SPRFMO
South Pacific Regional Fisheries Management Organisation

FAO species code: BWA
Scientific name: *Hyperoglyphe antarctica*

Taxonomy

Phylum	Vertebrata
Class	Actinopterygii
Order	Perciformes
Family	Centrolophidae
Genus	*Hyperoglyphe*
Species	*Hyperoglyphe antarctica* (Carmichael, 1819)
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).
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).
Molecular (DNA or biochemical) bar coding	Available in the Barcode of Life Data System (BOLD), at: http://www.boldsystems.org/index.php/Taxbrowser_Taxonpage?taxid=11318

Species Characteristics

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 the central south Atlantic, off South Africa, from various islands and submarine features across the Indian Ocean to the South Pacific.

Bluenose may occur from near-surface depths to at least 1,000 m. Overall, research trawl surveys record their main depth range as 250-800 m, with a peak between 300-400 m in some areas of occurrence (Anderson et al. 1998).

The depth distribution of bluenose is thought to change with size (Last et al. 1993; Kailola et al. 1993, Duffy et al. 2000, Cordue & Pomaréde 2012, Dutilloy et al. 2020). Small juveniles are known to occur at the surface under floating objects, with larger individuals being thought to live in coastal and oceanic pelagic waters for one or two years. Individuals 40-70 cm in length are generally caught between 200-600 m depth, whereas larger fish, particularly those greater than 80 cm, are more often caught deeper than 600 m. This ontogenetic shift in depth distribution has been supported by analysis of the stable radio-isotype ratios in otolith sections (Horn et al. 2008). However, the relationship may be more contingent on life-history stage rather than a continuous trend throughout the life-cycle where individuals move deeper with increasing length, and may be stronger for females (Bell et al. 2021).

Distribution within South Pacific

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 southwest Pacific they appear most abundant between about 200 m and 750 m. This is further supported by commercial catch records in SPRFMO, which indicate that bluenose is targeted in at depths of 300–600 m (BFIA 2020).

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

General habitat and behaviour

Juveniles inhabit surface waters, sometimes far offshore, in association with floating debris (Last et al. 1993; Duffy et al. 2000). It is believed that juvenile fish recruit to a demersal lifestyle from a presumed pelagic one at a total length of between 30–50 cm, or about 2 years of age (Kailola et al. 1993).

Adult bluenose are benthopelagic and occur most commonly over or near rocky areas, underwater topographic features such as hills and seamounts, at the edges of canyons and steep drop-offs, and continental slopes between 100-1,000 m depth (Kailola et al. 1993, Armitage et al. 1994). Bluenose appear to prefer relatively 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.

Reports on their patterns of diurnal vertical migration are contradictory. Generally, bluenose remain close to the seabed during the day and move up in the water column at night (Kailola et al. 1993), but Winstanley (1978) reported an opposite pattern. It is apparent from New Zealand commercial catch data that bluenose can be caught above the bottom during the day and night (Fisheries New Zealand 2021).

Biological characteristics

Morphology

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.
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'. It is unclear what causes these distinct morphs, but a relationship to sexual maturity has been hypothesised (Bolch et al. 1993). No genetic differences have been observed between the two different Australian morphs (Bolch et al. 1993).

Reproduction

Knowledge of bluenose reproductive biology is limited, with studies largely focusing on the western Pacific (Williams et al. 2017). Bluenose have been shown to be serial spawners, with females releasing oocytes in three or four large batches annually (Baelde 1996). Spawning time can be over an extended period and is somewhat location dependent but appears to peak in New Zealand waters from February to April (Horn & Massey 1989, Fisheries New Zealand 2021), between March and May off southern Australian fishing grounds (Baelde 1996), and evidence of spawning occurring later than June comes from off the coast of New South Wales (Kailola 1993). Maturity ogives derived from aged bluenose caught in New Zealand indicated ages at 50% maturity were approximately 15 and 17 years for males and females, respectively (Horn & Sutton 2011). These age estimates for sexual maturity were revised upwards, in concordance with age revisions, from earlier estimates, such as Horn et al. (1988) that described age- at-first maturity at approximately 4-5 years, or 7-12 years (Baelde 1996). Mean length-at-maturity was estimated to be between 55-65 cm for males and 65-75 cm for females (Jones 1985, Horn 1998, Baelde 1996

No confirmed spawning areas have yet been identified in the New Zealand Exclusive Economic Zone. However, most reproductively active fish have been sampled from locations in the Bay of Plenty, and in smaller abundances from northwest Taranaki to East Cape, and off the south west of the South Island (Dutilloy 2020). These reports support prior anecdotal reports suggesting spawning occurs near East Cape of northeast New Zealand (Horn & Massey 1989). Spawning areas in Australia have been reported off the New South Wales coast (Baelde 1996).

Length at maturity and growth

Bluenose exhibit sex-specific growth, with females achieving a greater maximum total length across all regions examined than males (Horn et al. 2010, William et al. 2017, Bell et al. 2021). Von

Bertalanffy growth parameters have been estimated and revised (e.g., Horn et al. 2010, Dunn 2020), however, these have been eschewed in favour of empirical data of length-at-age for some recent stock assessments due to inadequate fits of growth parameters to the observed length at age (Dunn 2020, Dunn et al. 2021).

Age and growth have been investigated in New Zealand and Australian specimens, with recent ageing validation work by Horn et al. (2008, 2010) substantially revising estimates of maximum age and size-at-maturity. Maximum age estimates have increased over time and may be regionally dependent (Annala 1994, Horn & Sutton 2010, Horn & Sutton 2011, Bell et al. 2021), with the oldest observed specimen being aged at 76 years in New Zealand (Horn & Sutton 2011). This maximum age is consistent with the maximum age of 85 years estimated for the closely related barrelfish (*Hyperoglyphe perciformis*) in the western North Atlantic (Filer & Sedberry 2008), but is substantially more than age estimates from southeast Atlantic bluenose of 44 years (Bell et al. 2021) – however, this result could be confounded by limited sampling in deeper waters during the course of the study. Such results indicate that earlier ageing studies (e.g., Webb 1979; Jones 1985; Horn 1988; Paul et al. 2004) were inaccurate, and severely under-estimated the maximum age of the species.

Biological productivity

Bluenose are highly fecund, producing about 480 000 eggs per kg of body weight (Baelde 1996). Eggs are thought to be buoyant and it has been assumed that the pelagic larvae are widely distributed by surface currents (Williams et al 2017). The onset of maturity at 7-12 years, moderate growth and moderate longevity indicates that this species has moderate biological productivity.

Role of the species in the ecosystem

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, Laptikhovsky et al. 2019). 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 larger fishes (particularly sharks) and marine mammals.

Impacts of Fishing

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 in some fisheries.

Trawling for bluenose, like trawling for other species, is likely to have long-term effects on the benthic community structure and function where fishing occurs (e.g., Rice 2006, Clark et al. 2019) and there may be consequences for benthic productivity (e.g., Jennings et al 2001, Hermsen et al 2003, Hiddink et al 2006, Reiss et al 2009).

Underwater topographic features such as seamounts, knolls and pinnacles are widely regarded as fragile habitats and are susceptible to damage from such practices (Althaus et al. 2009, Clarke et al. 2010), along with the habitat-forming species that reside upon them and contribute to local-scale habitat complexity and relief (Clark and O'Driscoll 2003, O'Driscoll and Clark 2005, Koslow et al. 2001).

The Cumulative Bottom Fishery Impact Assessment for Australian and New Zealand bottom fisheries in the SPRFMO Convention Area, 2020 (SC8-DW07_rev1) reviewed and assessed habitat impacts of demersal fisheries. It also assessed the extensive and complex management in place to mitigate benthic impacts within SPFRMO, which is mainly based on spatial restrictions of fishable areas.

References

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