

## **Fishery Natura Plan for Native oysters in Lough Swilly**

**2012-2017**

**Proposed by**

**Lough Swilly Wild Oyster Society Limited (LSWOSL)**



*Native oysters on the sorting table off the stern of an oyster fishing vessel in L. Swilly.*

## Contents

Background .....	3
History.....	3
Current arrangements for governance and regulation of the fishery .....	3
Current status of oyster stocks and fisheries in Lough Swilly.....	4
Current challenges .....	5
Management plan objective .....	6
Management Strategies .....	9
1. Increased data provision for stock assessment.....	9
2. Re-build and maintain native oyster biomass at levels that maximise productivity and spat fall potential.....	9
3. Develop a control programme for Pacific oyster.....	9
4. Increase monitoring of Bonamia to identify its role in mortality of oysters in the Lough.....	9
5. Develop a legal framework and governance structure with the capacity to limit inputs and out-takes of oyster from the Lough.....	10
6. Ensure that the management measures adopted in the plan are implemented through an effective monitoring and control programme .....	10
7. Review strategies and measures annually and ensure a management response to monitoring programmes in relation to conservation objectives.....	10
Management Measures .....	10
1. Increased data provision .....	10
2. Re-build stocks of native oyster.....	11
3. Control of Pacific oyster .....	15
4. Bonamia monitoring .....	18
5. Legal framework and governance.....	18
6. Monitoring and control .....	19
7. Review .....	19
References.....	20

## Background

### *History*

Wild oyster (*Ostrea edulis*) was first documented in Lough Swilly in 1604 when the British Admiralty report identified that oysters existed in commercial quantities in the bay. There has been a traditional native oyster fishery in the bay ever since. In 1904 the first comprehensive survey was conducted and documented in the “Brown Report” which stated that “there are two natural oyster beds in Lough Swilly one on the north side between Ballygreen Point and Ardrummon, in the Letterkenny Rural District and the other on the south side of the Lough between Drumby and Ballyaghan.” Recent surveys by O Sullivan and Dennis (2001) and in 2011 by the Marine Institute (Anon 2011) provide updated information on the distribution of oysters in the Lough. Local knowledge also suggests that there are additional beds not included in these surveys (Fig. 1).

### *Current arrangements for governance and regulation of the fishery*

The Lough Swilly Wild Oyster Development Association was formed in 2000 to represent the interests of fishermen licensed to gather wild oysters on the Swilly beds. Subsequently the Lough Swilly Wild Oyster Society Limited (LSWOSL) was formed as a friendly Society registered with the Irish Co-operative Organisation Society Limited. It has 29 members from the wild oyster (*Ostrea edulis*) fishing community. The Society currently has no legal authority to manage the fishery but has been active in promoting the conservation and management of wild oyster in L Swilly since 2000.

All oyster fishermen are required to hold dredge licences issued by Inland Fisheries Ireland (IFI) which specifies the season during which the dredge can be used. In addition the oyster fishing vessel should be registered on the National Sea Fishing Register administered by The Department of Agriculture, Food and Marine (DAFM) and hold the requisite bivalve or polyvalent capacity. Annually up to 30 oyster dredge licences have been issued to traditional fishermen in the locality to dredge for oysters (Table 1).

Table 1. Number of dredge licences issued annually for fishing of oysters in L. Swilly

Year	Number of Licences Issued
2012	24
2011	22
2010	16
2009	21
2008	27
2007	28
2006	30

The fishery is regulated by minimum landing size of 76mm and by a closed season from June 1<sup>st</sup> to August 30<sup>th</sup>. These regulations are enforced by IFI.

#### ***Current status of oyster stocks and fisheries in Lough Swilly***

In March 2011 a limited survey of the oyster populations of Lough Swilly was undertaken by the Marine Institute and BIM. This was not comprehensive and excluded sites already licensed for aquaculture. This survey indicated that the wild oyster population was at a low level and that previous fishing had resulted in removal of a high proportion of larger oysters (>76mm). The survey also indicated that a naturalised Pacific oyster (*Crassostrea gigas*) population was established, occurred in the native oyster bed at various densities and was of multiple year classes. A second survey was completed in November 2011 and included both wild Oyster beds and aquaculture sites. This confirmed and extended the conclusions of the March 2011 survey that generally stocks were low and that Pacific oysters were widespread. The surveys also showed however that some annual recruitment was occurring and growth rates appear to be strong (Anon 2012).

Output from the fishery has varied annually depending on stock availability, fishing effort and market price. As recently as 2008 55 tons of oysters were taken. The really significant development in the fishery has been the landing of 300 tonnes of naturalised Pacific oyster in 2010. This fishery continued in 2011 (Table 2).



Table 2. Estimated annual output of oysters from Lough Swilly 2006-2011. Data for 2011 is incomplete.

Year	Tonnage sales
2011	4 Tons <i>Ostrea edulis</i> ; 15 Tons <i>Pacific oyster</i> (*yr to date)
2010	40 Tons <i>Ostrea edulis</i> ; 300 Tons <i>Pacific oyster</i>
2009	45-50 Tons <i>Ostrea edulis</i>
2008	55 Tons <i>Ostrea edulis</i>
2007	Unknown
2006	Unknown

### ***Current challenges***

There are several major challenges facing the oyster stocks and oyster fishery in L. Swilly.

- There is no comprehensive plan the Lough that would afford protection to the native oyster stocks and fisheries.
- There is no legal mechanism currently in place that could limit the number of vessels fishing for oysters, the total fishing effort or the annual outtake. Other oyster fisheries in the country have either a fishery order which authorises the local co-op to manage the fishery or they have an aquaculture licence which gives them this same authority
- Scientific advice and data provision to inform management of the fishery has been weak
- Licences (for shellfish other than wild oysters) have been granted to aquaculture activities which overlap wild oyster habitat. Some of these licenced areas are extensive. Relaying of mussel and trestle production of Pacific oyster are the main activities in these sites
- There are a number of Aquaculture sites that are apparently licensed, but not being utilised but cannot be fished by native oyster fishermen even though there may be native oysters in these areas
- Pacific oysters have become established as a self-seeding population in Lough Swilly. Their distribution suggests that they are a threat to wild oyster stocks and habitat.
- *Bonamia* was accidentally introduced into the bay in or around 2006 and this disease has led to increased mortality of native oyster. In addition there is no biosecurity plan for the area that would reduce the risk of introduction of other non native species.

## Management plan objective

The overall objective of this management plan is to develop a sustainable wild Oyster (*Ostrea edulis*) fishery that is consistent with the conservation objectives for wild oyster habitat and other habitats in the Lough. To achieve this the plan acknowledges and specifically responds to the Conservation Objectives for oyster habitat described in NPWS (2011).

To achieve the overall objective of the plan a number of strategies are envisaged each of which will be implemented by adopting a number of procedural, legislative and management measures.

The plan will operate over the distributional extent of oyster beds in L. Swilly. The distributional extent has been determined from a 2001 BIM survey, a 2011 MI survey and local knowledge (Fig. 1). Together these data and information sources provide a best estimate of the current and potential distributional extent of native oysters in L. Swilly (Fig. 2). The LSWOSL intends that the management plan described here for native oyster will operate over this entire area. Temporary closures of some of these areas to oyster fishing will be for the purpose of restoration of stocks and will not mean that such areas can or should be used for other purposes.

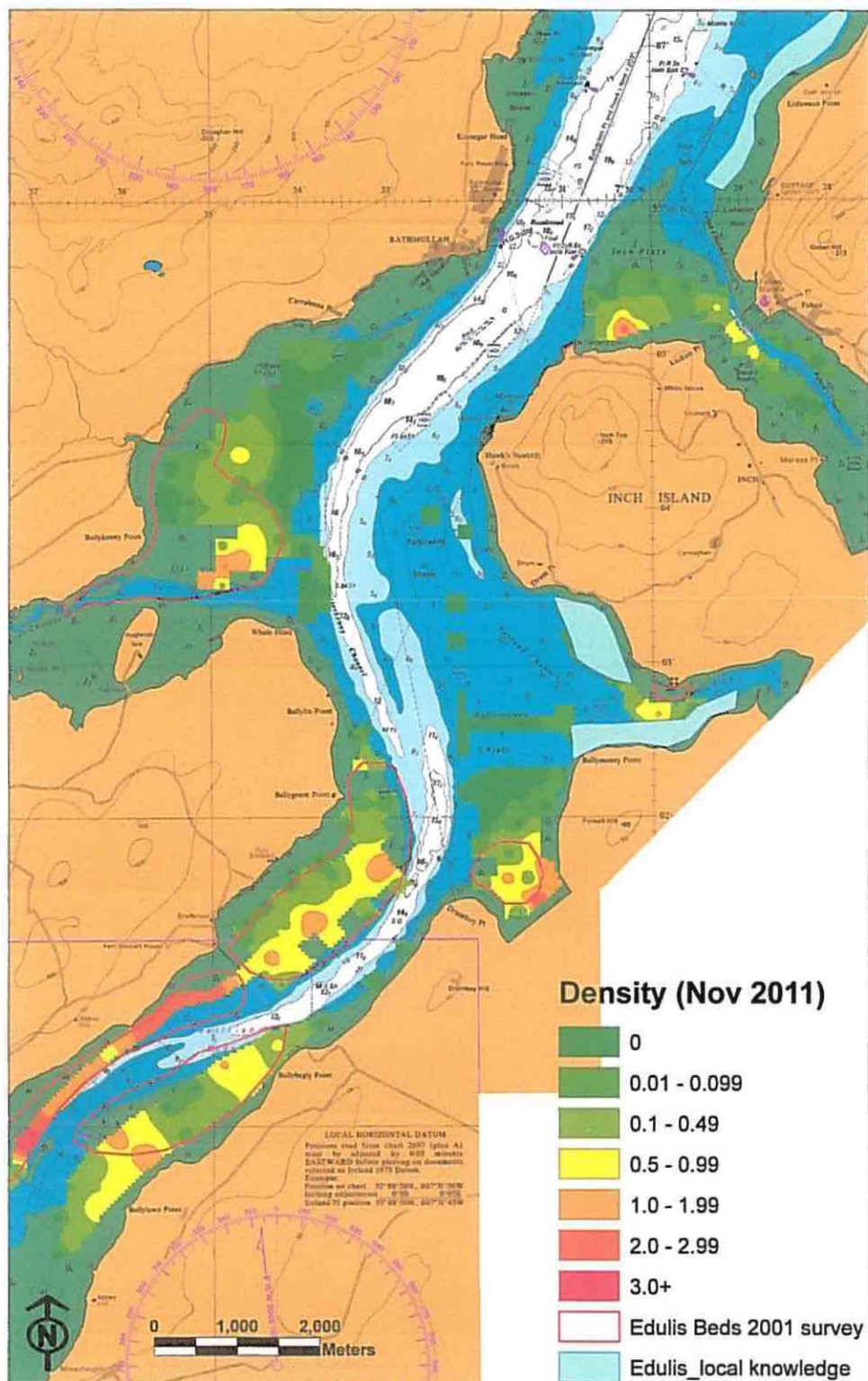


Fig. 1. Distribution of native oyster in L. Swilly derived from surveys in 2001, 2011 and local knowledge.







# Management Strategies

## **1. *Increased data provision for stock assessment***

Generally, and in particular prior to 2011, no data has been available for provision of advice on the management of oyster stocks in L. Swilly. This has been a significant impediment to the co-op in developing rational management measures. From 2012 the Marine Institute have indicated that an annual survey will be conducted to provide the relevant data and advice.

## **2. *Re-build and maintain native oyster biomass at levels that maximise productivity and spat fall potential***

Although the maximum annual production and sustainable yield of oysters in L. Swilly is unknown it is clear that stocks were previously at a significantly higher level than they are today. Re-building of stocks is, therefore, a reasonable and feasible objective from both fishery management and conservation objective (NPWS 2011) perspectives.

## **3. *Develop a control programme for Pacific oyster***

It is clear from the 2011 survey that Pacific oysters are widely distributed in the Lough, occur on what was formerly known to be native oyster habitat and may be expanding their distribution. Any re-building programme for native oysters has to include an intense and sustained control programme for Pacific oysters if it is to be successful.

## **4. *Increase monitoring of *Bonamia* to identify its role in mortality of oysters in the Lough***

Monitoring of the prevalence of *Bonamia* was last carried out in the Lough in 2008. The current spatial distribution of prevalence and the mortality caused by *Bonamia* in the Lough is unknown. Together with Pacific oysters *Bonamia* is a significant threat to any re-building programme for native oysters and monitoring of prevalence is essential in evaluating the feasibility of an oyster re-building programme. In addition to *Bonamia* monitoring biosecurity measures that would reduce the risk of accidental introduction of other non-native competing species or diseases should be developed.

**5. *Develop a legal framework and governance structure with the capacity to limit inputs and out-takes of oyster from the Lough***

Maintaining a sustained re-building programme for native oysters in the Lough and operating a fishery under a range of control measures requires a system of governance in which LSWOSL are central players. Management measures adopted by LSWOSL need to be backed up by legislative support. A number of mechanisms exist in other oyster fisheries but these are currently not in place in Lough Swilly.

**6. *Ensure that the management measures adopted in the plan are implemented through an effective monitoring and control programme***

The success of the plan hinges on the effective implementation of the management measures described. Monitoring and control of the fishery will be important in building confidence and buy in among the LSWOSL members and permit holders.

**7. *Review strategies and measures annually and ensure a management response to monitoring programmes in relation to conservation objectives***

The future effectiveness of the management measures outlined in this management plan are unknown because of the inherent variability in spawning, spat settlement, growth and survival of oysters. Monitoring of stocks, annual review of the effectiveness of measures taken and adaptive management are therefore very important aspects of this plan.

## **Management Measures**

The management strategies outlined above will be implemented using a range of measures as follows.

**1. *Increased data provision***

**a. Annual surveys and assessment of stocks and associated habitat**

Annual dredge and grab surveys will report the following indicators for all oyster beds

- i. Density of all oysters
- ii. Density of oysters over MLS
- iii. Density of oysters 1+ years

- iv. Qualitative index of 0+ settlement and development of an index of settlement using collectors
  - v. The shell content of oyster habitat (excluding live *Pacific oyster*)
  - vi. Macrofauna (including *Pacific oyster*) associated with oysters
  - vii. Total annual mortality rates derived from length composition and growth data
- b. All oysters harvested shall be landed at agreed landing points and all bags shall be tagged with a tag identifiable back to the individual boat and dredge licence so that accurate estimates of landings are recorded.
  - c. Fishing vessel operators will provide catch and fishing effort data to inform the management plan and allow for in season control of fishing activity and areas fished. This will allow for the following real time management measures to be taken if necessary
    - i. Low or declining catch rates could be used to close areas prior to the official closing date of the season
    - ii. The occurrence of a high (>80%) percentage of oysters under 55mm in the catch could be used to close areas and to support data obtained in the annual survey

These data will provide accurate records to the LSWOSL on landings and be used to cross check landings data collected by IFI.

## **2. *Re-build stocks of native oyster***

Re-building stocks, by increasing oyster density and biomass, over and above their current status is consistent with the conservation objectives for oyster habitat. Incrementally this will lead to oyster habitat achieving favourable conservation status and, as described above, will also achieve the fishery management objective for native oyster in L. Swilly. The following measures are proposed.

- a. Ensure the minimum landing size (MLS) is above the size at maturity
  - i. Biological assessment of size at maturity will be used to re-assess the MLS in year 1 of the plan. The appropriate MLS and the size at which a given cohort reaches maximum biomass also depend on the relationship between natural mortality and growth rates. Information on these biological



parameters of oysters in L. Swilly will be improved annually during the lifetime of the plan

b. Restrictions on dredge design

- i. The maximum dredge width will be 150cm
- ii. Only blade dredges (rather than toothed dredges) will be used to minimise disturbance of sub-surface habitat and breakage of dead shell

c. In areas where native oyster comprise at least 50%<sup>1</sup> of all oysters the exploitation rate and total fishing activity will be limited as follows:

- i. The exploitation rate will be limited to 33% of the pre-fishery spawning stock biomass in this area as determined by the annual survey and new estimates of size at maturity to be determined in 2012
- ii. Areas where density of oysters is less than 0.25 oysters m<sup>-2</sup>, as determined in the first year of the plan by the Nov 2011 survey, will be closed until density and biomass of oysters recovers above this threshold<sup>2</sup>. Generally, fishing in any given year will not occur in areas where density is below this level or when densities are depleted to this level during the fishing season (as derived from fishing activity data).
- iii. The fishing season will be shortened. The current opening date of Sept 1<sup>st</sup> will be delayed until Sept 19<sup>th</sup> while the current closing date of April 30<sup>th</sup> will be changed to Mar 31<sup>st</sup>. Fishing will not, therefore, occur during periods when juvenile oysters are actively growing to minimise negative effects of dredging on growth rates and mortality of juveniles
- iv. Areas where more than 70% of oysters are juveniles (<55mm), as determined by annual surveys, will not be fished

d. Develop a spawning reserve that will be closed to fishing

- i. An area of 55hectares will be closed to fishing in order to establish and conserve a high density of spawning stock, to increase fertilisation success and larval production from this area (Fig. 3).

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<sup>1</sup> Areas where Pacific oysters constitute >50% of oysters will be subject to the Pacific oyster control plan (measure 3)

<sup>2</sup> This is an arbitrary starting threshold for the management plan that will be reviewed annually

- ii. In year 1 of the plan Pacific oyster will be removed, by dredging, from the closed area
  - iii. In year 2, following the removal of Pacific oyster from this area, mature native oysters (>55mm) will be transplanted into the 'spawning reserve'. These oysters will be sourced from the fishery
  - iv. The location of the reserve in the upper Swilly will lead to larval dispersal to other oyster beds seaward of the reserve
- e. Relay cultch in a trial area to demonstrate potential benefits of cultching to spatfall
  - i. Mussel and oyster shell will be deposited in a trial area (50.5 hectares) initially to demonstrate beneficial effects of cultching on spatfall and restoration of oyster density. Spat fall in this area will be compared to a nearby area which will not be cultched (Fig 3). The cultch and cultch control areas are intertidal and can be monitored using standard survey methods
  - ii. In the first year of the plan Pacific oyster will be removed from the cultch and control areas.
  - iii. Shell content on the seabed will be estimated prior to and after cultching in the cultch area and in a nearby control area. Spat settlement and survival will be monitored after the spawning season in both areas.
  - iv. This area will be closed to fishing until a proportion of spat settling on the cultch have grown to the minimum size.
- f. Spatial elements of the plan will also take into account the prevalence and distribution of *Bonamia* in the Lough

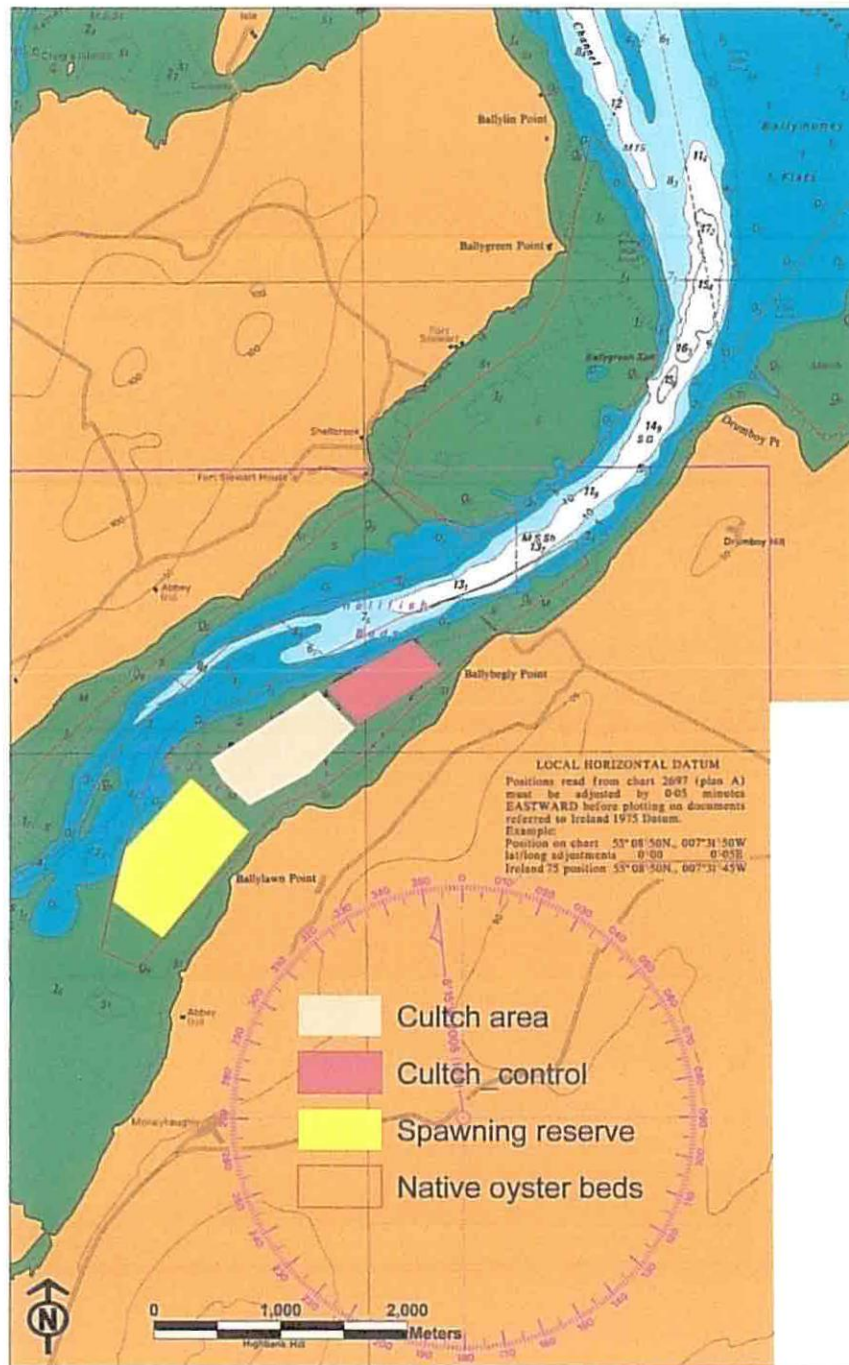


Fig. 3. Location of a proposed spawning reserve, cultch area and a cultch control area for native oysters. The spawning area will be closed to fishing for the duration of the management plan. The cultch area will be closed until spat have reached MLS. The cultch control area will be used to compare spat settlement densities with the cultched area and will be open to fishing.



### 3. Control of *Pacific oyster*

The 2011 survey showed that *Pacific oyster* was widely distributed and in many areas was the pre-dominant species of oyster present on what were previously described as native oyster beds. A control programme for this species is necessary as a first step in re-building native oyster stocks and achieving favourable conservation status for oyster habitat as defined in NPWS (2011). This will be achieved as follows

- a. Develop a spatial control plan (fishery) for *Pacific oyster*
  - i. Allow unrestricted fishing, between Sept and March, in areas where >50% of oysters are *Pacific oyster* (Fig. 4,5) irrespective of the density of native oyster. Areas where *Pacific oyster* are pre-dominant are well defined and it is feasible to target a fishery at these areas. Some of these areas may not have been included in the 2011 survey but are known by fishermen (Fig. 4,5). The area where *Pacific oyster* constitutes more than 50% of oysters is 482 hectares based on the 2011 survey (Fig. 5)
  - ii. All juvenile and adult *Pacific oyster* will be removed
  - iii. This fishery will operate in year 1 of the plan only and will be reviewed at that point
  - iv. Native oysters under the MLS captured in this fishery will be transplanted to the spawning reserve so they are not exposed to repeat dredging
  - v. When *Pacific oyster* is removed from these areas the suitability of the habitat for settlement of native oyster will be assessed and cultch will be re-laid if necessary
  - vi. If the market for *Pacific oyster* is not available the control plan should be subsidised by state grant aid. The members of the co-op cannot fund the control plan in the absence of a market for *Pacific oyster*.
  - vii. Areas where native oysters comprise greater than 50% of all oysters will be subject to the fishery management measures outlined above. All *Pacific oyster* captured in these areas will also be landed.

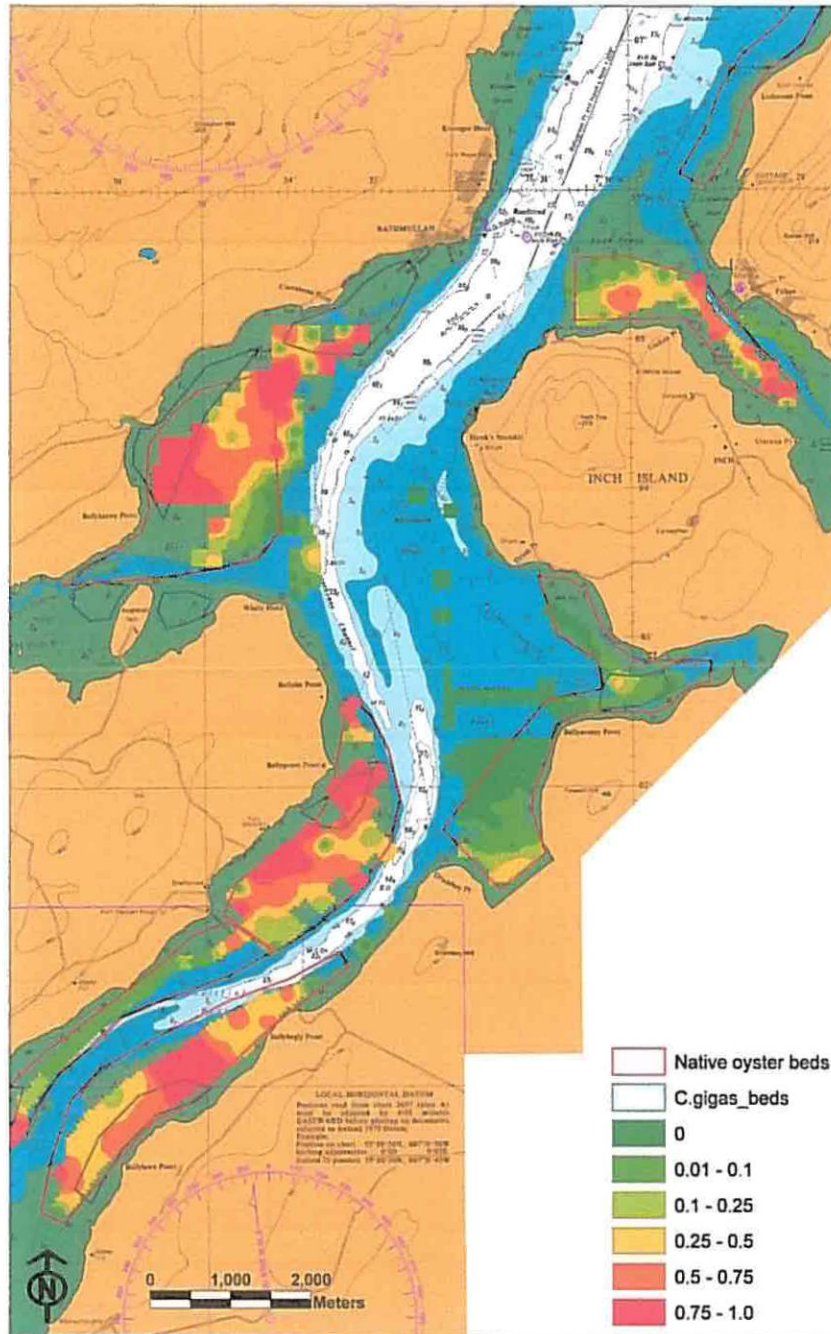


Fig. 4. Distribution of Pacific oyster as a proportion of all oysters present in native oyster beds in L. Swilly as of Nov 2011. Pacific oyster beds known by local fishermen and which were also targeted in a 2010 and 2011 fishery are also shown





#### **4. *Bonamia* monitoring**

- a. The current prevalence and distribution of *Bonamia* in the Lough needs to be established as this will determine the capacity to recover native oyster stocks and the effectiveness of the management measures described here.

#### **5. *Legal framework and governance***

This management plan cannot be implemented under existing regulations in force in L. Swilly. A new legal framework and governance arrangement is needed if the plan is to be implemented. The proposers of this plan, the Lough Swilly Wild Oyster Society Ltd. (LSWOSL), currently have no authority to implement any of the measures outlined although its members support the measures. Some options that could be considered might include

- An annual Statutory Instrument be developed to give legal effect to the management plan and its annual variations
- A range of conditions, outlined in the plan, be included in annual dredge permits issued by IFI
- Give legal authority to manage the fishery to the LSWOS in the same way that other oyster co-ops in the country has legal authority to manage their fisheries in the form of a Fishery Order or an Aquaculture licence
- Any new legal framework should enable restriction on the number of vessels in the fishery. Otherwise the plan is not operational
- In order to promote stewardship of the fishery among licence holders and to provide them with a return on the medium and long term objectives outlined in the management plan the dredge licence should be transferable to first degree relatives

In addition

- Given the special circumstances in L. Swilly regarding *Pacific oyster* and the need to develop a strategic and effective control plan for this species with the aim of removing naturalised Pacific oysters from native oyster beds, a dedicated fishery manager for the area should be appointed for years 1-2 of the plan at a minimum
- Given that Pacific oyster has naturalised in the Lough aquaculture of this species in the Lough should only use triploid, non-reproducing, oysters

## **6. Monitoring and control**

Measures outlined in this plan require effective monitoring and control.

- Effective control and enforcement of landings, minimum landing size, landing points and spatial extent of fishing activity is required.
- All boats will maintain a logbook to identify the quantities and species of Oyster caught and landed and tags utilised and date caught
- All oysters harvested shall be landed at agreed landing points and each and every bag shall be tagged with a tag identifiable back to the individual boat and dredge licence
- Arrangements for the monitoring and control of fishing in areas dominated by Pacific oysters and Native oysters will be agreed annually. The boundaries of these areas may need to be rationalised to enable effective control of fishing activity.

## **7. Review**

Annual review of the measures that have been implemented and their effects, as shown by the improved data provision will be key to the success of the management plan. This will require an integrated approach to management with the management plan objectives at the centre of the review process. The annual review in respect of the Oyster fishery will be led by the LSWOSL with assistance from IFI and scientific and development advice from the Marine Institute and other agencies as appropriate. This management committee will propose amendments and changes to the annual plan and consult with members of LSWOSL prior to proposing any changes to legislation. Specifically the following measures will be reviewed annually

- b. Effectiveness of the Pacific oyster control programme as indicated by landings, catch rates, size structure and estimated density of this species in the controlled areas
- c. Spawning stock biomass of native oyster in the spawning reserve as indicated by survey
- d. Volume of cultch spread
- e. Shell content of habitat particularly in the clutched area
- f. Spat fall density in the clutched area and elsewhere
- g. Catch rates in the fishery and changes in catch rates during the season
- h. Distribution and size structure of native oysters in the Lough
- i. Distribution and size structure of Pacific oysters in the Lough

- j. Prevalance of *Bonamia* in different oyster beds

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