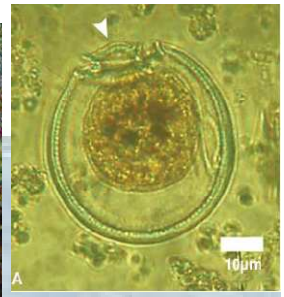
Marine Alien Species Assessment and Management

Nikos Streftaris
Argyro Zenetos

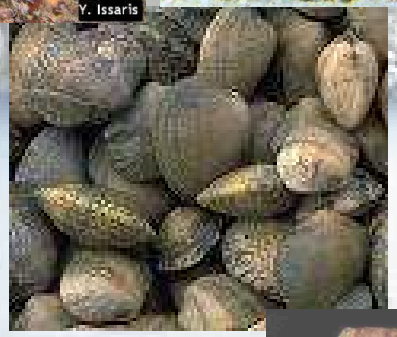
Mediterranean Small Island Meeting, Six-Fours, France, 7-10/10/2009

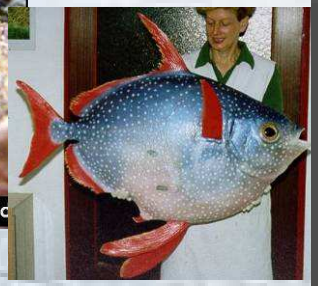

A. Daskos

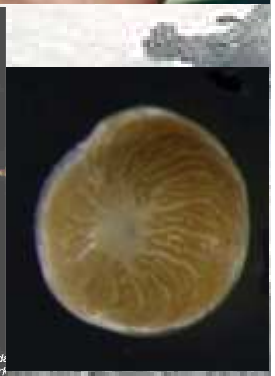

Y. Issaris


A
10µm


M. Salomic








K. Sarantakos

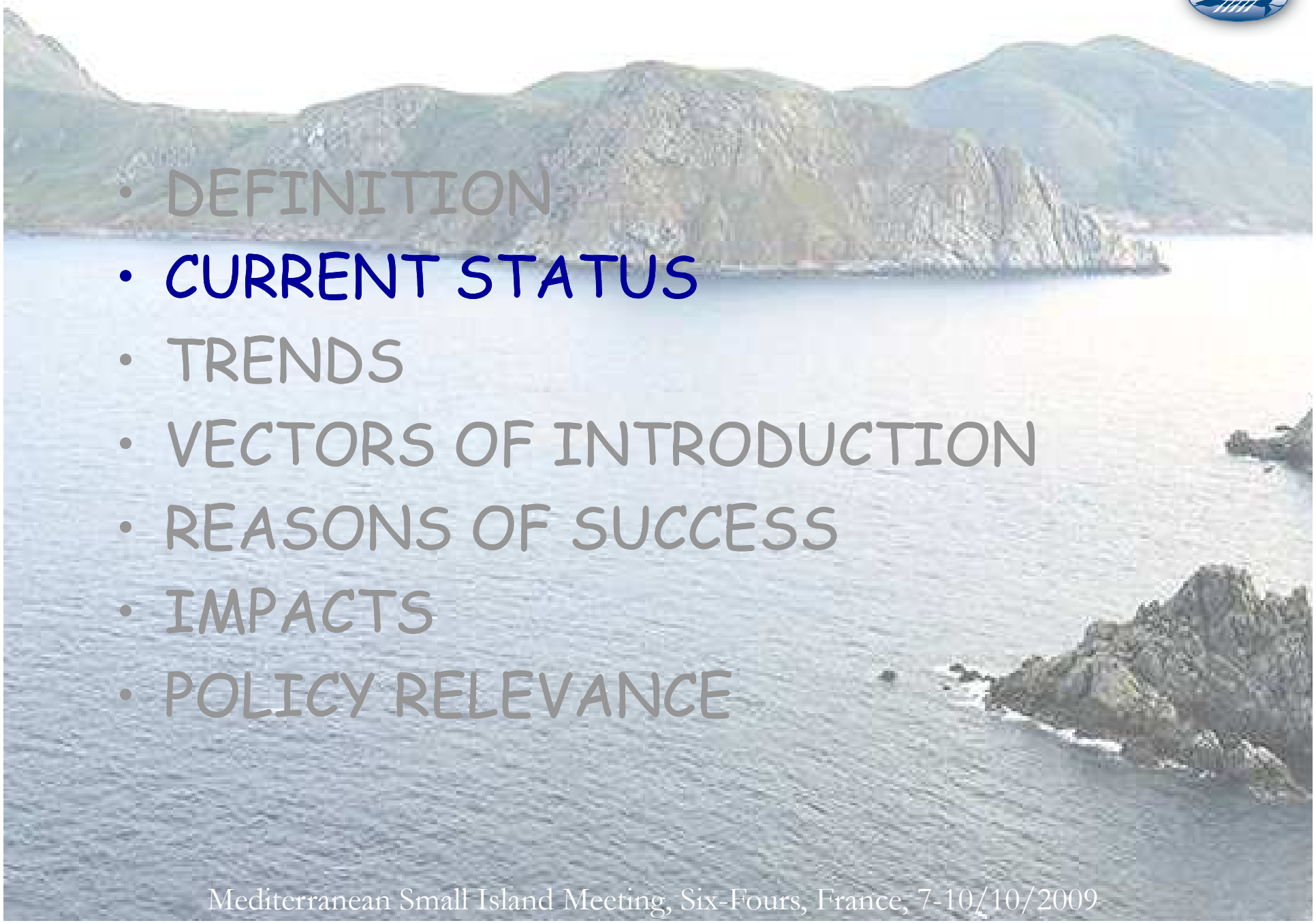

Trassyvoulides

- DEFINITION
- CURRENT STATUS
- TRENDS
- VECTORS OF INTRODUCTION
- REASONS OF SUCCESS
- IMPACTS
- POLICY RELEVANCE

***Alien*:** A species, subspecies or lower taxon occurring outside of the historically known range it occupies naturally and outside its dispersal potential as a result of direct or indirect introduction or care by humans.

Synonyms: non-native, non-indigenous, foreign, and exotic.

***Invasive*:** Species that threaten the diversity or abundance of native species, the ecological stability of infested ecosystems, economic activities dependent on these ecosystems and/or human health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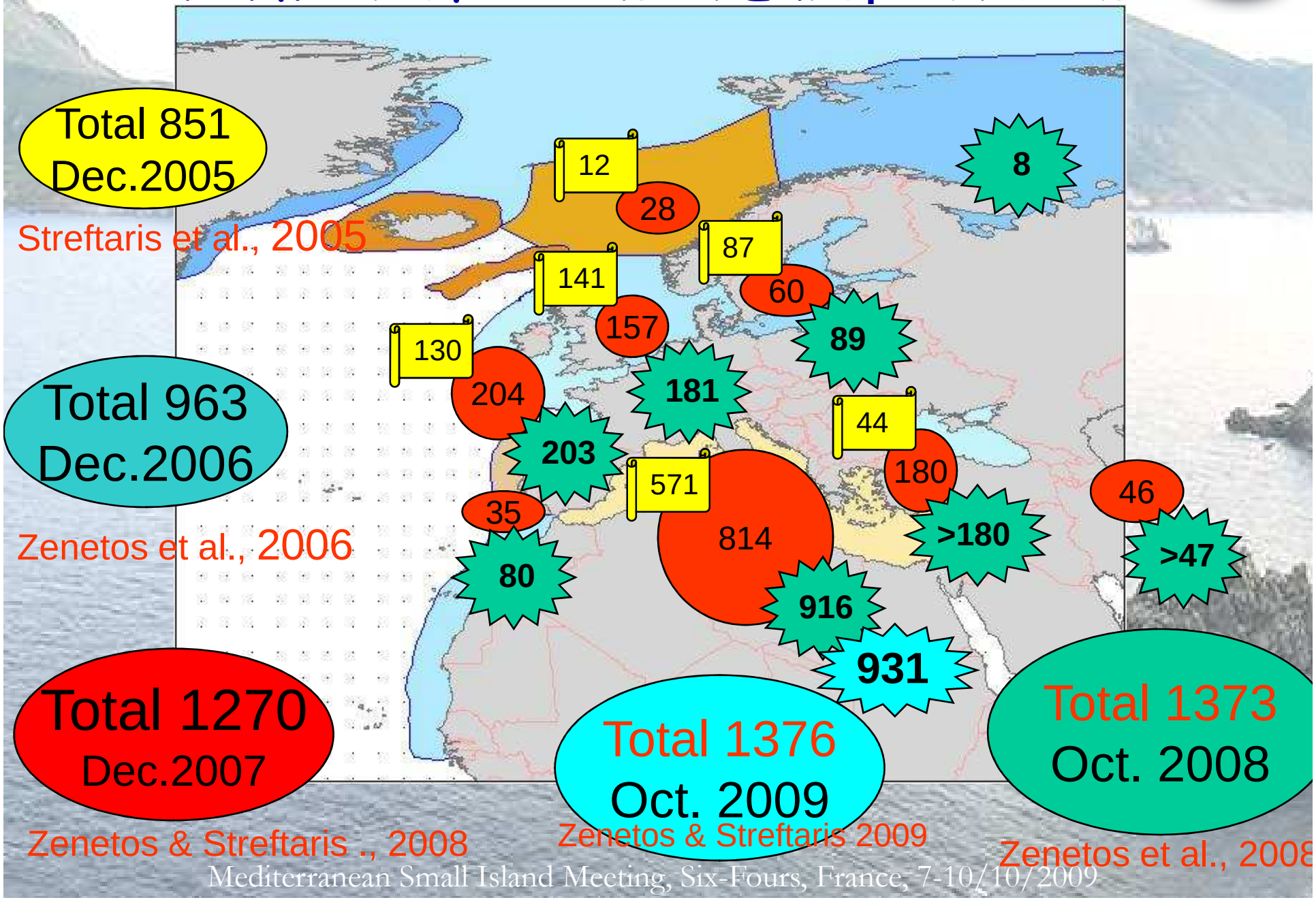
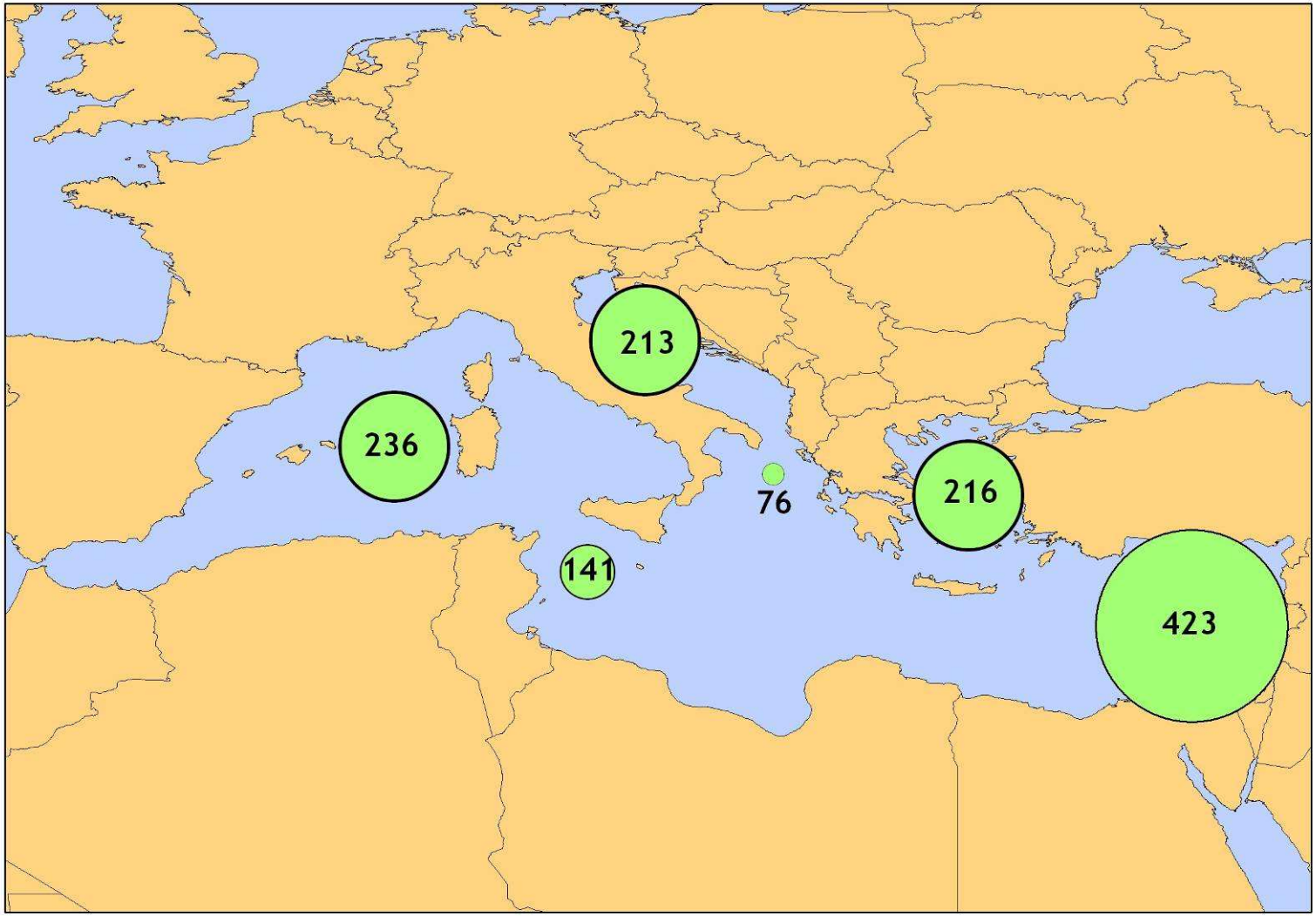
Number of Aliens in European Seas

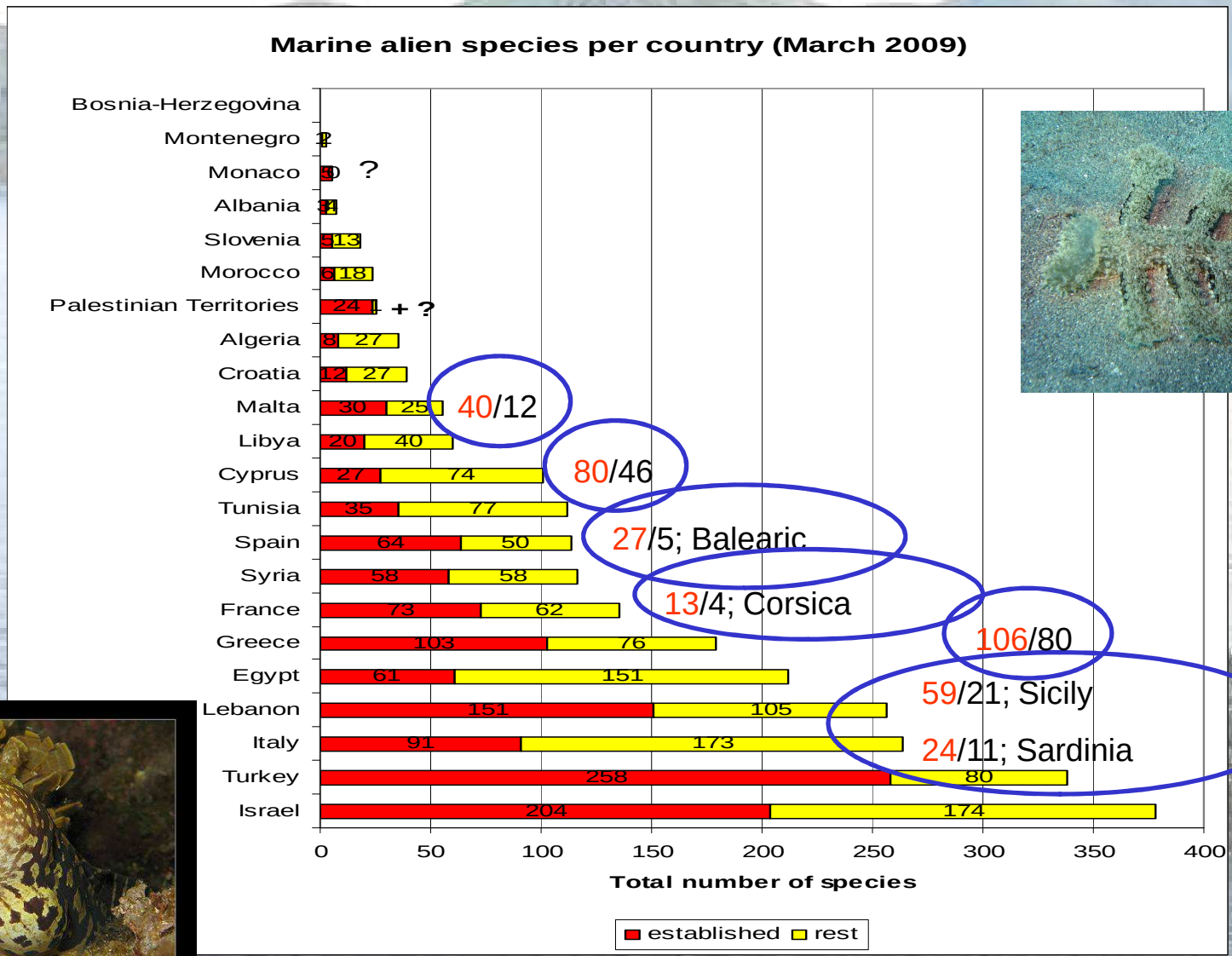


Distribution across the Mediterranean



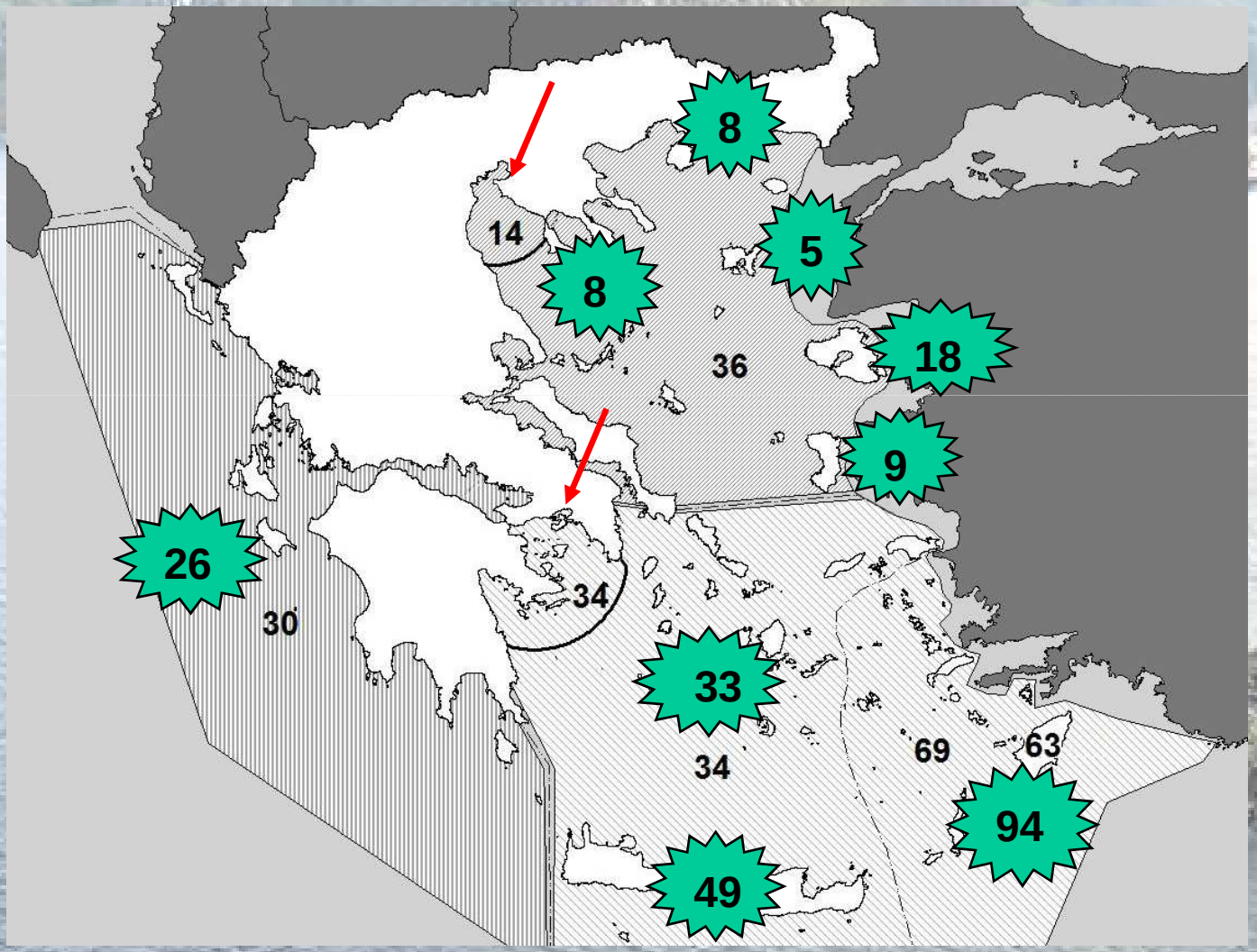
Zenetos & Streftaris 2008

Distribution in the Mediterranean countries



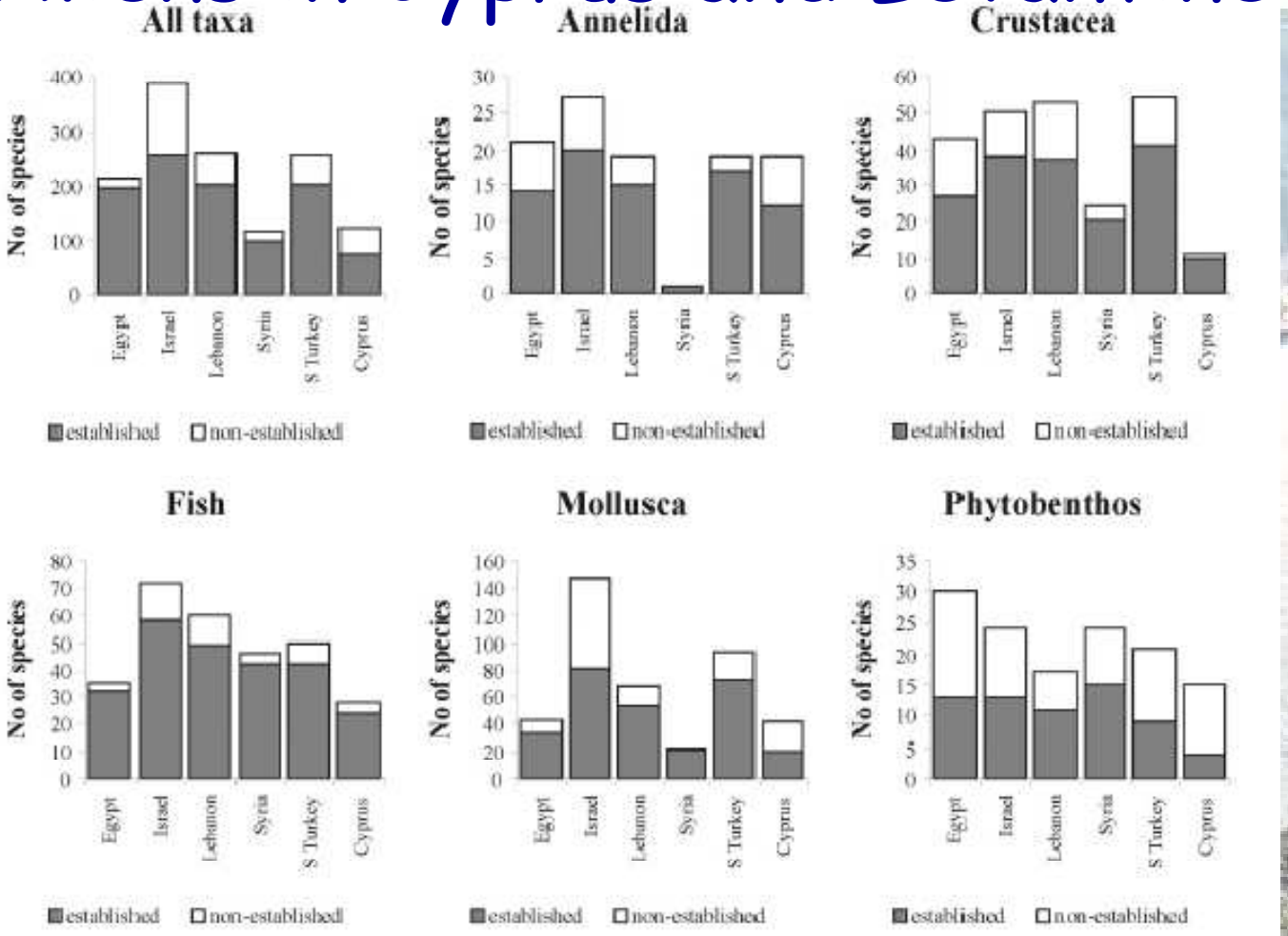
Zenetos, 2009: update Zenetos & Streftaris 2009

Distribution of Aliens in Hellenic Seas



Source: Pancucci et al., 2006; update ELNAIS 2009

Aliens in Cyprus and Levantine

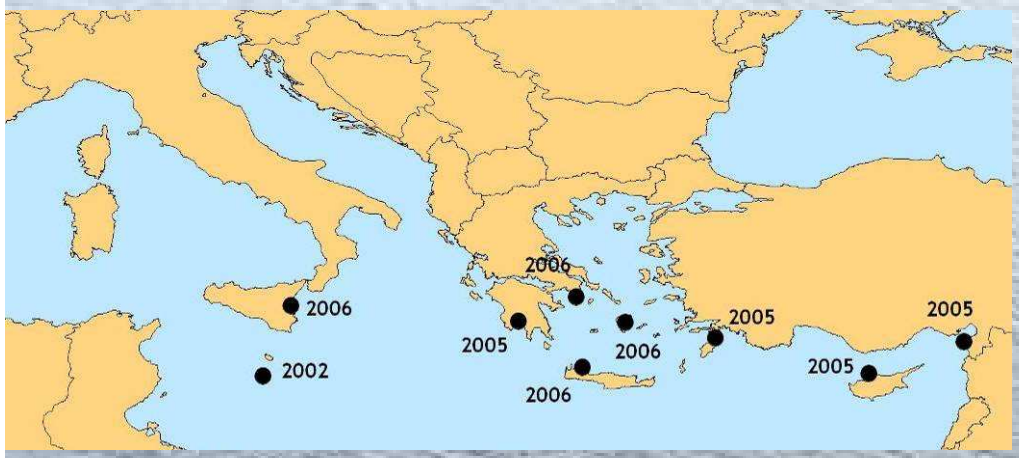


Cyprus: 126 species; 80 established Source: katsanevakis et al in press

Established 22% of the established in Levantine Sea

Colonisation hindered by currents, acting in this case as barrier

Aplysia dactylomela



ELNAIS 2009

new colonizers in Greek Seas: the crab *Percnon gibbesi*

1: Kalamata

2: Kaloi Limenes (Crete)

3: Tubruq (Crete)

4:Kato Zakros (Crete)

5:Pefki (Rodos Island)

Thessalou et al., 2006

ELNAIS, 2009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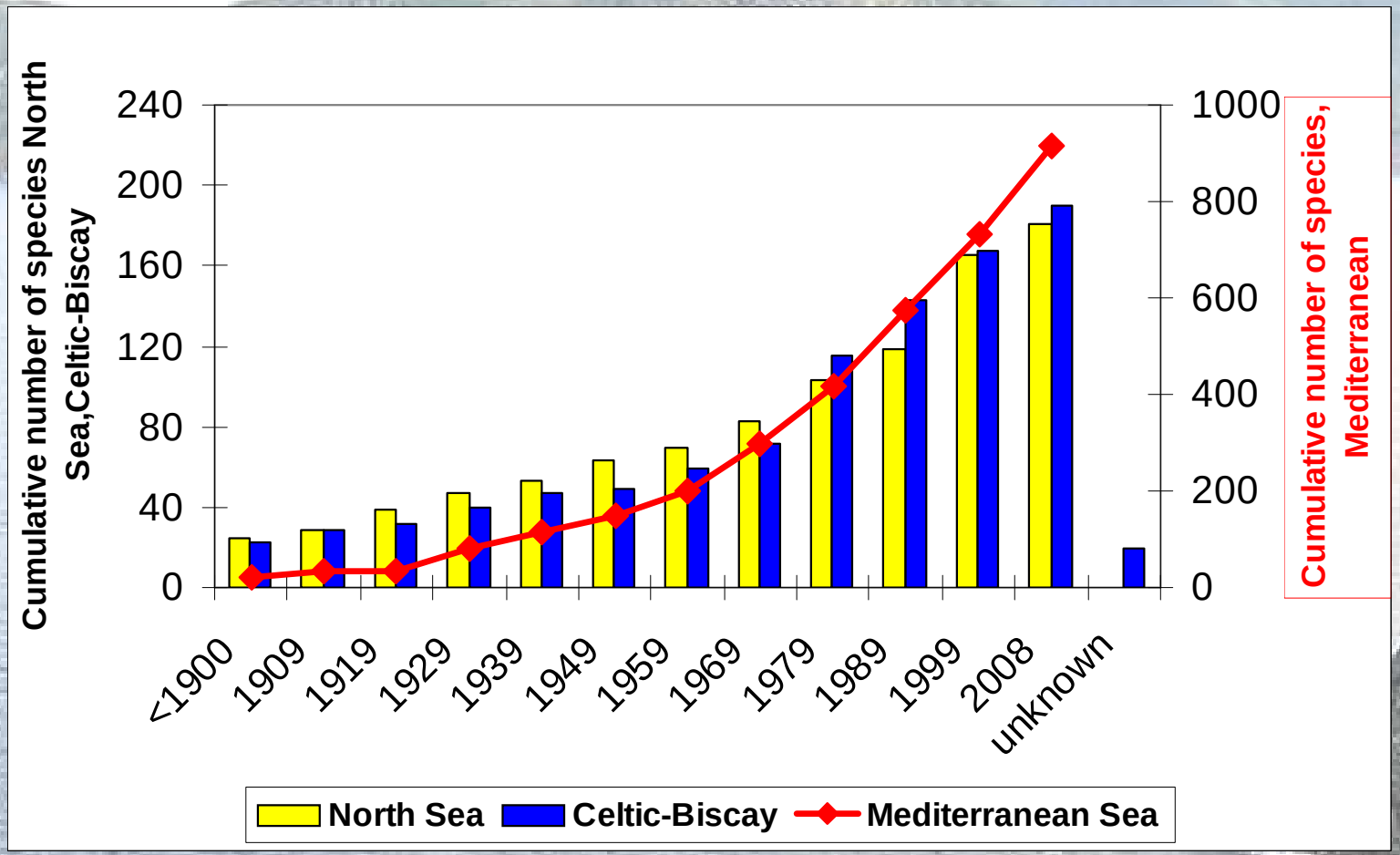
Trends per LME (Oct. 2008)

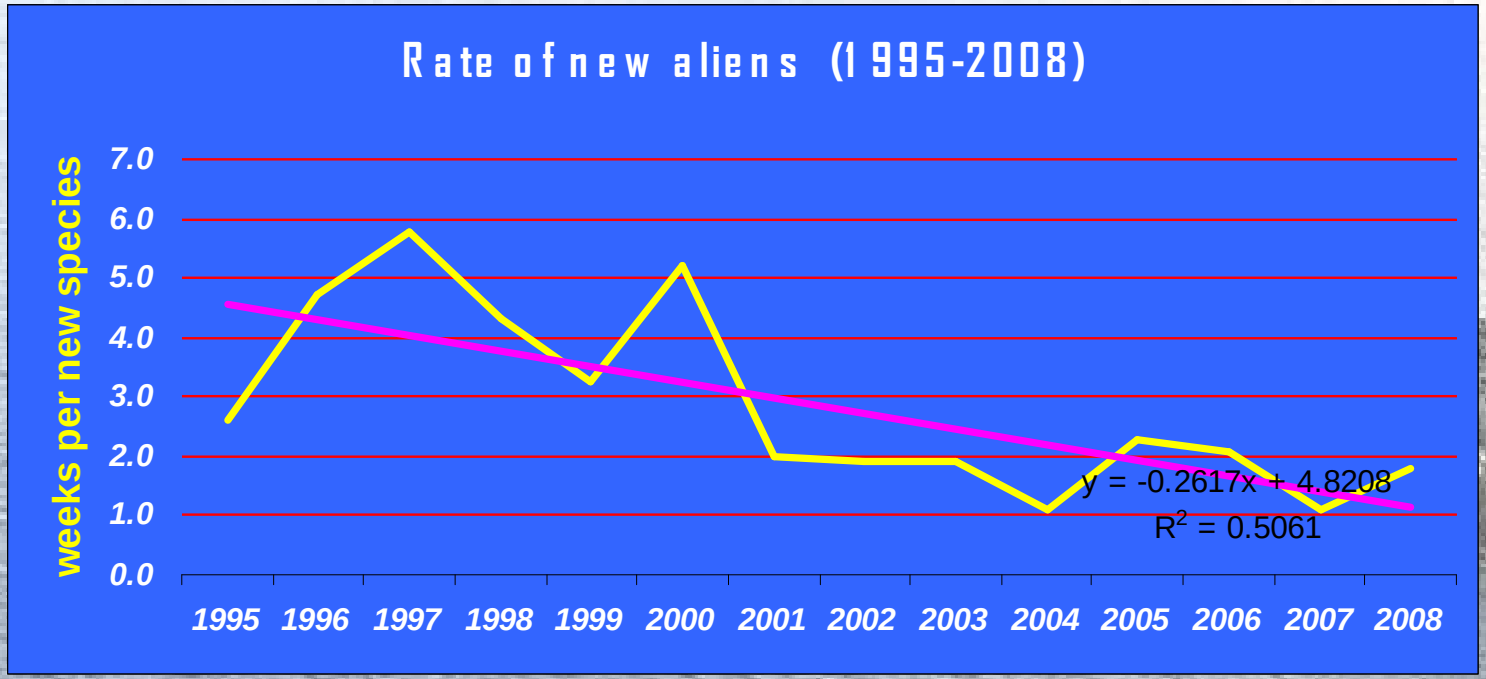


Zenetos et al., 2008

Mediterranean trend (December 2008)

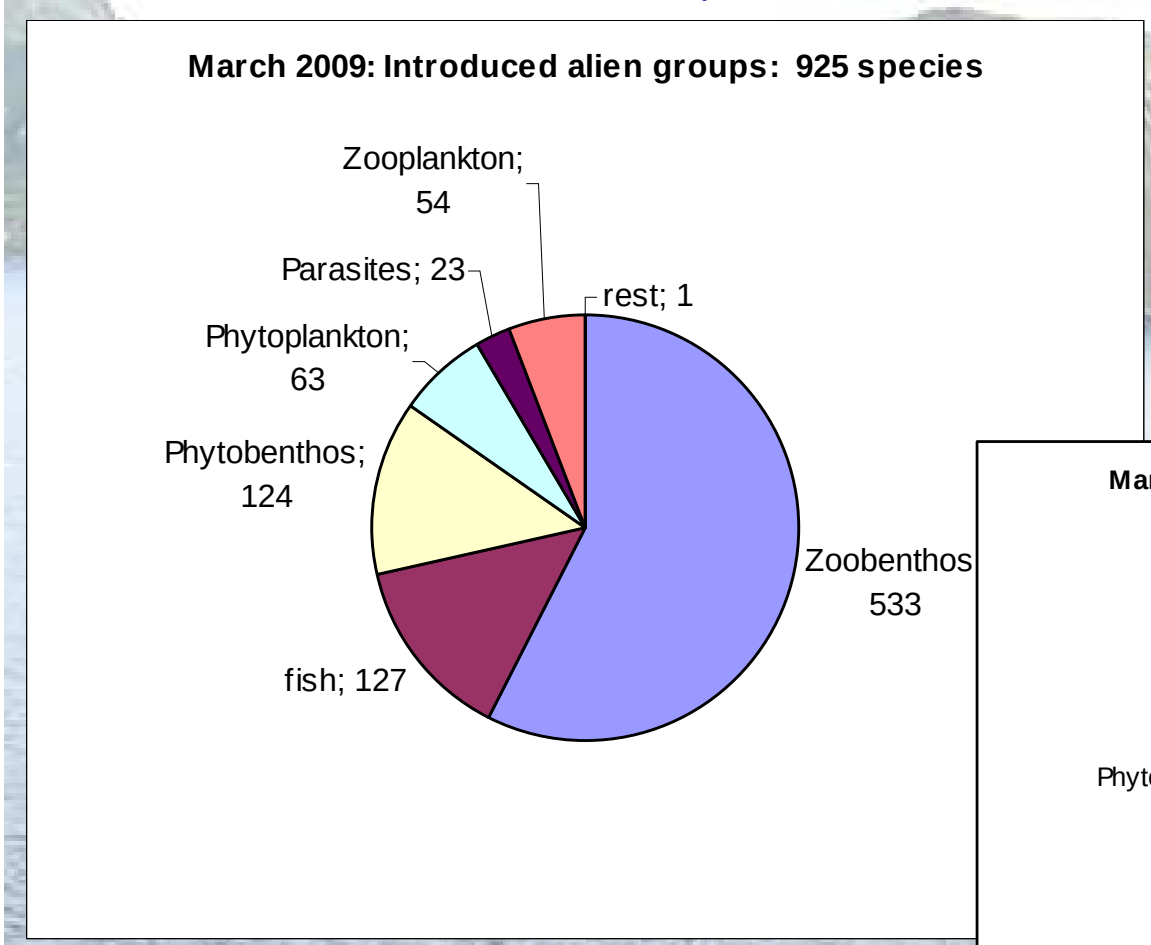
An average of one introduction every **three weeks** has been estimated over the past seven years

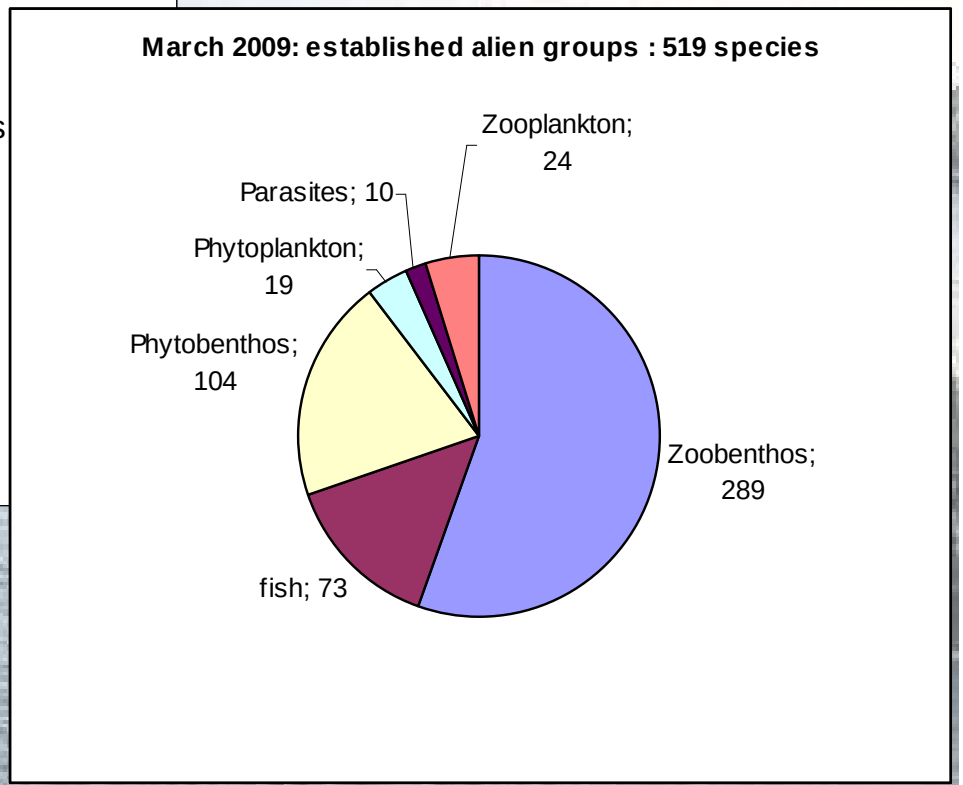
Current rate stands at one introduction every **1.3 weeks**



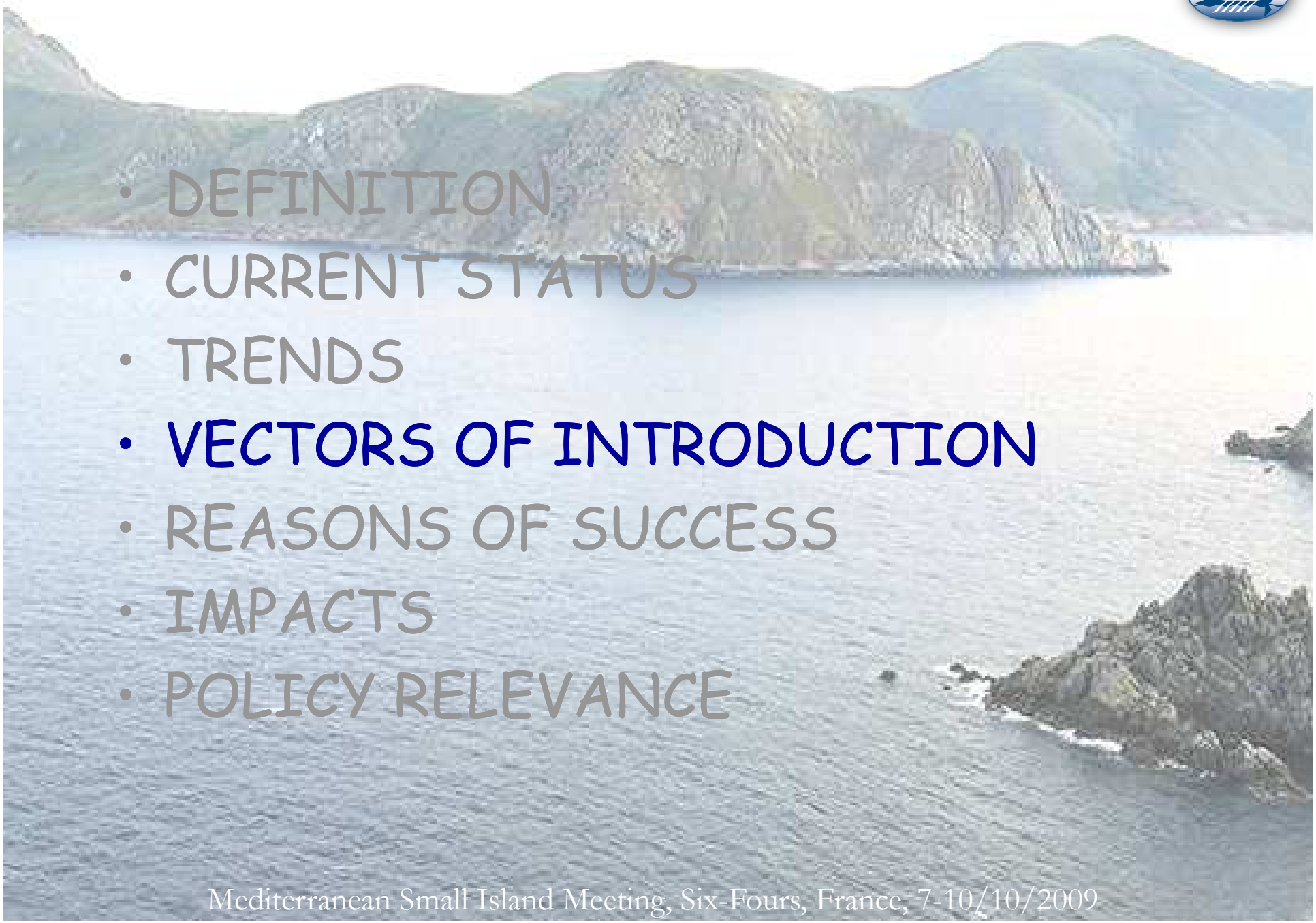
Zenetos, 2009

Aliens per taxonomic group





Zenetos, 2009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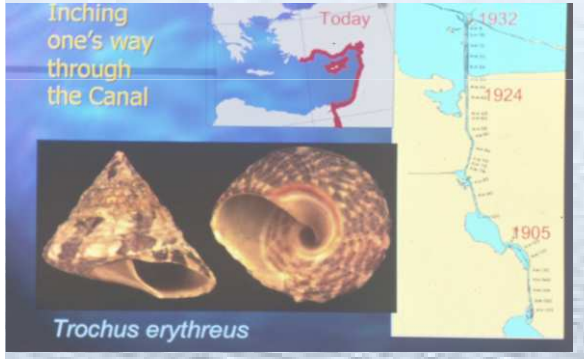
VECTORS OF INTRODUCTION

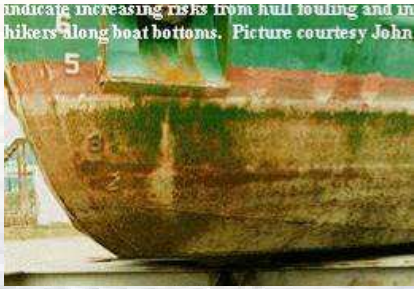
Via canals: Suez, Gibraltar.

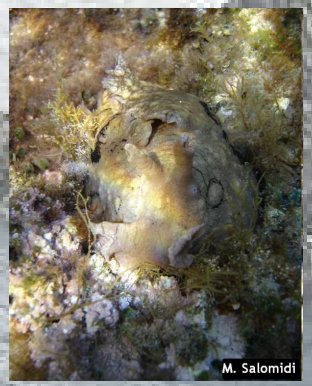
With ships: ballasts, fouling

Via aquaculture

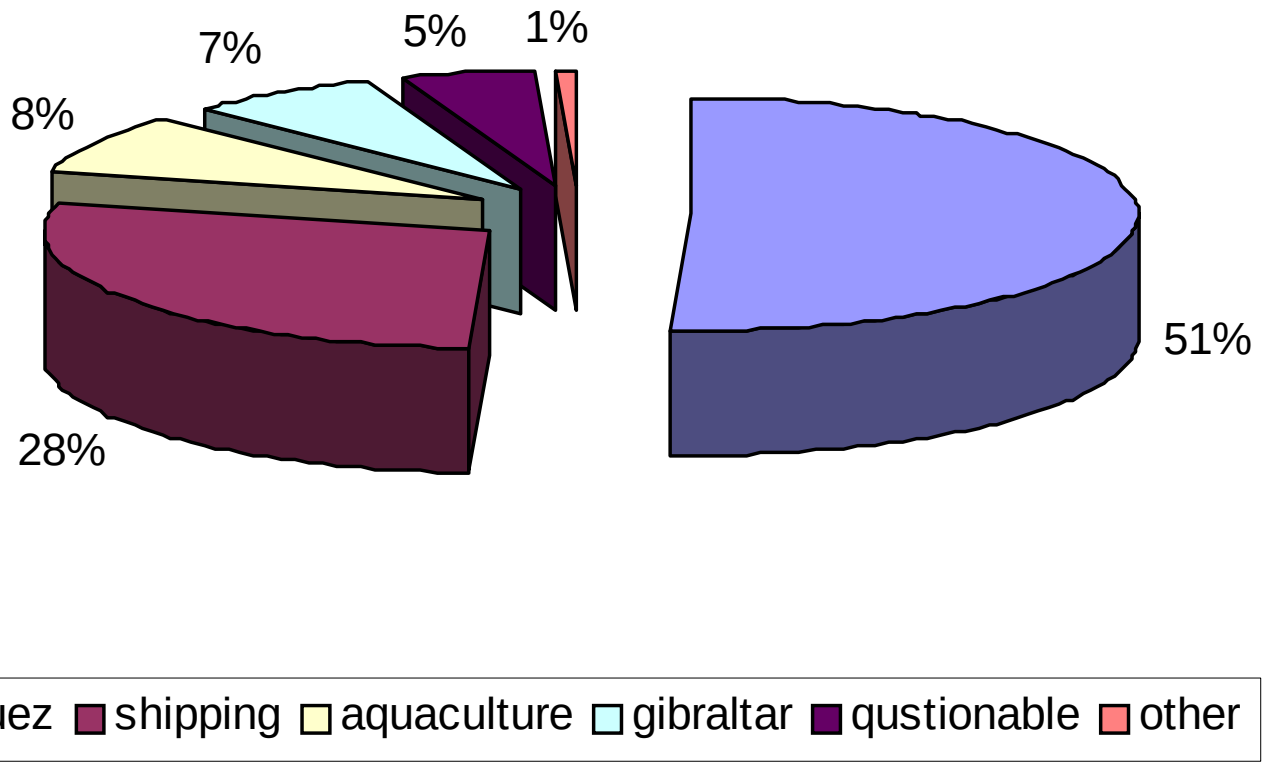
- **Other: aquarium, decoration**







Mode of introduction Mediterranean - May 2009



HCMR DB, 2009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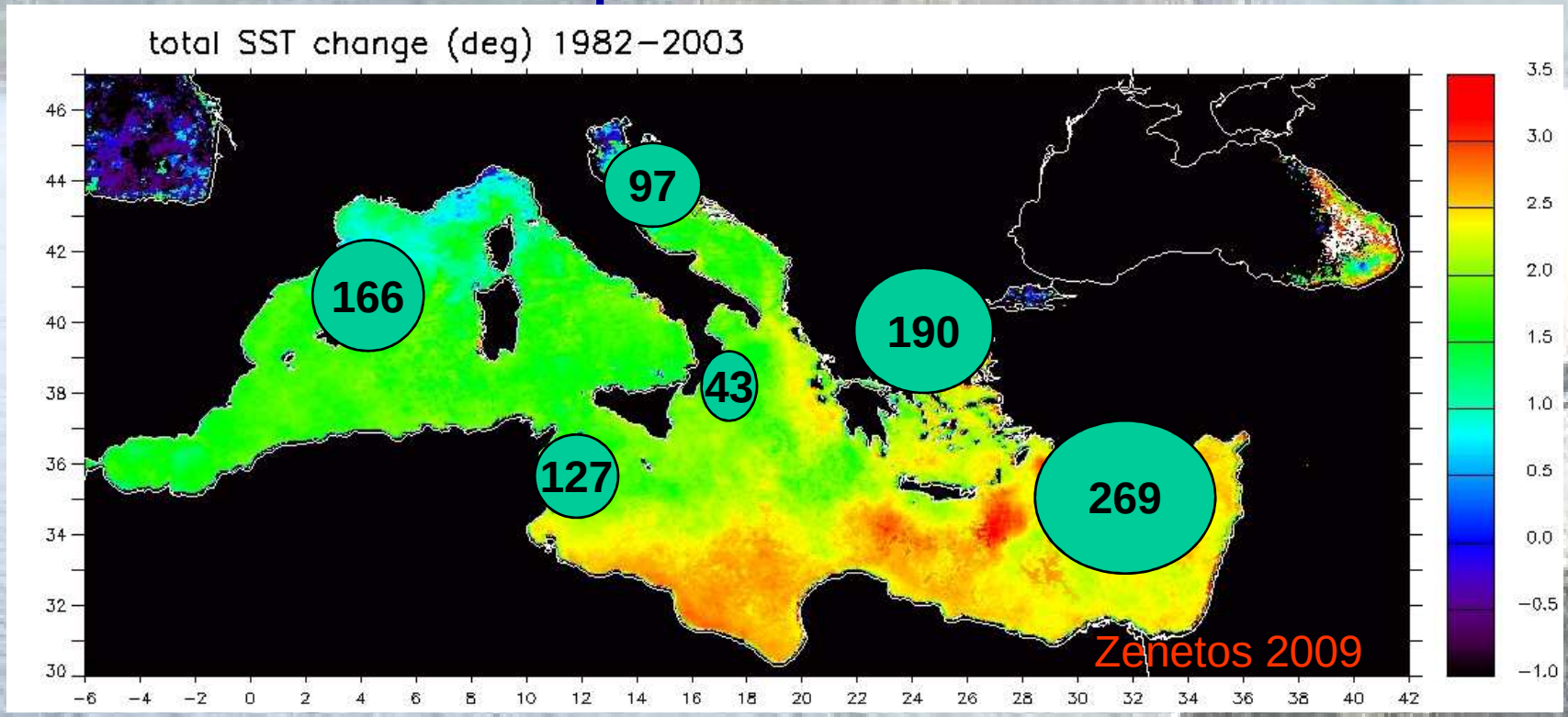
REASONS OF SUCCESS?

- Increased scientific interest?
- Pollution?
- Eutrophication?
- Overfishing?
- Habitat destruction / fragmentation?
- Climate change? T and S rise?

Sea surface temperature (SST) change in the Mediterranean 1982 – 2003 and alien species distribution



In the W and E Mediterranean, the average increase in SST has been 2.2 and 2.6 °C (1982 -2003) respectively. (EEA 2006)

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- **IMPACTS**
- POLICY RELEVANCE

Impact of Aliens

….As marine species know fewer and fewer boundaries, invasive species now constitute one of the four greatest threats to the world's oceans on local, regional and global scales ..

…Such transportation and release of NIS, often referred to as 'ecological roulette' or 'biological pollution' (Carlton & Geller 1993), represent a growing problem due to the unexpected and potentially harmful environmental as well as social (e.g., health) and economic impacts….

Unlike other forms of marine pollution where ameliorative action can be taken and their effects can be reversed, the impacts of invasive marine species are most often irreversible.

Nevertheless, while recent attention has focused on the adverse impacts of introduced species, introductions are a valid means to improve production and economic benefit from fisheries and aquaculture.

Impact of Aliens

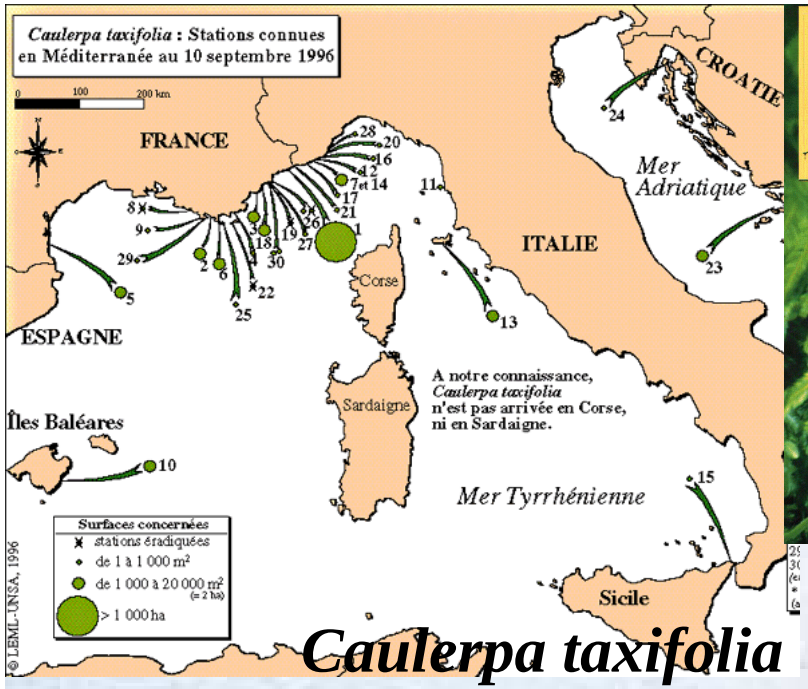
- **Biodiversity**
- **Native species**
- **Ecosystems either directly (affecting hydrology, nutrient cycling, and other processes, mainly by the so-called 'ecosystem engineers'), or indirectly by changing the whole ecosystem structure and functioning**
- **Unique biodiversity of endemic species isolated (pristine) ecosystems and conservation areas**

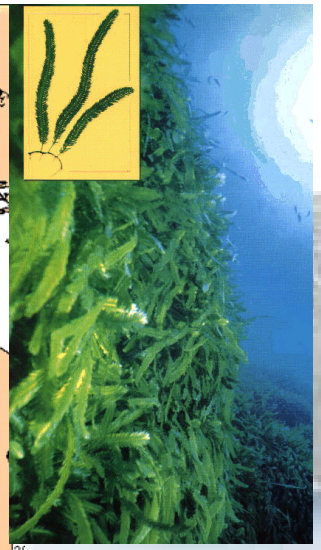
- **Socioeconomics**

***Fisheries & Aquaculture*: Alien species reduce yields drastically, either directly (e.g. pests) or indirectly (e.g. clogging of nets).**

***Health & Sanitation*: toxic species, parasites and pathogens impact on both the ecosystem and human health,**

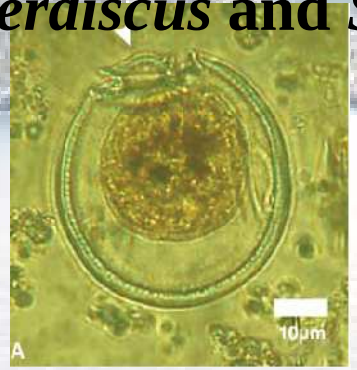
***Infrastructure & Building*: Alien species may induce habitat modification and alteration of physical conditions. They may also cause fouling (for example may clog water pipes and/or foul propellers), and may become navigational hazards**





Caulerpa taxifolia

Gambierdiscus and Sinophysis

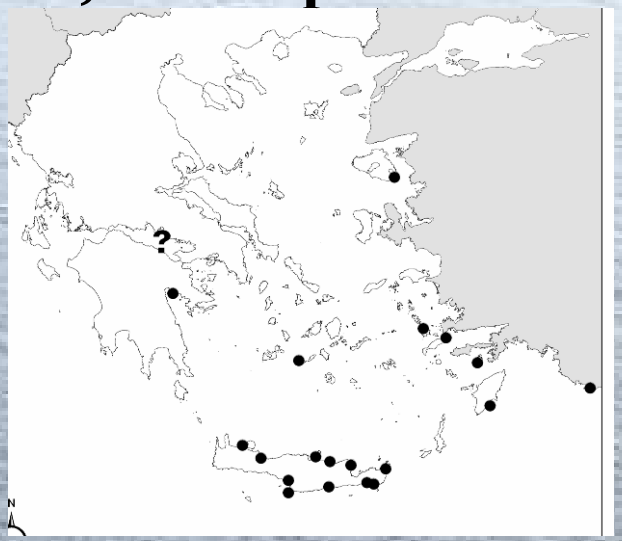


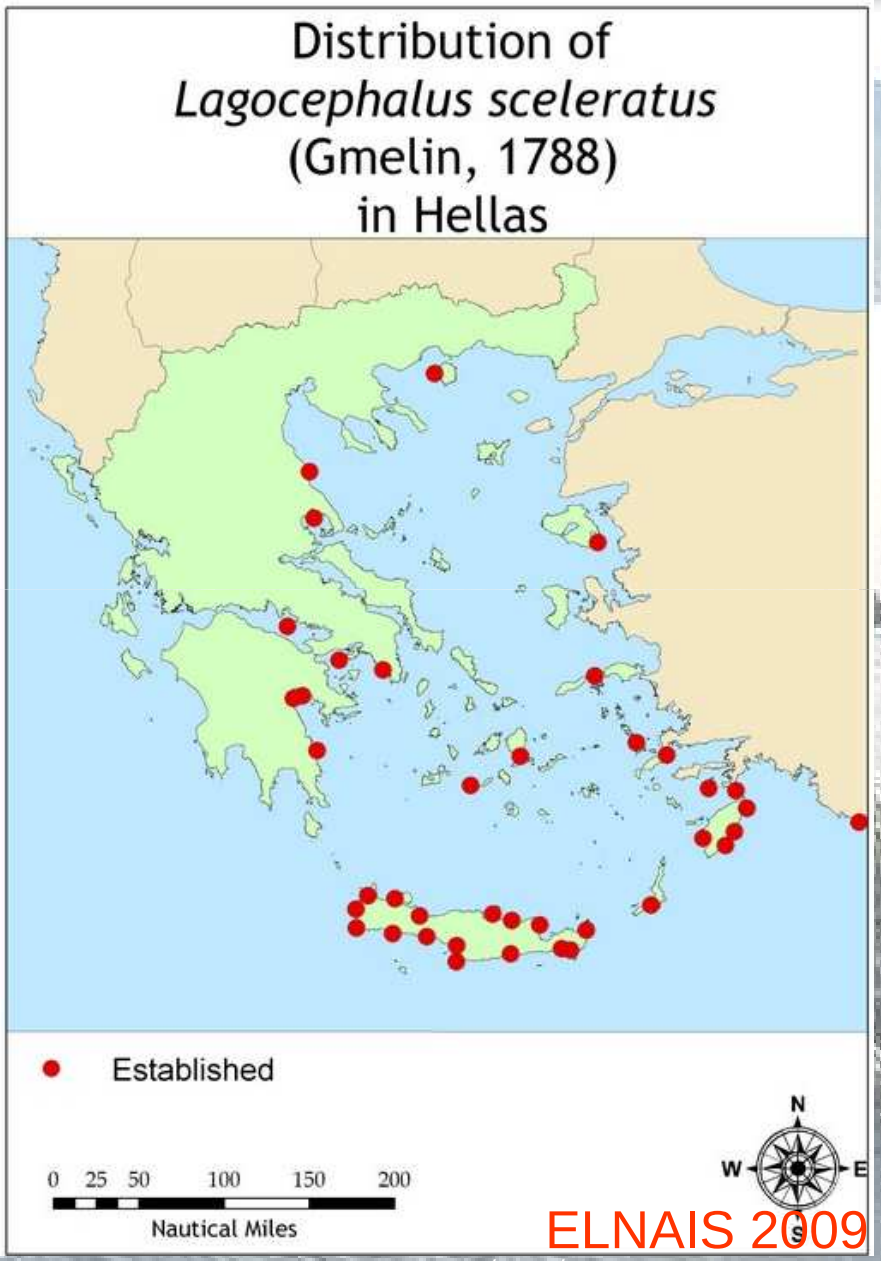
Phyllorhiza punctata

Fistularia commersonii

Lagocephalus sceleratus

2003: SE Turkey
Then Israel, Lebanon
2005: Rodos
2005: Kriti
2006, 2007: spread in S Aegean





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Positive impact??

- Aquaculture
- Almost half of trawl catches in the Mediterranean coast of Israel consists of exotic fish species (Golani & Ben Tuvia, 1995).

- Similarly invading species have been found to make 62% of the demersal fish biomass in the Gulf of Iskenderun, Turkey (Gücü & Bingel, 1994)

Pearl oyster (*Pinctada radiata*)

Invader: Israel, Syria, Lebanon, S. Turkey, Cyprus

Imported Greece, Italy, France

CIESM Atlas, 2002

1979: France

1982: Sicily

1913: Malta

1969: Greece

1985: Turkey & Syria

1899: Cyprus

1973: Israel

1878: Egypt

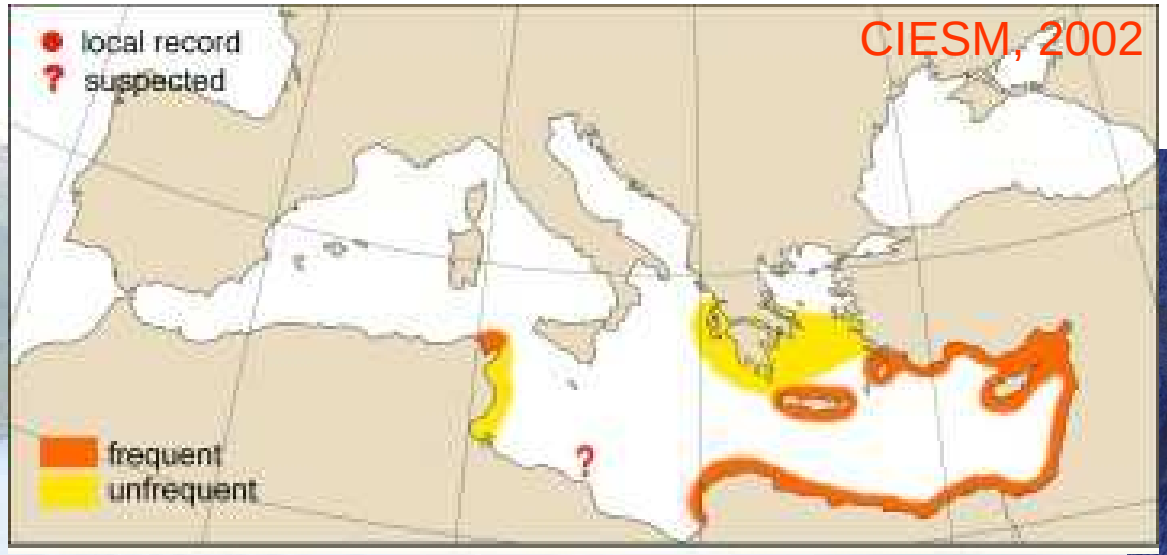
1883: Suez

1973: Libya

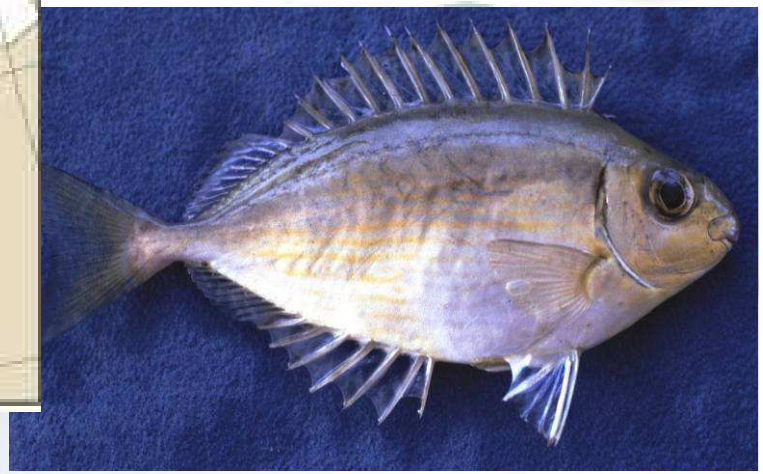

Distribution of
Strombus persicus (Swainson, 1821)
in Hellas
Established
0 25 50 100 150 200
Nautical Miles
N
W
E


M. Salomidi

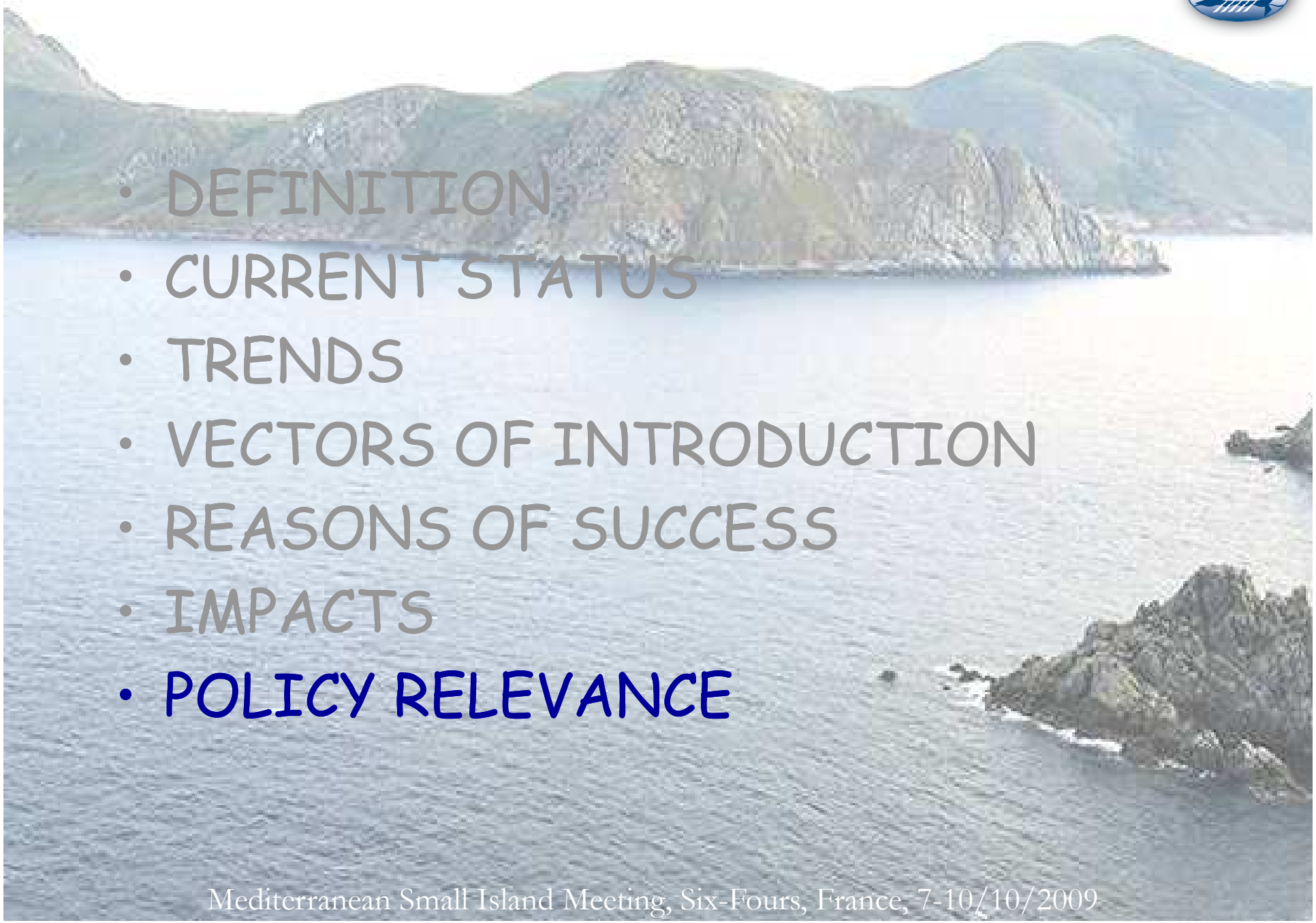
ELNAIS 2009



CIESM, 2002



ELNAIS 2009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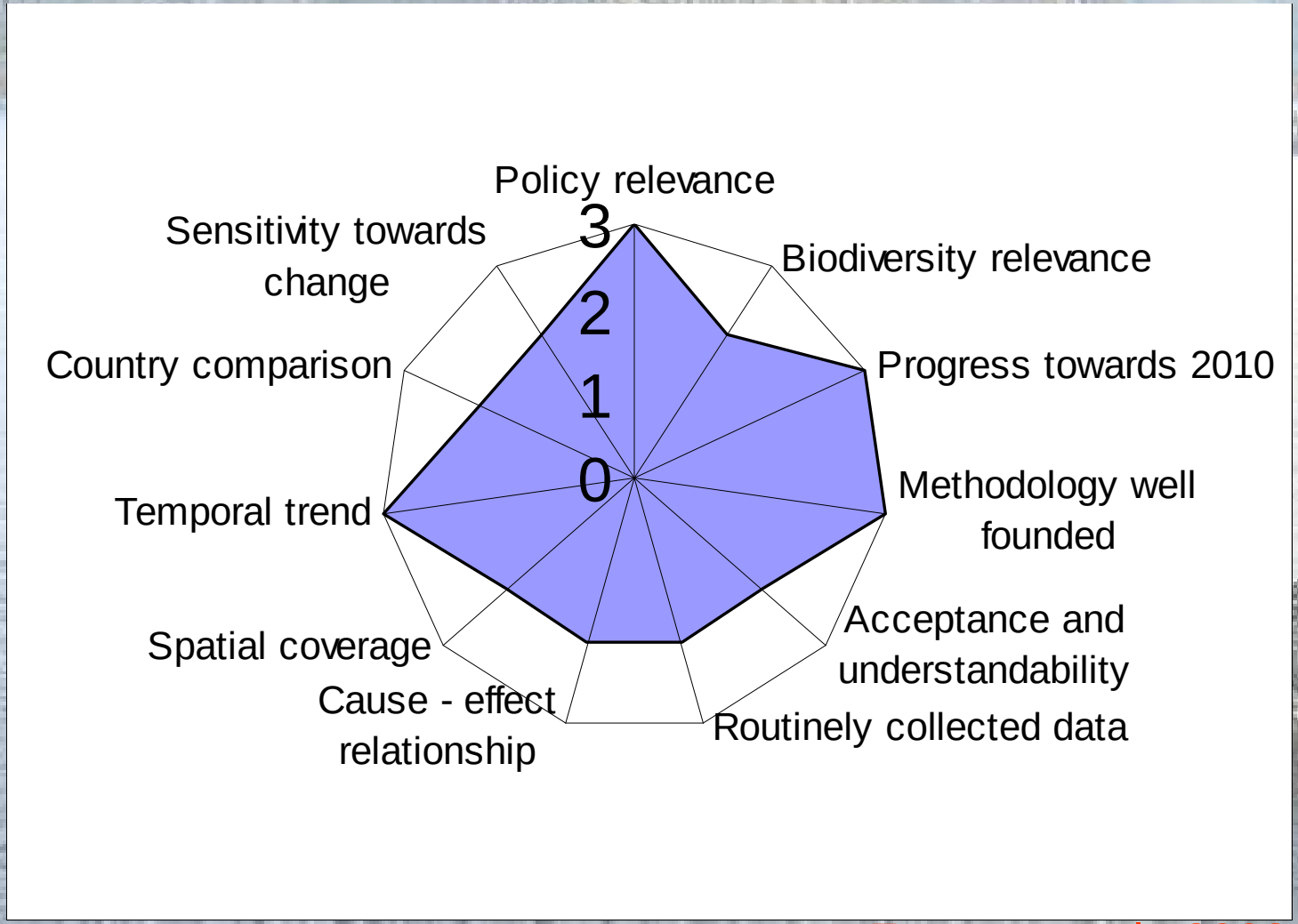
Alien species are of high relevance to:

- **Barcelona Convention**
- **Bern Convention on the Conservation of European Wildlife and Natural Habitats;**
- **International Maritime Organization (IMO) Convention for the Control and Management of Ship's Ballast Water and Sediments**
- **ICES/IOC/IMO : (WGBOSV)**

- **Common Fisheries Policy CFP -Council Regulation (EC) 371/2002**
- **Water Framework Directive - WFD (2000/60/EC)**
- **Marine Strategy Directive (2008/56/EC)**
- **Council Regulation 708/2007 on the use of alien and locally absent species in aquaculture**
- **EU Strategy on Invasive Species (plan for 2010 COM(2008) 789)**
- **EEA – SEBI2010 Communication on Biodiversity: Halting the Loss of Biodiversity by 2010 – and Beyond (COM(2006)216)**

- **UNEP/MAP - RAC-SPA (e.g. 2003 Action plan)**

Quality evaluation of the indicator 'Cumulative number of alien species in Europe since 1900.'



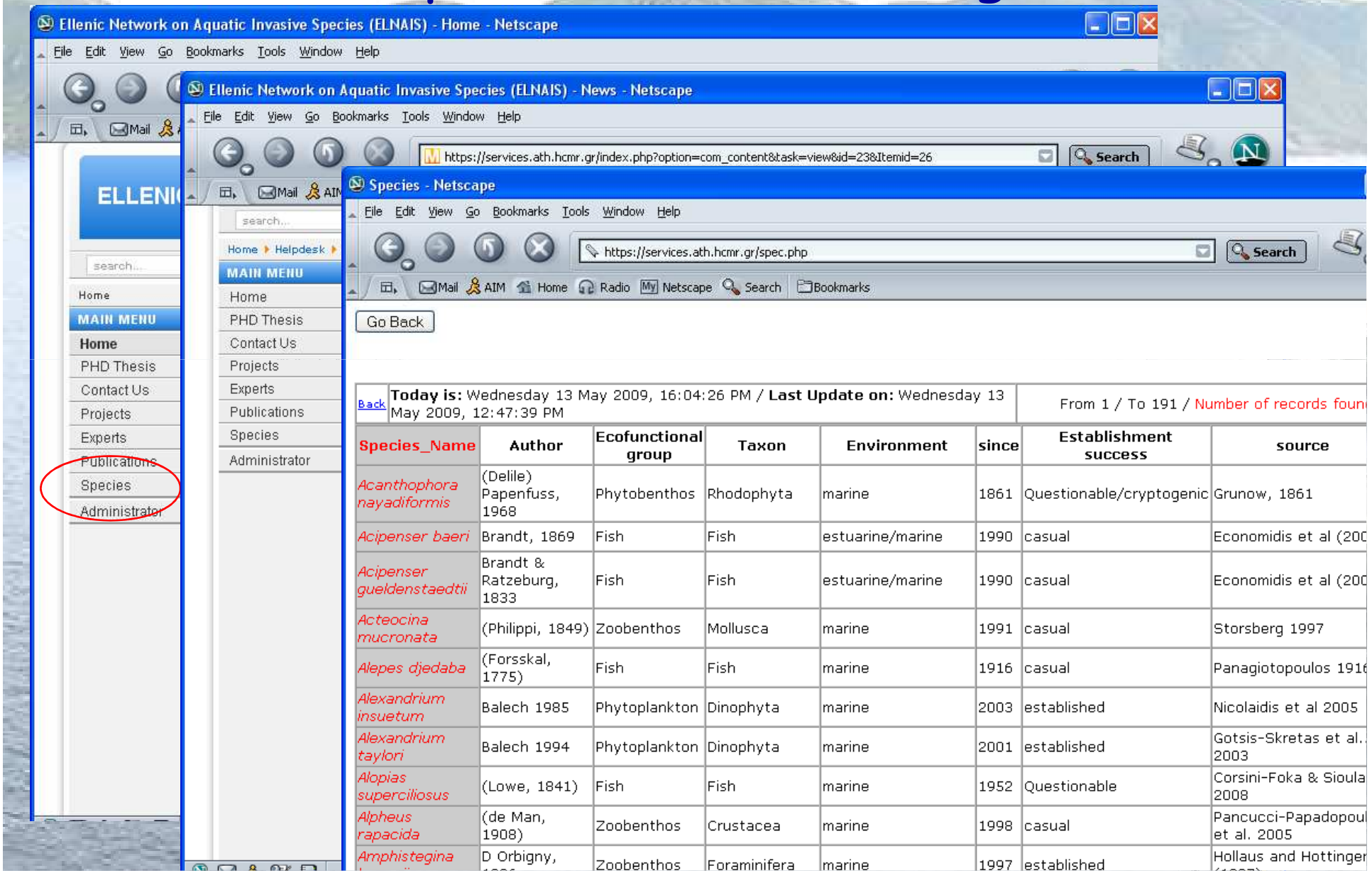
Zenetos et al., 2008

Data bases

- **NOBANIS: North European and Baltic Network *www.nobanis.org***
- **Baltic Sea alien species data base: http://www.corpi.ku.lt/nemo/mainnemo.html**
- **Directory of non-native marine species in British waters: http://www.jncc.gov.uk/page-1581**
- **ELNAIS: Greece http://elnais.ath.hcmr.gr**
- **DAISIE: no update *www.europe-aliens.org***
- **ICRAM: no update since 2005**
- **Black Sea DB: needs tuning**
- **Aquatic invasions: http://www.aquaticinvasions.ru**
- **HCMR Alien data base: PanEuropean Members only**

http://www.aquaticinvasions.ru

Ellenic Network website (http://elnais.ath.hcmr.gr)



Species_Name	Author	Ecofunctional group	Taxon	Environment	since	Establishment success	source
Acanthophora nayadiformis	(Delile) Papenfuss, 1968	Phytobenthos	Rhodophyta	marine	1861	Questionable/cryptogenic	Grunow, 1861
Acipenser baeri	Brandt, 1869	Fish	Fish	estuarine/marine	1990	casual	Economidis et al (200
Acipenser gueldenstaedtii	Brandt & Ratzeburg, 1833	Fish	Fish	estuarine/marine	1990	casual	Economidis et al (200
Acteocina mucronata	(Philippi, 1849)	Zoobenthos	Mollusca	marine	1991	casual	Storsberg 1997
Alepes djedaba	(Forsskal, 1775)	Fish	Fish	marine	1916	casual	Panagiotopoulos 1916
Alexandrium insuetum	Balech 1985	Phytoplankton	Dinophyta	marine	2003	established	Nicolaidis et al 2005
Alexandrium taylori	Balech 1994	Phytoplankton	Dinophyta	marine	2001	established	Gotsis-Skretas et al. 2003
Alopias superciliosus	(Lowe, 1841)	Fish	Fish	marine	1952	Questionable	Corsini-Foka & Sioula 2008
Alpheus rapacida	(de Man, 1908)	Zoobenthos	Crustacea	marine	1998	casual	Pancucci-Papadopoul et al. 2005
Amphistegina	D Orbigny,	Zoobenthos	Foraminifera	marine	1997	established	Hollaus and Hottinger

Conclusions (1)

The establishment success and potential impacts of AS is yet mostly unknown due to short period after introduction.

The location of the island in relation to the vectors of AS introduction, the degree of insularity, its ecosystem resilience and the presence of unique biodiversity of endemic species are key factors ‘regulating’ the impact of AS.

The increasing rate of alien introduction represents an issue of ecological and economic concern and needs political action and proper management.

Conclusions (2)

- Research on AS is currently being undertaken at both national and Community level. Resources for IAS research at national level appear to vary significantly.

- With regard to monitoring, and reporting of incursions, mandatory requirements are limited to plant pest and animal pathogen frameworks.

  There is no Mediterranean wide system to support general AS monitoring or reporting.

- The monitoring as well the study of AS in the Mediterranean islands, particularly the smaller ones, currently understudied, should be intensified


Thank You