
2022 Australian Wildlife Society

University of Technology Sydney Australian Wildlife Society Wildlife Ecology Research Scholarship Recipient



Aquarium Bred and Released Seahorses as a Conservation Method for the Endangered White's Seahorse, *Hippocampus whitei*

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White's seahorse (*Hippocampus whitei*) is a seahorse species endemic to the east coast of Australia. The species is relatively small, reaching a maximum length of sixteen centimetres and incredibly good at blending into their environment. They can effectively camouflage with their habitats and can be seen in a range of colours from yellow to orange to brown (the name White's seahorse comes from John White, the surgeon general of the first fleet – not their colour).

Like most seahorse species, the White's seahorse is a relatively poor swimmer. They spend most of their time using their prehensile tail to hold on to their habitats and display extraordinary site fidelity and habitat attachment. They rely on the availability of key habitats, such as seagrasses and soft corals, for anchorage and protection through camouflage.

Unfortunately, human activity, dredging, installation of moorings, and climate change implications have significantly impacted the habitats of the White's seahorse. Habitats that the White's seahorse have been shown to prefer, including the seagrass (*Posidonia australis*) and the soft coral (*Dendronephthya australis*), have declined at alarming rates. This decline has subsequently impacted the populations of White's seahorses; without suitable habitat, the seahorses cannot survive. In areas such as Port Stephens in New South Wales, where habitats have been drastically lost, White's seahorse populations have declined by upwards of ninety percent across their range. It is estimated that the number of seahorses has reduced by up to fifty percent.

Due to these alarming population declines, the White's seahorse has been listed as an Endangered species by the

International Union for the Conservation of Nature Red List of Threatened Species and in Australian state and federal legislation. It is clear that positive intervention is needed for the species to persist.

The research project aims to develop and refine conservation methods for the species and is doing so using two key methods. The first method is to provide critical habitat to White's seahorse populations. The second method is to restock wild seahorse populations through a breed-and-release program, a novel approach for marine fish and syngnathid conservation.

The provision of habitat is key to enabling seahorses to persist at

Top: Mitchell Brennan is a PhD Candidate with the Fish Ecology Lab at the University of Technology Sydney. He is a passionate marine scientist interested in threatened species, marine fish ecology, and conservation. Image: Tom Burd.



A seahorse on a seahorse hotel. Image: Tom Burd.



Seahorse hotel with divers. Image: Tom Burd.

their current sites and allow wild populations to recover. We have designed and installed a unique artificial habitat named 'Seahorse Hotels'. The metal cage-like structures are installed onto sandflats adjacent to existing seahorse habitats, such as seagrasses, and provide the seahorses with the holdfasts they require to grasp with their tail. Over time, the structures accumulate marine growth, including algae, bivalves, and sponges, which also brings small crustaceans such as amphipods and shrimps – a seahorse's primary diet. The metal slowly corrodes, and eventually, the marine growth will stand alone, leaving behind a small semi-natural reef that the seahorses can continue to use as their habitat. Meanwhile, research is being conducted with positive results on restoring their natural habitats through seagrass replanting and coral translocations. Together, the artificial habitat provision and habitat restoration will provide White's seahorses with a suitable place to live.

We aim to restock White's seahorse populations by breeding and releasing juvenile seahorses. Adult seahorses are collected locally and bred in specially designated aquarium facilities, including a new project at the Sydney Institute of Marine Science (SIMS) in Mosman. Male White's seahorses give birth to live young or 'fry', and can birth up to 150 fry in a single brood. Breeding occurs throughout the summer months from October through to February-March, and each male may have several broods throughout the season. Once born, the fry is approximately one centimetre long and, unfortunately, readily predated by other marine fishes and cephalopods. Juveniles will be reared until they are larger, approximately five centimetres, then released back into the wild – to increase their survival and replenish the wild populations. This project will focus on understanding the optimal



A wild White's seahorse (*Hippocampus whitei*) on a seahorse hotel. Image: Tom Burd.

husbandry methods (such as ideal temperatures and food types) for rearing juvenile seahorses to improve their growth rate and performance and ideally lead to greater survival of seahorses once they are released into the wild.

To monitor the success of the breeding program, the seahorses will be tagged before their release using a Visible Implant Fluorescent Elastomer (VIFE) tag. The tag is a polymer injected just below the skin of the seahorse. Using combinations of various colours and body placements on the seahorse, each individual is given an identifiable tag combination. Through regular SCUBA diving and an exciting upcoming citizen-science monitoring effort, we can identify released juveniles in the

wild to determine their survival and analyse how they use the habitats onto which they are released.

Looking to the future, we hope that the two conservation methods being designed and implemented provide the foundational work in driving the successful recovery of White's seahorse populations and that the long-term persistence and survival of the species are successful.

FUNDS PROVIDED BY THE AUSTRALIAN WILDLIFE SOCIETY will be used for equipment assisting in the in-situ SCUBA diving surveys, which monitor White's seahorse populations in Sydney Harbour and released captive-bred seahorses.



Mitchell Brennan with seahorses to be released. Image: SEA LIFE Sydney Aquarium.



Mitchell Brennan conducting a SCUBA diving seahorse survey. Image: Tom Burd.