E.1. THE DIVERSITY OF THE FAUNA OF GREECE

by Dimitra Bobori, B.P. Chondropoulos, P.S. Economidis, Vasiliki Flari, S.E. Fraguedakis-Tsolis, S. Kazantzidis, Maria Lazaridou-Dimitriadou, A. Legakis, E. Valakos and V.P. Vogiatzis

E.1.1. Introduction

It is well known that the fauna of Greece is very rich compared to that of the other European States. The number of animal species recorded so far is high in relation to the surface of Greece. This is mainly due to the geographical position of Greece which lies at the crossroads of Europe, Asia and Africa, to the existence of many islands and the fluctuation of the sea level, to the karstic nature of the substrate that resulted in Greece having the highest number of caves in Europe after Yugoslavia and finally due to the fact that the glaciers didn't reach Greece and refuge areas for many species were created in the north. However, the long presence of man has created pressures on many populations and has even led several species and subspecies to extinction. The Habitat Directive, although not as complete as would have been expected, is a good opportunity to conserve what still exists today.

The animal species listed in the Annexes to Directives 92/43/EEC and 79/409/EEC include many of the species encountered in Greece. Among the approximately 200 species of Annex II to Directive 92/43/EEC, 76 have been recorded in Greece, including mammals, reptiles, amphibians, fish and invertebrates. To these we should add 129 species of birds that are included in Annex I to Directive 79/409/EEC (Fig. E.1).

Of the approximately 280 species of Annex IV to Directive 92/43/EEC (species of Community interest that require strict protection), 126 species have been recorded in Greece: 52 mammals, 40 reptiles, 11 amphibians, 2 freshwater fish and 21 invertebrates. Finally, among the approximately 60 species of Annex V (species of Community interest that can be removed from nature or exploited under control), 4 mammals, 2 amphibians, 13 freshwater fish and 8 invertebrates have been recorded in Greece.

S. Dafis, E. Papastergiadou, K. Georghiou, D. Babalonas, Th. Georgiadis, M. Papageorgiou, T. Lazaridou & V. Tsiaousi (eds.), *Directive 92/43/EEC. The Greek Habitat Project Natura 2000: An overview.* Greek Biotope/Wetland Centre - University of Athens - Aristotle University of Thessaloniki - University of Patras, 1996

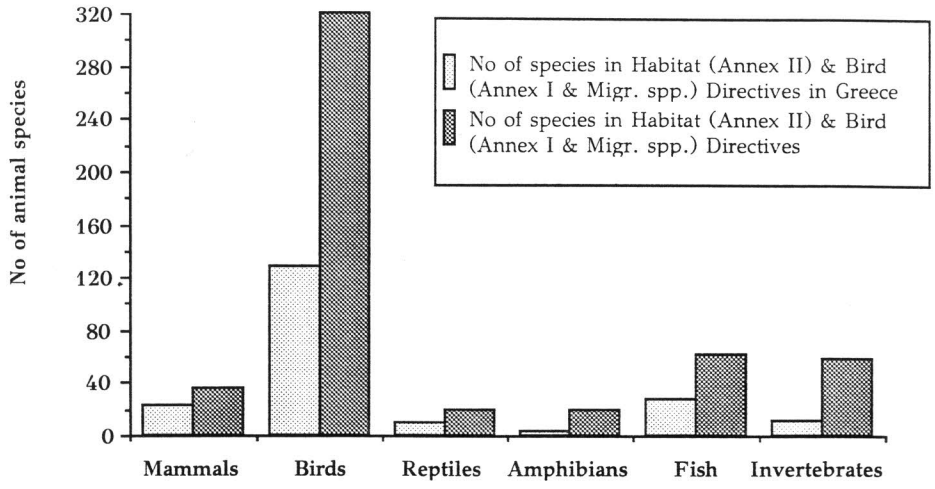

Fig. E.1. Number of species listed in Annex II to Directive 92/43/EEC, species in Annex I to Directive 79/409/EEC and migratory birds of Directive 79/409/EEC, recorded in Greece and Europe.

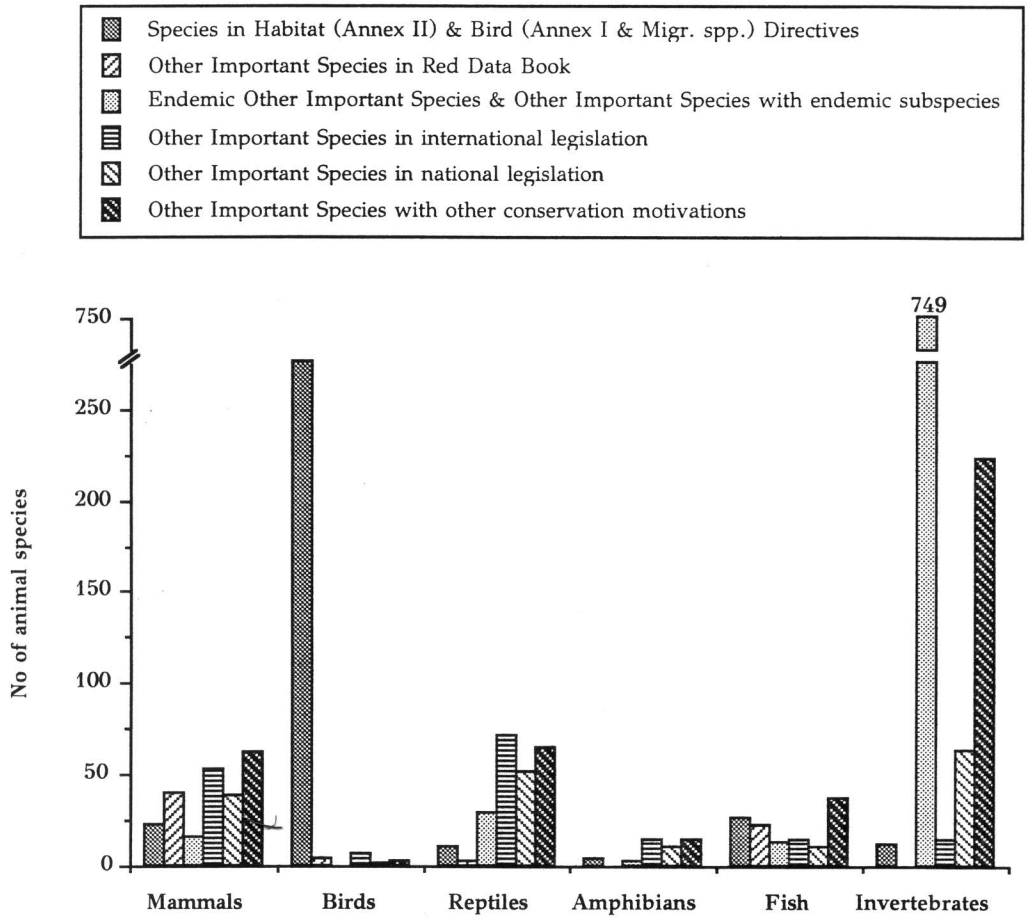

Fig. E.2. Number of species listed in Annex II to Directive 92/43/EEC, species in Annex I to Directive 79/409/EEC and migratory species of Directive 79/409/EEC, species recorded in the Red Data Book of Threatened Vertebrates, endemic species and species with endemic subspecies, species in the international and national legislation and other threatened species.

Most of the important vertebrates of Greece are included in the Annexes to Directive 92/43/EEC satisfactorily, one exception being the freshwater fish. Greece hosts many endemic, rare and threatened species and subspecies, a large number of which are not included in the directive. Moreover, the group of invertebrates is the least represented. It is estimated that approximately 25,000 species of invertebrates are found in Greece. Of these, at least 2,000 are endemic to Greece, some of them being very narrowly endemic. For example, many species have been recorded in only one site. Apart from the endemics, a significant number of species have very small populations or are threatened with extinction. However, only 33 species found in Greece have been included in the various Annexes to the Directive. Some of them are not threatened in Greece, whereas, several species that are representative of threatened habitats such as caves or sand dunes, are omitted.

One significant aspect that arose from the collection of data on the fauna was the identification of species that, although not included in Annex II to the Habitat Directive and Annex I to the Bird Directive, were considered as important by the experts. Such species would comprise those included in the Red Data Book of the Threatened Vertebrates of Greece and in various international conventions such as the Bern and Bonn Conventions and CITES or in the national legislation, the endemic species of Greece as well as other species that are rare or threatened with extinction (Fig. E.2). These species were recorded in two fields of the Standard Data Form: field 3.3 "Other Important Species" and field 3.4 "Greek Important Species". For the sake of clarity, species in both fields will be called henceforth Other Important Species. The recording of all these species, which certainly was not complete since it requires a long-term research, gave a better view of the biological diversity and the conservation status of the sites that were studied. The recording of these species will also aid in the adaptation of the Annexes to the Directive 92/43/EEC so that it can become a more useful and effective tool for nature conservation.

E.1.2. Methods

Most of the data presented in the Standard Data Forms (SDFs) for the proposed sites derive from literature. A small proportion comes from unpublished records of the SDFs' editors and from confirmed reports of local forestry and other officials. Recent literature was mainly scanned for data. Very old references were not taken into account as their data may have changed significantly over time. The majority of the literature on the invertebrates and a significant part of the vertebrate literature came from the archives of the Hellenic Zoological Society and the archives of the Project for the Survey of the Greek Fauna of the Dept. of Biology of the University of Athens. Unpublished data was also supplied by the Hellenic Society for the Conservation of Nature and Cultural Heritage, WWF-Greece, the Hellenic Society for the Study and Protection of the Monk Seal, the Society for the Protection of Sea Turtles and Arcturos, the Bear Protection Society.

SDFs editors reported on the reasons for which they thought that the other important species should be included in the database. These reasons (motivations) were discerned into four categories. Motivation A included all taxa contained in the Red Data Book of Threatened Vertebrates of Greece. Motivation B included all the taxa endemic to Greece. Motivation C included taxa that are mentioned in international conventions, namely the Bern, Bonn and CITES. Finally, motivation D included other reasons, such as national legislation, international lists of threatened species (IUCN, Council of Europe etc.), Balkan endemics, locally endangered taxa etc.

Of the 296 proposed sites, 274 were taken into consideration during data processing since the rest 22 sites were parts of larger designated sites.

It was decided to use zoogeographical regions for the analysis of the data instead of NUTS divisions because the latter are not meaningful for the distribution of animals in Greece. However, the NUTS divisions are used when presenting the sites where the Directives species were recorded. The zoogeographical regions of Greece are those accepted by many researchers (Map E.1). In Table E.1 the regions and the corresponding NUTS divisions are listed.

Table E.1. Zoogeographical regions of Greece.

Zoogeographical region	NUTS 1	NUTS 2	NUTS 3
I: Voreia Anatoliki Ellada (VAE)	Voreia Ellada	Anatoliki Makedonia, Thraki, Kentriki Makedonia (part)	Evros, Xanthi, Rodopi, Drama, Kavala, Serres, Kilkis, Thessaloniki, Chalkidiki
II: Voreia Dytiki Ellada (VDE)	Voreia Ellada	Kentriki Makedonia (part), Dytiki Makedonia	Pella, Imathia, Pieria, Florina, Kozani, Kastoria, Grevena
IV: Thessalia (TH)	Voreia Ellada	Thessalia	Karditsa, Larisa, Magnisia, Trikala
III: Ipeiros (IP)	Kentriki Ellada	Ipeiros	Arta, Thesprotia, Ioannina, Preveza
V: Ionia nisia (IOL)	Kentriki Ellada	Ionia nisia	Zakynthos, Kefallinia, Kerkyra, Lefkada
VI: Sterea Ellada (STE)	Kentriki Ellada, Attiki (part), Peloponnisos (part)	Dytiki Ellada (part), Sterea Ellada, Attiki (part), Peloponnisos (part)	Aitoloakarnania, Voiotia, Evvoia, Evrytania, Fthiotida, Fokida, Attiki (part), Korinthia (part)
VII: Peloponnisos (PE)	Kentriki Ellada, Attiki (part)	Peloponnisos, Dytiki Ellada (part), Attiki (part)	Achaia, Ileia, Argolida, Arkadia, Korinthia (part), Lakonia, Messinia, Attiki (part)
IX: Voreio Aigaio (VAi)	Nisia Aigaiou, Kriti	Voreio Aigaio	Lesvos, Samos, Chios
X: Dodekanisa (DO)	Nisia Aigaiou, Kriti	Notio Aigaio	Dodekanisos (part)
VIII: Kyklades (KYK)	Nisia Aigaiou, Kriti	Notio Aigaio	Kyklades, Dodekanisos (part)
XI: Kriti (KR)	Nisia Aigaiou, Kriti	Kriti	Irakleio, Lasithi, Rethymni, Chania

In the text that follows, names of places were mentioned using the Greek Standards Organization (ELOT) rules.

Map E.1. Zoogeographical regions of Greece. Modified after (a) W. Kuehnelt, 1965. Catalogus Faunae Graeciae. Pars I. Tenebrionidae, and (b) F. Willemse, 1984. Catalogue of the Orthoptera of Greece. Fauna Graeciae I. Hellenic Zoological Society. (**I**: Voreia Anatoliki Ellada, **II**: Voreia Dytiki Ellada, **III**: Ipeiros, **IV**: Thessalia, **V**: Ionia nisia, **VI**: Sterea Ellada, **VII**: Peloponnisos, **VIII**: Kyklades, **IX**: Voreio Aigaio, **X**: Dodekanisa, **XI**: Kriti)

E.1.3. General comments

A total of 1532 species and subspecies (the latter concern vertebrates only), covering a large number of animal groups, were recorded in the proposed sites (Fig. E.3). Of these, 351 are listed in Annex II to the Habitat Directive and in Annex I to Bird Directive or are migratory species, while 1183 were recorded as Other Important Species (fields 3.3 and 3.4 of the SDF). Of all the 1532 recorded animal species only 23% are species of the two Directives, and 3% are priority species.

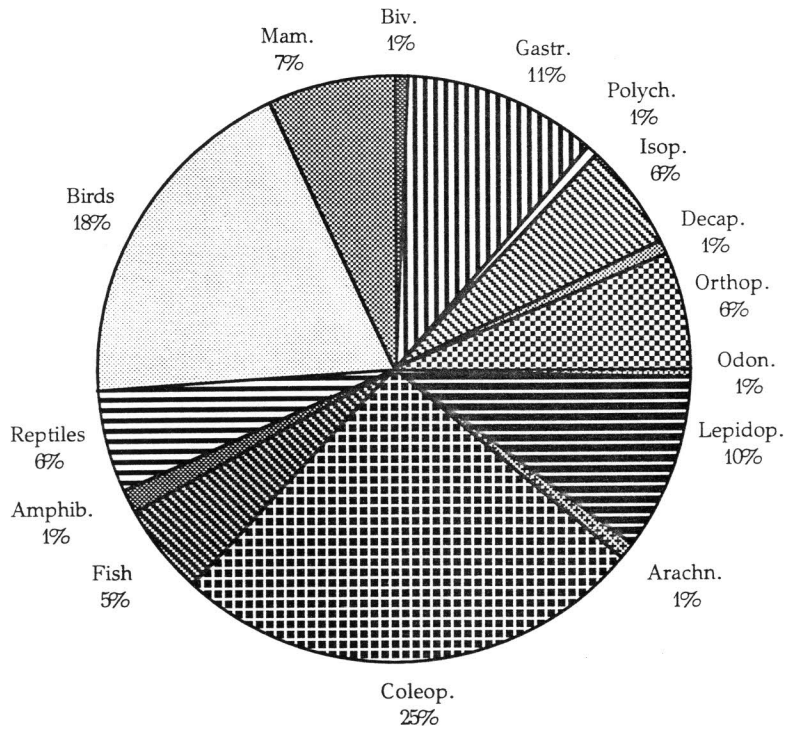

Fig. E.3. Percentage of each animal group in the total number of Annex II to Directive 92/43/EEC and Other Important Species. (Biv.=Bivalvia, Gastr.=Gastropoda, Polych.=Polychaeta, Arachn.=Arachnidia, Isop.=Isopoda, Decap.=Decapoda, Orthop.=Orthoptera, Odon.=Odonata, Lepidop.= Lepidoptera, Coleop.=Coleoptera, Amphib.= Amphibia, Mam.=Mammalia). Groups Porifera, Cnidozoa, Polyplacophora, Amphipoda, Diplopoda, Diplura, Heteroptera, Trichoptera, Echinoderma and Ascidia are represented by a percentage less than 1; therefore, they are not shown on the graph.

The majority of the recorded species are invertebrates most of which are registered in fields 3.3 and 3.4 of the SDFs as Other Important Species. The bird species are also numerous but almost all of them are included in Directive 79/409/EEC (Fig. E.2).

The taxa recorded were distributed in all the zoogeographical regions of Greece. The lowest number of taxa was recorded in the North Aegean (Voreio Aigaio) islands and the highest in Sterea Ellada and Peloponnisos (Fig. E.4).

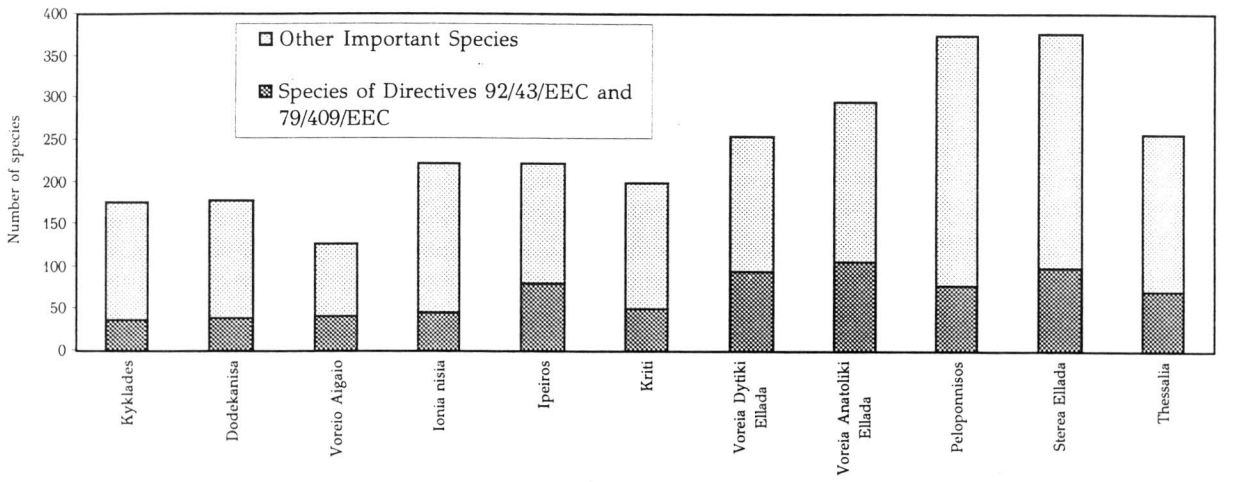

Fig. E.4. Number of Other Important Species and species referred to Directives 92/43/EEC and 79/409/EEC per zoogeographical region.

Fifty six percent of the sites host at least one species in the fields Other and Greek Important Species while 46% of the sites host at least one species mentioned in one of the Directives. Priority species have been recorded in 11% of the sites.

The endemic species which are important for Greece are distributed in the various zoogeographical regions as shown in Fig. E.5 to E.8. Endemic mammals and reptiles are mostly distributed in southern and insular Greece, endemic amphibians (2 subspecies) in central Greece and in Crete and endemic fish in northern and central Greece. There were no endemic birds while the data on invertebrates was considered as incomplete and would not produce meaningful results.

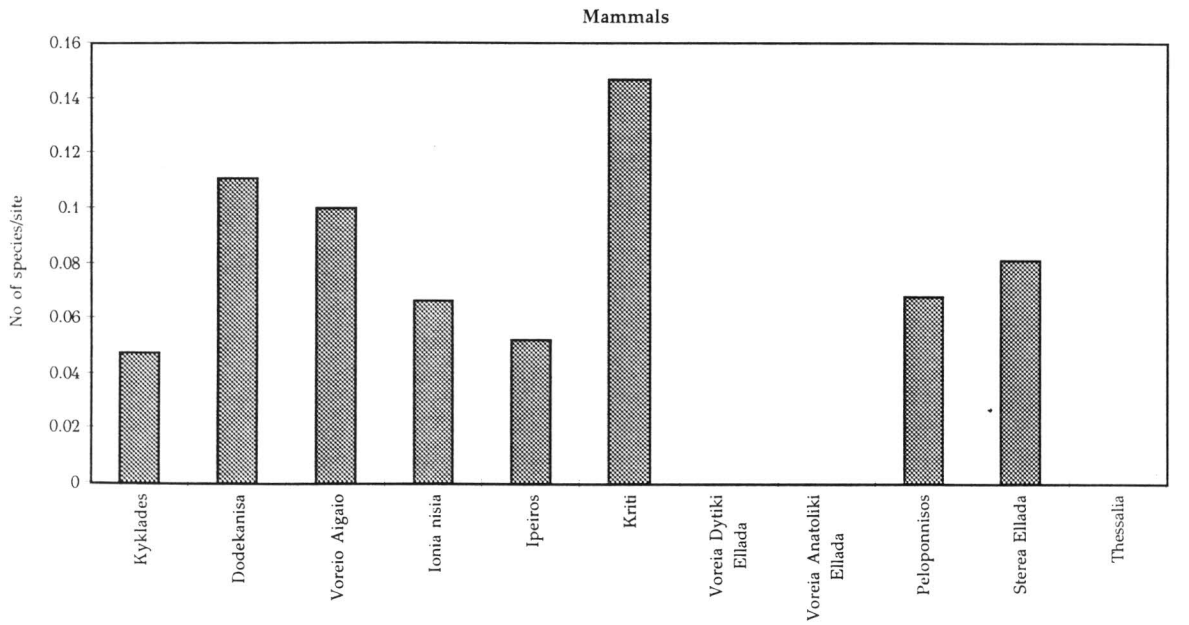

Fig. E.5. Number of endemic mammal species and species with endemic subspecies per site in each zoogeographical region.

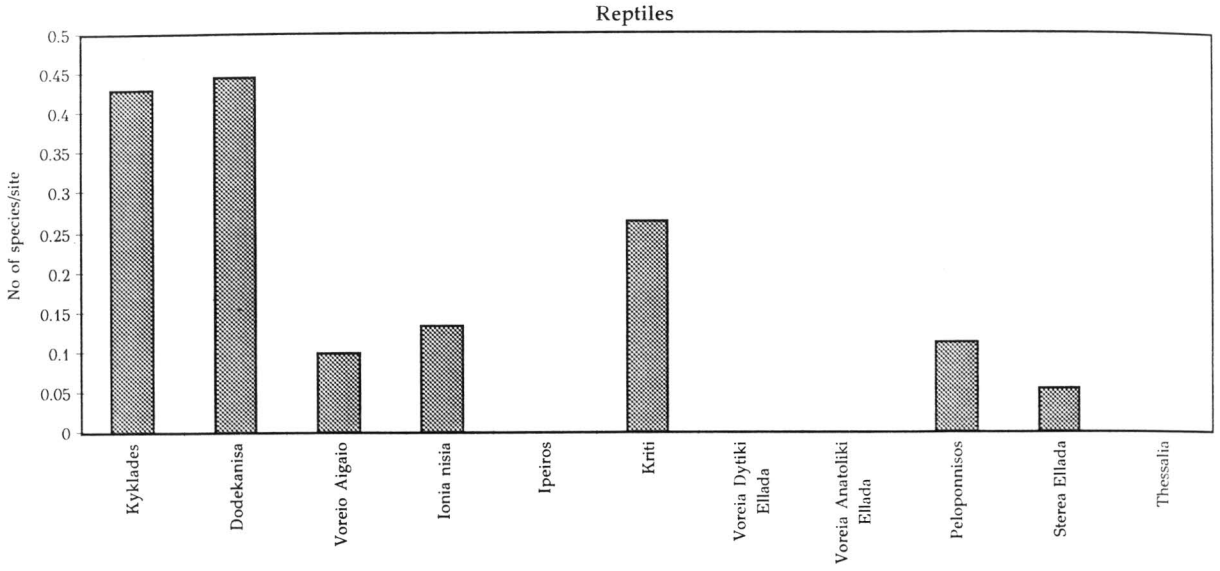

Fig. E.6. Number of endemic reptile species and species with endemic subspecies per site in each zoogeographical region.

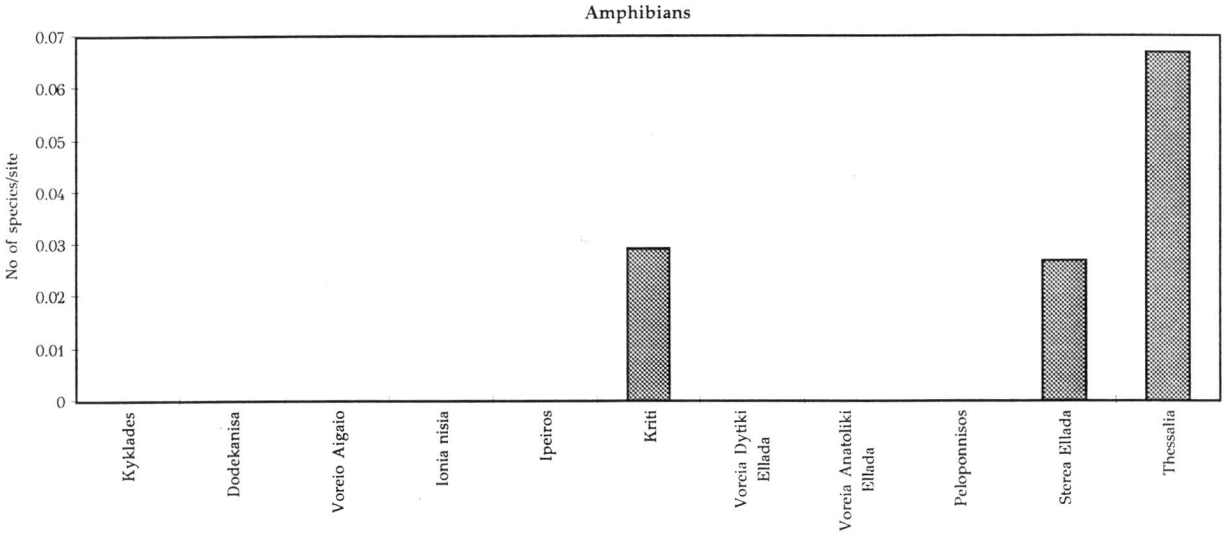

Fig. E.7. Number of endemic amphibian species and species with endemic subspecies per site in each zoogeographical region.

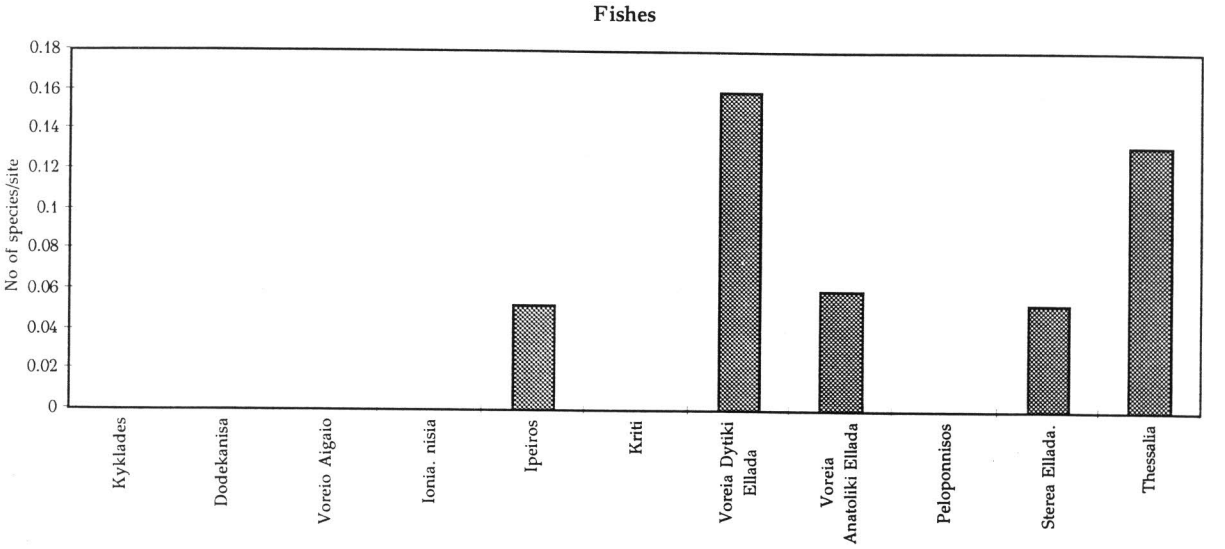

Fig. E.8. Number of endemic fish species and species with endemic subspecies per site in each zoogeographical region.

E.1.4. Habitat Directive Annex II species and Birds Directive Annex I and migratory species

Three hundred and fifty one animal species belonging to Annex II to Directive 92/43/EEC, migratory species and species of Annex I to Directive 79/409/EEC were recorded in the sites that have been proposed as Sites of Community Importance. Eleven of them are priority species: 3 fish, 3 mammals, 2 reptiles, and 3 invertebrates. In Table E.2 the scientific names of the species, the number of sites where these were recorded and the motivation (A, B, C, and D) for each one are given.

Table E.2. Species of Annex II to Directive 92/43/EEC, Annex I to Directive 79/409/EEC and migratory species of Directive 79/409/EEC recorded in Greece. A, B, C and D correspond to the motivation categories A: Red Data Book, B: Endemic taxa, C: International Convention D: Other reasons. (Detailed explanation of symbols is given at the end of the table).

MAMMALS (22 spp.)

Taxa	No of sites	A	B	C	D
Order Chiroptera (12 spp.)					
Barbastella barbastellus	3	R		II	3
Miniopterus schreibersii	11	E		II	1,3
Myotis bechsteinii	4	R		II	3
Myotis blythi	22	V		II	1,3
Myotis capaccinii	7	E		II	1,2,3
Myotis emarginatus	11	E		II	1,3
Myotis myotis	14	E		II	1,2,3,4
Rhinolophus blasii	14	E		II	1,2,3
Rhinolophus euryale	4	E		II	1,2,3
Rhinolophus ferrumequinum	35	V		II	1,3
Rhinolophus hipposideros	22	V		II	1,3
Rhinolophus mehelyi	5	E		II	1,3
Order Rodentia (1 sp.)					
Citellus citellus	28	V		II	1,3
Order Carnivora (4 spp.)					
Canis lupus	5	V		II,II	2,3,4
Lutra lutra	61	V		II,I	1,2,3,4
Lynx lynx	2	E		III	2,3
Ursus arctos	31	E		II,II	2,3
Order Pinnipedia (1 sp.)					
Monachus monachus	68	E		II,I,I/II	1,2,3,4
Order Artiodactyla (2 spp.)					
Capra aegagrus	5	E		II	3
Rupicapra rupicapra balcanica	20	R		III	3
Order Cetacea (2 spp.)					
Phocoena phocoena	1	R		II,II	1,2,3,4
Tursiops truncatus	19			II,II	1,3

BIRDS (276 spp.)

Taxa	No of sites	A	B	C	D
Order Gaviiformes (2 spp.)					
Gavia arctica	17			II	3
Gavia stellata	9			II	3
Order Podicipediformes (5 spp.)					
Podiceps auritus	5			II	
Podiceps cristatus	38				
Podiceps griseigena	6	I		II	
Podiceps nigricollis	36	K		II	
Tachybaptus ruficollis	39			III	
Order Procelariiformes (4 spp.)					
Calonectris diomedea	18			III	1,3
Hydrobates pelagicus	6	R		II	1,3
Puffinus puffinus	18			II	
Order Pelecaniformes (5 spp.)					
Pelecanus crispus	20	E1		II,I,II	2,3,4
Pelecanus onocrotalus	14	E1		II	3
Phalacrocorax aristotelis desmarestii	14	V		III	
Phalacrocorax carbo sinensis	35			III	1
Phalacrocorax pygmeus	27	E2		II	2,3,4
Order Ciconiiformes (13 spp.)					
Ardea cinerea	47			III	
Ardea purpurea	44	V		II	1
Ardeola ralloides	45			II	1
Botaurus stellaris	21	I		II	1,3
Bubulcus ibis	5			II	
Ciconia ciconia	50			II	1,3
Ciconia nigra	31	E2		II,II,II	1,3
Egretta alba	35	E2		II	1,3
Egretta garzetta	54			II	1,3
Ixobrychus minutus	42			II	3
Nycticorax nycticorax	41	K		II	1,3
Platalea leucorodia	21	E1		II,II,II	1,3
Plegadis falcinellus	39	E1		II	1,3
Order Phoenicopteriformes (1 sp.)					
Phoenicopterus ruber	24	R		II,II,II	1,3
Order Anseriformes (31 spp.)					
Anas acuta	35			III,-,II	
Anas clypeata	34			III,-,II	
Anas crecca	38			III,-,II	
Anas penelope	37			III,-,II	
Anas platyrhynchos	40			III,-,II	
Anas querquedula	36	K		III,-,II	
Anas strepera	26	K		III,-,II	
Anser albifrons	16			III,-,II	1
Anser anser	19	E2		II,-,II	
Anser erythropus	4	E2		II,-,II	2,3,4

BIRDS (276 spp.)

Taxa	No of sites	A	B	C	D
Anser fabalis	4			III,-,II	
Aythya ferina	37	K		III,-,II	
Aythya fuligula	24			III,-,II	
Aythya marila	7			III,-,II	
Aythya nyroca	23	V		III,-,II	1,3
Branta bernicla	1			III,-,II	
Branta ruficollis	7	E2		II,II,II	2,3
Bucephala clangula	12			III,-,II	
Clangula hyemalis	3			III,-,II	
Cygnus columbianus bewickii	2			II,-,II	1,3
Cygnus cygnus	16	K		II,-,II	1,3
Cygnus olor	34			III,-,II	
Melanitta fusca	3			III,-,II	
Melanitta nigra	3			III,-,II	
Mergus albellus	7			II,-,II	
Mergus merganser	3	E2		III,-,II	
Mergus serrator	15			III,-,II	
Netta rufina	21	R		III,-,II	
Oxyura leucocephala	6	E2		II,II,II	1,2,3,4
Somateria mollissima	1			III, II	1
Tadorna ferruginea	17	E1		II,-,II	3
Tadorna tadorna	26	V		II,-,II	
Order Accipitriformes (26 spp.)					
Accipiter brevipes	36			II,-,II	3
Accipiter gentilis	41			II,-,II	
Accipiter nisus	58			II,-,II	
Aegypius monachus	17	E1		II,-,II	1,2,3,4
Aquila chrysaetos	80			II	1
Aquila clanga	15	E2		II,-,II	3
Aquila heliaca	15	E1		II,-,I	2,3,4
Aquila pomarina	31	V		II,-,II	3
Buteo buteo	86			II,II	
Buteo lagopus	3			II,II	
Buteo rufinus	47	R		II,II	
Circaetus gallicus	81			II,II	1,3
Circus aeruginosus	62	V		II,II	1,3
Circus cyaneus	43			II,II	1,3
Circus macrourus	19			II,II	3
Circus pygargus	32	E1		II,II	1,3
Gypaetus barbatus	28	E1		II,II	1,3
Gyps fulvus	66			II,II	1,3
Haliaeetus albicilla	22	E1		II,I	1,2,3,4
Hieraaetus fasciatus	50	V		II,II	1,3
Hieraaetus pennatus	57	V		II,II	1,3
Milvus migrans	33	E1		II,II	1,3
Milvus milvus	13			II,II	1,2,3,4
Neophron percnopterus	45	V		II,II	1,3
Pandion haliaetus	21	I		II,II	1,3
Pernis apivorus	63			II,II	1,3

BIRDS (276 spp.)

Taxa	No of sites	A	B	C	D
Order Falconiformes (7 spp.)					
Falco biarmicus	37	V		II,II	1,3
Falco columbarius	21			II,II	3
Falco eleonorae	54	K		II,II	1,3
Falco naumanni	34	V		II,II	1,3,4
Falco peregrinus	88	K		II,I	1,3
Falco subbuteo	48			II,II	
Falco vespertinus	45			II,II	
Order Galliformes (3 spp.)					
Bonasa bonasia	6	I		III	3
Coturnix coturnix	35	K		III	
Tetrao urogallus	3	R		III	3
Order Gruiformes (7 spp.)					
Crex crex	2			II	
Fulica atra	44			III	
Grus grus	7			II	1,3
Porzana parva	10	R		II	3
Porzana porzana	6			II	3
Porzana pusilla	6			II	3
Tetrax tetrax	1	Ex		II,II	1,2,3,4
Order Charadriiformes (58 spp.)					
Actitis hypoleucos	39			III	
Arenaria interpres	14			II	
Burhinus oedicnemus	36	V		II	1,3
Calidris alba	17			II	
Calidris alpina	27			II	
Calidris canutus	3			II	
Calidris ferruginea	26			II	
Calidris minuta	32			II	
Calidris temminckii	14			II	
Charadrius alexandrinus	27			II	
Charadrius dubius	41			II	
Charadrius hiaticula	24			II	
Charadrius morinellus	3	K			1
Chlidonias hybridus	29	V		II	3
Chlidonias leucopterus	26			II	
Chlidonias niger	34	V		II	1,3
Gallinago gallinago	36			III	
Gallinago media	13				
Gelochelidon nilotica	22	K		II	1,3
Glareola pratincola	31	V		II	1,3
Haematopus ostralegus	22	K		III	
Himantopus himantopus	35	V		II	1,3
Hoplopterus spinosus	6	E2		II	3
Larus audouinii	11	E2		II,-,I	1,2,3,4
Larus canus	13			III	
Larus fuscus	6				
Larus genei	20	E2		II	1,3
Larus marinus	1				

BIRDS (276 spp.)

Taxa	No of sites	A	B	C	D
Larus melanocephalus	29	V		II	3
Larus minutus	24			II	
Larus ridibundus	44			III	
Limicola falcinellus	7	K		II	
Limosa lapponica	3			III	
Limosa limosa	27			III	
Lymnocryptes minimus	14			II	
Numenius arquata	26			III	
Numenius phaeopus	11			III	
Numenius tenuirostris	8	E1		II,I	2,3,4
Phalaropus lobatus	7			III	1
Philomachus pugnax	33			III	
Pluvialis apricaria	16			III	1,3
Pluvialis squatarola	27			III	
Recurvirostra avosetta	24	V		II	1,3
Scolopax rusticola	29			III	
Stercorarius parasiticus	4			III	
Stercorarius pomarinus	1			III	
Sterna albifrons	32			II	1,3
Sterna caspia	20	K			3
Sterna hirundo	38			II	1,3
Sterna sandvicensis	26	I		II	1,3
Tringa erythropus	22			III	
Tringa glareola	37			II	1,3
Tringa nebularia	27			III	
Tringa ochropus	33			II	
Tringa stagnatilis	24	K		II	
Tringa totanus	35			III	
Vanellus vanellus	35			III	
Xenus cinereus	3			III	
Order Columbiformes (12 spp.)					
Clamator glandarius	9			II	
Columba oenas	21	R		III	
Columba palumbus	48			II	
Cuculus canorus	50			III	3
Streptopelia turtur	67			III	
Order Strigiformes (5 spp.)					
Aegolius funereus	6	R		II,II	3
Asio flammeus	11			II,II	1,3
Bubo bubo	46			II,II	1,3
Glaucidium passerinum	2			II,II	3
Otus scops	58			II,II	
Order Caprimulgiformes (1 sp.)					
Caprimulgus europaeus	89			II	3
Order Apodiformes (3 spp.)					
Apus apus	64			III	
Apus melba	64			II	
Apus pallidus	21			II	

BIRDS (276 spp.)

Taxa	No of sites	A	B	C	D
Order Coraciiformes (4 spp.)					
Alcedo atthis	57			II	1,3
Coracias garrulus	47	V		II	3
Merops apiaster	56			II	
Upupa epops	59			II	
Order Piciformes (7 spp.)					
Dendrocopos leucotos	21	R		II	1,3
Dendrocopos medius	40			II	3
Dendrocopos syriacus	40			II	3
Dryocopus martius	19			II	1,3
Jynx torquilla	27			II	
Picoides tridactylus	2	R		II	3
Picus canus	10	R		II	3
Order Passeriformes (82 spp.)					
Acrocephalus arundinaceus	34			II	
Acrocephalus melanopogon	19	R		II	3
Acrocephalus paludicola	2				2
Acrocephalus palustris	10			II	
Acrocephalus schoenobaenus	21			II	
Acrocephalus scirpaceus	29			II	
Alauda arvensis	47			III	
Anthus campestris	58			II	
Anthus cervinus	11			II	
Anthus pratensis	47			II	
Anthus spinoletta	31			II	
Anthus trivialis	47			II	
Calandrella brachydactyla	56			II	3
Carduelis spinus	33			II	
Cercotrichas galactotes	31			II	
Coccothraustes coccothraustes	38			II	
Corvus frugilegus	19				
Delichon urbica	74			II	
Emberiza caesia	35			II	3
Emberiza cineracea	2	R		II	3
Emberiza citrinella	24			II	
Emberiza hortulana	53			III	3
Emberiza melanocephala	53			II	
Emberiza pusilla	2			II	
Emberiza schoeniclus	24			II	
Erithacus rubecula	66			II	
Ficedula albicollis	28			II	3
Ficedula hypoleuca	21			II	
Ficedula parva	4			II	3
Ficedula semitorquata	22	R		II	3
Fringilla coelebs	78			III	
Fringilla montifringilla	23			III	
Hippolais icterina	22			II	
Hippolais olivetorum	30			II	3
Hippolais pallida	43			II	
Hirundo daurica	68			II	

BIRDS (276 spp.)

Taxa	No of sites	A	B	C	D
Hirundo rustica	75			II	
Lanius collurio	87			II	3
Lanius excubitor	8			II	
Lanius minor	55	K		II	3
Lanius nubicus	12	R		II	
Lanius senator	61			II	
Locustella fluviatilis	4			II	
Locustella luscinioides	14	K		II	
Locustella naevia	7			II	
Lullula arborea	82			III	3
Luscinia luscinia	2			II	
Luscinia megarhynchos	62			II	
Luscinia svecica	3			II	1,3
Melanocorypha calandra	21			II	3
Monticola saxatilis	19			II	
Motacilla alba	56			II	
Motacilla cinerea	54			II	
Motacilla flava	55			II	
Muscicapa striata	60			II	
Oenanthe hispanica	57			II	
Oenanthe isabellina	10	R		II	
Oenanthe oenanthe	71			II	
Oriolus oriolus	50			II	
Panurus biarmicus	18			II	
Passer hispaniolensis	44			III	
Phoenicurus ochruros	49			II	
Phoenicurus phoenicurus	35			II	
Phylloscopus bonelli	33			II	
Phylloscopus collybita	61			II	
Phylloscopus sibilatrix	35			II	
Phylloscopus trochilus	40			II	
Prunella modularis	48			II	
Ptyonoprogne rupestris	51			II	
Pyrrhocorax pyrrhocorax	30			II	2,3
Regulus regulus	34			II	
Riparia riparia	42			II	
Saxicola ruberta	59			II	
Sitta krueperi	2	R		II	
Sturnus roseus	6			II	
Sturnus vulgaris	43				
Sylvia atricapilla	50			II	
Sylvia borin	22			II	
Sylvia cantillans	50			II	
Sylvia communis	52			II	
Sylvia conspicillata	1			II	
Sylvia curruca	33			II	
Sylvia hortensis	32			II	
Sylvia nisoria	9			II	1,3
Sylvia rueppelli	25			II	3
Turdus iliacus	23			III	
Turdus philomelos	52			III	
Turdus pilaris	27			III	

BIRDS (276 spp.)

Taxa	No of sites	A	B	C	D
Turdus torquatus	9	R		III	

REPTILES (10 spp.)

Taxa	No of sites	A	B	C	D
Caretta caretta	33	E		II,I	1,2,3,4
Elaphe quatuorlineata	77			II	1,3
Elaphe situla	96			II	1,3
Emys orbicularis	54			II	1,3
Mauremys caspica	76			II	1,3
Testudo graeca	48			II,II	1,2,3,4
Testudo hermanni	109			II,II	1,2,3,4
Testudo marginata	57			II,II	1,2,3
Vipera schweizeri	3	V	+	II	1,2,3,4
Vipera ursinii	5	R		II,I	3

AMPHIBIANS (4 spp.)

Taxa	No of sites	A	B	C	D
Bombina bombina	2			II	3
Bombina variegata	62			II	3
Mertensiella luschani	4	R		II	1,2,3
*Triturus cristatus**	45			II	3

* Includes *T. karelinii* and *T. carnifex*

FISH (28 spp.)

Taxa	No of sites	A	B	C	D
Acipenser sturio	1			III,I	1,2,3,4
Alosa alosa[1]	1				
Alosa fallax	7			III	3
Aphanius fasciatus	18			III	
Aspius aspius	4			III	3
Barbus capito[2]	15				
Barbus meridionalis[3]	29				
Barbus plebejus[4]	28				
Chalcalburnus belvica	1		+		
Chalcalburnus chalcoides	5	V		III	3
Cobitis taenia[5]	21				
Cobitis trichonica	5	L/V	+	III	
Eudontomyzon spp.[6]	4				
Gobio albipinnatus	1			III	
Gobio uranoscopus	2	L/V		III	
Ladigesocypris ghigii	2	V/E			1
Leuciscus souffia[7]	1				
Phoxinellus spp.[8]	23				

FISH (28 spp.)

Taxa	No of sites	A	B	C	D
Pomatoschistus canestrini[9]	2				
Rhodeus sericeus amarus	14			III	3
Rutilus alburnoides[10]	9				
Rutilus rubilio[11]	11				
Sabanejewia aurata	6	V		III	
Salmo macrostigma	19				
Scardinius graecus	1		+		
Silurus aristotelis	5			III	1
Valencia hispanica[12]	9				
Zingel streber	1			III	2,3

1 Includes *A. macedonica* and *A. caspia vistonica*

2 Includes *B. albanicus* and *B. graecus*

3 Includes *B. peloponnesius*

4 Includes *B. euboicus, B. cycloplepis* and *B. prespensis*

5 Includes *C. arachthosensis, C. hellenica, C. meridionalis, C. punctilineata, C. stephanidisi, C. strumicae* and *C. vardarensis*

6 Includes *E. hellenicus*

7 Includes *L. keadicus*

8 Includes *P. pleurobipunctatus, Paraphoxinus epiroticus, Pseudophoxinus beoticus* and *P. stymphalicus*

9 Includes *Economidichthys pygmaeus*

10 Includes *Tropidophoxinellus hellenicus* and *T. spartiaticus*

11 Includes *R. ohridanus* and *R. ylikiensis*

12 Includes *V. letourneuxi*

Because of the recent conception on fish taxonomy and distribution it was not possible to present the motivations of the fish species included in cases 1 to 12 mentioned above.

INVERTEBRATES

INSECTS (11 spp.)

Taxa	No of sites	A	B	C	D
Odonata (2 spp.)					
Lindenia tetraphylla	1			II	3,5,7,10
Ophiogomphus cecilia	2			II	2,3,4,5,6,7,10
Lepidoptera (4 spp.)					
Callimorpha quadripunctaria	27				5
Eriogaster catax	2			II	2,3,4,5,6,10
Euphydryas aurinia	7			II	3,5,8
Lycaena dispar	17			II	2,3,4,5,6,8,10
Coleoptera (5 spp.)					
Cerambyx cerdo	3			II	2,3,4,5,6,9,10
Lucanus cervus	14			III	5
Morimus funereus	6				2,3,4,5,6,9,10
Osmoderma eremita	1			II	2,3,4,5,6,9
Rosalia alpina	3			II	1,2,3,4,5,6,10

MOLLUSCS (1 sp.)

Taxa	No of sites	A	B	C	D
Unio crassus	5				2,5

Explanation of symbols

A: M. Karandinos (ed.). 1992.- The Red Data Book of Threatened Vertebrates of Greece. Hellenic Zoological Society-Hellenic Ornithological Society, 356 p.
Ex: Extinct species
E: Endangered species (E1: Immediately endangered, E2: Not immediately endangered)
V: Vulnerable species
R: Rare species
I: Indeterminate species
K: Insufficiently known species
L: Locally threatened species

B: Species and subspecies (for vertebrates only) endemic to Greece.

C: Council of Europe 1979.- Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention).
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1973.
Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention).
I: Annex I
II: Annex II
III: Annex III

D:

1: Presidential Decree 67/1981. "On the protection of wild flora and fauna and on the determination of procedures for the coordination and control of research". Ministerial Decree 414985/29.11.85. "Measures for the management of wild avifauna".
2: Economic Commission for Europe. 1991. European Red List of Globally Threatened Animals and Plants. United Nations. 150 p.
3: CORINE-Biotopes project. 1988. Technical Handbook vol. 1.
4: IUCN Conservation Monitoring Centre 1988. Red List of Threatened Animals. IUCN. 154 p.
5: Koomen, P. and P.J. van Helsdingen. 1996. Listing of biotopes in Europe according to their significance for invertebrates. Council of Europe, Nature and Environment No 77. 74 p.
6: Collins, N.M. and S.M. Wells. 1987. Invertebrates in need of special protection in Europe. Council of Europe, Nature and Environment No 34. 162 p.
7: Van Tol, J. and M.J. Verdonk. 1988. The protection of dragonflies (Odonata) and their biotopes. Council of Europe, Nature and Environment No 36. 181 p.
8: Heath, J. 1981. Threatened Rhopalocera (butterflies) of Europe. Council of Europe, Nature and Environment No 23. 157 p.
9: Speight, M.C.D. 1989. Saproxylic invertebrates and their conservation. Council of Europe, Nature and Environment No 42. 72 p.
10: European Invertebrate Survey. 1991. Proposed revised list of threatened invertebrates in need of protection of habitat in the community. Manuscript. 7 p.

Looking at the motivations of the various animal groups encountered in Greece, mammals of Annex II to Directive 92/43/EEC have the highest percentage of motivation A (inclusion in the Red Data Book of Threatened Vertebrates of Greece) (Fig. E.9). On the contrary, the other animal groups contain many species that are not considered as threatened in Greece. It must be noted though, that most of the Red Data Book species have been recorded in the NATURA 2000 database either as species of the Directives or as Other Important Species (Fig. E.10).

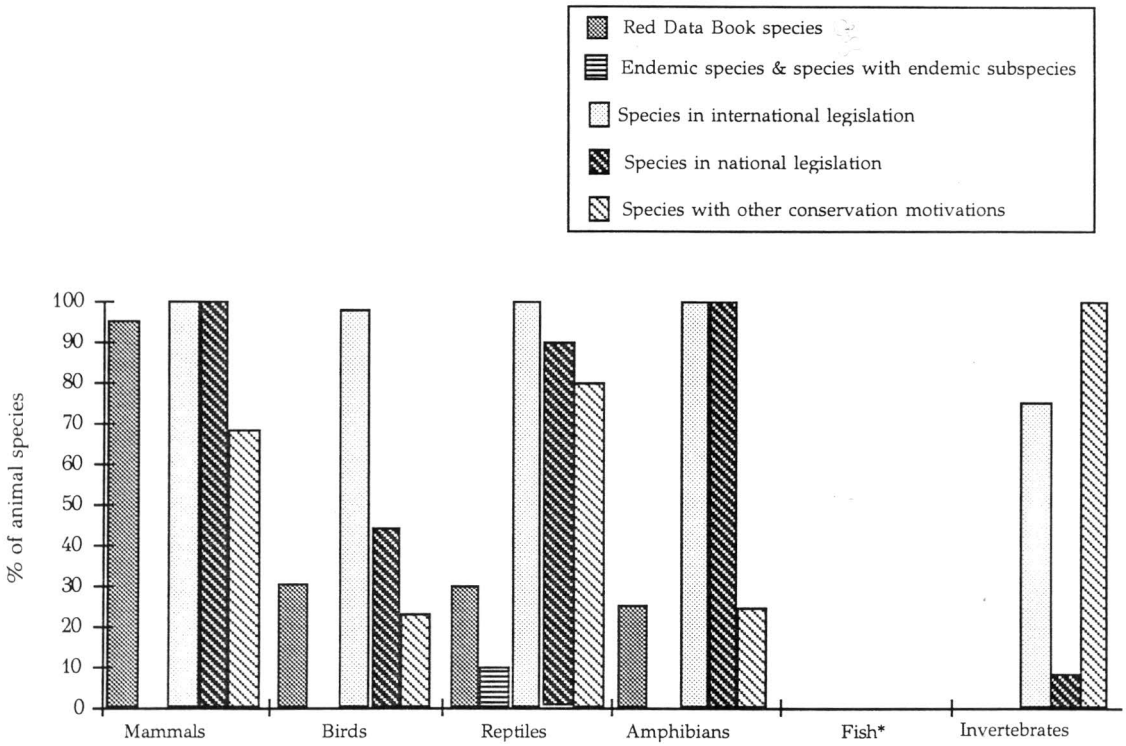

Fig. E.9. Percentage of animal species in Annex II to Directive 92/43/EEC and Annex I to Directive 79/409/EEC and migratory species to Directive 79/409/EEC, recorded in Natura 2000 sites in Greece, according to their conservation motivation (Red Data Book species, endemic species & species with endemic subspecies, species in international conventions, species in national legislation, species with other conservation motivations).
* The percentages of different motivations for fish species are not quoted (see section E.6.)

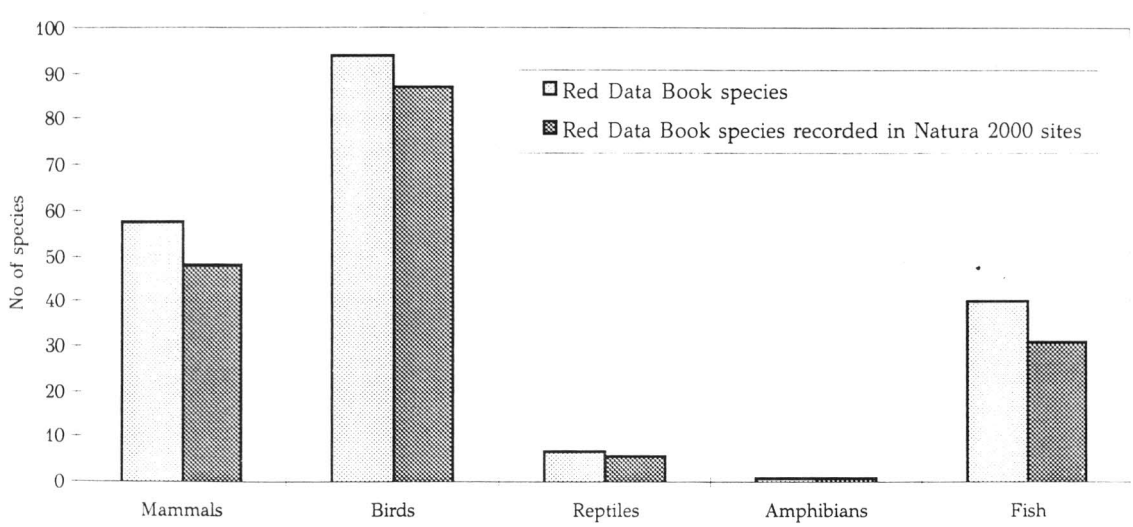

Fig. E.10. Comparison of the number of species in the Red Data Book with the number of Red Data Book species recorded in the Natura 2000 sites.

The Habitat and Bird Directives lack in Greek endemics (Fig. E.9) apart from a limited number of endemic reptiles. On the contrary, most of the species protected by international conventions that are present in Greece are listed in the Directives. As it concerns the species protected by the national legislation, they are also well represented in the Annexes to the Directives, with the exception of invertebrates. In particular, less than 10% of the invertebrate species recorded in the sites are protected by national legislation.

Among the various animal groups, mammals and reptiles are more often encountered in the studied sites (Fig. E.11). Approximately 70% of the sites host species from these two groups with a mean number of c. 2-3 species from each one per site (Fig. E.12). Bird Directive species have been recorded in half of the sites with a mean number of 60 species per site. However, it must be noted that only Important Bird Areas were surveyed for birds. Amphibians, fish and invertebrates are present in less than 1/3 of the sites. From the species listed in the two Directives, those referred also in the Red Data Book are present in 26% of the sites; endemic taxa are present in only 0.2%; species protected by international conventions in 47%, and those with motivation D (other reasons) in 48% of the sites.

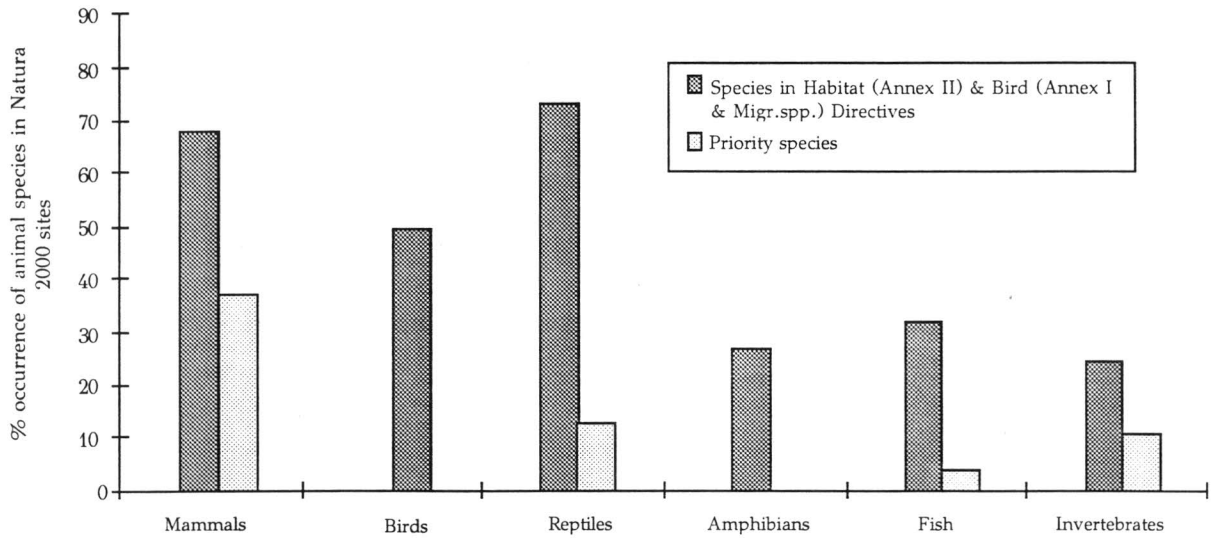

Fig. E.11. Percentage of sites in which the different animal groups (species of Annex II to Directive 92/43/EEC and Annex I to Directive 79/409/EEC and migratory species to Directive 79/409/EEC) are present.

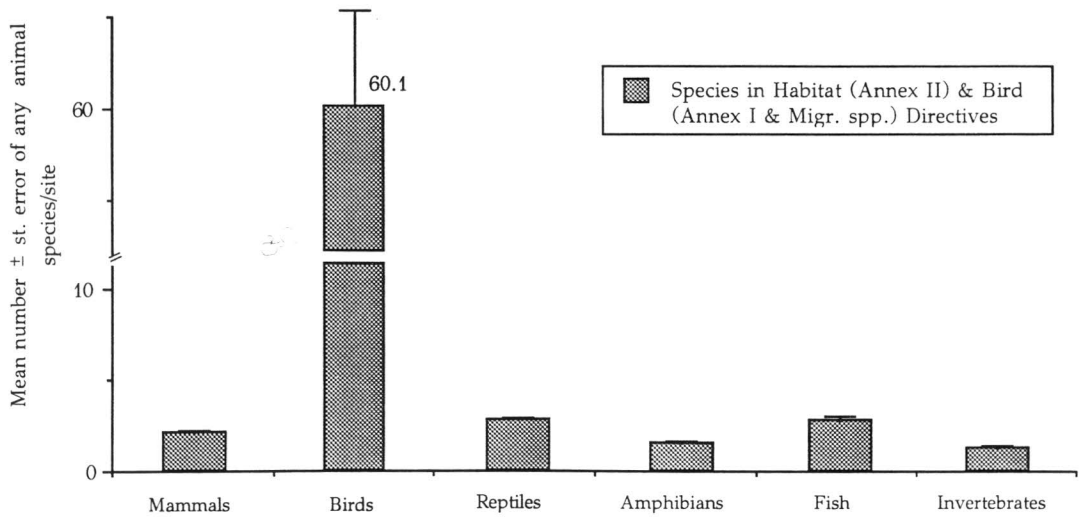

Fig. E.12. Mean number (±st. error) of animal species in Annex II to Directive 92/43/EEC and Annex I to Directive 79/409/EEC and migratory species to Directive 79/409/EEC per site, where they occur.

Comparing the proportion of sites where each animal group is present (Fig. E.11) with the mean number of species per site (Fig. E.12) we note that many animal groups which are present in a high proportion of sites are represented by a low number of species (from 3-5) with the exception of birds.

E.1.5. Other Important Animal Species

A large number of species and subspecies, namely 1183 taxa, not included in the Annexes to the two Directives were considered important and were recorded in the studied sites in fields 3.3. and 3.4 of the Standard Data Form, as Other Important and Greek Important Species, respectively. The distribution of these taxa in the various animal groups is shown in Fig. E.13.

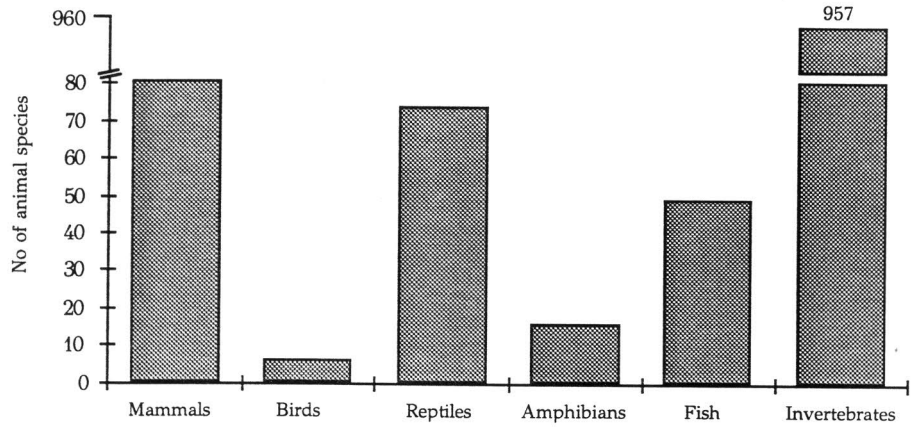

Fig. E.13. Number of Other Important Species in each animal group.

In Appendix 6 to the present publication, the scientific names of species, the number of sites in which these were recorded as well as the conservation motivations for each one are given. Only subspecies of the vertebrates were taken into consideration since invertebrate subspecies are very numerous and of uncertain taxonomic position.

Looking at the motivations of the Other Important Species per animal group (Fig. E.14) we observe that approximately 50% of the fish and mammal taxa are icluded in the national Red Data Book of Threatened Vertebrates, whereas only 4% of the reptiles and none of the amphibians belong to the same category. Data concerning the avifauna is not representative as only 5 species were recorded as Other Important Species (see also Chap. E.3.).

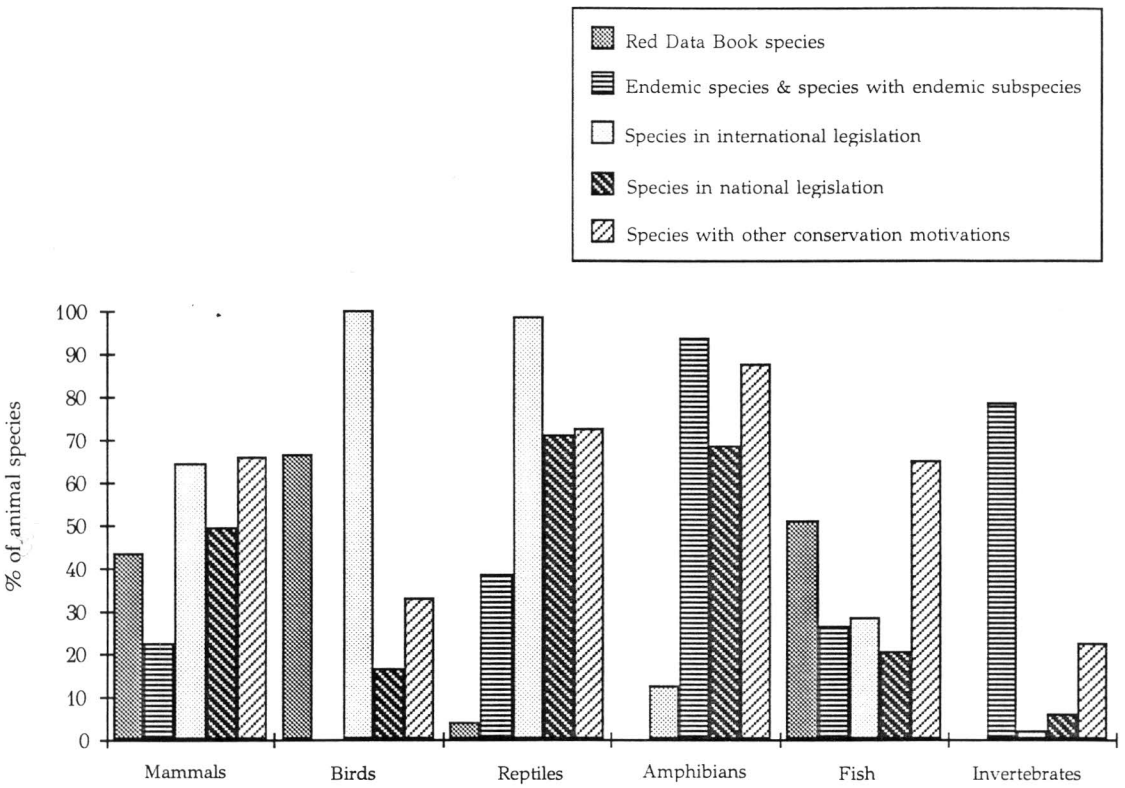

Fig. E.14. Percentage of each animal group of the Other Important Species according to their conservation motivation (species in the Red Data Book, endemic species & species with endemic subspecies, species protected by international conventions, species protected by national legislation, species with other conservation motivations).

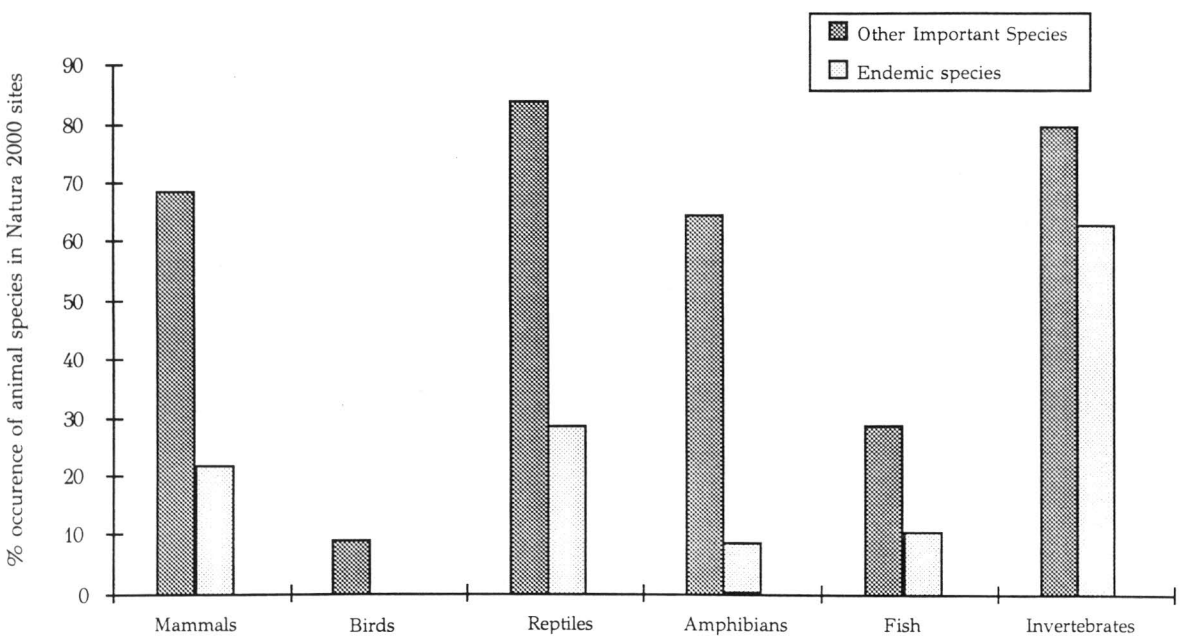

Fig. E.15. Percentage of the occurrences of each animal group of the Other Important Species in the Natura 2000 sites in Greece.

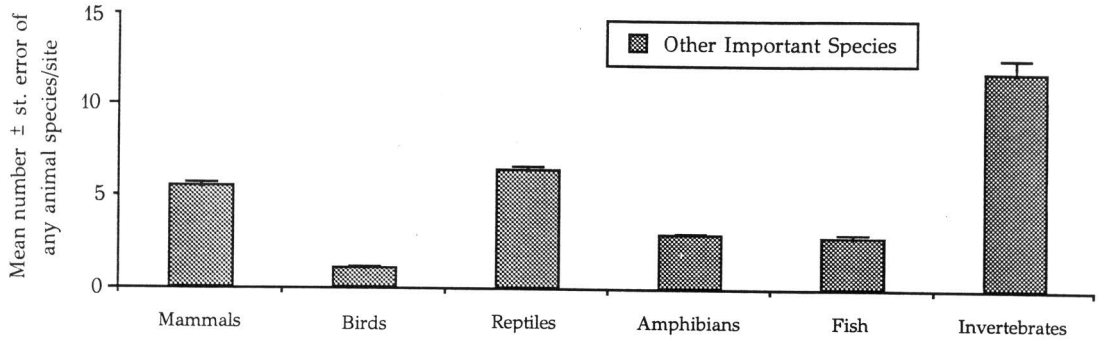

Fig. E.16. Mean number (± standard error) of each animal group of the Other Important Species per site where it occurs.

Other Important Species of reptiles, invertebrates, and mammals have the most frequent occurrence in the proposed Natura 2000 sites (Fig. E.15). Each site has on average more than 10 invertebrate species (Fig. E.16), 7 reptile and 6 mammal taxa. Of all the Other Important Species, those listed in the Red Data Book are present in 14.5% of the sites, endemic taxa in 22%, species in international conventions in 44% and species with other motivation in 39% of the sites. The most frequently occurring endemic taxa belong to the invertebrates. The other groups have medium to low occurring endemic taxa (Fig. E.15).

Comparing the percentage of sites where each animal group is present (Fig. E.15) with the mean number of species per site (Fig. E.16), we note that the animal groups which are present in a high percentage of sites are represented by a low number of species (from 3-5), the group of invertebrates excepted.