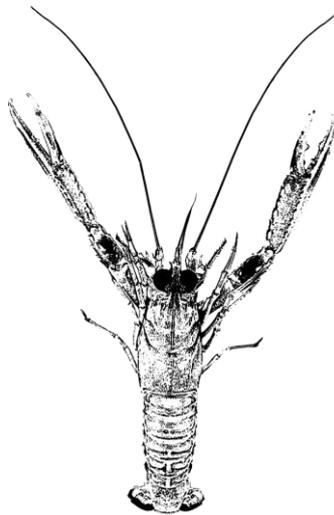


LONG TERM MANAGEMENT PLAN  
for the  
Nephrops fishery in Fladen

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Centre for Environmental and Marine Sciences

University of Hull

<http://www.hull.ac.uk/cems>

2014

*We would like to offer our warmest gratitude to the Fladen Nephrops Fishery, the members of which have given us their time, trust and thoughts in abundance.*

*For helping to achieve this, we are especially thankful for the assistance given to us by members of the SWFPA in particular James Reid, Chairman of the SWFPA Nephrops Committee and Bill Wiseman, Vice Chairman of the SWFPA.*

*We would also like to thank the SWFPA Chief Executive, Mike Park for his technical advice and support, with special thanks to Anne-Marie Summers and Lianne Morenc at SWFPA offices in Fraserburgh for their administrative support and hospitality. Our special thanks are extended Jane Sandell of the Scottish Fishermen's Organisation, Marine Scotland staff in Fraserburgh and Allan Gibb.*

## The Brief

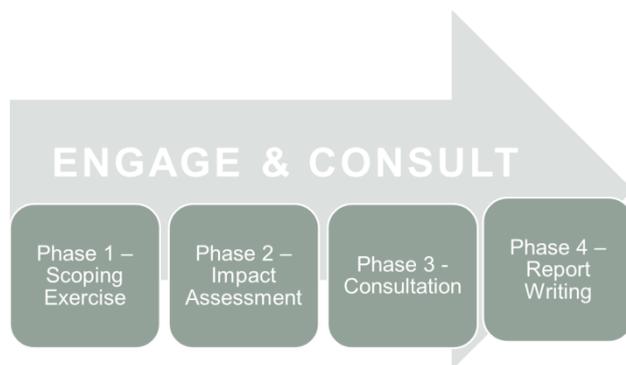
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Produce a long term management plan for the Fladen *Nephrops* Fishery in Fladen, commissioned by Scottish Whitefish Producers Association (SWFPA) on behalf of the North Sea Regional Advisory Committee *Nephrops* Focus Group.

## This document

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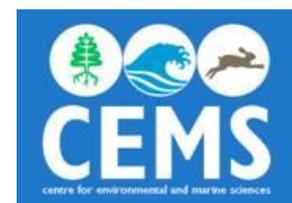
This document is a summary of the conclusion of the 4 Phases of 'developing a long term management plan for the *Nephrops* Fishery in Fladen', that were undertaken by the Centre of Environmental and Marine Sciences at the University of Hull, on Behalf of the Scottish White Fish Producers Association in 2013 – 2014.



## About Us

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The Centre for Environmental and Marine Sciences (CEMS) is a unit in the School of Biotechnology, Biological and Environmental Sciences at the University of Hull. CEMS expertise primarily centres around applied and field-based research in the areas of marine biology, fisheries, ecology and environmental science. It has about 150 undergraduates, 12 postgraduates and 8



full time academics. Research income in the centre is currently around £1 million from a variety of sources including consultancy, NERC, the EU and the Leverhulme Trust.

Key team members from the Centre involved in this piece of work are Dr Magnus Johnson and Annie Hooper. They have been helped by Bob Houghton in particular with the Literature Review, but also the industry interviews and preparation of the final report. John Whelan conducted the GIS analysis and has produced the video that demonstrates how the Fladen *Nephrops* fleet move around over a 4 year period. Nicola Dobson has provided technical and administrative support.

#### Commissioned by

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The Scottish White Fish Producers Association Limited (SWFPA) was set up in 1943 to protect the interests of fishermen in Scotland. The activity of its members account for some 70% of the Scottish demersal fishery revenue and around 40% of the UK value.

#### Background

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SWFPA is a key member of the North Sea Regional Advisory Council (NSRAC) which has been actively working on a Long Term Management Plan (LTMP) for North Sea *Nephrops norvegicus*, (hereafter referred to as *Nephrops*), a species of key importance to members of SWFPA. The LTMP draft is available at [www.nsrac.org](http://www.nsrac.org)

#### Our approach

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From the offset our approach has been to infiltrate the Fladen *Nephrops* Fishery, not limiting engagement to the 'consultation' period. This, we believe has been essential to; fully understanding the scope, reporting on the impact assessment, being able to conduct a robust consultation and create a sense of ownership of the report and its recommendations.

We wanted to do more than facilitate an agreed number of consultations with the fleet and their representatives.

Engaging with fishers' knowledge is increasingly valued in fisheries management (a) for fishers' knowledge utility for science and management, and (b) to improve the legitimacy of fisheries governance. (Daw; 2008)

Experience of previous consultations suggests that the greatest level of success is achieved when the consultees feel that facilitators have actively engaged with the community. We will be using a participatory (PAR) and collaborative research approach, based on the principle that people have a universal right to participate in the production of knowledge that directly affects their lives. (Smith, Johnson and Ottawa; 1997)

Our research, final report and its recommendations support the intent to increase the economic and social stability of the *Nephrops* industry in Scotland and improve the management of a fishery that is predominantly prosecuted by the Scottish fleet. Whilst providing, yet another good example of Scottish proactivity towards advancing fisheries management.

The overarching component of our approach to the research and delivery of the report and its recommendations has been our regard to engagement of the Fladen *Nephrops* Fishery

Our overall aim was to 'infiltrate' the Fladen *Nephrops* fishery and to deliver a robust management plan that would be owned and implemented by the fishery.

To this end our engagement and consultation objectives were:

- *Identify and use stakeholders preferred channels of communication*
- *Build relationships and trust, establishing personal contact*
- *Enable ownership of the report and its recommendations*

## Scoping exercise

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A scoping exercise was required to identify the characteristics of the fishery, the actors in the fishery and the specific issues associated with it.

On 2 field trips we conducted 23 semi-structured interviews (11 skippers, 2 netmakers, 3 processors, 3 industry and officers from Marine Scotland), all about an hour each. In addition we attended SWFPA *Nephrops* committee meeting and recorded 14 responses. To complete the Scoping Exercise we presented the report and its measures to the NSRAC *Nephrops* focus group.

## Scope of Literature Review

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We also conducted a literature review that covered;

- A review of management measures currently in place
- Summary of different gears used.
- A review of the catches taken from Fladen historically and compared to other grounds.
- A review of the changes in size structure over time (if any).
- Predator-prey interactions, especially anything relating to commercial fish species that may prey on *Nephrops*.
- Impacts of environment on catches – low temp = poor catches?
- Distribution of stock in Fladen.
- Fleet composition (*Nephrops* specialists v whitefish/*Nephrops* generalists). Important with regard to effort displacement.
- Stock assessment approaches used currently (camera) and options to consider (fishers measuring samples of catch, short tows where close attention is paid to track and catch – done by fishermen (possibly in exchange for a little extra leeway).
- Potential management measures and management reference points currently used.

We have used the full range of resources available at the University of Hull to carry out a literature review of the Fladen *Nephrops* functional unit.

We gathered information relating to Fladen in particular including historical patterns in landings and management measures. As has been done elsewhere recently (Ungfors et al., 2013) we made useful comparisons between fishing grounds in order to inform our approach to impact assessment and the consultation. The purpose of the literature review was to provide an initial platform from which we could securely talk to skippers and the SWFPA regarding the fishery. The full literature review of the *Nephrops* functional unit - relating to the Fladen in particular, for example historical patterns in landings and management measures

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## Method

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We established drop-in clinics over 3 days at the SWFPA, a safe and recognised location for most, if not all of the stakeholders.

We ambushed skippers, net-makers, officers of Marine Scotland, fishers representatives, processors and fish salesmen in their offices, on the quayside as they were preparing to leave, coming back into port or having breakfast in 'Angela's Tea Bar'.

We also attended a meeting of the SWFPA *Nephrops* committee and conducted SWOT and TOP3 analysis of responses from the 14 skippers present.

We continued to ambush skippers (and industry representatives) on the quayside.

For every interview two of us were present so that one could ask questions while the other took notes. Full transcripts of the discussions were not taken and the respondents retained anonymity in the process but notes were made to identify themes and glean an insight into the Fladen *Nephrops* Fishery.

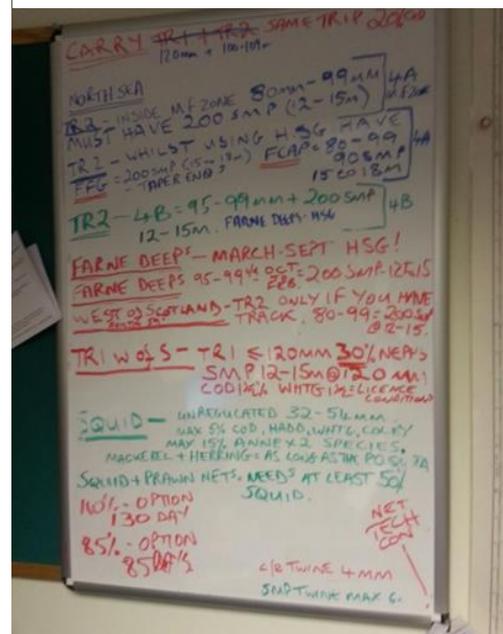
**On the 2 field trips we conducted 23 semi-structured interviews (11 skippers, 2 netmakers, 3 processors, 3 industry and officers from Marine Scotland), all about an hour each. In addition we attended SWFPA *Nephrops* committee meeting and recorded 14 responses. To complete the Scoping Exercise we presented the report and its measures to the NSRAC *Nephrops* focus group.**

## Findings

One of the most striking features of the *Nephrops* trawl fishery upon first meeting the fishermen and associated community is the complex tapestry of regulation in amongst which industry members have to work. Fishermen are subject to highly specific technical, temporal and spatial regulations which restrict their efficiency.

The most recent version of regulations was found on a whiteboard, reserved for the purpose in the office of the local Marine Scotland office (Fig. 1)

Figure 1



When asked to name the top three elements of concern the group expressed very negative and strong feelings about highly selective gear, quota and regulations. *Nephrops* boats are restricted by the likelihood that, because they use a small mesh, they will catch whitefish that they do not have quota for. At the same time many of the skippers pointed out that the whitefish have generally been regarded as the catch component that makes the profit.

Our approach has been to make provocative suggestions with regards to possible management measures with an aim of facilitating discussion.

The findings of the scoping exercise and the literature review are in a separate document – a vimeo summary of the [Scoping Document](#) can be found here.

Phase 1 included the literature review and 2 field trips and concluded with an initial list of potential management measures that were taken forward to the Impact Assessment (Phase 3)

## Impact Assessment

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The output of the Scoping Exercise (a list of possible management measures) was then assessed to determine the potential impact.

To enable the continued engagement and consultation, feed back to those that had helped us and make best use of our social media contacts within the Fladen *Nephrops* industry we produced a short video giving a brief summary of the position of the fishery, a reflection of what skippers and others have told us and made it available on line at <http://vimeo.com/88661555>

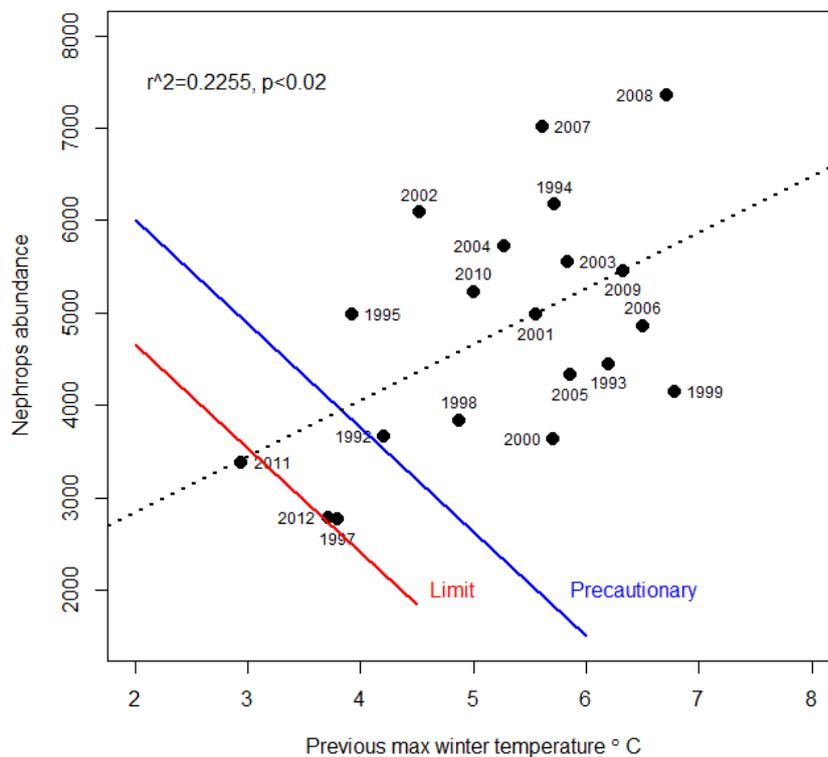
This put forward some very tentative initial suggestions for management measures that could be included in a long term management plan for the fishery.

Following the Vimeo, we made another visit to Fraserburgh to further assess the impact of the possible management measures. Through the SWFPA and our social media contacts we promoted the following consultation schedule we gave a presentation followed by a facilitated consultation discussion. In the afternoon we held a 'drop in' consultation on possible management measures. Beyond that we made ourselves available for private 1 to 1 sessions. Over the two days we spoke to a further 8 skippers.

The Impact Assessment gave consideration to:

- TAC/quota
- Minimum landing size
- Minimum mesh size
- Days at sea
- Gear size limitations
- Highly selective gear
- Catch rate limits
- Catch composition rules and,
- Engine size, efficiency

The ultimate goal for any management plan must be to be proactive rather than reactive. A plan that allows *Nephrops* fishermen to anticipate the levels of catches in a forthcoming season based on current data would allow them to develop an appropriate strategy. For example at the start of the year, if a skipper knew that prawn catches were going to be poor on Fladen this year he might bias his catches towards TR1 days or decide to fish other grounds. There is some evidence, both



anecdotal (i.e. the opinions of fishermen) and based on limited data, that there is a relationship between density of prawns on Fladen and meteorological conditions the previous year.

(Fig 2)

Figure 2

A suggested relationship between *Nephrops* abundance (thousands of animals) on the Fladen grounds and the maximum temperature registered in Eastern Scotland by the MET office the previous winter<sup>1</sup>. This relationship suggests for example that for 2014 the apparent abundance of *Nephrops* in Fladen will be around 5 000 000 animals (the maximum winter temperature last year was 6°C).

Using such a relationship, if proven to be robust, it could be possible to develop a rule that used both temperatures the previous year and abundance (or density or

<sup>1</sup> [http://www.metoffice.gov.uk/climate/uk/datasets/Tmax/date/Scotland\\_E.txt](http://www.metoffice.gov.uk/climate/uk/datasets/Tmax/date/Scotland_E.txt)

weight per  $m^2$ ) to decide when stock levels were such that some precautionary protective measures would be beneficial ( $B_{pa}$ ) or low enough that drastic measures should be taken ( $B_{lim}$ ).

However, the NSRAC Nephrops focus group do not feel these the data are yet robust enough to base a management plan on and prefer, for now to use traditional means of setting  $B_{lim}$  and  $B_{pa}$  (i.e. based on stock size alone). Although there may be a relationship between meteorological conditions and *Nephrops* abundance, at the moment the causal nature of the possible relationship is not clear. CEFAS are currently investigating the development of predictive tools for *Nephrops* abundance using a more extensive and diverse data set (Ana Leocadio, pers com).

### Background

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Fladen differs from other grounds in the North Sea in that it is an offshore ground that is generally prosecuted only by larger boats with twin-rig fishing gear. It is also unusual in that it is offshore, in deeper water and animals are of a low density compared to other Functional Units.

Together these factors offer some natural protection to the Fladen grounds because when *Nephrops* densities are lower than is economically feasible to work, boats either fish elsewhere or tie up until catches improve.

Last year many boats in the SWFPA tied up for about 3 weeks when the grounds usually used by this fleet were unproductive (Mike Park, pers com). The consistent decline in abundance of animals on the ground, over the last 5 years is cause for concern. The changes in the behaviour of fishermen in relation to increasing costs have been noted by various fisheries scientists (e.g. Floc'h et al 2007; Mixed fishery working group 2013).

The existing regulatory framework is complex. Many of the management measures imposed on the *Nephrops* fishery are a legacy of the Cod Recovery Plan and nearly all of them are “top down”. Some flexibility within the framework is available at skipper/owner/vessel level but this is limited and usually entails a cost/benefit decision from the individual.

When considering the LMTP the existing EU and national legislation has to be carried through as there is no legal locus to exceed the limits set by it. However, we tried to take a positive view towards its impact on the fishery and have identified the benefits as well as the challenges.

For instance, the fact that through the TAC process, there are relatively robust stock assessments and stock density information specific to the Fladen. They may not be perfect but it is helpful and saves time and money in not having to put these in place. Another example is HSG which, although it is not popular with skippers, has given rise to a fishing community that is technologically savvy and disposed to fishing selectively.

We then considered which management options weren't covered by the existing regime and assessed them to see what, if anything, they could add to the LTMP. In this we were very conscious of the need not to complicate an already complex situation. The process also had to be mindful of the upcoming changes that will result from the review of the Common Fisheries Policy and in particular the landing obligation which will significantly alter the management landscape.

As a result much of what we propose can be classed as recommendations rather than regulation. A periodic review of the regulatory position of the fishery should be part of the LTMP to keep it aligned with the prevailing EU and national regime and to accommodate developments arising from the landing obligation. Because of these factors, and in the absence of concrete predictive ability based on environmental conditions, we recommend taking measures to prevent any escalation of effort, to continue to use the technological measures that the fleet has developed to minimise discard and to recognise two stock levels of use for management. A precautionary biomass level where steps need to be taken to reduce effort and an absolute limiting level where fishing ceases should be set.

We further recommend that the fishery develop its own data collection capacity in order to provide better resolution on the stock levels in specific and more frequently exploited areas within the Fladen grounds. We also suggest that the *Nephrops* fleet develop even more selective fishing techniques that will allow them to avoid catching species, or to release after capture with minimal resultant mortality, for which they have no quota. Although highly selective gear is unpopular amongst *Nephrops* fishermen we cannot see how with the forthcoming landing obligation its use can be avoided. Our hope is that the expertise within the fleet will be such that industry can develop “super-selectivity” before the landing obligation bites.

The seasonal and annual pattern of movement of fishing effort between grounds is something that needs to be better understood in order to protect both the fleet and the stocks. We suggest that the industry should investigate the possibility of developing a better understanding of the interactions between grounds rather than focussing on them in sequence.

Finally, the ageing technique for lobsters developed by Kilada et al (2012) could provide very useful understanding of differences in stock structure between Functional Units.

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Recommendations:

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- 1) Further increases in effort levels should be restricted (e.g. by limiting gear used to twin or single rig)
- 2) Highly Selective Gear (incline panel + square mesh panel) to be used by all TR2 boats. When the landing obligation comes into force the precise stipulations for HSG should be relaxed. This will allow boats to evolve measures that work for their particular operation.
- 3) When the fishery is deemed to have reached a point where precautionary measures are necessary ( $B_{pa}$ ) no more than 5% of the abundance estimated by data from towed underwater vehicle surveys in the previous year should be removed.
- 4)  $B_{pa}$  should be set at 80 000 tonnes (the lowest tonnage recorded on the grounds to date). The tonnage figure is based on the density of *Nephrops* estimated by underwater camera surveys and the average weight of animals sampled. We feel that this is sensible because at this tonnage, effort is already limited by the cost of fishing the area and 5% as a harvest rate would equate to the catch taken this year.
- 5)  $B_{lim}$  (the point at which fishing for *Nephrops* should cease), should be set at 50 000 tonnes as this would represent a consistent decline over the last 5 years and a stock level at about 25% of the historical maximum. It is likely that fishing at a time when animals were at this low level would be uneconomic.

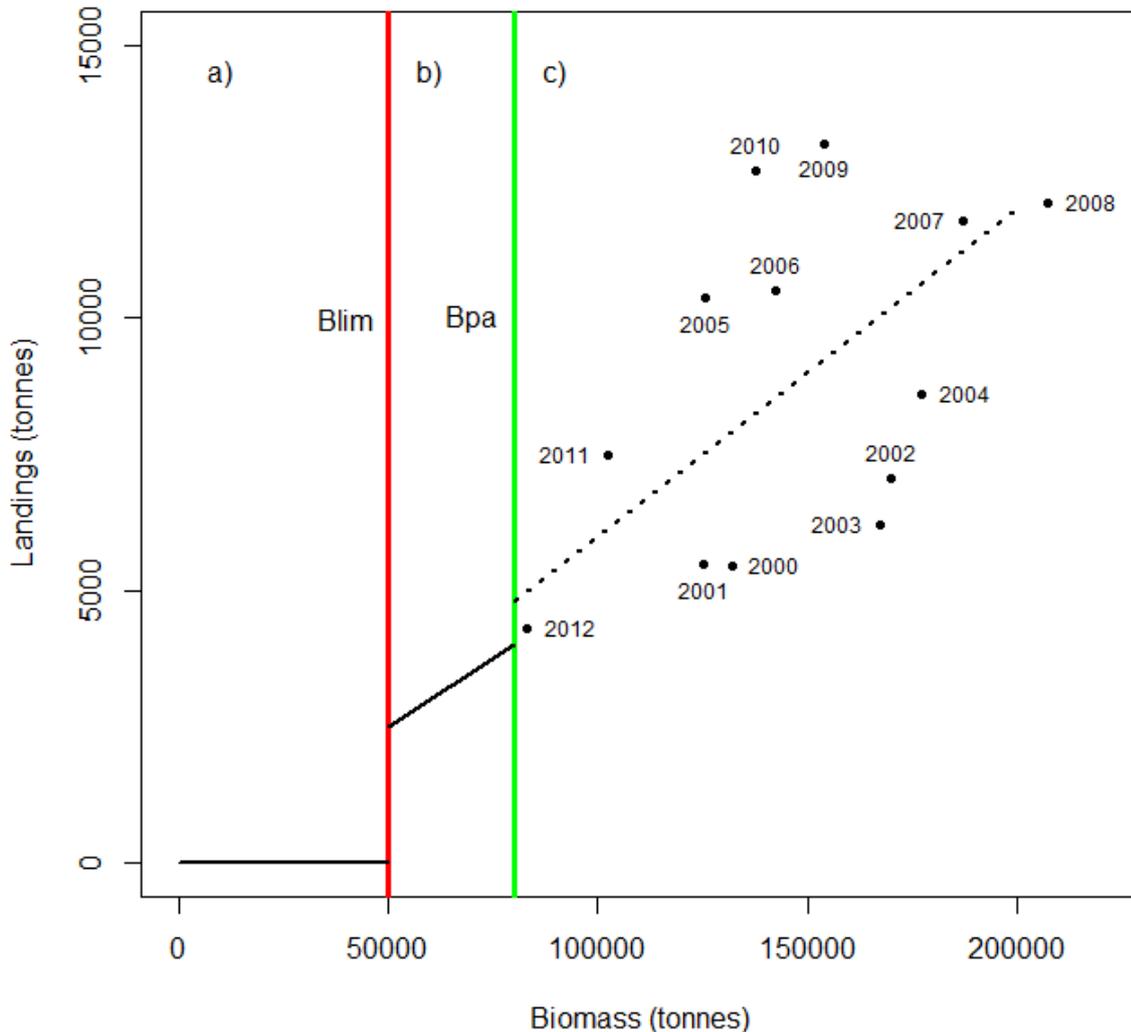


Figure 3: Schematic of the proposed management plan for Fladen. a) Biomass of *Nephrops* on the ground is less than 50 000 tonnes (red line) so landings should be zero. b) Biomass on the ground is between 50 000 and 80 000 tonnes (between the red line and green line) so landings of *Nephrops* should be no more than 5% of the available (the black line). We believe that at biomass availability of less than 80 000 tonnes boats would be targeting other grounds anyway. c) Biomass is above the precautionary threshold of 80 000 tonnes (the green line) so no limit is imposed (other than the natural economic limit). The dashed line represents landings at 6% of available biomass, the average over the years.

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Additional Recommendations:

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1. Develop a fishermen led quayside catch monitoring system. We feel that it is important that the TR2 fleet collects its own data on catch composition and size spectrum of Nephrops on Fladen.
2. Support is given to the efforts by CEFAS to develop models using environmental data to predict likely Nephrops abundance on the Fladen ground ahead of the season.
3. Develop super-selectivity technology before 2019, e.g.
  - Net cameras/monitoring systems
  - Closing cod ends to prevent unwanted catch
  - Opening cod ends to release unwanted catch
  - Flying demersal nets
4. Commission analysis of whole fishery rather than attempting to do FU's one by one. It is clear that displacement of the fleet between grounds by regional variation in *Nephrops* availability is a key feature of this fishery.
5. Investigate use of the ageing technique developed by Kilada et al. (2012) on American lobster (*Homarus americanus*)