Fisheries Scientific Committee

Student research grants for threatened (or potentially threatened) fish and marine vegetation in NSW

Information for applicants

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Background

The Fisheries Scientific Committee (FSC) is established under Part 7A of the *Fisheries Management Act 1994* (the Act), as an independent scientific body. One of the main functions of the FSC is to assess nominations for listing (or de-listing) threatened species, threatened populations and endangered ecological communities of fish (as defined under section 5 of the Act) and marine vegetation. The FSC also assesses the listing of key threatening processes (KTPs). At times, this task is made difficult by the absence of important scientific data on species distribution, abundance, habitat and ecology. This information is also important for the preparation of the Priority Action Statement and Recovery Plans by the NSW Department of Planning, Industry & Environment.

The FSC will award research funding of up to $3,000 in total aimed at filling gaps in research information for threatened (or potentially threatened) species of fish and marine vegetation in NSW. Grants are intended for use by undergraduate third-year major project students or as part of an Honours, Masters or PhD project.

Applicants may wish to propose a project based on:

1) a species identified in this guide as having a specific research gap in NSW;
2) a species of fish (as defined under the Act) or marine vegetation listed as threatened in NSW; or
3) a species of fish (as defined under the Act) or marine vegetation that has not been mentioned but that the applicant thinks may be under threat in NSW and adequate information is not available.

Grant applications addressing points 1 and 2 above will be considered as the highest priority by the FSC. Applications falling into point 3, however, are also encouraged but should be accompanied by evidence of threat to the species. Grants will not be issued for work on common or alien species or to students applying from institutions outside Australia.

APPLICATIONS CLOSE 11.59pm AEDT Friday 1 November 2019

Please note: Late applications will not be accepted unless a request for an exemption is received and approved in writing by the Chair of the FSC prior to the closing time and only under exceptional circumstances.

Research priorities

The following species and species groups are identified as having significant research gaps relating to their distribution, abundance, habitat or ecology. Grant applications addressing research gaps for these species will be given the highest priority.

- Alpine Redspot Dragonfly - *Austropetalia tonyana*
- Aquatic fauna of the artesian springs ecological community in the Great Artesian Basin
- Australian Grayling - *Prototroctes maraena*
- Cauliflower Soft Coral – *Dendronephthya australis*
- Fitzroy Falls Spiny Crayfish - *Euastacus dharawalus*
- Flathead Galaxias - *Galaxias rostratus*
- Great Hammerhead Shark - *Sphyrna mokarran*
- Greynurse Shark - *Carcharias taurus*
- Macquarie Perch – *Macquaria australasica*
- Marine Slug - *Smeagol hilaris*
- Murray Hardyhead – *Craterocephalus fluviatilis*
- Olive Perchlet – *Ambassis agassizii*
- Oxleyan Pygmy Perch – *Nannoperca oxleyana*
- Scalloped Hammerhead Shark - *Sphyrna lewini*
- Stocky Galaxias – *Galaxias tantangara*
- The Seagrass – *Posidonia australis*

Alpine Redspot Dragonfly

Scientific name: *Austropetalia tonyana*

Family or group: Austropetaliidae

Status: Vulnerable

Research gap:

The Alpine Redspot Dragonfly is one of only three species in the genus *Austropetalia* that are all endemic to Australia. It is a rare species, thought to be restricted to extremely specific habitat areas in the higher altitudinal areas of south-eastern Australia. Due to its specialised habitat requirements and restricted geographic distribution, very little is known about the Alpine Redspot Dragonfly. Anthropogenic threats continue to degrade suitable habitat for the species, raising concerns for its future conservation status. The FSC considers it a high priority to undertake targeted surveys of this species to determine its distribution and abundance.

Aquatic fauna of the artesian springs ecological community in the Great Artesian Basin

Status: Not listed in the *Fisheries Management Act 1994* (listed under EPBC Act)

"The community of native species dependent on natural discharge of groundwater from the Great Artesian Basin" is listed as endangered under the National *Environment Protection and Biodiversity Conservation Act 1999*. Furthermore, "the artesian springs ecological community in the Great Artesian Basin" is listed as a critically endangered ecological community under the NSW *Threatened Species Conservation Act 1995*.

The Fisheries Scientific Committee seeks data on the aquatic faunal communities associated with these springs.

Australian Grayling

Scientific name: *Prototroctes maraena*

Family or group: Retropinnidae

Status: Endangered

Research gap:

Populations of Australian Grayling in NSW have declined substantially, with a substantial southward range contraction and a decline in prevalence at sites occupied as recently as the mid-1990s. The species is obligately diadromous, with adults occupying freshwater habitats, spawning occurring in the lower freshwater reaches of rivers and then larvae occupying marine habitats for 5 - 6 months before migrating back into freshwaters where they remain for the remainder of their lives. Almost nothing is known about their biology during the marine phase of the life cycle. It is suspected that much of the decline in grayling populations is a result of climate induced changes in temperature, river discharge (particularly in autumn-winter) and oceanography. However, it is also likely that climate change and fishery induced changes in marine food webs are impacting on the species during its marine larval phase. Any research that investigates any aspect of the marine phase of the life cycle and/or quantifies the scale of threatening processes is of value. Information on the susceptibility of the species to common fish pathogens may also be informative.

Cauliflower Soft Coral

Scientific name: *Dendronephthya australis*

Family or group: Nephtheidae

Status: Potentially threatened

Research gap:

This species of soft coral is endemic to NSW and is thought to occur from Port Stephens to Jervis Bay. The Port Stephens population has declined significantly in recent years as a result of smothering by sand and damage from moorings and boat anchoring. More information is required regarding the species biology, life history and distribution/abundance. An assessment of the viability of breeding the species in aquaria for transplantation back into the wild would also be beneficial.

Fitzroy Falls Spiny Crayfish

Scientific name: *Euastacus dharawalus*

Family or group: Parastacidae

Status: Critically endangered

Research gap:

The Fitzroy Falls Spiny Crayfish is endemic to NSW and is only known to occur in Wildes Meadow Creek, a sub-catchment of the Shoalhaven River. The common yabby (*Cherax destructor*) has invaded this waterway and is believed to impact upon the spiny crayfish. The FSC considers it a high priority to collect data on the basic biological attributes of the Fitzroy Falls Spiny Crayfish (e.g. population size, age at first breeding, longevity, movement) habitat requirements of the species, interspecific interactions, and determine the feasibility of potential captive breeding-reintroduction or translocation programs to mitigate the risk of extinction.

Flathead Galaxias

Scientific name: *Galaxias rostratus*

Family or group: Galaxiidae

Status: Critically endangered

Research Gap:

Little is known about the biology and ecology of Flathead Galaxias. This species has declined dramatically across all of its former range. The FSC has a particular interest in understanding the factors that led to declines and that may be inhibiting population recovery, as well as general life history, habitat requirements, fecundity, reproductive biology and movements. The FSC continues to monitor the status of the species and requires up to date information on the current distribution and abundance for the species. Recent reports of the species in NSW have all been from floodplain wetland habitats. Wetland habitats have generally been poorly surveyed by past and current fish community sampling within the Murray-Darling Basin. The FSC considers it a high priority to undertake targeted surveys of these habitats using standardised sampling procedures in order to more effectively assess the status of Flathead Galaxias in NSW.

Great Hammerhead Shark

Scientific name: *Sphyrna mokarran*

Family or group: Sphyrnidae

Status: Vulnerable

Research gap:

Great Hammerhead Sharks are highly migratory species inhabiting tropical and warm temperate seas globally. While rare in NSW waters, data that do exist suggest that several processes are threatening to these sharks in NSW. The FSC is interested in historical data assessing the prevalence of Great Hammerhead Sharks in NSW waters, and any life-history or ecological data on the species that would facilitate conservation and management of this species in NSW.

Greynurse Shark

Scientific name: *Carcharias taurus*

Family or group: Odontaspididae

Status: Critically endangered

Research gap:

Greynurse Sharks have experienced substantial declines in NSW waters. Despite protection in 1984, the species has not shown a significant increase in population size. The FSC is interested in new research on general life history, habitat requirements, fecundity, reproductive biology and movements of this species. Research on capture and post release survival in response to Key Threatening Processes would also be of interest.

Macquarie Perch

Scientific name: *Macquaria australasica*

Family or group: Percichthyidae

Status: Endangered

Research Gap:

Macquarie Perch populations continue to decline in catchments in the Murray-Darling Basin and remain in a threatened state to various degrees in coastal catchments. The causes of the decline of Macquarie Perch are likely to include sedimentation, water extraction, overfishing, Epizootic Haematopoietic Necrosis Virus (EHNV), spawning failures due to cold water pollution, barriers to migration, habitat degradation and competition with and predation by introduced fish species.

Important research needed on the species includes:

- Identifying factors associated with recruitment failure (or success) within a Macquarie Perch population.
- Behavioural and trophic (predation) interactions with introduced salmonids.
- Evaluation of the efficacy of genetic rescue.

Marine Slug

Scientific name: *Smeagol hilaris*

Family or group: Smeagolidae

Status: Critically endangered

Research gap:

This species of marine mollusc is only known from a single location on the south coast of NSW. Even within that location, its habitat is limited. *Smeagol hilaris* is restricted to the upper littoral zone of gravel or cobble beaches. The FSC considers it a high priority to identify potentially viable habitats for *Smeagol* and if possible to survey these habitats for the species.

Murray Hardyhead

Scientific name: *Craterocephalus fluviatilis*

Family or group: Atherinidae

Status: Critically endangered

Research Gap:

Recent research on remnant populations in Victoria and South Australia suggest that Murray Hardyhead have specific habitat requirements and are largely specialists residing in saline floodplain wetlands of the Murray-Darling Basin. These habitat types have been largely un-surveyed by past and current fish community sampling within the Murray- Darling Basin. The FSC considers it a high priority to undertake targeted surveys of these habitats using standardised sampling procedures in order to more effectively assess the status of Murray Hardyhead in NSW (as well as other taxa co-existing with them in these specific ecosystems).

Olive Perchlet

Scientific name: *Ambassis agassizii*

Family or group: Ambassidae

Status: Endangered western NSW population

Research gap:

Little is known about the biology and ecology of Olive Perchlet in the Murray-Darling Basin. The FSC has a particular interest in understanding the factors that led to population declines and that may be inhibiting population recovery, as well as general life history, habitat requirements, fecundity, reproductive biology and movements. The FSC requires up to date information on the current distribution and abundance for the species.

Oxleyan Pygmy Perch

Scientific name: *Nannoperca oxleyana*

Family or group: Percichthyidae

Status: Endangered

Research gap:

Oxleyan Pygmy Perch have specialised habitat requirements and are confined to Wallum Heath upon the coastal plain on northern NSW. Recent surveys show significant fluctuations in population prevalence and abundance. The FSC considers it a high priority to undertake targeted surveys of the species to quantify changes in its distribution and abundance and the factors that drive them.

Scalloped Hammerhead Shark

Scientific name: *Sphyrna lewini*

Family or group: Sphyrnidae

Status: Endangered

Research gap:

The FSC is interested in any population genetic studies or research on movement, the ecology, ageing or other life-history aspects that would facilitate conservation and management of this species in NSW.

Stocky Galaxias

Scientific name: *Galaxias tantangara*

Family or group: Galaxiidae

Status: Critically Endangered

Research Gap:

A recently described species, the Stocky Galaxias is only known from a single population in a sub-catchment above Tantangara Reservoir in southern NSW, where the major threat is invasion by trout. The sub-catchment has not been thoroughly surveyed, and information is required on whether additional populations of Stocky Galaxias or trout-free waters for reintroduction are present. The impacts of feral horses on the instream and riparian habitat for this species are also poorly understood. The FSC is also interested in research into designs for constructed barriers to prevent upstream invasion by trout and potentially Climbing Galaxias into future reintroduced populations.

Posidonia Seagrass

Scientific name: *Posidonia australis*

Family or group: Posidoniaceae

Status: Endangered populations – Port Hacking, Botany Bay, Sydney Harbour, Pittwater, Brisbane Waters and Lake Macquarie.

Research gap:

Posidonia australis populations are found in 18 estuaries along the NSW coast. Large losses in distribution of *P. australis* have apparently occurred in the endangered populations in the early 20th century. Although the species does reproduce sexually, it is rare to see new recruits in NSW estuaries. The genetic affiliations of populations within NSW are not well understood. Suitable projects might include investigating the factors that limit recruitment of *P. australis* (e.g. predation of seedlings), and resolving the genetic diversity of *P. australis* along the NSW coast.

White's Seahorse

Scientific name: *Hippocampus whitei*

Family or group: Syngnathidae

Status: Endangered

Research gap:

Hippocampus whitei has been found to decline in abundance across its range as a result of natural habitat loss. As a result, the species is known to frequently use artificial habitats such as protective swimming nets. Purposefully developed artificial habitat units (known as seahorse

hotels) have been shown to be potential measure that could be used to assist in the recovery of the species. Research on the viability of using artificial habitat units for conservation would be beneficial. Another priority would be use of eDNA to assess the occurrence of species across its range in NSW and assess other estuaries where it potentially may occur.

Other research gaps

Other Shark Species

Information is lacking for many species of sharks in NSW. In addition to the already listed threatened shark species, the FSC is interested in studies relating to Smooth Hammerhead, Dusky Whaler, Bull, Sandbar, Longfin Mako and Shortfin Mako sharks. The FSC considers it a priority to undertake targeted surveys of these species, or other potentially threatened shark species, to assess their status in NSW waters.

Freshwater spiny crayfish (Euastacus spp)

There is little information on the ecology or threats to many freshwater crayfish, with new species being regularly described. The FSC is interested in projects that investigate age structure, size at maturity, habitat use, range delimitation, and interactions with alien species as well as threats to individual spiny crayfish species or the group as a whole.

Research on physical processes affecting threatened species

There are several processes that affect, or have the potential to affect, the abundances and recovery of threatened aquatic species and populations. The most recent high-profile example is climate change and associated changes in water temperatures, distributions of species, sea-levels, etc. Other processes include environmental flows in rivers, impacts on aquatic environments from feral horses, impacts of pollution from land run-off and point-sources. The FSC is interested in supporting projects that address such processes and how they influence threatened aquatic species and populations.

Research on historical baselines for threatened or near threatened species

The FSC is interested in projects that synthesise historical data from a range of data sources (such as ethnographic, social, fishing club records, newspapers archives, unpublished institutional sources, etc.) to improve knowledge on historical data gaps for NSW aquatic species, populations and communities.

Table 1: The current list of threatened species, populations and ecological communities in NSW

Critically endangered species	
Carcharias taurus (Rafinesrue, 1810)	Greynurse Shark
Craterocephalus fluviatilis (McCulloch, 1913)	Murray Hardyhead
Euastacus dharawalus (Morgan, 1997)	Fitzroy Falls Spiny Crayfish
Galaxias rostratus (*Klunzinger, 1872)*	Flathead Galaxias
Galaxias tantangara (Raadik, 2014)	Stocky Galaxias
Nereia lophocladia (Agardh, 1897)	Marine Brown Alga
Notopala hanleyi (Frauenfeld, 1864)	Hanley's River Snail
Notopala sublineata (*Conrad, 1850)*	Darling River Snail
Smeagol hilaris (Tillier & Ponder, 1992)	Marine Slug
Endangered species	
Archaeophya adamsi (Fraser, 1959)	Adams Emerald Dragonfly
Austrocordulia leonardi (Theischinger, 1973)	Sydney Hawk Dragonfly
Hippocampus whitei (Bleeker, 1855)	White's Seahorse
Maccullochella ikei (Rowland, 1986)	Eastern Freshwater Cod
Maccullochella macquariensis (Cuvier, 1829)	Trout Cod
Macquaria australasica (Cuvier, 1830)	Macquarie Perch
Mogurnda adspersa (Castelnau, 1878)	Southern Purple-Spotted Gudgeon
Nannoperca australis (Gunther, 1861)	Southern Pygmy Perch
Nannoperca oxleyana (Whitley)	Oxleyan Pygmy Perch
Prototroctes maraena (Gunther, 1864)	Australian Grayling
Sphyrna lewini (Griffith & Smith, 1834)	Scalloped Hammerhead Shark
Vulnerable species	
Austropetalia tonyana (Theischinger, 1995)	Alpine Redspot Dragonfly
Bidyanus bidyanus (Mitchell, 1838)	Silver Perch
Branchinella buchananensis (Geddes, 1981)	Buchanan's Fairy Shrimp
Carcharodon carcharias (Linnaeus, 1758)	White Shark
Epinephelus daemelii (Günther, 1876)	Black Rockcod
Euastacus armatus (von Martens 1866)	Murray Crayfish
Microchestia bousfieldi (Lowry & Peart, 2010)	Bousfields Marsh-Hopper
Sphyrna mokarran (Ruppell, 1837)	Great Hammerhead Shark
Endangered populations	

Murray-Darling Basin population of *Tandanus tandanus* (Mitchell, 1838)	Eel-Tailed Catfish
Population of *Posidonia australis* (Hook.*f*.,1858) seagrass in Port Hacking, Botany Bay, Sydney Harbour, Pittwater, Brisbane Waters and Lake Macquarie	
Snowy River population of *Gadopsis marmoratus*	River Blackfish
Western NSW population of *Ambassis agassizii* (Steindachner, 1866)	Olive Perchlet
Darling River Hardyhead population in the Hunter River catchment (Crowley & Invanstoff 1990)	Darling River Hardyhead
Endangered ecological communities	
Aquatic ecological community of the natural drainage system of the lower Murray River catchment	
Aquatic ecological community in the natural drainage system of the lowland catchment of the Lachlan River	
Aquatic ecological community in the natural drainage system of the lowland catchment of the Darling River	
Aquatic ecological community in the catchment of the Snowy River in NSW	