Mud Crab Research Update

An update on mud crab research in the Northern Territory

Edition 5: Jan 2009

Introduction

Welcome to the fifth edition of the 'Mud Crab Research Update'. This newsletter has been developed to provide an update on mud crab research in the Northern Territory. If you would like to join the mailing list for this newsletter, please contact Fisheries on 08 8999 2144, or e-mail: fisheries@nt.gov.au. Copies are also available via post or download at: www.nt.gov.au/d/Fisheries /mudcrab/

Durometer Trial

One hundred commercial legal sized crabs of each sex and shell type (i.e. soft and hard) have now been tested using a durometer (Figure 1). Males were tested in the middle of the second abdominal plate (the conventional hand test site) and females at the white dots shown in Figure 2.

The data shows there are some small differences between the durometer test results and the results from the currently prescribed thumb test method for determining commercially unsuitable crabs. We have not attempted to determine which method is a better indication of the 'fullness' of mud crabs.

From this data an optimal transition value minimising the proportion of soft crabs and maximising the proportion of hard crabs was determined for each sex (see blue lines in Figures 3 and 4).

FIGURE 1. PTC Model 307HF Durometer as used in trial

For male crabs, a durometer reading of 77 means that 91% of hard crabs and 6% of soft crabs are retained (i.e. 97 crabs out of a possible 100).

Northern Territory Government

Mud crab research in the Northern Territory is conducted by the Fisheries Group of the Department of Regional Development, Primary Industry, Fisheries and Resources with the assistance of commercial fishers and wholesalers.

For female crabs, a durometer reading of 86 means that 83% of hard crabs and 10% of soft crabs are retained (i.e. 93 crabs out of a possible 100).

These figures represent a compromise as not all crabs will be hard. To achieve 100% reliability the transition point for males would need to be set at 81 and that for females at 89 (see green lines in Figures 3 and 4).

It should be noted that at these elevated values, only 87 (of a possible 100) males and 64 (of a possible 100) females will be retained. This compromise needs thorough consideration by industry if the instrument is to be used as a quality assurance tool.

The next stage of the project will require the purchase of a number of durometers in order to familiarise the mud crab market chain with the use of the instrument and also conduct an industry survey as to an appropriate transition point for each sex.

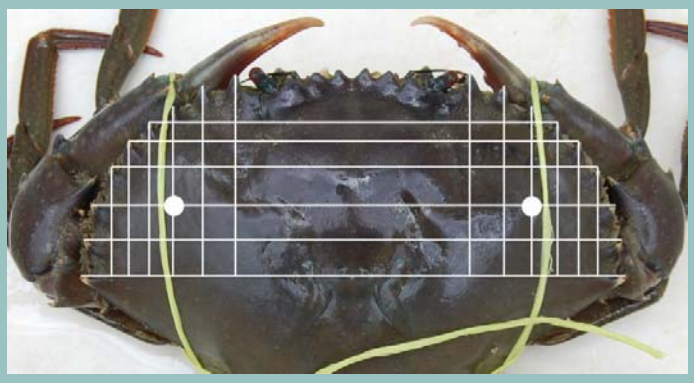

FIGURE 2. White dots indicate position of the standardised test site for females

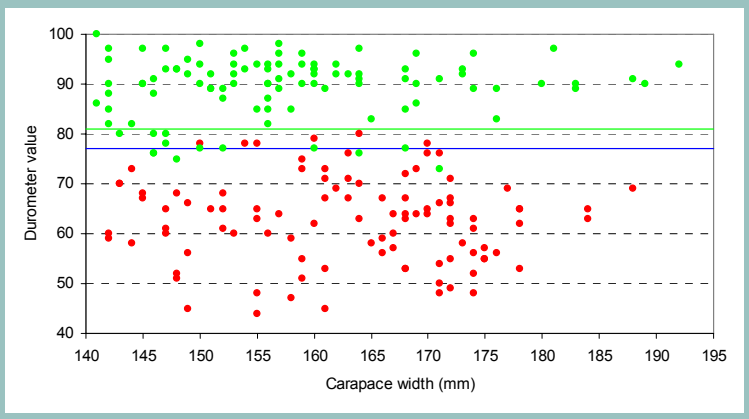

FIGURE 3. Durometer values for commercially unsuitable (red dots) and acceptable (green dots) male mud crabs versus size. The blue line represents the optimal transition point and the green line the soft crab cut-off point

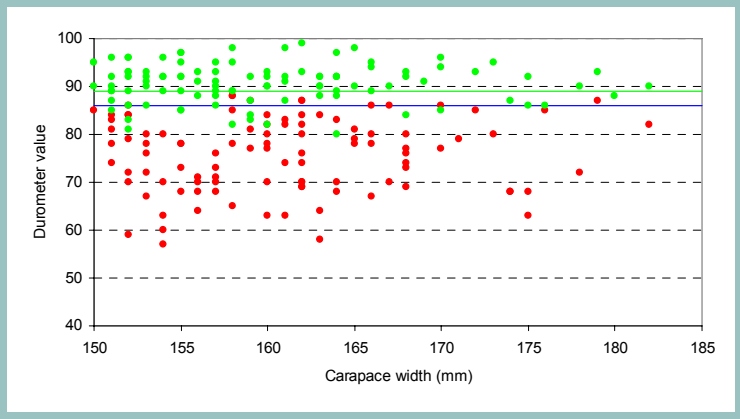

FIGURE 4. Durometer values for commercially unsuitable (red dots) and acceptable (green dots) female mud crabs versus size. The blue line represents the optimal transition point and the green line the soft crab cut-off point

Juvenile mud crab monitoring trial

A collaborative research project involving the Northern Territory Seafood Council, the Fisheries Group of the Department of Regional Development, Primary Industry, Fisheries and Resources (DRDPIFR), the NT Crab Fishermen's Association and the Numberindi and Li-Anthawirriyarra Sea Ranger Groups began in August 2008.

The two year study is funded through a National Landcare Programme Sustainable Practices Grant. The aim of the work is to collect information on when and where juvenile mud crabs are found and describe potential links between juvenile abundance and the subsequent commercial harvest of mud crabs. The areas to be monitored include the Adelaide River near Darwin and the Limmen Bight, McArthur, Roper, Rose and Wearyan Rivers in the Gulf of Carpentaria.

During September and November 2008, Fisheries staff, in conjunction with Chris Calogeras (C-AID Consultants), conducted training workshops for several commercial crabbers and both Sea Ranger Groups at Numbulwar and Borroloola, respectively. Where necessary, these workshops covered how best to set and retrieve crab pots, mud crab handling techniques as well as data recording and reporting protocols. Commercial fishers on the Adelaide and Wearyan Rivers have also received project advise/support from the Fisheries Group.

By December 2008, each participant (or group) had been issued with a number of purpose-built experimental pots and a scientific permit to use non-standard pots. The experimental pots are based on commercial crab pots but are wrapped in a smaller, finer mesh (Figure 5). Two entry funnels are built from a v-shaped section of rigid wire mesh wrapped in shade cloth. Shade cloth is used to prevent the fine legs of juvenile crabs from falling through the gaps in the wire mesh. Larger crabs are physically blocked from entering the pots as the funnel opening is only 25 mm high.

FIGURE 5. Experimental pot

Three to five pots have been grouped in several locations within each monitoring area (e.g. near salt pans, mangroves and mud flats) and are checked at least two to three times per week. Crabs captured are emptied into a plastic tray which has a checkerboard pattern applied to the inner surface for calibration purposes (see Figure 6). Once photographs of the catch have been taken (using water-proof digital cameras), the crabs are released. Images are returned to Darwin each month for crab size estimation using image analysis software.

FIGURE 6. Sub-adult mud crab in tray

At the completion of the project, the data collected will be used to identify patterns in juvenile crab abundance in each area. This information will then be compared with the commercial harvest. If trends in juvenile and adult (i.e. commercial) catches are similar, then the survey method may enable fishers to predict the relative size of their catch 6 to 9 months in advance. Such a forecasting tool may also allow crabbers to scale their operations to the predicted catch.

Improving the accuracy of effort estimates in the NT Mud Crab Fishery.

An application will be submitted to the Northern Territory Fishing Industry Research and Development Advisory Committee for funds to purchase depth/temperature data loggers (Figure 7) to attach to commercial and research crab pots.

FIGURE 7. Temperature/depth loggers (actual size)

The aim of the work is to provide accurate data on fishing effort (i.e. pot soak times), pot exposure times, tidal cycles and water temperature. This information will then be used in future Mud Crab Fishery stock assessments, the FRDC mud crab environmental drivers project (now being run by Griffith University) and the juvenile mud crab project described herein.

Recreational Fishing Survey

Planning for the NT recreational fishing survey is well underway and the survey will start in April 2009 and run for 12 months. It will include an estimate of the recreational harvest of mud crabs.

Escape vent trial

A recent research paper from Thailand on the use of escape vents to allow small (or undersized) mud crabs to exit pots has sparked interest in the NT Mud Crab Fishery. The main reason being that the 2006 mud crab observer program (which sampled just over 2000 crabs) showed that for every one crab retained, two were handled and released.

The use of appropriately sized escape vents may reduce the proportion of undersized crabs retained in crab pots and therefore lower cannibalism (particularly of soft crabs), handling and post-release mortality rates.

Essentially this means that more undersized crabs should survive to the next moult (at which point they may be caught) and that fishers will spend less time sorting crabs.

Logically, the larger the escape vent, the larger the crab that can exit the pot, but it's not quite that simple. Firstly, one must recognise that it is carapace length, not carapace width, that is important, as the crab exits sideways. Claw height is also important, more so in males than females.

Furthermore, the diagonal distance of the escape vent should be considered as the crab can escape at an angle other than horizontal. This may be of more relevance to female crabs than male crabs due to their smaller claws. The different minimum legal size for males and females further complicates things but there is nothing to preclude using different sized escape vents at different times of year based on the sex ratio of the catch.

Whilst the legislated minimum mesh size for crab pots is 45 x 60 mm, the most commonly used mesh size appears to be 2 inch x 3 inch (which equates to an opening of roughly 48 x 73 mm). The diagonal distance of this opening is 87 mm.

Measurements of carapace width, carapace length and claw height from 100 commercial legal sized male crabs (i.e. ≥ 140 mm) revealed that they all had a carapace length greater than 90 mm and a claw height greater than 40 mm.

This means that an escape vent 90 mm wide and 40 mm high should allow the escape of undersized (and retention of legal sized) male crabs. The same measurements taken from 200 commercial legal sized female crabs (i.e. ≥ 150 mm) found that they all had a carapace length greater than 95 mm and a claw height greater than 30 mm.

As expected, the different size limits for male and female mud crabs means that a "one size fits all" escape vent may not be feasible. Nevertheless, we intend to test a variety of escape vent sizes and shapes. The vents will be cut from steel plate using a computer aided laser cutter. This tool will enable precise and repeatable machining of the plate (Figure 8).

FIGURE 8. Prototype escape vent

Anyone interested in participating in the trial is asked to contact Mark Grubert or Chris Errity.

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