
# Review of Crawfish Technical Conservation Measures

# Final Report

February 2012

## 1 Introduction – Terms of Reference

In June 2011 The Minister for Agriculture, Simon Coveney, requested that BIM carry out a review of the Technical Conservation Measures (TCMs) currently in place for the Irish crawfish (*Palinurus elephas*) stock. The Terms of Reference to be used in framing that review were as follows. Having regard to:

1 ) the negative and declining state of the crawfish stock;

2 ) undesirable by-catch of non-target and possibly protected species from the use of nets by some fishermen in fishing for crawfish;

3 ) the apparent market preference for smaller crawfish; and

4 ) the range of technical conservation measures for crawfish used internationally;

BIM is requested is conduct a review, in conjunction with the Marine Institute, and in consultation with crawfish fishermen and their representatives, of the present technical conservation measures for crawfish, i.e.

a ) the minimum landing size of 110mm (Crawfish (Conservation of Stocks) Regulations 2006 S.I. No. 232 of 2006); and

b ) the prohibition on the use of nets to fish for crawfish in certain specified locations off the coasts of Kerry and Galway (Crawfish (Fisheries Management and Conservation) Regulations 2006 S.I. No. 233 of 2006);

and to make recommendations to the Minister on the most appropriate strategy and/or technical conservation measures to address the issues specified at (1) to (4) above.

In framing its recommendations, BIM shall ensure that its proposals provide at least the equivalent or a higher level of protection to the reproductive potential of the stock, as provided by the present measures, and that a high level of compliance can be assured within available resources.

## 2 The Crawfish Fishery in Ireland

### 2.1 Description

Crawfish are typically fished using tangle nets. These are loosely hung mono and multi-mono filament nets, 150 – 300 mm mesh size. Tangle nets are typically set around steep rocky reefs with the aim of catching crawfish moving up and down the slope of the reef. In the case of rocky pinnacles, it would be normal practice to completely encircle the outcrop with a series of nets.

The exception to the general use of tangle nets for fishing crawfish is the Tralee Bay area; this supports the largest spider crab fishery in the country. Here the spider crab are fished using top entry pots with 8-10" bucket entrances. This pot is also suitable for fishing crawfish, a welcome by-catch in the fishery. Conversely where tangle nets are the dominant fishing method, spider crab are generally a by-catch. It should be noted, that when smaller mesh size (150 - 180 mm) tangle nets are used, spider crab mortalities can be high resulting in increased discarding of this unmarketable bycatch.

### 2.2 Participation

There are no official statistics available on the level of participation in Ireland's crawfish fishery. To inform this report therefore, BIM coastal staff, using their local knowledge, compiled the following, "best estimate" of the number of vessels involved on a county basis, see table 1.

It should be noted that even this estimate (112 vessels) is problematic as not all vessels expend the same amount of effort in the fishery. For example, outside Kerry a relatively small proportion of vessels rely heavily on the crawfish fishery, typically 30% of the numbers given in table 1. For those boats fishing crawfish part time, most effort is expended in the spring (April-May) and autumn (September-October) and varies depending on the prices for crawfish available in any given year.

Effort is also heavily influenced by weather conditions as nets cannot be fished in periods of heavy swells. Also, the importance of the fishery declines from south to north.

**TABLE 1**

| County | Vessels |
|---|---|
| Cork | 21 |
| Kerry | 19 |
| Clare | 6 |
| Galway | 32 |
| Mayo | 24 |
| Sligo | 0 |
| Donegal | 10 |
| **Total** | **112** |

Finally, there is effectively a closure in place in Donegal due to the prohibition on all fixed nets under the Area VIa cod recovery program.

## 2.3 Conclusions

- Some 112 inshore boats target crawfish to varying degree; approximately 7 – 9 % of the Irish inshore fleet.
- Boats typically carry two to three persons when netting: some 250- 300 inshore fishermen (out of a total of 2,500 full and part time fishermen) depend to some extent on crawfish for their income.
- Many are not full time crawfish' fishermen, but also fish for a variety of other species including inter alia lobster, brown crab, shrimp with some also netting whitefish.
- Boats typically operate from April to October.
- Annual landings amount to 20 – 30 tonnes.
- Overall the craw fishery is worth some €1 million, or between 2% - 2.5% of the total value of inshore landing. (Assuming €30 per kg).
- Despite this low participation rate, in certain areas, the fishery remains locally important.

## 3 Public Consultation.

In framing the recommendations set out in sections 3 and 4, BIM undertook a consultation with crawfish fishermen and their representatives. This was done through a well advertised process, in the July issues of the trade press, that sought "*submissions from interested parties on the Technical Conservation Measures currently in force and alternative or additional measures that could be introduced while still affording the crawfish stock the same level of protection as provide by the current measures*"[1].

Interested parties were also offered the opportunity to make oral submissions *via* their local BIM Area Officer.

Table 2. Summary of the submissions received.

| ENTITY | STATE OF STOCK | BY-CATCH ISSUES | MARKET SIZE REQUIREMENTS | ALTERNATIVE TCMS |
|---|---|---|---|---|
| Group Of Shellfish Buyers *See below* | Stable | No | 95 mm | Max. Size, Season, Berried Ban |
| Fishermen | | No | 100 mm | Max. Size, Season |
| Fisherman | Increasing | | 90 mm | Berried Ban |
| Fisherman | | | 100 mm | Possible Max. Size, Season, Berried Ban, Reduce Closed Area |
| Fisherman | | | 100 mm | Possible Max. Size, Season, Berried Ban, Reduce Closed Area |
| Fisherman | | No | 100 mm | Season, Berried Ban, Reduce Closed Area |
| Fisherman | "Same As 10 years ago" | | 110 mm, but noted that there is "No Market Preference" | No Closed Area |
| Fisherman | | | 100 mm | Max. Size, Season |
| Fisherman | | | 95 mm | |
| Fisherman | | | 100 mm | Season |
| National Parks & Wildlife Service | | Possible | | |
| Sea Fisheries Protection Authority | | | | Need To Tighten Existing TCMS |
| Countryside Council For Wales | | | | General Support |
| Sea Angling Club | | Big Issue For Sharks And Rays | | Ban All Nets In Tralee Bay |

[1] The closing date for receipt of submissions in any format was the 15th of July 2011.

### 3.1 Submissions Received

A total of 14 submissions were received, primarily from Kerry fishermen but also from one trade organisation, three state agencies and one sea angling club. No fishermen outside the Kerry region made individual submissions. The submissions and how they addressed each of the four issues set out in the Terms of Reference are summarised in Table 2.

### 3.2 Summary of key points made

The negative and declining state of the crawfish stock: Only three of the submissions addressed this issue and present a somewhat contradictory picture. Two suggest the stock is stable while one suggests it is increasing.

Undesirable by-catch of non-target and possibly protected species from the use of nets by some fishermen in fishing for crawfish: Apart from the submissions from a Sea Angling Club and NPWS this issue is not addressed by any of the respondents. The submission of the Sea Angling Club expresses considerable concern about the by-catch of sharks and rays in particular. That of the NPWS suggests that any potential adverse impacts are mitigated through appropriate technical measures.

The apparent market preference for smaller crawfish: All of the industry respondents bar one suggest that the market preference is for crawfish smaller than the current 110 mm MLS. Suggestions range between an extreme of 90 mm (1 submission), 95 mm (2 submissions but one of those is a large group) to 100 mm (7 submissions). One of those submissions advocating 95 mm is that of a group comprising the main shellfish buyers. Five of the 12 members advocate 95 mm and in addition some 61 signatures of individual fishermen and two fishermen's groups are provided in support however these were gathered in late 2010 and early 2011 before the Review was announced and do not address the Terms of Reference in any way bar a request to reduce the MLS. That aside it is evident that the overwhelming view of industry respondents is that the MLS should be reduced. One interesting point raised by 2 submissions is that contrary to what has been claimed in the trade press, there is only a small difference in value between crawfish over 110 mm (€32/kg) and those under 110 mm (€36/kg). As regards the percentage catch below the current MLS four submissions addressed this issue. The submission from shellfish buyers suggested that it was 50-70%, two others 70% and yet another only 25%.

The range of technical conservation measures for crawfish used internationally: Seven of the submissions propose alternative TCMs that could be introduced to make up for a reduction in the MLS. These are: maximum size (4 yes, 2 maybe), season and a ban on taking berried

females. Maximum sizes proposed ranged from 2.5 – 3kg which would equate to 145 – 155 mm carapace length, another advocated 130 mm. Seven submissions advocated a season with a start date ranging between the beginning of April to the beginning of May and an end date ranging from the end of August to the end of December. Three submissions supported a ban on taking berried females. With respect to the current closed areas for crawfish netting, 4 proposed that they be reduced or removed entirely while one advocated a complete ban on all nets in Tralee Bay. In addition two submissions proposed that co-management or local management arrangements should be used to manage the stock. Four submissions explicitly rule out a return to a pots only fishery for the species. The submission from the SFPA focused on the deficiencies of the current MLS and closed area legislation which, it was suggested, needed to be addressed for them to be wholly effective.

### 3.3 Conclusion:

- Analysis of the submissions received clearly show that amongst fishermen, there is overwhelming support for a reduction in the crawfish minimum landing size (MLS).
- There was little or no acknowledgment of any by-catch issues associated with this fishery in the industry submissions.
- The majority of fishermen who commented on the 'state of the stock', are of the opinion that the stock is stable or improving.
- While it is true that in the past 5 years landings have been 20-30 tonnes (less than €1 million, or between 2% - 2.5% of the total value of inshore landings), historically they have been much higher.
- Landings peaked in 1989 when 200 tonnes were landed. In today's terms 200 tonnes of crawfish would be worth €6 million, or 15% of the value of all inshore landings.
- The scale and value of the fishery has declined by some 85% in the past 20 years.
- A number of submissions proposed alternative conservation measures, in lieu of a reduction in the MLS. These have been investigated by the Marine Institute (see part 2 of this report).

## 4 Alternative options for future management.

Note: The biological characteristics of crawfish are not well known in Ireland. Similarly the fishing mortality (F) and discard mortality (i.e. the mortality of undersize crawfish returned to the sea after capture) are also poorly known. Because of this and as the assessment of possible changes in the technical conservation measures, including the effect of changes in size limits, relies on such information, interpretation of the output should emphasise the relative effects rather than the absolute effects of changes in size limits on reproductive potential (egg production).

In calling for a reduction in the MLS for crawfish prior to this review being established industry suggested that the Irish national MLS of 110 mm was discriminatory as Council Regulation 724/2001 provided for an MLS of 95 mm across Europe. This Regulation (724/2001) amended the 110 mm MLS originally introduced in Council Regulation 850/98. The 110 mm MLS was retained in Ireland through SI 322/2001 which was subsequently replaced by SI 232/2006. However, contrary to the suggestion that the national 110 mm MLS is at variance with that applied across the rest of Europe, it can be seen from table 3 that in northern Europe 110 mm is in fact the most commonly adopted MLS.

Expanding on the information presented in Table 3 it is interesting to note that a recent report by the Northern Ireland Environment Agency (NIEA, 2011) describes the population there as declining, and suggested that it no longer supported a targeted fishery. Further under legislation introduced in 2011 the crawfish is afforded complete protection (Wildlife Act, NI, 2011) and specific protection from being caught by means of nets.

Table 3. Management measures for crawfish in Europe. Blank cells are unknown

| | | Measure | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Country | Region | Min size | Max. size | Closed seasons | Closed areas | TAC | Prohibition on berried females | Effort limits | Specific permits |
| Ireland | All | 110 | No | No | 2 (to nets) | No | No | No | No |
| Northern Ireland | All | 95 | No | All year | All waters | No | No | No | No |
| England & Wales | Cornwall | 110 | No | No | | No | Yes | No | Yes |
| | Devon and Severn | 110 | No | | Lundy | No | Yes | No | Yes |
| | South Wales | 110 | No | | | No | | No | |
| Scotland | All | 95 | No | No | | No | No | No | |
| France | Atlantic | 110 | No | Jan-Mar | | No | No | No | |
| Spain | Atlantic | 95 | No | | No | No | No | No | |
| Portugal | All | 95 | No | | No | No | Yes | No | |
| Spain | Mediterranean | 80 | No | Yes | 1 | No | Yes | Yes | |
| France | Mediterranean | 80 | No | Yes | 8 | No | Yes | No | |
| Italy | All | 107 | No | Yes | Yes | No | Yes | No | |
| Croatia | All | 82 | No | Yes | | No | Yes | No | |
| Greece | All | 85 | No | Yes | | No | Yes | No | |
| Tunisia | All | 67 | No | Yes | | No | Yes | No | |
| Morocco | All | 170 (TL) | No | No | | No | No | No | |

### 4.1 Recommendation 1: Minimum Landing Size

The reproductive potential of crawfish is, like many crustaceans, a function of the size of the female. By removing females from the stock at a smaller size (perhaps as much as a season earlier), some animals will not have reproduced at all, while others will have contributed a lesser number of eggs that would otherwise have been the case. Overall, reducing the minimum landing size results in a loss of reproductive potential (egg numbers).

- If the current size limit of 110 mm is reduced to 95 mm there will be a significant, *circa* 42%, reduction in the reproductive potential of the stock. Therefore the introduction of a minimum landing size of 95 mm is **not recommended** unless accompanied by other measures.

### 4.2 Recommendation 2: Maximum Landing Size

It is possible to compensate for the reduction in reproductive potential of the stock should the MLS be reduced to 95 mm. Introducing a maximum landing size above which all crawfish would be returned alive to the sea is one option in this regard. This would create a reservoir of reproducing adult crawfish which, given the higher fecundity of larger crawfish, could make up for the reduction in reproductive potential resulting from a reduced MLS. However the effectiveness of such a measure is predicated on the fishing effort not increasing or being reduced if necessary and the discard mortality being very low. If the fishing effort were to increase the chances of crawfish surviving to reach the maximum landing size would be reduced. Similarly if discard mortality was significant the protected pool of large individuals on which most of the reproductive potential of the stock would depend could be subject to ongoing mortality. Therefore the introduction of a maximum landing size of 120 mm as a compensatory measure **would be ineffective** if:

i ) fishing effort on the crawfish stock increased, *or*
ii ) fishing mortality is already higher than assumed in the assessment, *or*
iii ) discard mortality is not close to zero. Note: In some areas it is known to be 18%.

**Recommendation:** A reduction in the minimum landing size of crawfish to 95 mm accompanied by the introduction of a maximum landing size of 120 mm can only be recommended under the following conditions:

- The introduction of a mechanism to monitor and effectively control and, if necessary, reduce fishing effort on crawfish, as the reproductive potential of the stock could be reduced by 30-40% from current levels in such a scenario.
- The reduction is only introduced in areas where it has been demonstrated that there is no discard mortality.

- Irrespective of whether the MLS is reduced or retained at 110 mm, the MLS legislation requires revision to ensure that it can be effectively enforced.

### 4.3 Recommendation 3: Closed Season for the protection of crayfish.

Closed seasons cannot be recommended at this point in time as a means of protecting crawfish stocks because i) the seasonal profile of fishing effort is not well documented ii) the monthly contribution to total fishing mortality (F) is unknown, and iii) effort displacement from any closed period to open periods may occur given that there is no control on effort.

**Recommendation:** Closed seasons should not be introduced at this point in time.

### 4.4 Recommendation 4: Closed Areas for the protection of crayfish.

Areas, closed to fishing, can provide a suitable means of protecting crawfish in certain circumstances. Within such closed area, the abundance and the average size of crawfish should increase, leading to greater reproductive potential, population biomass etc. Thereafter this can result in "spill-over" benefits to surrounding areas. To be effective, however, a closed area must i) contain suitable habitat ii) be large enough to accommodate the annual range of movement of adult crawfish and iii) be appropriately enforced/enforceable.

In Ireland two areas, off west Galway and Kerry, have been closed to tangle netting for crayfish since 2002. However, deficiencies in the legislation establishing these closures, and identified by the SFPA, have rendered them less effective than might otherwise have been the case. Consequently it is not possible, at this point, to establish their efficacy.

**Recommendation:**

a ) The closures off west Galway and Kerry be retained and the deficiencies in the legislation establishing them, as identified by the SFPA, be addressed.

b ) The efficacy of these two closed areas be monitored, on an ongoing basis and in light of the legislative changes recommended in (a).

## 5 By-catch of non-target and possibly protected species

#### BY-CATCH OF COMMERCIAL SPECIES

Estimates of the value of the by-catch of commercial species in the Irish crawfish fishery are not available. The main commercial by-catch is spider and brown crab and, to a lesser extent, lobster. Monkfish is regularly captured. Skates, rays and dogfish are common.

In some areas however, such as north Kerry, the total value of the commercial by-catch lost through scavenging and depredation is higher than the value of the landings. In some cases this 'lost catch' could be taken by other means and add value to the local landings. For

instance it is likely that spider crab catch would be higher in the inshore pot fishery if they weren't captured in tangle nets during their inshore migration. Ray and skate are targeted by a recreational rod and line fishery in the area although this is usually caught and released. Some species of skate and ray, especially in the north Kerry area, are rare and ICES advice is for zero TAC and measures to reduce by-catch.

**BY-CATCH OF PROTECTED AND ENDANGERED SPECIES & NON-COMMERCIAL SPECIES**

A by-catch of bottle nosed dolphin and certain species of skates and rays has been reported in tangle nets in north Kerry. In addition there is an identified risk of bycatch of grey seal and harbour porpoise. This is inconsistent with the conservation and management objectives for these species as expressed either in conservation objectives for the Habitats Directive, in species action plans published by the NPWS or in IUCN and ICES advice. However, conflict with the conservation objectives and management advice does depend on the scale of the actual by-catch relative to the population size and the amount of human, usually fishing, induced mortality that can be allowed. By-catch of single or few individuals is a potential conflict and a threat to the long term stability of small populations but not to larger populations. In general, tolerable by-catch for local or small populations of cetaceans and, to a lesser extent, seals, is likely to be extremely low because of their low (per capita) reproductive capacity.

### 5.1 Recommendation 5: Retention of Kerry closure.

Evidence suggests that the total value of the commercial by-catch lost through scavenging and depredation in north Kerry is higher than the value of the landings. Consequently, this 'catch' is lost to other inshore fishermen in the area. On that basis it is recommended that the existing closure be retained, in particular:

- to reduce the economic losses of commercial species (due to scavenging and depredation in tangle nets)
- to protect and increase the economic value of local pot fisheries for spider crab, brown crab and lobster,
- to reduce discard mortality of crawfish entangled in nets.

Additionally this closure will

- reduce the risk of capture of bottlenose dolphin (given the proximity of the fishery to the local resident population of this species in the Shannon estuary), and

- reduce the risk of capture of rare and endangered species including angel shark and white skate and the nationally important local population of undulate ray, which are all known to occur in this area.

### 5.2 Recommendation 6: By-catch monitoring and existing designations.

Tangle nets are used in (or in proximity to) a number of SACs currently designated for grey seal and Harbour Porpoise (Roaringwater Bay, Blasket Islands, Iniskea Islands, Davillaun Island, Inisbofin, Inishark, and Slyne Head). Monitoring of any by-catch of cetaceans and/or seals in these fisheries should be enhanced to ensure that the fisheries are consistent with National Legislation, Action Plans and Conservation Objectives.

### 5.3 Recommendation 7: Future Designations/changes under the Habitats Directive.

In addition to the reasons given above, the existing closures off both Galway and Kerry, their re-design, or the introduction of any new closures should be reviewed in 2012, in light of new or changed designations for cetaceans under the Habitats Directive.