Department of Primary Industries

primefact

Eastern Freshwater Cod *Maccullochella ikei*

March 2017, Primefact 178, Third edition
Threatened Species Unit, Port Stephens Fisheries Institute

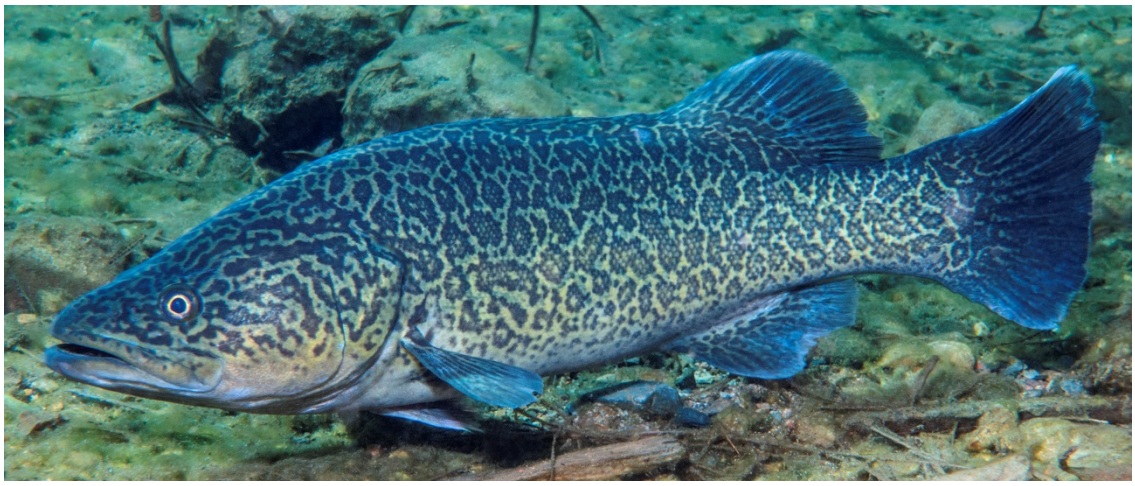

Figure 1: An Eastern Freshwater Cod (Image: B. Vercoe)

Introduction

Eastern Freshwater Cod (also known as Clarence River Cod) are a large predatory freshwater fish belonging to the family Percichthyidae. The species was once prolific in the Clarence and Richmond Rivers in north-eastern NSW, however populations collapsed in the 1920s and 1930s and continued to decline until the 1980s when the species was protected. Remnant (non-stocked) populations are now only found in parts of the Clarence River and its tributaries. No remnant populations remain in the Richmond River system, however stocked populations persist in some local tributaries.

Eastern Freshwater Cod is listed as an **endangered species** under both NSW and Commonwealth law. There are heavy penalties for harming, buying, selling or possessing them, or for harming their habitat (see 'Legal implications').

Description

Eastern Freshwater Cod can grow to over 1 metre in length and to 41 kg in weight, but are more commonly less than 66 cm and 5 kg. They have an elongated body with a distinctly concave profile, relatively small eyes and a short snout. They are generally yellow green to golden in colour with a speckled pattern of black to very dark green spots.

Eastern Freshwater Cod are similar in appearance to Murray Cod and Mary River Cod.

Habitat and ecology

- Eastern Freshwater Cod are typically found in clear slow-flowing streams with rocky substrate and large amounts of in-stream cover. They are generally found in areas that have boulders or large woody debris ('snags'). Such areas provide complex habitats for each stage of the species' life cycle and influence the quality and quantity of food and shelter.
- Adult fish are territorial and aggressive and generally display strong home-site fidelity.
- Eastern Freshwater Cod are carnivores, preying mainly on crustaceans, frogs, other fishes as well as a variety of terrestrial

animals such as snakes, birds and mice. Zooplankton and aquatic insects are the main food source for larvae.

- They are sexually mature at 4 or 5 years old, and between 700 g to 1.5 kg. The species spawns in late-August and early-September when temperatures rise from 16 to 18ºC. During the spawning season, males have been observed moving distances of up to 30 km to locate suitable spawning sites.
- Breeding fish are territorial and aggressive. Females produce large (3 mm) adhesive eggs that attach to hard substrates such as rocks and logs. Nesting sites are usually located under either large boulders or bedrock shelves.
- Larvae begin to hatch after 8 days and remain on the substrate at the nest for between 5 and 6 days before swimming away.

Artificial breeding and stocking

A stocking program for Eastern Freshwater Cod involving a commercial hatchery commenced in the 1990s and ceased in 2003. The stocking took place at various locations throughout the Clarence and Richmond River systems. While surveys and angler reports indicate that stocked fish have survived, the populations remain relatively small in these areas. Recent research also indicates that stocking may have contributed to genetic decline in the largest wild population, demonstrating the importance of using genetic information in breeding and stocking programs.

Recovery plan review

The review of the Eastern Freshwater Cod Recovery Plan was finalised in 2016. The review assessed the implementation of recovery actions in NSW and detailed progress made toward meeting the recovery plan objectives.

The review found that many specific recovery plan objectives have been completed over the last 10 years or are ongoing. There has been a significant increase in the understanding of the size, distribution, ecological requirements, and historical and existing genetic status of the species, as well as an increase in the coordination of community awareness and education programs.

However the review also highlighted several areas where more work is required to assist with recovery, including improving protection of Eastern Freshwater Cod habitat and more strategic implementation and monitoring of recovery action outcomes.

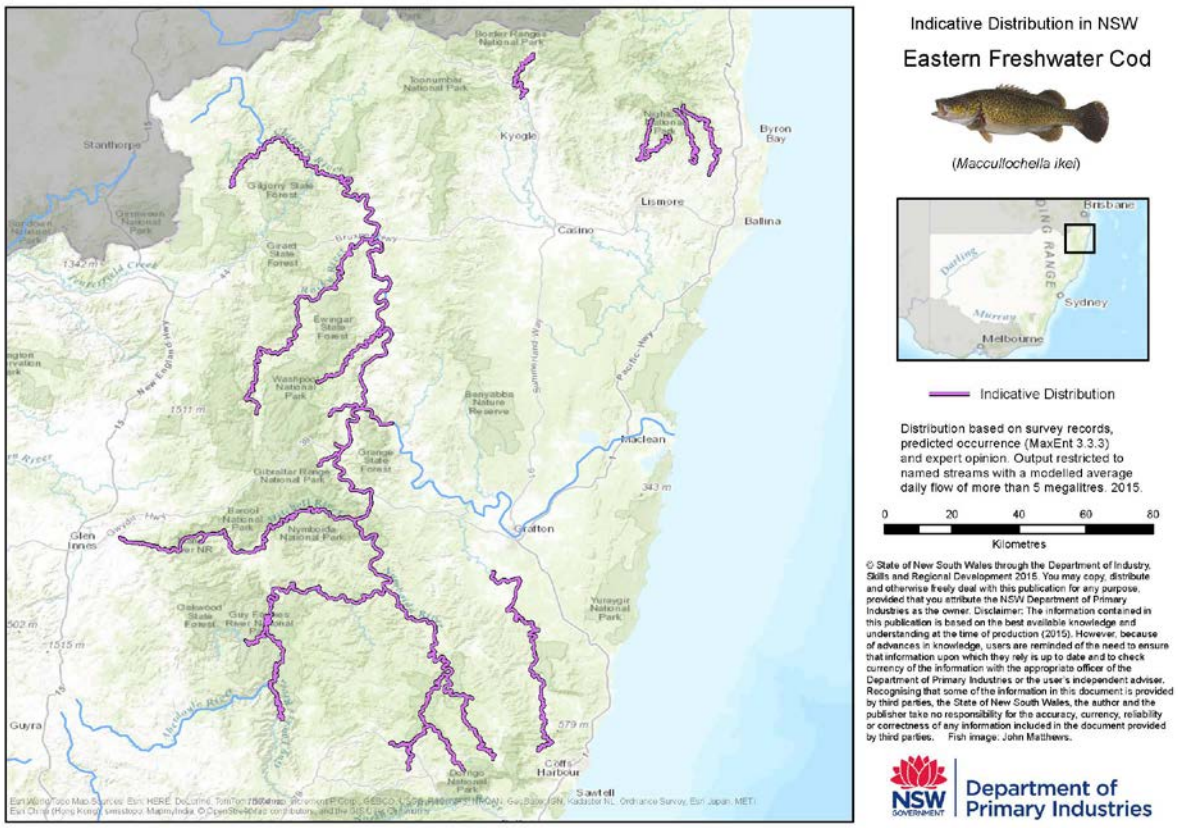

Figure 2: The indicative distribution of Eastern Freshwater Cod in NSW based on survey records, predicted occurrence and expert opinion.

Why are Eastern Freshwater Cod threatened?

- Historic decline of Eastern Freshwater Cod is thought to have been caused by a combination of factors. Many fish were killed in the late 1920s when dynamite was used for the construction of the north coast railway. Dynamite was also used in the late 1930s as a method of catching fish and killed thousands of fish.
- Fish kills were also observed in the 1920s and 1930s when water quality deteriorated due to heavy floods, which were followed by long dry periods, extensive bushfires and heavy summer rains.
- Releases of contaminated water from tailings dams at gold and tin mines are thought to have caused the death of many Eastern Freshwater Cod in parts of the Clarence system.
- Over-harvesting by recreational and commercial fishers has contributed to past declines. Eastern Freshwater Cod are now totally protected in NSW, but illegal fishing and hooking injuries in accidentally caught fish still pose a threat. Targeted or indirect capture of Eastern Freshwater Cod can directly reduce their numbers by removing breeding age adults and disrupting breeding activities such as egg and larvae guarding.
- The current threats to Eastern Freshwater Cod include habitat degradation through changes to natural river flows, removal of large woody debris, water extraction and sedimentation caused by land clearing activities. These factors reduce bank stability, water quality and shading as well as increasing water temperatures. As a result, they reduce quality habitat for Eastern Freshwater Cod and their food sources, leading to spawning failures and reduced fish dispersal.
- Introduced species such as Banded Grunter (*Amniataba percoides*) may also pose threats from disease, competition, predation and habitat degradation.

Conservation and recovery actions

- Continue to implement the NSW DPI Eastern Freshwater Cod Recovery Plan which aims to recover the species to a position of natural viability within its former range.
- Maintain bans on the taking of Eastern Freshwater Cod and enforce compliance with fishing regulations.
- Ensure that all fish stocking activities within the natural distribution of Eastern Freshwater Cod comply with the NSW Freshwater Fish Stocking Fisheries Management Strategy.
- Educate the community about the protected status of Eastern Freshwater Cod and how they can assist with recovery of this species.
- Allocate environmental flows in regulated rivers to restore natural seasonal flow patterns, improve or maintain fish passage and reduce the impact of cold water pollution downstream of dams.
- Prevent sedimentation and poor water quality by improving land management practices, conserving and restoring riparian vegetation and using effective erosion and sediment control measures.
- Reinstate large woody debris at key sites.
- Evaluate the need for fishways and removal of redundant weirs to improve fish passage and reconnect aquatic habitats.
- Report any sightings of the species via the NSW DPI online form.
- A full list of strategies that have been adopted for promoting the recovery of Eastern Freshwater Cod is set out in the NSW DPI Priorities Action Statement.

Figure 3: The distinct pattern of the Eastern Freshwater Cod (Image: B. Vercoe)

Legal implications

It is illegal to catch and keep, buy, sell, possess or harm Eastern Freshwater Cod (or any other threatened species in NSW) without a specific permit, licence or other appropriate approval, and significant penalties apply. For endangered species, these penalties can include fines of up to $220,000 and up to 2 years in prison.

There can also be significant penalties for causing damage to the habitat of a threatened species without approval, through actions such as dredging river beds, removing large woody debris and constructing barriers that block the free passage of fish.

Clearing that constitutes a routine agricultural management activity, and certain routine farming practice activities (other than clearing) are permitted, provided the activities are to the minimum extent reasonably necessary and all other relevant statutory approvals or authorities have been obtained.

The impacts of developments or activities that require consent or approval in accordance with the *Environmental Planning and Assessment Act 1979* must be assessed and considered by consent or determining authorities. Where such actions are likely to result in significant impact on a threatened species or its habitat, a detailed species impact statement must be prepared.

To protect breeding Eastern Freshwater Cod, all fishing is prohibited from August to October inclusive in the Mann River and all of its tributaries upstream of its junction with the Clarence River and the Nymboida River. The possession of fishing gear in, or adjacent to closed waters is also an offense.

Bibliography and further reading

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NSW Department of Primary Industries (2016) Review of the Eastern Freshwater Cod Recovery Plan. NSW Department of Primary Industries, Port Stephens Fisheries Institute, NSW.

For further information

See the NSW DPI website: www.dpi.nsw.gov.au

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ISSN 1832 6668

PUB08/84

Figure 4: An Eastern Freshwater Cod (Image: B. Vercoe)

Figure 5: Typical Eastern Freshwater Cod habitat (Image: J. Wright)