The Impact of Pot Fishing on the Marine Environment

Hilmar Hinz, Natalie Hold and Jodie Haig

European Fisheries Fund project:

Sustainable use of fisheries resources in Welsh waters
Welsh fisheries are mainly targeting shellfish with 90% of the fleet working in the inshore sector (up to 6 nautical miles)

<table>
<thead>
<tr>
<th>Species</th>
<th>Fishery landings (£)</th>
<th>Fishery landings (t)</th>
<th>UK retail mkt (t)</th>
<th>Total fishermen in Wales (estimate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mussels</td>
<td>7,500,000</td>
<td>10,168</td>
<td>2,869</td>
<td>20</td>
</tr>
<tr>
<td>Scallops</td>
<td>3,462,905</td>
<td>1983.8</td>
<td>670</td>
<td>75</td>
</tr>
<tr>
<td>Whelks</td>
<td>2,536,863</td>
<td>4131.7</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Lobster</td>
<td>1,482,797</td>
<td>149.1</td>
<td>195</td>
<td>500</td>
</tr>
<tr>
<td>Brown crab</td>
<td>341,779</td>
<td>316.9</td>
<td>668</td>
<td>500</td>
</tr>
<tr>
<td>Prawns</td>
<td>293,662</td>
<td>17.3</td>
<td>37,852</td>
<td>100</td>
</tr>
<tr>
<td>Spider crab</td>
<td>272,589</td>
<td>240.7</td>
<td>0</td>
<td>200</td>
</tr>
<tr>
<td>Sea bass</td>
<td>267,177</td>
<td>42.75</td>
<td>1,434</td>
<td>300</td>
</tr>
</tbody>
</table>

Other fish, ray, mackerel, gurnards, sprat etc.
Potential environmental concerns with respect to pot fishing

1. By-catch and Discards
2. Bait sourcing
3. Habitat impacts
4. Ghost fishing
By-catch

Pots and traps, are highly selective for the species they target with low incidental catch.

Crab and lobster pot incidental catch is primarily composed of undersized target species & those that are soft or in poor condition.

These are generally returned to the sea alive i.e. thus no discards.
Bait sourcing

Depending on which bait is used the pot fishing can be of environmental concern.

Negative example: Landing crab claws and the use of brown crab for bait in the whelk fishery.

Positive example: Use of fish carcases from fish farms or supermarkets.

For potting to be sustainable bait also need to be come from sustainable sources.
Habitat impacts

The physical damage caused by pots to the seabed is insignificant compared to mobile fishing gears.

The contact area of individual pots with the seabed is very small (0.2-1m²).

Investigations of the environmental impacts of pots found few signs of damage to benthic habitats and species.
Ghost fishing pots

Lost or discarded pots can continue to fish outside human control, termed Ghost fishing.

This can have a negative impact on species though loss rates are too low to warrant concern.

To mitigate effects modern pots use biodegradable materials that decay over time.
Successful sustainable management approaches in fisheries have generally been stakeholder lead or had substantial stakeholder support.
The Ecosystem based Approach for Welsh Fisheries

Delivering an ecosystem based approach for Welsh Waters will require sound scientific data:

- Documented knowledge about the spatial extend of the fisheries
- Documented knowledge about the fishing effort
- Documented knowledge about the state of habitats and target stocks
Work-package 1 — Fishers knowledge (questionnaire survey)

Work-package 2 — Habitat surveys

Work-package 3 — Stock status of target species

Work-package 4 — Connectivity of welsh stocks

Work-package 5 — Assessment and management advice

Additionally to these work packages the project is also able to respond to specific burning issues to assist the fishing industry with the sustainable management of marine resources.
Prawns & Whelks
Brown Crab & Lobster

Working with fishers across Wales to obtain samples and assist in field experiments
Management goals for static gear fisheries

- Recruitment index
- Baseline population data for long term monitoring and stock assessments of all target species
- Place all target fisheries in a position to obtain MSC accreditation
Adult population parameters

- Abundance
- Distribution
- Growth rate
- Population size and age structure
- Size at maturity
- Sex ratio
- Environmental factors
- Environmental impacts of potting
- Bycatch
Environmental Parameters

- Temperature
- Salinity
- Depth
- Currents
- Proximity to coastal run off

European Fisheries Fund
Investing in Sustainable Fisheries
On Board Camera Trial

Brown Crab Catch from 86 pots

- Number of pots fished
- Landed and discarded
- Sex ratio
- Size

<table>
<thead>
<tr>
<th></th>
<th>Undersized Males</th>
<th>Undersized Females</th>
<th>Landed Males</th>
<th>Landed Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pots</td>
<td>8</td>
<td>5</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>Landed females</td>
<td>10</td>
<td>20</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>Landed males</td>
<td>15</td>
<td>3</td>
<td>30</td>
<td>50</td>
</tr>
</tbody>
</table>

European Fisheries Fund
Investing in Sustainable Fisheries

Pryfysgol Bangor University
Nursery habitats

Identification of preferred habitat for juvenile crabs and lobsters;
Lobster Paternity

- Multiple paternity increases genetics diversity
- Bias in the sex ratio may decrease genetic diversity

**GENETIC DIVERSITY PROVIDES RESILIENCE TO CHANGE**

**Aims**
- Does multiple paternity exist for this species?
- What is the sex ratio of reproductively successful individuals?
- Are larger males are more reproductively successful than smaller ones?
- Does population density affect the observed reproductive ratios?
Natural Selection between different life stages

Natural selection due to changes in life stages can be identified with genetic techniques:

Can be a decrease in genetic diversity between one stage and another

Genetic structure identified between different life stages in markers associated with those adaptive traits e.g. salinity tolerance, competition for habitat.