Survival of discarded fish

A rapid review of studies on discard survival rates

Dr Andy Revill (andy@revillnation.com)

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Background and briefing for the work

REQUEST FOR SERVICES COMMITMENT NO. S12.615631
LEGAL BASE: COMMISSION DECISION 2005/629/EC
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EUROPEAN COMMISSION, DIRECTORATE-GENERAL FOR MARITIME AFFAIRS AND FISHERIES
Policy development and co-ordination, Brussels, MAREA2

Subject: Request for services - Survival of discarded fish

Description of the work: Background

Under Article 15 of the draft Basic Regulation as part of the reform of the CFP, the Commission has proposed the introduction of a discard ban. One of the provisions of the proposed ban is that fish with a high survival rate and vulnerable/protected species (e.g. basking shark, common skate and porbeagle) should be released back into the sea. However, it is not entirely clear what species should be excluded due to good survivability after capture. Studies on the mortality of different fish species discarded from the decks of fishing vessels generally show high mortality rates, although the types of injuries and their severity are highly species-specific. The main factors affecting the stress, injury and mortality of discarded fish are related to capture stresses, fishing conditions and biological attributes. Capture stressors include such factors as net entrainment, crushing, wounding and sustained swimming until exhaustion. Fishing conditions include towing time and speed, light conditions, water and air temperature, anoxia, sea conditions, size and species. Biological attributes are also important. Generally it has been shown that most fish with swim bladders that inflate after capture die because of pressure changes during the capture process. The post-release mortality of other fish and aquatic organisms (i.e. those without swim bladders) is more variable and sometimes can be low. Mortality is also related to the overall fragility and physical characteristics of species. For some species, discard mortalities can be reduced through reduced exposure to air and improved on deck handling procedures, but in many cases a significant reduction in discard mortality is difficult to achieve.

Terms of Reference
To develop a list of species with high survivability that could be excluded under the landing obligation and should be returned to the sea after capture.

For establishing this list you should:

• Review all studies carried out that have investigate the survivability of discarded fish by species and by fishing method.

• Extrapolate data on survival rates by species and fishing method based on this review and indicate species with high survivability and could be safely excluded from the list of species included under the landing obligation.

You shall send the final report (including raw data raw data in documented XL worksheet) by Friday 12 April 2012 at 16:00 CET

Time allocated for this study: 6 days
Method used

- Searched the literature, purchased and downloaded relevant papers on discard survival (3 days)
  - Literature search focussed on studies undertaken since 2000
  - Studies likely to be most relevant to EU fisheries
  - A total of Eighty eight (88) studies were identified. These were purchased and downloaded (of which 5 were review papers)

- The review paper by Broadhurst et al. (2006) was used as the template to tabulate new findings and structure our report

- A rapid review of 88 papers was undertaken and new findings were added to the tabulated existing findings of Broadhurst et al (2006) (2 days)

- A summary table was compiled and a brief overview report was written (1 day)

Results

- Details of discarded survival rates are given in the table 1.

Findings

- There is a significant amount of data on discard survival published.

- We note that the discard studies undertaken to date are patchy and do not provide a complete understanding of this issue within European fisheries.

- We note that there is often significant variation in the survival rates of discarded species within individual studies.

- We note that there are also large variations in discard survival rates between studies.

- The studies undertaken confirm that many factors can affect the survival rates of discards (for example: exposure on deck, seasonality, surface sea temperature, air temperature, body size, age of fish, depth caught, catch composition, haul duration, breeding and health status of fish etc. (examples - see: Parker et al (2003), Benoit et al (2010), Smith and Scharf (2011), Giomi et al. (2008) Cicia et al (2011)). This particular finding is in-line with the briefing document provided by the Commission for this work.

- It may be erroneous and mis-leading to make extrapolations on discard survival rates beyond the scope of the individual studies themselves. Such extrapolations are therefore not made at this point.

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1 The table (1) is also provided as a separate excel document
The six days allocated by the European commission to this task has limited the depth to which the large quantity of available study material could be analysed and reviewed.

In the absence of a clearly defined parameter ‘high survivability’ the data is presented in a ranked tabulated format to allow the reader to evaluate for themselves the survival rates across the entire spectrum of available results.

Recommendations

- That the parameter ‘high survivability’ be clearly defined.
- To commission a systematic and thorough review of the available literature on discard survival with an appropriate time and resource allocation. We estimate the resources required would be around 3 month’s man time (based on the review conducted by Broadhurst et al (2006). This review could potentially include a meta-analysis of the data if possible.
## Results: (Table 1.) Table of discard survival rates from research studies

<table>
<thead>
<tr>
<th>Location</th>
<th>Fishing method</th>
<th>Common name</th>
<th>Grouping</th>
<th>Latin Name</th>
<th>Discard survival lower limit</th>
<th>Discard survival rate higher limit</th>
<th>Study period</th>
<th>Reference</th>
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<tbody>
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<td>Portugal</td>
<td>Clam dredge</td>
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<td>Myxine glutinosa</td>
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<td>100</td>
<td>15 minutes</td>
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<td>Canary rockfish</td>
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<td>Time to Die</td>
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<td>Berghahn et al. (1992)</td>
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<td>Starfish</td>
<td>Echinoderms</td>
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<td>16</td>
<td>16%</td>
<td>7 days</td>
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<td>13</td>
<td>34</td>
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<td>European plaice</td>
<td>Teleost</td>
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<td>12</td>
<td>70</td>
<td>7 days</td>
<td>Kelle (1976)</td>
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<td>Crustacean</td>
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<td>60</td>
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<td>73</td>
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<td>84</td>
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<td>Teleost</td>
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<td>100</td>
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<td>100</td>
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<td>50 minutes</td>
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<td>0</td>
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</table>

*Note: There are references in this table that are not listed in the reference section of this document. They are however cited by Broadhurst et al (2006) wherein full details can be found.*
Reference Materials (Papers downloaded and given rapid review (2012))


