



Fisheries, Long Term Monitoring Program Sampling Protocol

Barramundi: (2008 onwards)

Section 1

This document may be cited as:

Fisheries Queensland (2010). Fisheries Long Term Monitoring Program Sampling Protocol – Barramundi (2008 onwards) Section 1. Department of Employment, Economic Development and Innovation, Brisbane, Australia.

Acknowledgments:

This protocol has incorporated contributions from many staff, in particular Darren Rose, Rod Garrett, Sue Helmke, Rick Officer, Mick O’Neil, Neil Gribble, Eddie Jebreen, Jonathan Staunton Smith, Malcolm Dunning, Ross Quinn, Joanne Atfield, Clive Turnbull and Olivia Whybird. Also we would like to acknowledge the contributions made by Norm Hall (Murdoch University) who helped provide an understanding of data requirements to monitoring the species.

© The State of Queensland, Department of Employment, Economic Development and Innovation, 2010.

Except as permitted by the Copyright Act 1968, no part of the work may in any form or by any electronic, mechanical, photocopying, recording, or any other means be reproduced, stored in a retrieval system or be broadcast or transmitted without the prior written permission of the Department of Employment, Economic Development and Innovation. The information contained herein is subject to change without notice. The copyright owner shall not be liable for technical or other errors or omissions contained herein. The reader/user accepts all risks and responsibility for losses, damages, costs and other consequences resulting directly or indirectly from using this information.

Enquiries about reproduction, including downloading or printing the web version, should be directed to ipcu@dpi.qld.gov.au or telephone +61 7 3225 1398.

Contents

Section 1

Contents	iii
Acronyms	iii
Rationale	1
Objectives	2
Sites	2
Times	3
Monitoring procedure	3
Sampling design	3
Length	3
Otoliths	4
Sex	4
Sample collection	4
Permits and approvals	5
Permits and Permission	5
Notifications	5
Data access	5
References	6

Section 2 - Operational Protocols

Section 2 of this sampling protocol can be obtained by contacting the Fisheries Data Coordinator:

Telephone +61 7 3224 2175, Fax +61 7 3224 2805 or

Email FishDataCoordinator@dpi.qld.gov.au

Acronyms

ALK	age-length key
CFISH	Commercial Fisheries Information System, Fisheries Queensland
ECIFFF	East Coast Inshore Fin Fish Fishery
GOCIFFF	Gulf of Carpentaria Inshore Fin Fish Fishery
LTMP	Long Term Monitoring Program, Fisheries Queensland
RFISH	Recreational Fisheries Information System, Fisheries Queensland

Rationale

Barramundi (*Lates calcarifer*), a Queensland iconic species, are caught by indigenous, recreational and commercial fishers in rivers, estuaries, and around headlands and nearshore islands of Queensland (Garrett 1995). In freshwater, particularly impoundments and dams, barramundi are highly prized sport fish by recreational anglers because they are strong fighters and grow to a large size.

Barramundi are part of an inshore multi-species finfish fishery. In Queensland, the Gulf of Carpentaria Inshore Fin Fish Fishery (GOCIFFF) is managed separately to the East Coast Inshore Fin Fish Fishery (ECIFFF) (DPI&F 2008, 2009). Management of the species is provided under the *Fisheries (Gulf of Carpentaria Inshore Fin Fish) Management Plan 1999*, *Fisheries Regulation 2008*. The export of fish from these fisheries is subject to the Australian Government *Environment Protection and Biodiversity Conservation Act 1999*.

The Long Term Monitoring Program (LTMP) for barramundi began in 2000 with fishery-dependent and fishery-independent surveys. Initially, its aim was to correlate an annual snapshot of barramundi catch rate data, with annual trends in the Commercial Fisheries Information System (CFISH) logbook program (Lunow *et al.* 2005). A workshop, held in May 2006 adapted an age-structured model, which had been developed primarily for the Northern Territory data, to accept and apply the inputs from the Queensland fishery. The regime for the LTMP age sampling was discussed and in 2008 the monitoring program was altered based on recommendations arising from the workshop.

The monitoring program focuses on investigating biological aspects of this species including length, age and sex data of the retained catch from all sectors in the fishery. Measuring these parameters is important as the data provide a time-series of information about the dynamics of exploited barramundi populations. Age structured data are used to detect changes in the biology of the species not discernible from commercial and recreational catch and effort data.

These data, together with catch and effort data from the commercial and recreational sectors will be used in population models to estimate the spawning stock biomass of barramundi on a year to year basis. The assessment provides a tool for managers, warning of stock reductions or highlighting improvements in barramundi stocks throughout Queensland.

Objectives

The objective of the LTMP barramundi program is to use fishery-dependent sampling to collect representative length, age and sex data from the recreational and commercial catch annually.

These data are useful indicators of the stock and are incorporated into an age structured stock assessment model for the Queensland barramundi fishery.

Sites

Barramundi sampling occurs in three areas in Queensland, selected based on genetic stocks identified by Keenan (1994). These areas were chosen as they reflect major concentrations of fishing activities and a large amount of biological data have already been collected from rivers within the stocks. Sampling occurs in the Gulf of Carpentaria, North-east coast and Central coast (Figure 1).

Samples of barramundi are collected from inshore coastal areas, rivers, estuaries, and around headlands and near shore islands. This monitoring program does not collect barramundi information from freshwater dams or impoundments.

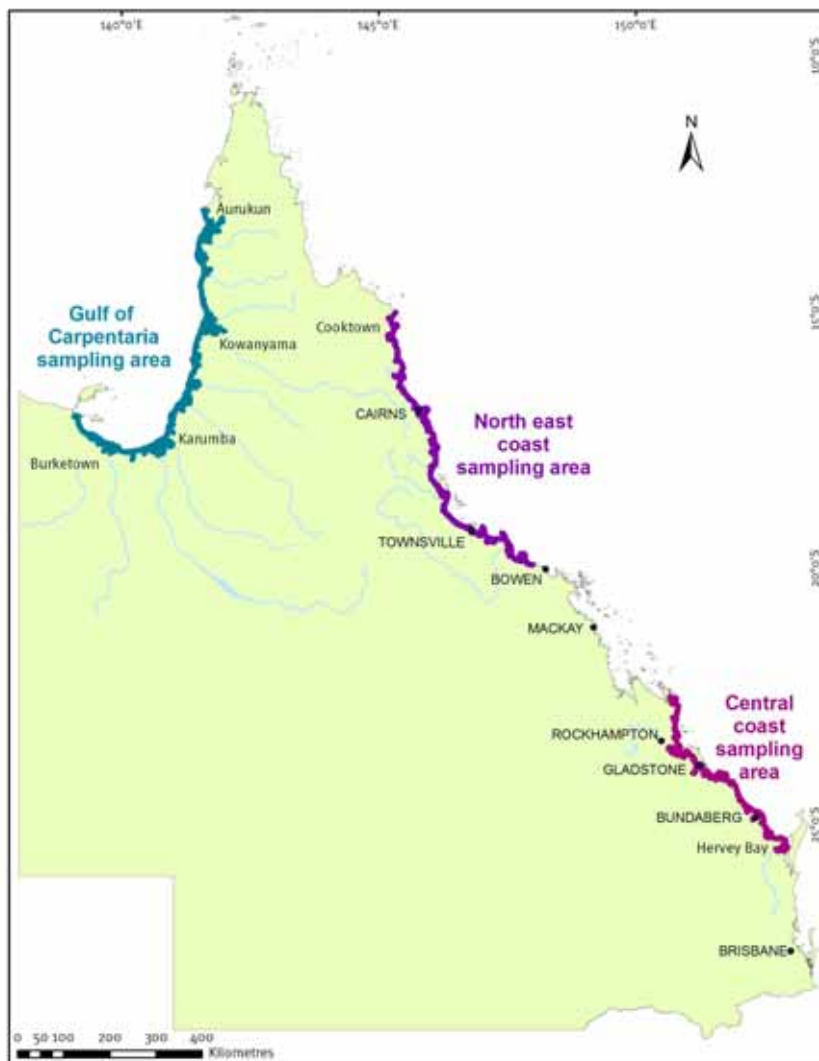


Figure 1. Areas sampled by the Long Term Monitoring Program for Barramundi.

Times

The sampling seasons for barramundi are within calendar years from February to October. No sampling occurs in the seasonal closures for the barramundi fishery. Sampling is aligned with the fishing seasons used in the barramundi stock assessments. Most length data are collected during peak fishing periods in each sampling area (Table 1).

Table 1. Sampling months for barramundi in each area.

*** = peak sampling ** = moderate sampling * = off peak sampling.

Sampling area	January	February	March	April	May	June	July	August	September	October	November	December
Gulf of Carpentaria	Seasonal closure	***	***	***	**	**	*	*	*	*	Seasonal closure	Seasonal closure
North-east coast		***	***	***	*	*	*	*	*	***		
Central coast		***	***	***	*	*	*	*	**	***		

Monitoring procedure

Sampling design

The monitoring program for barramundi uses fishery-dependent sampling to collect length data from the major sectors within the fishery. A sub-sample of otoliths, from the fish measured, is collected to construct age-length keys (ALK). The length data and the ALK are used to construct age structures for each three genetic stocks.

Length

Length data are collected from retained fish caught by recreational anglers, including those fishing on charter boats, and commercial fishers. Retained fish are those barramundi that the fisher has kept from a fishing session. The total lengths are measured to the nearest 10 mm.

Target numbers are used by the program to give a better representation of the overall length structure of the retained catch. Target numbers of commercial catches to be sampled are set as a guide for sampling at the start of each sampling season. The annual target for each genetic stock is 50 catches. These target catches are divided spatially and temporally within each sampling area and are based on average commercial catches (in weight) from logbook data in the CFISH database. This sampling design is aimed to collect more length information in areas at times with high catches, therefore providing length structure data that are representative of the barramundi catch.

Reliable estimates of recreational catch within the barramundi sampling areas could not be obtained from the Recreational Fisheries Information System (RFISH) database. Previous surveys, using diary and survey data, of recreational harvest of barramundi in Queensland have focused on establishing single, state-wide estimates, rather than regional estimates. This means the data are unsuitable for stratifying the length sampling. Sampling intensity from the recreational fishery is focused around periods of high catch and areas adjacent to high populations or locations frequently visited by recreational fishers targeting barramundi. The program sets a general target of 200 fish to be measured in each area each year.

Otoliths

Otoliths are collected in different sampling areas and seasons within a year to take into account natural variability in the population structures. Information read from the otoliths are used to construct an age-length key for each genetic stock each year. Age-length keys are used to convert representative length data for each sector to an age structure.

The otolith collection is stratified by length. A maximum of twenty otoliths are collected in each 10 mm length class for each area each year. A cap of five otoliths per length class per catch is applied to the otolith sampling to ensure otoliths are collected throughout the season. Techniques for otolith removal are described in section 2 of this protocol (Fisheries Queensland In Prep. a).

Fish age is determined by examining sectioned otoliths as per the LTMP Fish Ageing Protocol (DPI&F 2007c; Fisheries Queensland In Prep b.).

Sex

Sex of fish is determined macroscopically whenever possible. If no gonads are present (i.e. they have been removed) or if the fish are whole and the gonad are not examined, then the sex is recorded as unknown.

Sample collection

The LTMP uses a suite of sampling strategies to collect fishery-dependent data and samples for a large number of species, including barramundi. The monitoring program relies on the co-operation of the fishing community to allow monitoring staff to access their fish, for biological information and samples. These sampling strategies include:

- **Commercial sampling** (Fisheries Queensland 2009a)
 - measuring fish and collecting otoliths and sex information from fish before they are sold by commercial fishers
 - measuring fish and collecting otoliths and sex information from fish at seafood wholesalers
 - asking commercial fishers to measure fish and keep fish frames
- **Charter sampling** (DPI&F 2007b)
 - asking operators to measure fish or keep frames from their clients' fish
- **Recreational sampling**
 - asking anglers to donate fish frames (Fisheries Queensland In Prep. c)
 - asking anglers to measure fish that they keep (Fisheries Queensland In Prep. b).
 - measuring fish, and collecting samples from anglers at fishing tournaments (Fisheries Queensland 2009a)
 - measuring fish from anglers at targeted boat ramp surveys (DPI&F 2007)
 - conducting field surveys to measure fish and collecting fish frames from anglers at popular remote fishing locations (e.g. Kowanyama in the Gulf of Carpentaria) during busy fishing periods (Fisheries Queensland In Prep. a).

Permits and approvals

Permits and Permission

This project does not require permits or animal ethics approval to catch samples as they are taken by recreational or commercial fishers as part of normal fishing practice and provided to Fisheries Queensland, part of the Department of Employment, Economic Development and Innovation, for the project. A General Fisheries Permit (*Fisheries Act 1994*) is required to possess fish outside legislated possession or size limits.

Survey staff familiarise themselves with and follow all permit conditions and have a copy with them during each survey.

Notifications

Notifications for some of the sampling strategies, must be sent at least one week prior to the surveys, quoting relevant permit numbers and any variations to the methods. Details are outlined in the relevant sampling protocols (DPI&F 2007b, 2007c; Fisheries Queensland In Prep. a, In Prep. c, 2009a, 2009b).

Aboriginal Land offices are contacted requesting permission to conduct surveys in the area and also to gain access to the camp ground bookings in remote locations prior to field surveys.

Queensland Boating and Fisheries Patrol are advised on which LTMP staff will be conducting targeted boat ramp surveys.

Stakeholders and the general public are kept informed of the survey through a variety of media resources including press releases, pamphlets, reports and web site information, as documented in the Assessment and Monitoring Communication Strategies available from the Department.

Data access

All use of assessment and monitoring data is subject to a data agreement between the Department and the party requesting the data. The data agreement covers how data must be acknowledged in publications and other restrictions that may be placed on data use. If the publication is based substantially on LTMP data and on LTMP survey design then co-authorship may be requested or advised. All documents that utilise LTMP data must be sent to the Fisheries Data Coordinator as drafts for perusal before they are published. Copies of final documents utilising LTMP data must be provided to the Fisheries Data Coordinator free of charge for lodgement in the departmental library.

The Fisheries Data Coordinator is to be contacted for all applications:
Telephone +61 7 3224 2175, Fax +61 7 3224 2805 or
Email FishDataCoordinator@dpi.qld.gov.au

References

- DPI&F (2007a). Fisheries Long Term Monitoring Program Sampling Protocol – Fish Ageing Section 1. Department of Primary Industries and Fisheries, Brisbane, Australia.
- DPI&F (2007b). Fisheries Long Term Monitoring Program Sampling Protocol – Charter Boat Catch Sampling: (2006 onwards). Department of Primary Industries and Fisheries, Brisbane, Australia.
- DPI&F (2007c). Fisheries Long Term Monitoring Program Sampling Protocol – Boat Ramp Survey: (2006 onwards). Department of Primary Industries and Fisheries, Brisbane, Australia.
- DPI&F (2009). Annual Status Report 2008: Gulf of Carpentaria Inshore Fin Fish Fishery. Department of Primary Industries and Fisheries, Brisbane, Australia.
- DPI&F (2008). Annual Status Report 2008: East Coast Inshore Fin Fish Fishery. Department of Primary Industries and Fisheries, Brisbane, Australia.
- Environment Protection and Biodiversity Conservation Act 1999*, www.comlaw.gov.au/, Commonwealth of Australia.
- Fisheries Act 1994*, www.legislation.qld.gov.au/, Office of the Queensland Parliamentary Council.
- Fisheries (Gulf of Carpentaria Inshore Fin Fish) Management Plan 1999*, subordinate legislation of the *Fisheries Act 1994*, www.legislation.qld.gov.au/, Office of the Queensland Parliamentary Council.
- Fisheries Regulation 2008*, subordinate legislation of the *Fisheries Act 1994*, www.legislation.qld.gov.au/, Office of the Queensland Parliamentary Council.
- Garrett, R.N. (1995). Biology and fishery information for some commonly taken fishes of tropical Queensland coastal waters. Tropical Fin Fish Management Advisory Committee Restricted Circulation Information Paper. 41pp. Unpublished report to the Queensland Fisheries Management Authority, Brisbane, Australia.
- Keenan, C.P. (1994). Recent evolution of population structure in Australian barramundi *Lates calcarifer* (Bloch): an example of isolation by distance in one dimension. *Australian Journal of Marine and Freshwater Research* 45, 1123–1148.
- Lunow, C., Garrett, R., Gribble, N., Helmke, S., and Rose, D. (2005). Fisheries Long Term Monitoring Program – Barramundi (*Lates calcarifer*) surveys results: 2000-2002. Department of Primary Industries and Fisheries, Brisbane, Queensland.
- Fisheries Queensland (In Prep a). Fisheries Long Term Monitoring Program Sampling Protocol – Barramundi Sampling: (2007 onwards) Section 2. Department of Employment, Economic Development and Innovation, Brisbane, Australia

Fisheries Queensland (In Prep b). Fisheries Long Term Monitoring Program Sampling Protocol – Fish Ageing Section 2: Barramundi. Department of Employment, Economic Development and Innovation, Brisbane, Australia

Fisheries Queensland (In Prep. c). Fisheries Long Term Monitoring Program Sampling Protocol – Keen Angler Program: (2007 onwards). Department of Employment, Economic Development and Innovation, Brisbane, Australia.

Fisheries Queensland (2009a). Fisheries Long Term Monitoring Program Sampling Protocol – Commercial Sampling: (2007 onwards). Department of Employment, Economic Development and Innovation, Brisbane, Australia.

Fisheries Queensland (2009b). Fisheries Long Term Monitoring Program Sampling Protocol – Tournament Sampling: (2007 onwards). Department of Employment, Economic Development and Innovation, Brisbane, Australia.

Shaklee, J.B., Salini, J., and Garrett, R.N. (1993). Electrophoretic characterization of multiple genetic stocks of barramundi perch in Queensland, Australia. *Transactions of the American Fisheries Society* 122(5), 685–701.