Joint Press Release about the Toxic and Poisonous Alien Species occurring in the Mediterranean Sea

About 1000 alien species have been reported in the Mediterranean Sea, more by far than in other European seas. A small number of the marine invasive alien species induce human health impacts, being venomous and poisonous. Recently, the news of the death of three Libyan fishers who consumed the poisonous silver-cheeked toadfish, have drawn the attention of the media and the public. **As marine scientists, engaged in the study of alien species, we wish to provide accurate information concerning these new health hazards.**

Among the alien species recorded in the Mediterranean Sea, ten are noted as human health hazards – **seven fish, a sea urchin, a scyphozoan jellyfish and a hydrozoan. Most have either been post-millennial records or have greatly increased their spread in the last decade**. All originate in the Indian Ocean or the Indo-west Pacific Ocean and are considered to have entered the Mediterranean through the Suez Canal. Four species are confined to the Levant and Tunisia, and even for those recorded further west and north (e.g. Silver-cheeked toadfish *Lagocephalus sceleratus*, Dusky spinefoot *Siganus luridus*, Marbled spinefoot *Siganus rivulatus,* Nomadic jellyfish *Rhopilema nomadica* and Lionfish *Pterois miles),* the largest populations occur in the Levant. With rising temperature, it is likely these thermophilic species will expand their range.

Tetraodontidae (Pufferfish) and Diodontidae (Porcupinefishes)

So far eight species of the Tetraodontidae and three species of the Diodontidae family have been reported in the Mediterranean Sea. The most common are:

- *Lagocephalus lagocephalus* – Oceanic puffer (It is not an alien species)
- *Lagocephalus sceleratus* – Silver-cheeked toadfish
- *Lagocephalus suezensis* – Suez puffer
- *Lagocephalus guentheri* – Diamondback puffer (mis. *Lagocephalus spadiceus*)
- *Sphoeroides pachygaster* – Blunthead puffer
- *Torquigener flavimaculosus* – Yellow spotted pufferfish

Of the tetraodontid fish in the Mediterranean Sea, the alien Silver-cheeked toadfish and Yellowspotted puffer *Torquigener flavimaculosus*, and the indigenous Oceanic puffer *Lagocephalus lagocephalus*, are known to be poisonous. Especially, the Silver-cheeked toadfish, one of the most invasive alien fish in the Mediterranean Sea, has caused several cases of intoxication and even death due to its consumption by humans. For this reason, in the last years many posts and articles in the social and mass media of Mediterranean countries have reported the occurrence of *Lagocephalus sceleratus* and have alerted the citizen on its dangerous **Tetrodotoxin (TTX), a neurotoxin considered to be produced by bacteria in the gastrointestinal tract of pufferfish, can be found in their gonads, gastrointestinal tract, liver, muscle and skin, and is one of the most potent poisons known. Symptoms include nausea and vomiting, dizziness, headache, abdominal pain and progressive muscular paralysis, eventually causing death due to respiratory paralysis.**

Many posts and articles in the social and mass media relates pufferfish species occurring in the Mediterranean Sea (mainly *Lagocephalus sceleratus*) with species used in the traditional Japanese dish "fugu", mainly consumed in Asian countries. As the main delicacy of "fugu" is flesh (i.e. muscle tissue) of pufferfish and given its high toxicity, the selection of species and processing is restricted to the species catalogue listed by the Japanese Ministry of Health, Labour and Welfare, in which all the edible parts of permitted pufferfish species are mentioned.

Notably, **none of the pufferfish species found in the Mediterranean Sea, with the exception of *Sphoeroides pachygaster*, are included in this list by the Japanese Ministry of Health, Labour and Welfare of permitted "fugu" pufferfish species due to their high tetrodotoxin (TTX) concentrations in muscle tissue (flesh) and skin.** However, according to European legislation **(REGULATION (EC) No 853/2004 and REGULATION (EC) No 854/2004)** "**Fishery products derived from poisonous fish of the following families must not be placed on the market in any form: Tetraodontidae, Molidae, Diodontidae and Canthigasteridae"** thus also including *Sphoeroides pachygaster.*

Lionfish (*Pterois miles*) – EDIBLE with caution

The **lionfish *Pterois miles*** was recently reported in the Mediterranean and started spreading fast, establishing itself throughout the entire eastern Mediterranean Sea. The lionfish is a rather voracious predator and an extremely competitive species, causing many problems to both local ecosystems and the native fauna. The venom apparatus of the lionfish consists of 13 dorsal spines, 3 anal spines, 2 pelvic grooved spines and their venom glands. **A single sting can inflict lots of pain, swelling and in extreme cases can even affect the cardiovascular and neuromuscular system, however, its venom is not life-threatening to adult-human.** Care must be taken during fishing and cleaning, as lionfish will use its venomous spines for defense. Nevertheless, when carefully handled, their flesh is edible and rather tasty. Still, their presence along coastlines popular with fishers and tourists constitutes a health hazard.

Marbled spinefoot (*Siganus rivulatus*) and Dusky spinefoot (*Siganus luridus*) – EDIBLE

These species can be found in large schools in the South-Eastern Mediterranean Sea and are currently expanding both northwards and westwards. The venom apparatus of the **dusky and marbled spinfoot** consists of 13 dorsal spines, 7 anal spines, 4 pelvic grooved spines and **their venom glands which rupture and release their contents on penetration. Fishers must be careful when fishing and cleaning** but once carefully handled both species are tasty, attaining high market prices in South-Eastern Mediterranean countries.

Striped eel catfish (*Plotosus lineatus*) – EDIBLE with caution

The **striped eel catfish *Plotosus lineatus*** is a species of Indo-Pacific origin that was introduced through the Suez Canal and is currently found throughout the Levant coast, and has also been reported in Turkey. This is an eel-like species with a brown body, characteristic cream-coloured stripes along the body and 4 pairs of barbels. **It is one of the most venomous species globally, with its venom glands associated with the serrate spines on the dorsal and pectoral fins and its skin secretions contain toxins. Although its venom is rarely fatal, injury causes immediate throbbing pain, followed by cyanosis, numbness and swelling.** Erythema, muscle fasciculations, severe lymphadenopathy and fever are also common. The hand is the most common site of wounds and result from handling the fish after it has been caught. Furthermore, the species is edible with caution.

Nomad jellyfish (*Rhopilema nomadica*) – DANGEROUS

The **nomadic jellyfish *Rhopilema nomadica*** has spread throughout the Levant and was recently reported from Pantelleria, Sardinia and off Sicily, Italy, Malta and Tunisia. In the southeastern Levant it forms huge swarms, 100 km long, each summer since the early 1980s, though small clusters occur throughout the year.

weigh up to 10 kg, while its bell diameter can range from 10-60 cm. It is a tropical species, which was introduced in the Mediterranean through the Suez Canal. **Its venom apparatus consists of nematocyst-laden tentacles. Its sting is painful. Severe systemic manifestation may occur, including shortness of breath, swelling, erythema with papulovesicular eruptions and anaphylaxis.** Swimmers have to be very careful, once stung not to touch their face, as serious effects have been reported on the eyes and lips.

Alien Species in the Mediterranean

Human health hazards of invasive alien species are expected to worsen, benefitting from climate change and the greatly enlarged Suez Canal. In conjunction, these will enable the spread of thermophilic alien species to yet uncolonized regions and admit entrance to additional venomous and poisonous species from the Indian Ocean and the Red Sea.

Alien species that are a concern to human health have recently gained notoriety, but regional assessments have been scarce and only fragmentary information is available. **The lack of Mediterranean-wide quantitative data on medically-treated health impacts is worrying, as ignorance of the extent and severity of these health hazards and their treatment may lead on one hand to medical errors and on the other prejudice risk analyses undertaken by management.**

The littoral countries are called on to prepare themselves for these new health hazards, starting with the education and training of medical staff, tourism industry personnel, marine recreational industry personnel, as well as the general public.

All European Union countries have certain obligations with regard to alien species monitoring, under a European and a global framework including: **the Marine Strategy Framework Directive (MSFD); the EU Biodiversity Strategy, the Regulation (EU) No 1143/2014 and the EcAp process (under the Barcelona Convention) for Mediterranean countries.** These obligations include the effective development of early warning and rapid response mechanisms, the raising of public awareness and the prevention of the further introduction and spreading of marine alien species by identifying the pathways, conducting horizon scanning and identifying the most harmful species.

How to contribute:

You can contribute to the monitoring of alien species in the Mediterranean Sea through one of the following projects.

European Alien Species Information Network (Europe and neighboring countries)

IUCN MedMIS (Mediterranean)

Mediterranean Level projects

CIESM JellyWatch Program

ESENIAS

MAMIAS

Mediterranean Marine Life

Oddfish

Seawatchers

Albania

Invasive Species in Albanian Coast

Cyprus

Is it Alien to you? Share it!!!

RELIONMED

Greece

Archipelagos-Invasive species

ELNAIS

Is it Alien to you? Share it!!!

Italy

ISPRA: alien@isprambiente.it

AlienFish - Ente Fauna Marina Mediterranea

Aliens in the Sea

Occhio alla medusa

LIFE ASAP

Lebanon

"البحر اللبناني - Sea Lebanon"

Libya

Marine Biology in Libya

Malta

Spot the Alien Fish

Turkey

TUDAV Jellyfish monitoring project

Related material:

In the following link you can find material regarding marine alien and invasive species in the Mediterranean in various languages.

Announcement of the Greek Directorate-General for Sustainable Fisheries about Lionfish

CIESM Atlas of Exotic Crustaceans

CIESM Atlas of Exotic Fishes

CIESM Atlas of Exotic Macrophytes

CIESM Atlas of Exotic Molluscs

Do not eat this fish!!!

Is it Alien to you? Share it!!! poster - iSea

Italian awareness campaign on *Lagocephalus sceleratus*

Italian awareness campaign on *Pterois miles*

MedMIS Identification Guide

Lionfish in the Mediterranean - TUDAV

Six sea creatures who invaded in the Mediterranean due to the enlargement Suez Canal

Venomous Jellyfish in East Med and the Lionfish - TUDAV

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Lionfish
iSea
www.isea.com.gr
Venomous spines


Spinefoot


Striped eel catfish