Monitoring and management of the native Mediterranean killifish (Aphanius fasciatus) and introduced fish species in the poikilohaline environment of the Akrotiri Peninsula, Cyprus

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Structure of presentation

• Introduction
• Identification of fish and fisheries issues
• Initiation of mapping and monitoring programme
• Potential management measures
• Summary
The project

- Assessment of current and future Invasive Alien Species in Cyprus (RIS-KY)
- Darwin Plus: Overseas Territories Environment and Climate Fund
- 1 April 2017 to 31 March 2019
- WP1: Horizon scanning
- WP2: Surveillance of species distributions
- WP3: Biosecurity and capacity building
The location
The location
A complex poikilohaline environment

Freshwater channels
Saline pools
Freshwater channels
Identification of fish and fisheries issues
Literature searches and stakeholder workshops

- WP1: Horizon scanning
Mosquito (*Aedes detritus*)
Eastern mosquitofish (*Gambusia holbrooki*)

Mother Nature’s Mosquito Control

Use mosquitofish to reduce mosquito populations and the risk of getting West Nile virus.

Just one bite:
One bite from an infected mosquito can cause a deadly illness in humans. While most people won’t get sick, about 1 in 5 will develop flu-like symptoms that could last months – 1 in 150 will develop a potentially fatal, neurological disease.

How mosquitofish help:
- Mosquitofish – the *Gambusia affinis* – are a natural mosquito predator and eat aquatic bugs, including mosquito larvae and pupae.
- Used correctly, they are an efficient, cost-effective, and environmentally friendly method to reduce mosquito numbers and mosquito-borne diseases.
- The Coachella Valley Mosquito and Vector Control District uses mosquitofish in non-working swimming pools, ornamental ponds, ditches, and stormwater basins.

Are they right for you?
Contact the District to see if mosquitofish can prevent mosquitoes in your backyard, and if so, arrange pick-up or delivery at no charge.
Unconsented introductions to St George’s Pool

European seabass (*Dicentrarchus labrax*)

Flathead grey mullet (*Mugil cephalus*)

Seabream (*Diplotus sp.*)
Mediterranean (Banded) killifish (*Aphanius fasciatus*)

*Saving the Cyprus Killifish*

Despite competition from invasive species, and man-made destruction on all sides, one fish clings tenaciously to existence – but for how long?

(NERC: Science of the Environment)
Initiation of mapping and monitoring programme
Selection of standard sampling technique

- WP2: Surveillance of species distributions
Standard sampling protocol

- Thanks to Gareth Davies of Environment Agency
- Flash Fishing Tackle Trap A25
- Baited with single Dynamite Baits 21 mm Halibut Pellet
- 5 traps set overnight
- Catch identified, sexed (where possible), measured and returned alive
- Initial surveys to 26 February to 1 March 2018
Standard sampling protocol
Standard sampling protocol

- Contemporary measurements of temperature, dissolved oxygen and conductivity
Initial results

- *Aphanius* catches of 0 to 71 individuals per trap
Initial results
Initial results

- *Gambusia* catches of 0 individuals per trap
Initial results

- *Gambusia* catches of 0 individuals per trap
Initial results

- *Gambusia* catches still of 0 individuals per trap

- *Gambusia* catches of 0 to 15 individuals per trap

- Further surveys 8 March, 13 and 27 April, 3 and 4 May 2018
Combined results

No catch
An encouraging sign of coexistence of *Aphanius* and *Gambusia*
Aphanius, Gambusia and conductivity

- An encouraging sign of coexistence of Aphanius and Gambusia
Potential management measures

- *Gambusia* are no longer stocked in the Akrotiri Sovereign Base Area
- However, introduced populations persist and new introductions continue in external but connected waterways
- Awareness raising of dangers of *Gambusia* introductions
- Advocacy of *Aphanius* as a native agent for mosquito control
- Reduction/removal of introduced European sea bass, flathead grey mullet and seabream from the key *Aphanius* site of St George’s Pool
- Continued investment in *Aphanius* refuge populations
- Increased awareness of the conservation importance of *Aphanius*
Potential management measures

Arctic charr (*Salvelinus alpinus*)

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Summary

- *Aphanius* is threatened in many parts of its Mediterranean distribution.
- In the poikilohaline environment of the Akrotiri Peninsula in Cyprus, its distribution is now largely limited to higher conductivity sites which remain free of introduced *Gambusia* and support abundant *Aphanius* populations.
- However, several such sites dry out during the summer and the largest persistent site has recently received unconsented introductions of potential predators of *Aphanius*.
- Encouragingly, at least one freshwater site still supports both *Aphanius* and *Gambusia*. 
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