Preliminary Harvest Strategy: Dafeng Red Swamp Crayfish

23 February 2019

# Background

This harvest strategy was developed for the Dafeng crayfish fishery supplying the Baolong Group processor near Yancheng. The strategy is based on a stock assessment being conducted on data collected during the 2018 season and will be updated after the 2019 season as more information becomes available.

# Stock Definition

There is no well-defined stock. The population distribution is limited by physical boundaries and the Baolong plant purchases most of the catch in the Dafeng district around Yancheng. River connectivity between Dafeng and other districts is well-defined and limited to a small number of canals and rivers. Movement of crayfish between districts is unknown but also likely to be limited by the available connections. Therefore, for the purposes of this harvest strategy, Baolong purchases will be treated as the total catch from this management unit.

# Stock Status

Based on the 2018 stock assessment, the stock is not overfished and overfishing did not occur in 2018. This is likely to remain the case unless the fishery changes significantly.

# Reference Points

The reference points are based on the fished spawning stock biomass (SSB) compared to the unexploited SSB (SSB0)in the last four weeks of the season. A precautionary maximum sustainable yield (MSY) proxy was set at 40% SSB0 to determine if the stock was overexploited.

The SSB estimate is based on quantity of females present in the last four weeks of the season estimated by the stock assessment. By this point, catchability appeared to be decreasing, because, it was hypothesized, females would be increasingly retreating to burrows as they become berried.

The estimated fishing mortality (exploitation rate) during the season was compared to the constant fishing mortality which would produce 40% unexploited SSB (MSY target) or 20% unexploited SSB (PRI limit) to determine whether overfishing was occurring.

The estimated SSB and fishing mortality relative to these reference points was used to determine the trigger point used in the harvest control rule.

# Harvest Control Rule

It is proposed that a simple rule is introduced as a preliminary control for the 2019 season. The HCR sets a sustainable harvest rate, but will also a plan to reduce the harvest rate if the stock approaches its limit reference point.

The proposed harvest control rule will be:

1. Permissible harvest will start no earlier than **27 April** each season.
2. Harvest within the management unit will be limited to registered permit holders with the number of traps within their harvest areas as applied in 2018.
3. Catches will be taken with standard traps: the management authority will be notified of any proposed changes to gears or fishing operations. No changes to harvest practices should occur without prior agreement.
4. Harvest will cease either:
   1. on **14 August** each season.
   2. when the average catch rate determined each week falls below **an average of 8 crayfish per trap** within weeks 7-13 (last week of May – first week July). Notice will be given in the following week when catch rates have fallen below the threshold, and the fishery will be closed the week after, when Baolong would cease any further purchases.
5. The average crayfish per trap will estimated from the observer data at the end of each week by the management authority and reported to the fishing community during the following week.

# Monitoring

Weekly monitoring data will be collected by designated observers throughout the season. This is based on observing three traps at each site and recording the numbers and size composition of the crayfish landed as was done in 2018.

Baolong group will maintain full crayfish purchase records describing the quantity of crayfish purchased from each fisher on each day. The mean catch rate for each week will be reported the following week throughout the season.

# Stock Assessment

An age specific depletion model was fitted to the available purchase and observer data. The stock assessment estimated the exploitation rate and the number of females reaching maturity. Because it was based on only one year’s data, it was unable to estimate general productivity (e.g. average recruitment or the effect of temperature on production). However, it was sufficient to test the provisional 2019 harvest control rule through simulation and determine an appropriate trigger point.

# Risks

The assumption that the Baolong area can be managed as a single unit will require further investigation. Around 20000t of wild caught crayfish are caught in the region per year, with around 18000t in the Doulong river basin and around 6000t purchased by the Baolong plant (i.e. around 30%). If the crayfish population significantly connected to the wider area, the harvest strategy may need to encompass other buyers to ensure that it is effective.

The harvest control rule and reference point are preliminary. It is likely they will need revision when more data are available. In particular, the assumed changes in catchability through the season affect these results and need further investigation. The stock assessment suggested that the exploitation rate is high and while the current best estimate indicates it is sustainable, it is possible that the exploitation may be determined as too high in future and catches may need to be reduced.