

Invasive species and effects on fisheries in the long term

Presentation by G. Triantaphyllidis



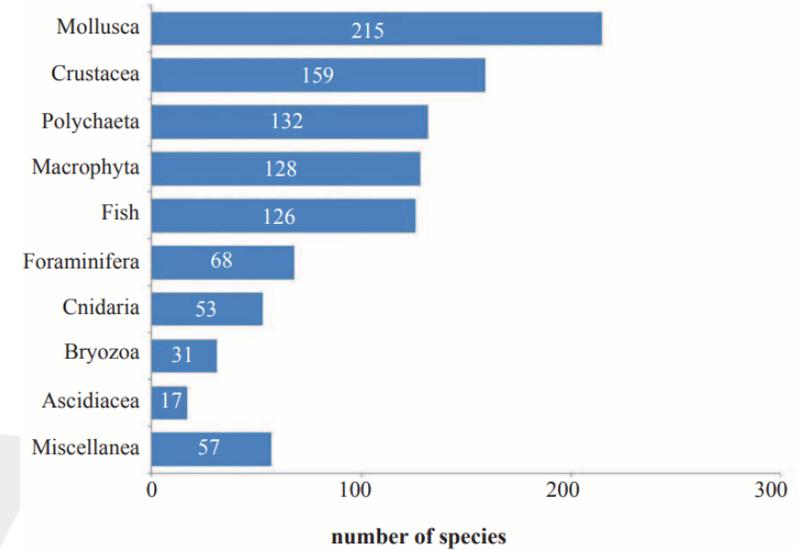
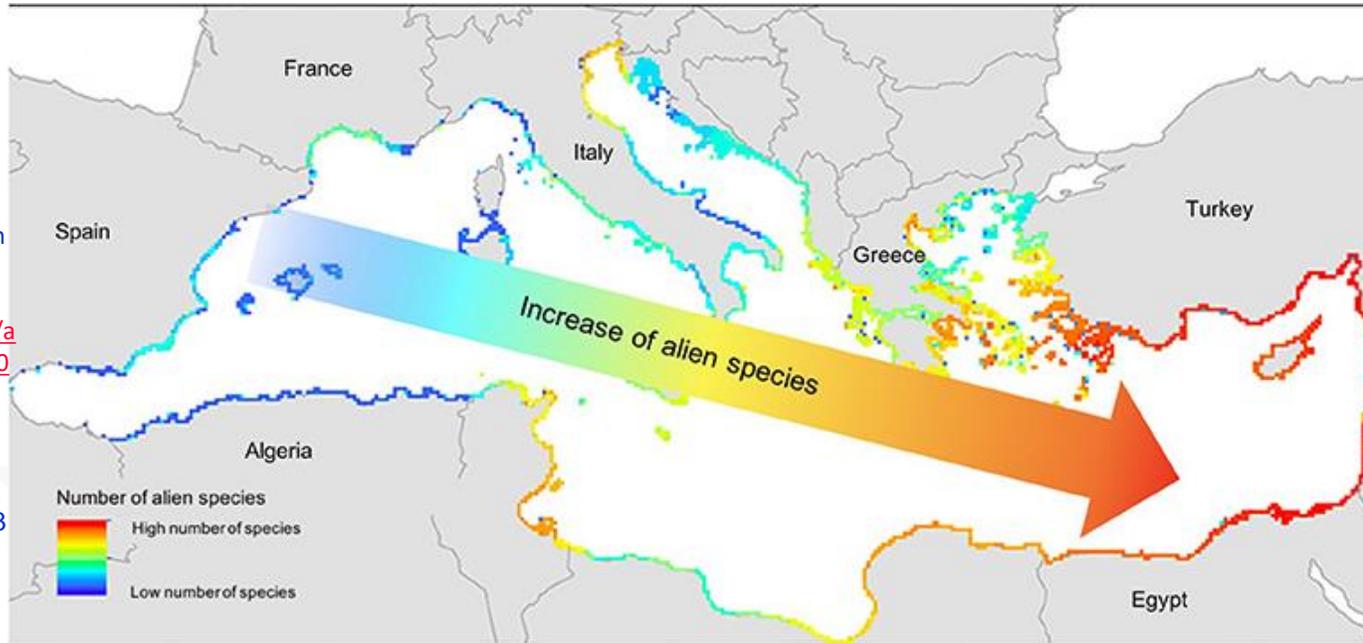
Co-founded by the European Union



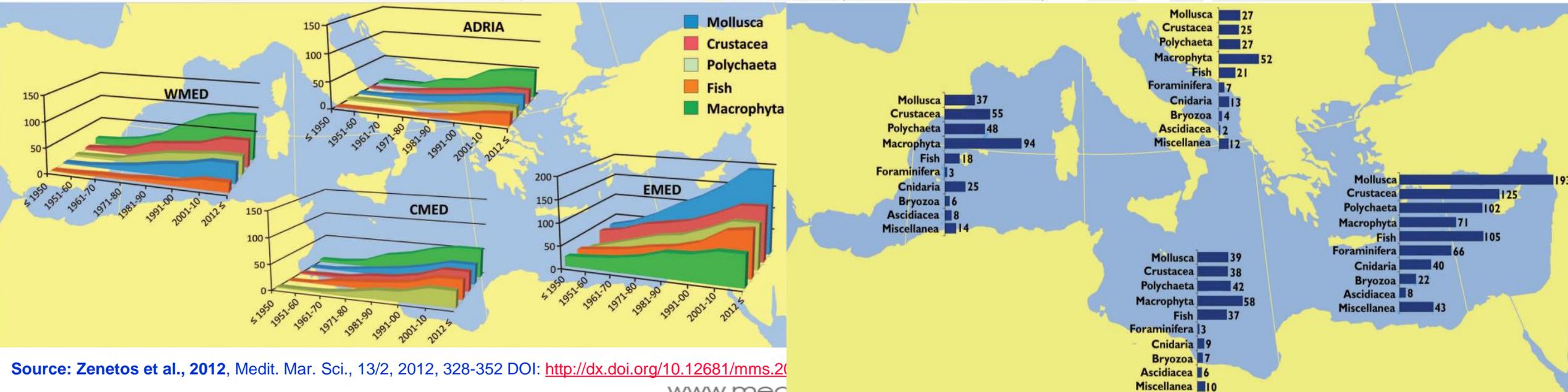
Non-Indigenous Species (NIS) in the Mediterranean Sea

Number of alien species found in the Mediterranean Sea. Source: Giovos et al., 2019, <https://kids.frontiersin.org/articles/10.3389/frym.2019.00097>

Original Source Article: Katsanevakis et al., 2014 Front. Mar. Sci. 1:32. doi: 10.3389/fmars.2014.00032



Source: Zenetos et al., 2012, Medit. Mar. Sci., 13/2, 2012, 328-352
DOI: <http://dx.doi.org/10.12681/mms.20716>



Source: Zenetos et al., 2012, Medit. Mar. Sci., 13/2, 2012, 328-352 DOI: <http://dx.doi.org/10.12681/mms.20716>

What is the definition of an invasive species?

An invasive species is a **non-native species whose introduction does or is likely to cause economic or environmental harm or harm to human, animal, or plant health**

An "invasive species" is a species that is:

- 1) non-native (or alien) to the ecosystem under consideration and,
- 2) whose introduction causes or is likely to cause economic or environmental harm or harm to human health.

The National Invasive Species Information Center (NISIC) of the U.S. Department of Agriculture (USDA)

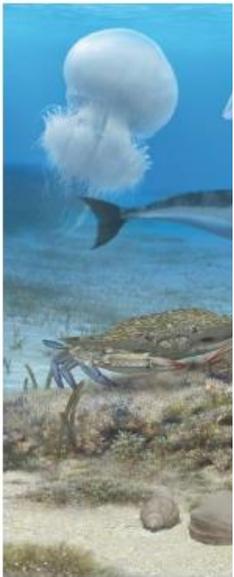
REGULATION (EU) No 1143/2014 (IAS Regulation), the following definitions apply:

- (1) **'alien species'** means any live specimen of a species, subspecies or lower taxon of animals, plants, fungi or microorganisms introduced outside its natural range; it includes any part, gametes, seeds, eggs or propagules of such species, as well as any hybrids, varieties or breeds that might survive and subsequently reproduce;
- (2) **'invasive alien species'** means an alien species whose introduction or spread has been found to threaten or adversely impact upon biodiversity and related ecosystem services;
- (3) **'invasive alien species of Union concern'** means an invasive alien species whose adverse impact has been deemed such as to require concerted action at Union level pursuant to Article 4(3);
- (4) **'invasive alien species of Member State concern'** means an invasive alien species other than an invasive alien species of Union concern, for which a Member State considers on the basis of scientific evidence that the adverse impact of its release and spread, even where not fully ascertained, is of significance for its territory, or part of it, and requires action at the level of that Member State;

How IAS end up in the Eastern Mediterranean Sea?

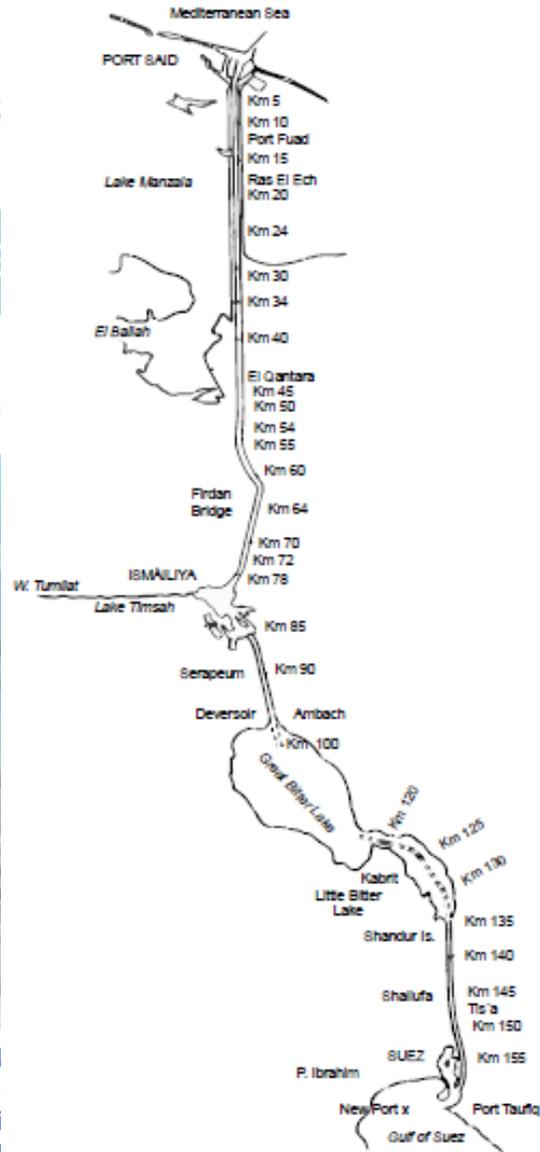
Most introduced species originated from the Indo-Pacific. Most species entered the Mediterranean Sea through the Suez Canal, followed by species transferred via vessels





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<https://doi.org/10.1007/s10641-021-00594-9>

Main vectors for invasive species into the Mediterranean Sea



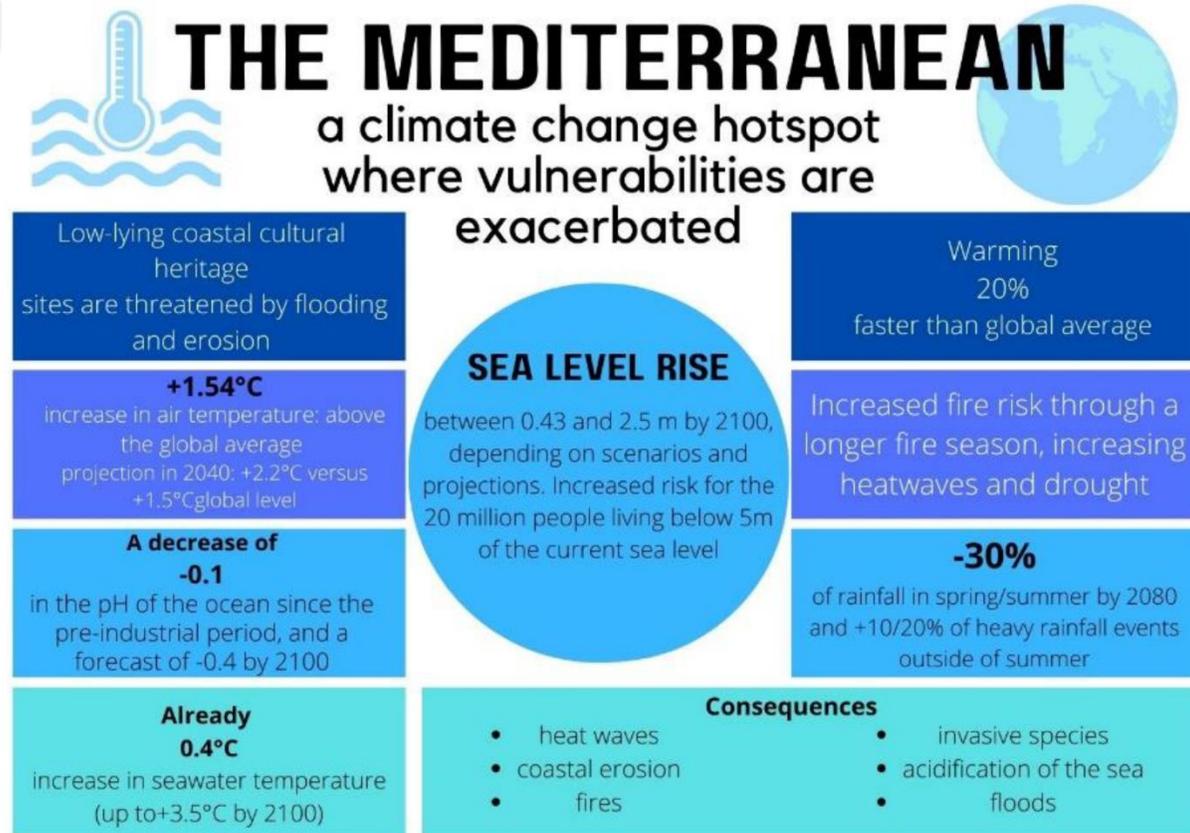
Source: Por, 1978.

The main vectors for invasive species introduction into the Mediterranean Sea can be described as follows:

- The Suez Canal: one of the major vectors for species of Indo-Pacific origin or Lessepsian migrants;
- Shipping: ballast water, tank sediments and hull fouling;
- Connecting straits: the Kerch and the Turkish Straits for Black Sea species and the Strait of Gibraltar for Atlantic species. These straits also play an important role in the introduction, respectively, of non-indigenous species of Black Sea origin, such as *Liza haematocheilus*, *Mnemiopsis leidyi* and *Rapana venosa*, and of non-indigenous species of Atlantic origin;
- Intentional or unintentional introduction by humans: this kind of introduction generally occurs for aquaculture purposes; and
- Minor vectors: aquariums, fish baits, recreational boats, among others.

How do invasive species survive Mediterranean waters?

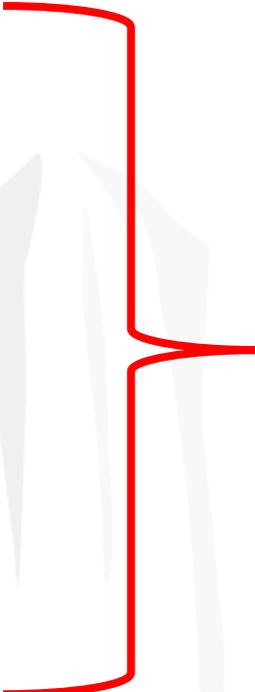
- Tolerance for a range of environmental conditions
- Adaptability
- Lack of predators or parasites
- High reproductive rates
- Strong competitive ability



Source: WBD (World Bank Data). World Bank Open Data. 2020.

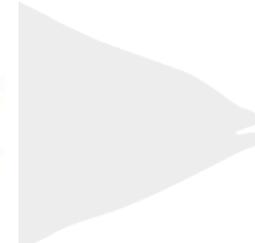
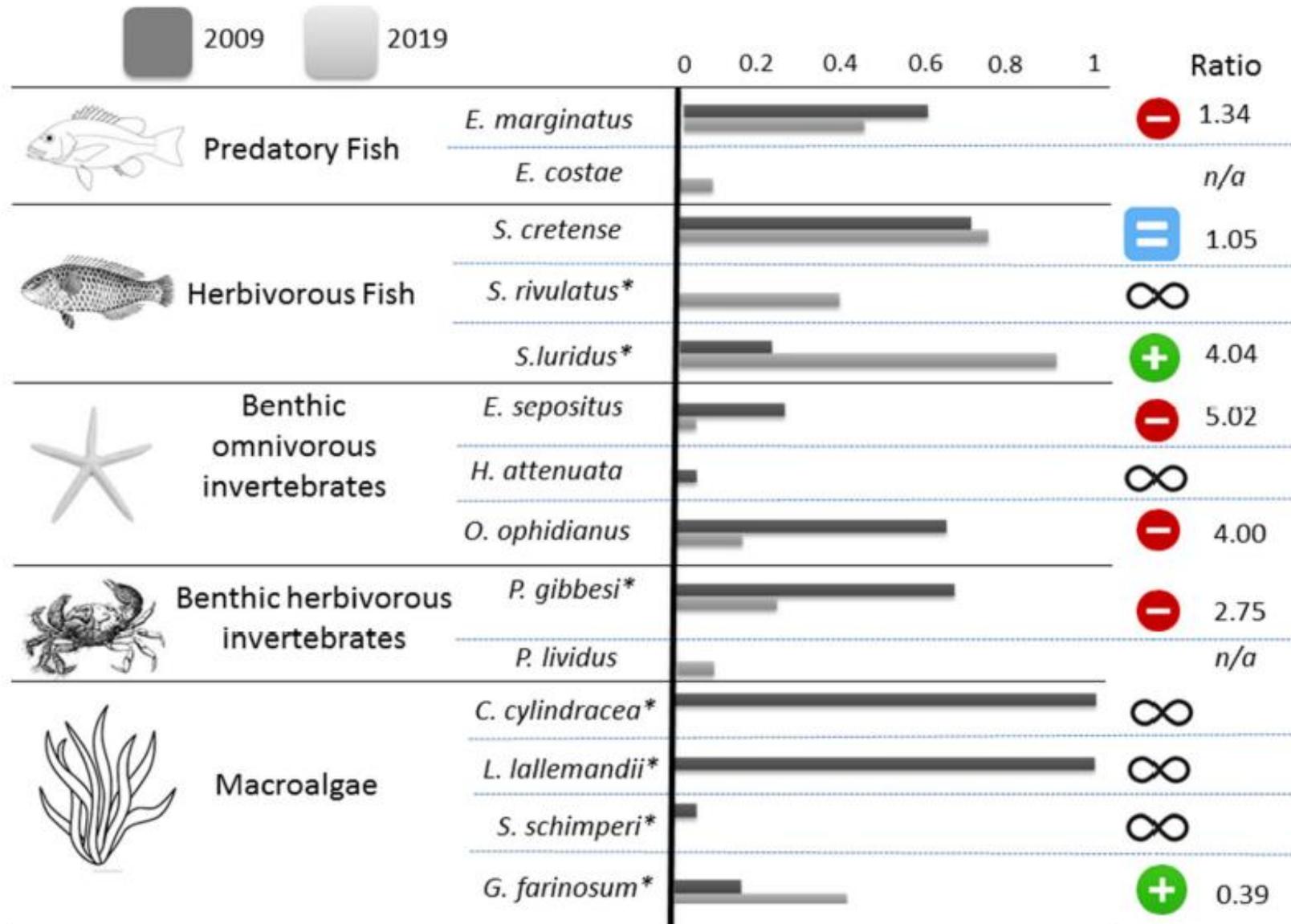
Invasive species effects on fisheries in the Eastern Med.

- **Competition with native species**
- **Predation on native species**
- **Changes in food webs**
- **Reduced biodiversity**
- **Economic impacts**

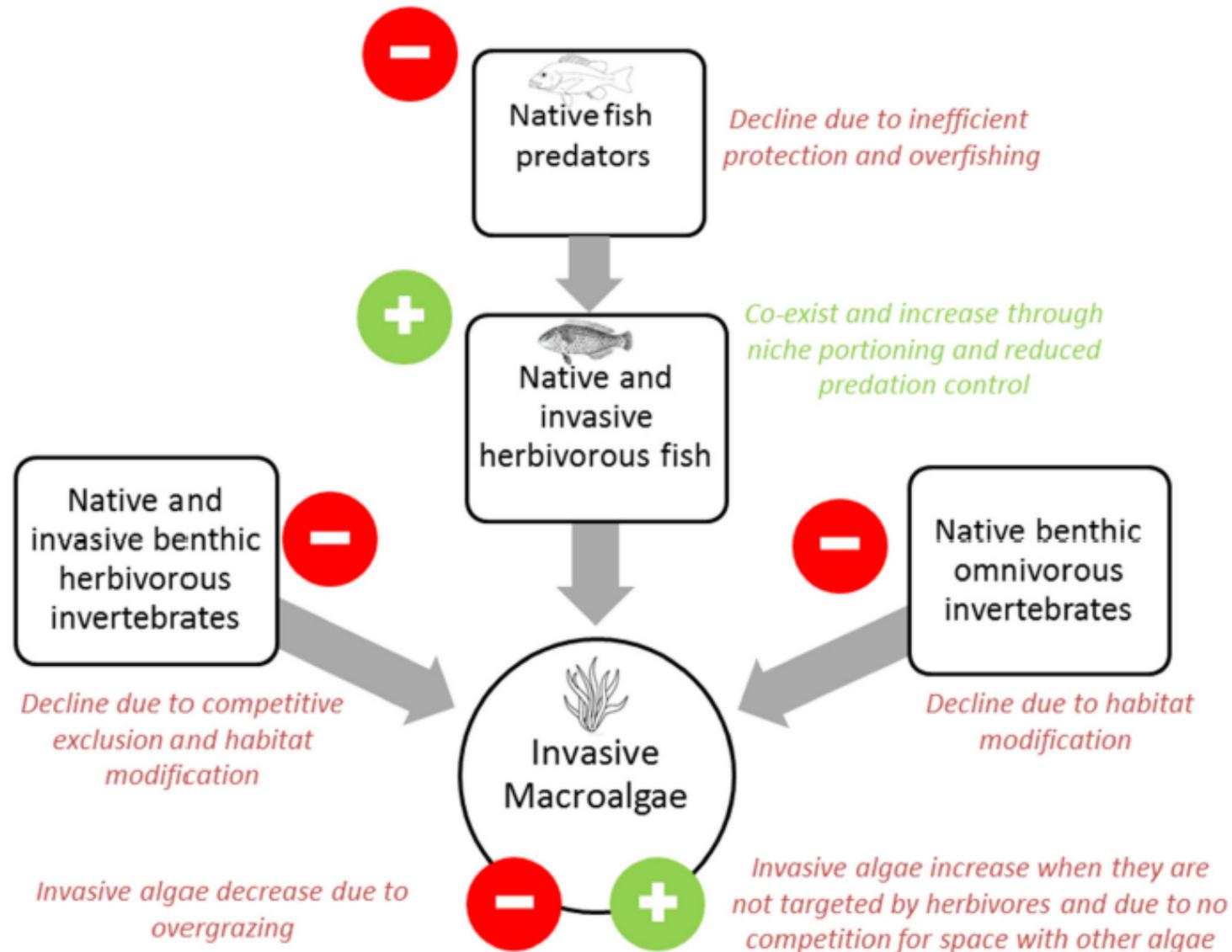


**significant long-term impacts
on fisheries**

Invasive species effects on MPAs in the Eastern Med.



Invasive species effects on MPAs in the Eastern Med.



Invasive species and effects on East Mediterranean fisheries EGYPT



Marbled spinefoot *Siganus rivulatus*



Dusky spinefoot *Siganus luridus*



Red-eye round herring (*Etrumeus golanii*)



Narrowbarred Spanish mackerel
(*Scomberomorus commerson*)

Invasive species and effects on East Mediterranean fisheries ISRAEL



lizard fish, *Saurida lessepsianus*



Dusky spinefoot *Siganus luridus*



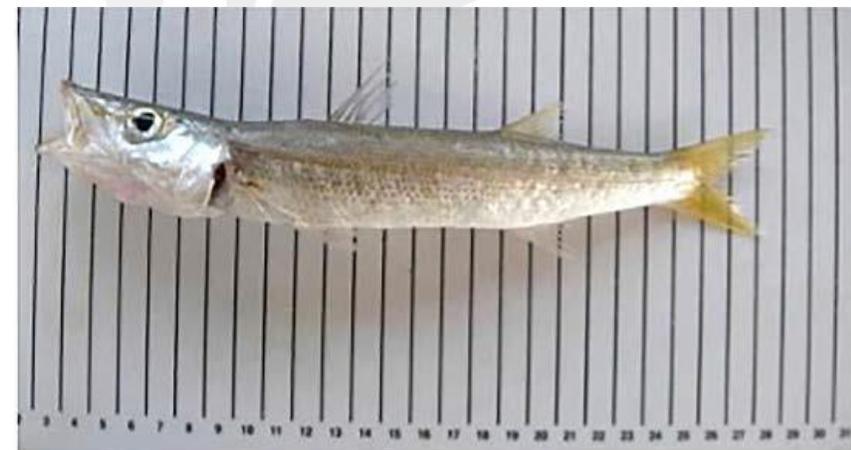
Marbled spinefoot *Siganus rivulatus*



Narrowbarred Spanish mackerel
(*Scomberomorus commerson*)



Shrimp scad (*Alepes djedaba*)



Yellowstripe barracuda (*Sphyraena chrysotaenia*)

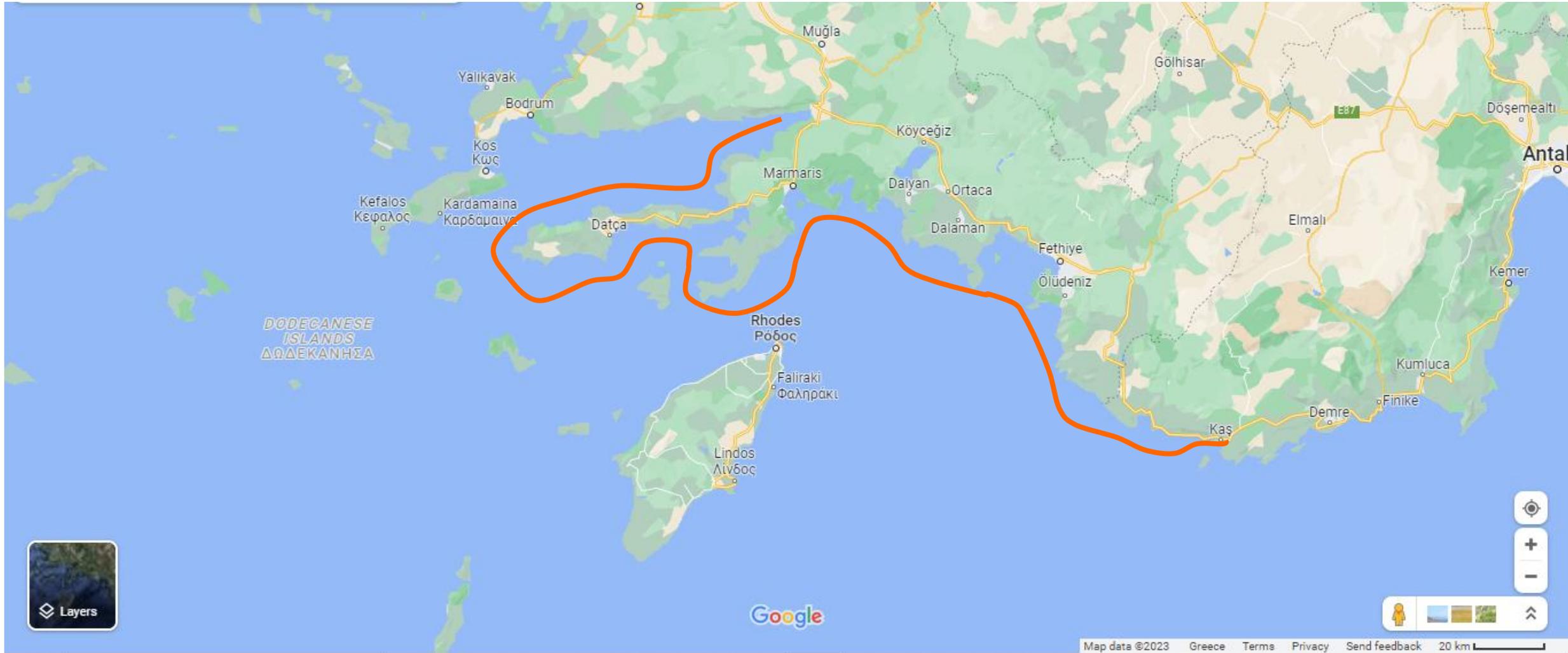
Invasive species and effects on East Mediterranean fisheries LEBANON

Lessepsian fish species constituted 37 % of the weight of the total landings in small-scale fisheries (Carpentieri et al., 2008)

Invasive species and effects on East Mediterranean fisheries SYRIA

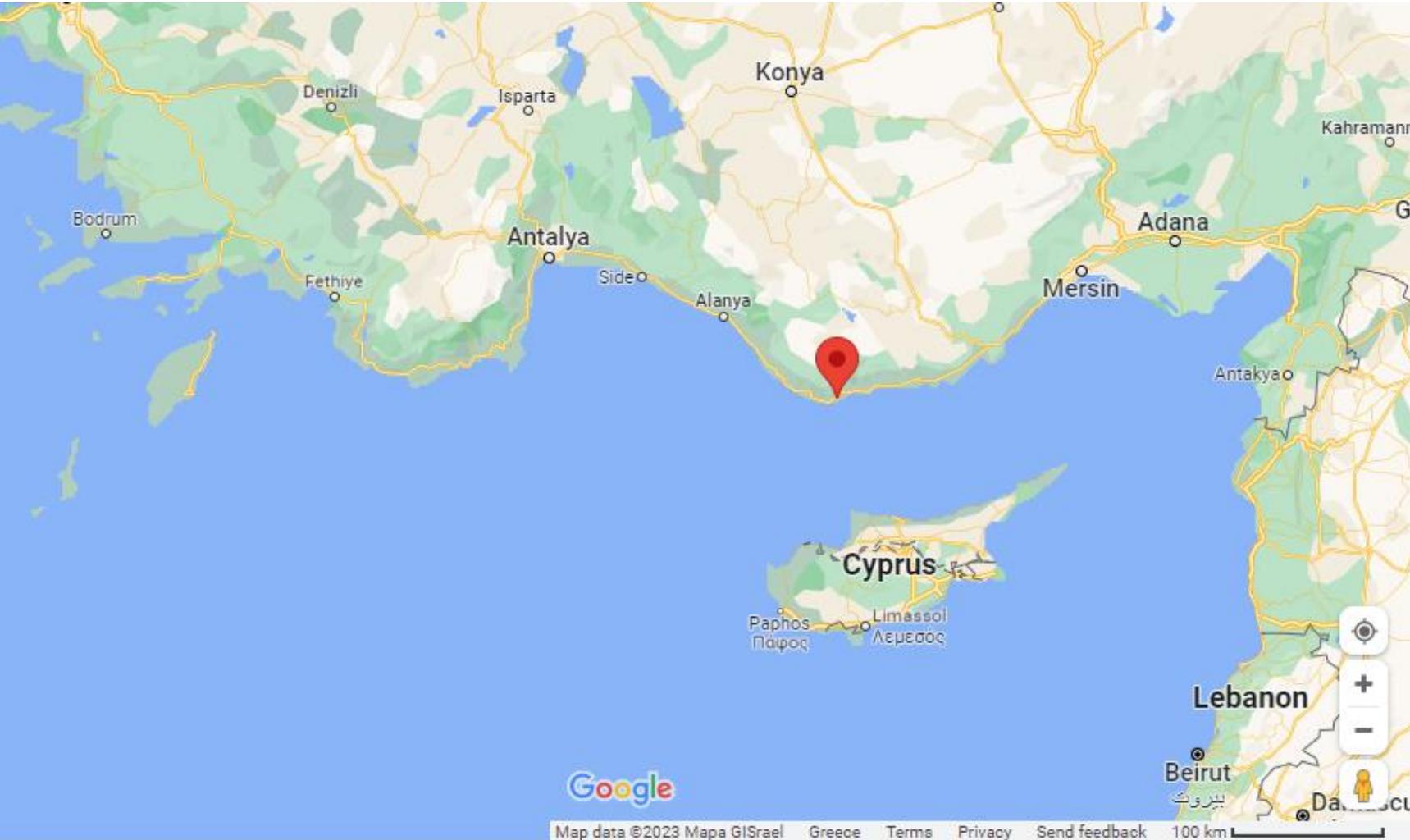
Lessepsian fish species, represent 16.5 % of all the bony fish species recorded. However, no commercial catch data have been reported for non-indigenous fish species.

Invasive species and effects on East Mediterranean fisheries TURKEY



Non-indigenous species such as lionfish, rabbitfish, urchins, Randall's seabream and soldier fish all have potential markets and can be caught in large numbers in Turkey

Invasive species and effects on East Mediterranean fisheries TURKEY



Lessepsian species are rather important in the complete demersal fish biomass, comprising:
62 % in the Gulf of Iskenderun, 34 % in Mersin Bay and 27 % in the coastal strip between Incekum and Anamur.

CPUE for Lessepsian fish ranged from 3.39 kilograms per hour in November 2001 to 11.73 kilograms per hour in September 2002, and calculated the mean value as 5.28 ± 3.32 kilograms per hour; most of the Lessepsian biomass was caught close to shore, i.e. at a depth range of 0–20 m, and the number of Lessepsian fish species constituted 18.9 percent of the total number of fish species, while 26.7 percent of the total biomass was attributed to Lessepsian fish.
Source: Çiçek and Avşar (2003)

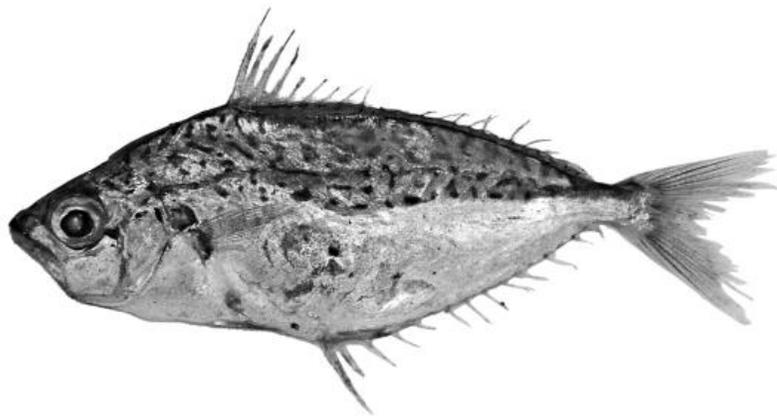
Invasive species and effects on East Mediterranean fisheries TURKEY



lizard fish, *Saurida lessepsianus* **47.2 %**



Por's goatfish (*Upeneus pori*) **29.9 %**



13.3 %

Klunzinger's ponyfish *Equulites klunzingeri*



Randall's threadfin bream
(*Nemipterus randalli*) 15

Turkish engineer makes leather purses out of puffer fish skin

By AGENCY

PEOPLE

Monday, 12 Sep 2022

6:00 PM MYT



Ozata holding a bag made from the skin of the puffer fish, a plague in the Mediterranean Sea that



It then takes eight hours to process the skin into leather. Next, Ozata works with local women to create the hand-made accessories. They need around seven fish skins, depending on their size, to make one handbag for example. They discard the remains of the fish as they are poisonous. With three helpers, fisherman Gokmen says he can catch around 100 puffer fish in the space of an hour.

<https://www.thestar.com.my/lifestyle/people/2022/09/12/turkish-engineer-makes-leather-purses-out-of-puffer-fish-skin>

He offers local fishermen 20 liras (1 Euro) for catching one fish.

Invasive species and effects on East Mediterranean fisheries CYPRUS

S.P. Iglésias and L. Frotté

First records of alien marine fishes for Cyprus.

A, *Spratelloides delicatulus*, **Muséum national d'Histoire naturelle (MNHN)** 2014-2905, 56 mm TL, 20 Sep. 2014, Agia Triada, 0.5 m depth;

B, *Sphyraena obtusata*, MNHN 2014-2853, 313 mm TL, 13 Sep. 2014, fish market Maryos at Deryneia;

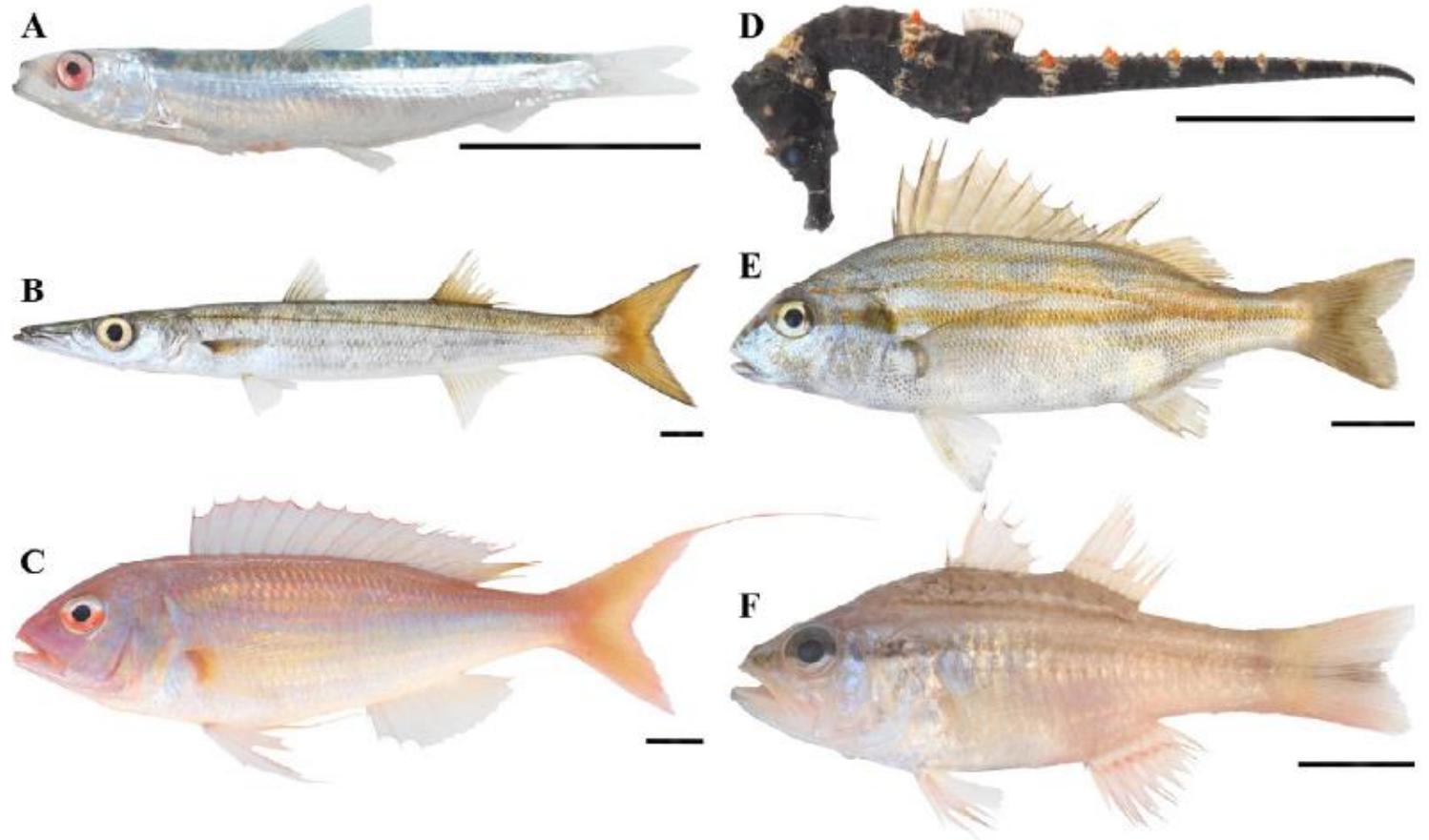
C, *Nemipterus randalli*, MNHN 2014-2912, 259 mm TL, 22 Sep. 2014, fish market Latsi at Nikosia;

D, *Hippocampus fuscus*, MNHN 2014-2876, 56 mm high, 16 Sep. 2014, Cyclope Cave, 15 m depth;

E, *Pomadasys stridens*, MNHN 2014-2878, 149 mm TL, 20 Sep. 2014, off Cape Greco, 20 m depth;

F, *Ostorhinchus fasciatus*, MNHN 2014-2896, 107.5 mm TL, 20 Sep. 2014, from Morphou Bay.

Scale bars = 20 mm.



Invasive species and effects on East Mediterranean fisheries

CYPRUS

Alien marine fishes for Cyprus:

A, *Etrumeus golanii*, Muséum national d'Histoire naturelle (MNHN) 2014-2877, 237 mm TL, 17 Sep. 2014, off Pernera, 120 m depth;

B, *Saurida lessepsianus*, MNHN 2014-2889, 256 mm TL, fishmarket PanFish at Limassol;

C, *Atherinomorus forskalii*, MNHN 2014-2833, 122 mm TL, 122 mm TL, 10 Sep. 2014, Port of Agia Triada, 0.5 m depth;

D, *Sargocentron rubrum*, MNHN 2014-2831, 127 mm TL, 09 Sep. 2014, Green Bay, 4 m depth;

E, *Fistularia commersonii*, MNHN 2014-2920, 1001 mm TL, 22 Sep. 2014, Agia Triada, 1.5 m depth.

F, *Pterois miles*, unpreserved, ~170 mm TL, 22 May 2014, off Ormidia, 10 m depth (photograph: A. Stavrinou);

G, *Apogonichthyoides pharaonis*, MNHN 2014-2828, 83 mm TL, 08 Sep. 2014, Agia Triada, 1 m depth;

H, *Upeneus moluccensis*, MNHN 2014-2900, 142 mm TL, 20 Sep. 2014, Morphou Bay;

I, *Upeneus pori*, MNHN 2014-2870, 95 mm TL, Sep. 2014, Pernera, 1 m depth;

J, *Pempheris rhomboidea*, MNHN 2014-2861, 156 mm TL, 14 Sept. 2014, Cape Greco, 1 m depth;

K, *Pteragogus trispilus*, MNHN 2014-2824, 93 mm TL, 08 Sep. 2014, Agia Triada, 2 m depth;

L, *Siganus rivulatus*, MNHN 2014-2921, 70 mm TL, 22 Sep. 2014, Agia Triada, 3 m depth;

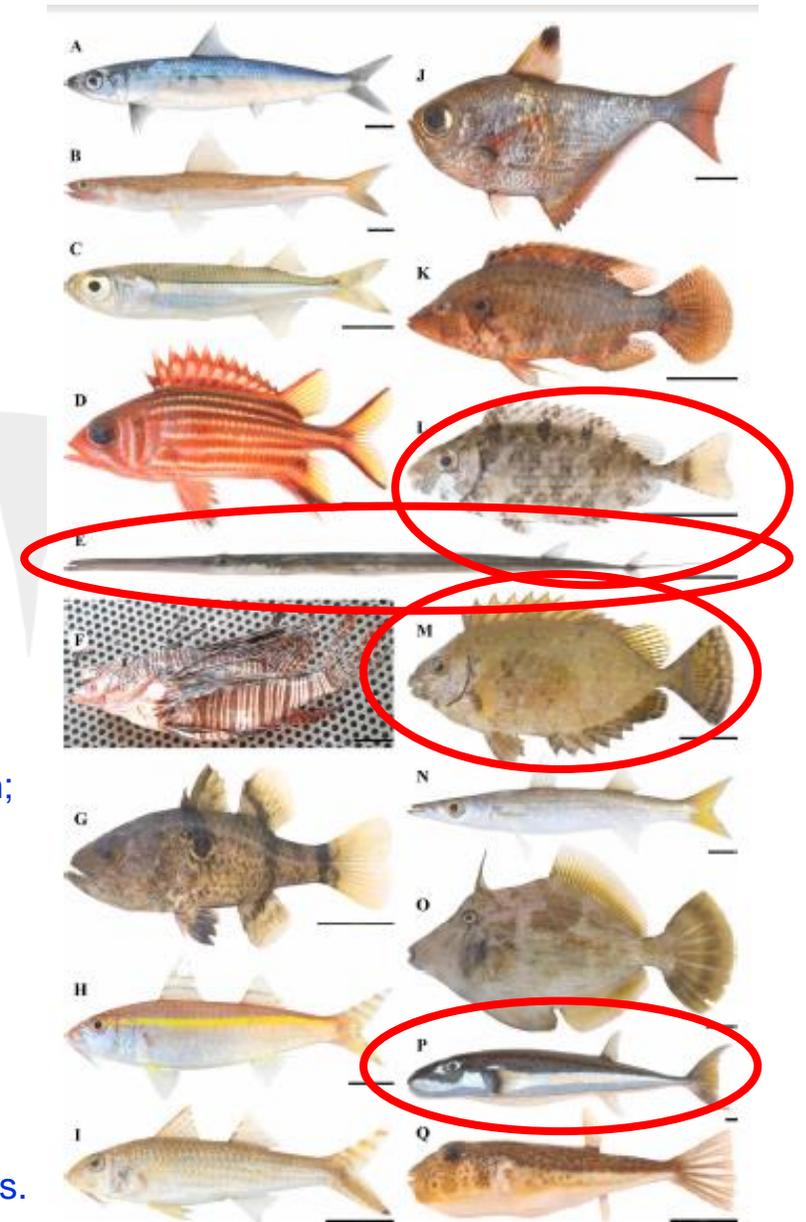
M, *Siganus luridus*, MNHN 2014-2845, 133 mm TL, 12 Sep. 2014, Omideia, 1 m depth;

N, *Sphyaena pinguis*, MNHN 2014-2926, 236 mm TL, 26 Sep. 2014, Morphou Bay;

O, *Stephanolepis diaspros*, MNHN 2014-2867, 239 mm TL, 15 Sep. 2014, Pernera, 6 m depth;

P, *Lagocephalus sceleratus*, MNHN 2014-2875, 575 mm TL, 16 Sep. 2014, off Pernera;

Q, *Torquigener flavimaculosus*, MNHN 2014-2827, 99 mm TL, 08 Sep. 2014, Agia Triada, 2 m depth.

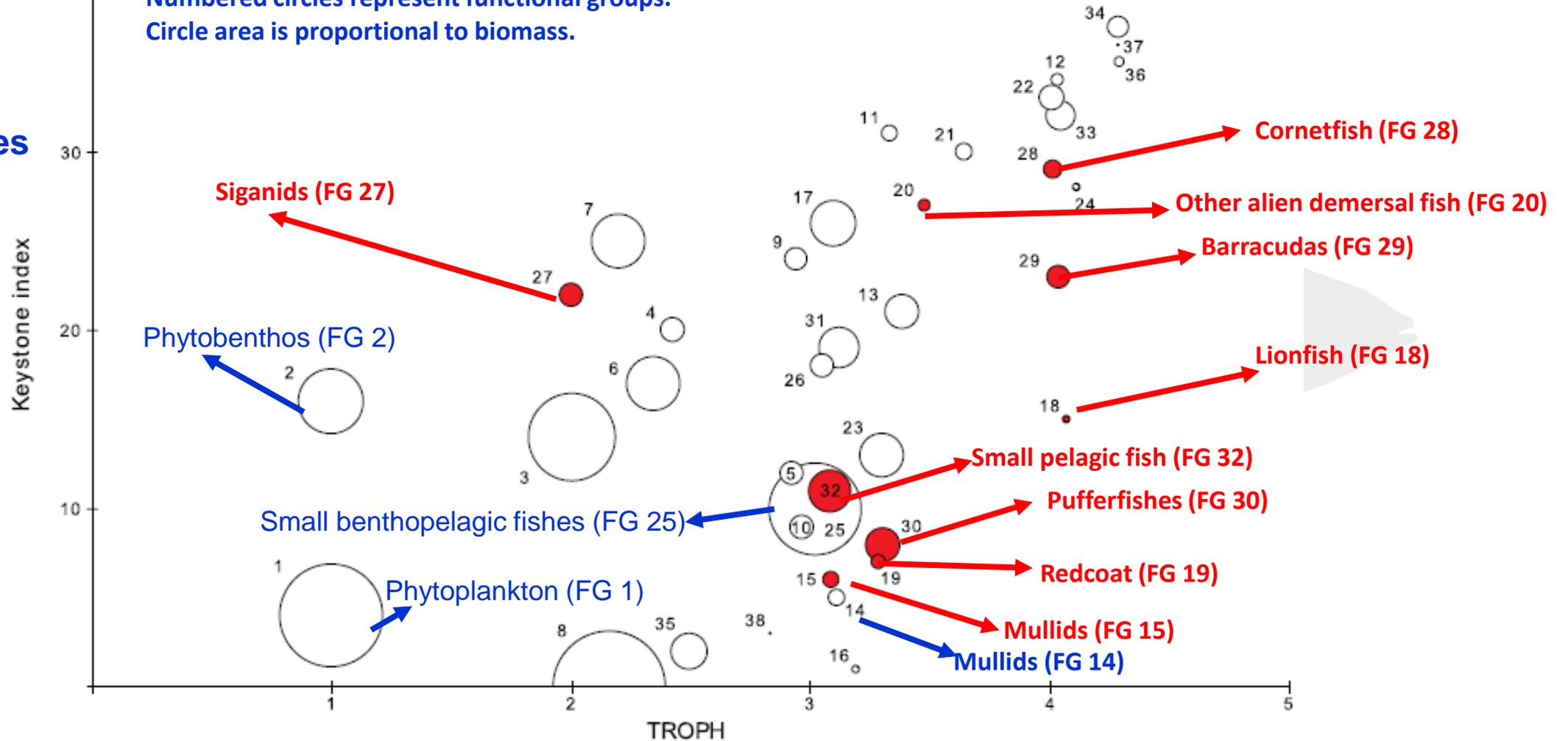


Scale bars = 100 mm for E and 20 mm for all others.

Invasive species and effects on East Mediterranean fisheries CYPRUS

Functional groups plotted against keystone index and TROPH of the 2015–17 trophic model of the insular shelf of Cyprus. Numbered circles represent functional groups. Circle area is proportional to biomass.

Alien species
Native species



Invasive species and effects on East Mediterranean fisheries GREECE



Redcoat (*Sargocentron rubrum*)



lizard fish, *Saurida lessepsianus*



Pempheris rhomboidea



Black-barred halfbeak (*Hemiramphus far*)



Marbled spinefoot *Siganus rivulatus*

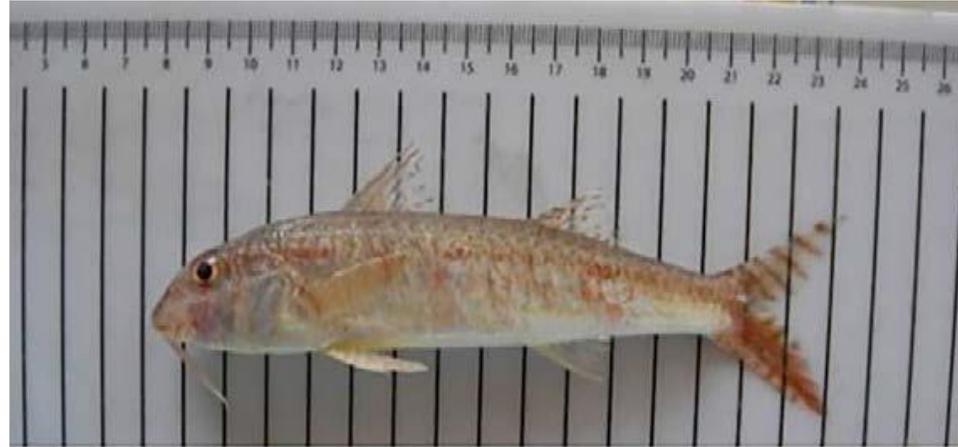


Dusky spinefoot *Siganus luridus*

Invasive species and effects on East Mediterranean fisheries GREECE



Upeneus moluccensis



Por's goatfish (*Upeneus pori*)



Sepioteuthis lessoniana

Invasive species and effects on East Mediterranean fisheries LIBYA

Six Lessepsian fish species and described more than 37 %of all present Lessepsian species as becoming commercially valuable, especially rabbitfish (*Siganus* spp.)

Invasive species and effects on East Mediterranean fisheries MALTA

Sciberras and Schembri (2007) reported 13 Lessepsian fish species, though until recently, no non-indigenous species had established itself in the wild or been commercially exploited.

Invasive species and effects on East Mediterranean fisheries

What is being done to address the issue?

4.11.2014

EN

Official Journal of the European Union

L 317/35

REGULATION (EU) No 1143/2014 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 22 October 2014

on the prevention and management of the introduction and spread of invasive alien species

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty on the Functioning of the European Union, and in particular Article 192(1) thereof,

Having regard to the proposal from the European Commission,

After transmission of the draft legislative act to the national parliaments,

Having regard to the opinion of the European Economic and Social Committee ⁽¹⁾,

After consulting the Committee of the Regions,

Acting in accordance with the ordinary legislative procedure ⁽²⁾,

Whereas:

<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014R1143&from=EN>





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THANK YOU!

Further information:
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