



FISHERIES FACT SHEET

THREADFINS

King ('giant') threadfin
Polydactylus macrochir



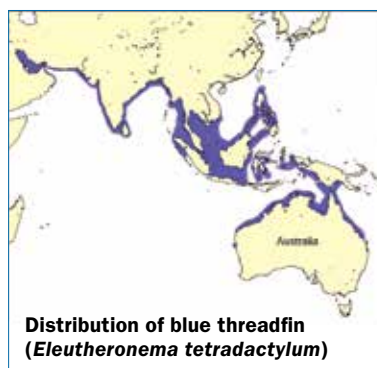
Blue ('four finger') threadfin
Eleutheronema tetradactylum

Weird whiskers

With their goggling, oddly placed eyes and their whisker-like pectoral filaments, threadfin are one of the weirder looking Western Australian fish species. Quirky looks aside, threadfin are prized table fish across the North West and are pursued by all sectors of the fishing community.

Distribution

The two most common species of threadfin that thrive in the waters of northern Western Australia are the blue threadfin (*Eleutheronema tetradactylum*) and king threadfin (*Polydactylus macrochir*). Blue ('four finger') threadfin are widely distributed in the Indo-West Pacific, from the Persian Gulf to Papua New Guinea and northern Australia. King ('giant') threadfin are common to northern Australia and southern Papua New Guinea. Within Australia, this species extends from Exmouth Gulf in the west to the Brisbane River in the east.



One big family

Threadfin belong to the fish family Polynemidae, which forms part of the order Perciformes (the most diverse order of fishes, including over 100 families). The 'suborder' it falls under is Percoidei, which contains those families with the most diversity in the order of Perciformes.

The Polynemidae are a family of benthic (sea or river bottom) fishes that are variable in size (up to two metres in length) but are very distinctive. They typically inhabit marine coastal waters, estuaries and freshwater river mouths.

Typical features of the family include eyes that are covered by adipose (transparent fatty/fleshy) tissue, two dorsal fins (the first dorsal fin with seven to eight spines and the second with one spine and 11 – 18 soft rays) and an inferior mouth (on the underside of the head with the snout projecting in front).

An additional characteristic is the set of filaments protruding from the pectoral fin area, which give the threadfin its name.

Kings and blues

Both king threadfin and blue threadfin are an important target species for fishers in the Pilbara and Kimberley regions of Western Australia. Not only are they top of the list for recreational, charter and aboriginal customary fishers in the State, but they are also targeted by the commercial fishing industry as a highly regarded table fish.

Australia has over 4,500 native fish species and many more are imported. It is important that a fish can be named and recognised by consumers, retailers and researchers alike. This is particularly the case when management arrangements (such as bag limits) differ between closely related species.

Both blue threadfin and king threadfin are the officially agreed names for these species according to the Australian Standard Fish Names list (ASFN).

Blue threadfin are also known as 'four finger' threadfin. This common name comes from the four short filaments that feature on the pectoral fin of the blue – the key way of telling this species apart from the king. The back and head of the blue threadfin are silvery blue in colouration and tail fins often have darkened edges.

King threadfin are a large species that have five pectoral filaments, and vivid yellow pectoral and pelvic fins. Often the overall colouration is golden silver to yellowish white.



Blue threadfin showing the obvious diagnostic characteristic of 4 free pectoral filaments. Photo: Gabby Mitsopoulos



King threadfin showing the diagnostic characteristic of 5 free pectoral filaments. Photo: Gabby Mitsopoulos

Blue Threadfin

Four pectoral filaments
Shorter life: 6 years
Maximum size: 120 cm
Maximum weight: 18.5 kg
Mature (male) at 20 cm (1 year)
Change to female at 40 cm

King Threadfin

Five pectoral filaments
Longer living: 10+ years
Maximum size: 170 cm
Maximum weight: 45 kg
Mature (male) at 24 cm (1 year)
Change to female between 70 and 110 cm

Threadfin kin

Other members of the threadfin family found in Australia include:

- Australian threadfin (*Polydactylus multiradiatus*) – a small species with seven pectoral filaments, most of the first dorsal fin is dusky black; maximum length 25 centimetres.
- Blackfin threadfin (*Polydactylus nigripinnis*) – has six pectoral filaments with the upper part of the pectoral fin jet black in colour; maximum length 20 centimetres.
- Striped threadfin (*Polydactylus plebeius*) – adults have seven dark olive brown lines above their lateral line; maximum length 50 centimetres.
- Streamer threadfin (*Parapolyneumus verekeri*) – grows to a maximum length of around 15 centimetres with a very restricted distribution.

As well as their prized eating qualities, threadfin are highly regarded as a sport fish. When hooked, they can put up epic fights displaying great strength and speed, often performing leaping acrobatics.

Barramundi accord

The Barramundi Accord was formed in 2000 and reformed in 2007 to help manage the recreational, charter and commercial take of fish. The accord established practical and sustainable solutions to increasing recreational, charter and commercial fishing. It addressed conflicts among fisheries stakeholders, and increasing concerns for the sustainability of barramundi and threadfin stocks in the Kimberley and Pilbara regions.



Threadfin filaments help the fish to find food by picking up vibrations of moving prey such as worms, prawns and crabs hiding in mud and sand. Threadfin have been reported to use their pectoral filaments to herd small fish and prawns into 'bait balls' to make them easier to capture.

A race to the end

King threadfin have been recorded at around 140 centimetres and live to at least 10 years of age in Western Australian waters, compared to about 80 centimetres and six years for blue threadfin.

Both species of threadfin grow quickly. The table below shows the comparative average lengths of each threadfin species at one, two and five years of age.

Years of growth	Blue threadfin	King threadfin
1	24.5 cm	32 cm
2	40 cm	52 cm
5	63.5 cm	94.5 cm

Both king and blue threadfin share similar habitats in coastal inshore waters. Juvenile threadfin mainly live in shallow inshore waters, where tiny invertebrates such as prawns, crabs and worms are abundant. Adult threadfin also favour estuarine areas and coastal waters, where large schools come together in tidal flats and river mouths around autumn and spring. There they search for food in the sand and mud.



King threadfin caught by commercial gill net at Anna Plains (139 cm total length). Photo: Glen Young



From tiny threadfin fry like this one, mighty adult fish can grow. Photo: Matt Pember

Taking stock

A recent study funded by the Fisheries Research and Development Corporation (FRDC) examined the 'stock' or population structure of king threadfin and blue threadfin across northern Australia. Scientists analysed parasites, genetics and the fishes' ear bones (otoliths) to help map movement and interaction patterns of threadfin populations.

The study showed that there is limited movement (both adult and larval) between localised king and blue threadfins stocks. This means that the mixing of stocks of either species in northern Australia is unlikely. However, there is evidence of genetic mixing among adjacent stocks within the Gulf of Carpentaria.

Blue threadfin tended to stay within one area, with localised population structures evident and adjacent stocks separated by only tens of kilometres, even where continuous coastline habitat presented no obvious barriers to mixing. This was shown by clear and consistent differences (including genetic) between fish from different locations. Blue threadfin also display 'isolation by distance' – the farther apart stocks are from one another the greater the genetic differences between them. The life history characteristics among the different stocks were also found to be highly varied.

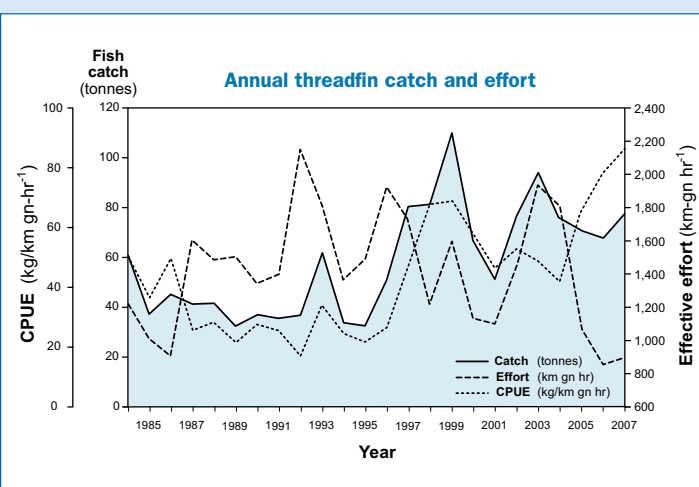
King threadfin also generally had a self-contained stock structure with limited mixing between adjacent stocks separated by tens to hundreds of kilometres. Where there was sufficient distances or bio-geographical barriers such as headlands separating adjacent stocks, king threadfin were also genetically distinct. King threadfin also exhibited isolation by distance, though the pattern was not as strong as in blue threadfin. King threadfin also show a high degree of variation in their life history characteristics among the different stocks identified.

Capturing catch rates

The Kimberley Gillnet and Barramundi Managed Fishery (KGBF) is the commercial fishery targeting threadfin, with its boundaries ranging from the Western Australia/Northern Territory border to the top of Eight Mile Beach, south of Broome (latitude 19°S). The KGBF uses mesh nets (gill nets) to capture fish in inshore areas. Net size restrictions on the fishery allow small sized fish to swim through the mesh while large fish are prevented from getting caught. The fishery is closed in the breeding season from December 1 until January 31 to minimise disturbances to the threadfin while they are spawning. This closure is currently under review and may be extended.

Commercial fishers are required by law to keep a record of the fish caught and their 'effort', including how many hours they spend catching fish and the dimensions of the nets used when fishing. Researchers use this information to understand whether fishing pressure is having an impact on threadfin stocks.

Important signals of excessive fishing pressure on a stock may include a decrease in the maximum age of fish caught



or a decrease in the proportion of older fish caught. If older fish are not present in a population, spawning potential for the stock can be reduced, limiting breeding success, leading to fewer younger fish.

The incredible changing act

As 'hermaphrodites' threadfin change sex – they start off life as a male and are able to release sperm. However, at a larger size, they change into females and start to produce eggs. Blue threadfin generally change to females at about 40 centimetres and two years of age because they are a smaller fish. The majority of king threadfin change from male to female between 80 and 110 centimetres and four to seven years of age, as they are larger and longer-lived.

This is an important consideration for fisheries managers, because maintaining a balance of sexes ensures there is enough egg and sperm production to sustain the population.

Stopping threadfin becoming threadbare

The growth in Western Australia's population has seen an increase in fishing and boat ownership. This coupled with rapidly developing fishing technology, such as highly sophisticated echo sounders and global positioning systems (GPS), has heaped more pressure on fish stocks.

Bag and size limits are set to limit the total catch of a species of fish within sustainable quantities for each fishing sector. Size limits are typically set to ensure that an individual fish is likely to reproduce at least once before it is caught. Each fisher needs follow the rules to ensure the sustainability and quality of the State's fisheries.

References

Websites:

Department of Fisheries, Western Australia:
www.fish.wa.gov.au

Books and papers:

Horne, J.B., Momigliano, P., Welch, D.J., Newman, S.J. and van Herwerden, L. 2011. **Limited ecological population connectivity suggests low demands on self-recruitment in a tropical inshore marine fish (*Eleutheronema tetradactylum*: Polynemidae)**. Molecular Ecology in press.

Newman, S.J., Pember, M., Allsop, A., Grace, B., Ballagh, A., Moore, B., Stapley, J., Gribble, N., van Herwerden, L., Horne, J. and Welch, D.J. 2009. **Threadfins – telling them apart. Western Fisheries, WA's Journal of Fishing and the Aquatic Environment**. March 2009, pp. 38-39.

Newman, S.J., Allsop, Q., Ballagh, A.C., Garrett, R.N., Gribble, N., Meeuwig, J.J., Mitsopoulos, G.E.A., Moore, B.R., Pember, M.B., Rome, B.C., Saunders, T., Skepper, C.L., Stapley, J.M., van Herwerden, L. and Welch, D.J. 2010. **Variation in stable isotope ($\delta^{18}\text{O}$ and $\delta^{13}\text{C}$) signatures in the sagittal otolith**

carbonate of King threadfin, *Polydactylus macrochir* across northern Australia reveals multifaceted stock structure. Journal of Experimental Marine Biology and Ecology 396 (1): 53-60.

Newman, S.J., Pember, M.B., Rome, B.C., Mitsopoulos, G.E.A., Skepper, C.L., Allsop, Q., Saunders, T., Ballagh, A.C., van Herwerden, L., Garrett, R.N., Gribble, N., Stapley, J., Meeuwig, J.J., Moore, B.R. and Welch, D.J. 2011. **Stock structure of blue threadfin *Eleutheronema tetradactylum* across northern Australia as inferred from stable isotopes in sagittal otolith carbonate**. Fisheries Management and Ecology in press.

Pember, M.B., Newman, S.J., Hesp, S.A., Young, G.C., Skepper, C.L., Hall, N.G. and Potter, I.C. 2005. **Biological parameters for managing the fisheries for Blue and King threadfins, estuary rockcod, malabar grouper and mangrove jack in north-western Australia**. Final Report to the Fisheries Research and Development Corporation (FRDC) on Project No. 2002/003. Centre for Fish and Fisheries Research, Murdoch University, Murdoch, Western Australia, Australia. 172p.

Welch, D.J., Ballagh, A.C., Newman, S.J., Lester, R.J.G., Moore, B.R., van Herwerden,

The bare bones

Fish use otoliths for balance and to hear underwater. Growth rings are added to otoliths, similar to growth rings in a tree. These growth rings are added every season – some are translucent, others opaque – creating banding. Each set of bands represents a year's growth. Researchers count the growth rings to age a fish and build a picture of the age make-up a fish population. This information will be used to manage threadfin stocks across northern Australia.



A Department of Fisheries research scientist analyses the ear bone of a fish. Photo: Stephen Emery

L., Horne, J.B., Allsop, Q., Saunders, T., Stapley J.M. and Gribble, N.A. 2010. Defining the stock structure of northern Australia's threadfin salmon species. **Final Report to the Fisheries Research and Development Corporation, Project 2007/032. Fishing and Fisheries Research Centre Technical Report No. 10**, Fishing & Fisheries Research Centre, James Cook University, Townsville, Australia. 180p.

Glossary

Catch rate

The amount of fish caught in relation to fishing effort

Effort

The amount of time spent fishing by a given group of fishers

Filaments

Threadlike whiskers

Hermaphrodite

The ability to change sex

Invertebrate

Animal without a backbone

Otolith

Fish ear bone

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Fish illustrations

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FURTHER INFORMATION

Visit the Department's website at www.fish.wa.gov.au or contact:

DEPARTMENT OF FISHERIES – HEAD OFFICE

3rd Floor, The Atrium,
168 St George's Terrace, Perth 6000
Ph (08) 9482 7333 Fax (08) 9482 7389
e-mail: headoffice@fish.wa.gov.au
ABN: 55 689 794 771