

MACALISTER ELLIOTT AND PARTNERS LTD

SURVEILLANCE VISIT REPORT FOR THE NORTH MENAI STRAIT MUSSEL FISHERY (*MYTILUS EDULIS*)

CERTIFICATE CODES: MEP-F-002/010

SURVEILLANCE YEAR 2

Undertaken by:

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&
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MEP QA REF: 2090R11A



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CONTENTS

1. GENERAL INFORMATION	3
2. INTRODUCTION	4
3. GENERAL OBSERVATIONS	5
3.1. Mussel Production.....	5
3.2. The fishery.....	5
3.3. Seed from Conwy Bay	6
4. OUTSTANDING CONDITIONS AND ACTION PLAN.....	8
5. TRACKING AND TRACING OF FISH PRODUCTS	9
6. CONCLUSION AND CERTIFICATION RECOMMENDATION	10
7. SURVEILLANCE SCORE.....	10
ANNEX 1	12

1. GENERAL INFORMATION

Fishery Name	North Menai Strait mussel fishery			
Unit of Certification	Mussels from bottom culture (wild caught seed) from the northern Menai Strait, Wales, UK, grown by members of the Bangor Mussel Producers Ltd. (BMP Ltd.) with seed fished by mussel dredge from other sites (Morecambe Bay, Caernarfon Bay, Dee estuary).			
Species	European / blue mussel (<i>Mytilus edulis</i>)			
Stock and Area	Seed fishery area: Morecambe Bay, Caernarfon Bay, River Dee (Cheshire / N. Wales) Mussel culture area: Menai Strait, north of the Swellies.			
Method of capture	Mussel dredge			
Client Address and Contacts	Bangor Mussel Producers Ltd. - Myti Mussels Ltd., Extramussel Ltd., Ogwen Mussel Ltd and Deep Dock Ltd. James Wilson c/o Deepdock Ltd Bwthyn-y-mor, Llanfaethlu Holyhead, Anglesey, LL65 4HD Phone/Fax: 01407 730075 mussels@deepdockltd.co.uk			
Certificate number	MEP-F-002 and MEP-F-010			
Certificate Issue Date	26 October 2010			
Certificate Expiry Date	25 October 2015			
Audit stage	Year 1	Year 2	Year 3	Year 4
Audit experts	Auditor 1 (Team Leader): Dr. Jo Gascoigne Auditor 2: Chrissie Sieben			
Surveillance Audit Date	27 September 2012			
Conclusion	Out of two conditions, one was closed out last year, and one is progressing in line with the Client Action Plan.			
Audit recommendation	MEP recommends that the fishery <u>should</u> remain certified for another year.			

2. INTRODUCTION

This report outlines the process and outcome of the second annual surveillance audit for the MSC certified North Menai Strait mussel (*Mytilus edulis*) fishery. The fishery operates by fishing seed mussels from various sources and relaying them on ‘lays’ in the Menai Strait (between Anglesey and Gwynedd, North Wales). The original Unit of Certification (UoC), MSC certified in October 2010 (MEP-F-002), included mussel seed taken from Morecambe Bay in England and Caernarfon Bay in Wales. An assessment has subsequently been undertaken to extend the UoC to also include seed taken from the River Dee. The assessment was completed in May 2012 (see [River Dee PCR](#)) and the UoC extended under MEP-F-010. All the above UoC were covered by the present audit.

The main purpose of the annual surveillance audit process is to determine whether any significant changes have occurred in the fishery since certification and to review progress in meeting the formal conditions as set out in the Client Action Plan (a part of the certification process, see the [Public Certification Report](#) for this fishery). The original UoC was certified with two conditions attached. During the separate assessment of the River Dee UoC, no additional conditions were set. A summary of the conditions is presented in Table 1.

Table 1. Conditions to which certification of North Menai Strait mussel fishery is subject and progress made during Year 1 of MSC certification (as per [Year 1 Annual Surveillance Report](#)).

Condition	Corrective action(s) required
<p>PI 2.2.3 – By-catch species information</p> <p>The fishery needs to collect quantitative or semi-quantitative data on starfish and green crab by-catch at each of the three sites, to show either i) that they typically constitute less than 5% of the catch (i.e. should be downgraded from main to minor by-catch species); or ii) so that the impact of the fishery on local population levels can be better understood and tracked over time.</p>	<p>During Year 1 of MSC certification, the fishery undertook quantitative research on by-catch at Morecambe Bay and Caernarfon Bar. This research was sufficient to conclude that there was no by-catch species that qualified as a ‘main’ by-catch species. Therefore, the condition was considered closed. The seed collection site in the River Dee, which was certified separately (see separate report) scored 80 for this PI and therefore no condition was applied. <u>No further corrective actions are required.</u></p>
<p>PI 3.2.4 – Research Plan</p> <p>The fishery should develop a formal, strategic research plan.</p>	<p>During Year 1 of MSC certification a research plan was drafted and accepted by the Menai Strait Fishery Order Management Association (MSFOMA). The research plan was reviewed and the Year 1 audit team concluded that it was appropriate and sufficient and on target with the Action Plan. Corrective actions to be addressed during Year 2 of certification are discussed in Section 4.</p>

This fishery remains in conformance with the Scope Criteria relating to unilateral exemption and destructive fishing practices (Certification Requirements (CR) v1.2, Section 27.4.4). This fishery is an ‘enhanced fishery’, since it harvests and relays mussels in order to increase their survival. MEP confirms that this fishery remains within scope for MSC certification of enhanced fisheries, as defined in the CR v1.2 (Section 27.4.12).

Stakeholders were informed of the scheduled site visit, its time and location and the proposed audit team on the 28th August 2012. No comments or requests for interviews were received.

The audit was carried out in Bangor, Wales by the surveillance team consisting of Dr. Jo Gascoigne and Chrissie Sieben, on September 27th 2012.

3. GENERAL OBSERVATIONS

3.1. MUSSEL PRODUCTION

Since the last surveillance audit, BMP Ltd. has harvested 7695 t of mussel seed in total, including 975 t from the Dee in late summer 2011, and 6500 t from Morecambe Bay in summer 2012 (this harvesting is still ongoing so the final figure for 2012/13 will be higher). 270 t of seed were also fished from Conwy Bay – this is discussed further below.

Mussel production from the fishery from August 2011 to August 2012 was 7600 t in total (Myti Mussels and Extra Mussels 5500 t; Deepdock and Ogwen Mussels 2100 t).

3.2. THE FISHERY

3.2.1 Changes to management

There have been no significant changes to the fishery (operation or management regime) since the Year 1 surveillance audit. The Welsh Government Fisheries Unit remains in control of inshore fisheries in Wales (since April 2010). As part of the reform of fisheries governance in Wales, the Wales Marine Fisheries Advisory Group (WMFAG), and three new regional Inshore Fisheries Groups (IFGs) have been established around Wales and are intended to involve the key stakeholders in inshore fisheries management. BMP Ltd. regularly attends the North Regional Inshore Fisheries Group. The fisheries management system in Wales is outlined in detail in the Public Certification Report for this fishery (from 2010) and for the River Dee UoC (from 2012).

In previous years, only BMP Ltd. and a few hand-gatherers have fished mussel seed from Morecambe Bay; however, this year for the first time there has been an influx of vessels from Ireland, leading to concerns about management. It has therefore been proposed that a new Fishery Order be put in place, covering both the mussel and cockle fisheries in Morecambe Bay. The Order would give the Northwest IFCA more regulatory powers, allowing adaptive management in response to changes in fishing pressure. The Order is being drafted by DEFRA and is likely to be implemented by the Northwest IFCA in the coming year. The Order may affect BMP Ltd. through the imposition of a license fee per vessel in order to cover the cost of management. The implications and operation of the Morecambe Bay Fishery Order will be addressed once it is in place – most likely during the Year 3 Surveillance Audit.

3.2.2 Undesirable species

During the Year 1 Surveillance Audit, the detection of the parasite *Bonamia ostrea* on European oysters at the southern end of the Menai Strait was flagged up as a potential cause for concern for this fishery. A control zone was subsequently imposed by CEFAS on the Menai Strait and the mussel fishery. However, the infected stock was reportedly completely exterminated and to date no more samples have tested positive for this parasite in the area. Nonetheless, the four-year quarantine period during which export of mussels to any *Bonamia*-free areas is prevented is still in place. This does not, however, impact on BMP Ltd.'s operations.

In 2011, the seed fishery in the River Dee was closed before the TAC was completely exhausted, because of concerns about Chinese mitten crabs in the estuary (following an

anecdotal report to the Environment Agency that a crab had been identified in the area). Following the Code of Good Practice, BMP Ltd. agreed to stop fishing. In Morecambe Bay, there have also been concerns about Chinese mitten crabs in the Duddon estuary. Again following the Code of Practice, following these possible sightings, BMP Ltd. will carry observers on their vessels for all further seed fishing in Morecambe Bay in 2012.

The Chilean oyster *Tiostrea chilensis* has been present in the southern half of the Menai Strait for some 40 years (after being introduced by MAFF as part of a fisheries development project). The population has never been particularly large or dense, but the species has gradually made its way northwards up the Strait and is now present in the northern half (north of the Swellies), not far from the southernmost mussel lays. Although this is not an undesirable species in the sense of having negative ecological impacts, it will potentially pose a problem from the mussel growers because it is not present in the Oosterschelde where their mussels are relaid after export. BMP Ltd. are keeping an eye on the situation.

3.3. SEED FROM CONWY BAY

As noted above, in 2012, 270 t of seed was fished from an ephemeral seed bed in Conwy Bay – the first time for several years that seed has been taken from this area. This seed was fished by Deepdock Ltd. and has been relaid in a separate area pending analysis of the MSC status of this seed. Figure 1 shows the approximate areas concerned.

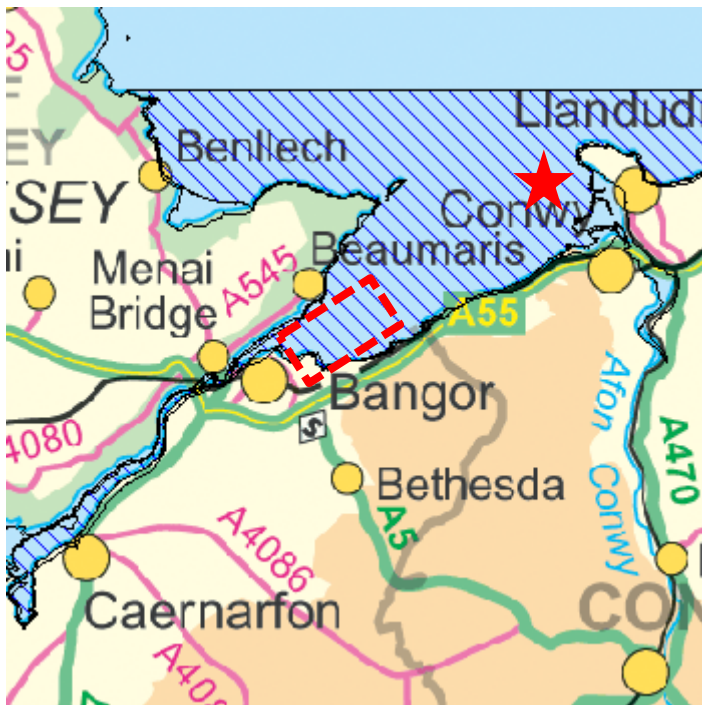


Figure 1. Area of Menai Strait and Conwy Bay SAC (taken from NBN Gateway¹) with the approximate area of the mussel lays in the Strait (dashed rectangle) and the approximate site of seed harvest (red star).

¹ See

<http://data.nbn.org.uk/siteInfo/siteSpeciesGroups.jsp?useIntersects=1&allIDs=1&engOrd=1&srcKey=UK0030202&srcDsKey=GA000327>

Second Surveillance Visit – Report for the North Menai Strait Mussel Fishery

This fishery was originally assessed before explicit requirements for the assessment of ‘catch and grow’ enhanced bivalve fisheries were developed. Since these are now in place, however, the audit team decided to consider Conwy Bay seed collection site within the framework of these new requirements (Annex CK of the Certification Requirements version 1.2). This identifies one of the critical questions for these fisheries as to whether or not there is ‘translocation’ – i.e. movements of mussels outside the immediate vicinity of the area where they are ultimately harvested from.

In the case of the seed collection site in Conwy Bay, the audit team concluded that this did not constitute translocation, for the following reasons:

- The seed collection site is physically close to the mussel lays, and within the boundaries of the geographical / oceanographic / ecological area of the Menai Strait, which is bounded to the northeast by the Great Orme (see Figure 1 and Figure 2 below).
- The seed collection site is within the Menai Strait / Conwy Bay SAC, which also includes the mussel lays (Figure 1).



Figure 2. A view from Bangor pier northeast towards the Great Orme (shown with an arrow), across the area encompassing the mussel lays. The seed harvesting area is between the mussel lays and the Great Orme.

The audit team therefore concluded that taking mussels from this area does not constitute translocation. This means that according to Annex CK, an assessment of Principle 1 is not required. Having concluded that this seed site is i) within the same ecosystem as the mussel lays and ii) under the same conservation management system (the SAC and the wider fisheries management structure), the audit team concluded that collecting seed from this area is in fact identical, with respect to Principles 2 and 3, to the movement and harvesting of mussels within the Menai Strait itself. The audit team therefore proposes that this seed collection area could be added to the UoC without further assessment.

The above rationale was presented in a variation request to the MSC on the 5th October 2012. The proposal was subsequently approved by the MSC on the 19th October.

4. OUTSTANDING CONDITIONS AND ACTION PLAN

The most important role of an annual surveillance audit is to verify that the client is progressing with the implementation of the Client Action Plan, such that the conditions will be met in time for re-assessment after five years.

The one outstanding condition, corresponding action plan and actions undertaken during Year 2 of certification are summarised in Table 2 below.

Table 2. Condition on research plan

PI	3.2.4
Condition	Although this fishery has one of the best records of funding, supporting and participating in research of any fishery known to MEP, a formal, written research plan is required in order to meet the SG80 level for this PI.
Outcome Year 1 Audit	A research plan was drafted and accepted by MSFOMA. The research plan was reviewed and the audit team concluded that it was appropriate and sufficient.
Action Plan Year 2	<ul style="list-style-type: none"> • Keep research issues and priorities under review • Continue implementation of plan • Continue dissemination of results to interested parties.
Actions during Year 2	<p>During the second year of certification, BMP Ltd. have implemented and further built on the research plan approved by MSFOMA in October 2011 (see Year 1 Audit Report). For the 2012 Research Plan (Annex 1), the following research priorities were agreed upon:</p> <ul style="list-style-type: none"> • Water quality • Mussel population dynamics • Seed mussel stocks • Non-target species (discards) • Ecosystem effects • Non-native species/ Biosecurity • Climate change <p>Progress made to date include the following:</p> <ul style="list-style-type: none"> - Water quality: Funding of two ongoing PhD research projects on water quality and partnership with the School of Ocean Sciences (SOS), through the Environment Centre Wales (ECW) and Welsh Water on an EFF-funded project “Human pathogens and shellfish in the Conwy, Menai strait and Burry Inlet (bacteria, viruses and biotoxins)”. - Mussel population dynamics: Commissioning of analysis of mussel genotypes from the Caernarfon Bar, Morecambe Bay and Dee Estuary seed mussel fisheries in cooperation with SOS and ECW. Modelling work has also been undertaken in cooperation with the Centre of Applied Marine Sciences (CAMS). BMP Ltd are also participating in an EFF-funded study on the population dynamics of the strategically important species of the Welsh Fishing Industry, carried out by SOS. - Seed mussel stocks: BMP Ltd. have carried out surveys in Morecambe Bay prior to and after harvesting and have provided the equipment resources to enable helicopter surveys of this area by NW IFCA and Natural England (NE). Surveys of the seed mussel stock in the River Dee at Salisbury Bank were undertaken together with the Environment Agency prior to the 2011 harvest. Surveys were carried out at Caernarfon Bar using sound discriminating sonar and drop-down underwater video prior to the 2012 fishing season – as a result of these surveys, no seed mussels were harvested in this area in 2012. - Non-target species: Having concluded that the fishery is not having any significant impacts

Second Surveillance Visit – Report for the North Menai Strait Mussel Fishery

	<p>on non-target species (see Audit Report Year 1), no further activities are foreseen under this heading except in relation to non-native species (see below).</p> <ul style="list-style-type: none"> - Ecosystem effects: progress is being made to set up a research project in cooperation with NE and Cumbria Wildlife Trust, investigating interactions between the seed mussel fishery and eider ducks in Morecambe Bay. BMP Ltd. are also participating in the Fish Map Môn initiative which investigates the interaction between fishing intensity and the environmental features within spatially defined areas inside Welsh territorial waters. - Non-native species / Biosecurity: i) funding of an ongoing PhD on slipper limpets, ii) commissioning of a management protocol for Chinese mitten crabs, as well as surveying in the Dee Estuary and monitoring of seed mussel catches in the area, iii) establishment of a management and monitoring plan for the carpet sea squirt in cooperation with CCW, Holyhead Harbour Authority and SoS, iv) participation in the LIFE + Pathways Project, a UK/Irish project on the understanding and management of the migration pathways of non-native species. - Climate change: BMP Ltd. is a partner in the SUSFISH project managed at SoS, which is looking at climate change impacts on bivalves in Wales. BMP Ltd. provide data and samples to the project. A similar, complementary study at Swansea University is supported by BMP Ltd. by facilitating sampling. <p>The planned schedule for the above research activities is shown in the 2012 Research Plan presented in Annex 1. For the most part, these research projects are collaborations with academic institutes, so results are disseminated via publication of papers and theses and via talks given at conferences by scientists, students and BMP Ltd. members.</p>
Evidence provided	The draft research plan was provided to the audit team (Annex 1).
Conclusion of audit	<p>From the activities listed above it is clear that BMP Ltd. are continually making progress in implementing their existing research plan in cooperation with third party research institutes. During the audit the client demonstrated a proactive approach towards identifying and implementing new research priorities, some of which are in addition to the scope of MSC certification. The audit team therefore concludes that this fishery's progress against the condition was on target. Ongoing research will be reviewed again at the Year 3 audit, although the audit team felt that BMP Ltd. have amply demonstrated their compliance with PI 3.2.4.</p>

5. TRACKING AND TRACING OF FISH PRODUCTS

As was the case during the initial assessment, nearly all the product from this fishery is exported to the Netherlands, with some onward re-export to France. Less than 100 t were sold on the UK market in 2011/12. BMP Ltd. have some plans to target the UK market in the future, but no concrete actions have been taken as yet.

As noted above, Deepdock Ltd. have relaid the seed from Conwy Bay in a separate area pending finalisation of the MSC status of these mussels (whether Conwy Bay should be considered part of the UoC). Following a variation request, the MSC have approved the audit team's proposal that seed from Conwy Bay should be included without further assessment. Once this decision has also been approved by this fishery's stakeholders, the UoC will be formally modified to also include Conwy Bay.

The team concludes that there were no further changes in this fishery which would affect the chain of custody.

6. CONCLUSION AND CERTIFICATION RECOMMENDATION

The conclusion of the audit for the one remaining condition is given in Table 2 above. The overall conclusion is that BMP Ltd. is on target with progress on meeting the actions listed in the Client Action Plan. MEP recommends that this fishery should remain certified and that seed from Conwy Bay should be included in the Unit of Certification without further assessment.

7. SURVEILLANCE SCORE

In accordance with the Certification Requirements v1.2, the frequency of future surveillance visits was calculated for this fishery. The overall surveillance score is calculated by adding the scores from Table 3 and matching those with the Surveillance Level in Table 4. This fishery's maximum score was calculated at 3 which implies a normal surveillance level with annual on-site surveillance audits. MEP therefore concludes that this fishery is subject to 'normal surveillance'.

Table 3. Criteria to determine Surveillance Score (see Certification Requirements v1.2, Section 27.22.1.1)

Criteria	Surveillance Score	UoC as per MEP-F-002	UoC as per MEP-F-010
1. Default Assessment Tree used?			
Yes	0	2	2
No	2		
2. Number of conditions			
Zero conditions	0	1	0
Between 1 – 5 conditions	1		
More than 5	2		
3. Principle level Scores			
≥85	0	0	0
≤85	2		
4. Conditions on outcome PIs?			
Yes	2	0	0
No	0		
Total Score		3	2

Second Surveillance Visit – Report for the North Menai Strait Mussel Fishery

Table 4. Surveillance level (see Certification Requirements v1.2, Section 27.22.1.3)

			Years after certification or recertification			
Surveillance score (from Table C3)	Surveillance level		Year 1	Year 2	Year 3	Year 4
2 or more	Normal Surveillance		On-site surveillance audit	On-site surveillance audit	On-site surveillance audit	On-site surveillance audit & recertification site visit
1	Remote Surveillance	Option 1	Off-site surveillance audit	On-site surveillance audit	Off-site surveillance audit	On-site surveillance audit & recertification site visit
		Option 2	On-site surveillance audit	Off-site surveillance audit	On-site surveillance audit	
0	Reduced Surveillance		Review of new information	On-site surveillance audit	Review of new information	On-site surveillance audit & recertification site visit

ANNEX 1

Bangor Mussel Producer Ltd

RESEARCH PLAN

2012

Introduction

The Bangor Mussel Producers Ltd (BMP) was formed in 2010 by the four companies that participate in the enhanced fishery/extensive mariculture mussels inside the boundaries of the 1962 Menai Strait East Oyster and Mussel Fishery Order.

Our Members have worked with scientists and regulators for many years to support, facilitate, and participate in research into seed mussel harvesting and mussel cultivation to address the information needs associated with managing the fishery and to work toward a fuller understanding of how the activity of extensive cultivation of mussels interacts within the local ecosystem.

Research has focussed on a number of key areas: the interaction between the fishery and bird populations; the effects of mussel farming on seabed habitats; and the fishery for shore crabs in the Menai Strait area and more recently effort has been directed toward the increasingly topical matter of invasive non native species. The results of this research have been published in peer reviewed journals and as reports to help guide management of the fishery.

BMP remains committed to carrying forward the tradition of stimulating and supporting research that will help to improve the understanding and management of the mussel farming industry in the Menai Strait. Participation in the development and delivery of research is integral to our strategic objective of delivering a science based understanding of extensive mussel mariculture.

In October 2010 the North Menai Strait Mussel Dredge Fishery won MSC Certification. It was the first enhanced bivalve fishery in the world to attain this standard. There were two conditions of certification for the fishery. One of these was to develop a formal, strategic research plan. This document is the second iteration in response to that condition. It sets out our priorities and describes current research underway and also indicates plans for future research into the Menai Strait mussel fishery. It also describes the extent to which BMP has been success in achieving the objectives outlined in the 2011 research plan.

As well as addressing some issues that are relevant to the MSC scheme, this research plan also includes plans for research into issues such as water quality that are not directly relevant to the MSC.

Development of the Research Plan

This research plan has been developed following discussions with fishery managers, such as the Welsh Government (WG) and the North West Inshore Fisheries and Conservation agency (NWIFCA) and statutory nature conservation agencies both in Wales and England, about the information requirements for managing the mussel fisheries in the Menai Strait, Caernarfon Bar and Morecambe Bay.

During 2011, BMP was also been involved in discussions with a multi agency group, including the Environment Agency, CCW, WG and Scientists from Bangor University about research requirements associated with the seed mussel fishery in the Dee Estuary.

These discussions are all part of the ongoing statutory requirements associated with each element of the Menai Strait mussel fishery. They ensure that research requirements are kept under regular review by a wide range of organisations outside the BMP. This in part is associated to the role that BMP plays within the structure of the Menai Strait Fishery Order Management Association (MSFOMA), the multi- stakeholder body that has overall responsibility for managing the activities that occur within the boundaries of the 1962 Fishery Order.

Research Priorities

We have agreed on a suite of research priorities for the different parts of the fishery. These are briefly summarised below.

- Water quality
- Mussel population dynamics
- Seed mussel stock status
- Non-target species
- Ecosystem effects – interactions between seed mussels and other species (especially birds);
- Non-native species
- Dissemination of information – making the results of research available to interested parties.
- Climate change – with focus on oceanic acidification effects

Some of these priorities have little or no bearing on the MSC standard (notably those associated with water quality). Others (such research connected with invasive non native species, target and non-target species) are directly relevant to the MSC standard. Likewise, some of the priorities are only relevant to certain parts of the fishery, while others are relevant to all aspects of it. These relationships are illustrated in **Error! Reference source not found.**

Progress

We have made significant progress with most of our research activities during 2011 and 2012. Key aspects of this include:-

- Water quality
 - We have funded two PhD research projects which are now underway, looking at:-
 - Microbial Water Quality in the Menai Strait and Conwy area (in the process of writing up).
 - Viral contamination in Seawater, Sediment and Shellfish: Protecting human health in Wales (enters year 3 in Jan 2013).

- Working in partnership with the School of Ocean Sciences through the Environment Centre Wales (ECW) and Welsh Water, we secured some £400,000 of European Fisheries Fund (EFF) money for a project looking at:-
 - Human pathogens and shellfish in the Conwy, Menai Strait and Burry Inlet (bacteria, viruses and biotoxins).
- Mussel population dynamics
 - We commissioned analysis of the genotype of mussels from the Caernarfon Bar, Morecambe Bay and Dee Estuary seed mussel fisheries in 2011. The results of this work suggested a high degree of homogeneity within populations. We continue to work with SOS and ECW to develop a more cost efficient and informative suite of genetic analysis tools to use to fine tune the wider appreciation of
 - We have not been successful to date in gaining full funding to develop a PhD project proposal in partnership with the School of Ocean Sciences to study dispersal patterns of mussel larvae in the Irish Sea. We are continuing to work toward the fulfilment of this objective however, following the line of research in conjunction with SOS and the NWIFCA. We have undertaken some indicative modelling work with staff from the Centre of applied marine Sciences (CAMS) utilising some of the complex models created to enable better understanding of the Burry Inlet Cockle population.
 - We are members of the science user advisory group inside the structure of a 3 year EFF study been undertaken by SOS that seeks to develop a wider understanding of the population dynamics of the most strategically important species for the Welsh Fishing industry; mussels being one of these species
- Seed mussel stocks
 - Morecambe Bay - we have carried out surveys, in conjunction with other participants, of the seed mussels in Morecambe Bay before and during mussel harvesting here, and provided the equipment resources to enable two helicopter survey visits to this area by the North West IFCA and Natural England to ensure that the fishery was appropriately managed.
 - Dee Estuary – in partnership with the Environment Agency we undertook surveys of the seed mussel stock at Salisbury Bank in the Dee Estuary before agreeing a TAC and fishing this area. These surveys were undertaken to provide a site specific input into the development of a holistic appreciation of perceived risks associated with the relaying of mussels from the Dee into the Menai Strait in relation to any inadvertent transfer of the Chinese mitten crab, *Eriocheir sinensis*.
 - Caernarfon Bar – surveys were carried out using ground discriminating sonar and drop-down underwater video in early spring and early summer of 2012. No significant seed mussel settlement was observed, and no fishing has taken place here in 2012.

- Non-target species
 - Seed mussel fishery – we commissioned a study of the seed mussel fishery at Caernarfon Bar and in Morecambe Bay in 2010. This has provided quantitative information about the type and quantity of non-target species that are caught in the fishery in these areas. The delivery of this information in 2011 fulfilled one of the conditions laid out for BMP to provide a clearer management understanding within the framework of the MSC certification.
- Ecosystem effects
 - We are still discussing options for progressing research into interactions between the seed mussel fishery and eider duck in Morecambe Bay with Natural England (NE) and Cumbria Wildlife Trust (further to earlier research that we contributed to). Some small progress has been made by NE in this regard, we remain committed to full participation when the development of the project stream has been finalised.
 - We are full & equal partners in the Fish Map Mon initiative, with CCW and other recreational and commercial fishing organisations. This project seeks to garner a better appreciation of the interaction between fishing intensity in spatially defined areas and the impact of that activity on the environmental features evident in situ. The work undertaken through the framework of this initiative is seen by WG as being integral in the development of and ecosystems based framework for fisheries management inside Welsh territorial waters.
- Non-native species / biosecurity
 - Slipper limpets (*Crepidula fornicata*)
 - We have funded a PhD on “*The distribution, spread and impacts of the invasive marine gastropod Crepidula fornicata in Welsh waters*” (Thesis submitted in 2011, not yet published).
 - Monitoring work carried out in the Menai Strait has confirmed that the area is now free of this species
 - Chinese mitten crabs (*Eriocheir sinensis*)
 - We have commissioned the production of a management protocol for this species, a survey of seed mussel beds in the Dee Estuary and subsequently monitoring of seed mussel catches in this area. We have had the opportunity to replicate the use of the framework developed for the River Dee in relation to the mussel seed fishery in Morecambe Bay, due to the discovery in early 2012 of 2 further adult female cmc.
 - Carpet sea squirt (*Didemnum vexillum*)
 - We have worked with the Countryside Council for Wales, Holyhead Harbour authority and scientists from the School of Ocean Sciences to develop a management and monitoring plan designed to contain the spread of this species. As members of MSFOMA we have approved the extending of an offer of financial and physical assistance to CCW as they seek to achieve the laudable objective of eradication.

- LIFE + Pathways project – protecting marine biodiversity and industries by managing non native species pathways. BMP is an industrial partner in this large scale (£3m & 5 year duration) joint UK and Irish project which seeks to develop a better and more applicable understanding of the routes (or pathways) through which invasive non native species migrate to new locations and to better manage and control these routes – due to start late 2012/early 2013

- Climate change
 - SUSFISH – we are part of an industry steering group on this innovative 3 year study on climate change impacts and how these can be determined within the Irish Sea
 - Swansea & Exeter University - NERC funded Ocean acidification project: Industrial participants

Timetable for Research

Our plans for future research are summarised in the table overleaf.

Menai Strait Mussel Fishery: summary of research priorities, progress and plans.

Topic	Relevant to MSC standard	Location				Timetable				
		Menai Strait	Caernarfon Bar	Morecambe Bay	Dee Estuary	2010	2011	2012	2013	2014
Water quality										
Microbial water quality		✓					✓	✓	✓	
Viral contamination		✓					✓	✓	✓	
Human pathogens		✓						✓	✓	✓
Mussel population dynamics										
Genetic monitoring	✓	✓	✓	✓	✓		✓	✓	✓	✓
Larval dispersal	✓	✓	✓	✓				✓	✓	✓
Seed mussel stocks										
Annual stock monitoring	✓		✓	✓	✓	✓	✓	✓	✓	✓

Non-target species										
Initial monitoring	✓		✓	✓		✓				
Establish & implement routine monitoring	✓		✓	✓	✓			✓	✓	✓
Ecosystem effects										
Mussel – bird interactions	✓	✓		✓				✓		
Non-native species										
Monitoring	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Review code of practice	✓	✓	✓	✓	✓		✓	✓		
Slipper limpet PhD	✓	✓				✓	✓			
<i>Didemnum</i> management		✓					✓	✓	✓	✓