Institute of Marine Biological Resources and Inland Waters

MSFD EC Decision (2010/477/EU) -Descriptor 2: "Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystem"

Argyro Zenetos
HCMR

What is an alien species?

The terms **alien**, exotic, **non-indigenous**, naturalized and non-native generally refer to organisms introduced into a region outside of their historic range

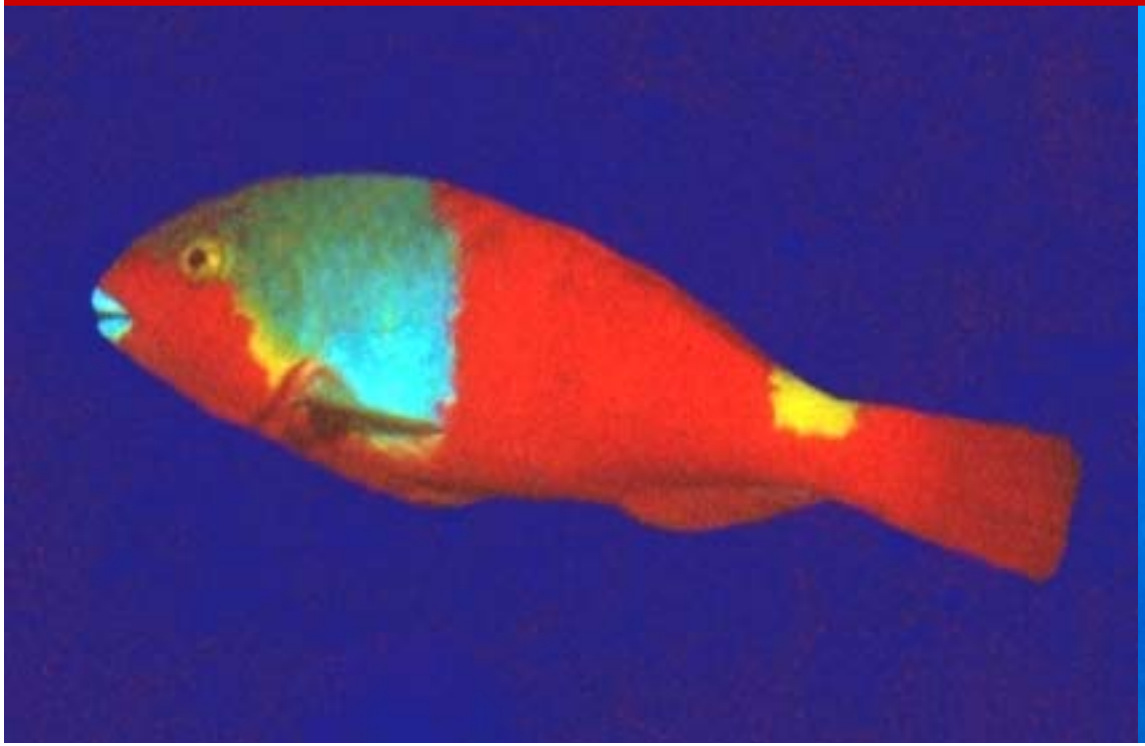
ANTHROPOGENICALLY

IAS: Invasive Alien Species

nuisance, noxious, pests and invasive have also been used to describe introduced species that are known, or believed, to threaten resources valuable to humans and/or Ecosystem services

No more trapped in the Eastern Mediterranean?

NO



Sparisoma cretense

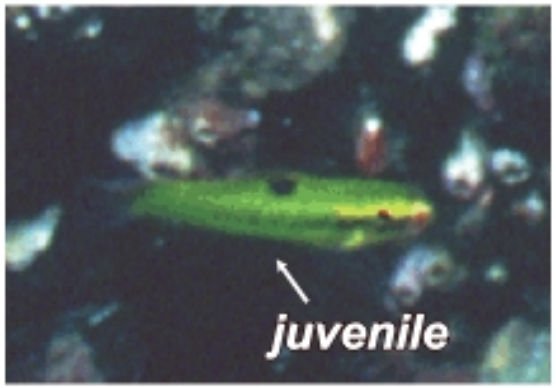
DISTRIBUTION:
Azoresto Senegal
SE MED

Adults in Tyrrhenian Sea, summer 1991 (Bianchi & Morri, 1994)

Juveniles in SW Adriatic, summer 2000 (Guidetti & Boero, 2001)

Institute of Marine Biological Resources and Inland Waters

A "SOUTHERN" SPECIES



The population of *Thalassoma pavo* in the French Mediterranean coast has clearly increased since 1988

Alien species are of high relevance to:

a) the Barcelona Convention;

b) the Common Fisheries Policy CFP (Aquaculture regulation (708/2007)

c) the Bern Convention on the Conservation of European Wildlife and Natural Habitats;

d) Animal health legislation (various directives)

e) Directive on the deliberate release into the environment of genetically modified organisms (90/220/EEC)

f) Regulation D-2 of the IMO Ballast Water Management Convention)

g) Water Framework Directive (2000/60/EC)

h) **Marine Strategy Framework Directive (2008/56/EC)**

MSFD EC Decision (2010/477/EU) -Descriptor 2

The two criteria for assessing progress towards GES

2.1. Abundance and state characterisation of non-indigenous species, in particular invasive species — Trends in abundance, temporal occurrence and spatial distribution in the wild of non-indigenous species, particularly invasive non-indigenous species, notably in risk areas, in relation to the main vectors and pathways of spreading of such species (2.1.1)

2.2. Environmental impact of invasive non-indigenous species

— Ratio between invasive non-indigenous species and native species in some well studied taxonomic groups (e.g. fish, macroalgae, molluscs) that may provide a measure of change in species composition (e.g. further to the displacement of native species) (2.2.1)

— Impacts of non-indigenous invasive species at the level of species, habitats and ecosystem, where feasible (2.2.2).

Initiatives in Europe

Multi-national Data bases: DAISIE, NOBANIS, BSASD, Black Sea , HCMR/EEA, EASIN, PERSEUS (Andromeda)

National Databases (websites): Belgium, Sweden, Denmark, Germany, UK, Ireland, Greece, Italy?

Networks: NOBANIS, ESENIAS, MAMIAS

HCMR DATABASES

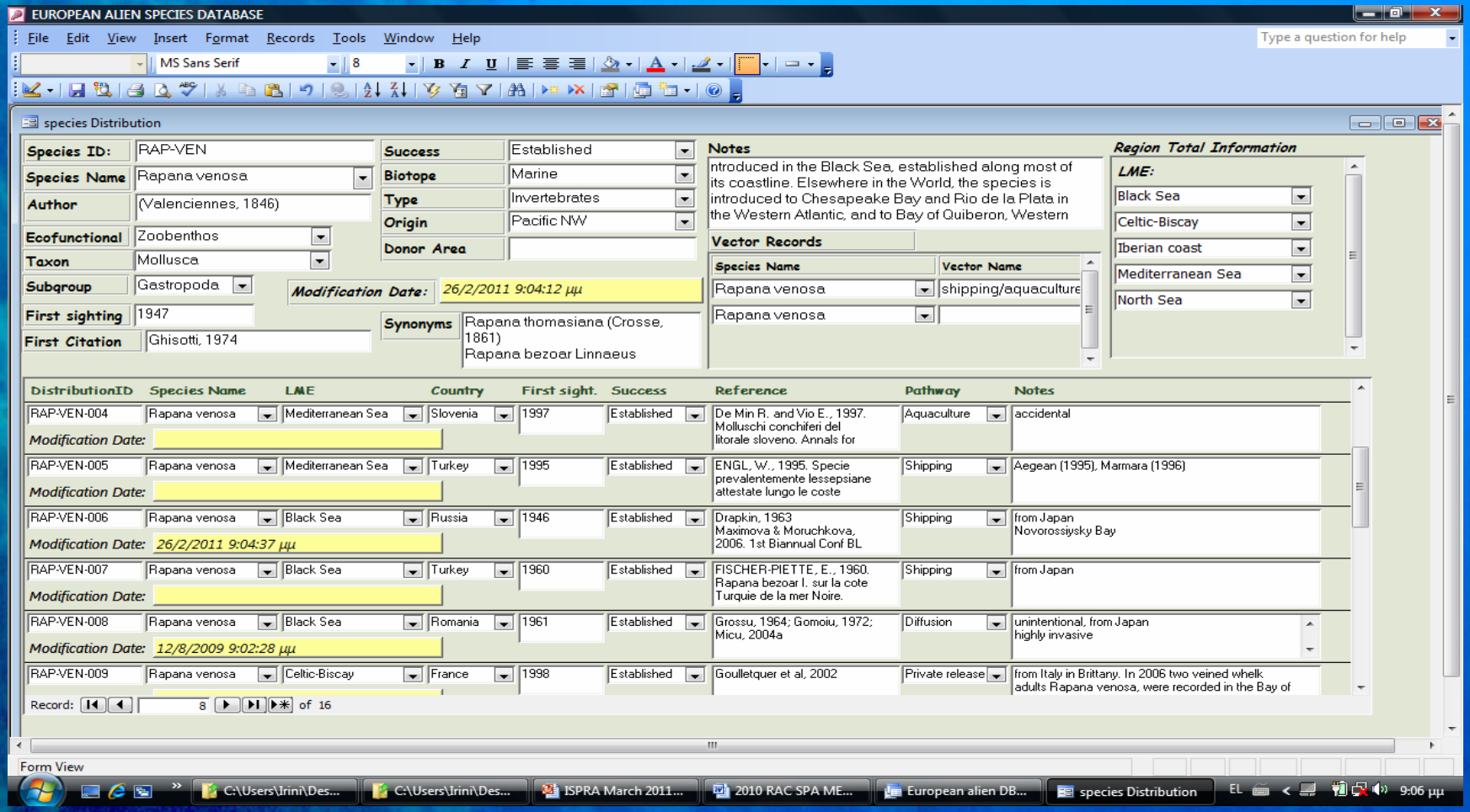
1. PAN EUROPEAN

2.MEDITERRANEAN- MAMIAS

3. GREEK -ELNAIS

Institute of Marine Biological Resources and Inland Waters

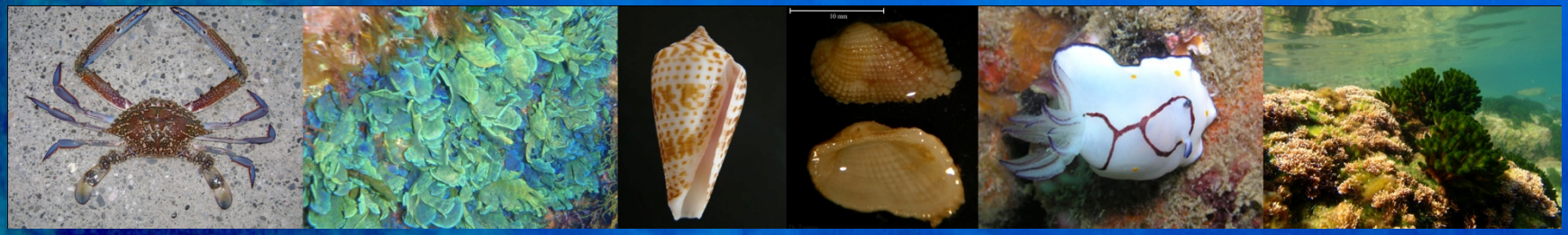
Pan European DB



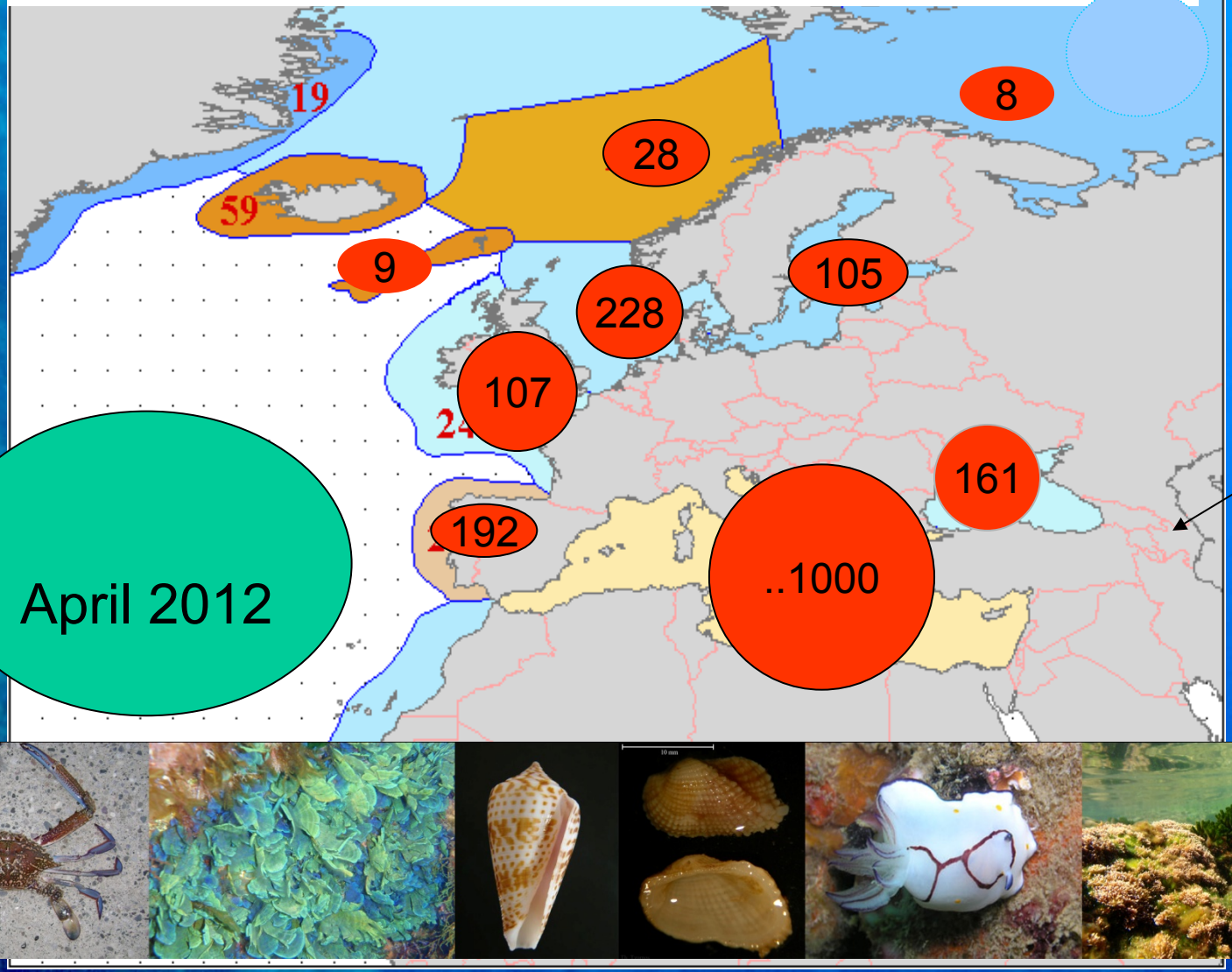
Homogenization of DBs : NOBANIS, BSASD, Black Sea

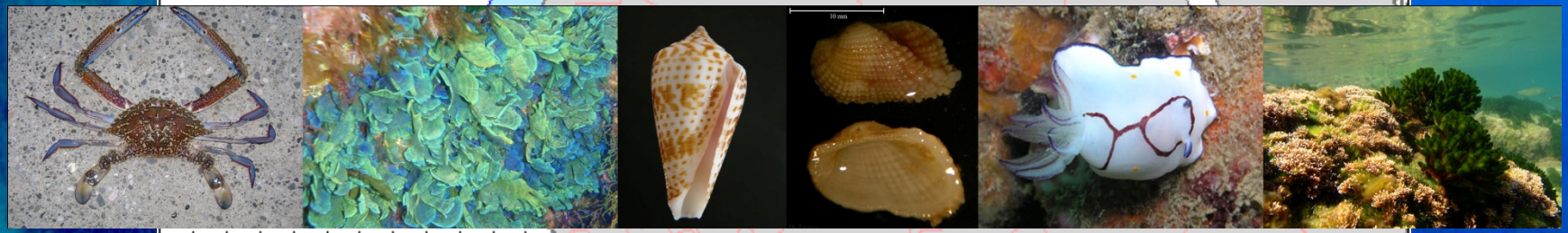
HCMR Pan European DB

- 2396 species including FW taxa (fish, plants, crustaceans, molluscs, birds. Non exhaustive, non for all countries)
- 7480 records at country level
- Multiple records for countries with coastal areas in two LMEs e.g. Spain, France, Turkey, UK, Germany, Sweden



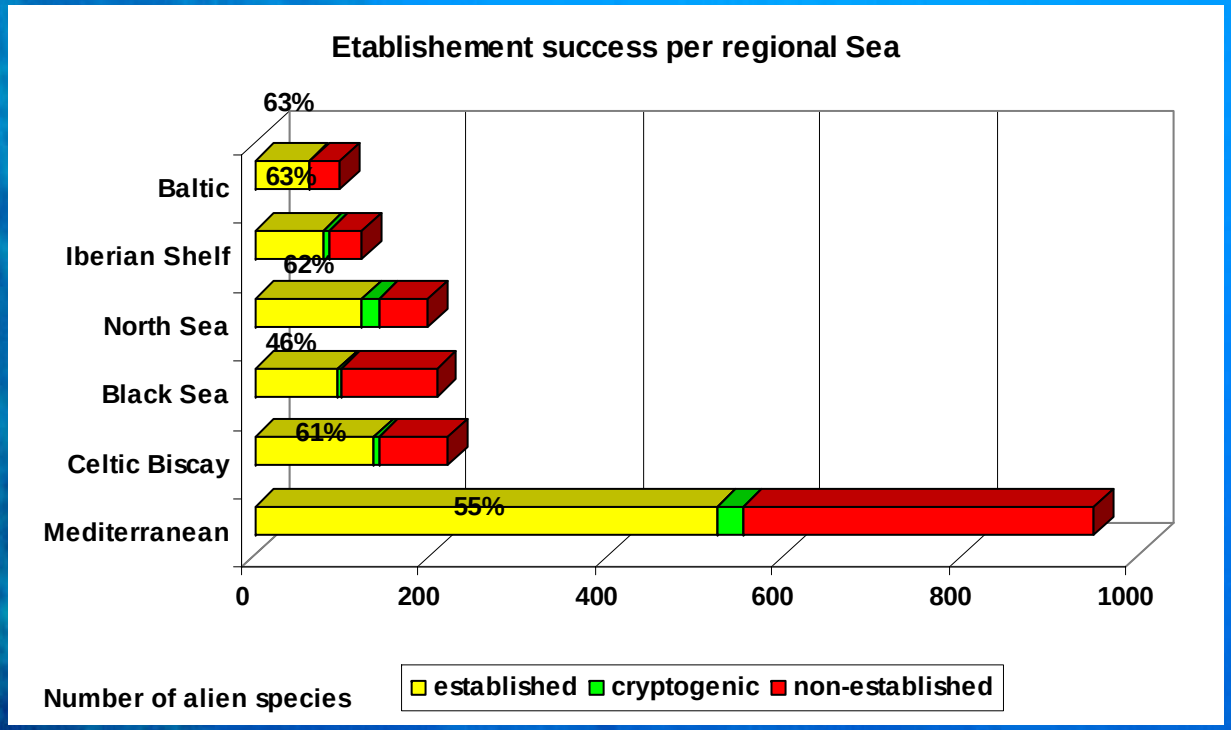
Number of marine/estuarine alien species





Institute of Marine Biological Resources and Inland Waters

Establishment success Oct 2009



HCMR application for the MED

Simple queries have been designed to provide information on:

- distribution per region
- distribution per country
- species within a taxonomic group
- species discovered for a specific year

HCMR/EEA database application

Species ID	ANA01	Author	(Say, 1822)	mis. Arca amygdalum Philippi, 1847
Species Name	Anadara transversa	Success	Established	mis Scapharca demiri Piani, 1981
Origin	West Atlantic	Vector	shipping/aquaculture	mis Anadara demiri (Piani, 1981)
Ecofunctional	Zoobenthos	First Sighti	1972	
Taxon	Mollusca	First Record	Demir, 1977: Turkey	
Subgroup	Bivalvia	Notes	Morphological comparison may suggest the origin of the Mediterranean population is from the southern part of the range of A.	

Findings

Species ID	LME	First sighting	Success:	Notes	Reference
Anadara transversa	Aegean Turkey	1972	Established	1972, Izmir, Turkey (Kocatas, pers. commun.) (Demir, 1977 as Arca amygdalum)	Demir M., 1977. On the presence of Arca (Scapharca) amygdalum Philippi, 1847 in the harbour of
Modification Date:	5/31/2009 11:10:44 AM				
Anadara transversa	Turkey	1972	Established	1972: see Aegean Turkey Cinar et al., 2006	Demir M., 1977. On the presence of Arca (Scapharca) amygdalum Philippi, 1847 in the harbour of
Modification Date:	5/31/2009 11:10:52 AM				
Anadara transversa	Greek North Aegean	1993	Established	1993: N. Aegean: Thermaikos Gulf (Zenetos, 1994)	Zenetos, A., 1994. Scapharca demiri (Piani, 1981): First finding in the North Aegean Sea. La
Modification Date:	5/31/2009 11:10:59 AM				
Anadara transversa	Greece	1993	Established	1993: Thermaikos: Thessaloniki	Zenetos, A., 1994. Scapharca demiri (Piani, 1981): First finding in the North Aegean Sea. La
Modification Date:	5/31/2009 11:11:05 AM				

query extract in xls format for list of species at a country e.g. Malta.

DistributionID	Species_Name	First_sighting	Country Success	Reference
ACA-NAY-003	Acanthophora nayadiformis	1969	Established	Lanfranco, 1989
AEO-IND-002	Aeolidiella indica	1992-98	Established	Sammut, C. and Perrone, A.S., 1998.
ALE-DJE-010	Alepes djedaba	1961	Established	Lanfranco, 1993
AMP-LOB-005	Amphistegina lobifera	2006	Established	Yokes, et al, 2007
APL-DAC-006	Aplysia dactylomela	2008	Casual	Schembri, 2008
APL-PAR-002	Aplysia parvula	1967	Questionable	Bebbington, 1970
ASP-ARM-006	Asparagopsis armata	1994	Established	Cormaci et al., 1997
ATA-GLA-002	Atactodea glabrata	1977	Casual	Cachia et al., 2004
BOT-MAD-002	Botryocladia madagascariensis	1994	Questionable	Cormaci et al., 1997
BRA-PHA-011	Brachidontes pharaonis	1970	Established	Cachia et al., 2004
BUR-LEA-005	Bursatella leachii	1969	Established	Bebbington, 1970
CAL-SAP-009	Callinectes sapidus	1972	Established	Schembri & Lanfranco, 1984
CAU-RAC-009	cylindracea	1997	Established	Stevens, 1999
CEL-APE-003	Celleporaria aperta	1975	Questionable	Agius et al., 1977
CEL-PIL-001	Celleporaria pilaefera	1975	Questionable	Agius et al., 1977
CER-SCA-009	Cerithium scabridum	2005	Established	Mifsud & Sammut 2006

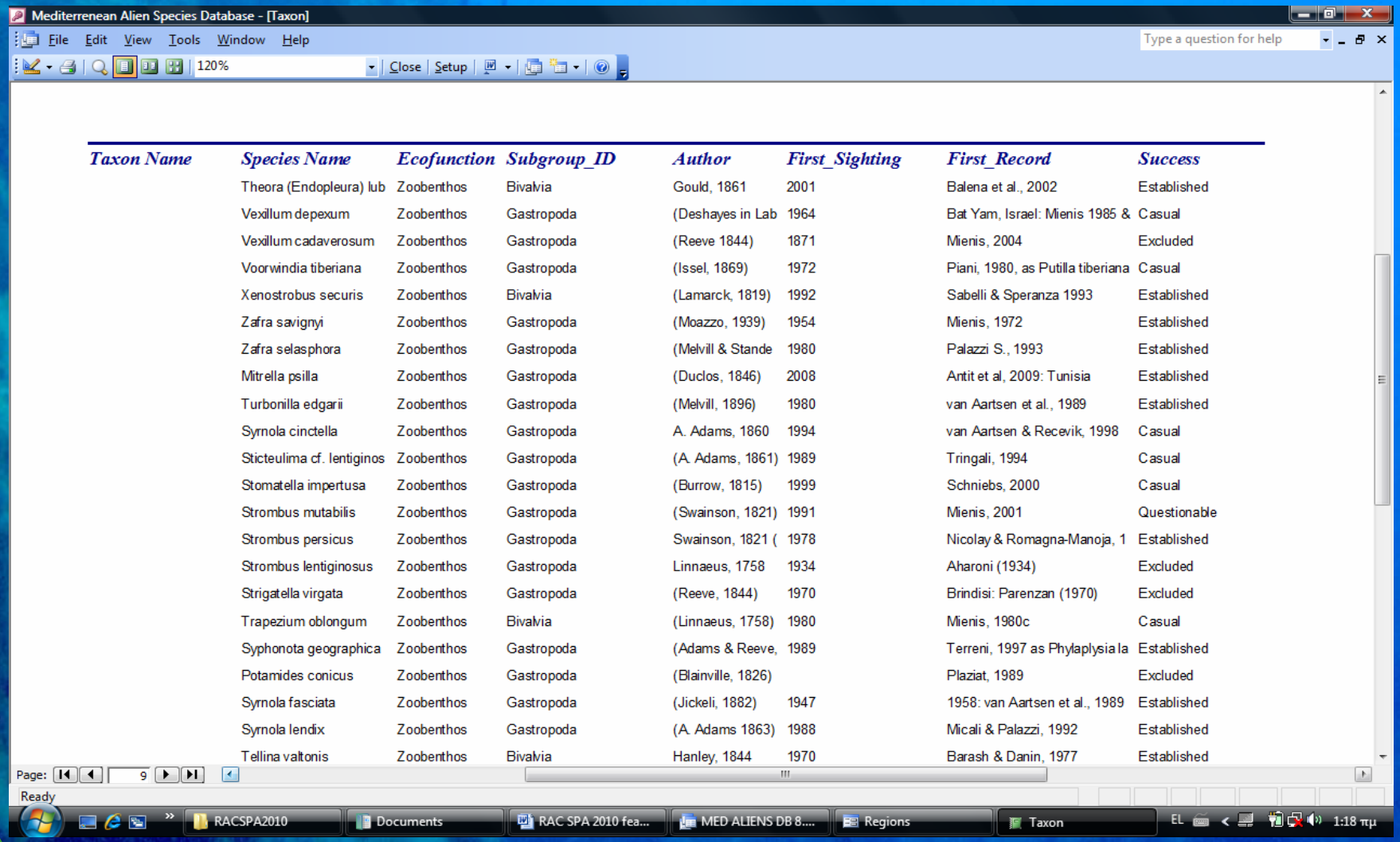
query extract for list of species at a region (North Adriatic). The output can be extracted either as a report or as an xls file.

Country/Region: N Adriatic | Print Region Report

Distribution ID	Species Name	First sighting	Establ. Success	Notes	Reference
BRA-01-013	Brachidontes pharaonis		Excluded	see Croatia	DE MIN R. & VIO E., 1997. Molluschi
Modification Date:	30/9/2009 8:09:54 μμ				
BRY-01-007	Bryopsis plumosa	2000	Excluded	Venice Lagoon: Curiel et al, 2006	CURIEL et al, 2006. Acta Adriatica. 47 (1):
Modification Date:					
BUR-01-018	Bursatella leachii	1989	Established	Gulf of Trieste (Jaklin & Vio, 1989; Vio & De Min, 1996; De Min &	MIZZAN L. & VIANELLO C., 2009. Bursatella
Modification Date:					
CAL-09-001	Callinectes danae	1981	Casual	Venice	MIZZAN 1993
Modification Date:					
CAL-10-010	Callinectes sapidus	1949	Established	1949 & 1959: Gulf of Venice as Neptunus pelagicus: 2 animals	GIORDANI SOIKA, 1951; MIZZAN, 1993
Modification Date:	16/3/2010 11:03:49 μμ				
CEL-03-001	Celleporella carolinensis	1993	Casual	collected on Mytilus in several places of the Venice Lagoon	OCCHIPINTI & d'HONDT, 1996. Introduzione di
Modification Date:					

Record: 15 of 63

Report of species within a taxonomic group (Mollusca)



Taxon Name	Species Name	Ecofunction	Subgroup_ID	Author	First_Sighting	First_Record	Success
	Theora (Endopleura) lub	Zoobenthos	Bivalvia	Gould, 1861	2001	Balena et al., 2002	Established
	Vexillum depexum	Zoobenthos	Gastropoda	(Deshayes in Lab	1964	Bat Yam, Israel: Mienis 1985 &	Casual
	Vexillum cadaverosum	Zoobenthos	Gastropoda	(Reeve 1844)	1871	Mienis, 2004	Excluded
	Voorwindia tiberiana	Zoobenthos	Gastropoda	(Issel, 1869)	1972	Piani, 1980, as Putilla tiberiana	Casual
	Xenostrobus securis	Zoobenthos	Bivalvia	(Lamarck, 1819)	1992	Sabelli & Speranza 1993	Established
	Zafra savignyi	Zoobenthos	Gastropoda	(Moazzo, 1939)	1954	Mienis, 1972	Established
	Zafra selasphora	Zoobenthos	Gastropoda	(Melvill & Stande	1980	Palazzi S., 1993	Established
	Mitrella psilla	Zoobenthos	Gastropoda	(Duclos, 1846)	2008	Antit et al, 2009: Tunisia	Established
	Turbonilla edgarii	Zoobenthos	Gastropoda	(Melvill, 1896)	1980	van Aartsen et al., 1989	Established
	Syrnola cinctella	Zoobenthos	Gastropoda	A. Adams, 1860	1994	van Aartsen & Recevik, 1998	Casual
	Sticteulima cf. lentiginos	Zoobenthos	Gastropoda	(A. Adams, 1861)	1989	Tringali, 1994	Casual
	Stomatella impertusa	Zoobenthos	Gastropoda	(Burrow, 1815)	1999	Schniebs, 2000	Casual
	Strombus mutabilis	Zoobenthos	Gastropoda	(Swainson, 1821)	1991	Mienis, 2001	Questionable
	Strombus persicus	Zoobenthos	Gastropoda	Swainson, 1821 (	1978	Nicolay & Romagna-Manoja, 1	Established
	Strombus lentiginosus	Zoobenthos	Gastropoda	Linnaeus, 1758	1934	Aharoni (1934)	Excluded
	Strigatella virgata	Zoobenthos	Gastropoda	(Reeve, 1844)	1970	Brindisi: Parenzan (1970)	Excluded
	Trapezium oblongum	Zoobenthos	Bivalvia	(Linnaeus, 1758)	1980	Mienis, 1980c	Casual
	Syphonota geographica	Zoobenthos	Gastropoda	(Adams & Reeve,	1989	Terreni, 1997 as Phylaplysia la	Established
	Potamides conicus	Zoobenthos	Gastropoda	(Blainville, 1826)		Plaziat, 1989	Excluded
	Syrnola fasciata	Zoobenthos	Gastropoda	(Jickeli, 1882)	1947	1958: van Aartsen et al., 1989	Established
	Syrnola lendix	Zoobenthos	Gastropoda	(A. Adams 1863)	1988	Micali & Palazzi, 1992	Established
	Tellina valtonis	Zoobenthos	Bivalvia	Hanley, 1844	1970	Barash & Danin, 1977	Established

MALTA

Review Article

Mediterranean Marine Science
Volume 8/1, 2007, 41-66

A critical review of records of alien marine species from the Maltese Islands and surrounding waters (Central Mediterranean)

M. SCIBERRAS and P. J. SCHEMBRI

Department of Biology, University of Malta, Msida MSD2080, Malta

e- mail: patrick.j.schembri@um.edu.mt

CYPRUS

Review Article

Mediterranean Marine Science
Volume 10/2, 2009, 109-133

Inventory of alien marine species of Cyprus (2009)

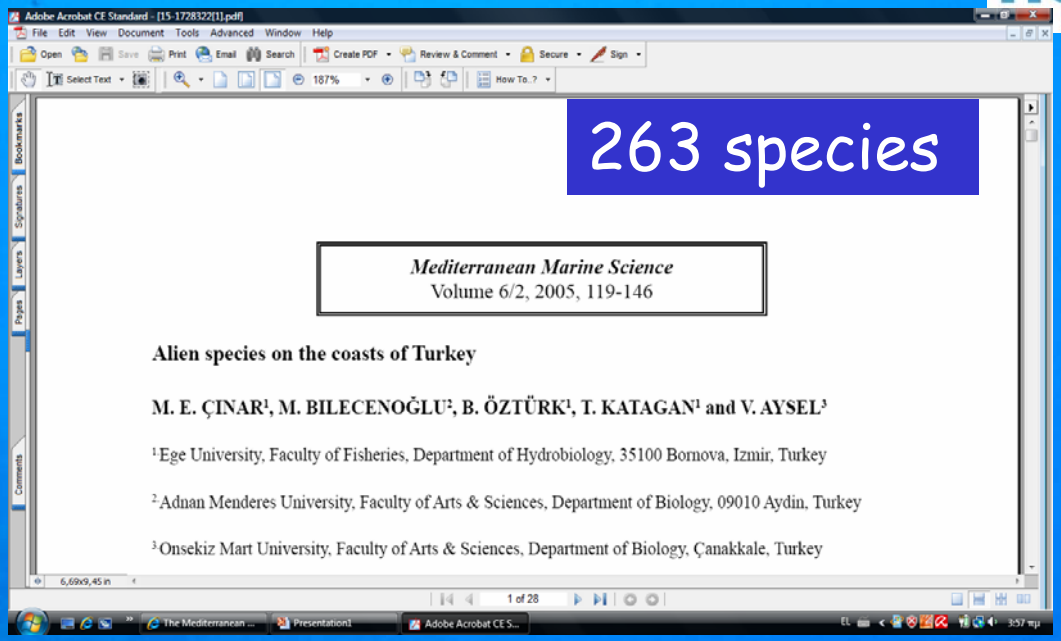
S. KATSANEVAKIS[1], K. TSIAMIS[2], G. IOANNOU[3], N. MICHAILIDIS[3] and A. ZENETOS[1]

[1] Institute of Marine Biological Resources, Hellenic Centre for Marine Research, Agios Kosmas, Greece
[2] Institute of Oceanography, Hellenic Centre for Marine Research, Anavyssos, Greece
[3] Department of Fisheries and Marine Research, Nicosia, Cyprus

e-mail: skatsan@ath.hcmr.gr

Institute of Marine Biological Resources and Inland Waters

TURKEY



263 species

Mediterranean Marine Science
Volume 6/2, 2005, 119-146

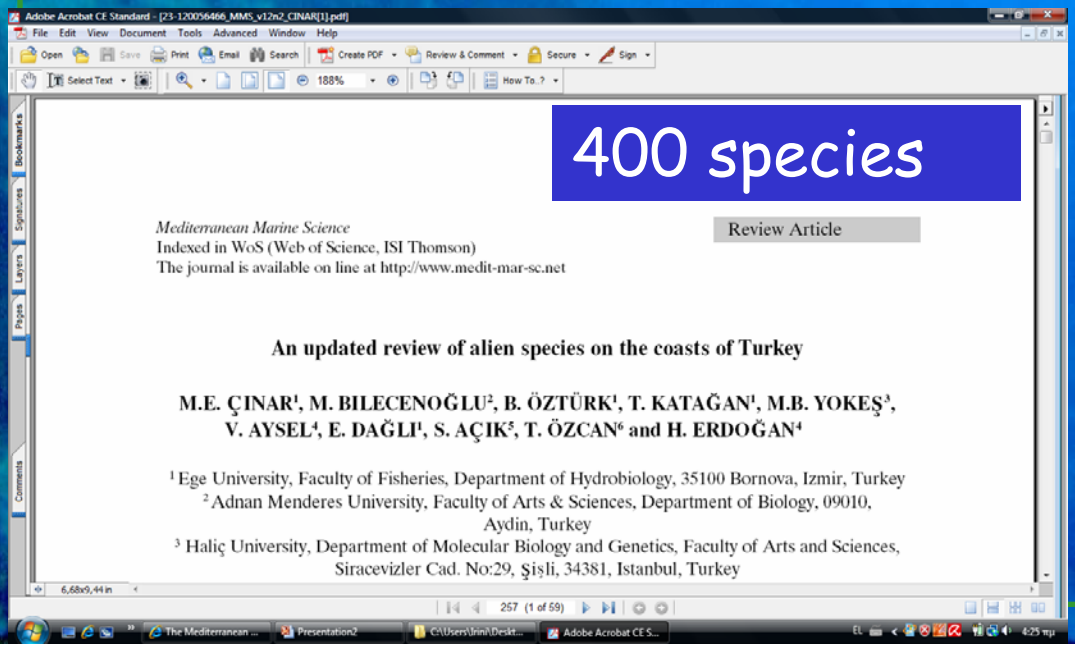
Alien species on the coasts of Turkey

M. E. ÇINAR[1], M. BILECENOĞLU[2], B. ÖZTÜRK[1], T. KATAGAN[1] and V. AYSEL[3]

[1]Ege University, Faculty of Fisheries, Department of Hydrobiology, 35100 Bornova, Izmir, Turkey

[2]Adnan Menderes University, Faculty of Arts & Sciences, Department of Biology, 09010 Aydin, Turkey

[3]Onsekiz Mart University, Faculty of Arts & Sciences, Department of Biology, Çanakkale, Turkey



400 species

Mediterranean Marine Science
Indexed in WoS (Web of Science, ISI Thomson)
The journal is available on line at http://www.medit-mar-sc.net

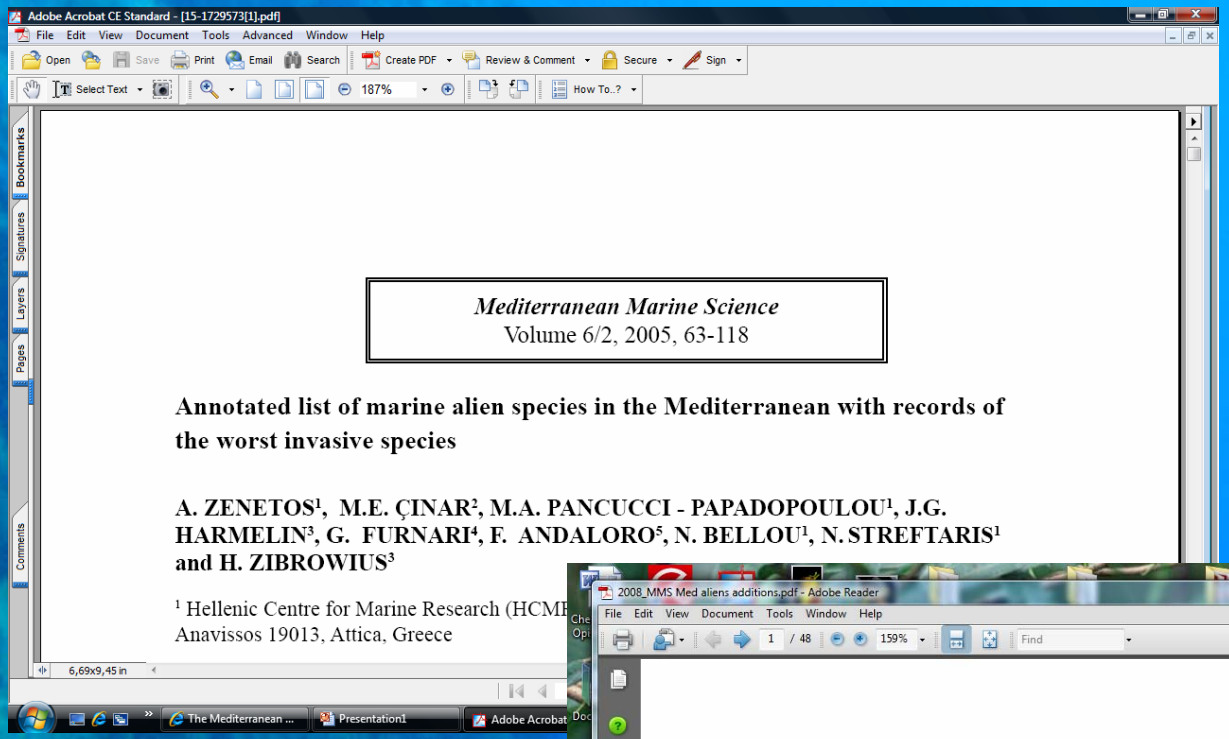
Review Article

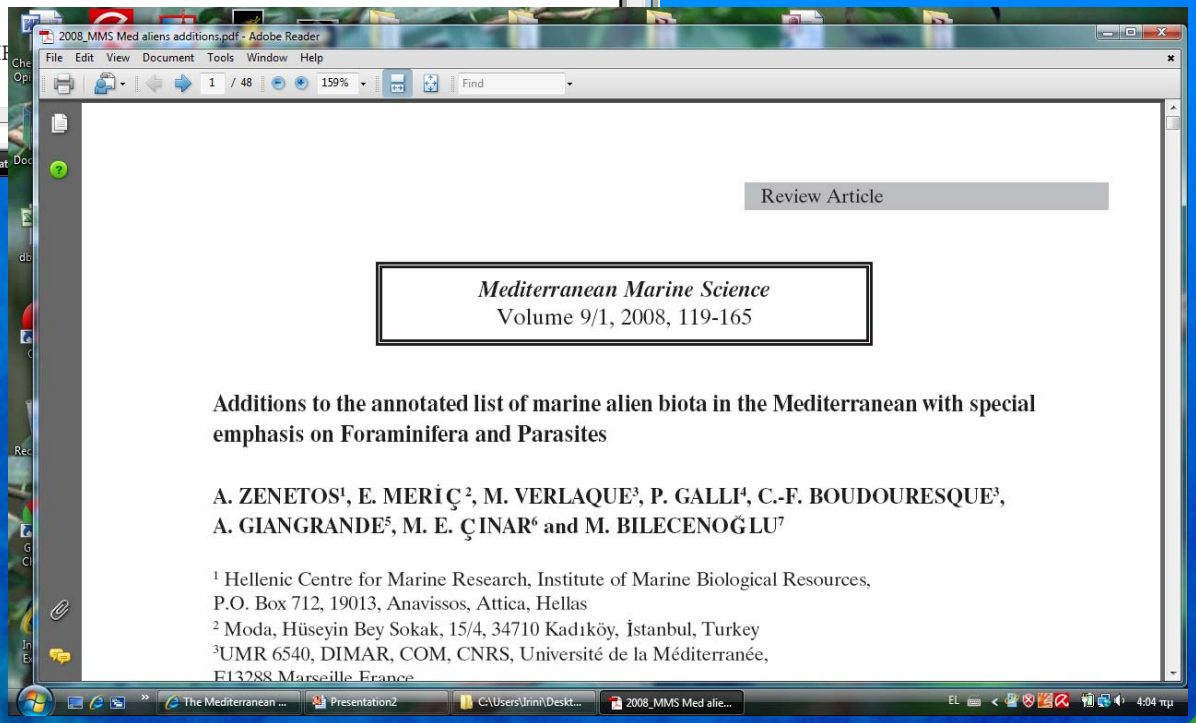
An updated review of alien species on the coasts of Turkey

M.E. ÇINAR[1], M. BILECENOĞLU[2], B. ÖZTÜRK[1], T. KATAĞAN[1], M.B. YOKEŞ[3], V. AYSEL[4], E. DAĞLI[1], S. AÇIK[5], T. ÖZCAN[6] and H. ERDOĞAN[4]

[1] Ege University, Faculty of Fisheries, Department of Hydrobiology, 35100 Bornova, Izmir, Turkey
[2] Adnan Menderes University, Faculty of Arts & Sciences, Department of Biology, 09010, Aydin, Turkey
[3] Haliç University, Department of Molecular Biology and Genetics, Faculty of Arts and Sciences, Siracevizler Cad. No:29, Şişli, 34381, Istanbul, Turkey

Institute of Marine Biological Resources and Inland Waters





Institute of Marine Biological Resources and Inland Waters

	COLL *et al.*, 2010			This work	
Taxon	all	aliens	native	aliens	% aliens
Protozoa (excluding Foraminifera)		0	0	4	
Foraminifera	>600	0	600	50	8.3
Rhodophyta	657	73	584	79	13.5
Phaeophyta & Pelagophyceae	277	23	254	24+1	9.8
Chlorophyta	190	17	173	20	11.6
Magnoliophyta	7	1	6	1	16.7
Polychaeta	1172	75	1097	129	11.8
Crustacea	2239	106	2133	153	7.2
Mollusca	2113	200	1913	212	11.1
Cnidaria	757	3	754	46	6.1
Bryozoa	388	1	387	23	5.9
Ascidiacea	229	15	214	16	7.5
Echinodermata	154	5	149	12	8.1
Porifera	681	0	681	8	1.2
Platyhelminthes	1000	0	1000	12	1.2
Other Invertebrates	2168	2	2166	16	0.7
Fish	650	116	534	149	27.9
Total		637*		954*	
Average %		**3.3 %**			**5.9 %**

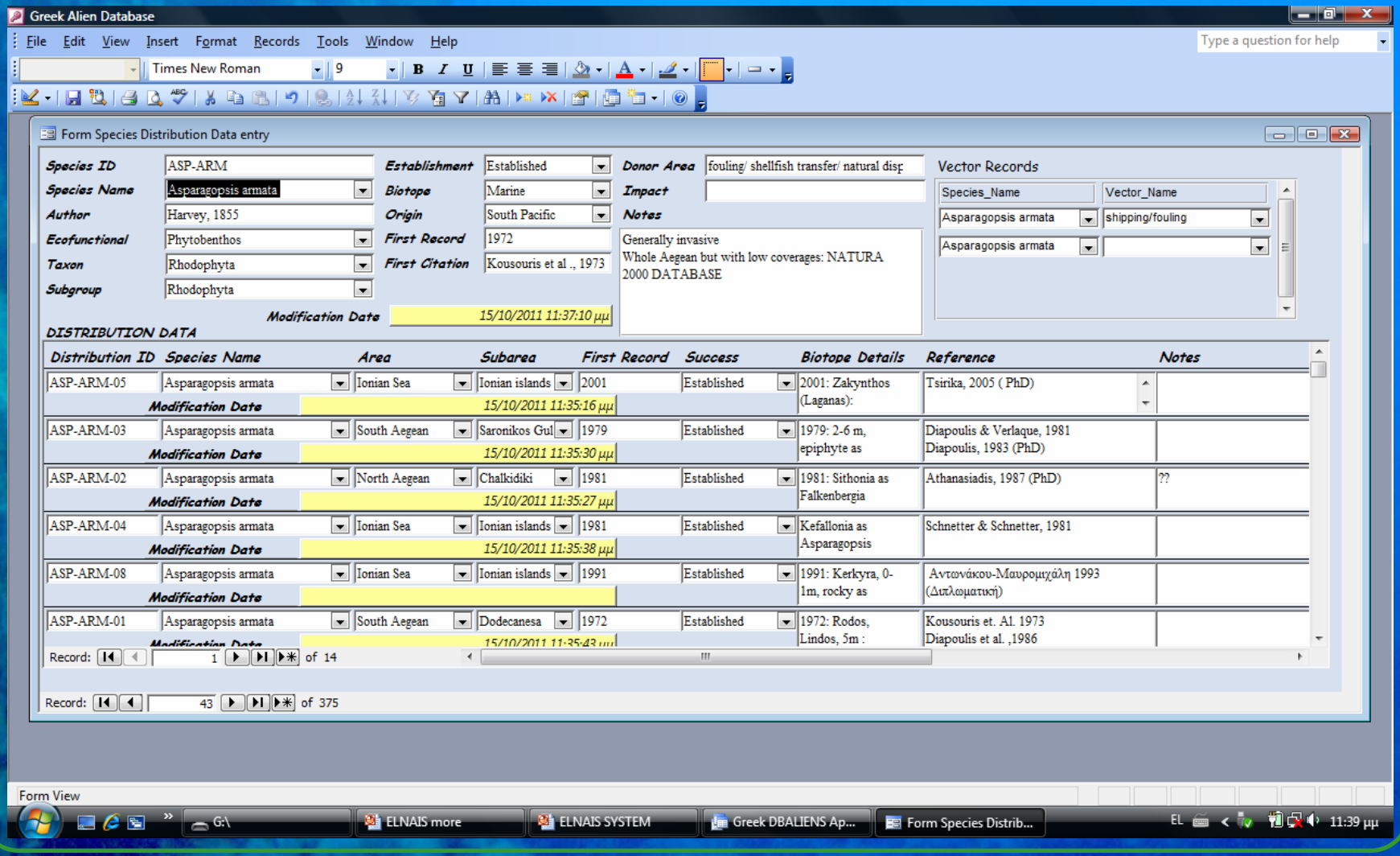
Source: Zenetos et al., 2010 MMS

ELNAIS Database system

- Microsoft Access application
- Collection of the available literature
- Record the data (locations, species, coordinates)
- Enter the data in the database system
- Migrate the data to ArcGIS Desktop System
- ……

Institute of Marine Biological Resources and Inland Waters

Access application



ELNAIS in numbers

Species = 375

including bibliographically introduced, synonyms etc.

Records= 978

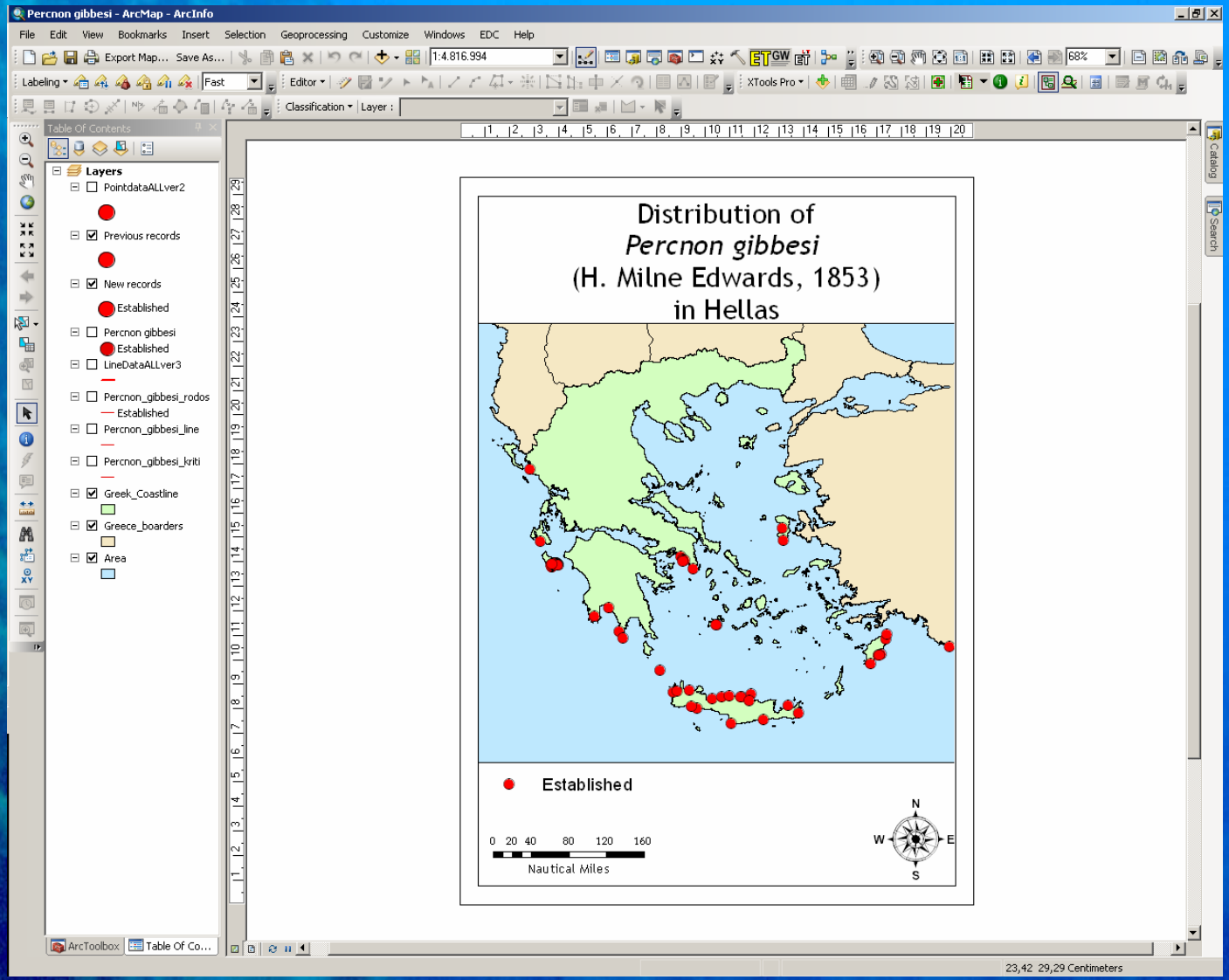
Areas=16

Sub-areas=90

Areas_ID	Areas
ARE-01	Ionian Sea
ARE-02	North Aegean
ARE-03	Libyan Sea
ARE-04	South Aegean
ARE-05	Sea of Kythira
ARE-06	Korinthiakos
ARE-07	Cretan Sea
ARE-08	N Greece lakes
ARE-09	CW Greece lakes
ARE-10	Peloponnesos lakes
ARE-11	Kriti lakes
ARE-12	W Greece lakes
ARE-13	other lakes
ARE-14	various rivers
ARE-15	C Greece lakes rivers
ARE-16	N Greece rivers

Institute of Marine Biological Resources and Inland Waters

GIS system – The ArcGIS Desktop



Institute of Marine Biological Resources and Inland Waters

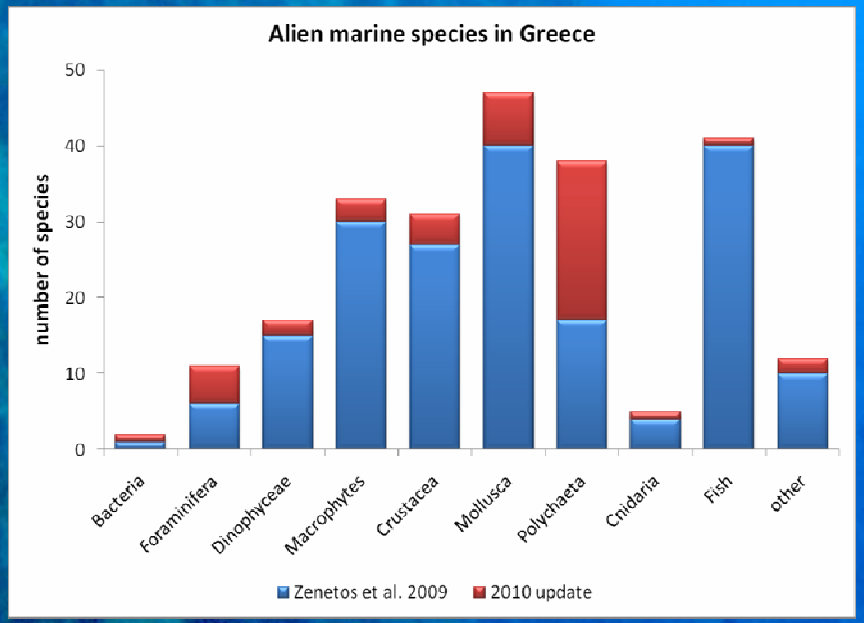
2009-2010

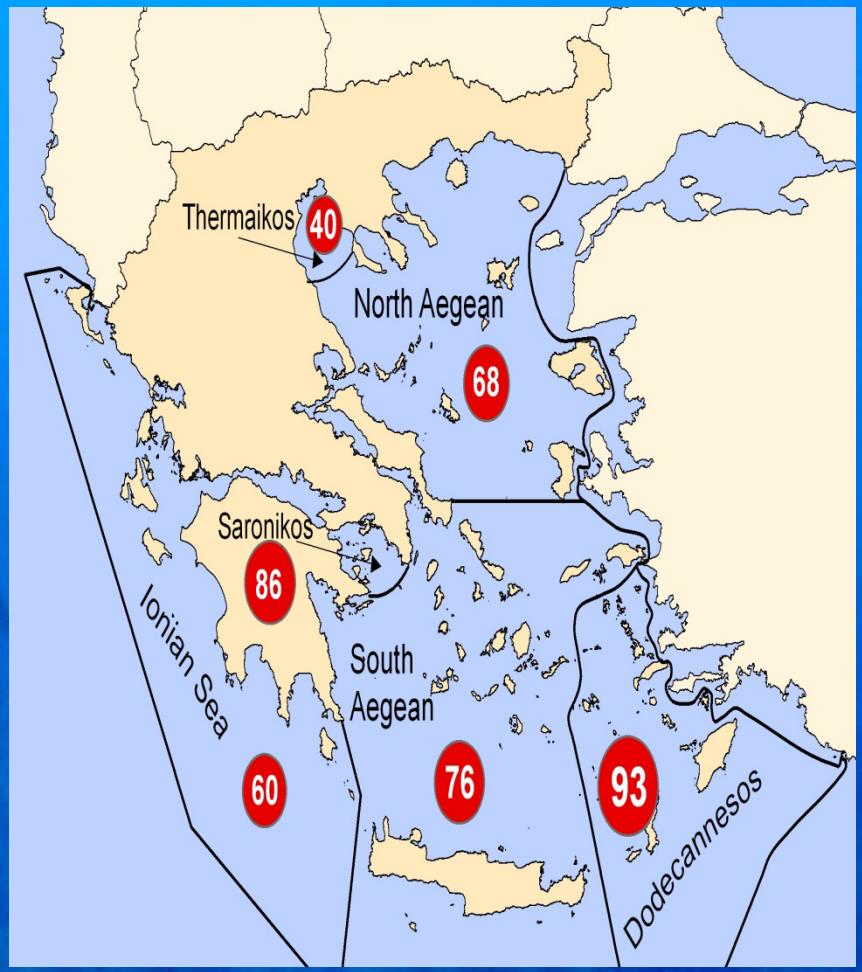
Lagocephalus sceleratus
(Gmelin, 1788)

Stephanolepis diaspros
(Fraser-Brunner, 1940)

Institute of Marine Biological Resources and Inland Waters

A. Zenetos, S. Katsanevakis, D. Poursanidis, F. Crocetta, D. Damalas, G. Apostolopoulos, C. Gravili, E. Vardala-theodorou & M. Malaquias, 2011.Additions and amendments to the marine alien species in Greek Seas (2010 update). *Medit. Mar. Sci.*, 2011





ELNAIS: **Ellenic Network on Aquatic Invasive Species (http://services.ath.hcmr.gr)**

«Invasive alien species (IAS)» includes also (casual) questionable and cryptogenic records

56 experts based at
11 sites University and/or Research Centres/Museums

.

11 Universities, Reseach Centres (ELNAIS Sites 56 Greek experts

ELLENIC NETWORK ON AQUATIC INVASIVE SPECIES (ELNAIS)

HOME

Written by Argyro Zenetos
Thursday, 06 November 2008

Importance of international cooperation in the field of aquatic invasions has been understood as early as in the beginning of 1970s, when the International Council for the Exploration of the Sea (ICES) established the Working Group on Introductions and Transfers of Marine Organisms (WGITMO).The more recent international working group with active participation of European scientists is the ICES/IOC/IMO Working Group on Ballast Water and Other Ship Vectors (WGBOSV)

The development of a European Research Network on Aquatic Invasive Species (ERNAIS) which started in 1999, was welcomed by EU which recognized it in 2002 (see EC Report 2 to CBD 2002. Thematic Report on Alien Invasive Species). Today the ERNAIS Experts Database includes currently a directory of 105 European experts (scientists and managers) in the area of aquatic invasions from 27 countries (see ERNAIS Sites Map).

However, Hellas is covered by one marine expert only. A parallel initiatitive at European level, DAISIE (www.daisie.ceh.ac.uk) experts Registry, includes a limited number of marine experts. The real number, more than 30 marine experts, reflects the importance and the magnitude of the phenomenon that has increased enormously over the last decade.

While networks exist in some Regional Seas e.g. Baltic Marine Biologists (BMB) Working Group (BMB WG 30 NEMO), or the North European and Baltic Network on Invasive Alien Species (NOBANIS: www.nobanis.org) in the Mediterranean, efforts are limited to the preparation of an atlas of exotics by CIESM. The Atlas is the first attempt to provide a comprehensive, group by group, survey of recent marine "immigrants" in the Mediterranean, which is undergoing drastic and rapid changes to its biota. However, the CIESM task force experts are very few and information exchange via the relevant website (www.ciesm.org/atlas) is limited and accidental.

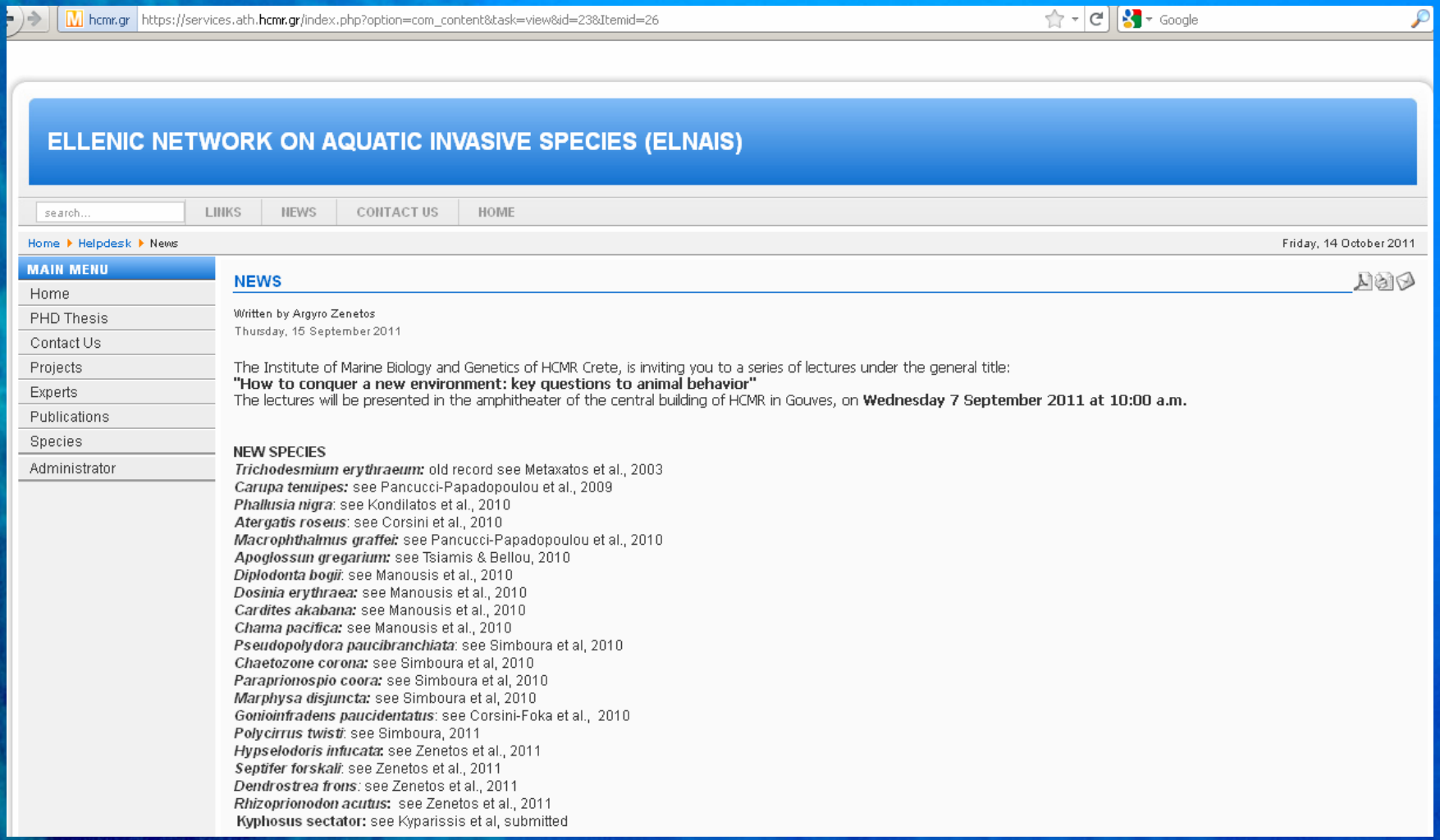
Trends and costs of invasive alien species are used as an indicator by the SEBI2010 Invasive Species Expert Group 5 (http://biodiversity-chm.eea.europa.eu/information/indicator) a)to suit the CBD Focal area on threats to biodiversity and (ii) to serve the EU Headline Biodiversity Indicator development. This indicator is developed in the general assessment framework about progress towards the European 2010 targets (halting the loss of biodiversity).

Hence the need to institute a national network of experts. The Ellenic Network website (ELNAIS.com) is structured in the same pattern as that of ERNAIS. Presently it includes only marine experts and marine/estuarine species. It is in our immediate plans to enlarge the network by including the fresh water species, and experts. ELNAIS list includes not only IAS Invasive alien species (IAS) but casual records as well. IAS are non-native species that are introduced deliberately or unintentionally outside their natural habitats where they become established, proliferate and spread in ways that cause damage to biodiversity, human heath, loss of production etc

eleven Research Institutes/Universities (see ELNAIS Sites Map) and more than 42 Greek scientists (see experts details) are currently carrying out research related to Aquatic (marine) Invasive Species .

If you want to join ELNAIS, or

News – Species and ……



New publications

- **PUBLICATIONS IN 2011**

1. Katsanevakis S., D. Poursanidis, B. Yokes, V. Mačić, S. Beqiraj, L. Kashta, Y. Ramzi Sghaier, R. Zakhama-Sraieb, I. Benamer, G. Bitar, Z. Bouzaza, P. Magni, C.N. Bianchi, L. Tsiakkliros & A. Zenetos. **2011**. Twelve years after the introduction of the crab *Percnon gibbesi* (H. Milne Edwards, 1853) in the Mediterranean: current distribution and invasion rates. *Journal of Biological Research-Thessaloniki)* **16**: 224 – 236.
2. Katsanevakis S. , Zenetos A., Vesna Macic V., Beqiraj S., Poursanidis D., Kashta L**.,** 2011. Invading the Adriatic: spatial patterns of marine alien species across the Ionian-Adriatic boundary. *Aquatic Biology***.** 13: 107–118
3. Kiparissis S. , Fakiris E., Papatheodorou G., Geraga M., Kornaros M., Kapareliotis A., Ferentinos G., 2010. Illegal trawling and induced invasive algal spread as collaborative factors in a *Posidonia oceanica* meadow degradation. *Biological Invasions*, 13, 3 : 669-678 DOI 10.1007/s10530-010-9858-9
4. Simboura, N., 2011. An overlooked alien species present on the coasts of Greece (eastern Mediterranean): the polychaete *Polycirrus twisti* Potts (Polychaeta: Terebellidae). *Mediterranean Marine Science*, 12 (1): 239-246.
5. Tsiakkiros L. & Zenetos A., 2011. Further additions to the alien mollusc fauna along the Cypriot coast New opisthobranchia species. *Acta Adriatica*, 52 (1): 115-124**.**
6. Zenetos A., S. Katsanevakis, D. Poursanidis, F. Crocetta, D. Damalas, G. Apostolopoulos, C. Gravili, E. Vardala-Theodorou & M. Malaquias, 2011. Marine alien species in Greek Seas: Additions and amendments by 2010. *Mediterranean Marine Science*, 12, 1: 95-120.

PUBLICATIONS IN PRESS

Pancucci-Papadopoulou MA, Raitsos DE & Corsini-Foka M. Biological invasions and climatic warming: implications for south-eastern Aegean ecosystem functioning. Journal of the Marine Biological Association of the United Kingdom, page 1 of 13. # Marine Biological Association of the United Kingdom, 2011 doi:10.1017/S0025315411000981

Zogaris S. & Apostolou A.. F irst record of Pontian Monkey Goby, Neogobius fluviatilis (Pallas, 1814) in the Evros River (Greece); Is it an alien species?. *Mediterranean Marine Science*, 12, 2

SUBMITTED PAPERS

Kiparissis S., Loukovitisa D. & Batargias C. First record of the Bermuda sea chub *Kyphosus saltatrix* (Pisces: Kyphosidae) inGreek waters. *Submitted* to Marine Biodiversity Records

Katsanevakis S**,**. Rapid assessment of the marine alien species in the shallow coastal waters of Paros and Antiparos Islands (Aegean Sea). S*ubmitted* to *Aquatic Invasions*

Institute of Marine Biological Resources and Inland Waters

Ph.D Theses

ELLENIC NETWORK ON AQUATIC INVASIVE SPECIES (ELNAIS)

search... | LINKS | NEWS | CONTACT US | HOME

Home | Friday, 14 October 2011

MAIN MENU
- Home
- PHD Thesis
- Contact Us
- Projects
- Experts
- Publications
- Species
- Administrator

PHD THESIS

Written by Takis Traxalakis
Monday, 19 October 2009

Katerina Aligizaki: COMPLETED IN 19 December 2008

TITLE: BIONOMY OF BENTHIC DINOFLAGELLATES IN COASTAL AREAS OF THE NORTH AEGEAN SEA WITH EMPHASIS IN TOXIC SPECIES

Department of Botany, School of Biology, Aristotle University of Thessaloniki, P.O. Box 109, GR-54124 Thessaloniki, e-mail: **aligiza@bio.auth.gr**

In this study, the structure and dynamics of the potentially toxic benthic dinoflagellate community in coastal, continental and island waters of North Aegean Sea is presented. The field study, which included macrophytes, sediment and water sampling, and water temperature and salinity measurements in a total of 52 sampling sites, was conducted during the period August 2003 – December 2005. In this period and until 2007, morphological identification of benthic dinoflagellates and macrophytes, abundance quantification, cultures establishment and determination of Chl-*a* and inorganic nutrients concentrations were carried out. Simultaneously, toxicity was investigated in dinoflagellate cells (from field and cultures) and tissues of bivalve mollusks collected from the study area.

Ten (10) potentially toxic benthic dinoflagellate species were identified, belonging to the genera *Amphidinium* (*A. carterae* and *A. operculatum*), *Coolia* (*C. monotis*), *Ostreopsis* (*O. ovata* and *O.* cf. *siamensis*) and *Prorocentrum* (*P. borbonicum, P. emarginatum, P. levis, P. lima* and *P. rhathymum*). Almost all the identified dinoflagellate species are detected in Greek coastal waters for the first time, while *P. borbonicum* and *P. levis* constitute new additions in the Mediterranean microflora. Additionally, *O. ovata*, *O.* cf. *siamensis*, *P. rhathymum* and *P. emarginatum* are described for the first time in the Eastern Mediterranean Sea.

The identification of the benthic dinoflagellates in the genus level did not confront any difficulty, while the opposite was arisen in the identification in species level of *O. siamensis* and *P. lima*. Some taxononical characters, such as the number and shape of valve pores, the presence or number of pyrenoids, were found unuseful. Thus, the two aforementioned taxa are referred to as *O.* cf. *siamensis* and «*P. lima* species complex», respectively, while the necessity for further taxonomical studies has emerged.

The highest abundance levels of *Ostreopsis* populations were recorded in the period between the end of summer and the beginning of autumn, while these populations were detected each year during the period July - November. This temporal pattern of *Ostreopsis* populations seems to be mainly related to the photoperiod changes and secondly to the temperature, as shown by the significant negative correlation between *Ostreopsis* populations and photoperiod changes, and the less intense positive correlation between these populations and temperature. *P. lima* populations were detectable all over the year, while displaying peak abundance in summer and autumn or even winter periods. The population of *C. monotis* and the other benthic dinoflagellates also presented highest abundance levels in summer and autumn, while, in some stations, *C. monotis*, *P. levis* and *Amphidinium* spp. cells were detectable in every season.

Most of the identified benthic dinoflagellates were detected in water or sediment samples only when they were simultaneously detected epiphytically. The maximum abundance levels on macrophytes reached the order of 10^5 and 10^6 cells gr^{-1} fwm, while, in the case of water and sediment samples, they did not exceed 10^4 cells L^{-1} και 10^3 cells gr^{-1} dws, respectively. Furthermore, it is worth noting that *P. borbonicum* was the only dinoflagellate species that, in some cases, was detected in sediment samples without being found epiphytically.

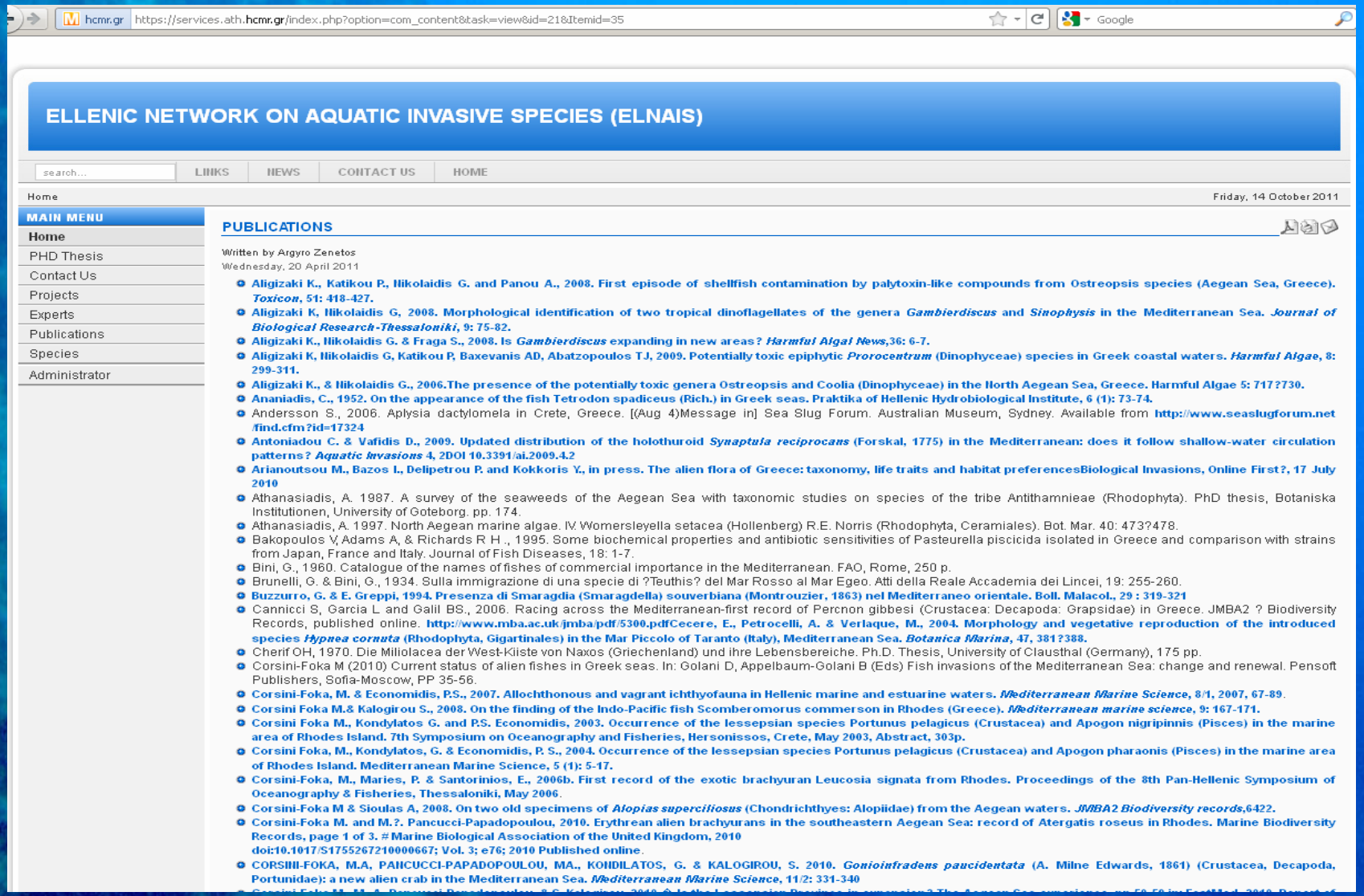
Regarding the macrophyte substrate, it was observed that, while in the highest abundance of *Ostreopsis* spp. and *C. monotis* firstly phaeophytes (*Padina pavonica, Cystoseira* sp.) and secondly phanerogams (*Cymodocea nodosa*) are the major contributors, the opposite was the case for *P. rhathymum, P. levis* και *Amphidinium* spp.. *P. lima* seemed to be able to reach high cell densities in any available substrate, despite the fact that it is clustered with *Ostreopsis* spp. and *C. monotis*.

The most abundant and widely distributed benthic dinoflagellates in North Aegean coasts were «*P. lima* species complex» representatives, *C. monotis* and *Ostreopsis* spp.. The negative correlations for some benthic dinoflagellates with Chl-*a* indicate that, mainly *Ostreopsis* spp., and also *C. monotis* and *P. emarginatum*, populations were favored in low Chl-*a* waters, rich in rhodophyte, phaeophyte and phanerogam vegetation, while they displayed minimum cell densities or are totally absent in areas, where high Chl-*a* concentrations were recorded, such as the western coasts of the inner part of Thermaikos Gulf.

According to the toxicity analyses conducted in the present study, *Ostreopsis ovata*, *O.* cf. *siamensis*, *Prorocentrum lima, P. rhathymum* and *P. borbonicum* were shown to be toxic, while *C. monotis* and *A. carterae* strains were not found toxic based on the *Artemia* and mouse bioassays. The haemolytic assay indicated that *Ostreopsis* spp. produce a toxin, analog of palytoxin (putative palytoxin, p-PLTX). Palytoxin is accurately detectable with the haemolytic assay due to its characteristic to cause delayed haemolysis, which is inhibited by ouabain

Institute of Marine Biological Resources and Inland Waters

The literature – sources



hcmr.gr https://services.ath.hcmr.gr/index.php?option=com_content&task=view&id=21&Itemid=35

ELLENIC NETWORK ON AQUATIC INVASIVE SPECIES (ELNAIS)

search... LINKS NEWS CONTACT US HOME

Home Friday, 14 October 2011

MAIN MENU
- Home
- PHD Thesis
- Contact Us
- Projects
- Experts
- Publications
- Species
- Administrator

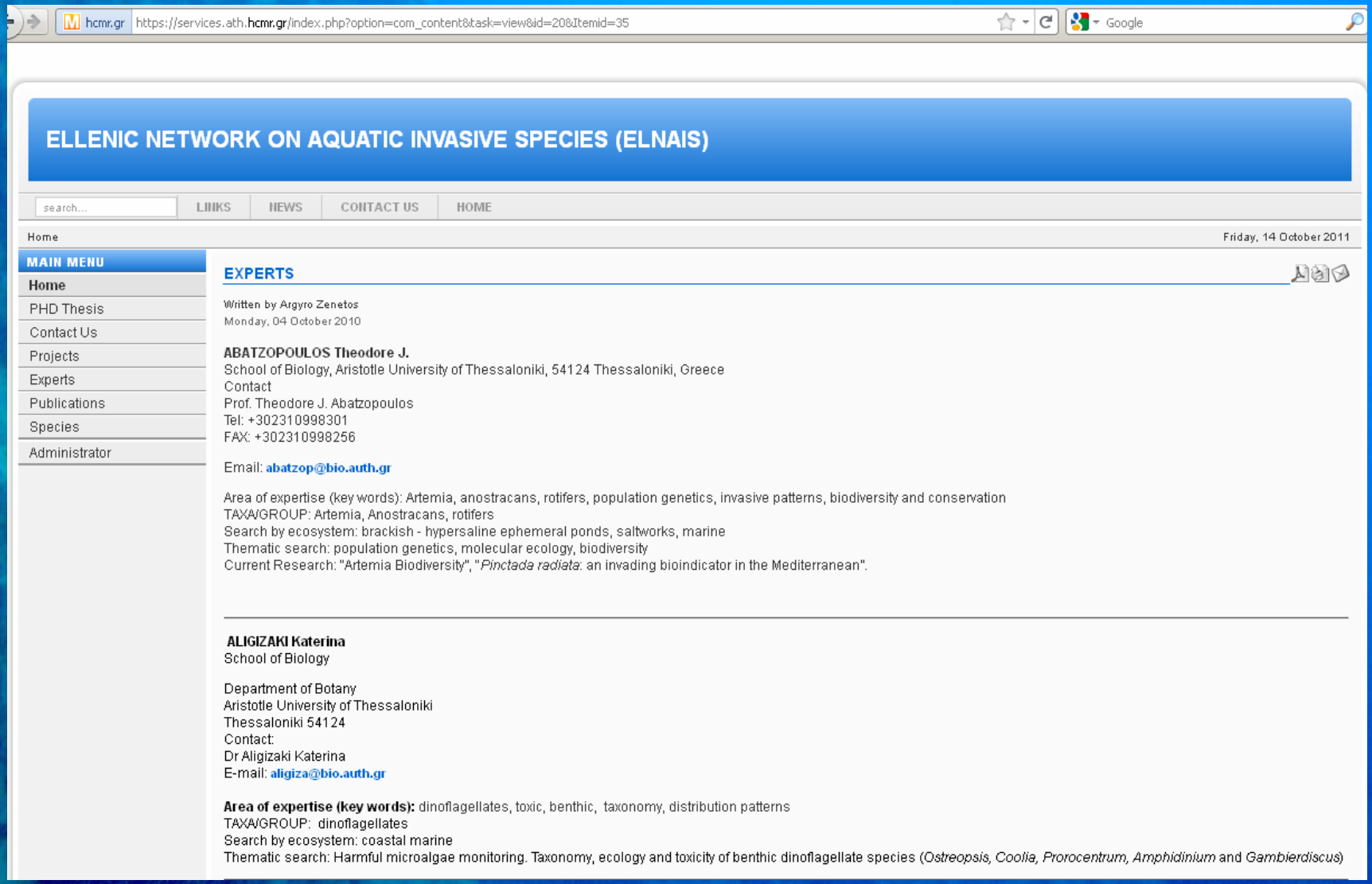
PUBLICATIONS

Written by Argyro Zenetos
Wednesday, 20 April 2011

- Aligizaki K., Katikou P., Nikolaidis G. and Panou A., 2008. First episode of shellfish contamination by palytoxin-like compounds from Ostreopsis species (Aegean Sea, Greece). *Toxicon*, 51: 418-427.
- Aligizaki K, Nikolaidis G, 2008. Morphological identification of two tropical dinoflagellates of the genera *Gambierdiscus* and *Sinophysis* in the Mediterranean Sea. *Journal of Biological Research-Thessaloniki*, 9: 75-82.
- Aligizaki K., Nikolaidis G. & Fraga S., 2008. Is *Gambierdiscus* expanding in new areas? *Harmful Algal News*,36: 6-7.
- Aligizaki K, Nikolaidis G, Katikou P, Baxevanis AD, Abatzopoulos TJ, 2009. Potentially toxic epiphytic *Prorocentrum* (Dinophyceae) species in Greek coastal waters. *Harmful Algae*, 8: 299-311.
- Aligizaki K., & Nikolaidis G., 2006.The presence of the potentially toxic genera Ostreopsis and Coolia (Dinophyceae) in the North Aegean Sea, Greece. Harmful Algae 5: 717?730.
- Ananiadis, C., 1952. On the appearance of the fish Tetrodon spadiceus (Rich.) in Greek seas. Praktika of Hellenic Hydrobiological Institute, 6 (1): 73-74.
- Andersson S., 2006. Aplysia dactylomela in Crete, Greece. [(Aug 4)Message in] Sea Slug Forum. Australian Museum, Sydney. Available from http://www.seaslugforum.net/find.cfm?id=17324
- Antoniadou C. & Vafidis D., 2009. Updated distribution of the holothuroid *Synaptula reciprocans* (Forskal, 1775) in the Mediterranean: does it follow shallow-water circulation patterns? *Aquatic Invasions* 4, 2DOI 10.3391/ai.2009.4.2
- Arianoutsou M., Bazos I., Delipetrou P. and Kokkoris Y., in press. The alien flora of Greece: taxonomy, life traits and habitat preferencesBiological Invasions, Online First?, 17 July 2010
- Athanasiadis, A. 1987. A survey of the seaweeds of the Aegean Sea with taxonomic studies on species of the tribe Antithamnieae (Rhodophyta). PhD thesis, Botaniska Institutionen, University of Goteborg. pp. 174.
- Athanasiadis, A. 1997. North Aegean marine algae. IV. Womersleyella setacea (Hollenberg) R.E. Norris (Rhodophyta, Ceramiales). Bot. Mar. 40: 473?478.
- Bakopoulos V, Adams A, & Richards R H ., 1995. Some biochemical properties and antibiotic sensitivities of Pasteurella piscicida isolated in Greece and comparison with strains from Japan, France and Italy. Journal of Fish Diseases, 18: 1-7.
- Bini, G., 1960. Catalogue of the names of fishes of commercial importance in the Mediterranean. FAO, Rome, 250 p.
- Brunelli, G. & Bini, G., 1934. Sulla immigrazione di una specie di ?Teuthis? del Mar Rosso al Mar Egeo. Atti della Reale Accademia dei Lincei, 19: 255-260.
- Buzzurro, G. & E. Greppi, 1994. Presenza di Smaragdia (Smaragdella) souverbiana (Montrouzier, 1863) nel Mediterraneo orientale. Boll. Malacol., 29 : 319-321
- Cannicci S, Garcia L and Galil BS., 2006. Racing across the Mediterranean-first record of Percnon gibbesi (Crustacea: Decapoda: Grapsidae) in Greece. JMBA2 ? Biodiversity Records, published online. http://www.mba.ac.uk/jmba/pdf/5300.pdfCecere, E., Petrocelli, A. & Verlaque, M., 2004. Morphology and vegetative reproduction of the introduced species *Hypnea cornuta* (Rhodophyta, Gigartinales) in the Mar Piccolo of Taranto (Italy), Mediterranean Sea. *Botanica Marina*, 47, 381?388.
- Cherif OH, 1970. Die Miliolacea der West-Kiiste von Naxos (Griechenland) und ihre Lebensbereiche. Ph.D. Thesis, University of Clausthal (Germany), 175 pp.
- Corsini-Foka M (2010) Current status of alien fishes in Greek seas. In: Golani D, Appelbaum-Golani B (Eds) Fish invasions of the Mediterranean Sea: change and renewal. Pensoft Publishers, Sofia-Moscow, PP 35-56.
- Corsini-Foka, M. & Economidis, P.S., 2007. Allochthonous and vagrant ichthyofauna in Hellenic marine and estuarine waters. *Mediterranean Marine Science*, 8/1, 2007, 67-89.
- Corsini Foka M.& Kalogirou S., 2008. On the finding of the Indo-Pacific fish Scomberomorus commerson in Rhodes (Greece). *Mediterranean marine science*, 9: 167-171.
- Corsini Foka M., Kondylatos G. and P.S. Economidis, 2003. Occurrence of the lessepsian species Portunus pelagicus (Crustacea) and Apogon nigripinnis (Pisces) in the marine area of Rhodes Island. 7th Symposium on Oceanography and Fisheries, Hersonissos, Crete, May 2003, Abstract, 303p.
- Corsini Foka, M., Kondylatos, G. & Economidis, P. S., 2004. Occurrence of the lessepsian species Portunus pelagicus (Crustacea) and Apogon pharaonis (Pisces) in the marine area of Rhodes Island. Mediterranean Marine Science, 5 (1): 5-17.
- Corsini-Foka, M., Maries, P. & Santorinios, E., 2006b. First record of the exotic brachyuran Leucosia signata from Rhodes. Proceedings of the 8th Pan-Hellenic Symposium of Oceanography & Fisheries, Thessaloniki, May 2006.
- Corsini-Foka M & Sioulas A, 2008. On two old specimens of *Alopias superciliosus* (Chondrichthyes: Alopiidae) from the Aegean waters. *JMBA2 Biodiversity records*,6422.
- Corsini-Foka M. and M.?. Pancucci-Papadopoulou, 2010. Erythrean alien brachyurans in the southeastern Aegean Sea: record of Atergatis roseus in Rhodes. Marine Biodiversity Records, page 1 of 3. # Marine Biological Association of the United Kingdom, 2010 doi:10.1017/S1755267210000667; Vol. 3; e76; 2010 Published online.
- CORSINI-FOKA, M.A, PANCUCCI-PAPADOPOULOU, MA., KONDILATOS, G. & KALOGIROU, S. 2010. *Goniointradens paucidentata* (A. Milne Edwards, 1861) (Crustacea, Decapoda, Portunidae): a new alien crab in the Mediterranean Sea. *Mediterranean Marine Science*, 11/2: 331-340

Institute of Marine Biological Resources and Inland Waters

List of experts in the network



hcmr.gr https://services.ath.hcmr.gr/index.php?option=com_content&task=view&id=20&Itemid=35

Google

ELLENIC NETWORK ON AQUATIC INVASIVE SPECIES (ELNAIS)

search... LINKS NEWS CONTACT US HOME

Home

Friday, 14 October 2011

MAIN MENU

- Home
- PHD Thesis
- Contact Us
- Projects
- Experts
- Publications
- Species
- Administrator

EXPERTS

Written by Argyro Zenetos
Monday, 04 October 2010

ABATZOPOULOS Theodore J.
School of Biology, Aristotle University of Thessaloniki, 54124 Thessaloniki, Greece
Contact
Prof. Theodore J. Abatzopoulos
Tel: +302310998301
FAX: +302310998256

Email: **abatzop@bio.auth.gr**

Area of expertise (key words): Artemia, anostracans, rotifers, population genetics, invasive patterns, biodiversity and conservation
TAXA/GROUP: Artemia, Anostracans, rotifers
Search by ecosystem: brackish - hypersaline ephemeral ponds, saltworks, marine
Thematic search: population genetics, molecular ecology, biodiversity
Current Research: "Artemia Biodiversity", "*Pinctada radiata*: an invading bioindicator in the Mediterranean".

ALIGIZAKI Katerina
School of Biology

Department of Botany
Aristotle University of Thessaloniki
Thessaloniki 54124
Contact:
Dr Aligizaki Katerina
E-mail: **aligiza@bio.auth.gr**

Area of expertise (key words): dinoflagellates, toxic, benthic, taxonomy, distribution patterns
TAXA/GROUP: dinoflagellates
Search by ecosystem: coastal marine
Thematic search: Harmful microalgae monitoring. Taxonomy, ecology and toxicity of benthic dinoflagellate species (*Ostreopsis, Coolia, Prorocentrum, Amphidinium* and *Gambierdiscus*)

Institute of Marine Biological Resources and Inland Waters

The main table of ELNAIS

ELLENIC NETWORK ON AQUATIC INVASIVE SPECIES (ELNAIS)

search... | LINKS | NEWS | CONTACT US | HOME

Home — Friday, 14 October 2011

MAIN MENU
- Home
- PHD Thesis
- Contact Us
- Projects
- Experts
- Publications
- Species
- Administrator

DB

Written by Argyro Zenetos

Elnais DataBase

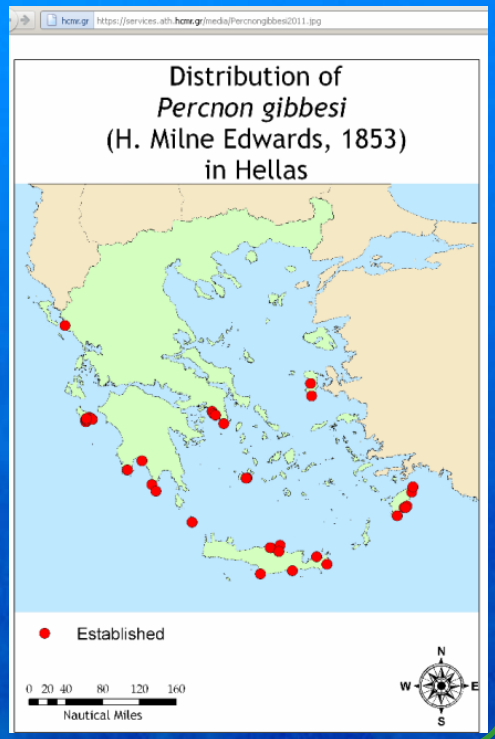
For information contact Technical Support: Balopoulou Stavroula

Today is: Friday 14 Oct 2011, 17:00:41 PM / **Last Update on:** Friday 16 September 2011, 14:21:45 PM — From 1 / To 200 / Number of records found: 323

Species_Name	Author	Ecofunctional group	Taxon	Environment	since	Establishment success	source	photos	Have photos	Distribution map
Apogonichthyoides (ex Apogon) pharaonis	(Bellotti, 1874)	Fish	Fish	marine	1982	established	Zachariou-Mamalinga, 1990	Click here	YES	Click here
Acanthophora nayadiformis	(Delile) Papenfuss, 1968	Phytobenthos	Rhodophyta	marine	1861	Questionable/cryptogenic	Grunow, 1861	Click here	YES	Click here
Acipenser baeri	Brandt, 1869	Fish	Fish	freshwater/marine	1990	casual	Economidis et al., 2000b	No Photo Available		Click here
Acipenser gueldenstaedtii	Brandt & Ratzeburg, 1833	Fish	Fish	freshwater/marine	1990	casual	Economidis et al., 2000b	Click here	YES	Click here
Acipenser naccarii	Bonaparte, 1836	Fish		freshwater	2000	questionable	Paschos et al., 2001	No Photo Available	NO	Click here
Acipenser ruthenus	Linnaeus, 1758	fish		freshwater	1990s	casual	Economidis et al., 2000a,b	No Photo Available	NO	Click here
Acteocina mucronata	(Philippi, 1849)	Zoobenthos	Mollusca	marine	1991	casual	Storsberg, 1997	No Photo Available	NO	Click here
Aedes albopictus	(Skuse, 1895)	Insects	Diptera	freshwater	2000	established	Patsoula et al., 2006	No Photo Available	NO	Click here
Alepes djedaba	(Forsskal, 1775)	Fish	Fish	marine	1960	questionable	Bini, 1960	No Photo Available	NO	Click here
Alexandrium insuetum	Balech 1985	Phytoplankton	Dinophyta	marine	2003	established	Nicolaidis et al., 2005	No Photo Available	NO	Click here
Alexandrium taylori	Balech 1994	Phytoplankton	Dinophyta	marine	2001	established	Gotsis-Skretas et al., 2003	No Photo Available	NO	Click here
Alpheus rapacida	(de Man, 1908)	Zoobenthos	Crustacea	marine	1998	casual	Pancucci-Papadopoulou et al., 2005	No Photo Available	NO	Click here
Ammania auriculata	Willd.	FW plants		freshwater	2004	established	Koumpli-Sovantzi, 2008	No Photo Available	NO	Click here
Ammania baccifera	Linnaeus	FW Plants		freshwater	2002	established	Greuter & Raus, 2002	No Photo Available	NO	Click here
Ammania coccinea	Roth	FW plants		freshwater	2001	established	Raus & Raabe, 2002	No Photo Available	NO	Click here
Ammania senegalensis	Lamarck	FW plants		freshwater	2002	established	Greuter & Raus, 2002	No Photo Available	NO	Click here
Amphisorus hemprichi	Ehrenberg 1840	Zoobenthos	Foraminefera	marine	1974	established	Hollaus & Hottinger, 1997	No Photo Available	NO	Click here
Amphistegina	D Orbigny,	Zoobenthos	Foraminifera	marine	1974	established	Hollaus &Hottinger, 1997;	Click here	YES	No Map

An example : the spider crab *Percnon gibbesi*

Paspalum paspalodes (synonym Paspalum distichum (Linnaeus)	(Michx) Scribner	FW plants		freshwater	1973-81	established	Koumpli-Sovantzi, 1983	No Photo Available	NO	Click here
Pempheris vanicolensis	Cuvier, 1831	Fish	Fish	marine	1983	established	Zachariou-Mamalinga, 1990	Click here	YES	Click here
Percnon gibbesi	(H. Milne Edwards, 1853)	Zoobenthos	Crustacea	marine	2004	established	Thessalou-Legaki et al., 2006	Click here	YES	Click here
Petricolaria pholadiformis	Lamarck, 1818	Zoobenthos	Mollusca	marine	1985	established	Delamotte & Vardala-Theodorou, 1994	Click here	YES	Click here
Petroscirtes ancylodon	Ruppell, 1838	Fish	Fish	marine	2004	casual	Corsini-Foka et al., 2005	Click here	YES	Click here
Phaeocystis pouchetii	Lagerheim 1896	Phytoplankton	Dinophyta	marine	1983	Established/cryptogenic	Ignatiadou, 1987	Click here	NO	Click here



Citizen-scientists

Shell-collectors….

tourists

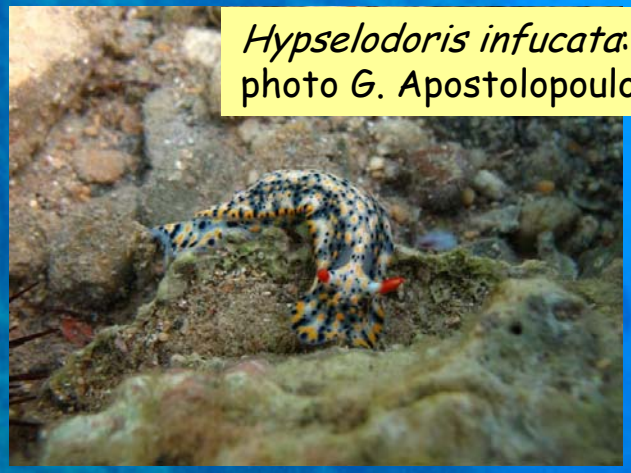
Taxonomic Keys

Internet

Photos

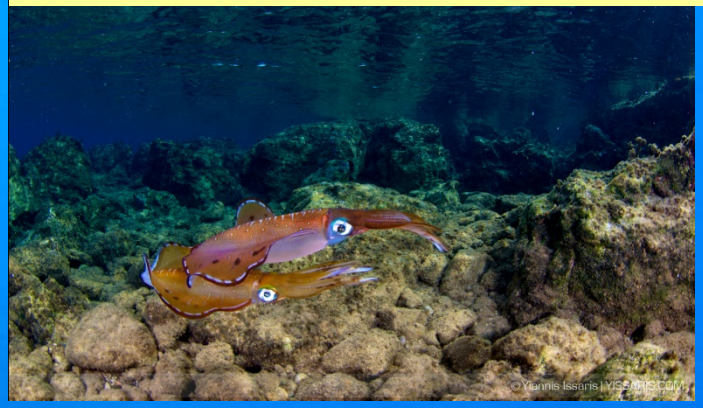
Institute of Marine Biological Resources and Inland Waters

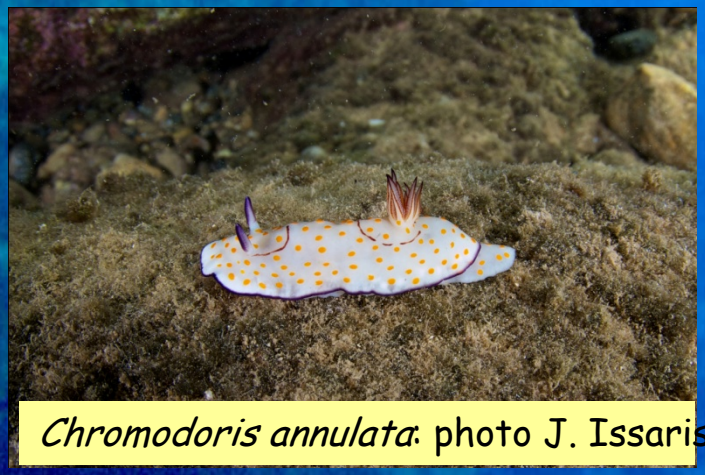
Divers: Kastellorizo 2010



Hypselodoris infucata: photo G. Apostolopoulos

Sepioteuthis lessoniana: photo J. Issaris





Chromodoris annulata: photo J. Issaris

Percnon gibbesi: photo J. Issaris

Fishermen…

Lagocephalus sceleratus

- new invader (2003); however, abundant in the Levantine basin
- negative impact in artisanal fisheries
- potential risk to humans (tetrodotoxin poisoning)

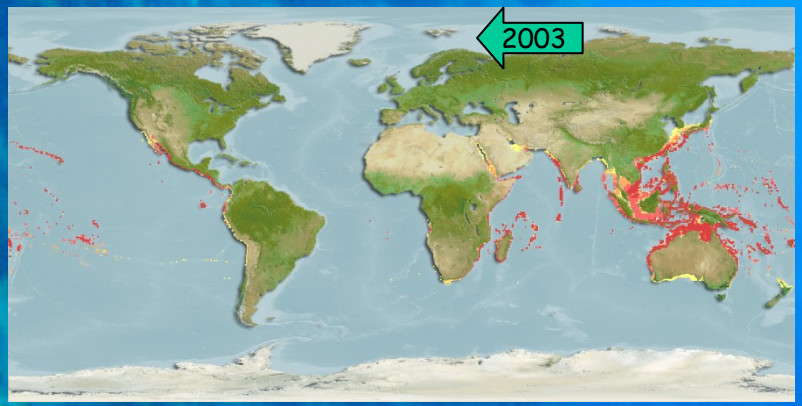
Dissemination

- ✓ Raise awareness: media, scientific community
- ✓ Fact sheets for EEA and National organizations: Fisheries Directive
- ✓ Provide Data to Ministries in relation to EU directives
- ✓ Collaborate in international fora
- ✓ Monitor when/where possible
- ✓ Research: 5 PhD theses in Greece (2 finalized in 2009, 1 in 2011, 1 in 2012)

Institute of Marine Biological Resources and Inland Waters

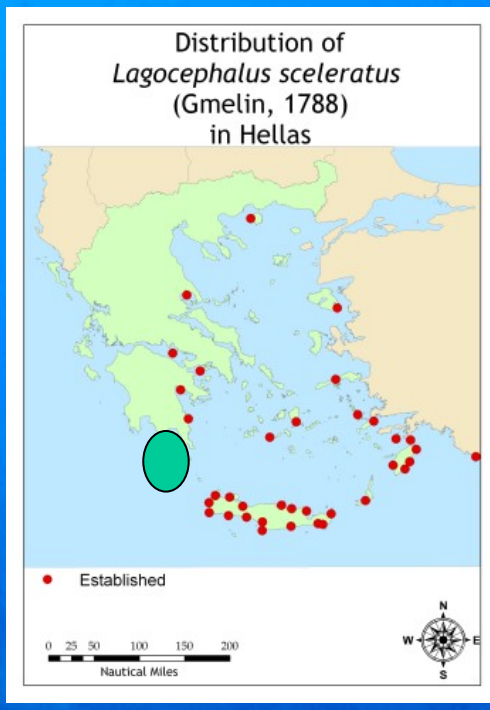
Awareness raising:
Fish: *Lagocephalus sceleratus*

First report : Rhodes, 2005




Θηρία οι λαγοκέφαλοι των ελληνικών νερών

Ψαράς στη Ρόδο έβγαλε τρία δηλητηριώδη ψάρια μήκους μισού μέτρου το καθένα




Και στη Λάρισα τοξικός λαγοκέφαλος

Συναγερμός έχει σημάνει από χθες στην περιοχή Στομίου του νομού Λάρισας, μετά τον εντοπισμό ενός λαγοκεφάλου από ερασιτέχνη ψαρά.

Το επικίνδυνο ψάρι αλιεύτηκε χθες το μεσημέρι στις 12:00 στο ύψος του οικισμού Αλεξανδρινή και προσκομίστηκε άμεσα στο Λιμεναρχείο και στη συνέχεια στη διεύθυνση Αλιείας της Νομαρχίας Λάρισας.

Αυτό είναι το τέταρτο κρούσμα εμφάνισης λαγοκεφάλου που καταγράφεται στις ελληνικές θάλασσες τους τελευταίους δύο μήνες.

Η κατανάλωση λαγοκέφαλου μπορεί να προκαλέσει μέχρι και θάνατο, ενώ ανησυχίες εκφράζονται για πιθανή αναπαραγωγή του είδους καθώς το συγκεκριμένο ψάρι ήταν μικρού μεγέθους.

Η Διεύθυνση Αλιείας απέστειλε ήδη το αλιευθέν ψάρι για τοξικολογική εξέταση, ενώ άρχισε να επικολλά σε κεντρικά σημεία στη Λάρισα και τα παράλια αφίσες με φωτογραφία του ψαριού που πληροφορούν για την επικινδυνότητά του.

Οι αλιείς που θα εντοπίσουν αυτό το είδος οφείλουν να το κρατήσουν και να ειδοποιήσουν τις κατά τόπους αρμόδιες αρχές, ενώ ιχθυέμποροι και καταναλωτές πρέπει να είναι ιδιαίτερα προσεκτικοί, καθώς το ψάρι μοιάζει με άλλα βρώσιμα είδη, όπως μαρίδα, γόπα και αθερίνα.

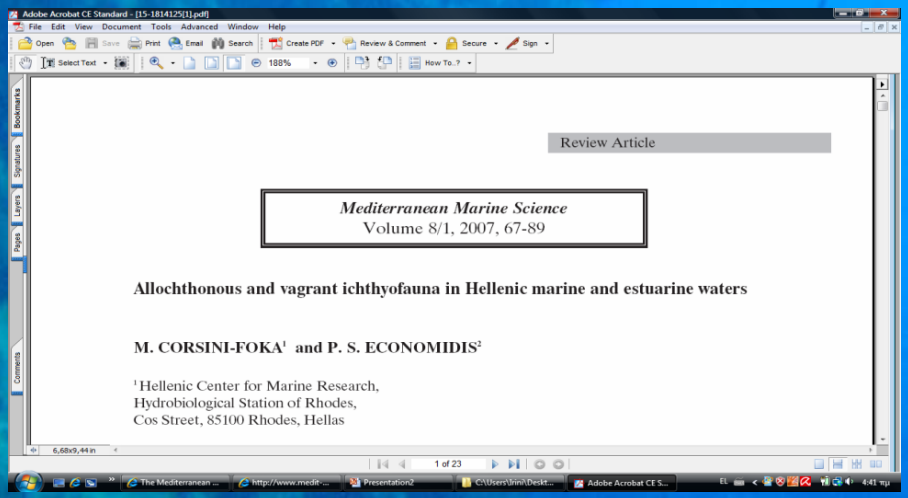

ΕΜΦΑΝΙΣΤΗΚΕ ΛΑΓΟΚΕΦΑΛΟΣ ΑΝΟΙΧΤΑ ΤΟΥ ΣΤΟΜΙΟΥ ΛΑΡΙΣΑΣ

Στο Αιγαίο το ψάρι - φονιάς

Σε συναγερμό έχουν τεθεί οι υγειονομικές και οι κτηνιατρικές υπηρεσίες

Institute of Marine Biological Resources and Inland Waters

Publications steming from ELNAIS



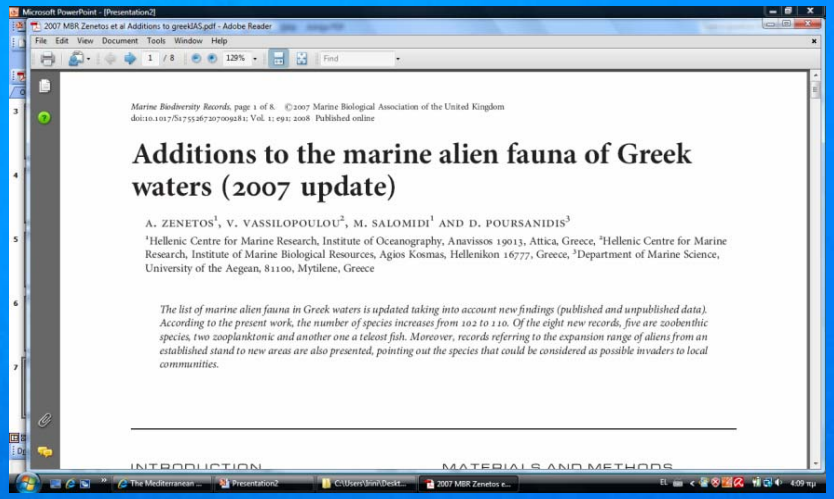
Review Article

Mediterranean Marine Science
Volume 8/1, 2007, 67-89

Allochthonous and vagrant ichthyofauna in Hellenic marine and estuarine waters

M. CORSINI-FOKA[1] and P. S. ECONOMIDIS[2]

[1]Hellenic Center for Marine Research,
Hydrobiological Station of Rhodes,
Cos Street, 85100 Rhodes, Hellas



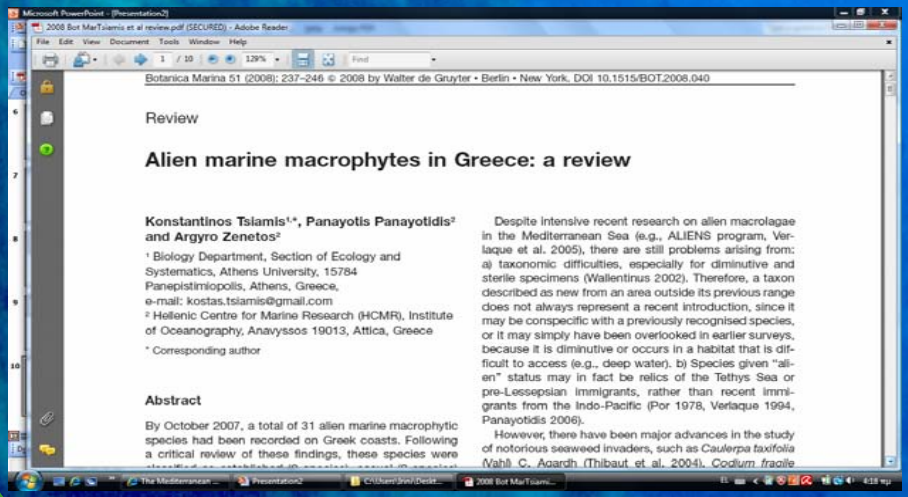
Marine Biodiversity Records, page 1 of 8. ©2007 Marine Biological Association of the United Kingdom
doi:10.1017/S1755267207009281; Vol. 1; e91; 2008 Published online

Additions to the marine alien fauna of Greek waters (2007 update)

A. ZENETOS[1], V. VASSILOPOULOU[2], M. SALOMIDI[1] AND D. POURSANIDIS[3]

[1]Hellenic Centre for Marine Research, Institute of Oceanography, Anavissos 19013, Attica, Greece, [2]Hellenic Centre for Marine Research, Institute of Marine Biological Resources, Agios Kosmas, Hellenikon 16777, Greece, [3]Department of Marine Science, University of the Aegean, 81100, Mytilene, Greece

The list of marine alien fauna in Greek waters is updated taking into account new findings (published and unpublished data). According to the present work, the number of species increases from 102 to 110. Of the eight new records, five are zoobenthic species, two zooplanktonic and another one a teleost fish. Moreover, records referring to the expansion range of aliens from an established stand to new areas are also presented, pointing out the species that could be considered as possible invaders to local communities.



Botanica Marina 51 (2008): 237–246 © 2008 by Walter de Gruyter • Berlin • New York. DOI 10.1515/BOT.2008.040

Review

Alien marine macrophytes in Greece: a review

Konstantinos Tsiamis[1,*], Panayotis Panayotidis[2] and Argyro Zenetos[2]

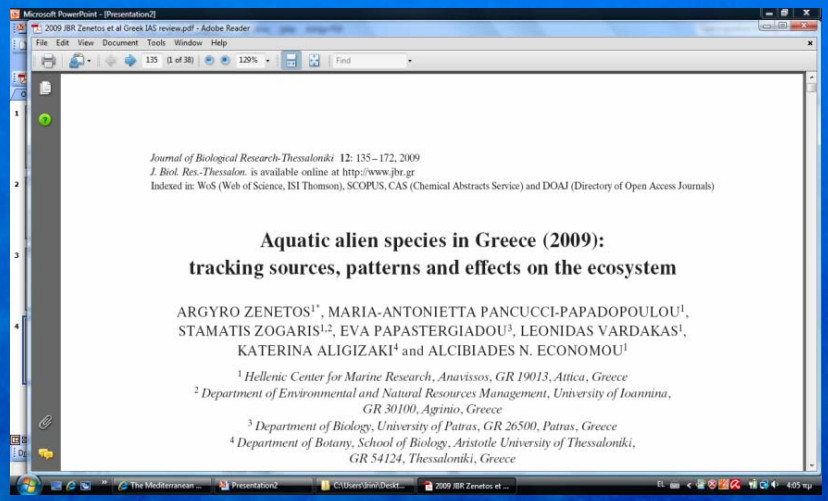
[1] Biology Department, Section of Ecology and Systematics, Athens University, 15784 Panepistimiopolis, Athens, Greece,
e-mail: kostas.tsiamis@gmail.com
[2] Hellenic Centre for Marine Research (HCMR), Institute of Oceanography, Anavyssos 19013, Attica, Greece
* Corresponding author

Abstract

By October 2007, a total of 31 alien marine macrophytic species had been recorded on Greek coasts. Following a critical review of these findings, these species were

Despite intensive recent research on alien macrolagae in the Mediterranean Sea (e.g., ALIENS program, Verlaque et al. 2005), there are still problems arising from: a) taxonomic difficulties, especially for diminutive and sterile specimens (Wallentinus 2002). Therefore, a taxon described as new from an area outside its previous range does not always represent a recent introduction, since it may be conspecific with a previously recognised species, or it may simply have been overlooked in earlier surveys, because it is diminutive or occurs in a habitat that is difficult to access (e.g., deep water). b) Species given "alien" status may in fact be relics of the Tethys Sea or pre-Lessepsian immigrants, rather than recent immigrants from the Indo-Pacific (Por 1978, Verlaque 1994, Panayotidis 2006).

However, there have been major advances in the study of notorious seaweed invaders, such as *Caulerpa taxifolia* (Vahl) C. Agardh (Thibaut et al. 2004), *Codium fragile*



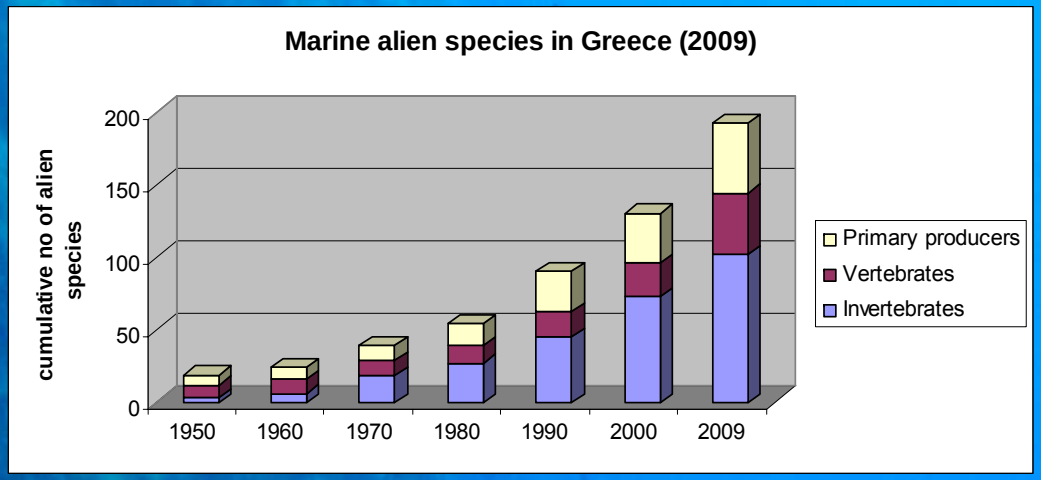
Journal of Biological Research-Thessaloniki **12**: 135–172, 2009
J. Biol. Res.-Thessalon. is available online at http://www.jbr.gr
Indexed in: WoS (Web of Science, ISI Thomson), SCOPUS, CAS (Chemical Abstracts Service) and DOAJ (Directory of Open Access Journals)

Aquatic alien species in Greece (2009): tracking sources, patterns and effects on the ecosystem

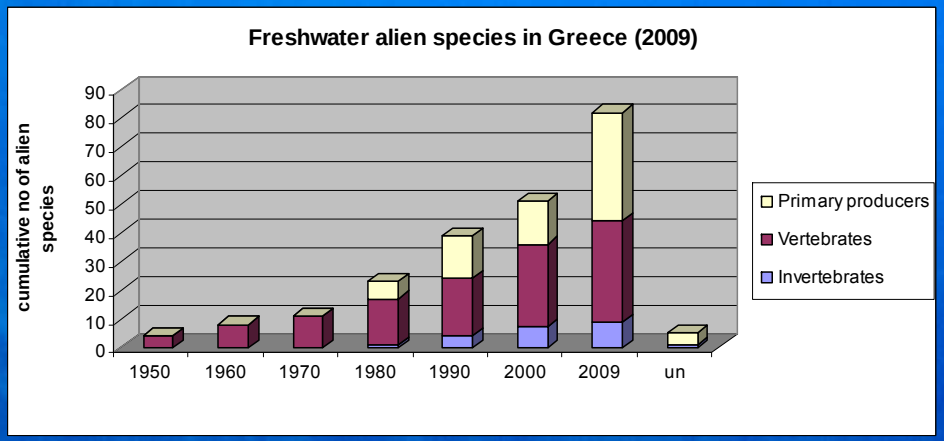
ARGYRO ZENETOS[1*], MARIA-ANTONIETTA PANCUCCI-PAPADOPOULOU[1], STAMATIS ZOGARIS[1,2], EVA PAPASTERGIADOU[3], LEONIDAS VARDAKAS[1], KATERINA ALIGIZAKI[4] and ALCIBIADES N. ECONOMOU[1]

[1] *Hellenic Center for Marine Research, Anavissos, GR 19013, Attica, Greece*
[2] *Department of Environmental and Natural Resources Management, University of Ioannina, GR 30100, Agrinio, Greece*
[3] *Department of Biology, University of Patras, GR 26500, Patras, Greece*
[4] *Department of Botany, School of Biology, Aristotle University of Thessaloniki, GR 54124, Thessaloniki, Greece*

Institute of Marine Biological Resources and Inland Waters



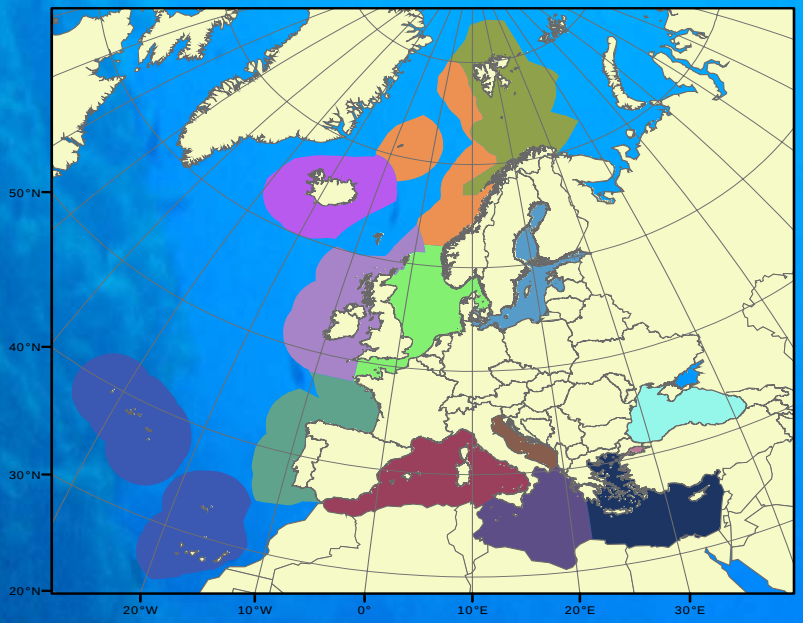
National Reports to EEA



2.1. Trends indicators

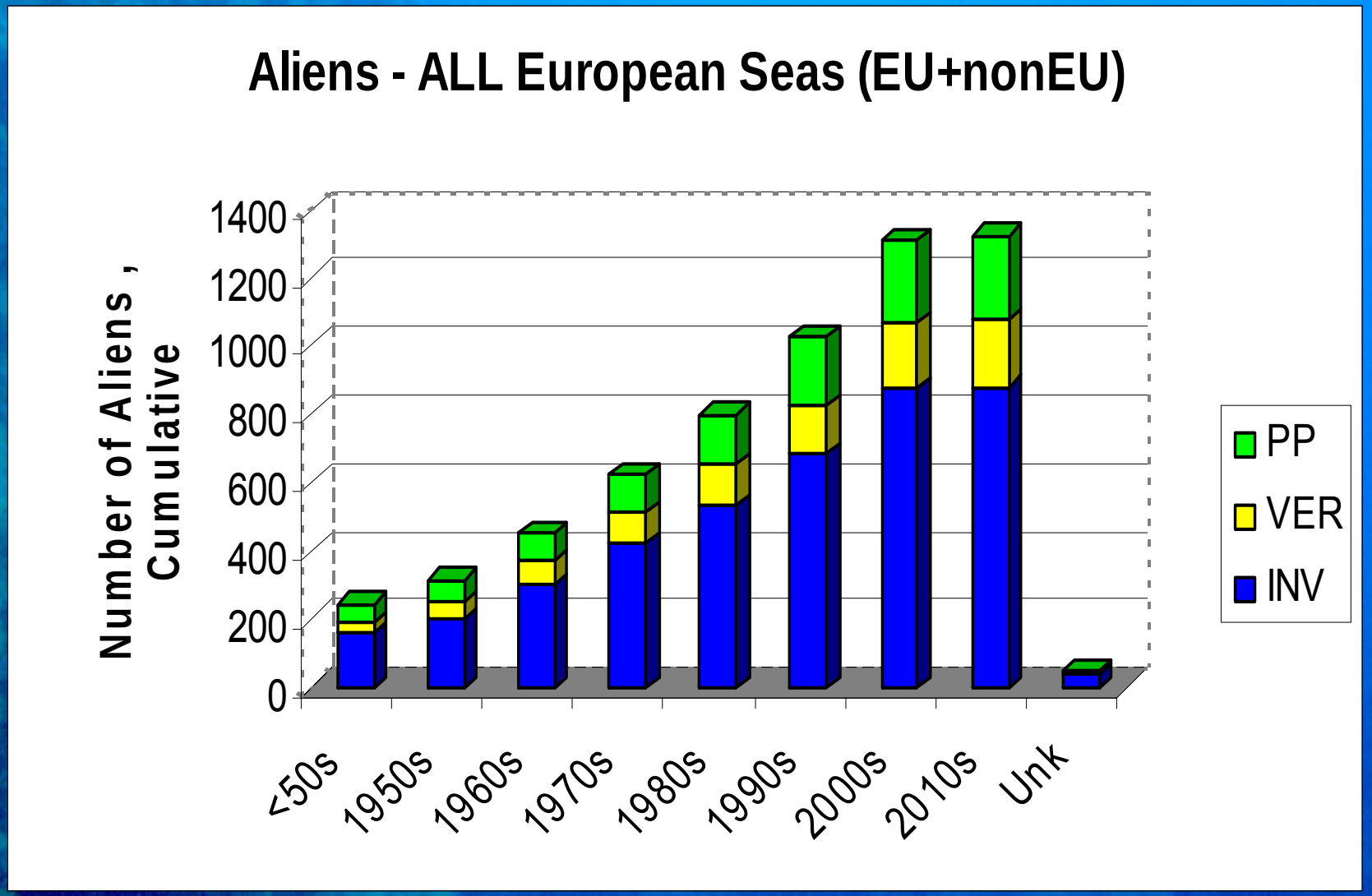
2.1.1. Abundance and state characterisation of non-indigenous species, in particular invasive species — Trends in abundance, temporal occurrence and spatial distribution in the wild of non-indigenous species, particularly ***invasive*** *non-indigenous species, notably in risk areas, in relation to the main vectors and pathways of spreading of such species (2.1.1)*

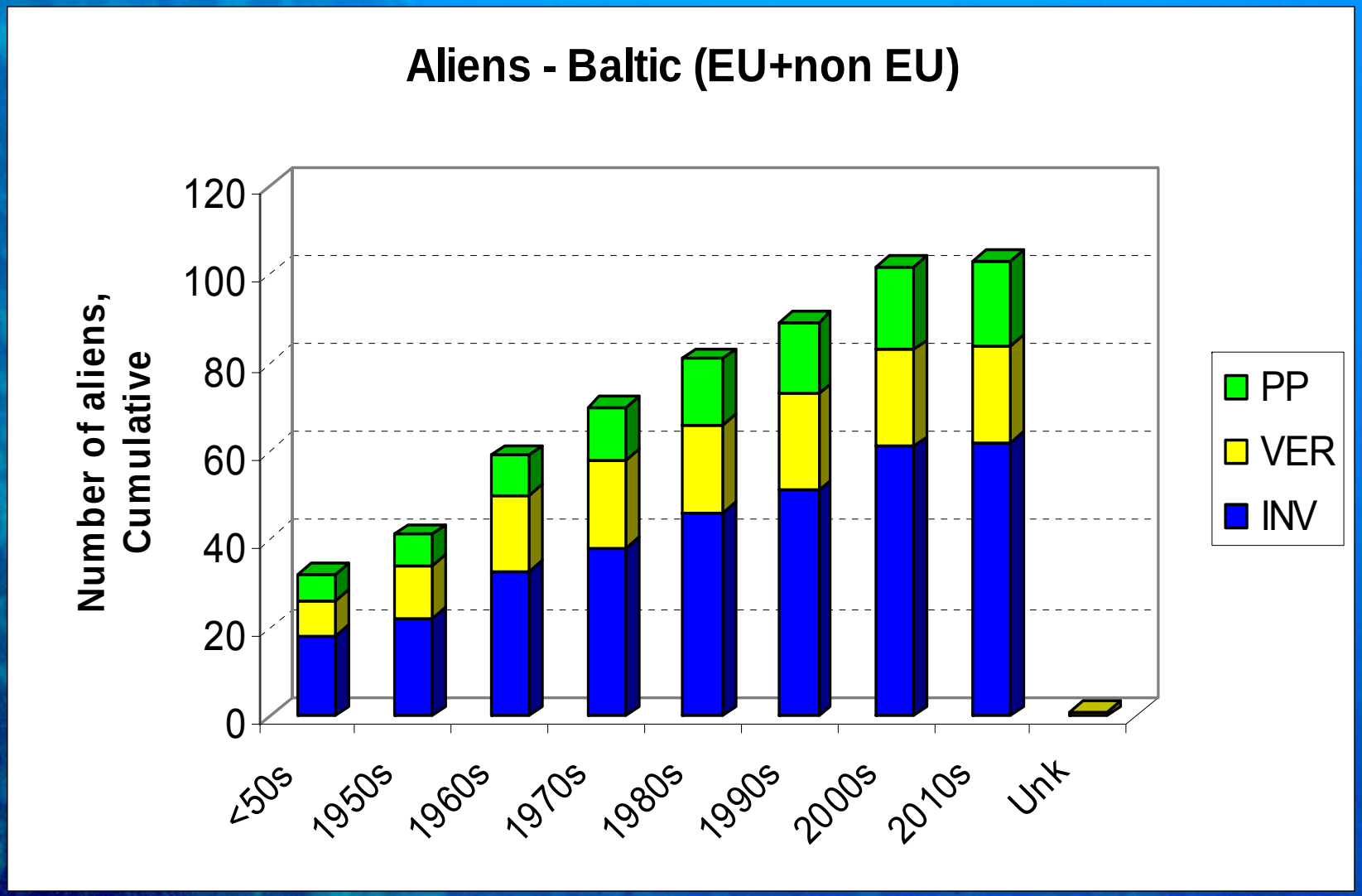
Institute of Marine Biological Resources and Inland Waters

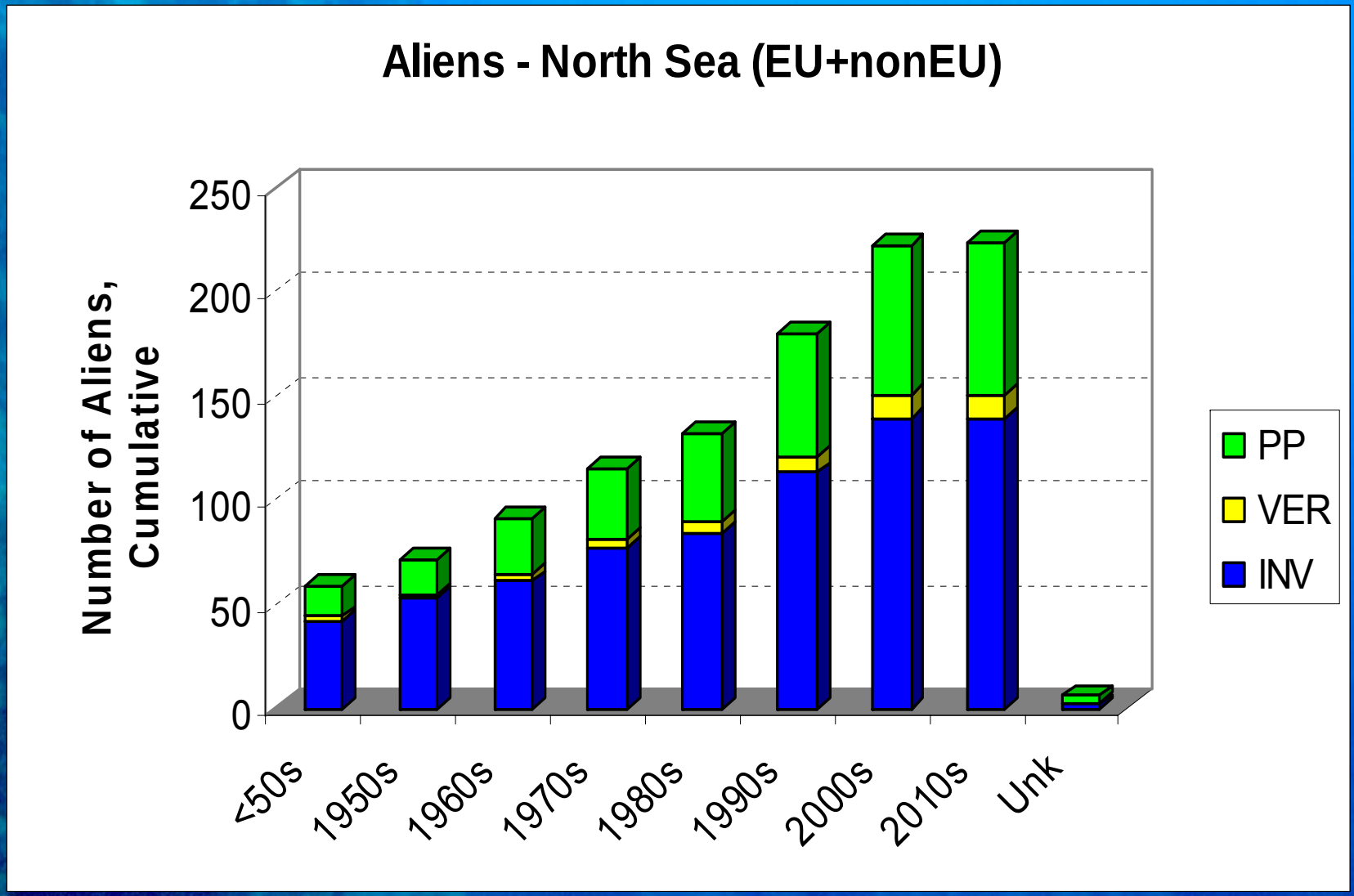


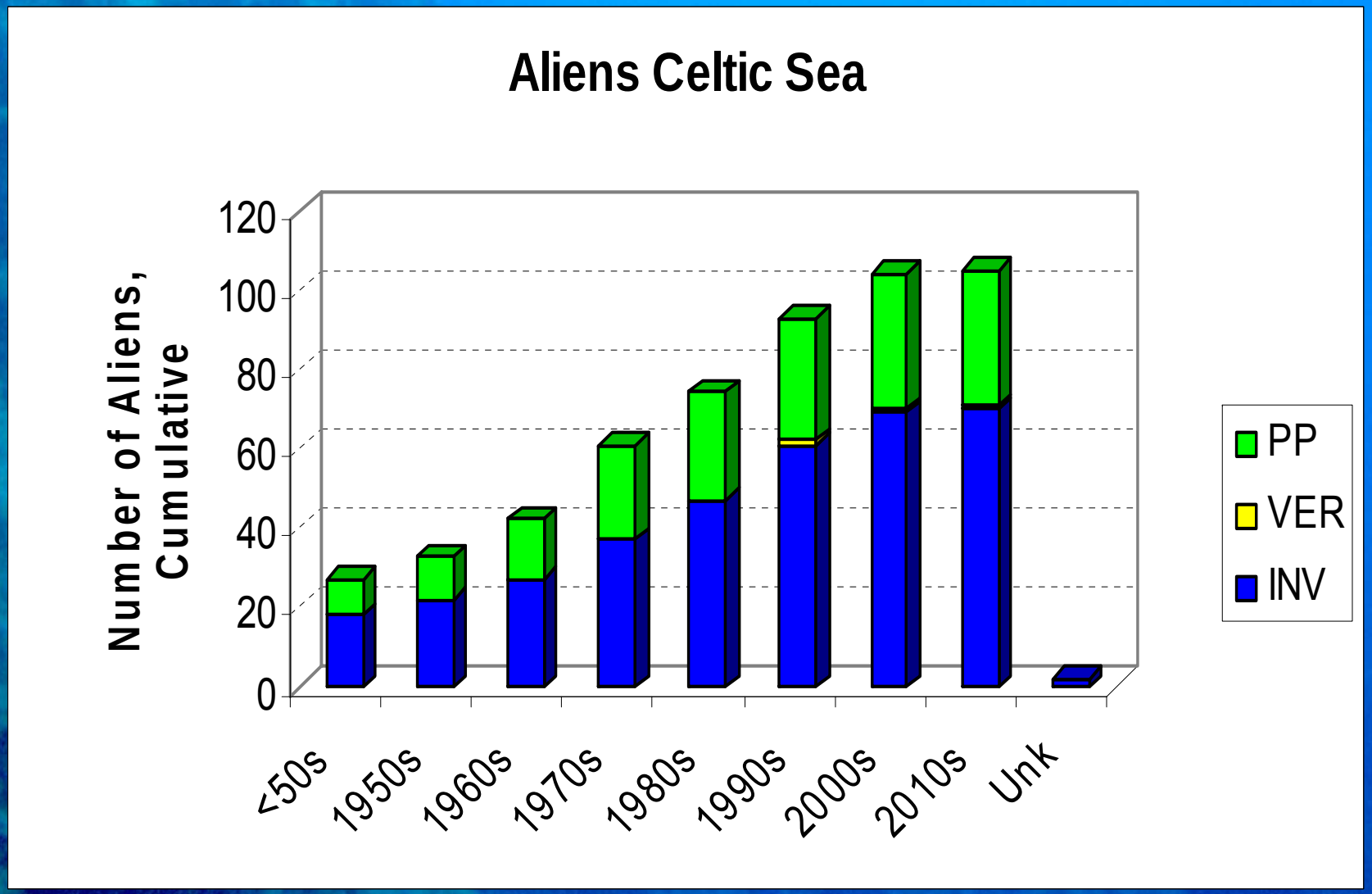
Regional Seas around Europe

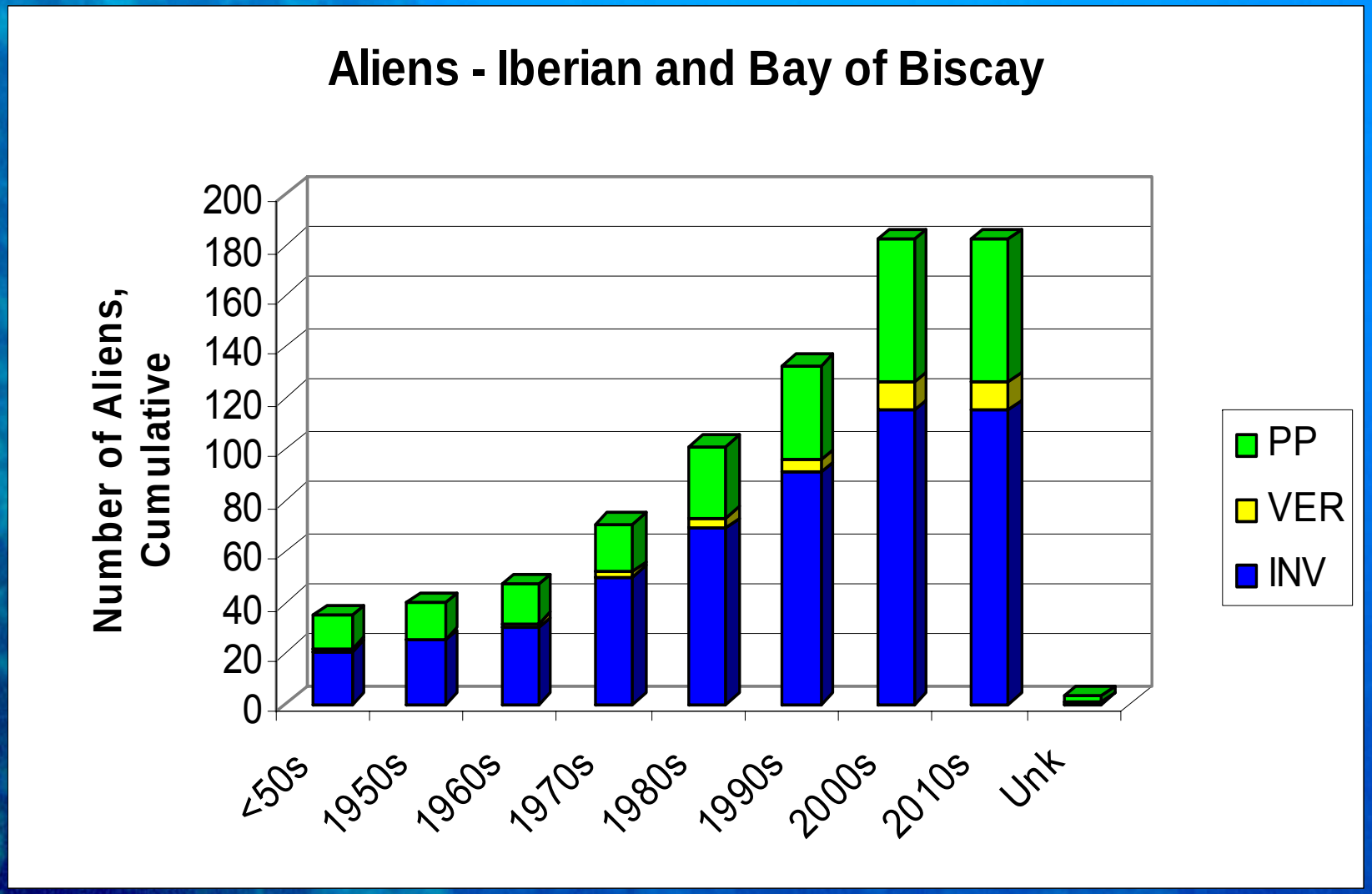
- Baltic Sea
- North-east Atlantic Ocean
  - Iceland Sea
  - Norwegian Sea
  - Barents Sea
  - Greater North Sea, incl. the Kattegat and the English Channel
  - Celtic Seas
  - Bay of Biscay and the Iberian Coast
  - Macaronesia
- Mediterranean Sea
  - Western Mediterranean Sea
  - Adriatic Sea
  - Ionian Sea and the Central Mediterranean Sea
  - Aegian-Levantine Sea
- Black Sea
- Sea of Marmara


Aliens - ALL European Seas (EU+nonEU)
Number of Aliens , Cumulative
1400
1200
1000
800
600
400
200
0
<50s
1950s
1960s
1970s
1980s
1990s
2000s
2010s
Unk
PP
VER
INV

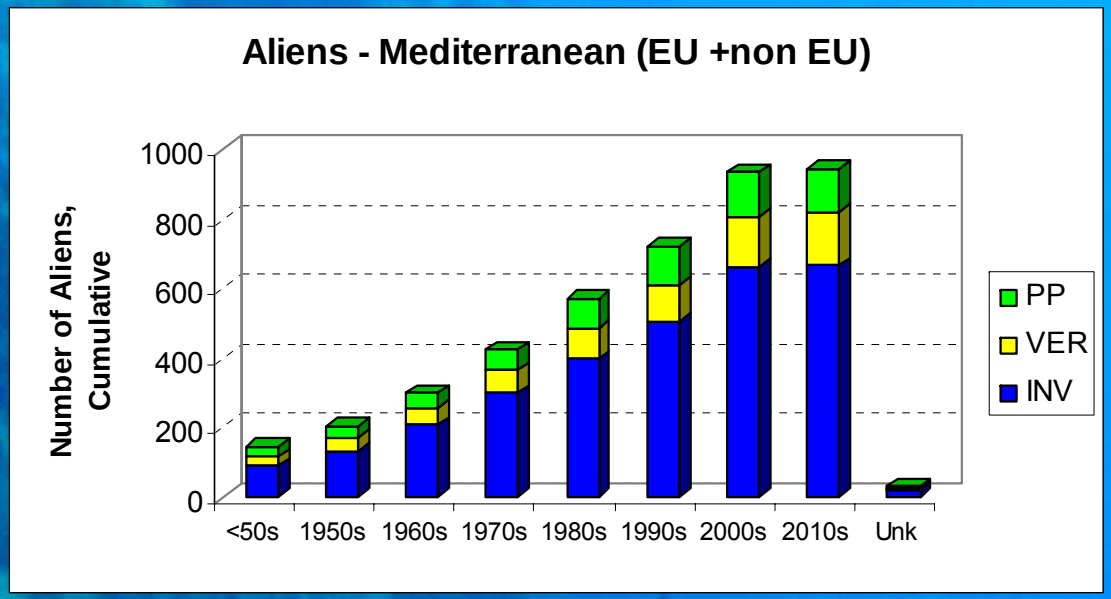

Aliens - Baltic (EU+non EU)
Number of aliens, Cumulative
120
100
80
60
40
20
0
<50s
1950s
1960s
1970s
1980s
1990s
2000s
2010s
Unk
PP
VER
INV

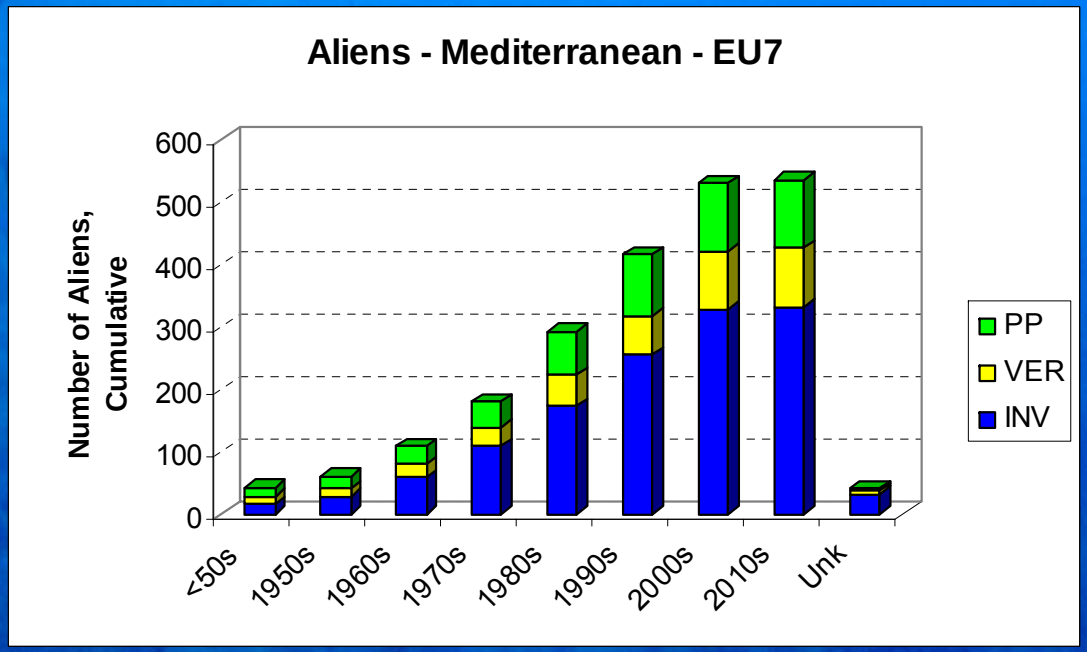

Aliens - North Sea (EU+nonEU)
Number of Aliens, Cumulative
250
200
150
100
50
0
<50s
1950s
1960s
1970s
1980s
1990s
2000s
2010s
Unk
PP
VER
INV


Aliens Celtic Sea
Number of Aliens, Cumulative
120
100
80
60
40
20
0
<50s
1950s
1960s
1970s
1980s
1990s
2000s
2010s
Unk
PP
VER
INV

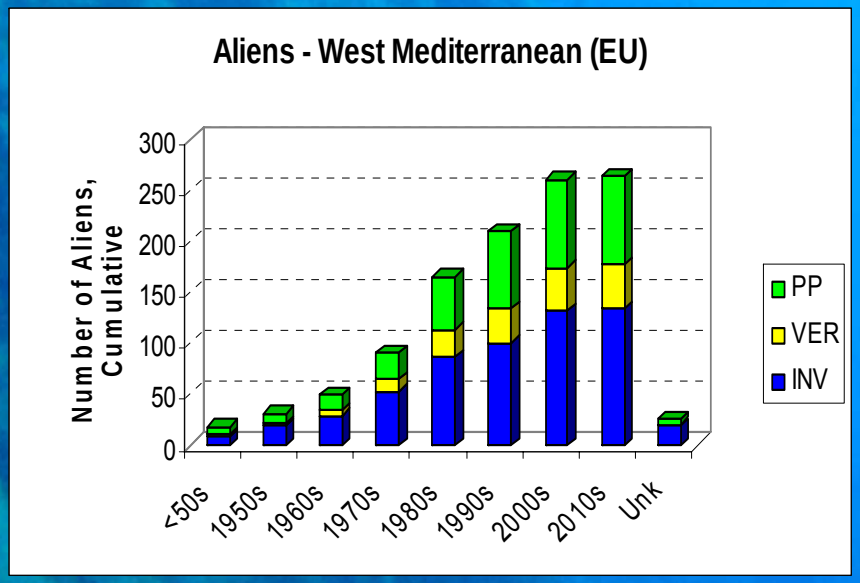

Aliens - Iberian and Bay of Biscay
Number of Aliens, Cumulative
200
180
160
140
120
100
80
60
40
20
0
<50s
1950s
1960s
1970s
1980s
1990s
2000s
2010s
Unk
PP
VER
INV

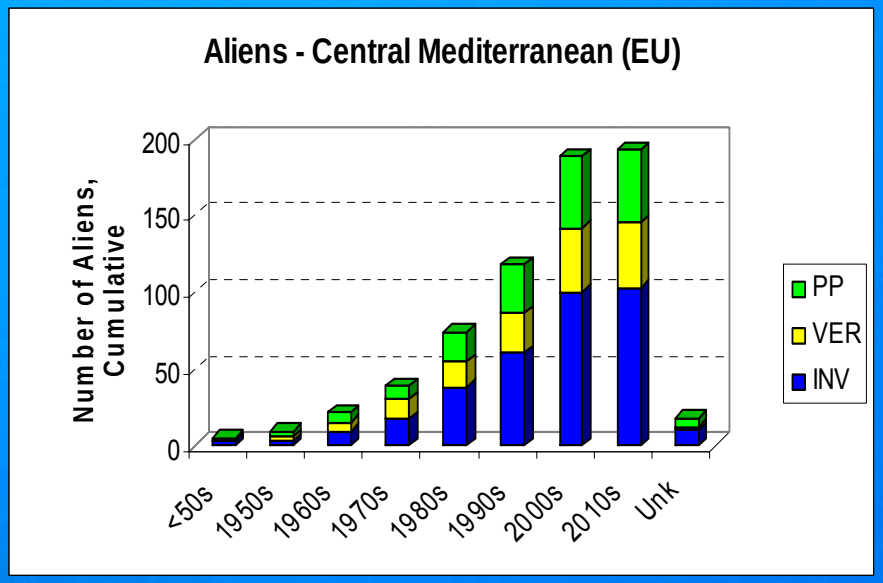
Institute of Marine Biological Resources and Inland Waters

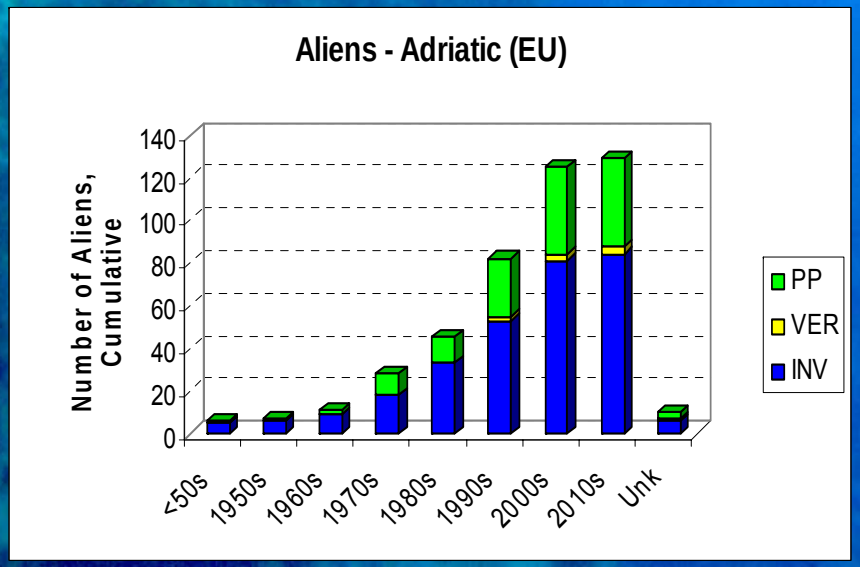


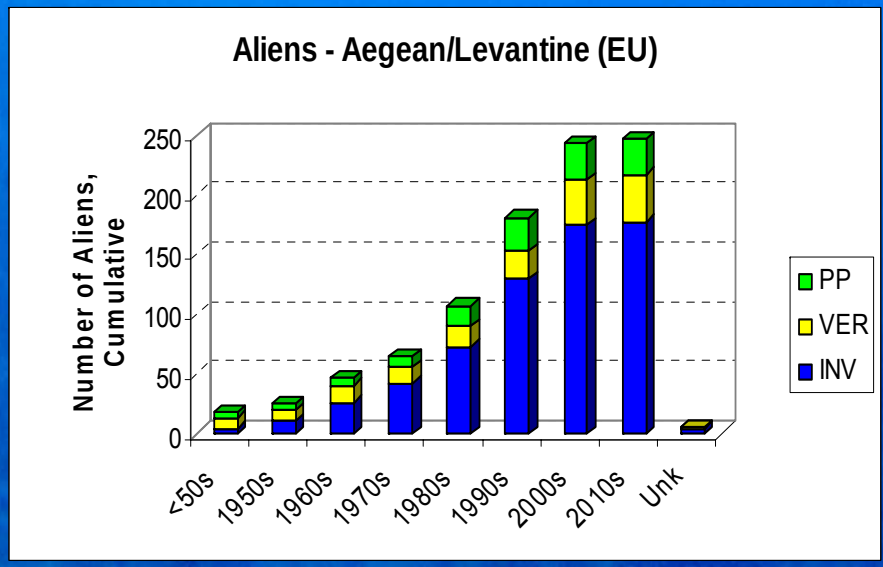


Institute of Marine Biological Resources and Inland Waters

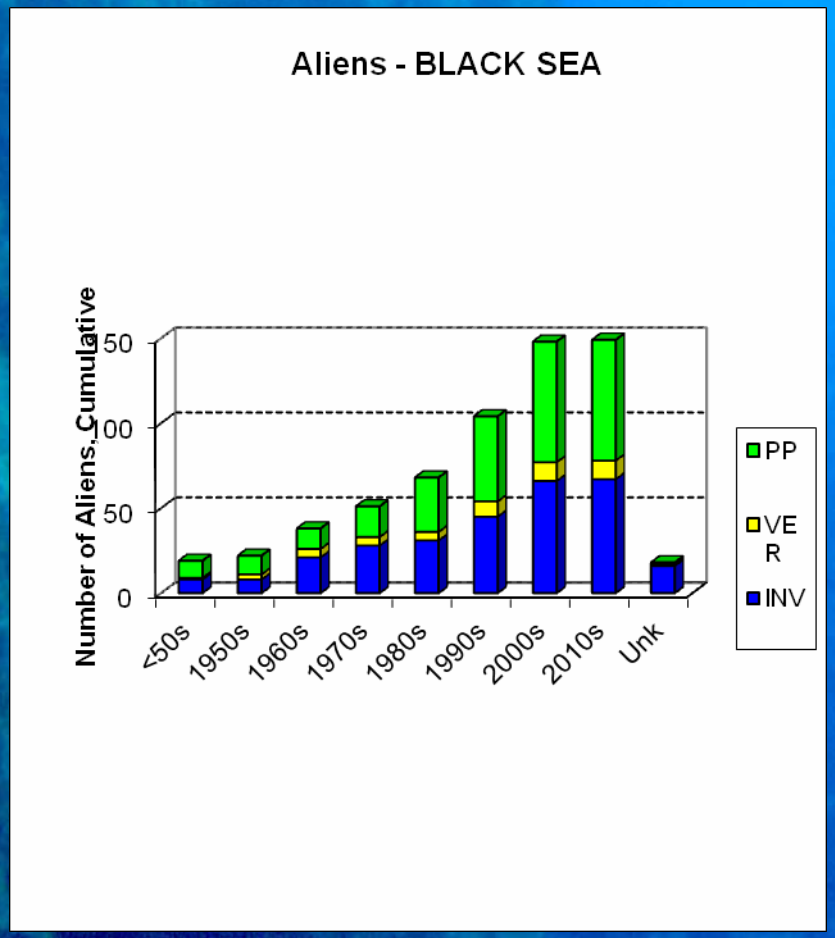


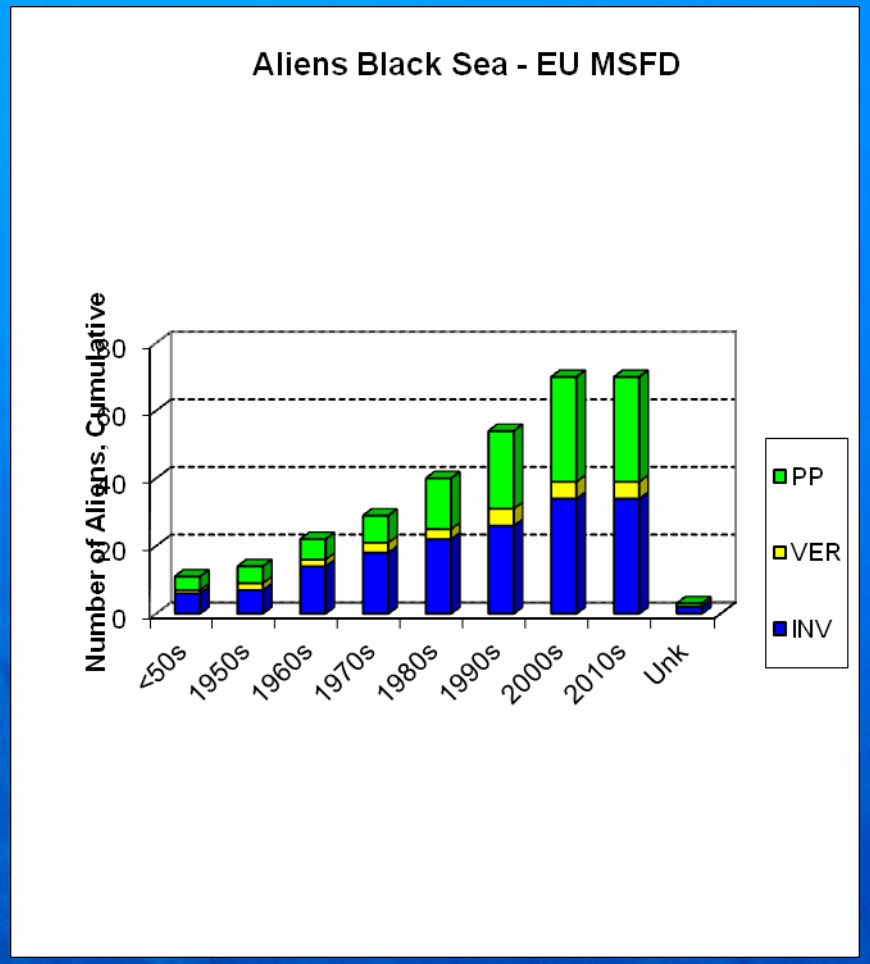




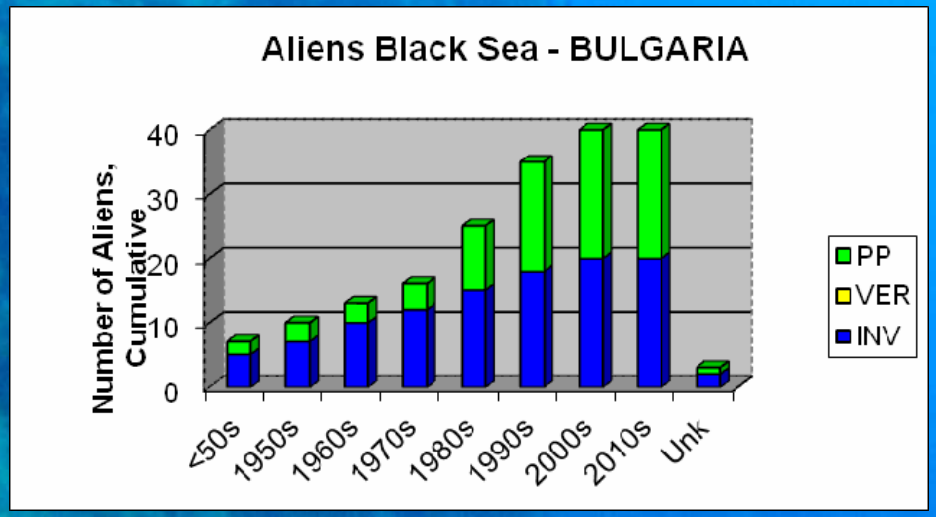


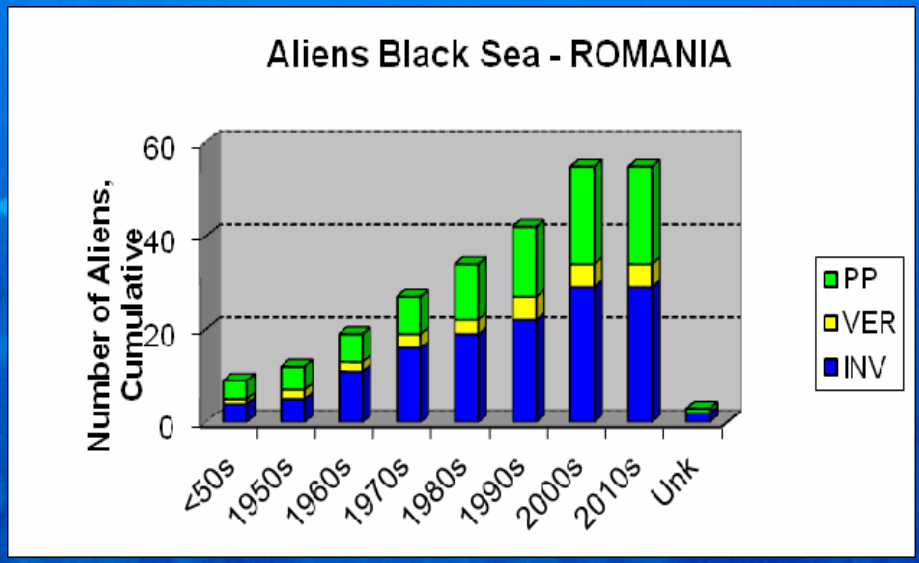
Black Sea


Aliens - BLACK SEA
Number of Aliens, Cumulative
150
100
50
0
<50s
1950s
1960s
1970s
1980s
1990s
2000s
2010s
Unk
PP
VE
R
INV

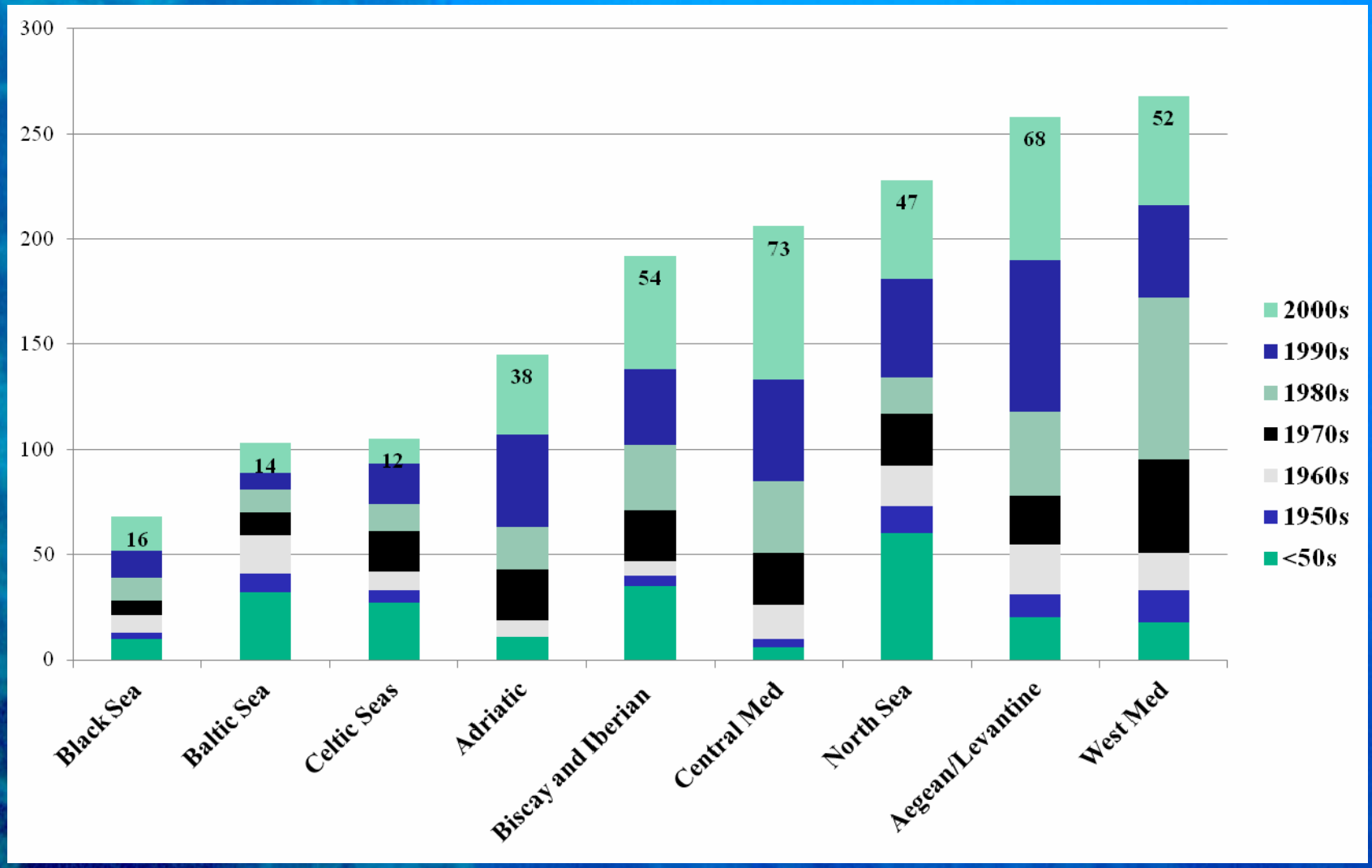

Aliens Black Sea - EU MSFD
Number of Aliens, Cumulative
0
<50s
1950s
1960s
1970s
1980s
1990s
2000s
2010s
Unk
PP
VER
INV

Trends per country





MAS at EU MSFD level



MSFD EC Decision (2010/477/EU) -Descriptor 2

The two criteria for assessing progress towards GES

2.1. *Abundance and state characterisation of non-indigenous species, in particular invasive species — Trends in abundance, temporal occurrence and spatial distribution in the wild of non-indigenous species, particularly* ***invasive non-indigenous*** *species, notably in risk areas, in relation to the main vectors and pathways of spreading of such species (2.1.1)*

2.2. *Environmental impact of invasive non-indigenous species — Ratio between invasive non-indigenous species and native species in some well studied taxonomic groups (e.g. fish, macroalgae, molluscs) that may provide a measure of change in species composition (e.g. further to the displacement of native species) (2.2.1)*

— Impacts of non-indigenous invasive species at the level of species, habitats and ecosystem, where feasible (2.2.2).

Indicator on impact Trends in IAS Early Warning System

IAS: Invasive Alien Species

nuisance, noxious, pests and invasive have also been used to describe introduced species that are known, or believed, to threaten resources valuable to humans and/or Ecosystem services

Harmful species

Photo: E.D.CHRISTOU.

Mnemiopsis leydi
Origin: NW Atlantic

Phyllorhiza punctata
Origin: Pacific

Rhopilema nomadica

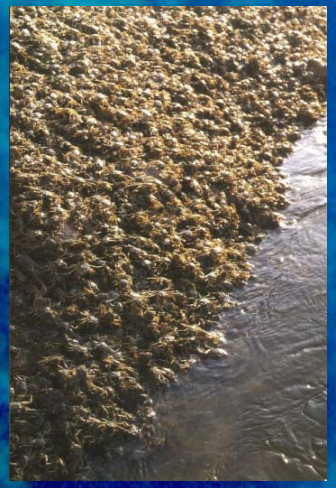
Each summer since the mid 1980s huge swarms of the invading jellyfish, *Rhopilema nomadica*, Galil, have appeared along the Levantine coast. The species originated in the Red Sea and the East African coast, but entered the Mediterranean through the Suez Canal and have established a Levantine population.

A swimmer stung by *Rhopilema nomadica* at Yumurtalik (Adana) during fall 2009 (Photograph: Tahir Ozcan).

Net Damage by Alien Jellyfish- extra cost for fishermen

Photos: Bayram Ozturk

Examples of IAS in European Seas



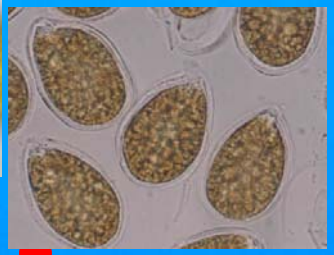
A. Dreissena (D. Minchin)
B. Didemnum (D. Offer)
C. Eriocheir (S. Gollasch)
D. Crassostrea (S. Gollasch)

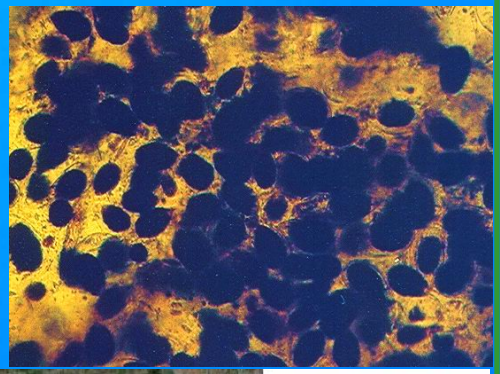
Institute of Marine Biological Resources and Inland Waters

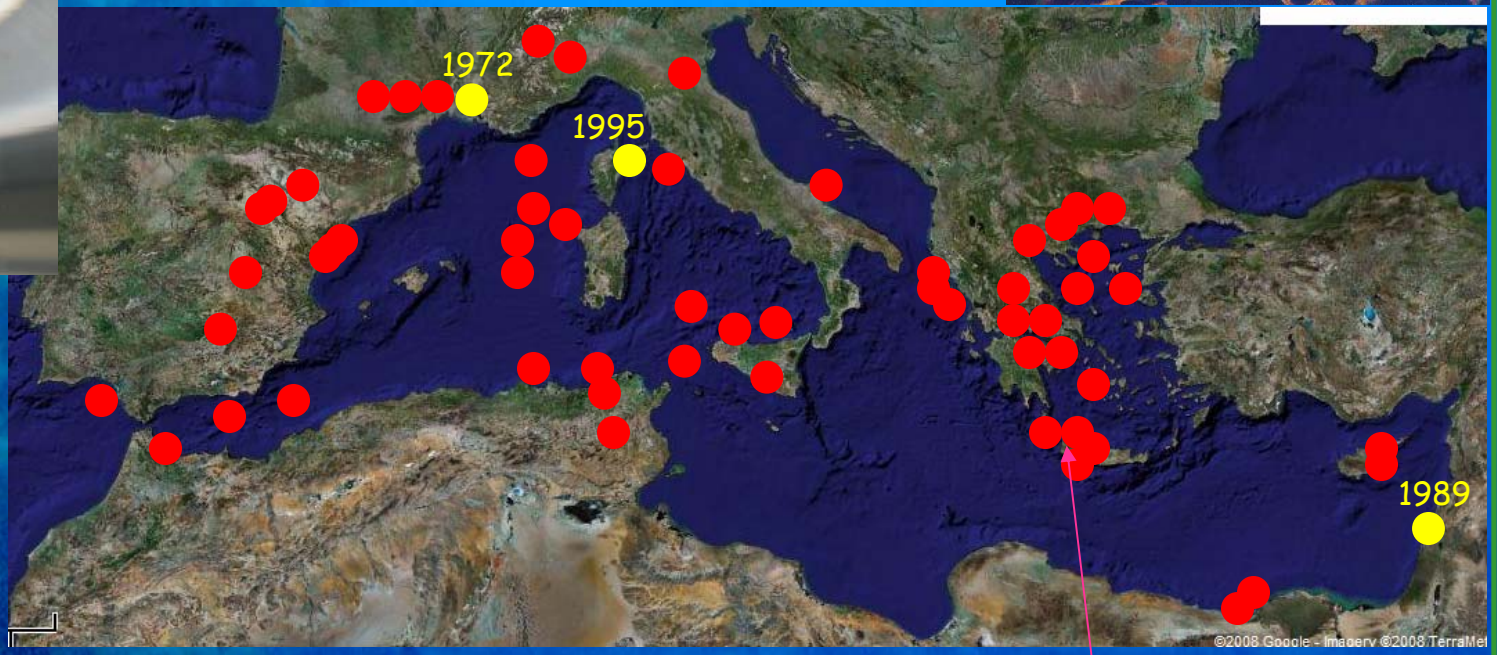
Ostreopsis spp. in the Mediterranean Sea

O. ovata

O. cf. *siamensis*







Source: Aligizaki, 2008. phD Thesis. AUTH, Thessaloniki, Greece.
Aligizaki, 2009. *CIESM monographs, 40. Tunis, 10-14 October 2009*

Crete:2003-2007

tourism

Rome (AFP) Jul 20, 2005
Beaches were deserted along a 15 kilometre (nine mile) stretch of the Italian riviera Wednesday after nearly **200 people were hospitalized** having come into contact with a toxic algae flourishing along the Ligurian coast.
Victims had come into either direct contact with the algae while swimming or inhaled it because of a windblown "aerosol affect", doctors at Genoa's Galliera hospital said. All were discharged within a few hours, after being treated for **fever, nausea and irritation to eyes and nose.**
The toxic algae, known by its scientific name "***Ostreopsis ovata***", first appeared on Sunday. Genoa mayor Giuseppe Pericu ordered the beaches closed to bathers on Tuesday.
And while the azure Ligurian sea looks inviting in the summer heat, fines of **50 euros** will be imposed on anyone defying the ban.

Amid Toxic Algae Fears

Brescianini et al. 2006. Eurosurveillance 11(9).
Ciminiello et al. 2006. Anal Chem. 78, 6153-6159.

aquaculture

Restriction of fisheries and commercial activities regarding bivalve mollusks for **more than 3 months** each year due to **Shellfish Contamination By Palytoxin-like Compounds**

Aligizaki K, Katikou P, Nikolaidis G, Panou A, 2008. **First episode of Shellfish Contamination By Palytoxin-like Compounds from *Ostreopsis* species** (Aegean Sea, Greece). *Toxicon,* 51: 418-427.

Selection of most invasive species in European Seas

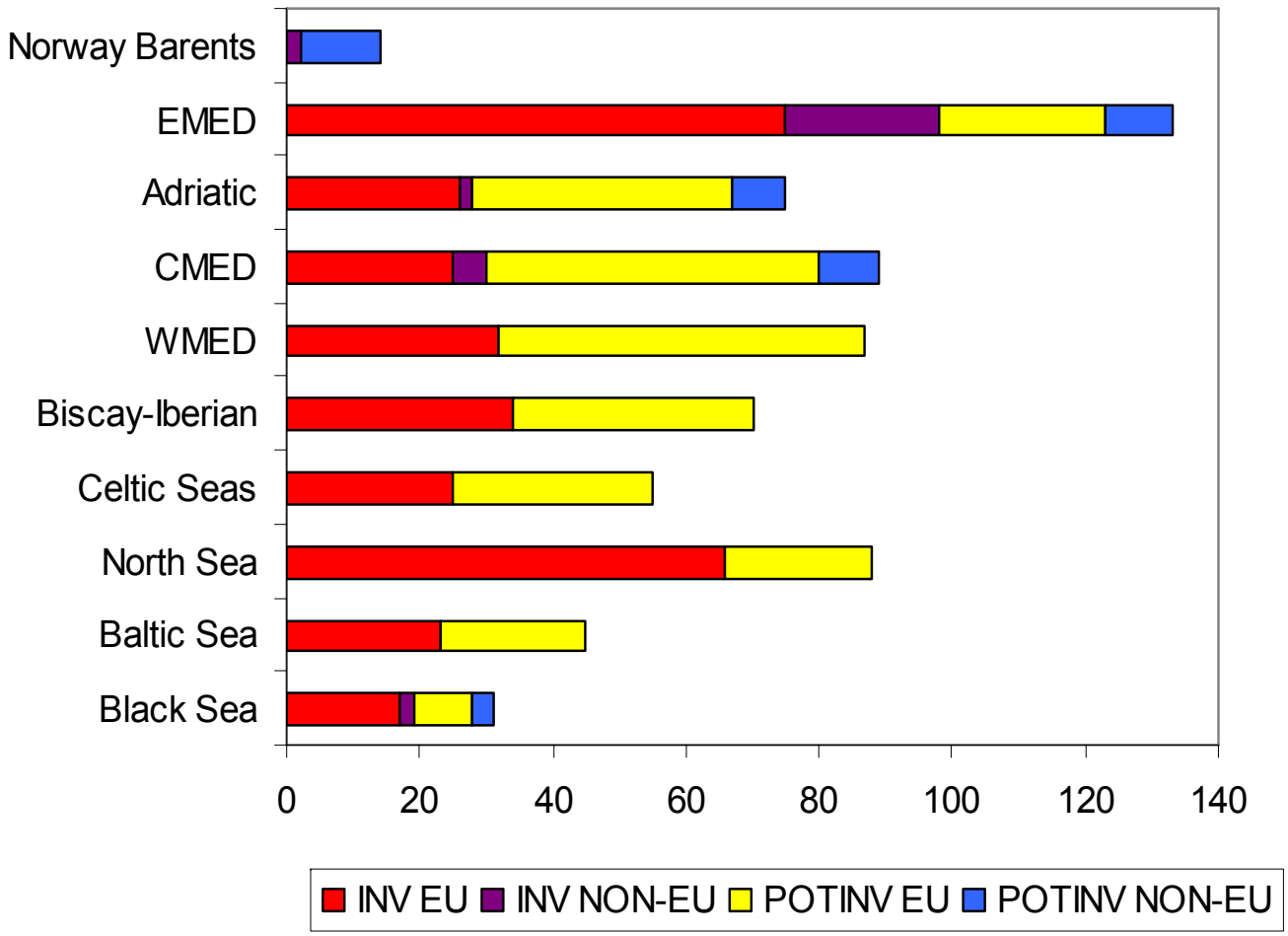
	other	CABI	SEBI	NOBANIS	DAISIE	BSEP	SESAME
Acartia tonsa		yes	yes				
Acrothamnion preissii	"ALIENS"		yes				yes
Alexandrium monilatum						yes	
Amphistegina lobifera							yes
Anadara kagoshimensis			yes			yes	yes
Anadara transversa			yes				yes
Anguillicola crassus		yes	yes	yes	yes		
Aplysia dactylomela							yes
Apogon pharaonis							yes
Aquilonastra burtoni							yes
Asparagopsis armata	"ALIENS", UK		yes				yes
Asparagopsis taxiformis			yes				
Austrominius modestus	GISD	yes	yes				

In European MSFD 184 IAS have been reported, 28 of which are cryptogenic

Institute of Marine Biological Resources and Inland Waters

Distribution of IAS in EU MSFD areas

Distribution of IAS and Potential IAS in European Regional Seas

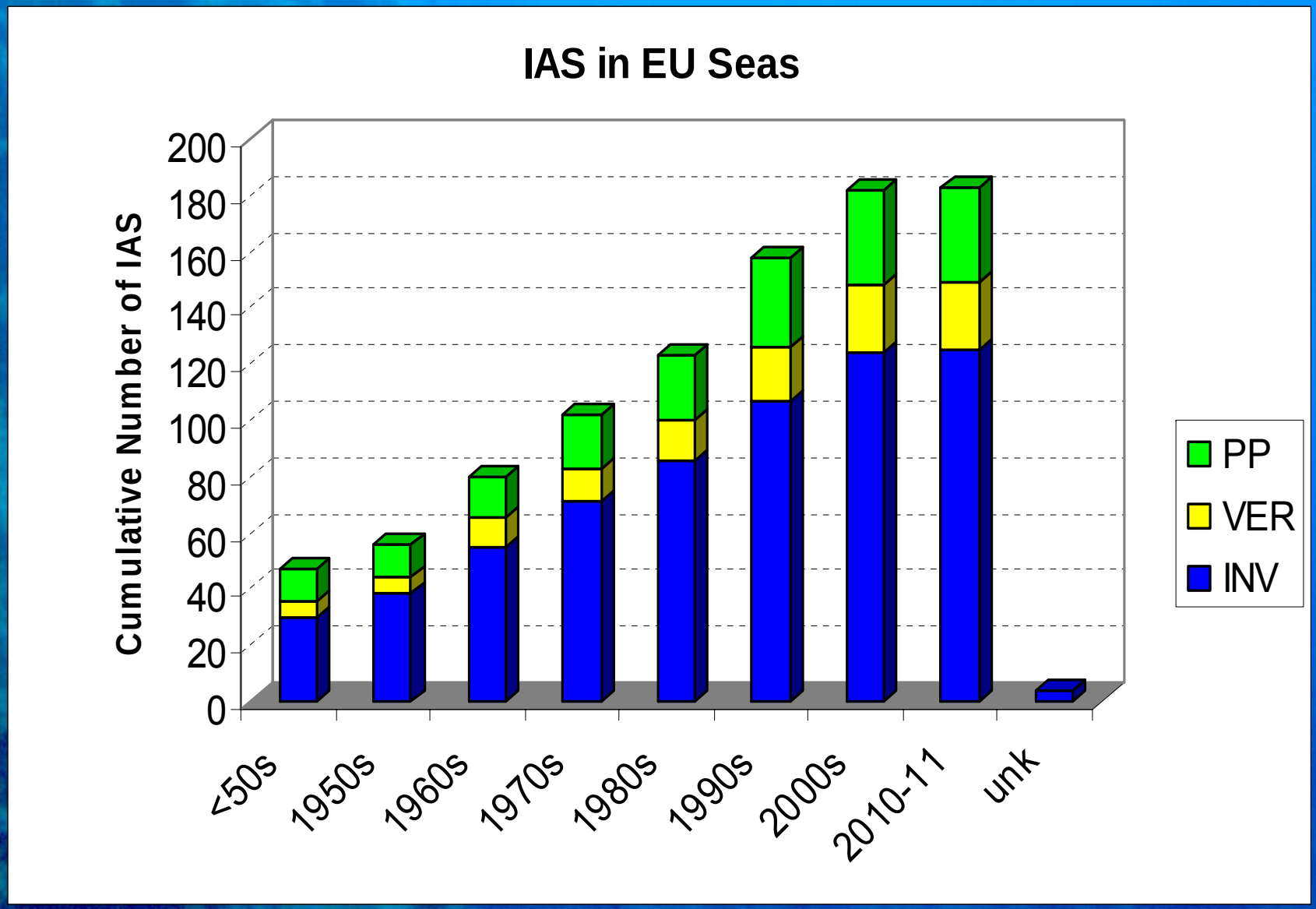


Mediterranean IAS =120 species [-27 in non EU]

- about 19 are commercially exploited (8 fish, 5 crustaceans, 6 molluscs)
- 20 are classified as worst invasives.
- 43 more species are recorded as potentially invasive.

Baltic Sea: only 23 species are classified as invasive in the Baltic Sea, 10 of which are among the "worst invasive" while another 22 are classified as potentially invasive.

Black Sea: **17** species are classified as invasive (with another 9 classified as potentially invasive); however this number corresponds to only two countries that are part of European waters in that MSFD (in the rest of the Black Sea 2 more species are recorded as invasive and 3 more as potentially invasive


IAS in EU Seas
Cumulative Number of IAS
200
180
160
140
120
100
80
60
40
20
0
<50s
1950s
1960s
1970s
1980s
1990s
2000s
2010-11
unk
PP
VER
INV

Institute of Marine Biological Resources and Inland Waters