

# Case Studies of introductions of Alien Species through Ballast Water in the Mediterranean Sea

*SAFEMED IV Project: Training on Implementation & Compliance of the IMO's Ballast Water Management Convention for Tunisia*



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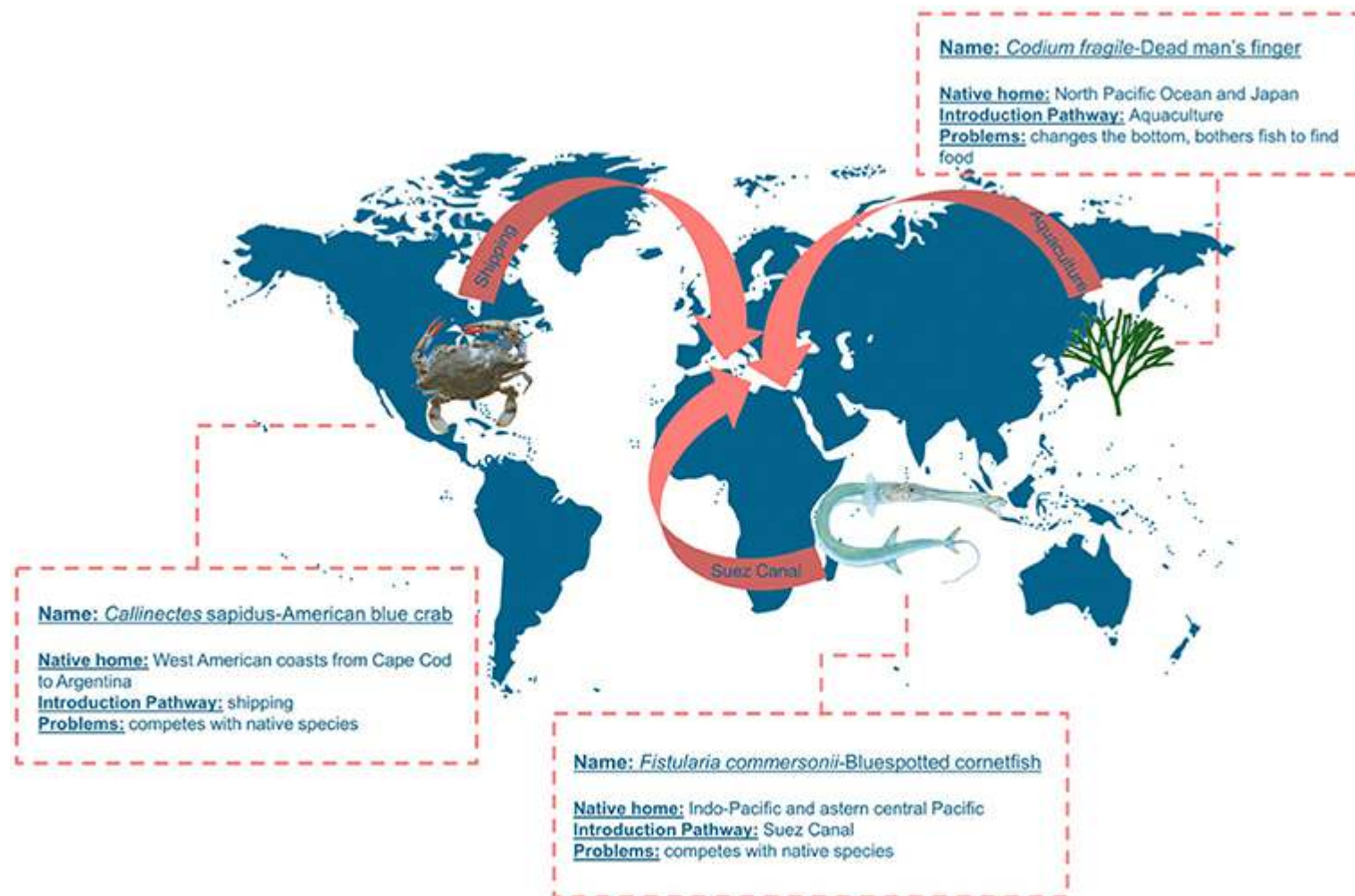
Unit 1.1: Sustainability

Lisbon - remotely / 13<sup>th</sup> and 14<sup>th</sup> October  
2021

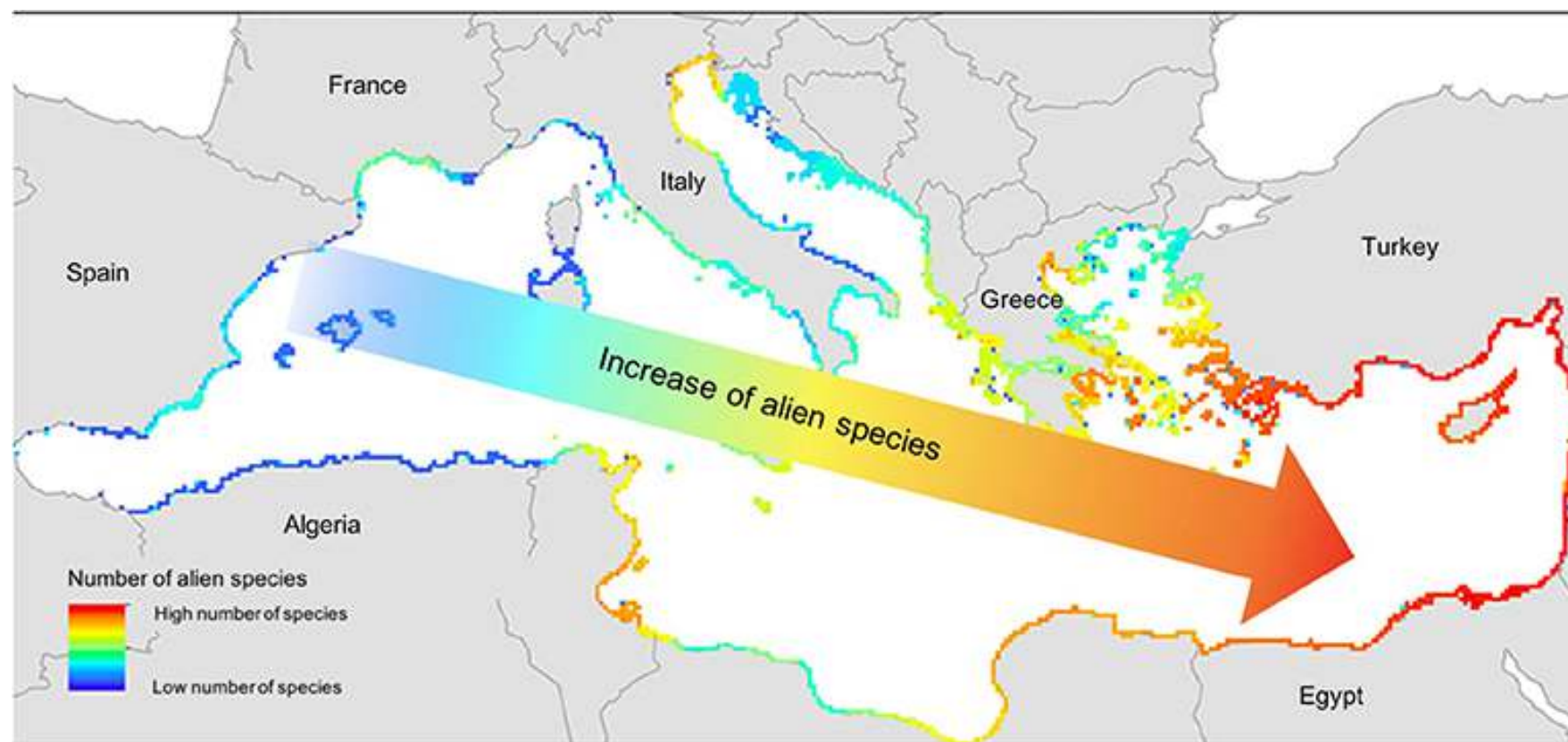
# What is an Invasive Species?



- Not all alien species are invasive.
- Outcome of a series of low-probability events.
- Some form a community
- Some fit in with ecosystem
- To become invasive, a species must follow three steps: introduction, establishment, and spread.
- Williamson's 'Tens Rule'
  - 10% of these species succeed
    - (i) from being simply imported to successfully introduced,
    - (ii) from being introduced to becoming effectively established, and
    - (iii) from being established to becoming harmful for other species and to biodiversity in general.
- Disturbed habitats are generally more vulnerable to invasion



According to a recent REMPEC Study, vessel-introduced non-indigenous species have been estimated to account for 26% of all species introduced in the Mediterranean.



# Lionfish – (*Pterois miles*)





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From: South Pacific and Indian Oceans; 2012 found in Cyprus

Feeds on a huge variety of prey;

Few natural predators – Moray Eels and Sharks;

Venomous spines;

Voracious predators – stomach can expand up to 30 times;

100 fish per hectare;

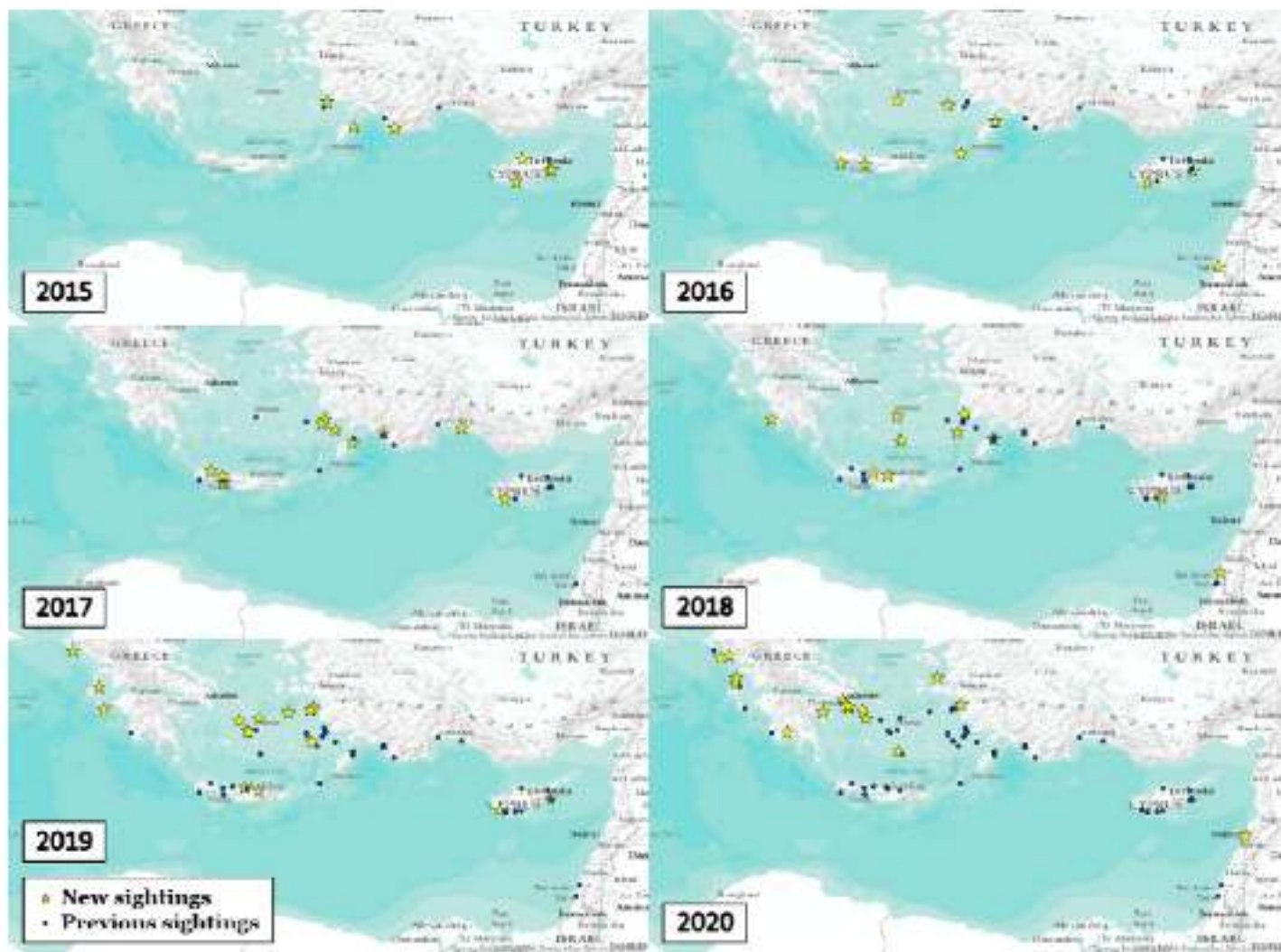
Spawn every two to three days;

Planktonic larvae;

- introduced through ballast or home aquariums

Remediation: Recreational  
Divers, Trapping, Remote Culling  
Development of New Fisheries





Phillips et al  
Wageningen  
University

Figure 2. Lionfish sightings by year

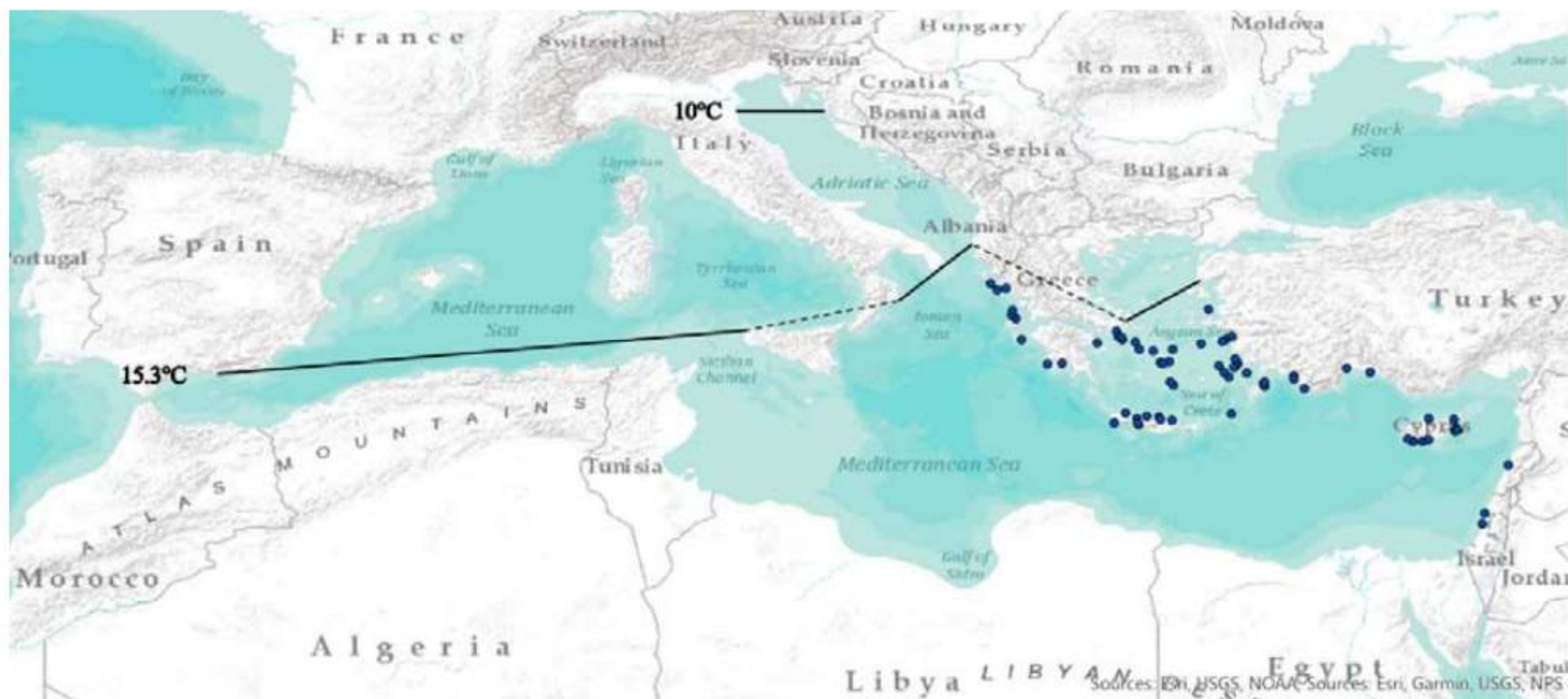


Figure 3. Thermal boundaries to invasion expansion



# American Blue Crab (*Callinectes sapidus*)



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- Ebro Delta – between Barcelona and Valencia 2012
- No known predators, high fecundity 8 million Eggs x 9 times per year
- Hard short claws and strong jaws - extremely aggressive
- “Devours everything”
- Sea to Fresh Water for reproduction
- Suited to warmer temperatures of the Mediterranean
  - – inactive in colder climates
- Limited Predators – Octopus
- Crabs destroy the fishing nets and pots
- all over the Mediterranean
- Fishery in Tunisian Waters
  - Appeared in 2014, wreaked havoc among the local species and destroyed fishing nets.
  - Jan-Aug 2019 1,450 tonnes of blue crab worth €3m
- Ebro Delta – 1tonne a day





# *Rugulopterix okamurae*



# *Rugulopterix okamurae*

- From China, Korea, the Philippines and Japan;
- Moved by ballast water;
- Identified for the first time in Ceuta in North Africa in 2015;
- Looked like local species of algae;
- No predators, it is able to attach itself to rocky ground up to 25 meters deep;
- Takes up the space used by many animals;
- Affects the tourism industry.
  - 50 cm tall blankets of rotting algae
  - 2,800 tons of seaweed collected six weeks.
- Tarifa - 600 meters of the beach, cost €10,000
- Comes back!
- Collects in fishing nets – thrown back and re-distributed







**Any questions?**

**Thank you!**

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