Information describing bluenose (*Hyperoglyphe antarctica*) fisheries information relating to the South Pacific Regional Fisheries Management Organisation

WORKING DRAFT
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1 Overview

Bluenose (*Hyperoglyphe antarctica*) has a southern ocean distribution, from about 25°–55° S, from the South Atlantic across the Indian Ocean, to the southwest Pacific. It is most common over rocky areas in depths of 200–750 m, and is often associated with seamounts. Target fisheries for bluenose have occurred in the South Pacific from the early 1980s to the present day.

Relatively little is known about spawning aggregations and migratory movements for this species. Tagging survey data indicate that bluenose may be generally sedentary in the short term (6-8months), although age specific migration may occur.

Bluenose appear to prefer cold water as part of their habitat characteristics. Schools of relatively small adults (50–60 cm) are occasionally taken by trawl over smooth, muddy substrates.

Maximum recorded size is 140 cm fork length; females reach a larger size than males. Age and growth have been investigated in New Zealand and Australian specimens, but an ageing method has yet to be validated. However, analyses of bomb ^{14}C in otoliths indicates that maximum age for the species is at least 25 years.

Spawning occurs off Tasmania from late summer to autumn, but the aggregations can begin to form some months before spawning starts. No confirmed spawning areas have yet been identified in or around the New Zealand EEZ.

Relationships between the Australasian stocks of bluenose and those beyond the EEZs are unknown.

Biological productivity is moderate. There are no available estimates of stock size, biomass or fishing mortality.

There are currently no known management measures in place for bluenose.

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

2 Taxonomy

2.1 Phylum

Vertebrata

2.2 Class

Actinopterygii

2.3 Order

Perciformes

2.4 Family

Centrolophidae

2.5 Genus and species

Hyperoglyphe antarctica (Camichael, 1819)

2.6 Scientific synonyms

Mupus perciformis (non Mitchell 1818), *Perca antarctica* (Carmichael 1918), *Palinurichthys antarcticus* (Carmichael 1918), *Diagramma porosa* (Richardson 1845), *Palinurichthys porosus* (Richardson 1845), *Hyperoglyphe porosa* (Richardson 1845).

2.7 Common names

Bluenose (Australia, New Zealand, UK), Antarctic butterfish, Antarkiese bottervis (South Africa), Antarktischer Schwarzfisch (Germany), Antarktisk sortfisk (Denmark), Big-eye, Deep Sea Trevalla (Australia), Matiri (New Zealand).

2.8 Molecular (DNA or biochemical) bar coding

No information

3 Species Characteristics

3.1 Global distribution and depth range

Bluenose has a widespread distribution in southern temperate oceans between the latitudes of about 25°–55° S. It has been recorded from Tristan da Cunha in the central south Atlantic, off South Africa, from various islands and submarine features across the Indian Ocean to the South Pacific. Adults of the species occur from depths of about 40 m to at least 1000 m (Anderson et al. 1998).

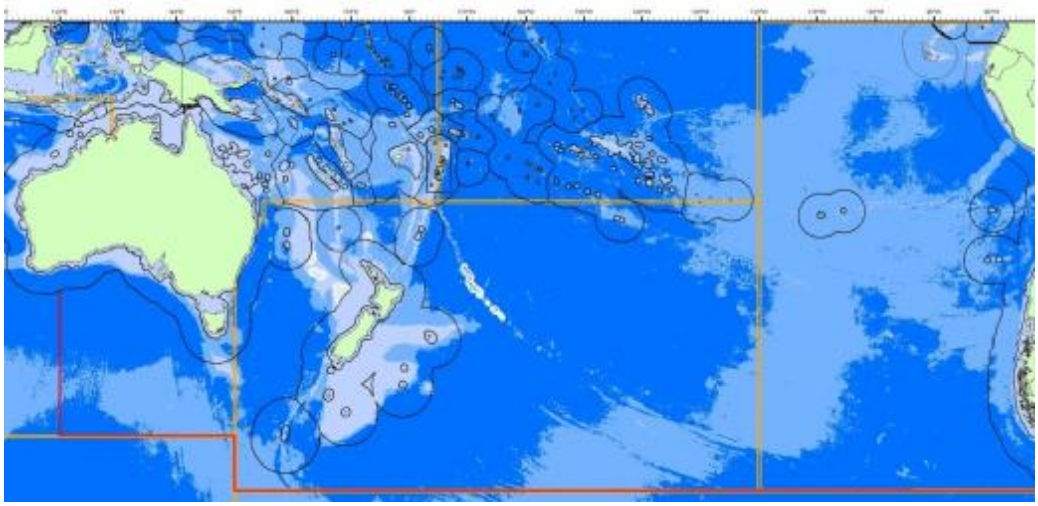

Figure 1: South Pacific high seas distribution of *Hyperoglyphe antarctica*.

3.2 Distribution within South Pacific area

Bluenose is present in the waters off South Australia and Tasmania, in the Tasman Sea as far north as New Caledonia, and throughout much of the New Zealand EEZ (McDowall 1982; Duffy et al. 2000). In the South Pacific they appear most abundant between about 200 m and 750 m (see Figure 1).

3.2.1 Inter-annual and/or seasonal variations in distribution

Relatively little is known about spawning aggregations and migratory movements. Tagging survey data indicate that bluenose may be generally sedentary in the short term (6-8months), although age specific migration may occur (Horn 2003).

3.2.2 Other potential areas where the species may be found

Bluenose may also occur on the Foundation seamounts in the mid South Pacific.

3.3 General habitat

Bluenose are benthopelagic and occur most commonly over or near rocky areas, and at the edges of canyons and steep drop-offs at depths of 100-300 m (Armitage et al. 1994). Generally, bluenose remain close to the seabed during the day and move up in the water column at night (Kailola et al. 1993). Reports on their patterns of diurnal vertical migration are contradictory. Winstanley (1978) concluded they lived near the sea floor at night, and moved upwards during the day to feed; the review in Kailola et al. (1993) states the opposite. It is apparent from New Zealand commercial catch data that bluenose can be caught above the bottom during the day and night. Juveniles inhabit surface waters, sometimes far offshore, in association with floating debris (Last et al. 1993; Duffy et al. 2000).

Bluenose appear to prefer cold water as part of their habitat characteristics (Kailola et al. 1993). Schools of relatively small adults (50–60 cm) are occasionally taken by trawl over smooth, muddy substrates.

3.4 Biological characteristics

In the fist two years bluenose grow relatively quickly, to average sizes of 31 and 45cm fork length in the first and second year, respectively (Horn 1988). It is believed that juvenile fish recruit to a demersal lifestyle from a presumed pelagic one at a length of around 47 cm FL. Females grow faster than males, and fish first spawn at about 62 cm FL at age 4–5 years (Horn 1988).

Maximum recorded size is 140 cm FL; females reach a larger size than males. Age and growth have been investigated in New Zealand and Australian specimens, but an ageing method has yet to be validated (Morison & Robertson 1995a). Analyses of bomb ^{14}C in otoliths have indicated that maximum age for the species is at least 25 years (Paul et al. 2004), so some earlier ageing studies (i.e., Webb 1979; Jones 1985; Horn 1988) are now believed to be inaccurate. Assuming that the fine growth zones apparent in otolith sections are annual markers, maximum age of bluenose is in excess of 40 years (Paul et al. 2004), and they have an average fork length of about 50 cm after 3 years and about 70–80 cm after 25 years (Morison & Robertson 1995b). Growth of juveniles is rapid; it is estimated that they reach a fork length of about 31 and 45 cm after 1 and 2 years respectively.

Bluenose are serial spawners, with females releasing oocytes in three or four large batches. Average size at sexual maturity appears to be about 60 cm for males and about 70 cm for females, equating to an age of 7–12 years (Baelde 1996). Spawning occurs off Tasmania from late summer to autumn, but the aggregations can begin to form some months before spawning starts (Baelde 1996). No confirmed spawning areas have yet been identified in the New Zealand EEZ, although Horn & Massey (1989) examined gonadosomatic indices and suggested that spawning probably begins in late summer. Anecdotal reports suggest

spawning occurs near East Cape of northeast New Zealand from January to April (Horn & Massey 1989). Bluenose are highly fecund, producing about 480 000 eggs per kg of body weight (Baelde 1996). Eggs are probably buoyant. It is assumed that the pelagic larvae are widely distributed by surface currents until they adopt a demersal existence, which occurs when they are about 47–50 cm long, or about 2 years of age (Kailola et al. 1993).

In Australian waters two distinct morphs of bluenose are caught. Specimens are distinguished by differing relative eye size, body colour and head shape, and are commonly referred to as 'big eyes' or 'small eyes' (Bolch et al. 1993). The distinct morphologies are possibly related to sexual maturity, with a change in morphology occurring at around 40-50cm standard length, and sexual maturity being associated with the 'bigeye' morph (Bolch et al. 1993). No genetic differences have been observed between the two different Australian morphs (Bolch et al. 1993).

Morphological characteristics

Bluenose have seven to eight dorsal spines, 19–21 soft dorsal rays, three anal spines, and 15–17 soft anal rays. Bluenose have a compressed body with a continuous dorsal fin. The lateral line extends to the caudal fin.

3.5 Population structure

A study of enzyme variation found no significant genetic differentiation between bluenose sampled from off South Australia, Tasmania, and New South Wales (Bolch et al. 1993).

Short term tagging studies carried out in New Zealand waters showed 36 out of 40 tagged and recaptured specimens were caught on the grounds in which they were tagged (Horn 1989). However, two fish displayed substantial movements with one fish travelling 490 km in 137 days and a second fish travelling 450 km in 231 days (Horn 1989). Therefore, although most individuals appear sedentary in the short term, the species is capable of long and fairly rapid migrations. These migrations and the pelagic larval stage could be responsible for the lack of heterogeneity observed in Bolch et al's (1993) genetic study and suggest that this area probably holds a single biological stock (Horn 2003).

Relationships between the Australasian stocks of bluenose and those beyond the EEZs are unknown. It is not known whether stocks in New Zealand and Australia EEZ's are part of high seas stocks.

3.6 Biological productivity

The onset of maturity at 7-12 years, moderate growth and moderate longevity indicates that this species has moderate biological productivity.

3.7 Role of the species in the ecosystem

The food of bluenose is somewhat varied. Bluenose generally feed on midwater organisms. Opportunistic observations of stomach contents of adult fish caught along the east coast of the North Island in New Zealand showed the main components to be pelagic tunicates (mainly *Pyrosoma*) and squid, with some small fish (often hoki) and only occasional crustaceans (Horn & Massey 1989). Off southeast Australia, Winstanley (1978) found the pelagic tunicate *Pyrosoma atlanticum* to be the most common food item in adult bluenose, with small quantities of squid, crustaceans, and fish. More generally, pelagic juvenile bluenose feed on fish larvae, small crustaceans, squids, ctenophores, and salps (Leim & Scott 1966).

Bluenose are prey at various stages of their life to other fishes (particularly sharks) and orcas.

4 Fisheries Characterisation

It is important to note that the line fisheries for bluenose on the high seas are part of a multi-species fishery. The other critical component in the catch mix is the wreckfishes (*Polyprion* spp.).

4.1 Distribution of fishing activity

New Zealand and Australian flagged vessels have commercially fished for bluenose in the southwest Pacific - FAO area 81 (see Figure 1 for general distribution of fishing activity).

4.2 Fishing technology

New Zealand flagged vessels catch bluenose using bottom and midwater trawls, bottom longlines, dahn lines, and trot lines. The majority of targeted fishing effort on the high seas uses dahn lines and bottom longlining. Australian vessels use bottom longlines and drop lines on the high seas to catch bluenose.

4.3 Catch history

Bluenose has been target fished, primarily by various lining methods, off Australia and New Zealand since the early 1980s. Catches are also taken by trawl. Landed bluenose catches from New Zealand vessels on the high seas in the South Pacific (Table 1) accounts for only ~4% of the catch taken within the New Zealand EEZ (~3000 t p.a. in recent years (FAO data)).

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.

Table 1: Catches of bluenose on the high seas in the South Pacific, 1991-2006.

Year	New Zealand	Australia
1991	3	-
1992	51	-
1993	223	-
1994	136	-
1995	175	-
1996	92	-
1997	169	32
1998	140	
1999	53	22
2000	19	27
2001	49	
2002	1	27
2003	26	30
2004	132	2
2005	101	3
2006*	277	
Total	**1,657**	**144**

**Preliminary data.*
Source: New Zealand Ministry of Fisheries 2007 and Sampaklis 2007.

4.5 Threats

No threat status known.

4.6 Fishery value

Section yet to be developed

5 Current Fishery Status and Trends

5.1 Stock size

No estimates of stock size are available.

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

6 Impacts of Fishing

6.1 Incidental catch of associated and dependent species

Seabirds

Line fisheries in general may catch seabirds. Most of the fishing for bluenose in the high seas of the South Pacific occurs north of 30°S. This is generally the northern extent of significant overlap between fisheries and vulnerable seabird species. Further the types of line methods used for bluenose tend to be well weighted and have faster line sink rates than observed in some fisheries. In combination this suggests that the risk of seabird capture in these fisheries is moderate to low.

No estimates of seabird incidental mortality in bluenose fisheries are available for the high seas.

The vessels targeting bluenose on the high seas are the same as those inside the NZ and Australian EEZ's. In New Zealand a longline code of practice, aimed at reducing impact on seabirds, has been developed and implemented by industry, and seabird mitigation devices are legally required on trawlers operating in higher risk waters. Exploratory bluenose fishing in the Australian EEZ around Norfolk Island is subject to the obligatory setting of bird scaring 'tori' lines when hook fishing, restrictions on offal discharge and 25% observer coverage. These same measures are generally used when fishing outside EEZs.

Fish

Associated and dependant species that have been recorded by New Zealand vessels fishing for bluenose outside the EEZ include: Conger eel (*Conger sp),* Northern Spiny Dogfish (*Squalus mitsukurii),* blue shark (*Prionace glauca*),

deepwater dogfish, longnecked eel (*Derichthys serpentinus*), frostfish (*Lepidopus caudatus*), hairy conger (*Bassanago hirsutus*), escolar (*Lepidocybium flavobrunneum*), orange perch (*Lepidopera aurantia*), pink maomao (*Caprodon longimanus*), Porae (*Nemadactylus douglasi*), rough skate (*Dipturus nasutus*), silver dory (*Cyttus novaezealandiae*), spider crab, and yellow boarfish (*Pentaceros decacanthus*).

6.2 Unobserved mortality of associated and dependent species

No information

6.3 Bycatch of commercial species

Numerous species have been reported as bycatch by New Zealand flagged vessels targeting bluenose outside EEZ's in the South Pacific region between 1990 and 2006. Species caught between 1992 and 2006 over 100 tonnes were: hapuka & bass (*Polyprion oxygeneios & P. americanus).* Species caught over 50 tonnes were: alfonsino & long-finned Beryx (*Beryx splendens & Beryx decadactylus).* Species caught over 10 tonnes were: king tarakihi (*Nemadactylus sp*) and rubyfish (*Plagiogeneion rubiginosus*). Species caught over 1 tonnes were: kingfish (*Seriola lalandi*), ling (*Genypterus blacodes),* School Shark (*Galeorhinus galeus),* Gemfish (*Rexea solandri),* and Sea perch (*Helicolenus sp.).*

6.4 Habitat damage

Longlining is the predominant fishing method for bluenose on the high seas and has minimal impact on the benthos. However, bottom trawling is also used and can have significant impact on the seafloor.

7 Management

7.1 Existing management measures inside EEZs

There is currently no management plan in place for bluenose on the high seas in the South Pacific.

7.2 Existing management measures in areas beyond national jurisdiction

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

7.3 Fishery management implications

It is unclear as to whether the current TAC's are sustainable within the New Zealand EEZ, and within the Australian EEZ bluenose is currently classified as not overfished. However, localised overfishing maybe occurring. Attempts to use

conventional stock assessment models have been unsuccessful for Australia's bluenose fishery. Indications of stock status have been based on declines in the catch rate, a drop in the age of small fish caught and a comparatively high estimated fishing mortality. These indicators suggest that the stock is fully fished (Fishery Status Report, Status of Fish Stocks Managed by the Australian Government, 2004).

Baelde (1995) showed that juvenile bluenose become fully recruited to the Australian dropline fishery shortly after adopting a demersal life style, at a length of about 50 cm, and that most fish were caught before they reached first maturity. Although they are highly fecund, post-juvenile productivity is low, and they appear to be relatively sedentary. Hence, bluenose are probably relatively susceptible to growth overfishing and population depletion.

It should be noted that even though bluenose may be resilient to fishing pressure due to widespread distribution, occurrence in untrawlable areas, and presumed juvenile pelagic life-style, the schooling behaviour does make bluenose vulnerable to fishing methods such as midwater trawling.

Determination of stock structure, in particular the links between within EEZ fisheries and high seas fisheries in the south west Pacific will be crucial to ensuring future sustainable management of bluenose.

7.3 Ecosystem Considerations

There is little scientific information on the long term impacts of bottom trawling-the overall productivity of deepwater systems and their resilience. Bottom trawl gear that touches the bottom damages long lived species, changes community structure and alters the geochemical cycles (see Jones 1992; Dayton et al. 1995). The degree of the loss of fishing gear in areas of the South Pacific is unknown but could be having adverse effects such as reducing habitat complexity.

8 Research

8.1 Current and ongoing research

In Australia, research is currently underway to investigate the genetic relationship (if any) between fish on offshore seamounts and those on the continental shelf (Fishery Status Reports 2004).

8.2 Research needs

Future research is required into population structure to determine if the South Pacific represents one stock.

9 Additional remarks

Bluenose are often found in association with alfonsino (*Beryx splendens*), gemfish (*Rexea solandri*), sea perch (*Helicolenus percoides*), and hapuka/bass (*Polyprion sps*.).

Little is known about the closely related barrelfish (*Hyperoglyphe perciformis*), occurring primarily in the northwestern Atlantic, or the medai (*H. japonica*) in the northwestern Pacific. They are similar in appearance to bluenose, and probably have similar life histories (i.e., a fast-growing juvenile pelagic phase, followed by a slow-growing and long-lived demersal phase).

The morphologically similar ocean blue-eye trevalla (*Schedophilus labyrinthica*) is often taken as bycatch of bluenose line fisheries in the South Pacific. Australian vessels fishing on the high seas catch almost as much ocean blue-eye trevalla (121 t) as bluenose (144 t). The proportion of ocean blue-eye trevalla appears to increase in northern areas.

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