Red handfish conservation

Population + habitat restoration

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Marine Biodiversity Hub

Handfish Conservation Project

NATIONAL GEOGRAPHIC

CSIRO

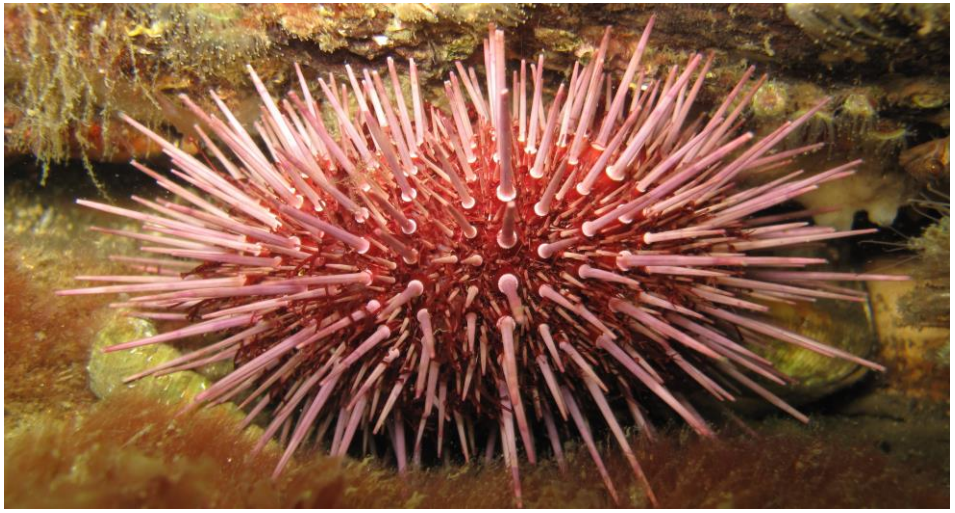
RED HANDFISH

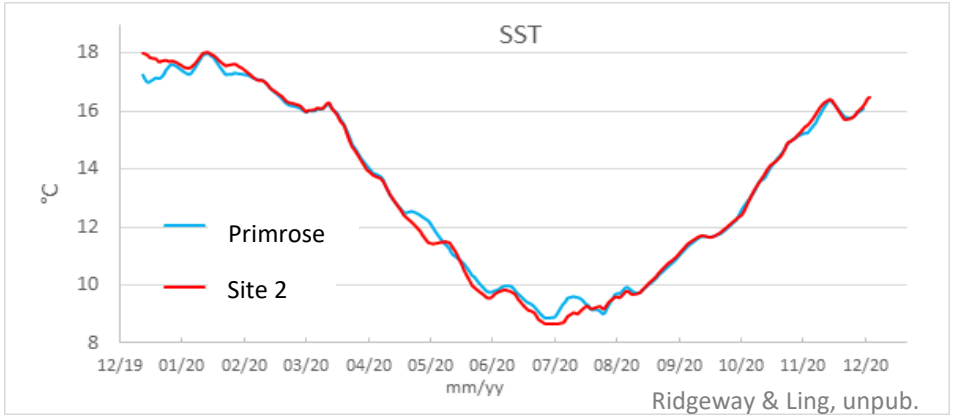
Thymichthys politus
Critically Endangered

- Small, marine anglerfish
- Modified pectoral fins
- Endemic to Tasmania
- Shallow rocky reefs - seaweed & seagrass
- Two small populations near Hobart
- Protected EPBC Act & Living Marine Resources Act

THREATS

- Habitat loss/degradation
  - Trophic cascade (removal of lobsters) resulting in increases in *Heliocidaris erythrogramma* and overgrazing of seaweed
  - Pollution/siltation/urban development/nutrients
- Climate change (temperature trap)
- Human disturbance – boating/anchoring, divers
- Small, fragmented populations





Ridgeway & Ling, unpub.

VULNERABILITIES

- Low reproductive output (few eggs)
- Limited dispersal capability
  - No planktonic life stage
  - Locomotion via walking
- Threats across entire range
- Low genetic diversity (presumably)

Image: Olivia Johnson

RECOVERY PLAN & TEAM

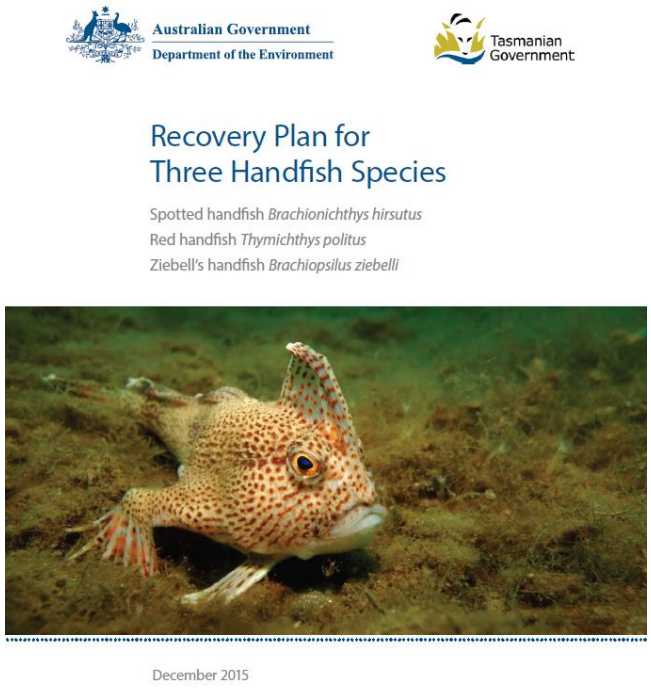
Guiding research & conservation

Recovery plan objective:

- Increase the understanding of the biology and ecology handfish in order to conserve, and contribute to the species recovery

Recovery strategies:

- Increase spawning success
- Reduce impacts
- Options for active management
- Improve knowledge (distribution, abundance, population trends)
- Increase understanding of habitat health and threats
- Encourage community participation in the conservation of handfish

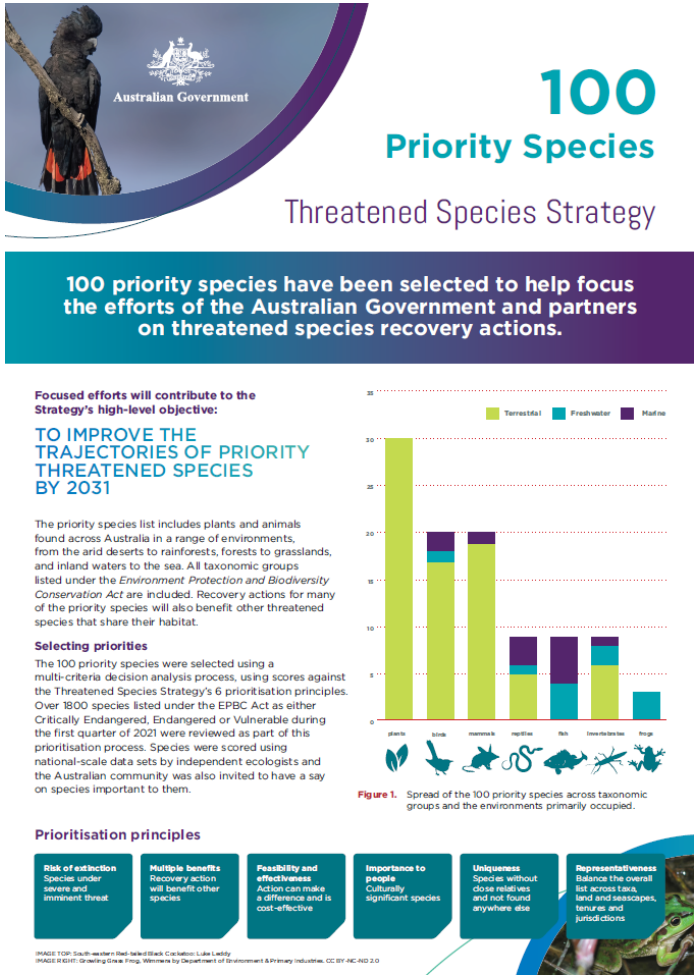


COMMONWEALTH PRIORITY

Top 100 priority threatened species (2021)

Commonwealth Oceans Leadership package (2022)
- Aquaculture
- Population monitoring
- Best Prac Guidelines

NRM South – Environment Restoration Fund (2022)
- Habitat monitoring
- Habitat restoration



CONSERVATION MEASURES

Combination of monitoring of wild populations, aquaculture (to improve juvenile survival), mitigating key habitat threats, habitat restoration trials, and diver awareness.

POPULATION MONITORING

Combination of Reef Life Survey transects (50x1m), and Bessell PhD surveys (50x3m)

Fish size, location, habitat & substrate type, photo ID

Population estimate, movement, habitat use, other observations

(Image: Tyson Bessell)

POPULATION ESTIMATE

Mark-recapture approach to estimate abundance (from 3 years' observations, Bessell PhD & Reef Life Survey transects)

- 397 observations

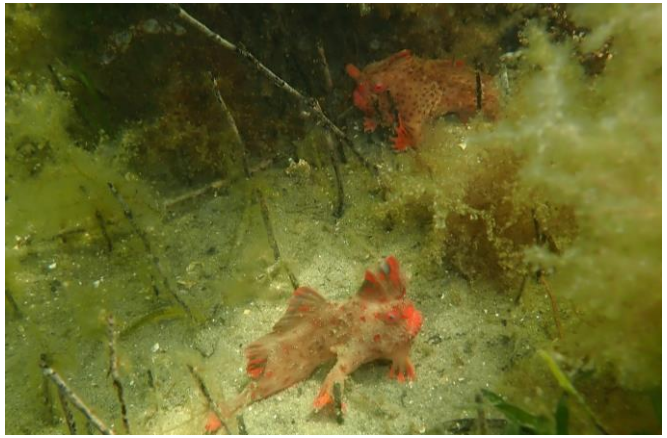
Abundance (adults)

- Site 1: 7 (95% CI 5-10)
- Site 2: 94 (95% CI 40-231)

Site 1: ~1,000 m^2
Site 2: ~3,000 m^2

Movement:

- Mean movement 26.7m/year
- Greatest distance moved was 99.5m/year
- 12 of 54 resightings were found 10m from original sighting



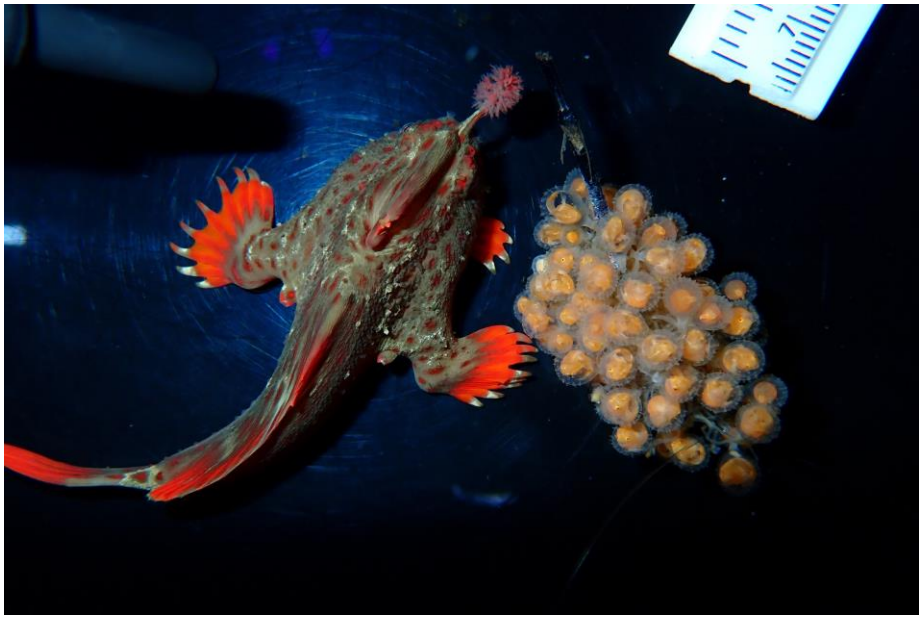
(Bessell *et al*., in review)

POPULATION RECOVERY EFFORT

Head-starting strategy

Aim: improve juvenile survival

- Protection during early life stages
- Ideal conditions for growth/survival



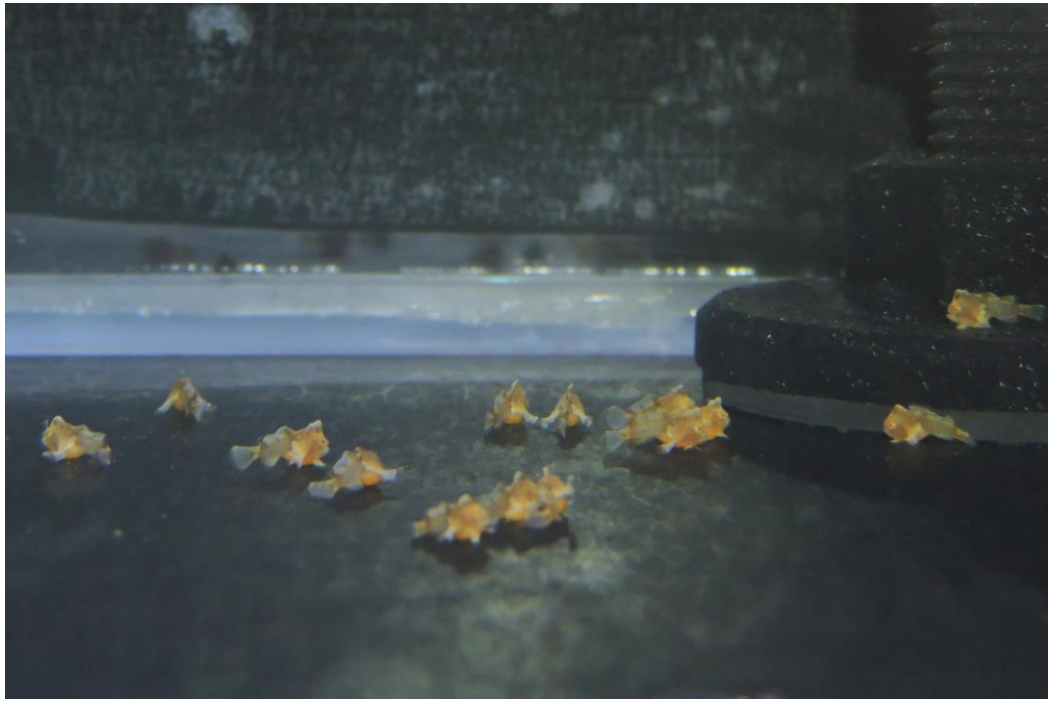
Limitations:

- Cannot tell males & females apart (i.e. cannot rely on captive breeding – need to collect fertilized eggs from wild)
- Funding and ability to properly acclimate fish before release

HEAD-STARTING

Year	Egg collection	Survival @1year	Survival @2yrs	Released (2020)
2018	1.5 clutches	50 hatch, 16 survived		8
2019	2 clutches	71 hatch, 51 survived	10 (@ 3years)	34
2021	2 clutches	134 hatched, 93 survived		
2022	1 clutch**	24 hatched, 15 survive (4 mo)		

**first captive breeding event



Post release survival – still processing data, likely low – but an individual at least 7 months post-release

Had limited pre-release acclimation resourcing

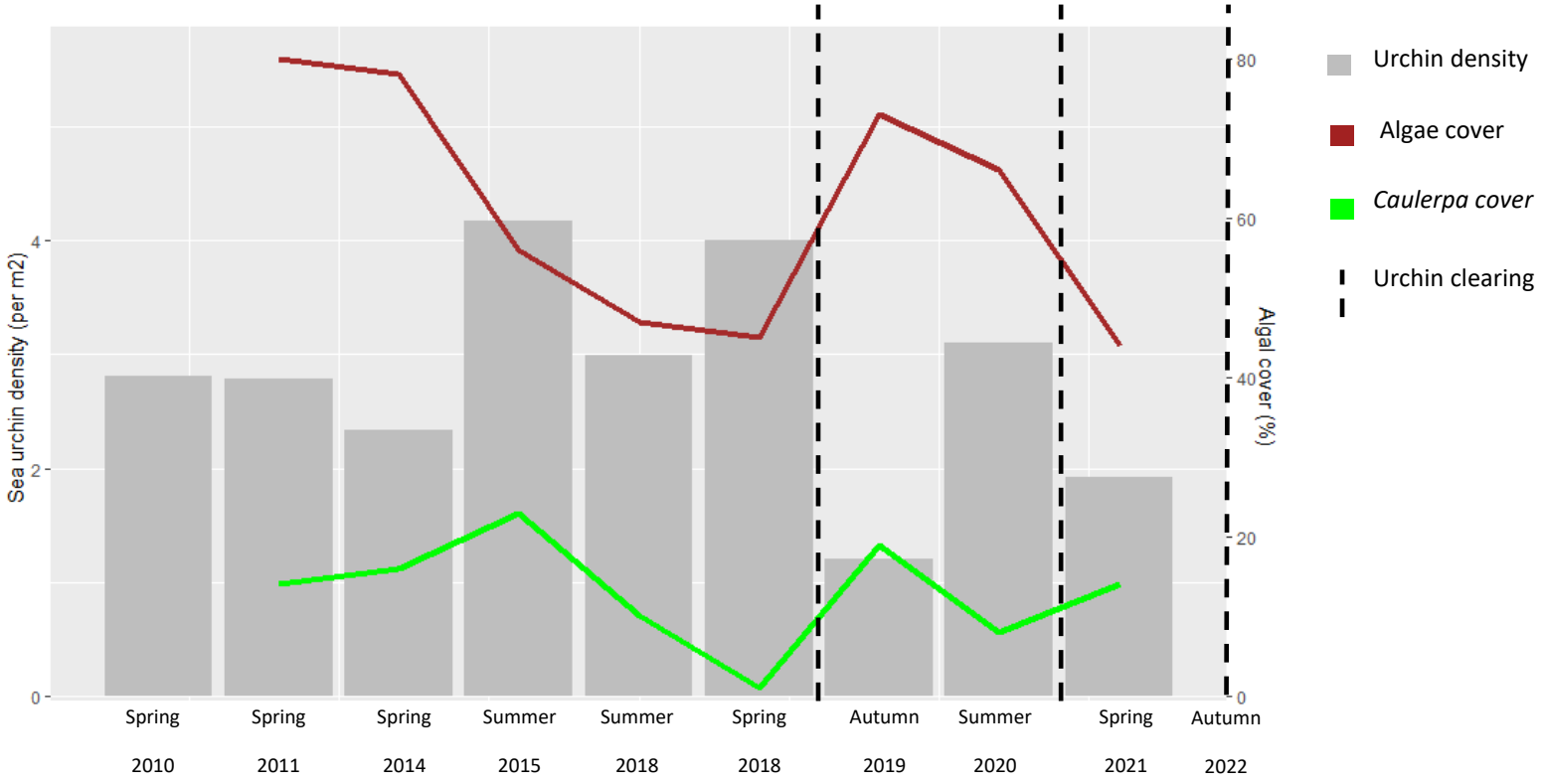
Limitations revisited

- Cannot tell males & females apart (i.e., cannot rely on captive breeding – need to collect fertilized eggs from wild)
- Funding and ability to properly acclimate fish before release

HABITAT MANAGEMENT: RESTORATION

Urchin removals conducted

- Site 1 2018 (~6000 urchins from within site; (~4 m^2 to 1 m^2)
- Both sites 2020 (around sites) ~17000 urchins
- Site 1 2022 (~6000 urchins)



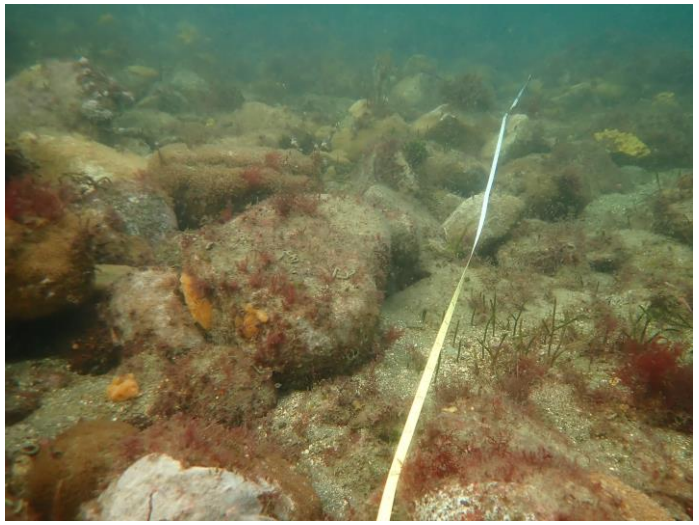
HABITAT MANAGEMENT

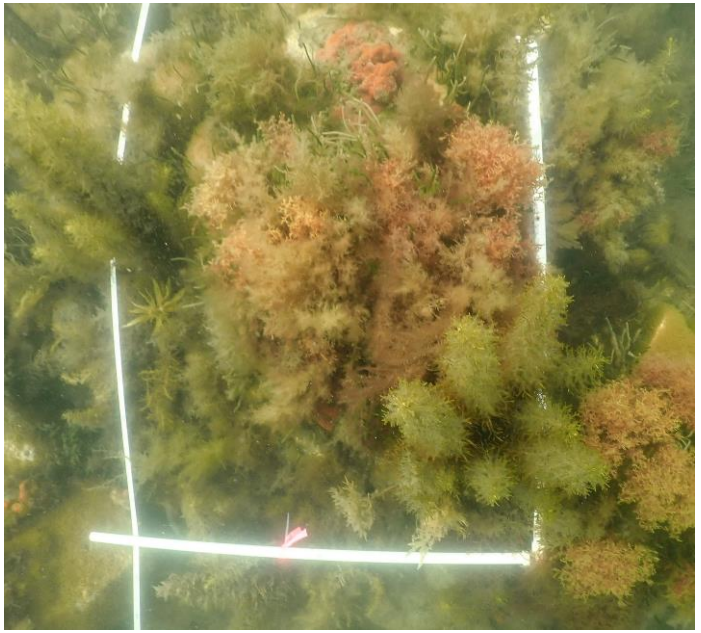
Seaweed translocation (attached to boulders from nearby area)

To urchin barrens adjacent to handfish sites – assess persistence as an avenue/technique for accelerating habitat restoration

In combination with urchin removals

(Project underway)





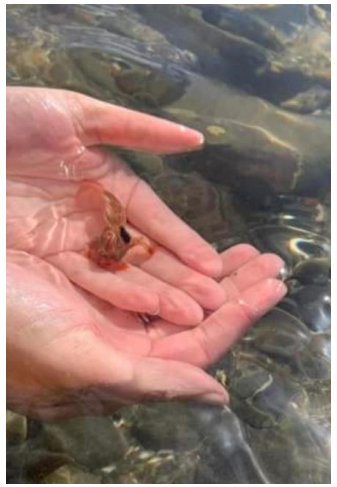
(Cayne Layton, Victor Shelamoff, Tyson Bessell, & Olivia Johnson)

BEST PRACTICE GUIDELINES

for diving & snorkelling with handfishes

Partnered with local dive groups/shops/community to develop some best practice guidelines for diving/snorkelling with handfishes

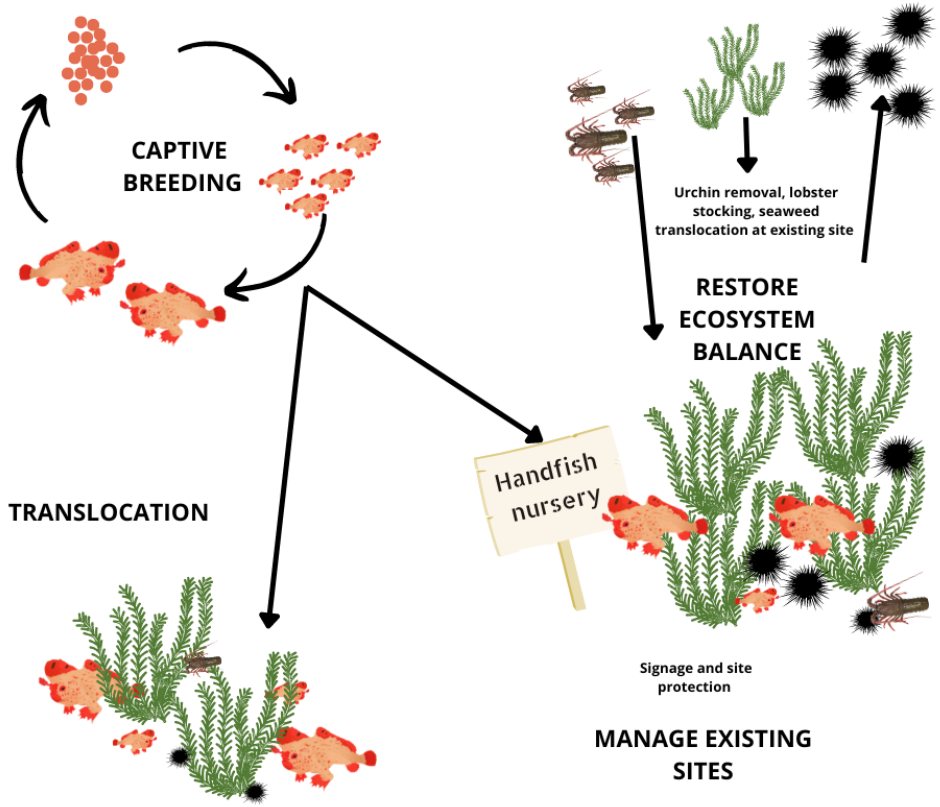
- Create awareness/education/stewardship
- Safeguard handfish/habitats by providing practical ideas for minimising disturbance



(Illustrations: Ella Clausius)

FUTURE

- Continued head-starting – refining pre-release protocol/conditioning
- Captive-breeding/insurance population (incl genetics)
- Continued habitat restoration
- Exploring options for translocation
- Continue to work with local authorities to implement site protection to facilitate sustainable recovery



ULTIMATE NEED: habitat management to restock natural urchin predators (rock lobsters) back to existing sites, and protection to allow them to remain and restore ecosystem balance

THANK YOU

handfish.org.au

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SEAHORSE WORLD
A world first in Tasmania

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