

**Information describing black cardinalfish (*Epigonus telescopus*)
fisheries relating to the South Pacific Regional Fisheries
Management Organisation**



**WORKING DRAFT
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1 Overview

Black cardinalfish (*Epigonus telescopus*) are widely distributed in the North Atlantic and South Atlantic, Indian, and Southwest Pacific Oceans.

They are found at depths of 75–1200 m and caught mainly by deepwater bottom trawl as bycatch of fisheries targeting alfonsino or orange roughy.

Unvalidated otolith readings from the South Pacific indicate that black cardinalfish is relatively slow-growing and long lived. The juveniles are pelagic and undergo major ontogenetic changes. Little is known of adult movements. Reproductive biology is not well known. There is no information on black cardinalfish stock structure as data is lacking on genetics, distribution of spawners, and adult movements.

Black cardinalfish are typically by-catch of fisheries targeting alfonsino (*Beryx splendens*) (characteristically >400 m) or orange roughy (typically about 800 m). Since 1992 large catches of black cardinalfish have been taken on the high seas on the Northern Challenger Plateau and the southern Lord Howe Rise.

The main method used to catch black cardinalfish is a high-opening trawl generally fished hard down on the bottom. Trawling for this species on seamounts impacts habitat, but the precise impact of this on the black cardinalfish populations or other species on the seamounts is unknown.

Black cardinalfish is a deepwater species with limited habitat in the high seas area of the South Pacific and assumed low resilience to fishing pressure. Given their longevity and late maturation the biological productivity of black cardinalfish is likely to be low.

There are currently no known management measures in place for black cardinalfish.

This is a living document. It is a draft report and requires additional information to complete.

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2 Taxonomy

2.1 Phylum

Vertebrata

2.2 Class

Actinopterygii

2.3 Order

Perciformes

2.4 Family

Epigonidae

2.5 Genus and species

Epigonus telescopus (Risso, 1810)

2.6 Scientific synonyms

None known

2.7 Common names

Black cardinalfish

2.8 Molecular (DNA or biochemical) bar coding

No information

3 Species Characteristics

3.1 Global distribution and depth range

Black cardinalfish are widely distributed in the North Atlantic from Iceland to the Canary Islands, in the western Mediterranean, and in the South Atlantic, Indian, and Southwest Pacific Oceans (Abramov 1992).

Black cardinalfish are found from 75–1200, but their preferred depth range is 600–900 m (Field et al. 1997). The preferred depth range of schools (600-900 m) overlaps the upper end of the depth range of orange roughy (*Hoplostethus atlanticus*) and the lower end of alfonsino (*Beryx splendens*) and bluenose (*Hyperoglyphe antarctica*).

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3.2 Distribution within South Pacific area

In the Southwest Pacific, black cardinalfish are found between Australia and New Zealand (Abramov 1992) (see Figure 1).

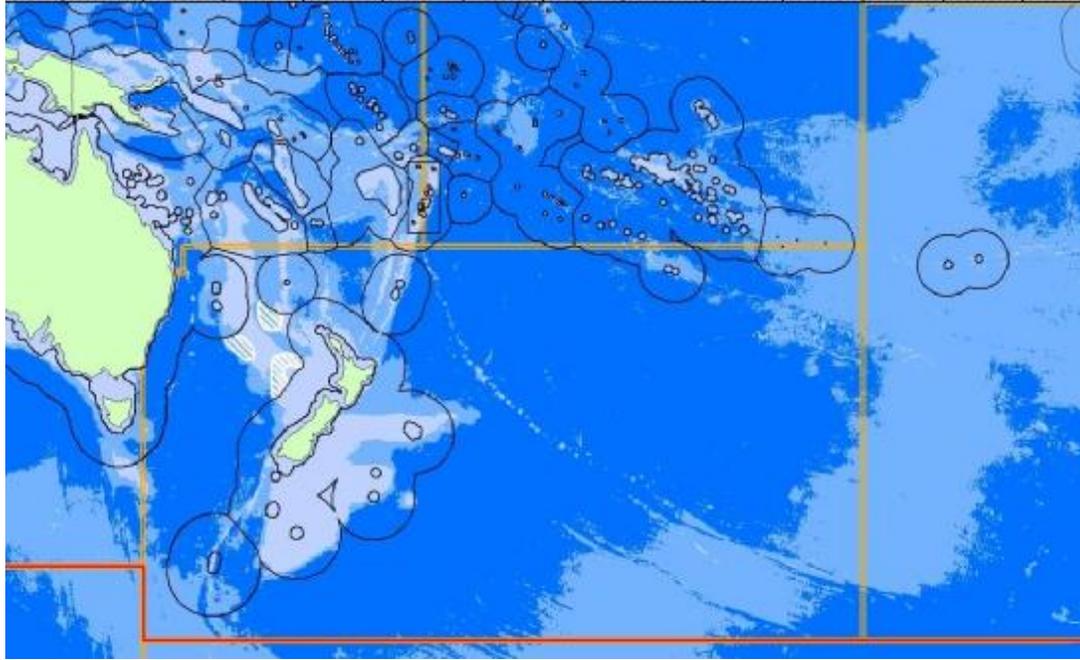


Figure 1: Known distribution of black cardinalfish on the high seas in the South Pacific Ocean.

3.2.1 Inter-annual and/or seasonal variations in distribution

No information

3.2.2 Other potential areas where the species may be found

No information

3.3 General habitat

Black cardinalfish are bathy-demersal. Adults are benthic or benthic-pelagic on continental slopes where they are found mostly in mobile schools up to 150 m of the bottom over hills and rough ground. The juveniles are pelagic.

3.4 Biological characteristics

Slow growing up to 75 cm (~104 years). The average size of black cardinalfish landed by the commercial fishery is about 50–60 cm fork length (FL) (Annala et al. 2004). Length frequency distributions from research surveys are unimodal with a peak at 55–65 cm FL. Unvalidated otolith readings from over 700 fish from eastern New Zealand waters indicate that this species is relatively slow-growing

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and long lived. Maximum ages of over 100 years were reported, with the bulk of the commercial catch being between 35 and 55 years of age.

However, Pshenichny et al. (1986) (as cited in Abramov 1991), examined whole otoliths and considered that black cardinalfish on the North Atlantic Ridge attained a length of about 70 cm at only 10 years. Pshenichny et al. (1986) (as cited in Vinnichenko 1997), stated that black cardinalfish become sexually mature at age 7. These age estimates are well below Tracey et al.'s assumed estimates of age at full recruitment and maximum ages. However Pshenichny et al. (1986) also reported lengths at maturity as 40-50 cm, similar to Tracey et al.'s estimate of full age at recruitment of 45 years.

The juveniles are pelagic and undergo major ontogenetic changes (Mauge & Mayer 1990). Little is known of adult movements. Reproductive biology is not well known. From research surveys and Observer Programme data in New Zealand, spawning may occur in early winter (Field et al. 1997). Northern species of cardinal fish also appear to spawn in autumn/early winter (March–May) (Mauge & Mayer 1990).

Life history parameters are given below (Tracey et al. 2000):

Parameter	Symbol	All	Male	Female
Natural mortality	M	0.034	–	–
Age at recruitment	A_r	45	–	–
Age at maturity	A_s	45	–	–
Gradual recruitment	S_r	13	–	–
Gradual maturity	S_m	13	–	–
Von Bertalanffy parameters	L_{inf}	70.8	70.9	67.8
	K	0.034	0.038	0.034
	t_0	-6.32	-4.62	-8.39
Length-weight parameters	a	0.027	–	–
	b	2.87	–	–
Recruitment variability	σ_R	1.2	–	–
Recruitment steepness		0.75	–	–

Morphological characteristics

E. telescopus have dorsal spines (total) 7-8; dorsal soft rays (total) 9-11; anal spines 2; anal soft rays 9. No opercular spines. 8 spines on first dorsal fin. Snout blunt, eye large, mouth large, lower jaw equalling or slightly protruding beyond upper jaw. Pyloric caeca 21-34. Brown-violet or black, iridescent in life.

3.5 Population structure

There is no information on stock structure as data is lacking on genetics, distribution of spawners, and adult movements.

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3.6 Biological productivity

This is a slow growing and long-lived species with late maturation. The bulk of the commercial catch is between 35 and 55 years of age. Accordingly, black cardinalfish are relatively susceptible to growth overfishing and population depletion.

3.7 Role of the species in the ecosystem

Black cardinalfish are assumed to be carnivorous, feeding on small fishes and planktonic invertebrates. Prey items observed from research surveys in New Zealand waters include mesopelagic fish, natant decapod prawns, and octopus (Clark & King, 1989).

4 Fisheries Characterisation

4.1 Distribution of fishing activity

E. telescopus are typically bycatch of fisheries targeting alfonsino (*Beryx splendens*) (characteristically >400 m) or orange roughy (typically about 800 m). Other commonly caught commercial species are boarfish (*Pseudopentaceros richardsoni*) and bluenose (*Hyperoglyphe antarctica*) (Ministry of Fisheries and Marine Resources 2001).

Since 1992 the largest known catches on the high seas in the South Pacific have been taken on the Northern Challenger Plateau and the southern Lord Howe Rise (Field et al. 1997).

4.2 Fishing technology

Black cardinalfish are taken by deepwater bottom trawl.

4.3 Catch history

Around half the New Zealand catch (Table 1, Ministry of Fisheries 2007) has been taken as bycatch, with 80% taken in the orange roughy fisheries. Australian vessels have reported landings of 78 tonnes in the period 1987-2006 (Sampaklis et. al. 2007).

4.4 Status of stocks

The stock status is not known or uncertain, but it is assumed that it is at least moderately exploited. Some specific areas maybe more exploited than others.

4.5 Threats

No threat status known.

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Table 1: Reported estimated catches (t) taken outside EEZs in the South Pacific region by New Zealand vessels. These figures do not include catches by vessels of other nations. 1990 = estimated catches 1 October 1990–30 September 1991 (NZ Ministry of Fisheries 2007)

Year	Epigonus telescopus
1991	11
1992	10
1993	245
1994	1,058
1995	320
1996	265
1997	351
1998	182
1999	325
2000	151
2001	485
2002	159
2003	227
2004	87
2005	188
2006	21
Total	4,081

4.6 Fishery value

Section yet to be developed

5 Current Fishery Status and Trends

5.1 Stock size

There are no known estimates of stock size in the South Pacific.

5.2 Estimates of relevant biological reference points

5.2.1 Fishing mortality

No information

5.2.2 Biomass

No information

5.2.3 Other relevant biological reference points

No information

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6 Impacts of Fishing

6.1 Incidental catch of associated and dependent species

No estimates available.

6.2 Unobserved mortality of associated and dependent species

No estimates available.

6.3 Bycatch of commercial species

Whilst targeting black cardinalfish, on the high seas in the South Pacific region, New Zealand flagged vessels have reported over 100 tonnes of alfonsino and over 5 tonnes each of black oreo, orange roughy and spiky oreos as bycatch between the years 1993- 2006.

6.4 Habitat damage

The main method used to catch this species is a high-opening trawl generally fished hard down on the bottom. Trawling for this species on seamounts impacts habitat (Clark and O'Driscoll 2003; Koslow et al. 2001), but the precise impact of this on the black cardinalfish populations or other species on the seamounts is unknown.

Studies have shown that repeated trawl disturbances alter the benthic community by damaging or removing macro-fauna and encouraging anaerobic bacterial growth (see review by Cryer et al. (in prep). Severe damage of coral cover from bottom trawl fishing inside the Australian EEZ has been documented (Koslow et al. 2001). Video images reveal bare rock and pulverized coral rubble where bottom trawling has occurred.

Bottom trawling also tends to homogenise the sediment, which damages the habitat for certain fauna. Benthic processes, such as the transfer of nutrients, remineralisation, oxygenation and productivity, which occur in undisturbed, healthy sediments, are also impaired (Cryer et al. in prep).

As fishing gear disturbs soft sediment they produce sediment plumes and remobilise previously buried organic and inorganic matter. This increase in the rates of nutrients into the water column has important consequences for the rates of biogeochemical cycling (Kaiser et al. 2002).

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7 Management

7.1 Existing management measures inside EEZs

Landings of black cardinalfish in the New Zealand and Australian EEZs are regulated by quotas.

7.2 Existing management measures in areas beyond national jurisdiction

There are currently no regulations in place for black cardinalfish on the high seas.

7.3 Fishery management implications

The lack of information, especially a direct stock assessment, exacerbates risk.

The unknown status of the population and very low productivity of this species, and the general lack of information render this species vulnerable to overfishing. Black cardinalfish is a deepwater species with limited habitat and low resilience.

7.3 Ecosystem considerations

The main method used to catch this species is a high-opening trawl generally fished close to, or on, the bottom. Trawling for this species on seamounts—which has taken place—will bring about habitat change, but the precise impact of this on the alfonsino populations and other species on the seamount is unknown.

8 Research

8.1 Current and ongoing research

Within EEZs

In specific quota management areas inside New Zealand's EEZ length and age information have been collected (Tracey et al. 2000).

High seas

None known

8.2 Research needs

To date the ageing technique using marginal increment analysis of adult black cardinalfish otoliths has not been validated. This validation remains a high priority for this species. Information on biomass and other relevant biological parameters is also needed. Sampling of length frequency data to determine the size composition of commercial catches is necessary for black cardinalfish caught outside EEZs in the South Pacific.

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9 Additional Remarks

High levels of mercury (Hg) have been reported in a sample of black cardinalfish from the Bay of Plenty, New Zealand. The mean mercury level (1.47 mg.kg⁻¹) was well above the maximum permissible level of 0.5 mg.kg⁻¹ set by the New Zealand Department of Health (Tracey, 1993).

The genus *Epigonus* consists of 12 species, the most closely related being *E. angustifrons*, *E. notacanthus*, and *E. macrops*. All lack opercular spines and have 8 spines in the first dorsal and a larger number of pyloric caeca (Abramov 1992).

One species, called Besugo *Epigonus crassicaudus* is endemic to Chile. They are found at depths of 100–550 m and caught between Valparaiso (33°30'S) and Puerto Montt (42°S) by trawling typically as bycatch of fisheries targeting common hake or Patagonian grenadier. This species may occur on the Nazca Ridge.

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