12	13-14	Ceyhan	15	16	17	18	19	20	21	22	23-24-25	26	27	28	29	30	31-32	33-34-35-36-37	Literature
Calidris ferruginea																														x
Calidris alpina																														x
Calidris pugnax													x																	
Gallinago gallinago													x																	
Limosa limosa																														x
Numenius arquata																														x
Tringa erythropus																														x
Tringa totanus										x																				
Tringa stagnatilis													x																	
Tringa nebularia													x																	
Tringa ochropus													x																	
Tringa glareola																														x
Actitis hypoleucos																														x
Arenaria interpres																														x
Larus ichthyaetus										x																				
Larus melanocephalus										x																				
Larus canus										x																				
Larus ridibundus										x																				
Larus genei										x																				
Larus armenicus										x																				
Larus michahellis					x					x																				
Gelochelidon nilotica																														x
Hydroprogne caspia																														x
Thalasseus sandvicensis																														x
Sterna hirundo																														x
Chlidonias hybridus																														x
Chlidonias niger																														x
Chlidonias leucopterus																														x
Pterocles orientalis																												x		

Bilimsel Adı	1	2-3	4	5-6	7	8	9	10	11	Seyhan	12	13-14	Ceyhan	15	16	17	18	19	20	21	22	23-24-25	26	27	28	29	30	31-32	33-34-35-36-37	Literature
Columba livia		x		x	x	x		x	x	x	x	x			x	x	x			x						x	x	x	x	x	
Columba oenas																														x
Columba palumbus														x				x	x		x					x			x	
Streptopelia decaocto			x	x	x			x	x	x	x	x				x	x			x					x		x		x	
Spilopelia senegalensis										x	x						x										x		x	
Streptopelia turtur										x		x		x				x								x			x	
Clamator glandarius																														x
Cuculus canorus												x		x				x		x						x			x	
Tyto alba									x			x		x				x								x				
Otus scops									x		x	x					x				x					x				
Bubo bubo																														x
Athene noctua	x			x				x				x	x		x	x			x	x			x							
Strix aluco																						x				x				
Asio otus																														x
Caprimulgus europaeus															x							x	x							
Apus apus		x	x	x			x	x	x	x	x	x		x	x	x	x	x	x			x	x		x	x	x	x	x	
Apus pallidus																										x				
Tachymarptis melba																										x				
Halcyon smyrnensis										x			x												x					
Alcedo atthis									x	x			x												x					
Ceryle rudis									x	x			x												x					
Merops persicus																														x
Merops apiaster		x					x						x	x	x	x		x				x			x	x	x		x	
Coracias garrulus														x	x															
Upupa epops	x	x				x	x			x	x		x	x	x			x	x	x		x			x	x		x	x	
Jynx torquilla										x												x								
Picus viridis																										x				
Dendrocopos major																						x								
Dendrocopos syriacus		x												x				x		x	x					x				

Bilimsel Adı	1	2-3	4	5-6	7	8	9	10	11	Seyhan	12	13-14	Ceyhan	15	16	17	18	19	20	21	22	23-24-25	26	27	28	29	30	31-32	33-34-35-36-37	Literature
Dendrocopos medius																														x
Dendrocopos minor																										x				
Melanocorypha calandra																							x						x	
Melanocorypha bimaculata																													x	
Calandrella brachydactyla											x		x		x													x	x	
Calandrella rufescens																													x	
Galerida cristata	x	x		x	x		x		x	x	x	x	x		x	x			x	x			x			x		x	x	
Lullula arborea							x											x				x							x	
Alauda arvensis									x					x												x				
Riparia riparia												x	x			x													x	
Hirundo rupestris						x						x	x		x							x			x	x		x	x	
Hirundo rustica	x	x					x		x	x	x	x	x	x	x	x	x			x		x	x			x	x	x	x	
Hirundo daurica									x			x	x																x	
Delichon urbicum							x		x	x		x	x						x						x				x	
Anthus campestris																										x			x	
Anthus pratensis												x	x										x							
Anthus cervinus																														x
Anthus spinoletta													x													x				
Motacilla flava										x			x																x	
Motacilla citreola													x																	
Motacilla cinerea										x			x												x				x	
Motacilla alba					x					x	x		x												x				x	
Pycnonotus xanthopygos	x	x		x				x	x	x		x	x	x																
Troglodytes troglodytes	x			x				x						x				x		x									x	
Erythropygia galactotes												x	x	x				x											x	
Luscinia luscinia										x																				
Erithacus rubecula	x	x		x		x		x	x	x		x	x	x			x	x	x	x	x	x		x	x	x	x		x	
Luscinia megarhynchos																						x							x	
Luscinia svecica																														

Bilimsel Adı	1	2-3	4	5-6	7	8	9	10	11	Seyhan	12	13-14	Ceyhan	15	16	17	18	19	20	21	22	23-24-25	26	27	28	29	30	31-32	33-34-35-36-37	Literature
Irania gutturalis																														**x**
Phoenicurus ochruros		x		x				x	x	x		x	x	x	x	x	x	x	x	x		x		x	x				x	
Phoenicurus phoenicurus																						x				x			x	
Saxicola rubetra		x												x															x	
Saxicola torquata					x								x		x															
Oenanthe isabellina	x										x				x	x							x					x	x	
Oenanthe oenanthe	x	x				x	x					x	x	x	x				x					x	x	x	x	x	x	
Oenanthe hispanica										x			x	x	x									x					x	
Oenanthe finschii																													x	
Monticola solitarius													x		x												x		x	
Turdus merula		x		x		x	x	x	x	x		x	x	x			x	x	x	x	x	x			x	x	x		x	
Turdus pilaris				x																										
Turdus philomelos										x			x																x	
Turdus viscivorus										x										x		x							x	
Cettia cetti																														**x**
Cisticola juncidis																														**x**
Prinia gracilis					x				x			x	x	x																
Acrocephalus melanopogon																														**x**
Acrocephalus schoenobaenus										x																				
Acrocephalus palustris																														**x**
Acrocephalus scirpaceus																														**x**
Acrocephalus arundinaceus																														**x**
Hippolais pallida																		x											x	
Hippolais olivetorum																													x	
Sylvia cantillans																								x						
Sylvia melanocephala		x		x		x						x	x	x				x	x					x		x			x	
Sylvia rueppelli																								x					x	
Sylvia hortensis																													x	
Sylvia curruca										x																			x	

Bilimsel Adı	1	2-3	4	5-6	7	8	9	10	11	Seyhan	12	13-14	Ceyhan	15	16	17	18	19	20	21	22	23-24-25	26	27	28	29	30	31-32	33-34-35-36-37	Literature
Sylvia communis										x				x			x									x			x	
Sylvia borin													x		x														x	
Sylvia atricapilla													x								x					x			x	
Phylloscopus collybita				x				x	x				x	x			x	x			x	x			x	x			x	
Phylloscopus bonelli										x																				
Phylloscopus trochilus																		x	x	x									x	
Regulus regulus																						x								
Regulus ignicapillus																														**x**
Muscicapa striata		x		x						x		x	x	x												x			x	
Ficedula parva																													x	
Panurus biarmicus																														**x**
Aegithalos caudatus		x					x													x		x				x			x	
Parus lugubris																											x		x	
Parus ater																														**x**
Parus caeruleus																			x	x						x			x	
Parus major	x	x		x					x	x				x				x		x	x	x			x	x	x		x	
Sitta krueperi																										x				
Sitta europaea																														**x**
Sitta neumayer	x						x						x		x														x	
Sitta tephronota																											x	x	x	
Certhia familiaris																										x				
Certhia brachydactyla																														**x**
Remiz pendulinus																														**x**
Oriolus oriolus																														**x**
Lanius collurio		x								x	x			x								x	x			x	x	x		
Lanius minor																										x				
Lanius senator	x	x												x													x	x		
Lanius nubicus										x				x																
Garrulus glandarius	x	x				x	x			x				x			x	x	x	x	x	x			x	x				

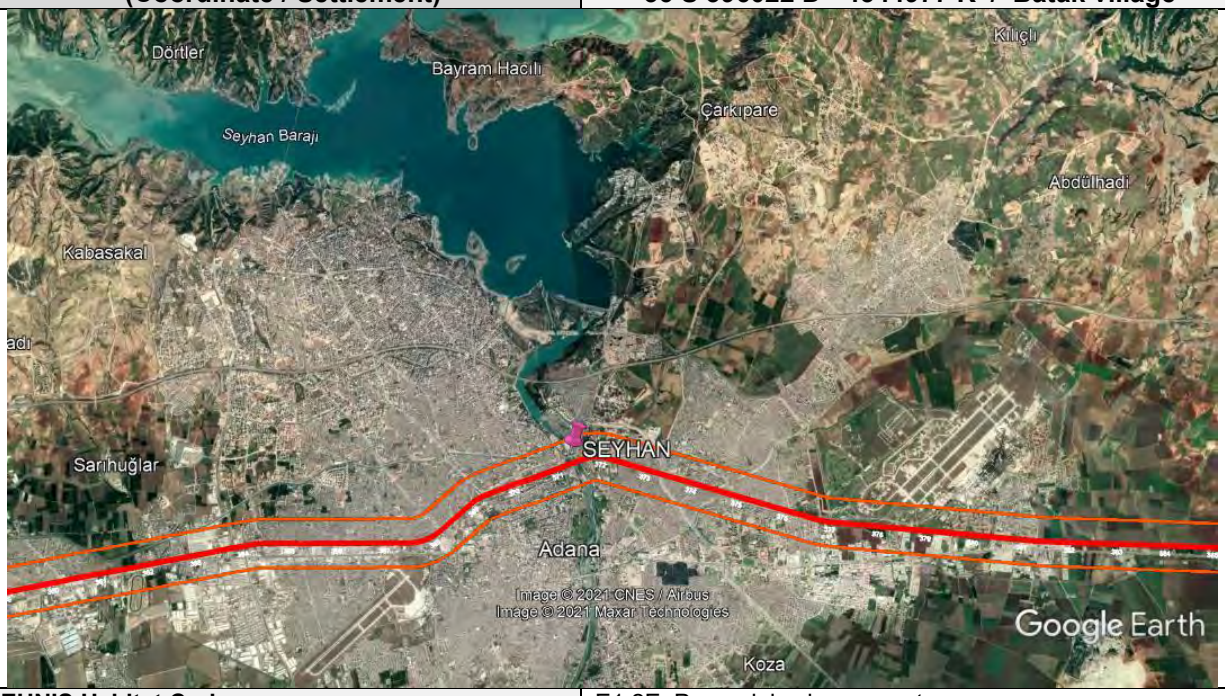
Bilimsel Adı	1	2-3	4	5-6	7	8	9	10	11	Seyhan	12	13-14	Ceyhan	15	16	17	18	19	20	21	22	23-24-25	26	27	28	29	30	31-32	33-34-35-36-37	Literature
Pica pica										x							x			x	x				x	x				
Corvus monedula			x	x				x	x	x									x							x		x		
Corvus frugilegus																							x							
Corvus cornix					x	x	x		x	x	x						x				x	x			x	x				
Corvus corax										x				x				x				x				x				
Sturnus vulgaris		x	x	x	x	x	x	x	x	x	x			x			x		x		x		x		x			x		
Sturnus roseus																														
Passer domesticus	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x		x	x	x				x				x	
Passer hispaniolensis													x																x	
Passer moabiticus																													x	
Passer montanus																													x	
Carpospiza brachydactyla																													x	
Petronia xanthocollis																													x	
Petronia petronia							x					x	x		x													x	x	
Fringilla coelebs		x							x	x			x	x				x	x	x	x	x			x	x			x	
Serinus serinus													x							x									x	
Carduelis spinus																													x	
Carduelis chloris									x	x								x								x			x	
Carduelis carduelis	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x		x	x	
Carduelis cannabina							x								x								x					x	x	
Rhodopechys obsoletus																													x	
Coccothraustes coccothraustes																													x	
Emberiza citrinella																							x						x	
Emberiza cirlus		x																												
Emberiza cia																													x	
Emberiza cineracea																													x	
Emberiza caesia																													x	
Emberiza hortulana						x												x											x	
Emberiza schoeniclus																														x

Bilimsel Adı	1	2-3	4	5-6	7	8	9	10	11	Seyhan	12	13-14	Ceyhan	15	16	17	18	19	20	21	22	23-24-25	26	27	28	29	30	31-32	33-34-35-36-37	Literature
Emberiza melanocephala										x		x	x	x									x				x	x	x	
Miliaria calandra	x	x		x							x	x	x	x			x		x				x						x	

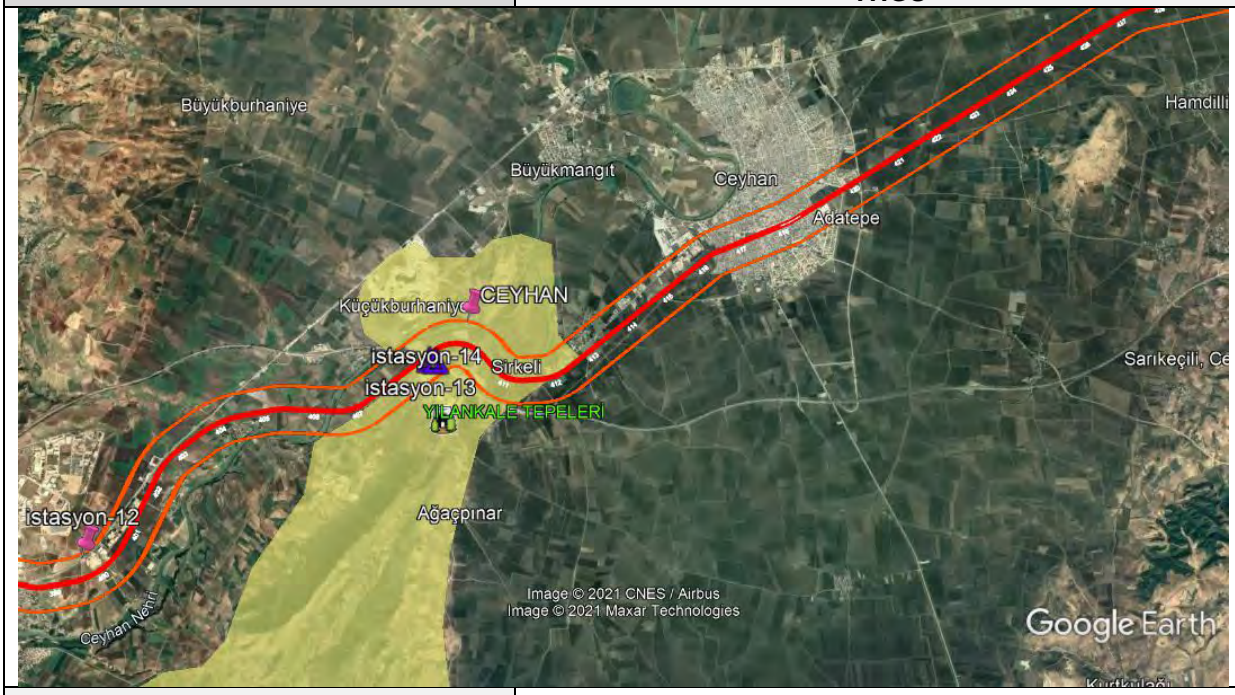
Appendix - F

Important Bird Areas (IBA)

IBA-1	
Station No Code (Coordinate / Settlement)	**İstasyon-1, Mersin Hills Dump site**
EUNIS Habitat Code	F.5.2 - J.6.6 - H.3.6
According to observation (O), literature (L) and habitat suitability (HS), bird species that can be in this area at different periods of the year	*Circaetus gallicus, Accipiter nisus, Buteo buteo Falco tinnunculus, Alectoris chukar, Athene noctua, Upupa epops, Galerida cristata, Hirundo rustica, Pycnonotus xanthopygos, Troglodytes troglodytes, Erithacus rubecula, Oenanthe isabellina, Oenanthe oenanthe, Parus major, Sitta neumayer, Lanius senator, Garrulus glandarius, Passer domesticus, Carduelis carduelis, Miliaria calandra*
Critical Habitat and Species Assessment	This area is defined as IBA (Important Bird Area) by Birdlife Data Zone. Birdlife indicates that some of the breeding raptors in the area are Lanner Falcon (Falco biarmicus), Bearded vulture (*Gypaetos barbatus*), Egyptian vulture (*Neophron percnopterus*), Black kite (*Milvus migrans*), and Caspian snowcock (*Tetraogallus caspius*). However, the study area is a material quarry currently in use. It is also located at the lower altitudes of the Bolkar Mountains (250 m). According to the habitat and altitude, the birds stated by Birdlife are not likely to breed in these areas. Nevertheless, it is recommended to monitor some species as they may be transition points.
Measures and Recommendations	Presence/breeding status (presence of nests) of Egyptian Vulture - *Neophron percnopterus* (IUCN-EN) and Rock Nuthatch - *Sitta neumayer* should be rechecked around the quarry, especially on/near rocky elevations during the breeding period. If these species are found to be breeding grounds, construction activities should be continued after the breeding period. In this area, ornithological monitoring (bio-monitoring) studies should be carried out in the spring and autumn periods (twice a year) by a specialist ornithologist to detect the presence of bird species here.

Important Bird Areas (IBA-2)– SEYHAN	
Station No Code (Coordinate / Settlement)	**7 – Q 3 - 32-33. Km (quarry) 36 S 396022 D - 4344977 K / Batak village**
	
EUNIS Habitat Code	E1.2E: Perennial calcareous steppes
Identified Bird Species	*Buteo buteo, Pica pica, Sturnus vulgaris, Passer domesticus, Carduelis carduelis, Carduelis cannabina,*
According to observation (O), literature (L) and habitat suitability (HS), bird species that can be in this area at different periods of the year	***Neophron percnopterus (IUCN-EN)**, Circaetus gallicus, Accipiter nisus, Buteo rufinus, Falco naumanni, Falco tinnunculus, Anthus campestris, Oenanthe isabellina, Oenanthe oenanthe, Turdus pilaris, **Sitta neumayer**, Emberiza cia, Miliaria calandra*
Critical Habitat and Species Assessment	The study station is located in the south of Seyhan Dam Lake and in the north of Seyhan Delta, which is an IBA. Flights that may take place between Seyhan Lake and Akyatan and Tuzla Lakes, especially during the winter months, may cause collision risks. Seyhan Delta is an IBA criteria triggered A1, A4i, B1i and B2. White-headed Duck *Oxyura leucocephala* is known from Seyhan Delta, but not any nearly record from Seyhan Dam Resevoir. Therefore, it is not thought that there will be risky passes related to this species. Both areas are important areas for wintering waterfowl.
Measures and Recommendations	Potential shock effects have also been identified for waterfowl and raptors, while potentially significant impacts have been identified as a result of collision-related deaths. There are two main options for minimizing this risk: influencing the flight activity of birds so that they fly above the possible collision height; and reducing train speeds (but this does not minimize the risk of collisions with auxiliary railway structures). Given the nature of the project (ie high speed rail), the reduction is based on the previous option. Mitigation measures should also consider information from targeted bird studies. Flight activity surveys for waterfowl should be conducted during the wintering period (usually until early February) at the designated Observation Point in December 2021 and January 2022, and for raptors from March to June, and from August to October at the Vantange Points.

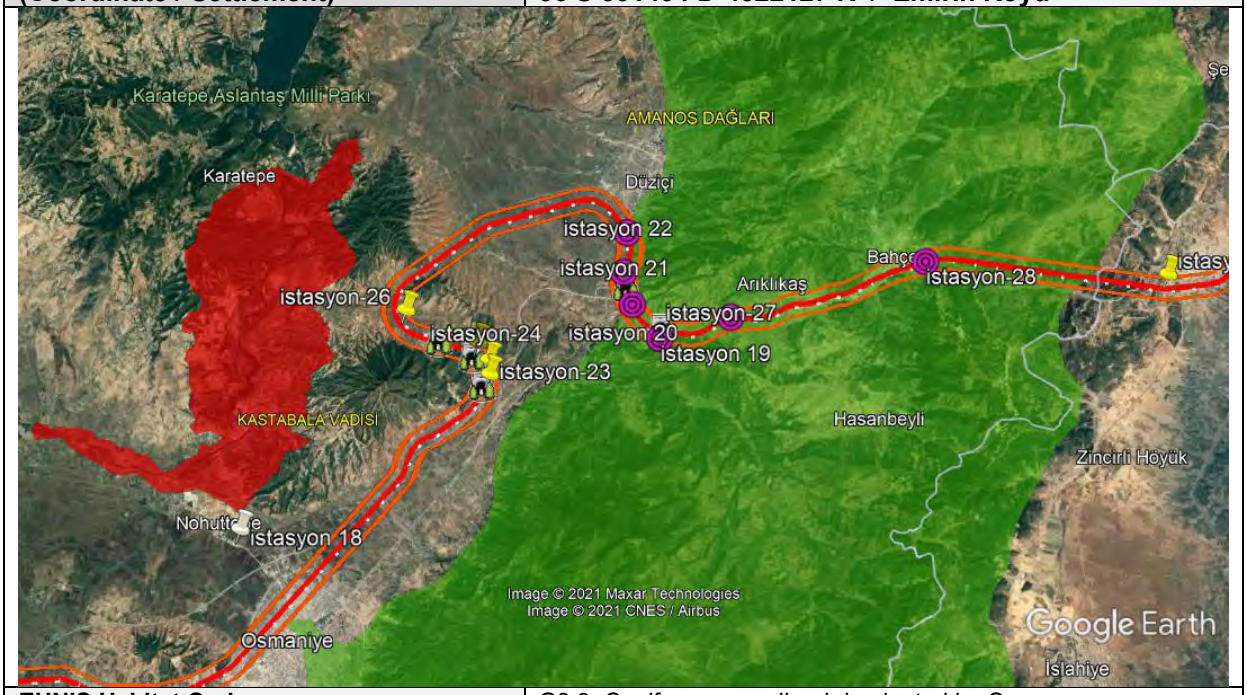
	The adapted fence should be installed where the most significant collision risk is identified or where more detailed baseline data is not available, it is considered wise to apply such measures as a precaution. There are numerous studies investigating the effectiveness of installing barrier-like structures to reduce bird collisions, and such measures are thought to be particularly effective in directing the flight of medium or large birds.

Important Bird Areas (IBA-3) -YILAN KAYA ve CEYHAN DELTA	
Station No Code (Coordinate / Settlement)	**9 – R4 – 50-52. Km (Railway and close vicinity) 36 S 380298 D-4336169 K / Ahiler Village ve Balıkdamı YHGS**
	
EUNIS Habitat Code	
Identified Bird Species	*Tachybaptus ruficollis, Phalacrocorax carbo, Columba livia, Streptopelia decaocto, Tadorna ferruginea, Anas crecca, Anas platyrhynchos, Netta rufina, Circus aeruginosus, Buteo buteo, Buteo rufinus, Falco tinnunculus, Gallinula chloropus, Fulica atra, Columba livia, Streptopelia decaocto, Alcedo atthis, Garrulus glandarius, Pica pica, Corvus monedula, Sturnus vulgaris, Passer domesticus, Fringilla coelebs, Carduelis carduelis, Carduelis cannabina*
According to observation (O), literature (L) and habitat suitability (HS), bird species that can be in this area at different periods of the year	*Podiceps cristatus, Botaurus stellaris, Ixobrychus minutus, Nycticorax nycticorax, Ardeola ralloides, Egretta garzetta, Ardea alba, Ardea cinerea, Ardea purpurea, Ciconia nigra, Ciconia ciconia, Plegadis falcinellus, Anser anser, Mareca strepera, Anas acuta, Spatula querquedula, Spatula clypeata, Haliaeetus albicilla, Neophron percnopterus, Circaetus gallicus, , Circus cyaneus, Accipiter nisus, Pandion haliaetus, Falco naumanni, Rallus aquaticus, Charadrius alexandrinus, Vanellus vanellus, Calidris pugnax, Gallinago gallinago, Tringa totanus, Tringa ochropus, Actitis hypoleucos, Larus ridibundus, Larus armenicus, Larus michahelles, Sterna hirundo, Sterna albifrons, Chlidonias hybridus, Chlidonias niger, Chlidonias leucopterus, Columba livia, Streptopelia decaocto, Cuculus canorus, Athene noctua, Apus apus, Merops apiaster, Upupa epops, Dendrocopos syriacus, Galerida cristata, Lullula arborea, Hirundo rustica, Delichon urbicum, Anthus campestris, Anthus pratensis, Motacilla flava, Motacilla alba, Troglodytes troglodytes, Erithacus rubecula, Luscinia megarhynchos, Phoenicurus ochruros, Phoenicurus phoenicurus, Saxicola torquatus, Oenanthe isabellina, Oenanthe oenanthe, Turdus merula, Turdus pilaris, Turdus viscivorus, Cettia cetti, Acrocephalus scirpaceus, Acrocephalus arundinaceus, Sylvia conspicillata, Sylvia melanocephala, Sylvia rueppelli, Sylvia atricapilla, Phylloscopus collybita, Muscicapa striata, Aegithalos caudatus, Parus caeruleus, Parus major, Certhia familiaris, Certhia brachydactyla, Oriolus oriolus, Lanius collurio, Garrulus glandarius, Pica pica, Corvus monedula, Corvus frugilegus, Corvus cornix,*

	Corvus corax, Passer montanus, Serinus serinus, Emberiza cirlus, Emberiza cia, Emberiza hortulana, Emberiza schoeniclus, Emberiza melanocephala, Miliaria calandra.
Critical Habitat and Species Assessment	Ceyhan River railway crossing and two material quarries in its vicinity were investigated. There are migratory birds and waterbirds that follow the Ceyhan River through Yılankale (Yılankaya KBA) and reach the Ceyhan Delta. Ceyhan Delta (Yumurtalık Lagünü – Yumurtalık Milli Parkı) IBA criteria triggered A1, A4i, A4iii, B1i, B1iv, B2. Therefore, these areas have been declared as critical areas for wintering bird species, critical bird species and migratory bird species.
Measures and Recommendations	*The railway line passes through a line close to the breeding and wintering areas of waterfowl in Balıkdamı Wetland. In the places where the line passes, temporary wetlands are used by birds as feeding and sheltering areas. Therefore, it is possible that the line will/may be permanent and/or temporary critical bird habitats and/or critical bird species on the Seyhan River. Therefore, it is necessary to carry out more detailed ornithological field studies in the spring and autumn periods. In this context, a large number and density of bird species/individuals can be detected even in studies conducted in January 2022 (winter). It is expected that this diversity and density will increase in the spring period. As a result, it has been suggested that this area should be re-studied in the spring (mid-April) when birds come and cluster heavily, and re-evaluate in terms of bird habitats/species/densities with the railway line. In the later stages of the project (construction and operation periods), it will be appropriate to determine mitigation measures in areas that may be important for birds.* *In this area, ornithological monitoring (bio-monitoring) studies should be carried out in winter, spring and autumn periods (3 times a year) by a specialist ornithologist to detect the presence of bird species in this area.*

Important Bird Areas (IBA-4) – YEŞİLCE	
Station No Code (Coordinate / Settlement)	**10 – FISH3 – 52-55. Km (River Crossing) 36 S 380332 D - 4336028 K**
EUNIS Habitat Code	C1.1-C.1.2 G1.1 : Riparian and gallery woodland, with dominant Alnus, Betula, Populus or Salix I1.2: Mixed crops of market gardens and horticulture
Identified Bird Species	*Tachybaptus ruficollis, Phalacrocorax carbo, Columba livia, Streptopelia decaocto, Tadorna ferruginea, Anas crecca, Anas platyrhynchos, Netta rufina, Circus aeruginosus, Buteo buteo, Buteo rufinus, Falco tinnunculus, Gallinula chloropus, Fulica atra, Columba livia, Streptopelia decaocto, Alcedo atthis, Garrulus glandarius, Pica pica, Corvus monedula, Sturnus vulgaris, Passer domesticus, Fringilla coelebs, Carduelis carduelis, Carduelis cannabina*
According to observation (O), literature (L) and habitat suitability (HS), bird species that can be in this area at different periods of the year	*Podiceps cristatus, Botaurus stellaris, Ixobrychus minutus, Nycticorax nycticorax, Ardeola ralloides, Egretta garzetta, Ardea alba, Ardea cinerea, Ardea purpurea, Ciconia nigra, Ciconia ciconia, Plegadis falcinellus, Anser anser, Mareca strepera, Anas acuta, Spatula querquedula, Spatula clypeata, Haliaeetus albicilla, Neophron percnopterus, Circaetus gallicus, , Circus cyaneus, Accipiter nisus, Pandion haliaetus, Falco naumanni, Rallus aquaticus, Charadrius alexandrinus, Vanellus vanellus, Calidris pugnax, Gallinago gallinago, Tringa totanus, Tringa ochropus, Actitis hypoleucos, Larus ridibundus, Larus armenicus, Larus michahelles, Sterna hirundo, Sterna albifrons, Chlidonias hybridus, Chlidonias niger, Chlidonias leucopterus, Columba livia, Streptopelia decaocto, Cuculus canorus, Athene noctua, Apus apus, Merops apiaster, Upupa epops, Dendrocopos syriacus, Galerida cristata, Lullula arborea, Hirundo rustica, Delichon urbicum, Anthus campestris, Anthus pratensis, Motacilla flava, Motacilla alba, Troglodytes troglodytes, Erithacus rubecula, Luscinia megarhynchos, Phoenicurus ochruros, Phoenicurus phoenicurus, Saxicola torquatus, Oenanthe isabellina, Oenanthe oenanthe, Turdus merula, Turdus pilaris, Turdus viscivorus, Cettia cetti, Acrocephalus scirpaceus, Acrocephalus arundinaceus, Sylvia conspicillata, Sylvia melanocephala, Sylvia rueppelli, Sylvia atricapilla, Phylloscopus collybita, Muscicapa striata, Aegithalos caudatus, Parus caeruleus, Parus major, Certhia familiaris, Certhia brachydactyla, Oriolus oriolus, Lanius collurio, Garrulus glandarius,*

	Pica pica, Corvus monedula, Corvus frugilegus, Corvus cornix, Corvus corax, Passer montanus, Serinus serinus, Emberiza cirlus, Emberiza cia, Emberiza hortulana, Emberiza schoeniclus, Emberiza melanocephala, Miliaria calandra.
Critical Habitat and Species Assessment	It was determined as IBA as it is the breeding area of the Cinereous Bunting *Emberiza cineracea* species. According to Birdlife, the number of breeding individuals is 20-30 pairs. According to IBAT, it has been determined that some species such as bald ibis are seen in areas close to the railway route crossing. These observations are incidental and belong to an individual moving away from the main nesting site of the species. This area is still on the raptor migration area and some monitoring has been suggested.
Measures and Recommendations	*Emberiza cineracea* is in the NT category according to the IUCN. However, a monitoring study is required in May to determine the number of breeding individuals in the areas where the railway route is located. In this area, ornithological monitoring (bio-monitoring) studies should be carried out in the spring and autumn periods (twice a year) by a specialist ornithologist to detect the presence and migration activity of bird species here.

Important Bird Areas (IBA-5)	
Station No Code (Coordinate / Settlement)	**18 – Q 6 – 105-106. Km (TAŞOCAĞI) 36 S 331404 D-4322127 K / Emirin Köyü**
	
EUNIS Habitat Code	G3.9: Coniferous woodland dominated by Cupressaceae
Identified Bird Species	*Buteo buteo, Columba livia, Streptopelia decaocto, Erithacus rubecula, Turdus merula, Garrulus glandarius, Pica pica, Corvus cornix, Sturnus vulgaris, Passer domesticus, Fringilla coelebs, Carduelis carduelis*
According to observation (O), literature (L) and habitat suitability (HS), bird species that can be in this area at different periods of the year	*Buteo rufinus, Falco tinnunculus, Alectoris chukar, Coturnix coturnix,* ***Streptopelia turtur (IUCN/VU),*** *Cuculus canorus, Athene noctua, Asio otus, Asio otus, Upupa epops, Dendrocopos major, Dendrocopos syriacus, Galerida cristata, Lullula arborea, Hirundo rustica, Delichon urbicum, Anthus campestris, Anthus pratensis, Motacilla alba, Phoenicurus ochruros, Phoenicurus phoenicurus, Turdus pilaris, Turdus philomelos, Turdus iliacus, Turdus viscivorus, Sylvia conspicillata, Sylvia melanocephala, Sylvia rueppelli, Sylvia atricapilla, Phylloscopus collybita, Regulus regulus, Regulus ignicapillus, Muscicapa striata, Aegithalos caudatus, Parus ater, Parus caeruleus, Parus major, Certhia familiaris, Certhia brachydactyla, Lanius collurio, Corvus corax, Carduelis chloris, Carduelis cannabina, Emberiza cirlus, Emberiza melanocephala, Miliaria calandra*
Critical Habitat and Species Assessment	A high mountain ridge that forms the boundary between Mediterranean Turkey and the Syrian plateau. Wet areas at low altitude are clothed with dense deciduous forest; Pinusforest dominates the lower serpentine slopes. Extensive *Quercus* scrub occurs on the drier landward slopes, with dry grasslands and Cedrus at higher elevations. Human use of the area is limited to sheep-grazing and forestry. This area was treated in the previous international IBA inventory (Grimmett and Jones 1989) as Belen Geçidi (Belen pass) (former site TR059). The majority of birds passing through site 005 (Bosphorus) during autumn and spring cross the Nur mountains, along with Turkish breeders. The only comprehensive autumn count was undertaken at the Belen pass over five weeks in 1976; few spring records are available. 6,203 *Pelecanus onocrotalus*, 3,303 *Ciconia nigra*, 82,887 *C. ciconia* and 26,756 raptors (mainly *Pernis apivorus, Accipiter brevipes* and *Aquila pomarina*) were counted.

	9,950 *Ciconia ciconia* were counted over the Belen Pass on one day in spring 1992.
Measures and Recommendations	This mitigation measure should be specifically targeted along tunnel entrances and exits. Mitigations should be placed as close to the tracks as possible (i.e. to the extent permitted by restrictions by underground services, overhead lines, etc.) and it is recommended that these measures be achieved by adapting the planned fences that will completely enclose the Project. This planned fence will be 2 m high and in the areas listed above, additional pole sections will be installed to increase this height to 3 m and colored stripes / tapes will be attached to these poles, which will affect bird flight behavior. The design conditions for the adapted fence sections are as follows: ▪ Fence height should be increased to 3m in additional pole sections; ▪ Poles must be strong enough to withstand wind / weather effects; ▪ Posts should be spaced 1m apart along the sections listed above; and ▪ Colored (eg red) tape / tape should be attached to each section and should be strong enough to withstand wind / weather effects.

Appendix - G

Abbreviations

ABBREVIATIONS	
BERN CONVENTION (for flora and fauna species)	
Annex 1: SPPS: Strictly Protected **Plant** Species **Annex 2: SPFS:** Strictly Protected Fauna Species **Annex 3 : PFS:** Protected Fauna Species	
IUCN (International Union for Conservation of Nature) Red List of Threatened Species *(IUCN 2009. IUCN Red List of Threatened Species. Version 2009.2. <www.iucnredlist.org>. Downloaded on 22 December 2009.)*	
2001 (version 3.1)	**2009 (version 2.0)**
EX: Extinct **EW:** Extinct in the wild **CR:** Critically endangered **EN:** Endangered **VU:** Vulnerable **LR:** Lower risk **cd:** conservation dependent **nt:** near threatened **lc:** least concern **DD:** Data deficient **NE:** Not evaluated	**EX:** Extinct **EW:** Extinct in the Wild **CR:** Critically Endangered **EN:** Endangered **VU:** Vulnerable **NT:** Near Threatened **LC:** Least Concern **DD:** Data Deficient **NE:** Not Evaluated
CITES (Convention on International Trade in Endangered Species)	
App1 (Appendix 1): Species threatened with extinction. Trade in specimens of these species is permitted only in exceptional circumstances. **App2 (Appendix 2):** Species not necessarily threatened with extinction, but their trade must be controlled to avoid utilization incompatible with their survival. **App3 (Appendix 3) :** Species protected in at least one country, and their trading is under control by CITES.	
CHC: NATIONAL HUNTING STATUS (According to Central Hunting Commission, 2020-201)	
App I (Appendix 1): Wildlife species which are protected by Ministry of Environment and Forestry **App III (Appendix 2) :** Game birds which are allowed to be hunted in predefined seasons by Central Hunting Commission	
STATUS FOR TURKEY (for bird species) *(Kiziroğlu, İ., 2009. The Pocket Book for Birds of Türkiye, ISBN: 975-7460-01-X, Ankamat Matbbası, Ankara, 564 s.)*	
K Wintering species-birds, wintering regularly **G:** Migrationg species-birds migrating regularly and seasonally between breeding and wintering areas **Y:** Native and breeding species-year birds-breeds regularly **T:** Migrationg species-birds migrating as transit and they can be observed in a short time at the migration seasons **V :** Vagrant, they can observed as accidentally or randomly	

LITERATURE

Albayrak 1993. The bats of western Turkey and their distribution (Mammalia: Chiroptera). Doğa – Turkish Journal of Zoology, 17: 237–257.

Anonim, 2014, TRAMEM (Türkiye'nin Anonim Memelileri), www.tramem.org

Anonim, 2014, Türkherptil (AdaMerOs Herptil Türkiye), www.turkherptil.org

Baran, İ. & Atatür, M.K., 1998, Türkiye Herpetofaunası (Kurbağa ve Sürüngenler), T.C. Çevre Bakanlığı, Ankara.

Baran, İ. & Yılmaz, I., 1984, Ornitoloji Dersleri. Ege Üniversitesi Basımevi. Seri no. 87. Bornova. İzmir. 1-323.

Baran, İ., 2005, Türkiye Amfibi ve Sürüngenleri, TÜBİTAK Popüler Bilim Kitapları No: 207 Başvuru Kitaplığı 21, Ankara. 165 s

Başoğlu, M. & Baran, İ., 1977, Türkiye Sürüngenleri. I. Cilt: Kaplumbağalar ve Kertenkeleler [The Reptiles of Turkey, Part I. The Turtles and Lizards], Ege Üniversitesi, Fen Fakültesi Kitaplar Serisi. İzmir, 76: 1-272. 1977.

Başoğlu, M. & Baran, İ., 1988. Türkiye Sürüngenleri. II. Cilt: Yılanlar [The Reptiles of Turkey, Part II. The Snakes], Ege Üniversitesi, Fen Fakültesi Kitaplar Serisi İzmir, 81: 1-218.

Başoğlu, M. & Özeti, N., 1973, Türkiye Amfibileri. Ege Üniversitesi Fen Fakültesi Kitaplar Serisi. İzmir, 50: 1–155.

Benda and Horacek 1998 Bats (Mammalia: Chiroptera) of the Eastern Mediterranean. Part 1. Review of distribution and taxanomy of bats in Turkey. Acta Soc. Zool. Bohem 62: 255-313.

Benda, P. & Horacek, I., 1998, Bats (Mammalia: Chiroptera) of the Eastern Mediterranean. Part 1. Review of distribution and taxonomy of bats in Turkey. Acta Soc. Zool. Bohem. 62: 255–313.

Bezzel, E. 2000: Vögel. Sonderteil: Seltene Arten, Jungvögel, Nester, Eier.6. Aufl. BLV-Verlag, München, Wien, Zürich.

Council of Europe, 1999: Appendices to the Convention on the Conservation of European Wildlife and Natural Habitats. Secretariat Memorandum prepared by the Directorate of Environment and Local Authorities. Strasbourg, 26 pp.

Çağlar, M., 1965, Türkiye'nin Chiroptera Favnası. İstanbul Üniversitesi Fen Fakültesi Mecmuası, Seri B, 30 (3-4): 125-134.

Çağlar, M., 1968, Türkiye'nin Yarasaları I. Türk Biologi Dergisi, 18 (1): 5-18.

Çağlar, M., 1969, Türkiye'nin Yarasaları II. Türk Biologi Dergisi, 19 (2-4): 88-106.

Çolak, R., E. Çolak, N. Yiğit, Kandemir, İ. & Sözen, M., 2007, Morphometric and biochemical variations and the distribution of Genus *Apodemus* (Mammalia: Rodentia) in Turkey, *Acta Zoologica Academiae Scientiarum Hungaricae*, 53 (3), 239-256.

Demirsoy, A., 1996, Türkiye Omurgalıları. Amfibiler. Türkiye Omurgalı Faunasının Sistematik ve Biyolojik Özelliklerinin Araştırılması ve Koruma Önlemlerinin Saptanması. Meteksan AŞ. 69 s.

Demirsoy, A., 1996, Türkiye Omurgalıları. Memeliler. Türkiye Omurgalı Faunasının Sistematik ve Biyolojik Özelliklerinin Araştırılması ve Koruma Önlemlerinin Saptanması, 292 s.

Demirsoy, A., 1996, Türkiye Omurgalıları. Sürüngenler. Türkiye Omurgalı Faunasının Sistematik ve Biyolojik Özelliklerinin Araştırılması ve Koruma Önlemlerinin Saptanması. Meteksan AŞ. 204 s.

Demirsoy, A., 1996: Amfibiler. Çevre Bakanlığı, Çevre Koruma Genel Müdürlüğü. Proje No: 90-K-1000-90, 69 s.

Demirsoy, A., 1996: Memeliler. Çevre Bakanlığı, Çevre Koruma Genel Müdürlüğü. Proje No: 90-K-1000-90, 292 s.

Demirsoy, A., 1997: Sürüngenler. Çevre Bakanlığı, Çevre Koruma Genel Müdürlüğü. Proje No: 90-K-1000-90, 205 s.

Diesener, G., Reichholf, J., 1986: Lurche und Kriechtiere. Mosaik Verleg GmbH, München, 287 pp.

Doğramacı, S., 1974, Türkiye *Apodemus* (Mammalia:Rodentia)'larının Taxonomik durumları. Tarım Hayvancılık Bakanlığı Zirai Mücadele Müdürlüğü Araştırma: 1-56, Ankara.

Doğramacı, S., 1989, Türkiye Memeli Faunası. Ondokuz Mayıs Üniv. Fen Fak. Derg. 1 (3). 107–136.

Felten, H., Spitzenberger, F. & Storch, G., 1971, Zur Kleinsäugerfauna West-Anatoliens. Teil I, Senckenbergiana biol., 52 (6): 393-424.

Felten, H., Spitzenberger, F. & Storch, G., 1973, Zur Kleinsäugerfauna West-Anatoliens. Teil II, Senckenbergiana biol., 54 (4-6): 227-290.

Felten, H., Spitzenberger, F. und Storch, G., 1977, Zur Kleinsäugerfauna West-Anatoliens. Teil IIIa, Senckenbergiana biol., 58: 1-44.

Heinzel, H., Fitter, R. & Parslow, J., 2001, Türkiye ve Avrupa'nın Kuşları. Çeviri; Kerem Ali Boyla. Doğal Hayatı Koruma Derneği. 1-384.

IUCN 2011. IUCN Red List of Threatened Species. Version 2011.1.

Karataş 2000. Orta ve Doğu Akdeniz Bölgesi Yarasaları (Mammalia: Chiroptera). Doktora Tezi. İzmir.

Karataş and Özgül 2003. On the Occurance of Myotis emarginatus (Geoffroy, 1806) in Turkey (Chiroptera: Vespertilionidae). Zoology in the Middle East, Vol. 28.

Karataş, A. & Sözen, M., 2004, Contribution to karyology, distribution and taxonomic status of the Long-winged Bat, *Miniopterus schreibersii* (Chiroptera: Vespertilionidae), in Turkey, *Zoology in the Middle East*, 33: 51-64.

Karataş, A. & Sözen, M., 2007, Karyology of three Vespertilionid bats (Chiroptera: Vespertilionidae) from Turkey" *Acta Zoologica Academiae Scientarium Hungaricae,* 53 (2): 185-192.

Karataş, A., 2009, Türkiye Yarasaları, Niğde Üniv. B.A.P. Birimi Proje No: 01.FEB.09 nolu yayınlanmamış proje raporu.

KARATAŞ, A. Özkurt, Ş. and Kock, D., 2007, The recovery of Nyctalus lasiopterus (Schreber, 1780) (Chiroptera: Vespertilionidae) in Turkey, Acta Zoologica Cracoviensia, 50A (1-2): 17-24.

Karataş, A., 2009, Türkiye Yarasaları, Niğde Üniv. B.A.P. Birimi Proje No: 01.FEB.09 nolu yayınlanmamış proje raporu.

KARATAŞ, A., Sözen, M., Özkurt, Ş. and Matur, F., 2007, Karyology of three bat species of the genus Myotis, (M. myotis, M. bechsteinii, M. brandtii) (Chiroptera: Vespertilonidae) from Turkey, Zoology in the Middle East, 40: 6-9.

KARATAŞ, A., Yiğit, N., Çolak, E. and Kankılıç, T., 2003, On the distribution, taxonomy and karyology of the genus Plecotus (Chiroptera: Vespertilionidae) in Turkey, Turk. J. Zool., 27 (4): 293-300.

KARATAŞ, A., BULUT,Ş., KARATAŞ, A.,TOPRAK, F. , ÖZKURT, Ş.Ö., Contribution to the natural history of *Barbastella barbastellus* in Turkey (Chiroptera: Vespertilionidae) Lynx, n. s. (Praha), 51: 49–63 (2020). ISSN 0024-7774 (print), 1804-6460 (online).

Kıvanç, E., 1988, Türkiye *Spalax*'larının Coğrafik Varyasyonları (Mammalia; Rodentia) Ankara Üniv., Fen Fak., Biyoloji Böl., 1-88.

Kiziroğlu, İ., 1989: Türkiye Kuşları. OGM yayınları, Ankara, 314 s.

Kiziroğlu, İ., 2008: The Birds of Türkiye. (Species List in Red Data Book). Ankara.

Krystufek, B. & Vohralik, V., 2001, Mammals of Turkey and Cyprus. Introduction, Checlist, Insectivora. Zgodovinsko drustvo za juzno Primorsko Znanstveno-raziskovalno sredisce Republike Slovenije Koper. 140 pp..

Krystufek, B. & Vohralik, V., 2005, Mammals of Turkey and Cyprus. Rodentia I: Scuidae, Dipodidae, Gliridae, Arvicolinae. Zgodovinsko drustvo za juzno Primorsko Znanstveno-raziskovalno sredisce Republike Slovenije Koper. 292 pp.

Kumerloeve, H., 1975, Die Saugetierte (Mammalia) der Turkei. Veröff. Zool. Staatssamlung München. 18: 69-158.

Lehmann 1966. Taxonomische Bemenerkungen zur Saugerausbeute der Kumerloevschen Orientreisen 1953-1965. Zool. Beitr. (N. F.), Berlin 12: 251-317.

Mursaloğlu, B., 1973, Türkiye Yabani Memelileri. IV. Bilim Kongresi, 5–8 Kasım 1973, Ankara. 1- 9. 1973.

Nadachowski et al 1990. Mammals from the Near East in Polish collections. Acta Zool. Cracov. 33: 91-120.

Nader and Kock 1990. Eptesicus (Eptesicus) bottae (Peters, 1869) in Saudi Arabia with notes on its subspcies and distribution (Mammalia: Chiroptera, Vespertilionidae). Senckenbergiana Biol. 70: 1-13.

Niethammer, J. & Krapp, F., 1978, Handbuch der Saugetiere Europas. Wiesbaden (Akademische Verlagsgesellschaft), I: 1–476.

Niethammer, J. & Krapp, F., 1982, Handbuch der Saugetiere Europas. Wiesbaden (Akademische Verlagsgesellschaft) I: 1–649.

Osborn, D.J., 1964, The Hare, Porcupine, Beaver, Squirrels, Jerboas and Dormice of Turkey. Mammalia 28: 578-592.

Özeti, N. & Yılmaz, İ., 1994, Türkiye Amfibileri. Ege Üniversitesi Fen Fakültesi Kitaplar Serisi, No: 151, İzmir, 221 s.

Özkurt, Ş.Ö., Bulut, Ş. 2020. Türkiye Memelileri. Ankara. Panama Yayınlcılı. ISBN: 978-605-7739-57-5.

Özkurt, Ş.Ö., Sözen, M., 2019. Seyfe Kuşları. T.C. Tarım Orman Bakanlığı, Doğa Koruma Milli Parklara Genel Müdürlüğü. Kırşehir. ISBN: 978-605-7599-29-2.

Spitzenberger, F., 1968, Zur Verbreitung und Systematik türkischer Crocidurinae (Insectivora, Mammalia). Ann. Naturhistor. Mus. Wien, 74: 233-252.

Sterry, P. 2004: Die Vögel am Mittelmeer. Frankch. Kosmos Verlags-GmbH. Stuttgart,192 S.

Svensson, L., Zetterström, D. & Mullarney, K., 2010, Birds of Europe: (Second Edition), Princeton University Press, 448 pp.

T.C Çevre ve Orman Bakanlığı Doğa Koruma ve Milli Parklar Genel Müdürlüğü, Merkez Av Komisyonu Kararları.

Turan, N., 1984, Türkiye'nin Av ve Yaban Hayvanları – Memeliler -. Ongun Kardeşler Matbaacılık Sanayii, Ankara, 178 sayfa. 1984.

VAN Winden 1988. Observations of bats in Turkey. Pp: 212-213. In: South Turkey Project. A survey of waders and waterfowl in the Çukurova deltas, spring 1987. WIWO – report Nr 22. Zeist, The Netherlands: Dutch Society for the protection of Birds.

Wilson, D.E. & Reeder, D.M., 2005, Mammal species of the world: A Taxonomic and Geographical Reference, 3rd ed., Smithsonian Institution Press, Washington.

Yiğit, N., Çolak, E., Sözen, M. & Karataş, A., 2006, Rodents of Türkiye. Meteksan, Ankara. 154 pp.

http://www.iucnredlist.org/ (IUCN Red List)

http://www.cites.org/eng/resources/species.html (CITES Appendices)

http://conventions.coe.int/Treaty/EN/Treaties/Html/104.htm (Bern Conventio

A.O.A.C. 1975. Official methods of analysis of the Association of Official Analytical Chemists. Horwitz, W (ed.). 12th Edition. Augier, H. 1977. Les hormones des algues. Etat

Akbulut, A., 1996, Türkiye Tatlısu Algleri, In Demirsoy, Genel ve Türkiye Zoocoğrafyası "Hayvan Coğrafyası", sf. 405-463, Ankara.

Alagöz, S., Ergüden, D., Göksu, M.Z.L., 2006, Seyhan Baraj Gölü'nde (Adana) İlk Kez Tesbit Edilen Balık Türleri, I. Balıklandırma Ve Rezervuar Yönetimi Sempozyumu 7 - 9 Şubat 2006, Antalya.

Alagöz. S., 2005, Seyhan , Baraj Gölü (Adana) Balık Faunasının Belirlenmesi, Çukurova Üniversitesi Fen Bilimleri Enstitüsü, Yüksek Lisans Tezi.

Arslan, N., Timm, T., Erséus, C., 2007, Aquatic Oligochaeta (Annelida) of Balıkdamı wetland (Turkey), with description of two new species of Phallodrilinae, Biologia, Bratislava, 62/3: 323—334

Ayaş, R., Kara, C., 2014, Deliçay (Kahramanmaras)'ın Makroinvertebrat Faunasının Mevsimsel Dağılımı, Yunus Arastırma Bülteni 2014 (4): 47-55

Bahadır, M., Emet, K., 2013, Anadolu'da Yayılış Gösteren Omurgalı Endemik Fauna Elemanlarının Cbs İle Dağılış Alanlarının Haritalanması, Uluslararası Sosyal Araştırmalar Dergisi, 6 (24): 34-50

Balık S., 1995. Freshwater Fish in Anatolia, Turkey, Biological Conservation, Elsevier Science Limited, 72, 213-223

Balık, S., Ustaoğlu, R., 1992, Türkiye Tatlısu Balıklarını Tanımlama Esasları, E.Ü. Fen Fakültesi Kitaplar Serisi No:137, İzmir, 58 s

Bayçelebi, E., 2020, Distribution and diversity of fish from Seyhan, Ceyhan and Orontes river systems, Zoosyst. Evol. 96 (2) 2020, 747–767.

Baydar, T., 2020, Büyük Menderes Nehri Su Kalitesinin Bentik Makroomurgasız Fauna Çeşitliliği Kullanılarak Tahmini, Aydın Adnan Menderes Üniversitesi Fen Bilimleri Enstitüsü Su Ürünleri Anabilim Dalı, Yüksek Lisans Tezi

Bellmann, H., 1988, Leben in Bach und Teich. Pflanzen und Wirbellose der Kleingew□sser. Steinbach Naturführer. 287 s.

Biro, K., 1981, Kleiner Bestimmungsschlüssel für Zuckmückenlarven (Diptera: Chironomidae). Wien 329 s.

Bold, H.C., Wynne, M.J., 1985, Introduction to the Algae, Structure and Reproduction, Second Ed., 720 pp., New Jersey

Borutski, E.V., 1963, Fauna of the U.S.S.R. Crustacea, Vol. III, No: 4, Freshwater Harpacticoida. I.P.S.T. Jerusalem, 314 pp.

Bozkurt, A., Doğu Akdeniz Bölgesi'ndeki Bazı Baraj ve Göletlerin Zooplankton Faunası Üzerine İlk Gözlemler.

Bozkurt, A., Seyhan baraj Gölü (Adana) Zooplanktonu, Çukurova Üniversitesi Fen Bilimleri Enstitüsü, Su Ürünleri Anabilim Dalı Yüksek Lisans Tezi.

Cox, E.J., 1996, Identification of Freshwater Diatoms From Live Material, Chapman and Hall, 158 pp., London

Czernecki. D. B. and Blinn, D. W., 1978, Diatoms of Colarado River, J. Cramer, 181 p. Germany Foged, N., 1981, Diyatoms in Alaska, J. Cramer, 310 p., Germany.

Çabuk, Y., Arslan, N., Yılmaz, V., 2004, Species Composition and Seasonal Variations of the Gastropoda in Upper Sakarya River System (Turkey) in Relation to Water Quality, Acta hydrochim. hydrobiol., 32 (6): 393−400.

Çicek, E., 2019, Seminemacheilus dursunavsari, a new nemachelid species (Teleostei: Nemacheilidae) from Turkey, Iran. J. Ichthyol. (March 2020), 7(1): 68-77

Çicek, E., Birecikligil, S.S., Fricke, R., 2015, reshwater fishes of Turkey: a revised and updated annotated checklist, Bıharean Bıologıst 9 (2): 141-157

Çiçek, E., Birecikligil, S., Öztürk, S., Seçer, B., Celepoğlu, Y., 2016, Nevşehir İli Balık Faunası İçin Koruma ve İzleme Programı Önerileri, Nevşehir Bilim ve Teknoloji Dergisi Cilt 5 (1) 1-9 2016.

Çiçek, E., Fricke, R., Sungur, S., Eagderi, s., 2018, Endemic freshwater fishes of Turkey, FishTaxa 3(4): 1-39

Dungan, P.J., 1990, Sulakalanların Korunması, IUCN-The World Conservation Union, DHKD Yayınları, 95 sf., İstanbul

Dussart, B., 1967, Les Copépodes des Eaux Continentales d'Europe Occidentale. Tome I, Calanoides et Harpacticoides, N. Boubee et cie, Paris, 500 pp.

Dussart, B., 1969, Les Copépodes des Eaux Continentales d'Europe Occidentale. Tome II, Cyclopoides et Biologie, N. Boubee et cie, Paris, 292 pp.

Duysak, T., 2016, Seyhan Baraj Gölü (Adana) Zooplanktonunun Vertikal Göçlerinin Tespiti, İskenderun Teknik Üniversitesi Mühendislik ve Fen Bilimleri Enstitüsü, Su Ürünleri Anabilim Dalı Yüksek Lisans Tezi

Edington, J. M., A. G. Hildrew, 1981, Caseless Caddis larvae of the British Isles. Freshwater Biological Association Scientific Publication No:43, 92 p.

Einsle U., 1996, Guides to the Identification of the Microinvertebrates of the Continental Waters of the World. Copepoda: Cyclopoida, Genera Cyclops, Megacyclops, Acanthocyclops. SPB Academic Publishing, No: 10, 82 pp.

Eliott, J. I., 1977, Seasonal changes in the abundance and distribution of planktonic rotifers in Grasmere, (English lake District) Freshwater Biology, 7, 147-166.

Elliot, J. M., K. H. Mann, 1979, A key to British Freshwater Leeches. Freshwater Biological Association Scientific Publication No: 40, 72 s.

Elliot. W., Stoching, C. R., Barbour, M. G., Rost, T. L., 1992, Botany, An Introduction to Plant Biology, 6 nd. Ed., John Wiley and Sons, Singapure.

Emergency and Remedial Response, Washington, DC. EPA/540/1-89/002. NTIS PB90-155581.

Emir, N.(1994): Zooplankton community structure of Çavuşcu and Eber lakes in Central Anatolia-Acta hydrochim. Hydrobiol. 22, 280-288.

Emiroğlu, Ö., 2011, Alien fish species in upper Sakarya River and their distribution, African Journal of Biotechnology Vol. 10(73), pp. 16674-16681

EPA, 2016, Standard Operating Procedure for Zooplankton Analysis, P.19

EPA. *Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers: Periphyton, Benthic Macroinvertebrates and Aquatic_*. Of.ce of Water, U.S. Environmental Protection Agency, Washington, D.C. EPA 841/B-99/002. 1999.

Ergüden, D., Göksu, M.Z.L., 2012, The Fısh Fauna Of The Seyhan Dam Lake (Adana), Journal of FisheriesSciences.com, 6(1): 39-52.

Ergüden, S.A., 2015, Length-weight relationships for six freshwater fish species from the Seyhan Reservoir (south-eastern Anatolia, Turkey), J. Appl. Ichthyol, 1–3

Erk'akan F.,1983 a. Sakarya Havzasının Balıklarının Sistematiği ve Biyo-Ekolojisi Üzerine Araştırmalar, Doğa ve Bilim Dergisi: Veterinerlik ve Hayvancılık Cilt:7, 141-154

Erk'akan F.,1983 b. The Fish Species of the Sakarya Basin and Their Abundance. Hacettepe Bulletin of Natural Sciences and Engineering Volume:12, 21-38.

Erk'akan, F., Atalay-Ekmekçi, F.G. and Nalbant, T.T., 1999. A review of the genus Cobitis in Turkey (Pisces:Ostariophysi:Cobitidae). Hidrobiologia, 403:13-26

Erk'akan, F., Atalay-Ekmekçi, F.G. and Nalbant, T.T., 1999. A review of the genus Cobitis in Turkey (Pisces:Ostariophysi:Cobitidae). Hidrobiologia, 403:13-26

Erkakan, F., Özdemir, F., 2011, Revision of the Fish of the Seyhan and Ceyhan River Basins in Turkey, Research Journal of Biological Science 6 (1): 1-8.

European Committee for Standardization, (2004), Water quality – Guidance standard for the routine sampling and pretreatment of benthic diatoms from rivers.

European Committee for Standardization, (2010), Water quality – Guidance standard for the surveying, sampling and laboratory analysis of phytobenthos in shallow running water.

European Committee for Standardization, 2003, European Standard EN 14011: Water quality - sampling of fish with electricity.

European Committee for Standardization, 2006, European Standard EN 14962: Water quality - guidance on the scope and selection of fish sampling methods.

FAO, 1991, *Recent developments in animal waste utilization".* REUR Technical Series No. 17, 1991

Fındık, Ö., 2000, berdan Baraj Gölü (İçel) Bentik Faunası, Çukurova Üniversitesi Fen Bilimleri Enstitüsü, Yüksek Lisans Tezi.

Fındık, Ö., 2006, Aslantas Baraj Gölü (Osman Ye) Bent K Faunası, Çukurova Üniversitesi Fen Bilimleri Enstitüsü, Doktora Tezi.

Fındık, Ö., Göksu, M.Z.L., 2013, Seasonal Changes of Larval Chironomids in Berdan Dam Lake (Içel, Turkey), Menba Journal of Fisheries Faculty, Sayı-Yıl/Vol.-Year: 1: 44-48

Foged, N., 1982, Diyatoms in Bornholm, Denmark, J. Cramer, 174 p., Germany

Freyhof, J, Erk'akan, F., Özeren, C., Perdices, A., 2011, An overview of the western Palaearctic loach genus Oxynoemacheilus (Teleostei: Nemacheilidae), Ichthyol. Explor. Freshwaters, Vol. 22, No. 4, pp. 301-312

Freyhof, J. and M. Özulug, 2014.Acanthobrama thisbeae, a new species of bream from southern Anatolia, Turkey (Teleostei: Cyprinidae). Ichthyol. Explor. Freshwat. 25(1):1-10.

Geldiay, R. ve Balık, S., 1999, Türkiye Tatlısu Balıkları, E.Ü. Su Ürünleri Fakültesi Yayınları No:46, İzmir, 532 s.

Geldiay, R., Balık,S., 1996. Türkiye Tatlısu Balıkları. Ege Üniversitesi Yayınları No:46 İZMİR 532 s.

Germain, H., 1981, Flora Des Diyatomés, Diatomophycées, 441 p., Paris.

Glöer, P., C. Meier Brook, O. Ostermann, 1992, Süsswasser mollusken: Ein Bestimmung-sschlüssel für die Bundesrepublic Deutchland. Hamburg. 111 s.

Göksu, M.Z.L., Çevik, F., Bozkurt, A., Sarıhan, E., 1997, Rotifera and Cladocera fauna of the River Seyhan (the part within borders of Adana city) [Seyhan Nehrinin (Adana İl Merkezi sinirlari ıç indeki bölümünde) Rotifera ve Cladocera Faunası, Tr J of Zoology, 21: 439-443

Güçlü, S. S. and F. Küçük. 2008, Population Age, Sex Structure, Growth and Diet of Aphanius mento Heckel in: Russegger, 1843 (Cyprinodontidae: Teleostei), at Kırkgöz Spring, Antalya-Türkiye, Turkish Journal of Fisheries and Aquatic Sciences 8: 269-274.

Güçlü, S.S., Erdoğan, Ö., küçük, F., 2019, Biology of Chondrostoma fahirae (Ladiges, 1960) (Actinopterygii: Cyprinidae), an Endangered and Endemic Fish of Turkey, Acta zool. bulg., 71 (1), 2019: 73-78

Güçlü, S.S., küçük, F., 2015, The Ichthyofauna of Gediz River (Turkey): Taxonomic and Zoogeographic Features, nnual Research & Review in Biology 6(3): 202-214

Güçlü, S.S., Küçük, F., Ertan, Ö.O., Güçlü, Z., 2013, The Fish Fauna of the Büyük Menderes River (Turkey): Taxonomic and Zoogeographic Features, Turkish Journal of Fisheries and Aquatic Sciences 13: 685-698

Gül, A., Benzer, S., Saylar, Ö., Gül, G., Yilmaz M., Mogan Gölü balık faunası, AUN Fen Bil. Enst. Dergisi, 19(1), 91-103.

Gülle, İ., Küçük, F., Güçlü, S.S., 2017, Re-Description and New Distribution Area of an Endemic Anatolian Fish Species, Alburnus nasreddini Battalgil, 1944, Turkish Journal of Fisheries and Aquatic Sciences 17: 863-869 (2017)

Gülşah Saç, G., Pseudophoxinus cilicicus, a new spring minnow from southern Anatolia (Teleostei: Leuciscidae), Zootaxa 4671(1):105-118

Gürlek, M., Kara, C., Korkmaz, M., 2010, The Fish Fauna of Upper Zamantı Stream (Tomarza-Örenşehir), Biyoloji Bilimleri Araştırma Dergisi 3 (2): 91-98.

Gürlek, M.E., 2015, Seyhan Havzası Tatlısu Mollusk Faunası, Kahramanmaraş Sütçü İmam Üniversitesi Fen Bilimleri Enstitüsü, Biyoloji Anabilim Dalı, Doktora Tezi.

Gürlek, M.E., 2019, A new genus and two new species of freshwater Gastropoda from the Ceyhan River Basin in the eastern Mediterranean (Mollusca: Gastropoda: Truncatelloidea), Zoology in the Middle East, Vol. 65, No. 1, 59–65.

Gürlek, M.E., Kebapçı, Ü., Lopes-Lima, M., 2016, Mersin Limonlu (Lamos) Çayı Malakofaunası, Yunus Arastırma Bülteni 2016 (1): 19-25.

Güzel, U., 2019, Akarçay Ve Sakarya Havzalarında Bulunan Göllerin Fitoplankton Komunite Yapısının Çevresel Değişkenler İle Karşılaştırılması, Sakarya Üniversitesi Fen Bilimleri Enstitüsü, Yüksek Lisans Tezi

Holmes, N., Whitton, B.A., 1977. Macrophytic vegetation of the river Tees in 1975 observed and predicted changes. Freshwater Biology 7, 43-60.

Holtacı, A., 2015, Afyon ve Aydın İllerinden Toplanan Odonata Larvalarının Faunası, Hitit Üniversitesi Fen Bilimleri Enstitüsü, Yüksek lisans Tezi

Hrbek T., Wildekamp R.H., 2003. Aphanius villwocki, a new species from the Sakarya River basin of central Anatolian plain, Turkey (Teleostei: Cyprinodontiformes), Ichthyoi.Explor. Freshwaters, Vol. 14, No.2, pp. 137-144.

Hrbek, T. and A. Meyer. 2003, Closing of the Tethys Sea and the phylogeny of Eurasian killifishes (Cyprinodontiformes: Cyprinodontidae), J. Evol. Biol. 16(1): 17-36.

Huber Pestalozzi G (1941). *Das Phytoplankton des Süswassers, 2. Teil, 1. Hälfte, Chrysophyceen.* Stuttgart: E. Schweizerbart'sche Verlagsbuehhandlung.

Huber Pestalozzi G (1955). *Das Phytoplankton des Süswassers, 4. Teil, Euglenophyceen.* Stuttgart: E. Schweizerbart'sche Verlagsbuehhandlung.

Huber Pestalozzi G (1961*). Das Phytoplankton des Süswassers, 5. Teil, Chrysophyceae (Ordung:Volvocales).* Stuttgart: E. Schweizerbart'sche Verlagsbuehhandlung.

Huber Pestalozzi G (1968). *Das Phytoplankton des Süsswassers, 3. Teil, Cryptophyceae, Chloromonadophyceae, Dinophyceae.* Stuttgart: E. Schweizerbart'sche Verlagsbuehhandlung.

Huber Pestalozzi G (1982). *Das Phytoplankton des Süswassers, 8. Teil, 1. Hälfte, Conjugatophyceae (Zynematales und Desmidiales).* Stuttgart: E. Schweizerbart'sche Verlagsbuehhandlung.

Hustedt, 1930, Die Süswasser-Flora Mitteleuropas, 466 pp. Jena

Hutchinson, G.E., 1967, A Tereatise on Limnology, Department of Yale University, 1115 P.

Illies, J., 1978, Limnofauna Europea. Gustav Aquatic_er Verlag. 532 s.

İlhan, A., Balık, S., Sarı, H.M., 2014, Orta Ve Batı Anadolu Endemik İçsu Balıklarının Günümüzdeki Dağılımları Ve Koruma Statüleri, İstanbul Üniversitesi Su Ürünleri Dergisi (2014) 29-2: 9-34

İlhan, A., Sarı, H.S., 2013, Marmara gölü balık faunası ve balıkçılık faaliyetleri, Ege J Fish Aqua Sci 30(4): 187-191

İnnal, D., 2020, Fish Diversity and Abundance in the Seyhan River Estuary, Mediterranean Sea Basin, Turkey, Acta Zool. Bulg., Supplement 15, August 2020: 173-180

Kalyoncu, H., Salur, A., 2018, Odonata Fauna Of Alara And Karpuz Stream and Theır Relatıons Wıth Physıco-Chemıcal Varıables, Volume 27 – No: 187-195.

Kara, C., Alp, A., Şimşekli, M., 2010, Distribution of Fish Fauna on the Upper and Middle Basin of Ceyhan River, Turkey, Turkish Journal of Fisheries and Aquatic Sciences 10: 111-122.

Kara, C., Çömlekçioğlu, U., 2004, Karaçay (Kahramanmaraş)'ın Kirliliğinin Biyolojik ve Fiziko-Kimyasal Parametrelerle İncelenmesi, KSU Journal of S 1 cience and Engineering 7(1): 1-7

Kargıoğlu, M., Serteser, A., Kıvrak, E., İçağa, Y., Konuk, M., 2012, Relationships between epipelic diatoms, aquatic macrophytes, and water quality in Akarçay Stream, Afyonkarahisar, Turkey, Oceanological and Hydrobiological Studies, International Journal of Oceanography and Hydrobiology, 41 (1): 74-84

Kayan, A., 2021, The Trichoptera Fauna of Ulupınar Stream and Its Relationship with Water Quality, Turkish Journal of Water Science & Management, Volume: 5 Issue: 1: 59-79

Kazancı N., 1987, *Gümüşhane, Erzurum, Erzincan, Artvin, Kars illerinde Ephemeroptera (Insecta) takımı larvalarının ve erginlerinin sistematik yönden incelenemesi.* TÜBİTAK Proje No: TBAG-574, 80 s.

Kazancı, N., 2001, Gümüşhane, Erzurum, Erzincan, Artvin, Kars İlleri Ephemeroptera Faunasına İlişkin Ön Çalışma. Türkiye İç Suları Araştırmaları Dizisi V. İmaj Yayınevi, 80 s., Ankara.

Kazancı, N., Ertunç, Ö., 2008, Bazı Simuliidae (Insecta, Diptera) Türlerinin Habitat Özellikleri, E.U. Journal of Fisheries & Aquatic Sciences, Cilt/Volume 25, Sayı/Issue 4: 319–323

Kazancı, N., Girgin, S., Dügel, M., Oğuzkurt, D., 1997, *Akarsuların Çevre Kalitesi Yönünden Değerlendirilmesinde ve İzlenmesinde Biyotik İndeks Yöntemi*, Türkiye İç Suları Araştırmaları Dizisi II (Ed. Nilgün Kazancı), Form Ofset, 100 s., Ankara.

Kence, A. ve Bilgin, C., 1996, Türkiye Omurgalılar Tür Listesi, Ankara, 183 s.

Keşir, Ü.E., 2016, Ceyhan Nehri Trichoptera Faunası, Nevşehir Hacı Bektaş Veli Üniversitesi Fen Bilimleri Enstitüsü, Biyoloji Anabilim Dal, Yüksek Lisans Tezi

Kılıçaslan, I., Özbek, M., Contributions to the knowledge on the distribution of freshwater Mollusca species of Turkey, Review of Hydrobiology 3,2: 127-144 (2010)

Kıvrak, E., Uygun, A., 2012, The structure and diversity of the epipelic diatom community in a heavily polluted stream (the Akarçay, Turkey) and their relationship with environmental variables, Journal of Freshwater Ecology Vol. 27, No. 3, September 2012, 443–457

Kıvrak, E., Uygun, A., Kalyoncu, H., 2012, Akarçay'ın (Afyonkarahisar, Türkiye) Su Kalitesini Değerlendirmek için Diyatome İndekslerinin Kullanılması, Akü Febid 12 (2012) 021003 (27-38).

Kiefer, F., 1955, Freilebende Ruderfusskrebse (Crustacea, Copepoda) aus Türkischen Binnengewasser. II. Cyclopoida und Harpacticoida. İ.Ü.F.F. Hidrobiyoloji Araşt. Enst. Yayınları, Seri B, II (4): 108-132.

Kiefer, F., 1978, Das Zooplankton der Binnengewasser 2. Teil. Freilebende Copepoda. Die Binnengewasser Band XXVI E. Schweizerbant'sche, Verlagbuchhandlung, Stuttgart. 315 pp.

Kolisko, R., 1974, Plankton rotifers biology and taxonomy. Biological Station Lunz of Austrian Academy of Science, Stuttgart.

Kolisko, R.A., 1974, Plankton Rotifers Biology and Taxonomy, Biological Station Lunz of the Austrian Academy of Science, Stuttgard, 974 p.

Komárek J (1983). *Das Phytoplankton des Süswassers, 7. Teil, 1. Hälfte, Chlorophyceae (Ordung: Chlorococcales).* Stuttgart: E. Schweizerbart'sche Verlagsbuehhandlung.

Koste, W., 1978a, Die Radetiere Mitteleuropas 1. texband Berlin Stutgart 670 P.

Koste, W., 1978b, Die Radertiere Mitteleuropas II. Tafelband Berlin Stutgart, 235 P.

Krammer, K., Lange-Bertalot, H., 1986, Sußwasserflora von Mitteleuropa, Bacillariophyceae, Band 2/1, 1. Teil: Naviculaceae, Gustav Fischer Verlag, 876 pp., Stuttgart

Krammer, K., Lange-Bertalot, H., 1988, Sußwasserflora von Mitteleuropa, Bacillariophyceae, Band 2/2, 2. Teil: Bacillariaceae. Epithemiaceae, Surirellaceae, Gustav Fischer Verlag, 584 pp., Stuttgart

Krammer, K., Lange-Bertalot, H., 1991a, Sußwasserflora von Mitteleuropa, Bacillariophyceae, Band 2/3, 3. Teil: Centrales, Fragilariaceae, Gustav Fischer Verlag, 576 pp., Stuttgart

Krammer, K., Lange-Bertalot, H., 1991b, Sußwasserflora von Mitteleuropa, Bacillariophyceae, Band 2/4, 4. Teil: Achnanthaceae, Kritische Ergänzungen zu Navicula (Lineolatae) und Gomphonema Gesamtliteraturverzeichnis, Gustav Fischer Verlag, 436 pp., Stuttgart

Kuru, M., 1980. Key to Inland Water Fishes of Turkey. Hacettepe Bull. Nat. Sci. Eng., 9, 103-133.

Kuru, M.,2004. Türkiye İçsu Balıklarının Son Durumu, GÜ, Gazi Eğitim Fakültesi Dergisi, Cilt 24, Sayı (3) 1-21.

Kuttikova, A., 1970, Rotatoria (The Rotifer fauna of SSCB), 670 P.

Küçük, F., D. Turan, S.S. Güçlü, A.G. Mutlu and Y. Çiftci, 2017. Two new species of ChondrostomaAgassiz, 1832 (Teleostei; Cyprinidae) from Ceyhan, Seyhan and Göksu Rivers in the East Mediterranean region of Turkey. Turk. J. Fish Aquat. Sci. 17:795-803.

Küçük, F., Turan, D., Güçlü, S.S., Mutlu, A.G., Çiftci, Y., 2017, Two New Species of Chondrostoma Agassiz, 1832 (Teleostei: Cyprinidae) from the Ceyhan, Seyhan and Göksu Rivers in the East Mediterranean Region of Turkey, Turkish Journal of Fisheries and Aquatic Sciences 17: 793-801

Lackey, J. B. 1938 The flora and fauna of surface waters polluted bv acid mine drainage. Publ. Health Rep. 53: 1499-1507.

Le Cren, E.D. 1951. The length-weight relationship and seasonal cycle in gonad weight and condition in Perch (*Perca fluviatilis*). J. Anim. Ecol. 20:201-219.

Ludwig, H.W., 1993, Tiere in Bach, Fluss, Tümpel, See, Merkmale, biologie, Lebensraum Gef□hrdung BLV Bestimmungsbuch 255 s.

Lund, J.W.G., Kipling, C. & LeCren, E.D. (1958). The inverted microscope method of estimating algal numbers and the statistical basis of estimations by counting. Hydrobiologia, 11, 143-170.

Macan, T. T., 1982, A guide to Freshwater Invertebrate Animals. Longman. 118 p.

Mann, K. H., 1962, Leeches (Hirudinea) Their Structure, Physiology, Ecology and Embryology. Pergamon Press. 201 p.

NC Department of Environmental Quality. 2016. Standard Operating Procedures for the Collection and Analysis of Benthic Macroinvertebrates. Division of Water Resources. Raleigh, North Carolina. February 2016.

Needham, J. G., P. R. Needham, 1962, A guide to the study of Freshwater Biology. San Francisco 107 p.

Negrea, S.T., 1983, Fauna Rebuplici Socialiste Romania Crustacea Cladocera. Academia Repiblicii Socialiste Romania, 4: (12), Buceristi, p. 399.

Odabaşı D.A., Arslan, N., 2015, Description of a new subterranean nerite Theodoxus gloeri n sp with some data on the freshwater gastropod fauna of Balıkdamı Wetland Sakarya River Turkey Ecologica Montenegrina 2 (4): 327 333.

Odum, E. P. 1971. Fundamentals of ecology. W.B. Saunders Co., Philadelphia.

Öscan, G., tarkan, A.S., 2019, Dıstrıbutıon Revısed- Fıfteen Years Of Changes In The Invasıon Of A Freshwater Fısh, Pseudorasbora Parva (Temmınck And Schlegel, 1846) In Turkey, Transylv. Rev. Syst. Ecol. Res. 21.2: 69-80

Özesmi, U., 1988, Sultan Sazlığı'nın Sucul heteroptera ve Coleoptera türleri üzerinde bir faunistik araştırma. TÜBİTAK BAYG-Proje yarışması Araştırma raporu.

Patrick, R., Reimer, C. W., 1966, The Diatoms of the United States, Vol. 1-2, Part I, Philadelphia.

Pauly, D. and Navaluna, N.A. 1983.Monsoon-induced seasonality in the recruitment of Philippine Aquatic_es. *In* G.D Sharp and J. Csirke (eds.) Proceedings of the Expert Consultation to Examine Changes in Abundance and Species Composition of Neritic Aquatic_ Resources, 18-29 April 1983, San Jose, Costa Rica. FAO Aquatic_eries Report 291, Vol. 3.

Pejler, B., 1962, Taxonomic notes on some planktonic-freswater rotifers, zoologiska Bidrag Fran Uppsalla, Bond 35, 302-319

Pennak, R. W., 1978, Freshwater Invertebrates of the United States. John Wiley and Sons Publication. 803 p.

Prescott, G.W., 1975, Algae of Western Great Lake Area, Brown Comp. Pub., 977 p.

Quigley, M., 1977, Invertebrates of Streams and Rivers. A key to Identification. London 874 p.

Rider, M. de, 1981, Rotifera, Cercle Hydrobiologique de Bruxelles, 190 P.

Rosenberg, D. M., and Resh, V. H., 1993, Freshwater biomonitoring and bentic macroinvertabrates, New York, 326p.

Round, F.E., 1973, The Biology of the Algae, Second Ed., Edward Arnold Pub., 278 pp., London

Rylov, V.M., 1963, Fauna of U.S.S.R. Crustacea, Vol. III, No: 3, Freshwater Cyclopoida, I.P.S.T. Jerusalem, 314 pp.

Salur, A., Kıyak, S., 2006, Additional Records for the Odonata Fauna of East Mediterranean Region of Turkey, Mun. Ent. Zool. Vol. 1, No. 2.

Sennika, S.A.B., 1943, Contributions to the Ecology and Biology of the Danish Freshwater Leeches (Hirudirea). K□benhaum Denmark 109 p.

Serteser, A., Kargıoğlu, M., İçağa, Y., Konuk, M., 2008, Vegetation as an Indicator of Soil Properties and Water Quality in the Akarçay Stream (Turkey), Environmental Management (2008) 42:764–770

Sladecek, V., 1983, Rotifers as indicators of water quality, Hydrobiologia, 100, 169-201.

Smirnov, N.N., 1992, Guides to the Identification of the Microinvertebrates of the Continental Waters of the World. The Macrothricidae of the World. SPB Academic Publishing, No: 1, 140 pp.

Solak, C.N., Çetin, T., Karaaslan, Y., kaleli, A., Yılmaz, E., Duran, M., Kıvanç, G., Kimençe, T., Koyunluoğlu, Ş.A., Çankaya, B.F., Aşık, D.Y., 2019, Common Diatoms of Phytobenthos in Gediz River Basin, Volume: 3 Issue: 2:58-70

Sreenivasa, M. R., Duthie, H. C., 1973, Diatom Flora of the Grand River Ontario, Canada, Hydrobiologia, 42: 161-224.

Şahin, Y., (1991): Türkiye Chironomidae Potamofaunası TÜBİTAK Proje No: TBAG-869. Ankara 88 s.

Şişli, N., 1996, Ekoloji, Yeni Fersa Matbaacılık, 492 s.

Tanatmış, M., 1995, Sakarya Nehir Sistemi ephemeroptera Limnofaunasının Belirlenmesi Üzerinde Araştırmalar, Türk. Entomol. Derg., 19 (4): 287-298.

Taşdemir, A., Ustaoğlu, R.M., Balık, S., 2009, Gediz Deltası (Menemen-İzmir) Chıronomıdae (Dıptera) Faunası'na Katkılar, Journal of FisheriesSciences.com, 3(1): 32-39

Temiz, G., 2019, Mersin İli Tatlı Su Balık Faunası, Nevşehir Hacı Bektaş Veli Üniversitesi Fen Bilimleri Enstitüsü, Yüksek Lisans Tezi

Turan, D., Kottelat, M., Doğan, E., 2013, Two new species of Squalius, S. adanaensis and S. seyhanensis (Teleostei: Cyprinidae), from the Seyhan River in Turkey, Zootaxa 3637 (3): 308–324

Türk Standartları Enstitüsü, (1991), Water quality – Using Techniques and classification for sampling phytoplankton in surface water.

U.S. EPA. 2001. *Risk Assessment Guidance for Superfund*: *Volume I. Human Health Evaluation Manual, Part D: Standardized Planning, Reporting, and Review of Superfund Risk Assessments.* Office of Emergency and Remedial Response. Washington, DC. OSWER Directive No. 9285-47. December.

Uslu ve Türkman, 1987, Su Kirliliği ve Kontrolu, T.C. Başbakanlık Çevre Genel Müdürlüğü Yayınları Eğitim dizisi 1, 364 sf.

Uygun, A., 2010, Akarçay'ın (Afyonkarahisar) Bentik Diyatomeleri Ve Çay Su Kalitesinin Değerlendirilmesinde Kullanılması Üzerine Bir Araştırma, Afyon Kocatepe Üniversitesi Fen Bilimleri Enstitüsü, Yüksek Lisans Tezi.

Van Heurck, H., 1962, A Treatise on the Diatomaceae, J. Cramer, 555 p., London.

Vollenweider, R. A. (1974). A manual on methods for measuring primary production in aquatic environments. Blackwell Scientific Publications, Oxford

Wetzel, 1983, Limnology, Michigan State University, 767 pp., USA

Wildekamp, R.H., F. Küçük, M. Ünlüsayin, and W. V. Neer. 1999, Species and Subspecies of the Genus Aphanius Nardo 1897 (Pisces: Cyprinodontidae) in Turkey, Turk. J. Zool. 23: 23-44.

Yeğen, V., Balık, S., Bilçen, E., Sarı, H.M., Uysal, R., İlhan, A., Bostan, H., 2007, Afyon İli Akarsularında Yayılış Gösteren Balık Türleri Ve Dağılımları, ürk Sucul Yaşam Dergisi Ulusal Su Günleri, 3: 419-428.

Yoğurtçuoğlu, B., Ekmeçci, F. G., 2017, New Records of Kızılırmak Toothcarp, Aphanius

marassantensis from Central Yeşilırmak River Basin (Turkey), Turkish Journal of Aquatic_eries and Aquatic Sciences 17: 205-208.

Zahrandik, J., Cihar, J., 1990, Der Kosmos-Tierführer. Ein bestimmungsbuch mit 1092 Farbbildern. Prag. 389 s.