MILESTONE PROGRESS REPORT

AFMA RESEARCH PROJECT NUMBER: 2017/0819

PROJECT TITLE: An integrated monitoring program for the Northern Prawn Fishery 2018–21

DATE DUE: 31 March 2019

PRINCIPAL INVESTIGATOR: Robert Kenyon

PROJECT MILESTONE STATUS -

| Has this milestone been achieved (Yes/No) | yes |
| Will the project be completed according to the current milestone schedule (Yes/No) | yes |

PROJECT PROGRESS AGAINST PROJECT OBJECTIVES

The NPF Monitoring project is progressing to schedule as specified in the AFMA/CSIRO agreement. The second survey as part of the current project, and the only survey for 2019, was successfully carried out from 25th February–15th March 2019. Three hundred and eight (308) sites were trawled. The survey was uninterrupted by either poor weather or mechanical breakdown. All trawl data (time, position, CPlot track), as well as prawn, scallop, cephalopod and bug abundance and size data have been entered into the CSIRO Oracle database.

Bubble plot maps of prawn catch rate and size at each site by species group (tiger, endeavour, banana and king), as well as tabulated catch-data by site, were provided to AFMA and NPF Industry prior to the first fishing season of 2019. Prawn abundance indices and size data were provided to the CSIRO NPF assessment team on 26th March 2019.

The 3-month precipitation regime prior to the survey and precipitation during the week to March 25th (rain attributed to Cyclone Trevor) are presented in Appendix A and bubble plot maps by species from the most recent survey are presented in Appendix B.

ORIGINAL MILESTONE DATE AND TITLE:

31 March 2019

Undertake Gulf of Carpentaria prawn survey in February 2019 (preparation, logistics and survey).

REVISED MILESTONE DATE AND TITLE: (IF NO CHANGE PUT N/A)

N/A

PROGRESS AGAINST MILESTONE (Achieved):

The Raptis’ vessels FV Eylandt Pearl (Tonya van der Velde, Rob Kenyon) and FV Territory Pearl (Gary Fry, Mark Tonks) trawled predetermined sites covering fishing grounds in the Weipa, Karumba, east-Mornington, Mornington, Vanderlins and Groote regions during February/March 2019 (vessel Masters Mark Robson and William West, respectively). At the pre-selected sites (grids), 30-minute trawls were carried out. All trawls were made at night. A total of 308 sites were trawled, a similar number to the historical series (304 sites in February 2017 and 306 sites in...
February 2018. The sample design is a repeated measures design; the same locations are trawled each year and in the majority of cases, the same trawl track is followed. The trawl locations were selected randomly from within the footprint of Gulf of Carpentaria commercial trawling during the initial 2002/03 NPF Monitoring project planning (Dichmont et al. 2004; Ye et al. 2004; Kenyon et al. 2018, p27-29). Global and regional indices of abundance for each prawn species were calculated using the standard data manipulation and analyses under the project’s sampling frame (as reported in Kenyon et al. 2018).

The weather over the 3 week duration of the survey was near perfect; mostly <10 knots. The survey schedule was not impacted by a cyclone, other adverse weather or mechanical issues.

During the charter, CSIRO scientists collected comprehensive information covering all aspects of the trawl exercise: trawl locations and durations, environmental parameters, trawl tracks, recording catches of all commercial prawn species and byproduct species (Moreton Bay bugs, scallops, squid, cuttlefish) and catches of threatened, endangered, protected (TEP) species in the bycatch. The survey was prosecuted to ensure that all operations followed the conditions and guidelines set out in the AFMA scientific permit.

In addition to target prawn and byproduct data collected, other specimens/tissues were collected for synergistic scientific projects. This included the collection of:

- Photographs of TEPs (turtles, sawfish, seasnakes, syngnathids) and at risk species (porcupine ray and two mantis shrimp species) for NPFIs CMO program. TEP species are photographed with a gridded scale and released promptly, unharmed. Their capture is recorded in the database. TEDs reduce the capture of large species and individuals, including TEP species.

Precipitation over the Australian continent from 1st December 2018 to 28th February 2019 is displayed in Appendix A. The three months prior to the survey delivered very high rainfall in east Gulf of Carpentaria river catchments, including the south-east savannah lands and their large-catchment rivers. Very high rainfall (600–1200 mm) was evident on Cape York (QLD). The extensive rainfall occurred during the first half of February, prior to the commencement of the survey, likely cuing banana prawn emigration well-prior to the NPF Monitoring survey. A CSIRO logger at the mouth of the Norman River showed salinities in the low 20s during late December/January/early February, dropping to <5 ppt by February 5th and freshwater (0 ppt) from February 11th to 27th, 2019. After February 28th, salinity increased to 10–15 ppt on the flood and high tides, becoming brackish through to mid-March. Low rainfall occurred in the south-west Gulf of Carpentaria, including the McArthur River and Roper River regions (NT). Rainfall over Arnhemland was not extensive, though north-east Arnhemland received high rainfall. There was little monsoonal activity in the Gulf of Carpentaria over the weeks of the survey.

Subsequent to the NPF Monitoring survey, in mid-March Cyclone Trevor delivered high rainfall (~200 mm) to the McArthur River and nearby catchments in the south-west Gulf of Carpentaria (see Appendix A), probably cuing prawn emigration from rivers in this region. Flood-cued offshore recruitment of banana prawns in the south-west Gulf of Carpentaria in mid-to-late March was not measured by the current survey. The cyclone also delivered ~300 mm of rain to the Embley and Mission rivers catchment; significant monsoon rainfall for a second time in 2019.

High levels of rainfall and high river freshwater flows have cued strong emigration from Cape York and the south-east savannah rivers resulting in promising catch rates of banana prawns; over 1000 prawns h⁻¹ were taken at six sites in 2019, compared to one in 2018. Banana prawns were abundant in Albatross Bay adjacent to the Embley and Mission rivers, and in the south-east gulf offshore from the Flinders and Norman rivers. The catches are reflected in a high banana prawn regional index for the Karumba region, and a moderate regional index for Weipa and the gulf-wide index (indices comparable to or higher than 2018). These catches may indicate emigration from other western Cape York rivers to nearshore habitats in response to freshwater flows in those rivers (remembering that most nearshore waters along western Cape York were not surveyed, as per sampling design).

The recruitment of brown tiger prawns in the vicinity of Mornington Island in 2019 has improved considerably compared to 2018. Analysis showed that the 2018 Mornington regional recruitment index for brown tiger prawns was the lowest surveyed in the history of the project, from 2003 to 2018. During 2019, nine sites showed tiger prawn catches of >1000 prawns h⁻¹ (two sites >2000 h⁻¹). During the 2018 survey, no sites in the Mornington/Bountiful region demonstrated catches >1000 prawns h⁻¹. In the west Vanderlins, a couple of sites also had strong brown tiger prawn recruitment. The just-calculated 2019 regional recruitment indices have shown a rebound in brown tiger prawn abundance in the Mornington and Vanderlins regions, together with the gulf-wide index.
At north Groote, catches of grooved tiger prawns were not strong compared to 2018, and those 2018 catches were low to moderate historically. The low grooved tiger prawn catches have been verified by low Groote regional and gulf-wide indices for this species in 2019 (apart from Albatross Bay). The regional and gulf-wide indices for grooved tiger prawns were the second lowest of the survey series (2017 was the lowest gulf-wide index). The abundance of grooved tiger prawns in Albatross Bay, though moderate, was not as strong as during 2018.

Interestingly, though not numerically high, the regional abundance indices for grooved tiger prawns for Karumba and Mornington remain relatively high and similar to the indices since 2010/11. Their abundance is much higher than during the first near-decade of the surveys, and may point to an expansion in the distribution of grooved tiger prawns to the south-east.

**ORIGINAL MILESTONE DATE AND TITLE:**

31 March 2019

Provide ‘database compatible’ 2019 survey data within CSIRO O&A (verification, formatting, processing).

**REVISED MILESTONE DATE AND TITLE: (IF NO CHANGE PUT N/A)**

N/A

**PROGRESS AGAINST MILESTONE (Achieved):**

All trawl data and all prawn, bug and scallop catch and length frequency data from the February 2019 survey have been entered into the CSIRO Oracle database. Prior to entry into Oracle, the data were checked for errors using data entry protocols developed for the project; including double entry routines and range checks. Errors were corrected.

**ORIGINAL MILESTONE DATE AND TITLE:**

31 March 2019

Undertake analyses of the survey data; provide abundance indices and size data to CSIRO NPF Assessment Team.

**REVISED MILESTONE DATE AND TITLE: (IF NO CHANGE PUT N/A)**

N/A

**PROGRESS AGAINST MILESTONE (Achieved):**

Fishery-independent prawn abundance indices and prawn size data for tiger, endeavour, banana and king prawns (February/March 2019 survey) were provided internally to the Assessment Team, CSIRO O&A on March 26th, 2019 (a stock assessment will not be undertaken in 2019). The indices of abundance for each species were calculated with rigorous precision. The latitude and longitude are reported by the vessel skipper at the start and conclusion of each trawl. The vessel track on the navigation plotter is recorded. The swept area of each trawl is then calculated using an estimate of the spread of the net (2 × 12 fathom nets) and the exact distance of the trawl (determined from the navigation plotter) (Kenyon et al. 2018, p25-27). Prawn density was calculated as number per hectare for 7 commercial species of penaeid prawn.

**ORIGINAL MILESTONE DATE AND TITLE:**

31 March 2019

Provide prawn distribution maps to AFMA (February 2019 survey).

**REVISED MILESTONE DATE AND TITLE: (IF NO CHANGE PUT N/A)**

N/A
PROGRESS AGAINST MILESTONE (Achieved):
Maps showing the densities and sizes of the main commercial prawn species-groups caught at each site were produced within one week of completion of the survey and were displayed on the AFMA web site for access by industry participants (see Appendix B). The preliminary bubble plot maps and tabulated data were provided to AFMA on March 21st, 2019. The bubble plot maps show catch as number of prawns per hour, kilograms of prawns per hour, and average size of prawns, expressed as number per pound (historical size categories used by the fishing industry). The bubble plot abundance data are calculated using the trawl duration and trawl speed (3.2 knots standard), to determine a count and weight per hour. These data are used to provide a prompt summary of survey catch to all NPF licensed fishers, well in advance of the opening of the first fishing season on April 1st, annually. The format of the bubble plot display has been consistent since project inception, to facilitate year to year comparison by the fishing fleet.

PUBLICATIONS/PRODUCTS
Bubble plots for prawn species groups and tabulated prawn catch data for each trawl site were published and provided to AFMA for distribution to the NPF Industry. The Northern Prawn Fishery fleet had timely access to the prawn distribution and abundance data via PDF maps and tabulated summary data sent via AFMA shortly after Thursday March 21st. A CSIRO website displays the catch of 4 prawn species by year, region and survey month (see http://www.cmar.csiro.au/npfmonitoring/).

PROGRESS AGAINST COMMUNICATION & EXTENSION PLAN:
This milestone report providing the methods and catch results of the February/March 2019 survey was produced by March 31st 2019 and will be made available to the fishing industry by display on the AFMA web site. Prawn distribution maps as bubble plots and location-specific tabulated data have been provided to NPF Industry. A summary and recruitment indices from the February 2019 survey were discussed verbally at a NPRAG telephone meeting on 29th March 2019. Plots of the indices will be presented to and discussed in detail by the NPRAG in mid-2019 and discussed with NPF Industry.

VARIATION TO PROJECT:
nil

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REFERENCES


APPENDIX B: Spatial maps of prawn species densities caught at each site during the February/March 2019 survey.

Figure 1: Total number of _Penaeus esculentus_ caught per hour at each site trawled during the survey.
Figure 2: Total weight (kg) of *Penaeus esculentus* caught per hour at each site trawled during the survey.
Figure 3: Size (commercial count) of *Penaeus esculentus* caught at each site trawled during the survey.
Figure 4: Total number of *Penaeus semisulcatus* caught per hour at each site trawled during the survey.

Grooved tiger prawn catch rate (no/hr) at each site trawled during survey

**Grooved Tiger Catch (no/hr)**
- 0
- 1 - 200
- 201 - 1000
- 1001 - 2000
- 2000 +

*Gulf of Carpentaria*
Figure 5: Total weight (kg) of *Penaeus semisulcatus* caught per hour at each site trawled during the survey.
Figure 6: Size (commercial count) of *Penaeus semisulcatus* caught at each site trawled during the survey.
Figure 7: Total number of *Metapenaeus endeavouri* caught per hour at each site trawled during the survey.
Figure 8: Total weight (kg) of *Metapenaeus endeavouri* caught per hour at each site trawled during the survey.
Figure 9: Size (commercial count) of *Metapenaeus endeavouri* caught at each site trawled during the survey.
Figure 10: Total number of *Metapenaeus ensis* caught per hour at each site trawled during the survey.

Red endeavour prawn catch rate (no/hr) at each site trawled during survey

**Red Endeavour Catch (no/hr)**

- 0
- 1 - 200
- 201 - 1000
- 1001 - 2000
- 2000 +

_Gulf of Carpentaria_
Figure 11: Total weight (kg) of *Metapenaeus ensis* caught per hour at each site trawled during the survey.
Figure 12: Size (commercial count) of *Metapenaeus ensis* caught at each site trawled during the survey.
Figure 13: Total number of *Penaeus merguiensis* caught per hour at each site trawled during the survey.
Figure 14: Total weight (kg) of *Penaeus merguiensis* caught per hour at each site trawled during the survey.
Figure 15: Size (commercial count) of *Penaeus merguiensis* caught at each site trawled during the survey.
Figure 16: Total number of *Penaeus latisulcatus* caught per hour at each site trawled during the survey.
Figure 17: Total weight (kg) of Penaeus latisulcatus caught per hour at each site trawled during the survey.
Figure 18: Size (commercial count) of *Penaeus latisulcatus* caught at each site trawled during the survey.