



New and known zoonotic nematode larvae within selected fish species from Queensland waters in Australia

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ARTICLE INFO

Keywords:

Anisakidae
Raphidascarididae
Nematoda
Fish
Seafood
Australia

ABSTRACT

Zoonotic fish-borne nematodes are a significant and growing global health concern. However, in Australia their occurrence and geographical distribution are not well known. Moreton Bay in Queensland, Australia, is a popular tourist destination for domestic and international visitors where seafood is a popular food item. The aim of this study was to determine the occurrence of zoonotic nematodes within four commercially significant teleost fish species from Moreton Bay; Surf Bream, Sea Mullet, Yellow-Fin Tripod fish and Gold-Lined Sea Bream. Overall, 34.03% of fish examined ($n = 144$) were found to be a host to at least one parasitic nematode. The seasonal dynamics and prevalence of nematode infection was tested by statistical means. Results indicated a significant difference in seasonal infection for Surf Bream ($p < 0.005$) only. Several potentially zoonotic larval morphotypes were found, including *Contracaecum* types I and II, and *Terranova* type II (Family Anisakidae), and *Hysterothylacium* types VI and XIV and a new *Hysterothylacium* larval type herein assigned as type XVII (Family Raphidascarididae). ITS sequence data showed that some *Contracaecum* type II and *Hysterothylacium* types VI found in the present study are genetically distinct from those previously reported. The new genotypes were assigned to *Contracaecum* type II Genotype B and *Hysterothylacium* type VI, Genotypes B and C. This study provides essential information for future research on specific identification and differentiation of infective stages of zoonotic nematoda in edible fish.

1. Introduction

In parallel with the move towards healthier eating habits and increasing seafood consumption, particularly raw and exotic fish dishes, there have been increasing reports of associated consumer health issues (Chai et al. 2005). Zoonotic parasites belonging to the Phylum Nematoda are responsible for global emerging food-borne diseases including anisakidosis (Eiras et al. 2017). Some zoonotic fish nematodes, such as members of *Hysterothylacium* spp. cause mild illness and occur rarely in humans while others such as *Anisakis* spp can be highly pathogenic (Desowitz 1986).

Fish-borne nematodes impact the quality and aesthetics of seafood and are responsible for economic losses in the Australian seafood industry. Under the guidelines of the hazard analysis and critical control point (HACCP), infected fish must be discarded, leading to a harvest loss (Anantanawat et al. 2012). In Australia, various species of zoonotic nematodes including anisakids and raphidascarids infect fish (e.g., Hooper 1983; Lymbery et al. 2002). However, due to the country's size, there is still limited knowledge regarding their occurrence, geographic distribution, host range, ecology and epidemiology, particularly

regarding their larval stages within teleost species. The main aim of this study was to determine the occurrence of potentially zoonotic nematodes within four commercially significant fish species from Moreton Bay, a popular destination for domestic and international tourists in Queensland, Australia, where seafood is a popular section of the cuisine. The seasonal variation and prevalence of nematode infection within the collection periods of January and June–July 2016 were also determined using statistical inference. This is important for determining the ecological dynamics of host-parasite relationships. In addition, this study was designed to determine the specific identity of the nematode larvae in infected fish.

2. Materials and methods

2.1. Sample site

Fish specimens were collected from Moreton Bay, Queensland (27°15'S, 153°15'E) (Fig. 1), located on the eastern coastline of Australia. The bay is 35 km wide and is mostly situated between the coastlines of Brisbane and protected by large sand islands to the east

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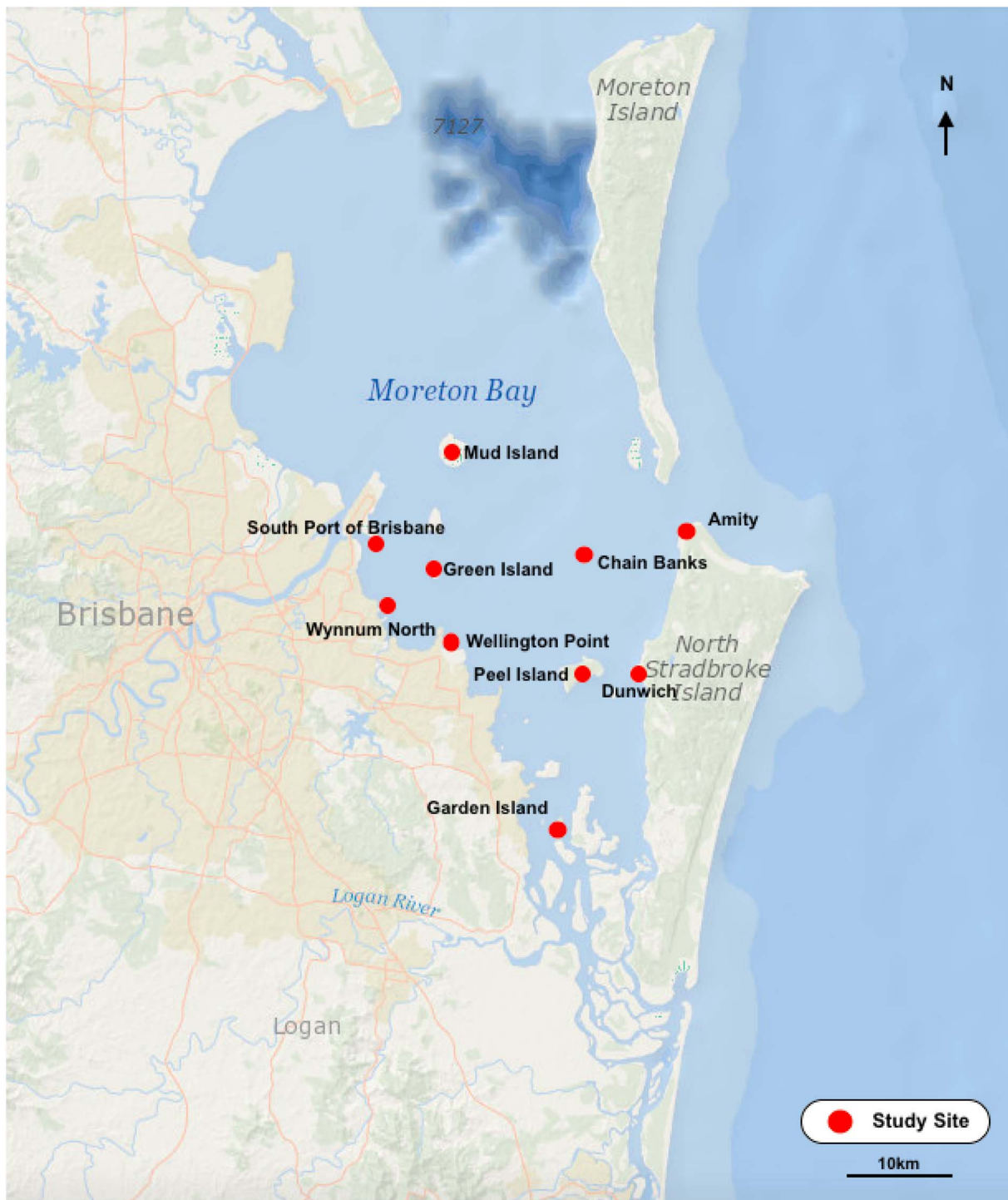


Fig. 1. The geographical extent of study site; located on the eastern coast of Australia is Moreton Bay, Queensland, Australia.

(Moreton Island and North Stradbroke Island). Fish specimens were collected from 10 sites within the bay including; Mud Island, Amity, Chain Banks, South Port of Brisbane, Green Island, Wynnum North, Wellington Point, Peel Island, Dunwich and Garden Island within Moreton Bay, Queensland (Fig. 1). Fish were collected during two field trips conducted in January and June–July of 2016.

2.2. Sample collection

A total of 144 fish belonging to 4 species; Surf Bream, *Acanthopagrus australis* ($n = 66$), Sea Mullet, *Mugil cephalus* ($n = 35$), Gold-Lined Sea

Bream, *Rhabdosargus sarba* ($n = 29$) and Yellow-Fin Tripod Fish, *Tripodichthys angustifrons* ($n = 14$) were collected and examined for nematodes in accordance with Shamsi and Suthar (2016b). Fish species were targeted by edibility and/or their geographic distribution within Australian coastal waters. Fish were obtained by a licensed fishing trawler supplemented with beach seine and line fishing. All nematodes collected were preserved in 70% ethanol and transported back to the Parasitology Laboratory facilities at Charles Sturt University, Wagga Wagga, New South Wales.

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