

**2008 International Travel Bursary - Biology and Management of Exploited Crab Populations under Climate Change**



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## **OBJECTIVES:**

1. Present a paper on the NT Mud Crab Fishery at the conference "Biology and Management of Exploited Crab Populations under Climate Change"
2. Document the mechanisms behind the synergistic effects of human and natural causes of fluctuations and collapses of crab stocks and fisheries around the world
3. Meet with Professor Carl Walters to discuss research and management of the NT Mud Crab Fishery
4. Apply the knowledge gained through Objectives 2 and 3 to any revised NT Mud Crab Fishery Management Plan
5. Disseminate the knowledge gained through Objectives 2 and 3 to management agencies in other jurisdictions that support mud crab fisheries

## **NON TECHNICAL SUMMARY:**

### **Outcomes Achieved To Date:**

I attended the 25<sup>th</sup> Lowell Wakefield symposium "Biology and Management of Exploited Crab Populations under Climate Change" at the Captain Cook Hotel (Anchorage, Alaska) from Tuesday 10 March to Friday 13 March 2009. The meeting was attended by approximately 100 delegates, including two other Australians, Danielle Johnston (WA) and Andrew Levings (VIC).

As part of the conference program I gave a talk entitled "Profile of the Northern Territory Mud Crab Fishery: Management and Recent Research" on the Friday morning (Objective 1). A poster entitled "A collaborative recruitment forecasting programme for the Northern Territory Mud Crab Fishery" was also displayed for the duration of the event (electronic copies of both works are available on request). The meeting was preceded by a field trip to the Alutiiq Pride Shellfish Hatchery in Seward, facilitated by the conference organisers. Delegates were shown larval culture systems as well as Red and Blue King crab broodstock (Figure 1).

Although most of the presentations at the conference concentrated on Arctic, deep-water crab fisheries, several of the research and management tools mentioned were relevant to the NT Mud Crab Fishery. It was interesting to note how crab pot and groundfish trawl fisheries interact off both the north-western and eastern coasts of North America. At one point, groundfish trawlers in the Bering Sea were taking large quantities of berried female king crabs as bycatch (which was then discarded) from an area that was closed to crab fishing. This of course had a significant impact on the breeding potential of the king crab stock. By contrast, heavy exploitation of groundfish (e.g. cod) stocks off eastern Canada has enabled snow crabs to expand their range due to a decrease in predation by cod and other groundfishes.



**Figure 1.** Red king crab broodstock at the Alutiiq Pride Shellfish Hatchery

Presentations dealing with inshore and estuarine crab fisheries (such as those targeting Dungeness and Blue crab) were of more relevance to the NT Mud Crab Fishery. It was apparent from several talks that the effects of climate change on crab fisheries will be most obvious at the limits of the target species' distribution.

The general consensus at present is that we are undergoing a period of global warming, and so it follows that the effects of climate change will be greatest at the northern (or southern) distributional limit of temperate crab species. However, there are documented cases of low temperature episodes limiting the range and/or productivity of tropical/sub-tropical crab species (e.g. the Blue crab, *Callinectes sapidus*, in the USA and the Blue swimmer crab, *Portunus pelagicus*, in Western Australia). Hence, the direction (and magnitude) of any climate change may have differential impacts on temperate and tropical crab species (and in turn fisheries on which they are based – synopsis above aligning with Objective 2).

Following the conference, I spent the weekend in Anchorage and arrived in Vancouver the afternoon of Monday 16 March. The following day, I met with Professor Carl Walters of the University of British Columbia (UBC) School of Fisheries to discuss research and management options for the Mud Crab Fishery (i.e. Objective 3). I informed Carl of the recent recovery in both the catch and catch rate of commercially harvested mud crabs in the NT, planned changes in the management of the commercial sector and new research and monitoring initiatives for the Fishery. I also gave a presentation on the NT Mud Crab Fishery to staff and students of the UBC School of Fisheries on Wednesday 18 March.

On the morning of Friday 20th March, I was given a guided tour of the Simon Fraser University (SFU) research vessel the “CJ Walters” which carries a remote operated vehicle (ROV) used for underwater filming of Dungeness crab behaviour. That afternoon, I gave another presentation on the NT Mud Crab Fishery to SFU staff and students.

Prior to my return to Australia on Wednesday 1 April, I took five days recreational leave in British Columbia, during which time I visited the small fishing and tourist town of Tofino, on the western coast of Vancouver Island. This area supports a Dungeness crab (see Figure 2) fishery and is also a processing and distribution hub for local salmon farms. Whilst there, I visited the Tofino branch of the Canadian Department of Fisheries and Oceans (DFO) and was given copies of the local sport fishing regulations.



**Figure 2.** Dungeness crab at a fish wholesalers, Tofino, Vancouver Island.

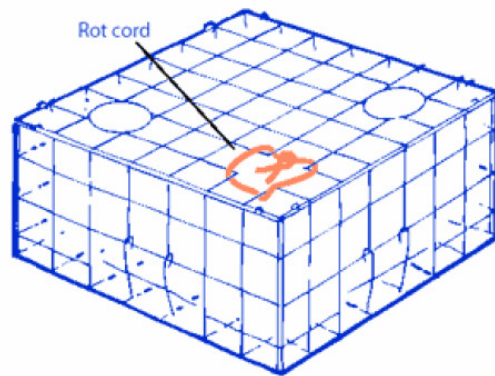
On Thursday 14 May, I gave a summary of the study tour to the NT Mud Crab Fishery Management Advisory Committee (MCFMAC) meeting (which provides advice on the management of the fishery – Objective 4). My observations of the use of escape vents in crab pots elsewhere in the world reaffirmed my belief that this device would provide a valuable tool in reducing bycatch, cannibalism, post-release mortality and sorting time in all sectors of the NT Mud Crab Fishery. I also tabled an extract from the sport fishing regulations issued by the DFO, Pacific Branch (Figure 3). Note the use of a rot cord as a ghost-potting mitigation measure.

Where relevant, the knowledge gained through this study tour will be disseminated to research and management representatives from other jurisdictions that harvest mud crabs (i.e. objective 5) via the workshop for FRDC project 2009/031: Taking of female mud crabs (*Scylla serrata*): assessment of risks and benefits (to be held in early November 2009).

## Crab Gear Requirements

### Fishing Gear, and Choosing and Marking Buoys

Crab traps are required to have a section in the top or side wall that has been secured by a length of untreated cotton twine no greater than No. 120. On deterioration, this must produce a rectangular opening with a minimum size of seven centimetres by 20 centimetres, or a square opening with a minimum size of 11 centimetres by 11 centimetres. This regulation ensures that if the trap is lost, the section secured by the cord will rot, allowing captive crab to escape and preventing the trap from continuing to fish. To comply with the regulation, a rectangular or square section of the trap must be removed and then re-threaded using untreated cotton twine, creating a space of the above dimensions.



**Figure 3.** Extract from Canadian Department of Fisheries and Oceans, Pacific Branch regulations.

**KEYWORDS:** Crab fisheries, fishery management, climate change.