

### MEDAC advice on Invasive Species (NIS) in the Eastern Mediterranean Sea

Considering the EU Regulation 1143/2014 on the prevention and management of the introduction and spread of invasive Non- Indigenous Species (NIS) and

Given that:

- By 2018, a total of 957 non-indigenous species (NIS), have been documented in the Mediterranean Sea, (Zenetos, 2019<sup>1</sup>), of which 751 were established by December 2021, (Zenetos 2022<sup>2</sup>) and of which the majority (775) are in the eastern Mediterranean Sea (Zenetos 2019);
- The Mediterranean Sea is the most invaded sea in the world. Increase in NIS is due to its wide temperature range, degraded habitats, high volume of shipping traffic and occurrences of aquaculture units, as well as man-made constructions, namely the Suez Canal, that allowed the movement of tropical species from the Red Sea into the Mediterranean (Zenetos et al. 2017)<sup>3</sup>;
- Marine invasive species may have negative socio-economic impacts on coastal societies, affecting ecosystem services such as food provision, tourism and recreation (Katsanevakis et al., 2014)<sup>4</sup>;
- The eastern area of the Mediterranean Sea is brimming with non-indigenous species, i.e. species that have travelled, often over large distances, and taken root in new waters. These species include fish, jellyfish, snails, prawns, urchins etc, making the subregion a hotspot for non-indigenous species (GFCM, 2021)<sup>5</sup>;

Given that the main vectors for NIS introduction into the Mediterranean Sea include:

- The Suez Canal: as the main pathway 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, and of non-indigenous species of Atlantic origin.
- Intentional or unintentional introduction by humans: this kind of introduction generally occurs for aquaculture purposes.

<sup>1</sup> Zenetos A (2019) Mediterranean Sea: 30 Years of Biological Invasions (1988-2017). In: Langar H, Ouerghi A (eds), Proceedings of the 1st Mediterranean Symposium on the Non Indigenous Species (Antalya, Turkey, 18 January 2019). SPA/RAC, Tunis, pp 13–19.

<sup>2</sup> Zenetos, A., Albano, P. G., Garcia, E. L., Stern, N., Tsiamis, K., & Galanidi, M. (2022). Established non-indigenous species increased by 40% in 11 years in the Mediterranean Sea. *Mediterranean Marine Science*, 23(1).

<sup>3</sup> Zenetos A, Çinar M E, Crocetta F, Golani D, Rosso A, Servello G, Shenkar N, Turon X, Velarque M (2017). Uncertainties and validation of alien species catalogues: the Mediterranean as an example. *Estuarine, Coastal and Shelf Science* 191: 171–187, <https://doi.org/10.1016/j.ecss.2017.03.031>

<sup>4</sup> Katsanevakis, S.; Wallentinus, I.; Zenetos, A.; Leppäkoski, E.; Çinar, M.E.; Öztürk, B.; Grabowski, M.; Golani, D.; Cardoso, A.C. (2014). Impacts of marine invasive alien species on ecosystem services and biodiversity: A pan-European review. *Aquat. Invasions*, 9, 391–423.

<sup>5</sup> Öztürk, B. 2021. Non-indigenous species in the Mediterranean and the Black Sea. Studies and Reviews No. 87 (General Fisheries Commission for the Mediterranean). Rome, FAO. <https://doi.org/10.4060/cb5949enhttps://www.fao.org/3/cb5949en/cb5949en.pdf>

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- Minor vectors: aquariums, fish baits, recreational boats, among others.

The Mediterranean region is warming 20 % faster than the global average with sea temperature expected to rise by 3.5 degrees Celsius in the next 70 years, according to a United Nations' Environment Programme Mediterranean Action Plan (UNEP/MAP) report produced by Plan Bleu, a UNEP/MAP regional activity centre.

NIS, and fishes in particular, are able to survive in Mediterranean waters due to a variety of factors, including:

- Tolerance for a range of environmental conditions: Invasive fish species are often able to tolerate a wide range of environmental conditions, including temperature, salinity, and pH, which makes it easier for them to establish themselves in new habitats.
- Adaptability: Invasive fish species are often able to adapt quickly to new environments, allowing them to compete effectively with native species and exploit new food sources.
- Lack of predators or parasites: In some cases, invasive fish species may be free of predators or parasites in their new environment, which allows their populations to grow rapidly.
- High reproductive rates: Invasive fish species often have high reproductive rates, which allows their populations to grow quickly and compete effectively with native species.
- Strong competitive ability: Invasive fish species often have strong competitive abilities, which allows them to outcompete native species for resources such as food and habitat.

All these factors can make it easier for invasive fish species to survive and thrive in Mediterranean waters.

As a result, they can have significant impacts on the native fish populations and the ecosystem, making it important to take steps to prevent their introduction and manage their populations if they become established.

Invasive fish species can have significant long-term effects on fisheries in the Eastern Mediterranean. These effects are in most cases negative and include:

1. Competition with native species: Invasive fish species can compete with native species for resources such as food and habitat, which can **reduce the productivity and profitability of fisheries**.
2. Predation on native species: Invasive fish species may also prey on native species, which can **reduce the populations** of those species and **impact the overall structure of the ecosystem**.
3. Changes in food webs: The introduction of invasive fish species can **alter the structure of the food web**, which can impact the entire ecosystem and reduce the productivity of fisheries.
4. Reduced biodiversity: The establishment of invasive fish species can lead to a **reduction in the biodiversity of the ecosystem**, which can impact the resilience of the ecosystem and its ability to adapt to changing environmental conditions.
5. Economic impacts: Invasive fish species can **have significant economic impacts on the fishing industry**, reducing the catch and profitability of traditional fisheries.

In addition, NIS may provide new opportunities, and since they cannot be eradicated, they can be viewed as a resource that can partially alleviate income losses and fishing can act as an attempt to limit the population increase in established NIS.

In this context, the Eastern Mediterranean experience has shown, during the last two decades where the subject has become more pronounced, that:

1. Consideration should be given to managing NIS which become commercially important. Fisheries communities create a dependence, as in the case of Siganids in Cyprus, on this new resource, where

this is possible. Long term sustainability of the fishery, as opposed to uncontrolled exploitation by both commercial and recreational users may not be sustainable in the long-term. It is possible, that with the correct management, promotion and exploitation of some NIS species, consumer pressure on indigenous species may be decreased.

2. It is possible that NIS create a more 'tropical' underwater scene which boosts the tourist's interests, especially the diving industry e.g. *Pterois miles* (Lionfish).
3. It is possible to create opportunities for parallel sources of income for fishers, i.e. utilisation of species for production of items (e.g. handbags and jewellery) or extraction of chemicals utilised in other industries (*Lagocephalus sp.* - pufferfish).
4. It is possible to diversify traditional fishing activities by combining NIS fishing with fishing tourism as a new source of income to fishers and an eco-friendly fishing activity (e.g. targeted removal of invasive species).
5. There is a possibility for recreational fisheries fishing competitions in to target species selectively at a local level and limit the quick expansion potential of specific NIS .
6. Selective fishing of NIS should be allowed in No-Take Marine Protected Areas under strict control and special licensing (such as the case of *Lagocephalus sceleratus* in Cyprus) where an ecological risk assessment shows that benefits outweigh risks for fish populations in the respective NTZ.

All these measures can have significant short and long-term impacts on fisheries in the eastern Mediterranean, making it important to take steps to prevent the spread of invasive fish species, in particular, and to manage their populations. This can include measures such as early detection and rapid response, effective control and removal measures, and the development of sustainable management practices that take into account the potential impacts of invasive fish species on the ecosystem and the fishing industry.

**It is the MEDAC's view that:**

- a) A Review of the current EU legislation in general, that provides obstacles to the utilisation, trade, removal methods and control measures is needed. This should include a solid stakeholders' consultation.
- b) An in-depth assessment of the knowledge relating to NIS, is needed.
- c) Consideration should be given to the effective ways that impact NIS, and invasive populations. Fishing methods can be utilised effectively to limit expansion as well as population size. New removal methods that do not impact other species should be developed and tested. Priority should be given to testing methods proven successful in other regions with similar species e.g. *Pterois sp.* in the eastern United States of America.
- d) Where commercialisation of NIS is possible this should receive the relevant importance, support and promotion. A market analysis and ecological impact assessment of commercialisation of selected NIS should be supported to evaluate the chances and risks of commercialisation of NIS. Based on the results, commercialisation of NIS could then receive adequate support and promotion.
- e) Lessons learned on effective control and removal measures should be shared through targeted consultations and exchanges with Mediterranean stakeholders in order to maximise the effectiveness and preparation of other countries to possible NIS invasions and management strategies.

- f) A NIS Observatory in Eastern Mediterranean<sup>6</sup>, as agreed by the GFCM CPCs during the 45<sup>th</sup> Annual Session in Tirana, must have close collaboration with EU Member States in the region, not only at a scientific level, but within the stakeholders (fishing industry itself, including Small Scale Fishers which are particularly impacted, recreational fishers and the Other Interest Groups). This Observatory would act, amongst other things, as an early warning and Competence Centre for monitoring, advising and managing the impacts of invasive species in the region relating to both the environment and fisheries. The NIS Observatory activities should include the contents listed above (from “a” to “e”).
- g) The NIS Observatory should be operative the sooner the better to start the collection and analysis of data on invasive species, develop management strategies and disseminate information to stakeholders and the public.
- h) In light of the problem with the invasive lionfish in the Eastern Mediterranean, and following the example of the United States of America (and other countries of the American continent, that have an Atlantic border and the lionfish invasion problem), MEDAC suggests<sup>7</sup> a derogation in the case of the removal for the control of invasive species, such as lionfish, to Annex IX Part C, paragraph 7, of the Regulation (EU) 2019/1241 of the EP and of the Council of 20 June 2019, that prohibits “*to fish with spear guns if used in conjunction with underwater breathing apparatus (aqualung) or at night from sunset to dawn*”, providing that in order to limit the expansion of NIS species, such fishing activities may be authorised under the following exclusive conditions:
- 1) scientific research defining species, ranges and catch ceilings;
  - 2) fishing activity carried out under strict control of the competent authorities;
  - 3) presence of licence fishing authorisation.

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<sup>6</sup> **MEDAC opinion on invasive species and algae Ref.:238/2020:** “...1. Constituting and developing an **international coordination centre** and a Mediterranean warning network to detect, monitor and manage invasions. The centre should be based or have monitoring centres close to the entry points of invasive species, such as Strait of Gibraltar or the Suez Canal. Then, for example in Eastern Mediterranean they should be located in Cyprus or Greece.”...

<sup>7</sup> **WWF and Medreact** cannot support the proposal to derogate such a regulation, exposing to an unacceptable risk of opening loopholes to the system. **WWF and Medreact** would instead support any pilot or research on adaptations of conventional fishing gears to increase inter-species selectivity to target NIS. There might be a more efficient way to catch Lionfish for example, instead of targeting one at the time.