Shellfish News

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Cefas

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Highlights:

SAGB UK native oyster restoration workshop
A workshop, funded by the European Fisheries Fund and the SeaFish Industry Projects Fund, on restoration of native oysters, was held in March at Fishmongers' Hall. Representing the wide range of interests that this subject attracts.

Shellfish production 2010
A summary of farmed shellfish production in the United Kingdom in 2010. The article includes an analysis of previous and current trends.

Water quality workshop
The Cefas-Environment Agency-SAGB sponsored workshop took place on 2-3 November 2011 at Cefas. Around thirty people attended over the two days from a wide range of UK organizations, together with some overseas guests with specialist knowledge of chemical water quality and shellfish.

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Aquaculture reducing poverty and improving food security

Aquaculture is the world's fastest-growing source of animal protein and currently provides nearly half of all fish consumed globally, according to a recent report published by FAO.

The report 'World Aquaculture 2010' found that global production of fish from aquaculture grew more than 60 percent between 2000 and 2008, from 32.4 million tonnes to 52.5 million tonnes. It also forecasts that by 2012 more than 50 percent of the world's food fish consumption will come from aquaculture. More details, with a link to the report, at: www.fao.org/news/story/en/item/94232/icode/

For a Seafish summary on this report see: www.seafish.org/media/publications/Seafish-Summary_FAOAquaculture2010_201112.pdf

The FAO has also recently published seven technical documents on aquaculture which are of global relevance, namely: one Global Synthesis of Aquaculture Development Status and Trends; and six Regional Reviews, including Europe, of Aquaculture Development, Status and Trends. See www.fao.org/fishery/regional-aquaculture-reviews/aquaculture-reviews-home/en/ for links to these documents.

For a summary of the FAO Europe Regional Review 2010 (Aquaculture) see: www.seafish.org/media/publications/SeafishSummary_FAOAquacultureEurope2010_201112.pdf.

CFP reform will help EU aquaculture expand

In October last year Marine Scotland hosted the 2nd Annual UK Aquaculture Forum in Brussels. In a speech marking the start of the forum, Struan Stevenson MEP, Senior Vice President of the European Parliament's Fisheries Committee, argued that the reform of the Common Fisheries Policy will boost opportunities for UK fish farmers to grow exports to developing markets.

More details at: www.fishnewseu.com/latest-news/world/6762-cfp-reform-will-help-euaquaculture-expand-globally-says-stevenson.html.

New marine plan areas to be announced this summer

The Marine Management Organisation (MMO) are pleased to announce that the next marine plan areas will be confirmed in July 2012, as work on the current plan areas continues.

The current plans – covering an area from Flamborough Head to Felixstowe – are expected to be in draft form by the end of 2012, and the MMO will start work on the next marine plans in October this year, following the announcement in July. They have already begun working with stakeholders in the future plan areas so are well prepared for the challenges ahead.

More information at: www.marinemanagement.org.uk/news/news/120330.htm.

Marine spatial planning

EU Commissioner Maria Damanaki addressed a conference on Maritime Spatial Planning in Brussels in March this year, highlighting the need for planning to help co-ordinate the increasing use of Europe's seas. She is convinced that we need to think in terms of more, not less aquaculture: "this industry can and indeed must grow in Europe, if we are to meet the rising demand for fisheries products and make the catching sector more sustainable." More information at: http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/12/224.

EU Maritime and Fisheries Fund

The European Commission has proposed a new fund for the EU's maritime and fisheries policies for the period 2014-2020: the European Maritime and Fisheries Fund (EMFF). This new fund will replace the existing European Fisheries Fund (EFF) and a number of other instruments. Maria Damanaki, European Commissioner for Maritime Affairs and Fisheries, has said that aquaculture will be given a real financial boost so that it can bring growth and jobs to Europe's coasts, and that new forms of aquaculture, with high growth potential, will be promoted.

Further information at: http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/12/170&format=HTML&aged=0&language=EN&guiLanguage=en.

Major new award for sustainable fish and shellfish management

The European Union's INTERREG IVA Programme, managed by the Special EU Programmes Body (SEUPB) has provided funding of approximately £6 million to establish a new cross-border and inter-regional project, with a total investment of over £8 million, that will help to protect aquatic resources across Northern Ireland, the Border Region of Ireland and Western Scotland. The project creates a unique partnership of aquatic research expertise from the University of Glasgow and Queen's University, Belfast (QUB) under the leadership of the Loughs Agency, the statutory cross-border body for the Foyle and Carlingford catchments.

The Project aims to deliver 70 years of applied research through doctoral and masters research, 16 Continuing Professional Development courses, the first of which has been completed, and 12 Knowledge Transfer workshops between now and June 2015. This will ensure that the project leaves a legacy of expertise, skills and models relevant to the sustainable management of aquatic resources in the three jurisdictions. Research, education and training will be provided at The Scottish Centre for Ecology and the Natural Environment (University of Glasgow) SCENE on Loch Lomond and at the Marine Laboratory in Portaferry (Queen's University).

Four PhD projects have already started, including one on management strategies for improving yield of mussels in benthic cultivation and one on environmental and commercial sustainability of native oysters. Both of

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these will be based at QUB. Nine more will be advertised shortly.

The ethos of IBIS is to aid economic development in an environmentally sustainable manner within the INTERREG IVA programme area through evidence-based management of aquatic resources. The data generated will enter the public domain through the statutory agencies, and will be made available to stakeholders through Knowledge Transfer workshops.

The first Knowledge Transfer workshop will be held in Portaferry, Northern Ireland on 13th and 14th September and will have a distinct shellfish theme, with sessions on oysters and mussels.

Further details on this can be obtained from d.roberts@qub.ac.uk.

French shellfish seminar

The European Aquaculture society (EAS) held a workshop on shellfish aquaculture in Bordeaux in February. The event addressed the future of shellfish aquaculture and was targeted at shellfish farmers, aquaculture associations, government representatives, research institutions, research funding agencies and other stakeholders in the sector.

Further information is available at: www.eatip.eu/Default.asp?SHORTCUT=542.

Janet Brown, who attended this meeting, has written a report in the March 2012 issue of The Grower, available at: http://assg.org.uk/cgi-bin/download.cgi.

Shellfish safety

Delegates from across Europe met at the NAFC Marine Centre recently to hear the results of the project 'Warning of Algal Toxin Events to Support Aquaculture in the Northern Periphery Programme Coastal Zone Region' (WATER) that was initiated to reduce disruption to the shellfish industry through establishing advanced testing technologies for the analysis of algal blooms. The project has succeeded on two counts: firstly by identifying two rapid assay tests that can be successfully used; and secondly in proving that a link does exist between algal blooms and wind direction and sea temperature, based on a case study conducted over the summer at Busta Voe, Brae, Shetland.

Further information at: www.nafc.ac.uk/Water-project-succeeds-in-finding-ways-to-project-.aspx.

Red Tide Research

A project is running in Spain with the objective of reducing the impact of toxic episodes on shellfish cultivation, using a multidisciplinary approach, encompassing studies of epidemiology, toxicology, genetics, accumulation and depuration of toxins. The project will also develop new analytical techniques.

Further information from the EPITPOX project website (in Spanish) - www.epitox.es.

EFSA assesses control options for norovirus in oysters

The European Food Safety Authority (EFSA) Panel on Biological Hazards (BIOHAZ Panel) concludes in its risk assessment that the most effective public health measures to protect consumers from exposure to norovirus in oysters are to produce oysters in areas which are not contaminated or to prevent contamination of mollusc production areas.

Further information at www.efsa.europa.eu/en/press/news/120117.htm.

Coral and mollusc responses to acidified oceans

Coral and mollusc species with an outer layer of protective tissue are more able to withstand acidic seawater than some other species, according to a recent study. However, higher temperatures projected under climate change are likely to worsen the impact of ocean acidification on coral and molluscs, even affecting those that are otherwise resistant to higher levels of acidity.

More details at: http://ec.europa.eu/environment/integration/research/newsalert/pdf/269na1.pdf.

Exmouth mussels enter MSC assessment

Exmouth's award-winning mussel fishery has entered MSC assessment. If successful, mussels from the fishery will be able to add the MSC's Certified Sustainable Seafood eco-label to their host of awards. The fishery is based in a Site of Special Scientific Interest, a Special Area of Conservation and a National and Local Nature Reserve.

Owner Myles Blood Smyth hopes that the assessment will help bring local people a greater understanding of the mussel fishery and its interactions with the local environment.

More details at: www.msc.org/newsroom/news/award-winning-exmouth-mussels-enter-msc-assessment?fromsearch=1&newsquery=exmouth&year=&month=&isnewssearch=1.

Shrimp Fishery Advisory Working Group (SFAWG)

An inaugural meeting was held on the 17th February 2012 in Kings Lynn to formulate a group who will oversee and provide liaison for the process of achieving full Marine Stewardship Council (MSC) accreditation for the Brown & Pink Shrimp fisheries off the East Coast of England.

Members of the group are:

- Processors (John Lake Shellfish Ltd and Lynn Shellfish Ltd) (2 places)
- Skippers (2 places)
- Natural England (1)
- Marine Management Organisation (1)
- Eastern Inshore Fisheries and Conservation Authority (1)
- CEFAS (Andy Lawler) (1)
- Spindrift Marine (Jessica Woo) (1)
- Alert 2020 Services limited (David Guy) (1)

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Purpose
The group will provide oversight and liaison on the development of management measures applicable to the Brown and Pink Shrimp fisheries off the East coast on England with the aim of achieving full MSC accreditation for these fisheries.

A new company has been formed "Shrimp Producers Organisation Limited" to run the accreditation through.

The newly appointed Chair David Guy of Alert 2020 Services Ltd said "being voted in as Chair of such an important group is a great honour for me, and I take on this responsibility very seriously", "this is an exciting time for us all and we look forward to working through the process to achieve the final goal of Full MSC Accreditation for both Pink & Brown Shrimps independently" "Jessica Woo has started work on the project plan and we will work through that plan to completion". "I would like to thank the Eastern IFCA for their support in providing a meeting venue and critical fishing activity information"

"We have a wealth of knowledge within the group including Andy Lawler (Cefas) who was involved in an extensive seven year study of the pink and shrimp pink fisheries in The Wash and adjacent areas starting in the mid 1990s and is a member of the ICES Crangon working group, this provides an excellent footing to base this project on"

Further information from Alert 2020 Services Ltd, David Guy 07980 591631, davidguy2020@gmail.com.

Do you need SALSA?

Demand for locally or regionally sourced products is on the increase - despite the current economic climate. The local sourcing challenge has now been taken up by many of the UK's major buyers including supermarkets, foodservice and catering suppliers, local authorities and health trusts. Many of these see local sourcing as major priorities. Growth in local sourcing initiatives has reinforced the need for a robust and effective Food Safety Certification Scheme which is more appropriate for smaller food producers and processors than the BRC Global Standard.

SALSA (Safe and Local Supplier Approval) was developed specifically for buyers and smaller food producers who need to demonstrate that they operate to standards that are recognised and accepted across the industry and exceed the minimum standards expected by enforcement authorities.

Seafood businesses wishing to gain SALSA approval can apply for support from Seafish towards the cost of mentoring and training.

For more information see: www.salsa-food.co.uk/index.php.

Irish mussels enter MSC assessment

Mussel fisheries representing the entire bottom grown mussel landings of Ireland have entered the Marine Stewardship Council (MSC) assessment. The cross-border fisheries from Northern Ireland and the Republic of Ireland cover both collection and cultivation and together produce over 40,000MT of mussels each year. The mussel fishery includes both mussel seed collection and relaying and on-growing. Seed collection takes place off the east coast of Northern Ireland and the Republic of Ireland using dredges designed to skim the upper layer of mud that gathers around aggregations of juvenile mussels with minimal impact to the underlying seabed.

Further information at: www.msc.org/newsroom/news/irish-mussel-fishery?fromsearch=1&newsquery=irish+mussels&year=&month=&isnewssearch=1.

Dutch oysters enter MSC assessment

The Dutch Oyster Association has started its assessment against the internationally recognised MSC standard for sustainable fishing. If successful, their two fisheries will be able to display the MSC ecolabel on their products. The two species targeted, Native Oyster (*Ostrea edulis*) and Pacific Oyster (*Crassostrea gigas*) will be assessed at the same time. Both fisheries rely on enhancement of oyster stocks – a Catch and Grow (CAG) system.

Further information at: www.msc.org/newsroom/news/dutch-oyster-fisheries-enter-marine-stewardship-council-assessment?fromsearch=1&newsquery=dutch+oyster&year=&month=&isnewssearch=1.

World Aquaculture Conference

This will be held in Prague, on September 1st-5th 2012.

Full details are available at: www.was.org/WasMeetings/meetings/Default.aspx?code=Aqua2012.

New Aquaculture Modern Apprenticeship Frameworks

Scotland's employers and learners can now benefit from a newly developed level 2 and a fully revised level 3 Aquacultural Modern Apprenticeship framework, created by Lantra Sector Skills Council.

More details, with further links, are available at: www.lantra.co.uk/News-Media/News/New-Aquaculture-Modern-Apprenticeship-Frameworks.aspx.

Sea Urchins

A novel, intensive, land-based system for culturing sea urchins has been developed over the past eight years in Ireland. It has been thoroughly assessed in both the laboratory and at independent commercial tests.

Further information at www.fis.com/fis/techno/newtechno.asp?id=47357&l=e&ndb=1.

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Spider Crabs

The Institute of Agrifood Research and Technology (IRTA) in Spain has started new research aimed at successful cultivation of the Mediterranean spider crab, a highly valued and over-exploited species.

For further information see www.irta.cat/en-us/RIT/Noticies/pages/Cultiu_comercial_cranca.aspx.

Crustacean shells as a raw material for chemicals

The EU-funded ChiBio project is aiming to develop new methods of producing specialty and fine chemicals from chitin-rich fishing-industry waste. Currently, more than 750,000 tonnes of crustacean shells go to waste in the EU every year.

Further information at www.igb.fraunhofer.de/en/press-media/press-releases/2011/chibio.html.

Industry News

SEAFISH

Seafish social media

Seafish blogs on pertinent issues. Seafish staff have been sharing their commentary and insight on pertinent seafood issues. To keep up-to-date see: www.seafish.org/about-seafish/seafood-blog.

Seafish continues to develop strategies regarding its website and social media presence (Facebook www.facebook.com/seafood2aweek and on Twitter twitter@seafishuk and twitter@seafood2aweek.

Supporting the shellfish supply chain

Training

South West Apprenticeship Group launched 14 March 2012
The Duchy College and Seafood Cornwall have begun their active support of the delivery of fish and shellfish apprenticeships in the South West. With support from Seafish, this partnership of fish and shellfish skills with funding and apprenticeship expertise is aiming to be a model of success for the rest of the UK. Employers in the region are already showing a keen interest in the apprenticeship, and several attended the fact-finding event on the 14 March. If you would like to know more about these apprenticeships, please contact Phil Palfrey of Seafish, Sarah Crosbie of Seafood Cornwall Training or Emma Pate of Duchy College.

Bivalve Purification Training for Food Inspection Officers
In a new collaboration, Seafish and the Food Standards Agency have joined forces to train Food Inspection Officers from up to 32 Local Authorities in the UK. They will attend a two day training programme in Bivalve Purification Operations and Inspections at which they will learn more about this important sector and how to carry out proportional and balanced inspections of purification and despatch centres. These two one-day training programmes are part of a range of training courses developed by Seafish and available from the Scottish and Southern Shellfish Training Centres. To find out more, please email academy@seafish.co.uk

Level 3 Fish and Shellfish Qualification for supervisors and managers
Seafish, in collaboration with seafood employers and Improve Ltd, are to develop a Level 3 qualification framework for the processing, retailing and foodservice sectors. Work is expected to begin with industry consultations during March 2012, and to quickly conclude with the accreditation of a qualifications framework that will see supervisors and managers able to access funding through the various apprenticeship initiatives later this year. If you are an employer and would like to be consulted over the design of this qualification, please contact Lee Cooper l_cooper@seafish.co.uk.

Fish quality assessment training courses
A two/three day Intermediate fish quality assessment training course has been developed to complement our half day Introductory and five day Advanced courses. For more information, please visit the Seafish website or email academy@seafish.co.uk.

Marketing support

Langoustines nutritional information
Seafish funded a research project on nutrition and health benefits of langoustines. The work was undertaken by the Institute of Food Research and commissioned by the Shellfish Association of Great Britain. A copy of the factsheet is available from the Seafish website - www.seafish.org/media/Publications/SIPF0013_SAGB_Langoustines_nutrition_factsheet.pdf.

Seafish market insight services
Seafish provides regular overviews and reports on retail sales and import and export data, and can also produce bespoke retail searches for industry. For further information contact Richard Watson at r_watson@seafish.co.uk.

Information

Seafish Responsible Sourcing Guides
Seafish has up-to-date Responsible Sourcing Guides on cold water prawns, crabs and lobsters, and mussels, and will shortly be introducing a guide to warm water prawns. See: www.tinyurl.com/seafishrsg.

Monthly aquaculture e-alert
Seafish produces a monthly aquaculture news bulletin highlighting news, legislation and reports affecting the aquaculture sector. To subscribe contact Karen Green at k_green@seafish.co.uk.

Further information

Please contact Karen Green
Email: k_green@seafish.co.uk
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Industry News

Shellfish Association of Great Britain (SAGB)

David Jarrad

The small SAGB team have had a busy time recently.

A major change occurred for the Association in September 2011, with the first restructure of membership categories in over forty years. We now have a category for the entire industry from sea to plate, including any associated supply industries (bags, nets, consultants, laboratories etc), many offering SAGB member discounts, as well as a 'Restaurateur Membership' for catering outlets and a 'Seashore Membership' aimed at the general public who have an interest in all things shellfishy!

The first six months have proved successful, in that, the vast majority of members have renewed their membership in their new categories. The breakdown of membership (as renewed in the first 6 months of the new categories) is as shown on the figure.

In these figures we also welcome an additional 30 new members.

Thanks are due to all members for renewing/joining, as they recognise the importance of the SAGB and the activities that it undertakes for the entire industry. Many of these activities are 'below the radar' and as such are challenging to promote. It is well understood that we represent members in specific tasks, relevant to their particular business, be it dealing with local environmental health departments, nature conservation agencies, planning/rating authorities, Food Standard Agency, etc – who may have misunderstood the operation/application or occasionally just 'got it wrong'.

These SAGB activities are apparent and openly known about.

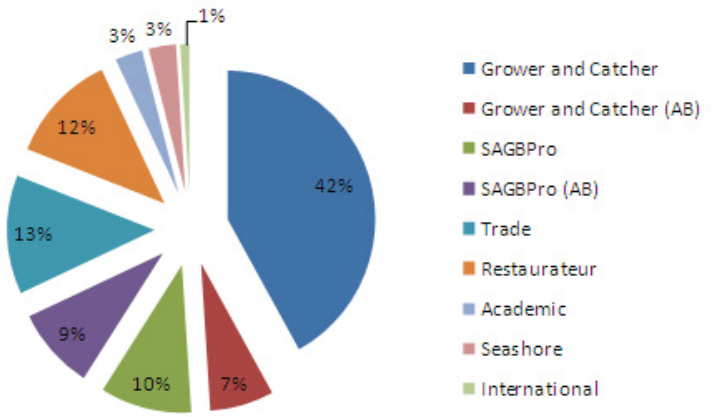
In addition there are more tangible benefits of membership with discounts, already negotiated, on:

- Commercial insurance (guaranteed 10% off existing commercial policies),
- Credit card acquiring (reductions in the percentage paid to the credit card companies),
- Microbial analysis (*E-coli*, Norovirus as well as toxins) for all species by a number of independent laboratories,
- Legal advice (in Marine Law),
- Purification equipment

and more…we are in the process of negotiating further discounts on:

- Transportation of products,
- Debt collecting services,
- Banking and further financial services.

However what is less well understood are the activities the SAGB undertake that are less visible, such as representing the industry in Europe, via EMPA, the European Mollusc Producers Association. When any new EU legislation is suggested EMPA have a voice direct with the commission and are able to represent the industry, together with



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Shellfish Association of Great Britain (SAGB)
David Jarrad

our European compatriots. In this manner our voice is heard!

Currently EMPA is heavily engaged with the EU Commission on the new European Marine Fisheries Fund, (the replacement to EFF), the problem with Norovirus in shellfish growing waters and the repealing of the Shellfish Growing Waters Directive by the Water Framework Directive and the setting of microbial standards in growing waters.

Our work with the FSA is generally also 'hidden'. We regularly meet with them to discuss generalities, such as, amongst others, the Cadmium in Crab issue, sampling regimes in differing products, Classifications and the operation of Sanitary Surveys.

Further 'hidden' work includes liaising with Defra, Cefas, MMO, EFF, Statutory Nature Conservation Agencies, IFCA's, JNCC, the Non Native Species Secretariat, The Crown Estate, Seafish, Gangmasters… and more!

The SAGB plays a vital role in all of these issues which is recognised by our members and it is suggested that all non-members should consider joining – for the benefit of the entire industry.

Further details of membership can be found on the website www.shellfish.org.uk or contact the Director, David Jarrad on 0207 283 8305

SAGB Appeal

This was launched by our Chairman, Dr Bannister, last May. The fund is growing, to help shore up the financial base of the association.

Thanks are due to all those who have donated, however we have a long way to go to reach our target of £100,000 so please consider donating!

On-going Projects

The following projects are now underway or completed:

- iPhone App. This was to develop an iPhone application, the Great British Oyster Tasting Guide. This is an electronic version of our Tasting guide leaflet that permits the user to browse differing oysters and tastes, whilst in the restaurant waiting for the waiter to take their order. Please visit: http://itunes.apple.com/mu/app/id458321474?mt=8
- Nephrops Nutritional Data. The research has now been concluded into the nutritional data and the new fact sheet has now been produced. Initially it will be available on the website, however the funds for the printing of this are being sought.

- Native Oyster Workshop. The object of this workshop (on 26th March 2012) was to facilitate best-working practice, networking and 'cross-fertilisation' of ideas between all those involved in native oyster restoration. The workshop consisted of a series of short presentations on on-going and planned work on the restoration of the native oyster followed by breakout discussion sessions, culminating in a conclusion discussion chaired by Dr Colin Bannister. – a full report of the workshop is elsewhere in Shellfish News.
- 'How to' films. Following the success of the 'How To' films on the You-Tube website (Scallops, Oysters, Langoustine, Cockles, Clams, Whelks, Mussels), this project was to enlarge the number of species available. The new films now include Crab, Lobster, Squid, Coldwater Prawns, Octopus, Crayfish and Cuttlefish. At the time of writing the entire You-Tube suite of videos have been seen 252 395 times! All videos available at www.youtube.com/user/ShellfishGB.

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Shellfish Association of Great Britain (SAGB)
David Jarrad

- Gigas 'issue' paper. This could be argued to be the most important project on the table. The status of gigas oysters in the UK is in question. Under the Water Framework Directive they have been labelled as 'Non Native Invasive Species'. This can (and already has in some cases) restrict the use of the species in the UK. The issues paper will help the Defra minister to decide what action to take and this will have significant impact on the future of the oyster cultivation industry. Bournemouth University is carrying out the research and the writing of the paper. The project started in November 2011 and is due to be completed by the Summer of this year. SAGB has been instrumental in sending out questionnaires to cultivation operators and is on the steering group.
- National Cockle Forum. Following years of mortalities in cockles around our coasts, the subsequent management of cockle beds by the IFCA's and the advice and restrictions placed on the industry by the Statutory Nature Conservancy agencies, we have decided that a forum consisting of industry scientists, regulators and environmental advisors will further the understanding of all perspectives. It is intended that this will occur in the early Spring of 2012.

Over the past few years the SAGB has produced a number of leaflets, factsheets and recipe booklets. (all available on the website) These have been received very well and demand has been strong.

However this still causes a dilemma as unfortunately stocks of these are now running very thin. Regrettably the SAGB is not in a position, yet, to have more printed – any thoughts or offers?

The 43rd Annual Conference, Dinner and AGM

Date - 22nd and 23rd May 2012.

With the key note speech being delivered by the fisheries Minister, Mr Richard Benyon, followed by presentations from Seafish, the MMO, North Norfolk Flag, SSMG, FSA, The Crown Estate and Seafood Scotland the programme is full to bursting! Two further presentations will be given on a new festival this year 'Crabstock' (www.thereallyinterestingcrabcompany.co.uk/crabstock) and a talk by Monty Halls, TV presenter and the Fisherman's Apprentice.

An annual event NOT to be missed!
The full programme can be found at www.shellfish.org.uk/SAGB_Publications.php?thisfolder=12.

Industry News

Association of Scottish Shellfish Growers (ASSG)

Janet H Brown

ASSG is a partner in the Seafood in Schools Programme which aims to educate schoolchildren about seafood, where it comes from, what it is and why it is good to eat. Walter Speirs, ASSG chairman and the other members have been very busy working with this in schools, ensuring the market for shellfish remains healthy in the future.

The future of the ASSG itself is under discussion since the introduction of tiered funding according to production probably just highlights to a more stark extent just how much the non-members are being subsidised. The fact that the oyster growers are signing up in greater numbers than mussel farmers probably reflects the greater regulatory pressures they have been feeling recently with questions raised over the status of *Crassostrea gigas* as a suitable culture species, and the norovirus issue. Problems remain with oyster spat supply and ASSG continues to work behind the scenes for solutions to this problem.

Spat supply has also been a problem for mussel growers and a workshop to scope the extent of the problem of lack of settlement or of subsequent loss from the lines was held at SAMS, Oban funded by The Crown Estate. Prompted by these concerns the ASSG newsletter, The Grower, now boasts a new columnist, the mussel culture authority, Dr John Bonardelli and there is discussion ensuing as to whether a workshop with him could be arranged as part of this year's conference in Oban in October.

ASSG is partner in a number of other projects that aim to provide benefit to shellfish growers and consumers in the long term. BEADS looks at possible methods of neutralising algal toxins using bacteria and MusselsAlive explores methods of reducing stress in mussel during the marketing process including depuration.

Another practical benefit organised for shellfish growers was a workshop held at Loch Fyne Oysters. David Attwood of LFO had invited Leon and Carol Stott and Garry Thompson of SEAPA to explain their method of suspended oyster cultivation and to demonstrate their products. This was generously hosted by Loch Fyne Oysters who also provided a sumptuous lunch including platefuls of oysters farmed in different parts of the West coast of Scotland by growers attending the workshop. All were voted delicious and added weight to the closing remarks of Australian oyster farm Leon Stott - "don't worry about overproduction – there is always demand for fresh oysters" - totally believable when served oysters like this. If there is a real interest in such methods this could be where the concerted power of the ASSG could help.

Participants at the Loch Fyne workshop examine the oyster baskets on display (Photo: Janet Brown)

For further information on activities of the ASSG please visit our website at www.assg.org.uk.

And see *The Grower*, the newsletter of the ASSG published quarterly.

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SAGB UK native oyster restoration workshop
Report by Ian Laing, developed from a short article by Janet Brown in 'The Grower'

A workshop, funded by the European Fisheries Fund and the SeaFish Industry Projects Fund, on restoration of native oysters, was held in March at Fishmongers' Hall. There were around 60 participants, representing the wide range of interests that this subject attracts, including industry, wildlife conservation, government, and research bodies.

Dr Colin Bannister, chairman of SAGB opened the meeting and chaired the day's event.

David Palmer of Cefas was the first speaker, giving an overview on both historic and biological aspects. He clearly outlined the problems that this species has endured over the years, especially over-exploitation, adverse water quality, pests and diseases, and showed the effect this has had on populations and commercial production.

Antony Jensen of Southampton University next talked about some of his recent scientific studies with this species and of his recent finding that the proportion of female native oysters in the Solent is only 14%. Traditionally, and in other areas, the sex ratio is believed to be much closer to 1:1. It is not clear what is casing this but endocrine disruptors may play a part. He felt that more research is needed on what controls determination of gender, on larval behaviour and on the associated ecosystem issues. Antony also introduced a couple of the themes for the later discussion. That is, should restoration be to improve the fishery, restore the habitat, or both and what are the most appropriate methods, especially in an area as large as the Solent. Such is the complexity of the issues surrounding the decline of the Solent Fishery that it is hoped to hold a separate meeting devoted to this area later in the year.

Helen Stevens of Natural England spoke on the legal basis for restoration, drawing attention to potentially greater opportunities arising from the advent of Marine Conservation Zones. She developed the theme of what is the most appropriate method, agreeing that introducing broodstock into undisturbed areas was potentially successful and that this had worked with other oyster species elsewhere. Helen also spoke of the need to work with all stakeholders to ensure full engagement in a restoration project.

This theme was taken up by the next speaker, Belinda Vause, who talked about the promising initiative in Chichester Harbour (CHOPI). This is a recent (2010) development with the aim of reviving the population in the Harbour. Three closed to fishing areas have been stocked with broodstock, at 30 per square metre. Monitoring has shown that breeding is taking place. Future management of the resource to ensure sustainability will be agreed collectively. Dai Roberts, from the floor, emphasised the importance of developing trust between industry and regulators. He said that it can take time but has been shown to work with, for example, the lobster V-notching schemes.

Antony Jensen addresses a packed audience at Fishmongers' Hall (photo: Janet Brown)

Experience from three other native oyster areas was also shared at the meeting. Paul Ferris described the Fal fishery, which has been regulated since the 1860s. The restrictions on the use of power, together with a minimum landing size and a closed season has kept the fishery active with very little intervention, other than some fattening of under-sized oysters harvested and some harrowing and removal of slipper limpets. Tristan Hugh-Jones presented his success story with restoration of the Loch Ryan Fishery over the last 16 years. Here the harvest rate is restricted, currently to about 30 tonnes per annum, from an estimated biomass of 60 million oysters. Any small oysters caught are restocked at high density. The area benefits from being free of disease and under exclusive management control, ensuring that no stock is moved into the area from elsewhere, reducing the risk of introducing pests and diseases. He also spoke about his work with developing Bonamia resistance in the oyster

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SAGB UK native oyster restoration workshop

ponds in Cork and involvement with the Oysterecover Project (see http://oysterecover.eu/ for more details). Richard Haward and Alan Bird of the Blackwater gave presentations from the perspective of an area managed through a Several Order. They spoke about the recovery since massive mortalities in the extremely cold 1962/63 winter. The industry are working together, to an agreed plan, funding for which is coming from the Pacific oyster fishery that is currently increasing through natural recruitment.

A common theme in all these presentations was that recovery of native oyster fisheries is a long term process.

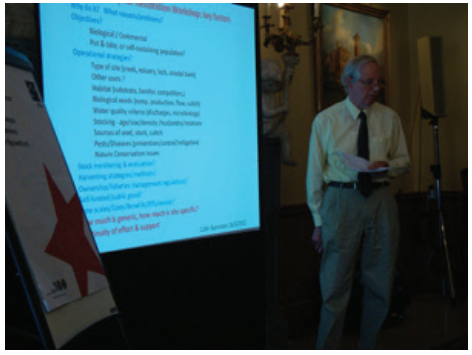
Janet Brown made a case for restoration of oyster reefs which she argued had been lost sight of in the intensive management of the fisheries that oysters have endured for 150 years, with potential benefits for biodiversity, ecosystem services as well as the oyster populations themselves. She opened her talk by saying she was firmly on the side of aquaculture to produce the shellfish to market, not restoration to produce new competitors for our markets.

Three groups formed to discuss the various issues after lunch. All were firmly in favour of restoration and there seemed an understanding that restoration for commercial fishery and for biodiversity benefits need not be in competition. Everyone seemed to agree that it had been a very worthwhile event and an opportunity to maintain some momentum for oyster restoration.

Full details will be made available on the SAGB web site as all speakers will be providing a summary of their talks and this should be available shortly.

Hauling native oysters by hand from a sailing boat – this method is still used in the Fal fishery

Could native oysters be restored to the Firth of Forth?



Colin Bannister, chairman for the day, presents his summary (photo: David Jarrad)

Articles

Factors affecting the microbial quality of shellfish

Carlos Campos, Ron Lee, Simon Kershaw, Owen Morgan (Cefas)
John Crowther, David Kay (CREH)

Background

During filter-feeding, bivalves accumulate bacteria and viruses from the water column which can be pathogenic to humans. These pathogens are commonly introduced into the marine environment via runoff from land affected by livestock farming and the discharge of sewage from sewage treatment works (STWs) and intermittent discharges (IDs) (combined sewer overflows, storm overflows and emergency discharges) to watercourses within the catchment or directly to the fishery. The accumulation of microbial contaminants by shellfish is not only a human health issue but also an indication of the health status of the ecosystem as a whole.

Over recent decades, UK water companies have made substantial investments to reduce the impact of sewage discharges and diffuse pollution from agriculture on the quality of shellfish waters.

In 2009, Defra funded an investigation of the sanitary profiles of seven shellfish water catchments and a comprehensive review of site-specific factors that influence the take-up of faecal indicator organisms (FIOs) by shellfish. This review would enable Defra to improve planning of remedial action in order to ensure future protection of shellfish waters.

Appraisal of STW improvements

Faecal indicator organism (FIO) loads (number per unit time) were quantified for seven shellfish water catchments covering different levels of sewerage improvements. In six of these catchments (the exception being the Conwy), the improvements involved installation of ultra-violet (UV) disinfection (tertiary treatment) in one or more STWs over the period 2000–2010 (AMP3/4). In five catchments (the exceptions being Conwy and Chichester Channel), the improvements also involved increase in storage capacity and installation of screens in one or more IDs. These studies were largely based on generic and modelled data and on specific assumptions made with regard to volumes of ID flow pre- and post-improvement. Results showed substantial reductions in FIO loads after sewerage improvements with the biggest estimated reductions in the Taw/Torridge and the smallest in the Yealm (Figure 1).

In the six catchments where improvements were made to key STWs, treated sewage effluents from these works now contribute ≤0.6% to the total FIO loads impacting on the shellfish waters.

In the five catchments where IDs have been improved, then, on the assumption of a 90% reduction in the estimated volume of ID flow following improvement, the IDs post-improvement contribute only small proportions (≤ 7.0%) of the total FIO fluxes. However, under a 'worst-case scenario' in which estimated ID flow volumes are greater pre-improvement and are reduced by only 50% following improvement, ID contributions increase to > 50%.

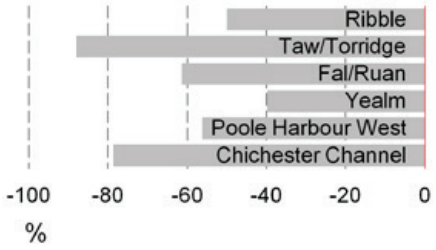


Figure 1: Reductions (% change) in total loads of faecal coliforms from all pollution sources during the summer following STW and ID improvements

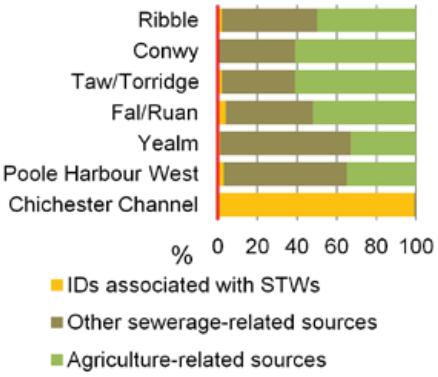


Figure 2: Estimated source apportionment of overall faecal coliform load to seven shellfish water catchments during the summer post improvement

The impacts of sewerage and agriculture-related sources of pollution impacting on shellfish waters were also estimated.

With the exception of Chichester Channel, (where no improvements have been made to the emergency discharges associated with the STWs at which UV-disinfection had been installed and IDs are estimated to account for 99% of the FIO loads), these studies indicated that catchments are impacted by a combination of pollution sources (Figure 2). These results support the dual focus on addressing point and diffuse sources of pollution (see Davies et al. 2010, Shellfish News 29).

Factors influencing FIO accumulation by shellfish

The survival of microbial pathogens in seawater is influenced by a combination of environmental factors (Figure 3).

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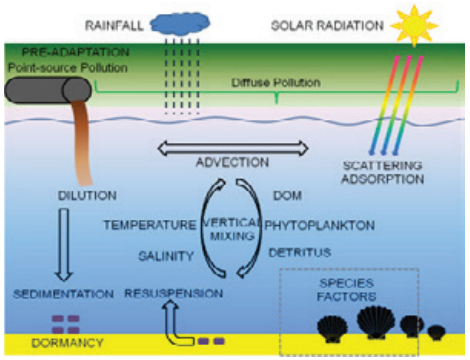
Factors affecting the microbial quality of shellfish

Figure 3: Factors controlling FIO survival in coastal waters



A review of the scientific literature on these effects revealed that the highest rates of bacterial elimination occur when solar radiation is high, sewage content is low, mixing conditions in the water column are high and the levels of suspended solids in the water are low.

Strong association was found between salinity and FIO levels in shellfisheries. This is because decreased salinity often indicates the presence of 'fresh' water which can be contaminated with sewage and also because salinity exerts a significant stress on bacterial cells. For instance, salinity could be used as a proxy for FIO contamination in the Ribble but not in Tresillian or Yealm shellfish waters presumably because of the lower complexity and the location of the sampling point in the former estuary.

The review also demonstrated that rainfall is the environmental parameter most frequently cited risk factor for fluctuations in FIO contamination in shellfish. Rainfall effects depend on the magnitude of the event and the characteristics of the catchment. Using the Yealm Estuary as case study, it was discussed that rainfall-induced peak FIO concentrations could persist in shellfish flesh as much as 6 days after the rainfall event.

Different species of shellfish behave differently to these environmental factors. Usually, mussels and cockles accumulate microbial contaminants to higher level than oysters. However, site-specific differences in water:flesh FIO ratios occur because temperatures and salinities significantly higher or lower than the optimum for the species may reduce pumping action of the bivalves, with the animals ceasing filtration activity and closing at extremely high or low levels. Occasional events of water temperatures and salinities outside the minimum for shellfish growth were identified in UK estuaries.

Association between *E. coli* in shellfish and water

The relationship between levels of *E. coli* in shellfish flesh and overlying waters was studied using paired water and shellfish samples collected from 40 monitoring points within 6 production areas in England and Wales collected over the period 1991–1994. The resulting statistical models could be used to predict *E. coli* concentrations in the water on the basis of levels quantified in shellfish flesh as part of regulatory assessments. They could also be used to predict shellfish flesh quality in the event of a sewage discharge. However, only 35% of the variance in *E. coli* levels in shellfish flesh was explained by the variation of the indicator in the water. The lack of a clear linear relationship is in accordance with the past research in this field which has not produced credible mathematical relationships linking water quality and shellfish flesh concentrations. These studies would however help Defra understand the levels of water quality necessary to protect shellfish beds when the Shellfish Waters Directive is revoked by the Water Framework Directive in the UK in 2013. Further work is being undertaken by Cefas and CREH to refine the models using more up-to-date *E. coli* data.

Research highlights

In recent years, there has been considerable progress in reducing average levels of FIOs in shellfisheries.

In many catchments, these reductions were associated with major sewerage infrastructure improvements involving installation of UV disinfection, elimination of crude sewage discharges and reduction in the frequency of sewage spills from IDs

Effluents from UV disinfected plants nowadays contribute with very low levels of FIOs to shellfish waters

Currently, the main sources of FIOs are STWs that have not been improved, IDs and diffuse pollution from agricultural land

During high-flow conditions, under the 'worst-case scenario' investigated, IDs may contribute over 50% of the total FIO load to shellfish waters

Favourable conditions for FIO survival are low solar radiation, low temperature, low salinity, low density of micro-predators and high levels of organic matter

Extreme temperatures and salinities may affect the filter-feeding activity of shellfish and alter shellfish:water FIO ratios between fisheries

Elevated levels of FIOs may persist in shellfish flesh as much as 6 days after a rainfall event.

Project reports can be found at: www.cefas.defra.gov.uk/our-science/animal-health-and-food-safety/food-safety/shellfisheries-water-quality.aspx.

Further information: Carlos Campos, carlos.campos@cefas.co.uk. Tel: 01305 206749.

Articles

Marine planning update
Final Evidence and Issues Report publication

The final Evidence and Issues Report 2012 for the East inshore and offshore areas was published by the Marine Management Organisation (MMO) on 7 February 2012. This follows the consultation on the draft version of the report between 24 November 2011 and 10 January 2012.

The report looks at the data the MMO is using to inform its marine planning decisions, and also highlights issues and opportunities for a range of marine activities. The report includes:

- the evidence taken account of in marine planning
- assessment of the evidence
- interactions between marine sectors and options for co-location
- emerging issues which need to be taken account of in marine planning.

The MMO would like to thank everyone who provided feedback and comments, which they have taken into consideration and amended the report where appropriate. Both Seafish and the Shellfish Association of Great Britain met with the marine planning team and gave valuable input into the aquaculture related sections.

The report also includes the Sustainability Appraisal (SA) Scoping Report formal consultation (required under the Strategic Environmental Assessment Directive). The MMO has combined the SA scoping requirements with the other material in the report to reduce the number of documents at this stage in the marine planning process.

The full report is available here: www.marinemanagement.org.uk/marineplanning/issues.htm

Current marine planning activity

The MMO's marine planning team is currently developing objectives and policies for the first plan areas, these will have a sectoral view as well as a cross-cutting aspect. Stakeholders will have an opportunity to feed into the planning process throughout the year with the first opportunity being an informal consultation on objectives in April.

Keep in touch

To keep up to date with the marine planning latest, sign up to the marine planning newsletter by emailing planning@marinemanagment.org.uk. You can also use this email address for any marine planning queries or alternatively can contact the team at this address: Marine Planning Team, Marine Management Organisation, PO Box 1275, Newcastle upon Tyne, NE99 5BN or call on 0191 376 2790.

Articles

Marine Conservation Zones
The Marine Conservation Zone Project

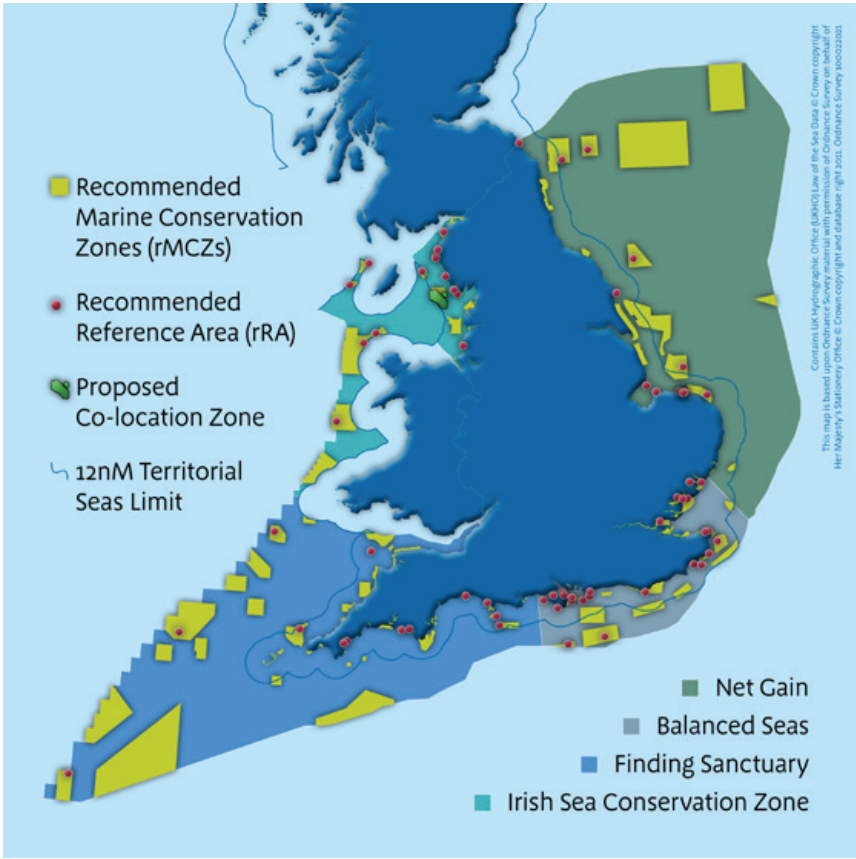
It is over 60 years since the 1949 National Parks Act was passed to create safe havens for wildlife on land, and provide enjoyment for millions of people who visit them. Protection of the marine environment has taken much longer and, while some forms of Marine Protected Areas were introduced during the same period – for sea birds, some sea habitats, wetlands and Sites of Special Scientific Interest – the area protected is less well-established than that which exists on land. To achieve more comprehensive coverage, the 2009 Marine and Coastal Access Act made provisions for a new type of protection called Marine Conservation Zones (MCZs). Their aim is to ensure that underwater habitats and species flourish, and to contribute to a well-managed and ecologically coherent UK network of Marine Protected Areas.

As well as protecting a range of nationally important marine habitats and wildlife, MCZs are being designed to take sea users' livelihoods into account. Uniquely, it has not been the Government making the initial recommendations on where MCZs should go. Instead, four regional groups of sea users – established in 2009 – collaborated to recommend sites that could benefit from designation, based on scientific evidence and their local knowledge. Shellfisheries' representatives were involved from the start; and an independent Science Advisory Panel acted as a sounding board throughout as discussions took shape. The groups represented the North Sea, the Irish Sea, the south east and the south west. In September 2011, after two years' dedicated hard work, they presented their final recommendations. These are currently being looked at by Natural England and the Joint Nature Conservation Committee (JNCC) who will submit joint advice which will be considered by Government later in 2012.

Recommendations

In total, the regional groups put forward 127 recommended MCZs (rMCZs) – covering a total area of approximately 37,500 km². This includes recommendations for 65 much smaller, but more highly protected, 'reference areas', covering 2% of this total area. There are no set shapes and sizes for MCZs. The largest (approximately 5,800 km²) is offshore in the far south west of UK territorial waters; while the smallest occupies less than half a square kilometre in the Aln estuary in Northumberland.

Many species, such as oysters, are likely to benefit from this new type of marine protection. Off the coast of Essex, due south of Mersea Island, is a recommended reference area measuring 750 x 250 metres lying in



The map shows where the recommended MCZs and recommended reference areas are

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Marine Conservation Zones

a sub-tidal area. This was suggested by the local shellfisheries sector as a suitable area to protect native oysters and oyster beds. It is located within the largest proposed MCZ in the area – at over 300 km². Starting off the coast of Clacton on Sea, extending down towards Burnham on Crouch, this site includes the Blackwater, Crouch, Roach and Colne Estuaries. Designed to protect features such as mudflats, saltmarshes and lagoon sea slugs – it is also considered to be an important area for wild and cultivated native oysters.

In the Dover Straits, a 20 km² stretch has been recommended called 'Dover to Folkestone rMCZ'. This is a highly diverse area and has excellent examples of chalk reefs with gullies up to 2 metres high, supporting a rich array of animal life. The site contains intertidal and subtidal blue mussel beds, peat and clay exposures and Rossworm reefs. It has very good examples of intertidal underboulder communities such as sponges and seasquirts, as well as species of crustacean and molluscs. To achieve the draft conservation objectives of the site, the trawling sector has agreed that, if it was designated an MCZ, they would stop fishing (currently seasonal) on a permanent basis whilst commercial potting is anticipated to continue at its current low level.

Native oysters (Ostrea edulis) amidst maerl (Photo: Paul Kay)

A small section of North Norfolk's blue mussel beds is in a recommended reference area, located inside a site called 'Cromer Shoal Chalk Beds rMCZ'. This larger area is off Cromer beach in North Norfolk spanning from Weybourne to Sea Palling and stretching out to five nautical miles. It forms part of Europe's longest chalk reef with striking arch formations in its white walls, surrounded by a seabed of rocks, peat and clay. This environment gives a permanent home to a variety of wildlife and plants, such as shrimp-like creatures, marine worms and tiny snails, and provides good foraging areas for seabirds. The blue mussel beds in the 0.25 km² reference area provide a habitat for species such as seaweeds, anemones, barnacles, gastropods, starfish and worms, creating an area that supports a biodiverse fauna and flora.

Helen Stevens, fisheries senior specialist for Natural England, said: "The four regional projects worked very hard for two years bringing together a range of sea users along the coast. Last September, they handed their final recommendations for MCZs to us and the Joint Nature Conservation Committee. We're now completing the next phase of work which involves assessing the evidence underpinning the ecological aspects of the proposals, to help the Government decide which sites to designate.

Common or blue mussels (Mytilus edulis) covered in barnacles just below water in the lower intertidal. Found around all British coasts (Photo: Paul Kay)

She continued: "It is a complicated project, but it's important to say this is a type of nature conservation which takes sea users' livelihoods and activities into account. For example, if oyster populations can re-

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Marine Conservation Zones

cover, then their reproductivity will increase. In many cases, it presents an opportunity for a 'win/win' situation for marine wildlife and habitats, and people who make a living from the sea. Natural England is not the final decision-maker, but we're very keen to help local communities and industries understand exactly what has been recommended, the reasons why, and explain how people can get involved with the Government's formal consultation."

Offshore in the deep waters of North St George's Channel in the Irish Sea, a rMCZ has been identified to protect a variety of habitats and species, including horse mussel beds. The aim is to maintain most of these habitats and features in their current condition; and for horse mussel beds and subtidal sands and gravels to recover to a favourable condition. Further inshore, the 'Cumbria Coast rMCZ' extends roughly 27km from just north of St Bees Head south to the Ravenglass Estuary. The bedrock and boulder shores are nationally important, and the cobble and boulder scars support blue mussel beds and extensive honeycomb worm reefs. According to the recommendations, at their existing levels, static gear fishing, gill netting, hand-gathering of shellfish and vessel speeds may require additional management in some parts of the zone, if it is designated.

The 'Hilbre Island Group rMCZ' is the smallest in the Irish Sea at 5 km². It is focused around three islands in the mouth of the River Dee that are connected to the mainland at low tide, when they can be reached on foot – which is a popular activity for tourists. Blue mussel beds are found here, alongside exposed peat and clay beds. The recommendations state that, at their current levels, hand-gathering of shellfish, walking, horse riding and general access to the islands may require additional management, but only in areas where blue mussel beds and peat and clay exposures are present.

On the north Cornish coast, 'Newquay and The Gannel rMCZ' has been identified to protect native oysters and sea snails, alongside other species and habitats. The aim is to maintain the native oysters in a favourable condition. The site, just less than 10 km² in size, includes the Gannel Estuary because of its ecological importance in terms of productivity and as a nursery area. Much further down in the south west, the Isles of Scilly MCZ Working Group developed a single site within its 6 nautical mile limit consisting of 11 separate components and two non-disturbance areas; and 10 of these components would protect spiny lobsters and sea snails, alongside other species such as sunset cup corals, stalked jellyfish and pink sea fans. The rich diversity of undersea habitats in the south west means that a large range of species is found in the region's recommended MCZs.

Consultation

The opportunity for everyone to have their say on the recommendations takes place in December 2012 when the Department for Environment, Food and Rural Affairs opens a formal public consultation. This will play a vital role in helping inform the Government's decisions on designating individual sites. As Marine Minister Richard Benyon said recently: "It is important that we get this right. It is vital that we have an adequate evidence base for every site if we are to create successful well-managed MCZs. An adequately robust evidence base will be essential when we come to implement management measures." Government will begin designating MCZs in phases, with phase one planned for summer 2013.

After MCZs are designated, management measures for each site will be decided by relevant public authorities – including regional Inshore Fisheries & Conservation Authorities, the Marine Management Organisation and local government. These are likely to be different from site to site, reflecting different levels of usage and different environmental conditions. At this stage, it is too early to say which measures will be needed where and it will be at least another year before decisions on the first set of management measures are made. But the fundamental assumption about human activities within MCZs is that activities can continue (under current licensing regimes where applicable), as long as they do not prevent the conservation objectives from being achieved.

Fact box: How to get involved

Sign up to the MCZ Project newsletter: http://jncc.defra.gov.uk/page-2409.

Email the MCZ Project: mczproject@jncc.gov.uk

Visit the interactive map: www.mczmapping.org.

Get involved with the public consultation in December 2012

Articles

Farming the seas: a pathway to seafood security

John Paul Bignell, Cefas

John recently returned from a Winston Churchill Travelling Fellowship (www.wcmt.org.uk) to New Zealand, where he investigated how they developed their own strategy for a successful aquaculture industry. This is his report:

It was important for me to understand the history and recent developments and extrapolate that to England so that we can effectively develop the capacity to undertake sustainable marine aquaculture within home waters. It was a challenging goal with hints of trepidation as I had next to no experience of this vast industry. However, I saw this as beneficial and approached this fellowship not as a scientist per se, but as a journalist in the same manner that Churchill did during his time overseas. During my six week Fellowship, I visited government organisations, farmers and science laboratories, and saw how legislation, industry and the scientific community work together to help grow a prosperous industry. Specifically, I wanted to understand "why" and "how" the New Zealand government supported and transformed their aquaculture industry.

The single most important thing that I saw on my fellowship was how the New Zealand government has a department dedicated solely to aquaculture. As part of the Ministry of Fisheries, the Aquaculture Unit is the government's principal advisor on aquaculture and works with the industry, local government and environmental groups and other stakeholders. Its three main goals are (1) to build coordination between stakeholders involved in aquaculture (2) to develop and implement an aquaculture strategy and (3) lead the implementation of legislative reforms and law. I particularly noted the amount of effort that had gone into legislative reforms.

Greenshell mussel farming in New Zealand

In 2002, a moratorium on aquaculture was introduced because of a gold rush for space, specifically in relation to Greenshell mussel farming. The gold rush was primarily bought about by an increase in the value that Greenshell mussels were fetching at market and the subsequent increase in the value of the mussel farms. As such, many farms were acquired and not utilised, only to be sold on later for a profit. This was seen as unfavourable by the government and a moratorium was passed. Legislative reforms were clearly required and the first reforms of 2004 were deemed unsuccessful. The first reforms introduced Aquaculture Management Areas (AMAs) whereby councils first had to zone areas for aquaculture through consultation with the aquaculture industry and the general public. This was prior to any planning applications being submitted. Agreeing these zones (especially with the public) proved immensely difficult, time consuming and expensive. Moreover, this did not just affect shellfish activities, finfish were also affected.

As a result there was very little in the way of aquaculture expansion between 2004 and 2011. It just did not work. With significant government support, the more recent Aquaculture Legislative Reforms of 2011 aim to solve the problems that were born out of the 2004 reforms. Now there is a clear step-by-step process that is followed to facilitate aquaculture growth, which is a huge step forward for the industry.

The Rt. Hon. John Key (Prime Minister) opens the annual Aquaculture NZ conference

Another important milestone, the development of an aquaculture strategy, was also implemented during the time frame above. What was most interesting about its development was that it was written by someone with a strong marketing background through industry consultation and not by an industry representative per se.

I felt this was refreshing and progressive ensuring that the strategy was absolutely fit for purpose and carried no excess baggage. Interestingly, the author went on to become the Chief Executive of Aquaculture NZ (a levy funded, one voice organisation that represents the entire New Zealand aquaculture industry). His background and experience proved to be instrumental in developing an exceptional organisational brand built on New Zealand's "clean green and sustainable" heritage.

This theme is evident throughout the organisation's website (www.aquaculture.org.nz) and marketing literature, demonstrated by a design concept that is minimal, professional and successfully captures what aquaculture is about. It is about food. As such the photography used often incor-

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Farming the seas: a pathway to seafood security

porates aquaculture products depicted as exquisite culinary dishes. The branding is perfect. In the eventuality that an aquaculture strategy is produced for England, I hope we can learn from New Zealand and be just as bold and progressive.

Finally, it was eye opening to see how much aquaculture-based scientific research was being undertaken in New Zealand. During my fellowship I visited the two main research providers, Cawthron and the National Institute of Water and Atmospheric Research (NIWA). Both organisations had bespoke tailor made facilities for undertaking aquaculture based research.

One of the subjects I was most interested in prior to beginning my trip was the subject of offshore mussel farming which has received a large amount of funding by the New Zealand government since 2003. Over a seven year period, Cawthron received approximately NZ$800 thousand of government and commercial funding to undertake feasibility studies into this exciting concept. These studies incorporated many aspects including oceanographic modelling, farm design, biological fouling and the economics of offshore aquaculture. By modelling tidal currents around the coast and utilising modified mussel lines, Cawthron are able to test mussel farm design in a computer environment and run simulations to observe how they will behave under a variety of conditions prior to deployment. It was extremely impressive.

The concept of selective breeding in aquaculture is of great importance as the industry attempts to replicate those successes previously seen with agriculture. In 2011, a large amount of funding was invested in a comprehensive selective breeding programme for Greenshell mussels to ensure a reliable supply of high performance spat to industry. Located at Cawthron's aquaculture research laboratory, SpatNZ is a matched-funded commercial and government research programme worth NZ$52 million. The three biggest seafood companies, Sanford, Sealord Group and Wakatu Incorporation collectively contribute NZ$26.3 million of funding over seven years with the other half coming from government investment. Interestingly, it is the government who will be contributing the majority of the initial investment. As the programme develops and government investment decreases, the commercial sector will meet the shortfall. This model protects the commercial sector from significant financial losses if the concept is not successful.

Pacific oyster produced from Cawthron developed from selectively bred spat

My journey through New Zealand was long yet over all too soon. I was expecting there to be a complicated answer as to why there is significant governmental support for aquaculture. I was wrong. It is simply because aquaculture is seen as New Zealand's next big primary industry; fundamental in providing food, jobs and economic growth. As such there is a strong desire to replicate the successes of the agriculture industry all those years ago. Taken together the four key findings of my fellowship were how New Zealand have:

1. Developed an industry-led aquaculture strategy that incorporates a marketing perspective.
2. Established an industry representative organisation that unites the aquaculture industry.
3. Implemented integrated legislative reforms that allows aquaculture to develop.
4. Produced a comprehensive research strategy (aligned with the overarching strategy) to ensure future sustainable growth and development.

The recent Aquaculture Consultation undertaken by Defra should reveal whether or not these are appropriate for adoption in England. Whatever the outcome, it is important that the industry works together collectively in achieving their goals and that the government has the vision to assist in helping an important primary industry to grow. If you are interested in reading more about my travels then visit my blog at http://wcmt-aquaculturenz.blogspot.co.uk.

Articles

Shellfish farming and risk

John Theodorou, Department of Fisheries & Aquaculture, Greece

This article is taken from an abstract of some work presented at the October 2011 meeting of the European Aquaculture Society. A summary of the full meeting is available at: www.easonline.org/images/stories/Meetings/AE2011/AE2011_Summary_Document.pdf.

Introduction

Despite the availability of risk research in agriculture, there is limited knowledge on the subject regarding bivalve aquaculture. A recent effort to close this gap was carried out during 2007-2009 from independent research groups for their local shellfish industries in France (oysters-traditional industry), Greece (Mediterranean mussel-mature industry) and Denmark (blue mussel-emerging industry).

Risk sources

The risk perceptions of mussel producers in the Mediterranean were similar to those in Denmark but ranked differently. Ex-farm prices seemed to be major risk in Greece, with increases in production costs driven by external sources i.e. oil price, labour, administration.

Similar concerns were expressed by the emerging mussel industry of Denmark which, being almost totally export oriented, as in Greece, was still totally dependent to the projected market demands of the Netherlands. Price was also a critical factor for the financial sustainability of the Danish Sector.

Oyster farming in France however, was not sensitive to price risks due to absence of international competition, multi-year cycles and early season price negotiation. In France major risks were related to the production environment e.g. severe oil spills, shellfish pathogens and mortality due to occasional summer high temperatures. In Greece, disease, pollution or weather losses were not perceived as high risks, maybe due to the extensive nature of farming carried out in near-shore unpolluted waters to avoid microbial loads. Also there had been no serious oil spills for the farmers to worry about. Similarly disease prevention was rated low risk for the mussel sector in Denmark, since it is an emerging industry with no major disease problems to date.

Institutional risks have low impact for the Greek farmers as long as they can bypass them through personal relations with the local administrators. In France regulations have an important impact as a horizontal risk, as EU food legislation becomes stricter. Changes to regulations and public perception of mussel farming were rated as high

Oyster farming in France, where environmental issues are ranked as high risk.

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Shellfish farming and risk

risk in Denmark. French oyster farmers and Greek mussel farmers perceived personal risks (health and safety aspects) to be very important, as the production activity is labour intensive in a tough working environment. Danish farmers perceived also the risk of injuries as important but ranked these low, since mechanisation and working standards could minimise accidents.

Risk Management strategies

Greek mussel farmers opted for financial reserves as the best risk management strategy with farming excellence as second. Prioritising liquidity and solvency were considered very important by Danish mussel farmers, though they rated production at the lowest possible cost most highly. Collaboration in production with other farms and cooperative marketing was the second ranked risk management strategy in Denmark, a country with the oldest cooperative tradition in the world while in contrast Greek producers lack this tradition and do not trust these practises. Institutional risks are thought to be mitigated by pre-emptive actions by the Danish producers e.g. take part in policy formulation and implementation strategies. In France farmers considered institutional changes as high risk e.g. sanitary standards conformity, improvement of employees' working conditions, etc. Greek producers do not consider the tackling of persisting bureaucracy problems as a risk management strategy, as they perceive it as a common daily action.

Diversification (other species) seems to be a low priority for Greek mussel farmers, as their traditional stance does not allow for easy adoption of new products together with the need to develop new markets. Danish mussel producers on the other hand do not view production diversification, branding or private labelling as a risk management tool. Price contracts were also not perceived as important risk-management tools to mitigate marketing risks by Greek or by Danish mussel farmers.

Finally, limited preference for insurance products was expressed by the producers in Greece and France. In Greece, farmers usually expect such products to be offered by the state at low cost, while in France oyster farming risks were broadly considered un-insurable.

Conclusions

Shellfish producers in Europe set the risk management priorities based on their local experience e.g. low prices in Greece and Denmark, environmental issues in France. The risk sharing strategies were focused on the self protective mechanisms such as capital reserves and farming optimisation. Other tools such as price contracts, insurance policies were considered too complex and mainly beyond daily practice. Further research on improving the risk management tools would guarantee the recovery from possible future disasters.

Articles

Shellfish News readership survey – the results

Ian Laing, Cefas

The response rate to the survey, based on those completing it as a proportion of the number of unique visits to the Shellfish News pages of the Cefas web site, was small (3.75%), although this is considered satisfactory and is normal for this type of survey. There was a good cross section of the readership represented in the respondents, with 24% from industry, and 38% from each of administrators and academics/consultants. Most (52%) respondents lived in England, and 67% were from the UK, with 14% from each of elsewhere in Europe and elsewhere in the world.

Main findings

Shellfish News is very highly appreciated, especially so by industry respondents, all of whom rated it as excellent. Overall, 71% rated the publication as excellent, with a further 24% putting it into the next best category of good.

Similar to the previous survey in 1998, the most popular sections are Articles, Research News and Statistics. Monitoring Reports and News from Seafish are the next most liked sections. No one proposed any other areas to cover, suggesting that the current content is comprehensive. The only section deemed less than extremely or very useful by more than 50% of all respondents was Announcements, although the percentage in these categories for industry respondents was higher (60%). We have tried to address this by shortening this section and making more use of links to further information for those that are interested in a specific item.

Interestingly, overall there was a clear majority that are content with on-line delivery as a single entity (currently the PDF file) with 77% of UK respondents electing for this option, compared with 14% who would prefer a printed and posted version. Less than 9% would want the magazine format abandoned in favour of a series of links to information posted elsewhere on the Cefas web site. However, a small majority of industry respondents would still prefer a posted copy with 39% in this category compared with 37% in favour of the on-line edition. All respondents had ready access to the internet and went on-line on a daily basis.

It seems from the comments that PDF file copies are often downloaded and kept for reference purposes. It is mostly read on-screen, with over 70% using this method, but certain sections (especially articles, statistics and monitoring reports) are more likely to be printed to be read (or kept for future reference).

The email alert system seems to be appreciated as most of those that are aware of it make use of it.

Articles

A survey of stocks and exploitation of European lobsters in Brittany

Laure Robigo, Departmental Fisheries Committee of Côtes d'Armor, Brittany, France
lrobigo@bretagne-peches.org

This article presents the initial results from a program of stock surveys led by professional fishermen and funded via an innovative project of marine renewable energy.

Framework: a project of marine turbines installed within a fishing reserve

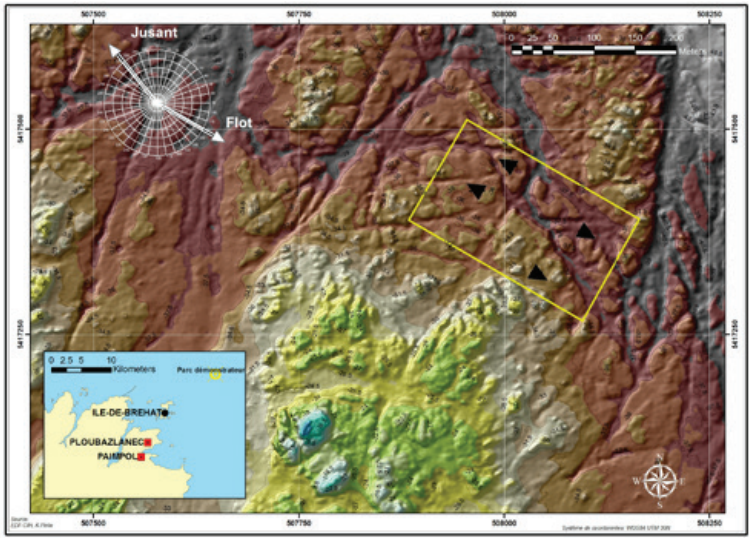
A project of experimental marine turbines, conducted by EDF (Electricité de France), was initiated in 2005.

Very early in their project, EDF contacted the professional fishermen throughout the Local Fisheries Committee of Lannion-Paimpol (CLPM). Indeed, the waters coming under the legal competence of the CLPM were potentially useful for the exploitation of tidal currents and EDF wanted to involve all the stakeholders in this venture, especially fishermen. In order to have the minimum impact on fishing activity, the CLPM proposed to install the experimental devices within a fishery reserve area called 'La Horaine'. This area was created in 1966 by the professional fishermen who wanted to protect crustaceans (lobsters, spiny lobsters, brown crab and spider crab); the exploitation of which is historically and economically very important. Thus, since 1966, all gear is prohibited in the reserve of La Horaine, excepted lines and long-lines. Technical studies showed that the request was feasible.

After a study trip in Ireland with EDF and a delegation of professional fishermen in 2007, discussions began between the company and the CLPM in order to decide what kind of partnership they wanted to established. Both of them agreed that funding a collective program on the resources exploited by the majority of the fishermen was better than giving individual financial compensation.

In June 2008, members of the CLPM's council voted by a majority in favour of EDF placing four experimental marine turbines in the 'Paimpol-Bréhat' area, placed within the reserve of La Horaine.

Then in 2009, the CLPM started to study the stock and the local European lobster fishery across the entire maritime district of Paimpol. The operational part of this study is funded by EDF; the working time is supported by the Département des Côtes d'Armor, the Région Bretagne and the European Fisheries Fund. The first experimental marine turbine was expected for autumn 2011, to be followed by three other turbines in 2012.



The project area

A study led by the professional fishermen

The first stage of this study took place during the 2009 lobster's fishery, and involved 19 professional fishing boats. It consisted in notching a 'V' mark in the tail of the female lobster, bought from a professional fisherman, and to release V-notched lobsters to the sea. As a professional or leisure fisherman caught a V-notched female lobster, he had to report it to the CLPM with the position of the catch. Of 1, 989 lobsters V-notched and released at sea, about thirty have been recovered. Such a small return did not provide a lot of information, but it helped greatly to advertise the program to the professional and the leisure fishermen.

From that first campaign, the CLPM repeated the notching campaign in 2010, with 1, 885 lobsters from 21 professional fishing boats. But in order to get individual infor-

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A survey of stocks and exploitation of European lobsters in Brittany

mation about displacements and growth, a yellow numbered tag was applied in the abdomen of each lobster, after the lobster had been weighed and measured. Lobsters were then released at sea by the CLPM, in 3 different areas, one of which was within the reserve of La Horaine. At the same time, a series of boardings of two professional fishing boats permitted sampling of all lobsters caught in pots, even lobsters under commercial size, through all season of lobster fishing. Sex, carapace length, number of pots used, area of fishing were noted to calculate indicators of exploitation.

In 2011, the same method of V-notched and numbered tag was applied on 1, 459 males and females lobsters from 13 professional fishing boats. The same kind of sample on board of the same two professional fishing boats was made. Furthermore, the CLPM put in place fishing within the reserve of La Horaine, with the intention of getting a long-term series of data to be compared with indicators of exploitation calculated out of the reserve. In that aim, three lines of pots were put in the reserve by the professional boats with the CLPM sampling the catches. Then all the pots, those put out of and those put in the reserve, could be sampled on the same day and a comparison could be made. Moreover, one line of pots put in the reserve of La Horaine was placed where the

Measuring, tagging and releasing lobsters

4 experimental marine turbines were to be installed.

Lobster movements

From the campaigns in 2010 and 2011, 73 tagged lobsters were recovered, 14 by leisure fishermen. Of those 73 lobsters, 34 are considered to show significant movements, while 35 didn't move from the point of release. The other four tagged lobsters had been bought by restaurants, fishmongers or by customers on markets, and their catch position was not known.

Almost all the lobsters that moved travelled in a westerly direction from the point of release. Some of these lobsters travelled very long distance in a relatively short time. For example, one lobster was caught 55 nautical miles from its point of release only 2 months later.

A few favoured recovery spots were noticed, such as the coasts of Ile de Batz, where 7 lobsters tagged in 2010 and 1 tagged in 2011, from different areas of release, have been found.

On the contrary, lobsters released in the Bay of Lannion, located at the West of the maritime district of Paimpol, seem to stay within the Bay. The circular marine currents and the closeness of a rocky seabed may

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A survey of stocks and exploitation of European lobsters in Brittany

Plotting results of lobster movements

keep them in that Bay. Further research on the causes of displacement is considered necessary.

An efficient fishing reserve

Sampling on board the professional fishing boats revealed a larger range of sizes within the reserve of La Horaine, compare to outside. In the same way, the mean carapace length seems to be bigger within the reserve, as is the mean weight. Moreover, the catch rate of commercial lobsters (i.e. where the carapace length is above the minimum landing size of 87mm) is higher in lines put in the reserve than in lines put outside. Thus, the catch per unit of effort (CPUE in Kg of lobster per 100 pots) is higher within the reserve compared to outside, whatever the season. To make a complete assessment of the 'reserve effect' and to assure a correct survey of the stock of lobsters' exploitation, the sampling has to be continued in the future in a similar way.

Above all the scientific results, this program make different sea users acting together

As said before, this program is partly funded by EDF, realized by a professional organization with the participation and for the interest of the local professional fishermen and supported by leisure fishermen. Actually, the associations of leisure fishery of the maritime district of Lannion-Paimpol are fully implicated in this program: fourteen of them reported re-catches of tagged lobsters in 2010 and 2011, and two of the lobsters that have been tagged were from leisure fishery. Being on board or in the harbours to tag the lobsters allows discussions with everyone working around the fishery industry, even with the general public. Information about the EDF's project or about the lobster fishery can be provided and a certain conception of the fishermen and their implication in improving knowledge about the stocks they are exploiting can arise from that kind of program.

Further information

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Articles

Water quality workshop

A summary of the Cefas-Environment Agency-SAGB Workshop on 'Chemical Water Quality & Shellfish', Weymouth, 2-3 November 2011, prepared by Tom Hutchinson, David Jarrad, Amanna Raman & Sue Utting

Recent progress

Over the past twenty years, there has been major progress in the UK in terms of regulation to reduce the levels of hazardous chemicals in the marine environment. Disposal of large volumes of industrial and urban waste into the UK seas has ceased and the important work undertaken for Defra's Charting Progress marine programme shows clear reductions in priority legacy contaminants such as organochlorine pesticides and polyaromatic hydrocarbons (PAHs). Major oil-related disasters such as the Deepwater Horizon catastrophe (2010) and the Buncefield oil storage fire (2005) remind us of the need to still monitor these types of chemicals. Success has also been achieved through the international ban on the use of tributyltin in antifoulant paints, supported by evidence of reduced imposex levels in marine molluscs (eg dogwhelks) monitored around the UK.

Emerging chemicals

Scientific evidence and, importantly, the valuable observations of the shellfish industry itself, collectively tell us that the investments towards controlling chemical pollution have been a real success story for all concerned. Evidence for tackling historical chemical pollution also provides the public with greater confidence in the UK's clean seas, with indirect benefits to the public's perception of the health benefits of seafood and shellfish. To maintain this positive situation, however, it remains important to be vigilant with respect to new types of chemicals being developed by commercial organizations and used in many of our homes and industries. The scientific community refer to these as 'emerging chemicals' and the examples include flame retardants, nanomaterials, personal care products and pharmaceuticals. Scientists from both Cefas and the Environment Agency are actively engaged in the emerging chemicals issue through a variety of UK and European projects (see background reading). Cefas and the Environment Agency are proactively involved in sharing knowledge on chemical water quality with the shellfish industry, leading to the November 2011 workshop at Weymouth.

The Buncefiled fire (photo: Chiltern Air Support Unit)

Sewage outfall - the Thurlestone stormwater overflow (photo: Tom Hutchinson)

Workshop

The Cefas-Environment Agency-SAGB sponsored workshop took place on 2-3 November 2011 at the Cefas Weymouth Laboratory. Around thirty people attended over the two days from a wide range of UK organizations, together with some overseas guests with specialist knowledge of chemical water quality and shellfish.

David Jarrad was the first workshop speaker, giving an overview of UK shellfisheries as well as stressing the role of the SAGB and its present financial situation. He was followed by Neil Auchterlonie of Cefas who talked about an English aquaculture strategy that he is completing, funded by Defra. He had hoped that it would be launched by May 2012 but transfers of key personnel within Defra make this less likely. Paul Whitehouse (Environment Agency) then gave the background to the regulatory framework for Environmental Quality Standards in the Water Framework Directive and whether these can

Articles

Water quality workshop

be adopted for the Marine Strategy Framework Directive.

The workshop discussions then moved into some scientific presentations on chemical contaminants in the aquatic environment that can act as endocrine disruptors and affect the reproductive capability of shellfish. John Thain (Cefas) talked about the impacts of tri-butyl tin (TBT) in antifoulant paints and how industry initially reporting the shell thickening in Pacific oysters and imposex in dog whelks had lead to national and international cooperation, the eventual regulation and ban on the use of this substance and the gradual decline in TBT from the marine environment. Nick Pope (Marine Biological Association, Plymouth) presented his most recent findings on imposex in Scrobicularia. Shelagh Malham (Bangor University) talked about her work in the Conwy Estuary on chemicals (and E coli) in the river catchments and how they can be locked up in muddy sediments for years and later released. Without taking too much from the other speakers, Evan Ward (University of Connecticut and working for six months at Exeter University) gave a memorable presentation on nanomaterials in modern day products that are finding their way into the aquatic environment. A highlight of the workshop was Evan's wonderful two minute video of mussel gills at work! The video linked to an endoscope showed

The water quality workshop at Cefas Weymouth (photo: David Jarrad)

particles moving from the sea water, through the microscopic gills and into the mussel's mouth, leaving the audience mesmerized and asking for an encore.

The Workshop was hailed a great success and undoubtedly opportunities will arise for collaborative research involving industry. Growers and fishermen working out in the environment on a daily basis can play a vital role in picking up that something is wrong and certain shellfish species can be used as sentinels of environmental change. The role of industry and scientists working together remains a key priority. One of the advantages of the meeting being at Cefas was that industry operators could meet and talk to the scientists working on chemical water quality and on other aspects of interest. Building on the success of this workshop, it is hoped to repeat it again in the future.

Background reading & web links

Defra Charting Progress 2 (2010) The State of UK Seas (web link http://chartingprogress.defra.gov.uk/).

European Environment Agency (2011). Hazardous Substances in Europe's Fresh and Marine Waters. European Environment Agency, Copenhagen. 61 pp (web link www.eea.europa.eu/publications/hazardous-substances-in-europes-fresh).

European Science Foundations (2011) Monitoring Chemical Pollution in Europe's Seas – Programmes, Practices and Priorities for Research. European Science Foundation, Ostend. 104 pp (web link www.marineboard.eu/component/publications).

Statistics

World shellfish production
Food and Agriculture Organisation of the United Nations (FAO)

Each year, the Food and Agriculture Organisation of the United Nations (FAO) releases data on the status of global fisheries and aquaculture. The figures for 2010 are now available.

Cultivation

World aquaculture production of shellfish (molluscs and crustaceans) continues to grow. The annual increase in production in 2010 was about 5.5%.

Mollusc species account for about 71% of the total 19.9 million metric tonnes of shellfish produced. Although molluscs dominate shellfish production by weight, the greater unit value of crustaceans makes them much more valuable. In 2010, the reported figures were 26.9 billion US dollars for crustaceans and 14.3 billion for molluscs. The total value represents a 9.6% increase over that for 2009.

European mollusc production of 0.63 million metric tonnes represents about 4.5% of the world total. Their value, of 1.21 billion US dollars, is just over 8.5% of the world total for this group. Crustacean production in Europe is very small on a world scale and in 2010 was valued at 3.7 million US dollars, from 251 metric tonnes.

Mussels are the main group cultivated in Europe, with almost 477,000 tonnes (all species) produced in 2010. Pacific oysters are next in importance, with just over 105,000 tonnes produced in 2010, although this is 14% less than was produced in 2007. Shellfish production in general in Europe is exhibiting a decreasing trend. Over the last 5 years production has fallen by 9% and 24% for molluscs and crustaceans, respectively. The UK is the third most important producer in Europe for both mussels and Pacific oysters. Just over 2,500 tonnes of native oysters were cultivated in Europe in 2010 and this is less than half of that produced four years previously.

Statistics

Shellfish Production in the UK in 2010

Ian Laing, Cefas

Data for shellfish landings from wild fisheries were published in Issue 32 (Autumn/Winter 2011) of Shellfish News.

For farmed production, there is some overlap in the statistics as figures for some species may or may not also be included in the Fishery Order figures. This is indicated where information is available. The data are nevertheless valuable for giving an overall impression of activity within and value of the industry, and for comparisons between years. More detailed analyses of the figures may be obtained from the sources quoted.

Farmed shellfish production

A summary of farmed shellfish production in the UK in 2010 is given in the table. The total value of the shellfish produced for the table was estimated at about £25.5 million, from about 31.5 thousand tonnes. This represents an 11% decrease compared with 2009.

The figures do not include hatchery/nursery seed production, for on-growing, much of which is exported. In 2010 there was significant hatchery seed production from established sites, particularly Pacific oyster seed, partly to meet demand resulting from problems in the French industry, together with a smaller but significant quantity of Manila clam seed.

There is now a requirement to report capture-based input to aquaculture. In 2010 an estimated 600 tonnes of seed mussels from England and 7,163 tonnes from Northern Ireland were translocated to on-growing sites. It should be noted that these figures don't include all the "wild" spat encouraged to settle on ropes.

Finally, the National Lobster Hatchery in Padstow, Cornwall released about 12,000 juvenile lobsters in 2010, as a means of enhancing wild stocks. This is a slight increase on the output for 2009 of 11,000 juveniles.

A. England and Wales

Source: Fish Health Inspectorate, CEFAS Weymouth Laboratory, Barrack Road, The Nothe, Weymouth, Dorset, DT4 8UB.

There are currently 82 authorised shellfish aquaculture production business in England and 9 in Wales, giving a total of 91 businesses. A public register of these is available at http://euregister.efishbusiness.co.uk/annex2.aspx.

These businesses supported 160 full time and 64 part time posts (England, 137 full time, 60 part time; Wales, 21 full time, 4 part time).

Production of the various species culti-

Production (tonnes) of farmed shellfish in the UK in 2010

	Scotland	England	Wales	Northern Ireland	UK Total
Pacific oyster	241	646	3	260	1,150
Native (flat) oyster	28	88.5	0.05	0	116.85
Scallops	7.6	0	-	1	8.6
Queens	7.3	-	-	-	7.3
Mussels	7,199	3,233	8,960	10,820	30,212
Clams	-	26.5	-	0	26.5
Cockles	-	7.3	-	-	7.3
Estimated value (£ million)	8.3	3.4	6.1	7.7	25.5

Farmed shellfish (table) production in England and Wales 2006-2010 (in tonnes)

	Native oysters	Pacific oysters	Mussels	Clams	Cockles
2006	64	680	13,340	0	1.2
2007	55	587	13,270	22.3	10.1
2008	44	598	15,025	9	10
2009	54	815	17,612	13	2,027
2010	89	649	12,193	26.5	7.3

Statistics

Shellfish Production in the UK in 2010

vated, compared with levels in the previous four years, is shown in the table.

Mussels are the main species. Production of mussels decreased by a third compared with 2009, and the total was the lowest for over 10 years.

Production of native oysters increased significantly (by 65%) compared with preceding years, an encouraging sign given the interest in restoration of the species. Pacific oyster production declined by 20%, but still represents the third highest recorded annual total.

Some comment on production of cockles is required. In 2009 a significant quantity was recorded as cultivated production, presumably from relaying of undersize animals. Although this activity is unlikely to have stopped it seems that it is being recorded, as previously, as fishery production. The Fishery Order returns will give a more accurate picture of fluctuations in cockle production in the UK (see below).

B. Scotland

Source: "Scottish Shellfish Farm Production Survey 2009" (ISSN: 1363-5867) published by Marine Scotland – Scottish Government.

Data for 2010 farmed shellfish production in Scotland are published on-line and may be obtained at www.scotland.gov.uk/Publications/2011/08/16093234/0.

The main findings in 2010 are:

- Production of mussels increased by 14 per cent to 7,199 tonnes. This increase shows continuing growth in the sector.
- Production of Pacific oyster increased by 4 per cent to 2,900 tonnes. This follows fluctuating production over the past six years. Native oyster production decreased from 39 tonnes in 2009 to 28 tonnes.
- King and queen scallop production increased by 83 per cent and 33 per cent respectively from the 2009 total, targeting a small niche market.
- Employment in the shellfish industry increased from 345 in 2009 to 399 in 2010 (a rise of 16 per cent), demonstrating continuing interest and growth of the industry.
- The industry was dominated by small producers, although there was a continued and marked trend toward large businesses contributing to the annual production of all species.

C. Northern Ireland

Source: DARDNI, Fisheries Division, Room 420, Dundonald House, Upper Newtownards Road, Belfast, BT4 3SB.

Production

The public register of shellfish aquaculture production businesses in Northern Ireland can be downloaded from: www.dardni.gov.uk/index/publications/pubs-dard-fisheries-farming-and-food/publications_fisheriespublic_register_of_authorised_production_businesses.htm.

Shellfish production statistics for Northern Ireland in 2010 are included in the summary table, above. The main species cultivated is mussels, where production of 10,820 tonnes was a 35% increase of that in 2009 and the third highest annual total. Production of Pacific oysters, at 260 tonnes was 16% less than in 2009.

3. Shellfish production from Several and Regulated fisheries

Source: Annual Returns

In 2010 there were 7 Several Fisheries, 3 Regulated Fisheries and 3 Hybrid Order Fisheries in England and 5 Several Fisheries and 2 Regulated Fishery in Wales. Scotland has 11 Several Fisheries; primarily for scallops. Farmed shellfish production from the Scottish sites is included above.

The tables on the next page show production/landings of the various species produced in England and Wales respectively, as reported by Annual Returns, where received.

The total estimated value of production, at £14.4 million, is similar to that in 2009.

Cockles are produced from three Regulating Orders (Burry Inlet, Thames and Dee Estuaries) and two Hybrid Orders (Wash and Poole Harbour). The Dee estuary figures are included in the English table. Total production showed an 11% decrease compared with 2009 and was at the lowest level since 2005. Problems with mortality in this species continue to be reported and production in the Burry Inlet, at 508 tonnes, is the lowest ever recorded. Almost all cockle production is from managed fisheries.

Production of mussels from Fishery Orders fell by about 15% in 2010 to give the lowest production since 1999. All of this production is also included in the farmed shellfish production data (above).

Production and value of clams from Fishery Orders was slightly higher than in the two previous years. In total, about 461 tonnes of Manila clams were landed in the UK in 2010, worth about £0.78 million. Most of these, about 378 tonnes, were landed at ports in the Solent, with most of the balance (75 tonnes, worth £0.19 million) at Poole.

Production of Pacific oysters from English Fishery Orders continues to increase, by a further 8% compared with 2009, and production in these areas has exceeded 300

Statistics

Shellfish Production in the UK in 2010

Production / Landings (tonnes) of shellfish from Fishery Orders (S = Several, R = Regulating, H = Hybrid) in England in 2010

Species	S	R	H	Total	Value
Pacific oyster	40	20	255	315	£582,000
Native oyster	5	31	1	37	£113,000
Clams	0.5	-	75	75.5	£383,000
Mussels	49	102	1,051	1,202	£631,000
Cockles	-	11,526	2,482	14,008	£7,916,688
Total					£9.6 million

Production / Landings (tonnes) of shellfish from Fishery Orders (S = Several, R = Regulating) in Wales in 2010

Species	S	R	Total	Value (£)
Mussels	8,700	-	8,700	£4,570,000
Cockles	-	508	508	£213,360
Total				£4.8 million

tonnes for the first time. This is a significant proportion of the total farmed production in England and Wales of about 650 tonnes.

Production of native oysters from Fishery Orders continues to decline, notwithstanding the small increase in farmed production. This is a reflection of the continuing lack of recruitment in the Solent. Data from catch returns as reported to MMO port offices suggest that about 153 tonnes of native oysters were landed in the UK in 2010, with 90 tonnes of this from the Solent. The total value is estimated at £251,000. This compares with landings of just over 1,000 tonnes ten years previously.

Research

1. Norovirus outbreak study

Numerous studies using PCR have demonstrated norovirus contamination in a significant proportion of both oyster and other bivalve shellfish production areas and ready-to-eat products. By comparison, the number of epidemiologically confirmed shellfish-associated outbreaks is relatively low. This suggests that factors other than the simple presence or absence of virus RNA are important contributors to the amount of reported illness.

This study compares norovirus RNA levels in oyster samples strongly linked to norovirus or norovirus-type illness with the levels typically found in commercial production areas (non outbreak-related samples).

A statistically significant difference between norovirus levels in the two sets of samples was observed. The mean level in outbreak samples (1,048 copies per g) was almost one order of magnitude higher than for positive non outbreak-related samples (121 copies per g). Further, while none of the outbreak-related samples contained fewer than 152 copies per g, the majority of positive results for non-outbreak-related samples were below this level.

These observations support the concept of a dose-response for norovirus RNA levels in shellfish and could help inform on threshold criteria for risk management.

Lowther, J.A., Gustar, N.E., Hartnell, R.E., Lees, D.N. (2012). Comparison of Norovirus RNA Levels in Outbreak-Related Oysters with Background Environmental Levels. Journal of Food Protection, 75, 389-393.

Further information on detecting and quantifying Norovirus in bivalve shellfish can be found at: www.cefas.defra.gov.uk/media/558211/norovirus%20-%20ct%20values%20vs%20copies%20per%20gram%20-%20cefas%20jan%202012.pdf.

2. Norovirus in foodstuffs

Belgium, Canada and France were the first countries to provide data about the prevalence of Norovirus (NoV) in fresh produce. In total, 867 samples of leafy greens, 180 samples of fresh soft red fruits and 57 samples of other types of fresh produce (tomatoes, cucumber and fruit salads) were analyzed.

NoV was detected by real-time RTPCR in 28.2% (N = 641), 33.3% (N = 6) and 50% (N = 6) of leafy greens tested in Canada, Belgium and France, respectively. Soft red fruits were found positive by real-time RT-PCR in 34.5% (N = 29) and 6.7% (N = 150) of the samples tested in Belgium and France, respectively. Of the other fresh produce types 55.5% (N = 18), analyzed in Belgium, were found NoV positive by real-time RT-PCR.

From this study, using the described methodology, NoV genomes were frequently detected in fresh produce, however sequence confirmation was not successful for the majority of the samples tested. Infection or outbreaks were rarely or not known to be related to the NoV positive samples. With the increase in sensitivity of the detection methodology, there is an increasing concern about the interpretation of positive NoV results by real-time amplification. Strategies to confirm the results by real-time RT-PCR should be developed in analogy with the detection of microbial pathogens in foods. Detection might indicate contact with NoV in the fresh produce chain. Consequently, a potential risk for infection cannot be excluded but the actual risk from RT-PCR NoV positive produce is still unknown. Studies should be designed determining the probability of infection related to the presence or levels of NoV genomic copies.

Baert, L., Mattison, K., Loisy-Hamon, F., Harlow, J., Martyres, A., Lebeau, B., Stals, A., Van Coillie, E., Herman, L., Uyttendaele, M. (2011). Review: Norovirus prevalence in Belgian, Canadian and French fresh produce: A threat to human health? International Journal of Food Microbiology, 151, 261-269.

3. Water quality monitoring

This study investigated the transverse spatial variation in *E. coli* numbers (as an indicator of faecal pollution) across the estuary of the River Conwy, UK. Water samples were collected from four transverse transects across the estuary: Spatial variation of *E. coli* was significantly different from one side of the river to the other, although was not correlated with depth or the physiochemical properties of the water. Subsequently, microbial water quality classifications on the two opposite banks suggested very different levels of pollution coming down the river. This work has shown that the side of the river that routine water monitoring samples are taken from can make a significant difference to the classification of microbial water quality. This has important implications for sampling strategies and the use of microbial source tracking (MST) techniques.

Quilliam, R.S., Clements, K., Duce, C., Cottrill, S.B., Malham, S.K., Jones, D.L. (2011). Spatial variation of waterborne *Escherichia coli* - implications for routine water quality monitoring. Journal of Water and Health, 9, 734-737.

4. Water quality in the Tamar (1)

As part of the PREDICT Tamar Workshop, the toxicity of estuarine waters in the Tamar Estuary (southwest England) was assessed by integration of metal speciation determination with bioassays.

Toxicity tests, based on the response of Pacific oyster larva exposed to discrete water samples showed a high level of toxicity (up to 100% abnormal development) at two stations in the Tamar, particularly during periods of the tidal cycle when the influence of more pristine coastal water was at its lowest.

The free cupric ion concentration was unlikely to have been the sole cause of the observed toxicity. Nonetheless, it is probable that the combined effect of the metals (Cadmium, Lead, Copper) determined in this work contributed significantly to the bioassay response.

Money, C., Braungardt, C.B., Jha, A.N., Worsfold, P.J., Achterberg, E.P. (2011). Metal speciation and toxicity of Tamar Estuary water to larvae of the Pacific oyster, *Crassostrea gigas*. Marine Environmental Research, 72, 3-12.

5. Water quality in the Tamar (2)

This study assessed numerous histological parameters as markers of health status in

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mussels collected from several locations along a contamination gradient on the River Tamar and two coastal sites on the north and south coast of Cornwall. Reproductive condition and inflammatory lesions showed changes indicative of a contamination gradient response. Mussel populations further upstream within the Tamar were relatively less developed compared to mussels situated downstream in the estuary. Compared to coastal locations, mussels sampled within the Tamar also exhibited a higher prevalence of inflammatory lesions that increased at locations situated furthest upstream.

Various pathogens was observed during this survey. Generally, the range and prevalence of pathogens was highest from the two estuarine locations at Cremyll Ferry and Wilcove.

Bignell, J.P., Stentiford, G.D., Taylor, N.G.H., Lyons, B.P. (2011). Histopathology of mussels (*Mytilus* sp.) from the Tamar estuary, UK. Marine Environmental Research, 72, 25-32.

6. Bio-contaminants in Wales

Bio-monitoring of contaminants (metals, organotins, PAHs, PCBs) was undertaken in Milford Haven Waterway (MHW) and a reference site in the Tywi Estuary (St Ishmael/ Ferryside) during 2007-2008. Seaweeds, limpets, mussels, cockles and polychaete worms were sampled.

Contaminant burdens in MHW were higher than the Tywi reference site, reflecting inputs. Elevated metal concentrations were observed at some MHW sites, whilst Arsenic and Selenium (molluscs and seaweed) were consistently at the higher end of the UK range. However, for most metals, distributions in MHW biota were not exceptional. TBT levels in MHW mussels were below OSPAR toxicity thresholds and in the Tywi were close to zero. Phenyltins were not accumulated appreciably in mussels, whereas some worm populations appear subjected to localized (historical) sources. PAHs in worms were generally evenly distributed across most of MHW, although certain of these chemicals were highest at one site near the mouth and naphthalenes were enriched in the mid-upper Haven (a pattern seen in mussels for most PAHs). Whilst PAH (and PCB) concentrations in MHW mussels were mostly above reference and OSPAR backgrounds, they are unlikely to exceed eco-toxicological thresholds. Bivalve Condition indices (CI) were highest at the Tywi reference site and at the seaward end of MHW, decreasing upstream.

Langston, W.J., O'Hara, S., Pope, N.D., Davey, M., Shortridge, E., Imamura, M.,Harino, H., Kim, A., Vane, C.H. (2012). Bioaccumulation surveillance in Milford Haven Waterway. Environmental Monitoring and Assessment, 184, 289-311.

7. Shellfish toxin assays compared

Significant differences previously observed in the determination of paralytic shellfish poisoning toxins (PSTs) in oysters using official method AOAC 2005.06 and the mouse bioassay (MBA) were investigated in detail with regard to possible matrix effects. Method AOAC 2005.06 gave results 2-3 times higher than the MBA method, differences thought to be due to underestimation of PSTs by the bioassay. In order to prove the cause of these large differences, work was conducted to examine the presence and effects of matrix components on the performance of each of the two assays. A range of oyster, cockle and mussel samples were extracted using the AOAC 959.08 hydrochloric acid extraction method and analysed for PSP by both MBA and LC-FLD. In addition, extracts were analysed by Inductively Coupled Plasma Mass Spectrometry (ICP-MS) for metals as well as being subjected to a range of nutritional testing methods.

Whilst there was no evidence for effect of nutritional components on either assay, ICP-MS analysis revealed a relationship between samples exhibiting the largest differences in relative method performance, specifically those with the largest LC-FLD/ MBA toxicity ratio, and samples containing the highest concentrations of zinc and manganese. In order to prove the potential effect of the metals on either the LC-FLD and/or MBA assays, acidified extracts of a range of shellfish were subjected to a number of matrix modifications. Firstly, a number of PSP-positive oyster samples were processed to reduce the concentrations of metals within the extracts, without significantly reducing the concentrations of PSTs. Secondly, a range of mussel and cockle extracts, plus a standard solution of saxitoxin di-hydrochloride were spiked at variable concentrations of zinc. All treated and non-treated extracts, plus a number of controls were subjected to ICP-MS, LC-FLD and MBA testing. Results proved the absence of any effect of metals on the performance of the LC-FLD, whilst showing a large suppressive effect of the metals on the MBA. As such, the results show the performance of the official MBA is potentially unsafe for application to the routine monitoring of PSP toxicity in oysters or in any other shellfish found to contain high concentrations of metal ions.

Turner, A.D., Dhanji-Rapkova, M., Algoet, M., Suarez-Isla, B.A., Cordova, M.,Caceres, C., Murphy, C.J., Casey, M., Lees, D.N. (2012). Investigations into matrix components affecting the performance of the official bioassay reference method for quantitation of paralytic shellfish poisoning toxins in oysters. Toxicon, 59, 215-230.

8. Okadaic acid levels and DSP

In June 2009, 11 outbreaks of food poisoning occurred in France, involving 45 individuals who had consumed mussels harvested in Vilaine Bay. As toxic algae had been detected in the area from mid-May, okadaic acid (OA) and dinophysistoxins were suspected to be the cause of these outbreaks, although the weekly monitoring tests by mouse bioassay had been negative. With the help of the French reporting system for food-borne disease outbreaks, the detailed data on epidemiology, mussel consumption and complete product trace-back were collected for 11 individuals involved in three reported outbreaks. The batch of mussels identified as the source of these three outbreaks contained concentrations of toxins of the okadaic acid group that were approximately eight times higher than the European Regulatory limit. Moreover, based on the consumption data available for the 11 cases, a lowest observable adverse effects level (LOAEL) was deduced. The LOAEL

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calculated from this study, although based on a very limited number of individuals, was in the same range, i.e. approximately 50 µg OA equivalents per person, as the LOAEL established by the European Food Safety Authority in 2006.

Hossen, V., Jourdan-da Silva, N., Guillois-Becel, Y., Marchal, J., Krys, S. (2011). Food poisoning outbreaks linked to mussels contaminated with okadaic acid and ester dinophysistoxin-3 in France, June 2009. Eurosurveillance, 16, 15-21.

9. Detecting Oyster Herpesvirus

Ostreid herpesvirus-1 (OsHV-1) infections have been reported around the world associated with mortalities of the Pacific oyster. Recently, a new genotype called OsHV-1 µvar was described associated with extremely high oyster mortalities in France and has been considered a dangerous emerging pathogen.

Here, we describe the presence of this new genotype OsHV-1 µvar in Spain, also associated with Pacific oyster mortalities. Moreover, we have developed a specific polymerase chain reaction-restriction fragment length polymorphism (PCR-RFLP) assay to identify OsHV-1 µvar and distinguish it from the reference herpes virus genotype. We offer this technique as a useful method to provide a rapid identification of OsHV-1 µvar in epizootiological studies and disease control programmes.

Aranguren, R., Costa, M.M., Novoa, B., Figueras, A. (2012). Detection of herpesvirus variant (OsHV-1 µ var) in Pacific oysters (*Crassostrea gigas*) in Spain and development of a rapid method for its differential diagnosis. Bulletin of the European Association of Fish Pathologists, 32, 24-29.

10. Oyster Herpes Virus variants

A new and highly pathogenic variant of Ostreid Herpesvirus 1 (OsHV-1), called µVar, has recently been described. The purpose of this study was to characterize the genotype (variants or OsHV-1 reference) of 300 positive samples in Pacific oysters analyzed between July 2008 and July 2010 collected along the French, Jersey, and Irish coasts.

OsHV-1 µVar was detected in 257 oyster samples (87%). The genotype OsHV-1 reference was never detected during the 25 months of the survey. Thirty-eight samples could not be determined and the majority of them had a low viral load. A novel genotype, named OsHV-1 µVar Delta 9 was found in the other 5 samples.

Martenot, C., Oden, E., Travaille, E., Malas, J.P., Houssin, M. (2011). Detection of different variants of Ostreid Herpesvirus 1 in the Pacific oyster, *Crassostrea gigas,* between 2008 and 2010. Virus Research, 160, 25-31.

11. Biosecurity

Aquaculture production has dramatically risen over the last 30 years. Movement of live aquatic animals within and between countries for aquaculture and the ornamental trade is an important route of disease spread. Over the last decades, many aquatic animal diseases have emerged to have a substantial economic impact on aquaculture, sometimes with ecological consequences.

Effective biosecurity strategies provide protection to both farmed and wild aquatic animal populations by minimising the risk of introducing pathogens and minimising the consequences if the pathogen was introduced. We provide an overview of international, supranational and national biosecurity strategies for aquatic animal health. The role of the World Organisation for Animal Health (OIE) as the reference organisation for the development of standards relating to international trade in animals and animal products is described and an overview of the OIE standards provided: Europe and England and Wales are used as examples to illustrate how the international standards are implemented at supranational and national level. Other important elements of biosecurity not defined by international standards are described.

At the national level, the paper describes and discusses the role of the competent authority, instruments to prevent the introduction of exotic diseases and limit the impact of endemic diseases: it highlights the relevance of import risk assessments and the importance for awareness of international developments. At farm level, it summarises available standards and the role of farm biosecurity plans. Challenges to biosecurity strategies at the various levels are discussed.

Oidtmann, B.C., Thrush, M.A., Denham, K.L., Peeler, E.J. (2011). International and national biosecurity strategies in aquatic animal health. Aquaculture, 320, 22-33.

12. Low temperature tolerance of pacific oysters

Intertidal species are generally very tolerant to varying environmental conditions.

Mortality of groups of Pacific oysters after exposure to simulated winter conditions (minus 22 degrees C) for 24, 48, and 72 h, such as can be experienced in Scandinavia, was recorded. The oyster was found to be very tolerant to low temperatures with, in general, 50% survival after 24 h. Thermal acclimatization and premature adjustment to winter conditions allowing for improved survival after cold treatment were also observed.

Strand, A., Waenerlund, A., Lindegarth, S. (2011). High tolerance of the Pacific oyster (*Crassostrea gigas*, Thunberg) to low temperatures. Journal of Shellfish Research, 30, 733-735.

13. Winter mortality of Pacific oysters

After a decade of mild winters, in January and February 2010, the first severe winter occurred since the Pacific oysters became dominant on former intertidal blue mussel beds in the North-Frisian Wadden Sea. After the ice winter, mortality of Pacific oysters on densely populated beds in the List tidal basin reached about 90%, indicating much higher losses in comparison to former mild winters. At lower densities between the islands of Amrum and Fohr, oysters were less or even not affected. Although Pacific oysters are assumed to be very tolerant to frost, the duration of cold water and air temperatures

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accompanied by mechanical stress of the ice burden might have caused the high mortality in the winter 2009/2010 in formerly dense beds.

Buttger, H., Nehls, G., Witte, S. (2011). High mortality of Pacific oysters in a cold winter in the North-Frisian Wadden Sea. Helgoland Marine Research, 65, 525-532.

14. Pacific oyster recruitment in the Wadden Sea

Using a variable non-coding mitochondrial marker, we show Pacific oyster recruitment in the European Wadden Sea is the result of two independent invasions, one in the southern and the other in the northern Wadden Sea. We found virtually no genetic differentiation throughout the southern range and the putative source from British Columbia, Canada, suggesting that the Southern region can be considered as a closed population. In the North, mismatch distributions, haplotype ordination and isolation-by-distance analysis suggest a stronger, persistent impact of aquaculture on invasive populations. Due to the ongoing supply of new genetic material from hatchery production the northern invasive populations can therefore be considered as an open population highlighting the importance of aquaculture practice on the genetics of this species in the Wadden Sea.

Moehler, J., Wegner, K.M., Reise, K., Jacobsen, S. (2011). Invasion genetics of Pacific oyster *Crassostrea gigas* shaped by aquaculture stocking practices. Journal of Sea Research, 66, 256-262.

15. A model for Pacific oyster farming

We have developed a generic growth model for Pacific oysters. The oyster-DEB model simulated oyster growth dynamics of both spat and adult stages accurately over time when applied at various culture sites in France in different years (Arcachon, 1993-1994; Marennes-Oleron, 2007; Quiberon, 1999, 2000, 2001; Brest Harbour, 2008; Mont-Saint-Michel Bay, 2003; Baie-des-Veys, 2002). These different ecosystems offer a wide range of values for the two forcing variables of the model: water temperature (range: 6-24 degrees C) and phytoplankton concentration. The validation data (oyster dry flesh mass) were obtained from various growth surveys carried out by IFREMER.

The model captures: i) the active spring growth: ii) the timing and amplitude of spawning events; and iii) the lean periods (i.e. loss of dry flesh mass) in autumn and winter. The environment-specific half-saturation coefficient is the only model parameter that varied between sites and years. This coefficient reflects variability in the food of the oysters: quantitative and qualitative effects of the inorganic material and of the phytoplankton species on the feeding response of oysters. Otherwise, with a single set of parameters, this is thus the first bio-energetic growth model for Pacific oysters robust enough and of a sufficiently generic nature for the accurate simulation of oyster growth in different Atlantic ecosystems.

Alunno-Bruscia, M., Bourles, Y., Maurer, D., Robert, S., Mazurie, J., Gangnery, A., Goulletquer, P., Pouvreau, S. (2011). A single bio-energetics growth and reproduction model for the oyster *Crassostrea gigas* in six Atlantic ecosystems. Journal of Sea Research, 66, 340-348.

16. Offshore oyster cultivation

Both Pacific and native oysters were shown to grow successfully in a high-energy environment in the German part of the North Sea. Mean growth rates were similar to those measured in individuals from coastal habitats (wild banks and cultures) and the Condition Index showed seasonal variation in both species. The survival rate for both species was > 99% in 2007. However, in the previous trial in 2004 a high mortality rate was observed for native oysters at one of the four sites at the end of the experiment. Differences were observed in the increase of shell length and dry mass between sites and size classes.

Pogoda, B., Buck, B.H., Hagen, W. (2011). Growth performance and condition of oysters (*Crassostrea gigas* and *Ostrea edulis*) farmed in an offshore environment (North Sea, Germany). Aquaculture, 319, 484-492.

17. Oyster restoration – learning from experience

A century-long decline of the fishery for the Eastern oyster in Maryland and Virginia stimulated numerous efforts by federal, state, and non-governmental agencies to restore oyster populations, with limited success. To learn from recent efforts, we analyzed records of restoration and monitoring activities undertaken between 1990 and 2007 by 12 such agencies. Of the 1,037 oyster bars (reefs, beds, or grounds) for which we obtained data, 43% experienced both restoration and monitoring, with the remaining experiencing either restoration or monitoring only. Restoration activities involved adding substrate (shell), transplanting hatchery or wild seed (juvenile oysters), bar cleaning, and bag-less dredging. Of these, substrate addition and transplanting seed were common actions, with bar cleaning and bag-less dredging relatively uncommon. Limited monitoring efforts, a lack of replicated post-restoration sampling, and the effects of harvest on some restored bars has hindered evaluation of the effectiveness of restoration activities.

Future restoration activities should have clearly articulated objectives and be coordinated among agencies and across bars, which should also be of-limits to fishing. To evaluate restoration efforts, experimental designs should include replication, quantitative sampling, and robust sample sizes, supplemented by pre- and post-restoration monitoring.

Kennedy, V.S., Breitburg, D.L., Christman, M.C., Luckenbach, M.W., Paynter, K., Kramer, J., Sellner, K.G., Dew-Baxter, J., Keller, C., Mann, R. (2011). Lessons learned from efforts to restore oyster populations in Maryland and Virginia, 1990 to 2007. Journal of Shellfish Research, 30, 719-731.

18. Mussel farming in Greece

Mussel farming in Greece covers 375.5 ha primarily located in the northern part of the country. About 523 farms have been licensed

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since 1976, of which 218 are using the single long-line floating technique for a nominal production capacity of about 100 t/ha and a farming area of 1-2 ha on average. The total annual production was 36,000 t in 2008. Currently, there is a trend for further expansion by licensing new farming sites. Eighty percent of the farmed mussels are exported fresh and intact, primarily to Italy. One major problem seems to be the increasing number of harmful algal bloom incidents during the past decade. The future of the industry depends on the industrialization of production methods and the development of scale to suppress the production cost. Support of product branding and development of a quality scheme would further strengthen the sector.

Theodorou, J.A., Viaene, J., Sorgeloos, P., Tzovenis, I. (2011). Production and marketing trends of the cultured Mediterranean mussel *Mytilus galloprovincialis* Lamarck 1819, in Greece. Journal of Shellfish Research, 30, 859-874.

19. A model for mussel farming on long-lines

Farm structures and dense mussel populations may result in water flow reduction and food depletion and thus reduce mussel growth. One of the challenges in mussel farming is thus to scale and configure farms in order to optimise total mussel production and individual mussel quality under different environmental conditions. A spatially resolved model for simulation of flow reduction, food depletion and individual mussel growth inside a long-line farm, based on information about farm configuration (spacing between long-lines, farm length and stocking density) and background environmental conditions (current speed, food concentration and temperature) was developed using environmental data from two fjords in south-western Norway.

The simulations show that flow reduction and food depletion have significant impacts on individual mussel growth. Long-line spacing has a strong impact on the spatial distribution of individual growth, and the spacing is characterised by a threshold value. Below the threshold, growth reduction and spatial growth variability increase rapidly mainly as a consequence of reduced water flow and food supply rate, but increased filtration due to higher mussel densities also contributes to the growth reduction. The spacing threshold is moderated by other farm configuration factors and environmental conditions. Comparisons with other farm sites show that the model simulations are within observed ranges. A demonstration is provided on how the model can guide farm configuration with the aim of optimising total farm biomass and individual mussel quality (shell length, flesh mass, spatial flesh mass variability) under different environmental settings. The model has a potential as a decision support tool in mussel farm management and will be incorporated into a GIS-based toolbox for spatial aquaculture planning and management.

Rosland, R., Bacher, C., Strand, O., Aure, J., Strohmeier, T. (2011). Modelling growth variability in longline mussel farms as a function of stocking density and farm design. Journal of Sea Research, 66, 318-330.

20. Responses of mussels to predators

The response to predators from suspended mussels was active in that they developed a significantly firmer attachment to the substrate and a closer aggregated structure. Bottom mussels had a passive strategy by having a thicker shell and larger relative size of the adductor muscle. In a field experiment mussels originated from suspended cultures had a higher length increment and lower mortality when compared to bottom mussels. It is concluded that suspended mussels potentially are an alternative resource to bottom culture and can be used in habitat improvement of mussel beds, but that the use of suspended mussels has to be tested further in large-scale field experiments.

Christensen, H.T., Dolmer, P., Petersen, J.K., Torring, D. (2012). Comparative study of predatory responses in blue mussels (*Mytilus edulis* L.) produced in suspended long line cultures or collected from natural bottom mussel beds. Helgoland Marine Research, 66, 1-9.

21. Cockle mortalities

Recently, mass surfacing and mortalities of cockles have been observed and reported at sites in Ireland and elsewhere, particularly in the summer months. One such site is Flaxfort Strand, Courtmacsherry Bay, County Cork, an important feeding area used by many seabirds during the summer. For the past few years large numbers of surfaced cockles have been observed at the site in a moribund condition.

Samples of cockles from this area that had surfaced (moribund) and those still buried in the sediment were collected during the summer for examination.

The most significant finding was that mortalities and surfacing of cockles was related to a greater incidence of disseminated neoplasia (the abnormal proliferation of cells). No neoplasia was observed in the smallest and largest size classes. There was a significantly higher prevalence of neoplasia in moribund cockles than in buried cockles, whereas in both groups a similar concentration of trematode metacercariae was observed in the screened tissues. Also, most of the cockles that had surfaced were either in the process of spawning or were spent. Overall, a much larger percentage of moribund cockles exhibited both trematode infections plus neoplasia compared with buried cockles. A combination of the presence of neoplasia and trematodes, along with stress related to spawning, may immunologically compromise the cockles, causing the animals to surface and become moribund.

Morgan, E., O'Riordan, R.M., Kelly, T.C., Culloty, S.C. (2012). Influence of disseminated neoplasia, trematode infections and gametogenesis on surfacing and mortality in the cockle *Cerastoderma edule*. Diseases of Aquatic Organisms, 98, 73-84.

22. Crab predation and burrowing cockles

Cockles were placed in experimental tanks and treated with three levels of predatory disturbance: (1) unfed crab loose inside the tank, (2) unfed crab inside a cage suspended

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in the water column and (3) no crab present. Cockles' burrowing depth was measured in two sediment types: mud and sand. Cockles burrowed more deeply in treatments with no crabs. Burrowing depth in sand was significantly greater than in mud. Two factors may contribute to the reduction in burial depth in the presence of crabs: the change in the vertical orientation of the cockle and the 'cough response'. No significant difference was found in the cockles' feeding rate among the different levels of predator threat.

Romano, C., Sara, G., Salvo, G., Bishop, J., Mazzola, A., Widdows, J. (2011). Effect of the presence of the shore crab, *Carcinus maenas*, on burrowing behaviour and clearance rate of the common cockle, *Cerastoderma edule*. Marine Biology, 158, 2685-2694.

23. Marteilia in cockles

A *Marteilia* parasite, potentially *M. refringens*, was observed in cockles growing in bays of the Ebro Delta during a mortality event in 2008. *Marteilia* parasites are usually found in oysters and mussels. However, they have also sometimes been observed in other commercial bivalve species. Parasite prevalence was not negligible (40%) and was potentially associated with the cockle mortality.

Parasite infection intensity was high to moderate, and, in general, developmental stages observed were similar to those seen of *M. refringens* infecting fiat oysters and mussels. This is the first report of a *Marteilia* parasite in cockles in Spain and the second report in the world.

Aarrasco, N., Roque, A., Andree, K.B., Rodgers, C., Lacuesta, B., Furones, M.D.,(2011). Marteilia parasite and digestive epithelial virosis lesions observed during a common edible cockle *Cerastoderma edule* mortality event in the Spanish Mediterranean coast. Aquaculture, 321, 197-202.

24. Sea star predation on scallops

The potential for starfish predation on juvenile scallops at a size (41 mm shell height) ready for seeding in sea ranching areas was investigated in a 30-day laboratory predation experiment.

The rate of predation of large common sea stars (*Asterias rubens*, 95-115 mm radius) and large spiny starfish (*Marthasterias glacialis*, 120-164 mm radius) was similar, at 0.88 and 0.71 scallops per individual per day, respectively. Maximum rates of predation were 2.44 scallops per individual per day for large common sea stars and 3.00 scallops per individual per day for large spiny starfish. Small spiny starfish (76-87 mm radius) had a significantly lower predation rate than large individuals of either species (average 0.13 scallops per individual per day). Small common sea stars (50-80 mm radius) only began to prey on scallops when average scallop size was reduced to 35 mm.

Based on estimated density of sea stars at sea ranching sites in Norway and average predation rates, a population of scallops seeded at 10 per square metre would be reduced by between 0.5% and 11% in one month. Using the highest observed predation rate, the degree of loss of scallops indicated that scallop culture via sea ranching would not be economically viable and thus methods for reducing scallop predation by sea stars are necessary.

Magnesen, T., Redmond, K.J. (2012). Potential predation rates by the sea stars *Asterias rubens* and *Marthasterias glacialis*, on juvenile scallops, *Pecten maximus*, ready for sea ranching. Aquaculture International, 20, 189-199.

25. The lobster louse

The morphology and pathology of the parasitic copepod, *Nicothoe astaci* (the 'lobster louse') was examined in its host, the European lobster.

Lobsters were sampled from waters surrounding Lundy Island (Bristol Channel, UK) and all individuals collected were found to harbour female adult parasites in their gills, with a mean of 47.3 parasites/lobster. The parasite was found to attach to gill filaments via its oral sucker, maxillae and maxillipeds, and to feed on host haemolymph (blood) through a funnel-like feeding channel. It caused varying degrees of damage to the host gill.

Wootton, E.C., Pope, E.C., Vogan, C.L., Roberts, E.C., Davies, C.E., Rowley, A.F. (2011). Morphology and pathology of the ectoparasitic copepod, *Nicothoe astaci* ('lobster louse') in the European lobster, *Homarus gammarus*. Parasitology, 138, 1285-1295.

26. Lobsters in marine reserves

Over the period September 2006 to August 2007, 95% of tagged lobsters remained either within a marine reserve on the Norwegian Skagerrak coast or near reserve boundaries. Home range estimates ranged from 5,728 to 41,548 square metres (mean 19,879 square metres), representing 0.57%-4.15% of the reserve area (1 kilometre square), with no significant difference among males, non-ovigerous females, and ovigerous females for an overlapping observation period of 242 days.

These results show that European lobsters can be resident with limited home ranges. Small coastal reserves can be designed to afford complete or partial protection by letting boundaries engulf or intersect patches of habitat preferred by this species.

Moland, E., Olsen, E,M,, Andvord, K., Knutsen, J.A., Stenseth, N.C. (2011). Home range of European lobster (*Homarus gammarus*) in a marine reserve: implications for future reserve design. Canadian Journal of Fisheries and Aquatic Sciences, 68, 1197-1210.

27. Ocean acidification (1)

Results from an oyster hatchery on the Oregon coast, where intake waters experienced variable carbonate chemistry (aragonite saturation state < 0.8 to > 3.2; pH < 7.6 to > 8.2) in the early summer of 2009 showed that both larval production and mid-stage growth (~120 to ~150 µm) of the Pacific oyster were significantly negatively correlated with the aragonite saturation state of waters in which larval oysters were spawned and reared for the first 48 h of life. The effects of the initial spawning conditions did not have a significant effect on early-stage growth (growth from D-hinge stage to ~120 µm), suggesting a delayed effect of water chemistry on larval development.

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Barton, A., Hales, B., Waldbusser, G.G., Langdon, C., Feely, R.A. (2012). The Pacific oyster, *Crassostrea gigas*, shows negative correlation to naturally elevated carbon dioxide levels: Implications for near-term ocean acidification effects. Limnology and Oceanography, 57, 698-710.

See also the article on the Fish Site, at: www.thefishsite.com/fishnews/16902/ocean-acidification-linked-to-larval-oyster-failure.

28. Ocean acidification (2)

Despite the importance of carry-over effects in the evolutionary history of marine organisms, few studies have considered links between life-history stages when determining how marine organisms will respond to elevated pCO_2, and none have considered the link between adults and their offspring. This study suggests that sensitive marine organisms may have the capacity to acclimate or adapt to elevated pCO_2 over time.

We found that elevated pCO_2 reduced the growth, rate of development and survival of Sydney rock oysters. Exposing adults to elevated pCO_2 during reproductive conditioning, however, had positive carry-over effects on larvae. Larvae spawned from adults exposed to elevated pCO_2 were larger and developed faster, and displayed similar survival compared with larvae spawned from adults exposed to ambient pCO_2. Furthermore, selectively bred oyster larvae were more resilient to elevated pCO_2 than wild larvae.

Parker, L.M., Ross, P.M., O'Connor, W.A., Borysko, L., Raftos, D.A., Portner, H.O. (2012). Adult exposure influences offspring response to ocean acidification in oysters. Global Change Biology, 18, 82-92.

29. Ocean acidification (3)

Mussels were exposed to four different seawater pCO_2 concentrations (39, 142, 240, 405 Pa) and two food algae concentrations for a period of seven weeks during winter (5 degrees C).

Low food algae concentrations and high pCO_2 values each significantly decreased shell length growth. Internal shell surface corrosion of nacreous (= aragonite) layers was observed (via stereomicroscopy and SEM) at the two highest pCO_2 treatments in the high food group, while it was found in all treatments in the low food group. Both factors, food and pCO_2, significantly influenced the magnitude of inner shell surface dissolution. Our findings illustrate, for the first time, that integrity of inner shell surfaces is tightly coupled to the animals' energy budget under conditions of CO_2 stress. It is likely that under food limited conditions, energy is allocated to more vital processes (e. g. somatic mass maintenance) instead of shell conservation. It is evident from our results that mussels exert significant biological control over the structural integrity of their inner shell surfaces.

Melzner, F., Stange, P., Trubenbach, K., Thomsen, J., Casties, I., Panknin, U., Gorb, S.N., Gutowska, M.A. (2011). Food Supply and Seawater pCO2 Impact Calcification and Internal Shell Dissolution in the Blue Mussel *Mytilus edulis*. PLoS ONE 6(9): e24223. doi:10.1371/journal.pone.0024223.

30. Manila clam recruitment

Fine-resolution hydrodynamic models coupled with a water salinity model and an individual behaviour model of Manila clam larvae were used to evaluate whether natural larval transport and behaviour alone can explain the pattern of invasion and establishment of the non-indigenous Manila clam, and its spread beyond Poole Harbour, the point of introduction in the UK. The model was informed by experimental studies on the vertical response of larvae to salinity and field studies of the species in its natural and new environments.

Variations in the behavioural response of larvae to salinity in the model considerably affected the retention of clam larvae within the harbour. High levels of predicted larval retention occurred in two of five zones in the harbour when the salinity target was set at 17 practical salinity units. Persistently high densities of adult clams and recruits are accurately predicted in these regions. Therefore, even within a relatively small region such as Poole Harbour, there is both localized retention of larvae or 'closed' areas and areas that are considerably more 'open' and potentially connected. The behavioural response of larvae to salinity significantly affected the degree of retention and 'openness' of the harbour to this species. Although, through natural transport, larvae could theoretically reach the next available habitat within the duration of their pelagic stage our study indicates that areas of sufficiently reduced salinity may be necessary for sufficient retention, recruitment and establishment of new adult populations in estuaries.

Herbert, R.J.H., Willis, J., Jones, E., Ross, K., Hubner, R., Humphreys, J., Jensen, A., Baugh, J. (2012). Invasion in tidal zones on complex coastlines: modelling larvae of the non-native Manila clam, *Ruditapes philippinarum*, in the UK. Journal of Biogeography, 39, 585-599.

31. Chilean oysters in the Menai Strait

Following more than 30 years of containment at Tal y Foel (North Wales), the Chilean oyster, a species with a highly-reduced natural dispersal capacity, has now spread over a range of more than 30 km of shoreline. Alternative vectors, including rafting and several anthropogenic activities are likely to have facilitated the dispersal of this species away from Tal y Foel. Areas of high oyster densities (maximum=232 oysters per square metre) have become established both close to and distant from the site of original introduction. The presence of all year classes throughout the observed age range (7 and 9 years old in the intertidal and sub-tidal populations, respectively) confirms regular annual recruitment in the area.

Information is now urgently required regarding the factors that promote the persistence and spread of this species within its new environment, as well as the impacts of its increasing localized dominance on the native biodiversity and ecosystem function in a designated Special Area of Conservation.

This paper also highlights discrepancies in the current UK legislation framework that allow for the successful establishment and spread of even the most unlikely invaders. The formation of a comprehensive and

Research

dedicated EU legal framework for managing invasive species is advocated that also promotes coherence and continuity with impending legislative instruments concerning other relevant sectors.

Morgan, E.H., Richardson, C.A. (2012). Capricious bioinvasions versus uncoordinated management strategies: how the most unlikely invaders can prosper under the current UK legislation framework. Aquatic Conservation-Marine and Freshwater Ecosystems, 22, 87-103.

32. Marine Planning

The statutory closure of 60 square miles of Lyme Bay to towed fishing gear in 2008 marked the culmination of nearly 20 years of discussions between conservationists and fishermen. Lyme Bay provides an excellent case study of the challenges likely to be posed by wider stakeholder involvement imposed under the new Marine Act. This paper examines a broad range of perspectives in relation to the Lyme Bay consultation and subsequent closure, via semi-structured interviews with 25 representatives of different interest groups in Lyme Bay. All respondents acknowledged significant flaws in the process leading to the Lyme Bay decision and felt the Marine Act was well placed to tackle many of these criticisms. However, while the Marine Act should provide a framework for resolving conflicts, it will not prevent them. Success will depend on collaboration between different marine interests, and also on the government acknowledging that outcomes are unlikely to favour everyone in the short-term and that top-down interventions are inevitable.

Fleming, D.M., Jones, P.J.S. (2012). Challenges to achieving greater and fairer stakeholder involvement in marine spatial planning as illustrated by the Lyme Bay scallop dredging closure. Marine Policy, 36, 370-377.

Press cuttings

Strange find

This lobster with an unusually formed 'star' claw was caught onboard the St Abbs creel boat Cygnus Cyclone 30 Sharatan SY 828 just off the Cove harbour in a 36inch Gae Force parlour creel. Fishermen Steven and Keith Hood said they have never seen one like this before

Fishing News - 16 December 2011

Project to protect shellfish industry

Delegates from across Europe met at the NAFC Marine Centre recently to discuss results of a project that was initiated to reduce disruption to the shellfish industry through establishing advanced testing technologies for analysis of algal blooms.

The project was deemed a success on two counts: firstly by identifying two rapid assay tests that can be successfully used; and also in proving that a link exists between algal blooms, wind direction and sea temperature, based on a case study conducted at Busta Voe, Brae, Shetland.

Algal blooms can occur when numbers of naturally occurring microscopic algae in plankton rapidly increase. Some species are harmful when a bloom occurs and this can present serious environmental problems, particularly if shellfish are harvested in an area where a bloom occurred.

Fishing News - 11 November 2011

Seafish appoints board members

The four UK Fisheries Ministers have appointed a new Board to Seafish. This follows discussions with the industry on Seafish's future, which were held last autumn.

A new deputy chair, Jane Ryder and seven non-executive members have been appointed to the Seafish Board from 1 April 2012. The non-executive board members are: Clare Dodgson, Peter Hajipieris, Philip Huggon, Michel Kaiser, Michael Park, Stephen Parry and James Wilson.

The deputy chair appointment is based on a time commitment of two and a half days per month and board member appointment is based on one and a half days per month. All appointments run from April 2012 for three years and have the option of an extension of up to three years. For information see *www.defra.gov.uk/news/2012/03/29/seafish-board/*

Fishing News - 6 April 2012

North Sea nephrops withdrawal from MSC accreditation

ONE OF Scotland's most important fisheries has withdrawn from the Marine Stewardship Council accreditation process.

The North Sea nephrops fishery, worth £74m in 2010, was presented for MSC certification by a consortium of Scottish Producers Organisations and Fishermen's Associations in 2007 and was expected to pass with flying colours.

Iain MacSween, CEO of SFO and board member of SFSAG said 'While we are very disappointed that we have had to make the decision to withdraw from the MSC process, we are unanimous that the decision is correct. MSC assessment criteria simply don't take the reality of the situation for stocks such as this into account. Full story in next week's *Fishing News*.

Iain MacSween, CEO of SFO and Board member of SFSAG said that he firmly believes that the NS nephrops stock is healthy – "a fact supported by the science, and that it is managed in a sustainable way."

Fishing News - 23 March 2012

Channel scallop fishery project underway

A NEW industry-funded PhD research project is underway at Bangor University to help improve understanding of the scallop fishery in the English Channel.

This first-time collaboration between processors and fishermen, and scientists at Bangor University and CEFAS, has been spearheaded by the Scallop Association, who have identified crucial data gaps which need to be addressed if the fishery is to move towards a certified status.

The first phase of the project is already underway, and builds on research undertaken in the Isle of Man studying the population structure of scallops in UK waters. In the coming months, Claire Szostek will be undertaking a scallop fishery questionnaire to establish the current and past extent of scallop beds, and to interrogate fishermen's knowledge about changes in scallop spawning patterns, distribution and recruitment over time.

The research is co-funded by the following organisations: Falfish; AM Seafoods; Coombe Fisheries; TN trawlers; West Coast Sea Products; McLeod Trawlers; The Fishmonger's Company.

Fishing News - 16 December 2011

Press cuttings

Scallop ranching to build on success achieved by closed areas

As part of the integrated fisheries management strategy to secure sustainable scallop fishing, during the summer of 2009 Manx fishermen placed 200,000 young scallops into two areas on the east and west coast of the Isle of Man that were selected and closed at the start of a programme to evaluate the benefits of scallop ranching.

The intention behind the practice of scallop ranching is to 'seed' areas of sea-bed with scallop spat in order to grow them on to harvesting size.

Working in partnership with the Manx FPO, DEFA placed a total of over 200,000 juvenile (two and three-year-old) scallops onto existing scallop beds within Laxey and Niarbyl Bays.

Half of these scallops were collected by local boats on such grounds as the Targets, while the juveniles released in Laxey Bay were sourced from Ireland.

The scallops are expected to reach maturity next year, during which time DAFF has continued to work closely with Manx scallop vessels to monitor the growth and survival rates of the redistributed scallops.

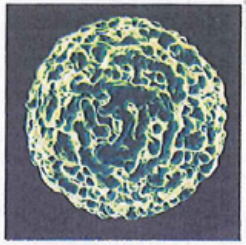
The initiative, which could include a limited form of rotational small area fishing annually co-ordinated by the MFPO, forms part of the on-going plan to subsequently seed much larger areas of seabed.

This would enable boats to achieve better catch rates and profitability from less fishing time and lower fuel costs; in other words a win/win situation.

The introduction of such-pioneering research and development programmes as scallop ranching is assisted by the fact that the seabed of the Territorial Sea is owned by the Isle of Man Government, as opposed to the situation in the UK, where the seabed is controlled by the Crown Estate.

Fishing News - 16 December 2011

New shellfish testing service launched



The new shellfish testing service will monitor bacteria and viruses such as Norovirus

THE National Laboratory Service (NLS) is pleased to announce the launch of a new shellfish testing service, AquaProva. This is a joint venture between the NLS and Aquatic Water Services (AWS).

Viruses in shellfish raise important safety issues for the food industry. This new service will assist in the detection process – testing for Norovirus, E.Coli and Salmonella.

The AquaProva service provides high quality UKAS accredited testing services, for both regulatory and commercial producers.

The online platform provides a step by step procedure for submitting samples for testing. Plans are also in place to introduce a UK-wide courier facility to support the service.

NLS Commercial Director Ian Rippin believes that AquaProva will see the expertise of AWS and the NLS combine to offer a pioneering service to the seafood industry.

"We are delighted to be involved. As well as supporting a profitable seafood industry through the production of safe seafood, the service also reaffirms our position as leaders within our sector as we continually strive to improve the testing facilities available in the UK."

■ For information on AquaProva, please contact us on 0845 5212478 / info@aquaprova.co.uk or visit www.aquaprova.co.uk.

Fishing News - 16 December 2011

Whelks wanted!

Defra project announced

A NEW study on whelks, which aims to inform the management of this valuable fishery is to be launched, reports **Andy Lawler**, CEFAS.

Whelks are a valuable fishery with landings in England and Wales alone totalling £9m in 2010. Now a new, Defra-funded study hopes to shed light on the size and maturity of whelks so that better management can deliver long-term sustainability.

The management regime used for most whelk fisheries is the European Minimum Landing Size (MLS), which is a 45mm shell height. Previous work showed that this MLS is well below size which most whelks become mature in UK waters and does little to protect spawning stocks.

The 2011 Fisheries Science Partnership (FSP) whelk project in Sussex (a collaboration involving industry, the Sussex IFCA and CEFAS) provided important biological data. The project demonstrated regional variations in the size at which whelks mature. The FSP project results were well received at an industry meeting hosted by the Sussex IFCA. Among issues covered was the that effort for whelks is unrestricted in most areas and has increased over the past decade.

Proposed changes to management of crustacean trap fisheries may displace more effort to whelk fisheries. These factors contributed to concerns regarding long-term sustainability of the whelk fisheries.

The common whelk. (Image Crown copyright)

For that reason it is essential that we quantify whelk characteristics for all areas so managers can determine local and national measures. The new nationwide project is designed to provide Defra and regional IFCAs with scientific evidence to enable them to make informed decisions about appropriate measures, in particular the choice of suitable national and regional MLSs for whelks.

CEFAS scientists are collecting whelk samples from fishermen to determine the size of whelks at sexual maturity from the main fisheries around England.

Five areas will be studied in each of the two years of the project. Sample collection for the first year is underway in Devon, Dorset, Hampshire, Kent and Norfolk.

In addition, information will also be collected including sex ratio and factors affecting the reproductive health of the populations. To determine growth rates at each site scientists will explore various techniques designed to reveal ages of individual whelks including counting growth rings on the trap door of the whelk.

The Chief Fisheries and Conservation Officer for the Sussex IFCA, Tim Dapling, has welcomed the Defra-funded expansion of the original project to other regions: "It is encouraging to see further nationally orientated science work on whelk given their present commercial significance.

"Successful future management of whelk populations relies on sound evidence with an understanding of the stock and associated fisheries. Our experience of joint work between the industry, CEFAS and the Sussex IFCA team has provided valuable results for future management needs."

■ For more about the FSP whelk study, visit *http://www.cefas.defra.gov.uk/media/358431/whelkfspfinalreport.pdf and for the new project http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=2&ProjectID=17916.*

Fishing News - 17 February 2012

60-year-old lobsters caught

Simon Faber from Riverside Fish at Littlehampton with two impressive 10lb lobsters

THE water has been uncommonly warm off the Sussex coast and there have been some impressive catches including a 24lb 8oz turbot. The latest has been two fine lobsters weighing in over 10lb each. Average weight of lobsters caught off here is 3lbs, writes **John Perlam.**

Simon Faber, fishmonger and fisherman who runs Riverside Fish at Littlehampton said that due to a large influx of sprat there are bigger predators including turbot, brill and cod.

"Lobsters this size have never been seen here and they must be at least 60 years old and these sizes would tend to be in deep sea shipwrecks," he told *Fishing News.*

The lobsters which were netted two miles west of Littlehampton were sold at Billingsgate Fish Market in London.

Fishing News - 23 March 2012

Press cuttings

Scottish North Sea nephrops out of MSC

AS BRIEFLY reported in last week's *Fishing News*, one of Scotland's most important fisheries has withdrawn from the Marine Stewardship Council accreditation process.

The North Sea Nephrops fishery, worth in the region of £74 million in 2010, was presented for MSC certification by a consortium of Scottish Producers Organisations and Fishermen's Associations in 2007 and was expected to pass with flying colours.

The Scottish Fisheries Sustainable Accreditation Group (SFSAG) entered both the NS Nephrops and NS Haddock fisheries into the MSC accreditation process in 2007, after a period of discussion with Scottish Government and other interested parties.

The NS haddock fishery was certified in 2010, but the time taken to put the Nephrops fishery through the process meant that it had to be reassessed against different criteria.

During this time, ICES had started to make strong recommendations for the functional unit management of Nephrops stocks and these were reflected in the standard against which the fishery was evaluated.

Provisional results of the assessment indicated that the Fladen grounds would pass the assessment, but none of the other areas of the North Sea would, and suggested that the Firth of Forth and the Moray Firth could only receive the standard if the management of quota by functional units (FU) was introduced.

The quota for Nephrops is currently managed on a regional basis, with allocations made for a sea area as a whole. The northern North Sea is composed of three discrete areas of Nephrops abundance and all of them are consistently productive.

Functional unit management involves managing each area separately and could involve separating the quota allocation for the three fisheries.

SFSAG has, in the past, openly supported the concept of management at the functional unit level, but not by functional unit TAC's; the group considers this approach to be overly restrictive and unnecessary.

The benefits of individual quotas for each fishing area are far outweighed by the disadvantages, in terms of the restriction on the activities of the fleet and the administrative chaos that would be caused at both domestic and European level.

The fisheries remain productive and each fishery has its own specific characteristics that assist in ensuring that overexploitation is unlikely. Other methods of FU management are being investigated by the group, though a variety of fora, including support for the emerging North Sea Regional Advisory Council (NSRAC) Long Term Management Plan for Nephrops.

Mike Park, chairman of SFSAG, said: "The process has been long and arduous and while this course of action is not ideal, we cannot promote the idea of functional unit management by TAC just to obtain a blue tick.

"The Scottish fleet is at the forefront of sustainable practice, and we are fully supportive of using every means possible to ensure the health of the resource on which we depend.

"SFSAG will continue to seek sustainability accreditation for other stocks, but experience tells us that it is not an appropriate yard stick for all species."

Iain MacSween, CEO of SFO and Board member of SFSAG said: "While we are very disappointed that we have had to make the decision to withdraw from the MSC process, we are unanimous that the decision is correct. The MSC assessment criteria simply do not take the reality of the situation for stocks such as this into account.

"I firmly believe that the NS Nephrops stock is healthy, a fact supported by the science, and that it is managed in a sustainable way. SFO will continue to promote and sell NS Nephrops as a truly sustainable choice."

Fishing News - 30 March 2012

Boost for Shetland fisheries research

A SHETLAND-based research centre will provide more support for sustainable fisheries, thanks to funding from the Scottish Government.

Scientific research by the NAFC Marine Shetland was critical for Shetland king scallops, brown and velvet crab becoming the first fisheries of their kind in the world to be certified as sustainably managed by the Marine Stewardship Council last month.

On a visit to the NAFC, Fisheries Secretary Richard Lochhead announced £150,000 investment over the next three years to support the Centre's research work.

Mr Lochhead said: "The pristine waters around Shetland produce some of the world's highest quality seafood – and shellfish in particular. It's an outstanding achievement therefore for Shetland to achieve MSC status for three fisheries, which I'm sure will deliver an economic boost for the Isles in the coming years.

"However, this would not have been possible without the application from the Shetland Shellfish Management Organisation being underpinned by the scientific research carried out at the NAFC Marine Centre.

"This funding will help the NAFC work with more fishermen and conduct research into how stocks can be sustainably managed and harvested.

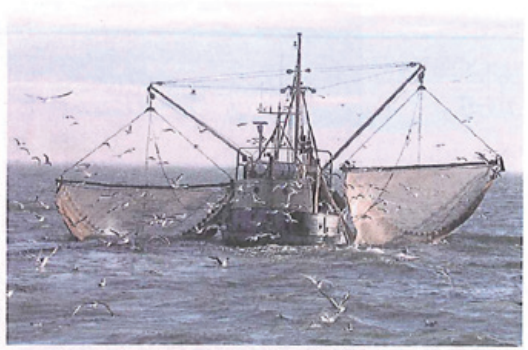
"Scottish and sustainable: that's the mantra we must promote for our seafood, and scientific research has a key role to play in our journey to a fully sustainable industry known across the world for its quality products. ."

Dr Martin Robinson, Head of Marine Science and Technology at NAFC, said: "The MSC awards passed to the SSMO by the Minister last week were the culmination of a long process of building solid working relationships between industry and applied scientists to deliver robust, locally informed stakeholder management. Transparent communication and an understanding of all stakeholders' perceptions are at the heart of the success.

Cabinet Secretary for Rural Affairs and the Environment Richard Lochhead with Dr Martin Robinson, Head of Marine Science and Technology at the NAFC Marine Centre

Fishing News - 6 April 2012

Press cuttings



The Wash pink and brown shrimp fisheries are to be assessed for sustainability

Wash shrimp fisheries moves towards MSC

MARINE Ecological Surveys Limited recently completed a pre-assessment for the pink and brown shrimp fisheries operating out of the Wash using the Marine Stewardship Council (MSC) methodologies, reports **Cormac Burke**.

The pre-assessment included a thorough review of current fishing practices against the MSC sustainability criteria as well as a detailed critique of comparable sustainability assessments that have, or are currently being undertaken around the world.

Duncan Vaughan, CEO of the Eastern Inshore Fisheries and Conservation Authority (Eastern IFCA), said that the pre-assessment carried out by Marine Ecological Surveys Limited is thorough and represents the new gold standard for this type of work.

"The report that they have produced is invaluable to the industry and will really help the shrimp fisheries move towards sustainability certification. Critical gaps in our understanding of shrimp stocks and the impact this type of fishing has on the wider marine ecosystem were identified during pre-assessment, which also highlighted a need for more stringent management measures. Since the publication of the report, the Eastern IFCA has taken steps towards establishing a Shrimp Fishery Advisory Group (SFAG). It is hoped that the group will be comprised of industry representatives and fisheries experts from the Marine Management Organisation, CEFAS and Natural England. Collectively, this group will advise the Wash shrimp industry on the best ways to fill knowledge gaps identified by the pre-assessment and will keep the industry informed of the latest developments in stock assessment and fishing techniques. The SFAG will also have an input into the formal management plans which are currently under production.

The progress of the brown and pink shrimp fisheries as they move towards accreditation can be seen on the Eastern IFCA website: *http://www.eastern-ifca.gov.uk/index.php?option=com_content&view=article&id=106:shrimp-accreditation&catid=10:newsandpress&Itemid=55*

Fishing News - 2 March 2012

Rare Holy Island 'blue' lobster

THE photo, sent in to *Fishing News* recently by Ryan Douglas, reports that when the vessel Jenna H was hauling lobsters pots one mile north east of the Emmanuel Head, Holy Island (Northumberland), "while the grey of the morning was just starting to come in", skipper Paul Douglas was surprised to see an extremely light blue creature come aboard in the trap end of his 32inch Medley lobster pot.

On closer inspection he then discovered that is was a very light blue hen lobster.

Crew man Mark Douglas then 'V notched' the blue lobster and released it back to the sea just outside of Holy Island Harbour.

The Jenna H has caugh, v-notched and released a large number of hen lobsters since the summer of 2011 and also lobster boat Fulmar II, which also fishes out of Holy Island, had caught and realased approximately the same amount as Jenna H, bringing their joint total to over 400 hen lobsters caught, v-notched and released around the Island since the summer of 2011.

Both skippers and crews say that this helps to keep up the healthy population of lobsters inshore and off Holy Island.

Fishing News - 24 February 2012

Press cuttings

Three-clawed crab finds new home at Padstow Lobster Hatchery

Staff at the National Lobster Hatchery, Padstow was this week anticipating the arrival of a unique three-clawed crab. The remarkable crab which displays an extra pair of pincers on one of its legs was hauled in by fisherman Craig Robinson who was fishing off the coast of Swanage in Dorset.

On spotting the crab's bizarre extra claw, Craig alerted the National Lobster Hatchery who were delighted to be able to offer a home to the mutant crustacean, amongst their own display of sea creatures.

Craig said that he could hardly believe his eyes when I saw three claws on the crab.

"Particularly as the extra one was on the end of an individual leg, rather than protruding from an already existing claw. What's even more incredible is that all three claws are fully functional, so it must have a pretty good advantage over other crabs"

The crab was housed at the Centre for Environment, Fisheries and Aquaculture Science (CEFAS) before going to its new home on Padstows South Quay, by Lobster Hatchery Trustee, Dr Grant Stentiford.

Staff at the Padstow Hatchery said that it is unusual to find a crustacean with a third claw that is fully operational

"Crabs, along with other crustaceans, are capable of re-growing limbs that have been lost or damaged, so it could be the case this crab's regeneration mechanism has got a little confused as to what it was replacing," Dr Stentiford said.

The National Lobster Hatchery's visitor centre attracts 40,000 visitors per year and staff believe this unusual addition will cause much interest, especially with all three claws in working order.

The National Lobster Hatchery's Dr Carly Daniels said it is unusual to find crustaceans with extra claws, especially one protruding from an individual leg socket.

"We can't be certain as to how it came about and it could be the result of a genetic mutation or environmental factors," said Dr Daniels.

Fishing News - 13 April 2012

Lobsters released in marine project

A TAVISTOCK man is leading efforts to release hundreds of baby lobsters into the sea as part of a major marine conservation project, reports the *Plymouth Herlad*.

Simon Scott, of BSAC (pictured left) is seen above with Mark Pearce, fellow BSAC diver and Visits Licensee for the Coronation wreck in Whitsand Bay where young lobsters will be released and hopefully grow into the fine specimen pictured here

As a member of the British Sub-Aqua Club (BSAC) he has enlisted the help of fellow divers from the Bude branch of BSAC to deposit hundreds of baby lobsters on the seabed near the 17th century shipwreck.

After coming across a leaflet for the National Lobster Hatchery in Padstow, Cornwall, Mark approached the charity to offer the area in and around the wreck as a perfect place to nurture juvenile lobsters.

The local hatchery agreed to donate the lobsters and is acting as the mastermind behind the environmental conservation programme.

Divers Simon Scott and Mark Pearce with a fine lobster specimen

Mr Pearce, a butcher by trade, said: "It is an ideal place to release the lobsters because there is a no take zone in place and it will hopefully give as many of the babies as possible a chance to grow. I think it is a fantastic project to be involved in.

"I have dived a lot with the Bude Dive Club and I know them to be experienced, knowledgeable and respectful divers and for that reason I have asked them to help me with the release."

Fishing News - 9 March 2012

Press cuttings

IMTA joint venture for Scottish farmers

Two Scottish seafood farmers are to launch an IMTA project to fulfill demand for sustainable, local product

Eva Tallaksen

Photo: IFM Images

IMTA SITE: Loch Fyne is the longest sea loch or fjord in the UK

Loch Fyne Oysters and the Scottish Salmon Company (SSC) will start trialing integrated aquaculture of salmon, mussels, oysters and seaweed, Loch Fyne said.

"We have done some research into integrated multi-trophic aquaculture (IMTA) and we'll gradually increase our efforts in this," Loch Fyne's CEO, Bruce Davidson, told FFI.

"We'll probably have a few hiccups on the way, but that's to be expected!"

Last month Loch Fyne - which farms oysters, mussels and operates a smokery from its site at Cairndow in Scotland - announced that it was taken over by Scottish Seafood Investments, a joint venture between SSC and SSC's majority owner.

Loch Fyne and SSI are already working in partnership and both companies want to build a business "on a sustainable cycle of mutually dependent growth crops," Loch Fyne said.

In its statement, Loch Fyne said its aquaculture director David Attwood has been "developing an investment plan with SSI" to grow capacity of salmon, oysters, mussels, sea urchins and seaweed in Loch Fyne.

Loch Fyne has also had some contact with Cooke Aquaculture in Canada, which has pioneered commercial research in IMTA, Davidson said.

"We've [also] fiddled with it by default," Davidson said. "There used to be a salmon farm next to our site, and we were getting higher growth on our mussels."

Loch Fyne is the longest sea loch, or fjord, in the United Kingdom. While SSC's salmon farms and Loch Fyne's oysters and mussels pens are located at opposite ends of the loch, the idea is to invest in a facility to farm the species close to each other.

The investment will start immediately, although shellfish take a couple of years to grow. There will also be a regulatory process to go through, in addition to consultation with the local population, Davidson said.

The project would tap into an "established" demand for Scottish seafood, as well as meeting demands for increasingly sustainable crops, Davidson said.

"This is a great opportunity to develop a business in Argyll that will be totally sustainable, both environmentally and commercially," Attwood said in his statement.

Search IntraFish.com
IMTA

Fish Farming International - March 2012

French fishing port takes on aquaculture

A new experimental aquaculture facility for marine and freshwater species is being set up in the French port of Boulogne-sur-mer

Quentin Bates

Photo: Boulogne-sur-Mer Developpement

BACK TO BOULOGNE: The new facility will take approximately two years to build

A new innovation platform based at the French port of Boulogne has been established with a group of public and private shareholders that also absorbs the activities of existing organisation Haliomer.

Nouvelles Vagues is envisaged as a pioneering organisation particularly in aquaculture, while also maintaining a technical department that carries on the microbiological, training and the product development work that has been Haliomer's activity.

According to director Olivier Poline, a pilot project with substantial funding from the regional government is being set up now with premises in the Capecure district of Boulogne harbour.

"This will take approximately two years to build so until then we are planning to work with partners and our shareholders," he said, adding that the plans are for an experimental aquaculture facility for both marine and freshwater species, also taking in microalgae and zooplankton.

Construction is starting on the new building at Capecure and although this is being funded by the Nord Pas de Calais region, after three years Nouvelles Vagues loses its state funding and is expected to become an autonomous organisation.

"It's very important for Boulogne and for France, as there is no similar body in Europe that brings together research, innovation and training in a single platform, while also combining equipment, expertise and people with specialist knowledge into a kind of melting pot at the centre of the seafood district," Olivier Poline said.

Boulogne's Capecure district has been through a huge facelift in the last few years following the departure of steel manganese manufacturer Comilog. The Comilog site, adjacent to the fishing harbour, has been cleaned up after the demolition of the old factory, and plots have been acquired by several leading seafood companies.

The final plots available have gone to Nouvelles Vagues and also to Boulogne Producers' Organisation CME, which represents most of the middle-range trawlers operating from the port as well as providing services to both its members and others.

Now CME has embarked on a move into aquaculture with a site earmarked next to Nouvelles Vagues, and is looking at the options for investing in a closed aquaculture system for producing trout and salmon.

"We are not setting out to compete with Norwegian salmon on the French market, but we feel that we can do something with small quantities of high-quality salmon and trout," CME director Eric Gosselin said, adding that the investment in a system consisting of six 80t capacity tanks on the 60 by 40m site is similar to the cost of a new 24m trawler – but without the ongoing problems of fuel and quotas, and with both a faster payback and potentially better financial results.

"With a production of around 500t per year, it's similar to a boat," he said. "We also set out to go into species for which there is a strong market."

"It's certainly an interesting option to diversify into this and to make use of the new seafood district at Boulogne harbour."

Eric Gosselin said that at present a study is in progress, with results due in early 2012 and the project scheduled to start towards the end of the year.

The plan is to buy smolts to grow on at the new Boulogne facility, so that the fish can be sold in one year, with a focus on the highest quality and aiming at producing fish that can be given a red label in France.

Fish Farming International - January 2012

Press cuttings

Aquaculture to benefit from changes to the CFP

THE European Commission has proposed a new fund for the EU's maritime and fisheries policies for 2014-2020: the European Maritime and Fisheries Fund (EMFF). This will help deliver the ambitious objectives of the reform of the Common Fisheries Policy and will help fishermen in the transition towards sustainable fishing, as well as coastal communities in the diversification of their economies. The fund will finance projects that create new jobs and improve quality of life along European coasts. Red tape will be cut so that beneficiaries have easy access to financing.

Maria Damanaki, Commissioner in charge of Maritime Affairs and Fisheries, said: 'This new fund will increase economic growth and create jobs in the sector. No more money will be spent to build big vessels. Small scale fisheries and aquaculture will benefit from this budgetary greening of the Common Fisheries Policy.'

This new fund will replace the existing European Fisheries Fund (EFF) and a number of other instruments. The proposed envelope amounts to €6.5 billion for the period 2014-2020.

Struan Stevenson, Conservative fisheries spokesman in the European Parliament, commented that the new system contains good news – namely that the European Maritime and Fisheries Fund is intended to be more-efficient and simpler to access for potential beneficiaries, including governments, enterprises, fishermen and coastal communities. It aims to support sustainable growth for natural resources and for local communities.

However, the politician also said the overall funding pot of €6 billion was insufficient. 'That is only €6 billion for all of the EU maritime economy, of which fisheries is only a part. So compared to the €50 billion spent on Common Agricultural Policy that is not very much.'

He pointed to several welcome measures in the package, including the fund's greater focus on aquaculture, and said: 'We need to invest more in research, development and innovation in this industry, as Europe is only 40 per cent self-sufficient in fish and we have to import the other 60 per cent. This means there is a fantastic opportunity to expand EU fish farming if we are prepared to provide the necessary financial support.'

Struan Stevenson

Fish Farmer - Jan/Feb 2012

FeedUpdate

THE TRIAL:
A shellfish hatchery needs to grow algae, a costly commodity, to feed the shellfish, so reseachers decided to see if Skretting product, some of which is 100 percent algae, work just as well.

TRIALLED BY:
Biologist Chantal Gionet, the shellfish project leader at Canada's Coastal Zone Research Institute (or Institut de Recherche sur les Zones Cotieres) Aquaculture Department in New Brunswick, ran the trial with some Skretting samples.

OBJECTIVE:
Gionet said the objective was to see if the Skretting feed would work for shellfish feed. She said she was aware that other products, such as yeast, had been used but said she had never found them to be successful.

"It never really had (a) good performance, so it never stuck," Gionet told *Fish Farming International.*

METHOD
Gionet explained that she did several trials using Skretting products Ori-Culture, a natural algae-based powder for culturing rotifers, and Ori-Green, a natural algae and protein-based powder for the fast enrichment of live feeds.

Using the two products, Gionet began conditioning brood stock using various combinations of the two; for example using 90 percent Ori-Culture and 10 percent Ori-Green, or 70 percent Ori-Green and 30 percent Ori-Culture.

RESULT
Gionet's said through the experiments and trials, "we did condition the brood stock and we did have larvae that was viable."

The most successful trial, the one that produced the most eggs, consisted of 70 percent Ori-Culture and 30 percent Ori-Green.

"We did it a couple of more times to be certain of the results," Gionet said. "It worked all the time."

CONCLUSION
Gionet said she now uses only Skretting product for her American oysters, which is what she had based the testing on. Through follow-up testing, she and her team found that the hard clam also have a "good performance" with the Skretting, so she uses it for that, as well.

Using the Skretting product is "good for this hatchery (because) it costs a lot less," Gionet explained. Growing algae requires having light and air conditioning on around-the-clock, which Gionet can be expensive.

"This, you buy it, put it in the fridge and take the amount you need and there's no bacteria," she said. "It's really not expensive and it's more efficient, so this is a big thing for the hatchery."

Due to the success with the American oyster and hard clam, Gionet and her team are now doing trials with bay scallops.

"We're trying to do all the species that we grow here," she said.

Fish Farming International - January 2012

Press cuttings

Isle of Man sets up first marine reserve

Manx PO involved from the outset

THE Isle of Man has designated Ramsey Bay as the island's first marine nature reserve (MNR).

It will protect marine life, safeguard local fisheries and provide opportunities for Ramsey to develop as a centre for marine tourism, research and education.

The Manx environment and fisheries department (DEFA) said: "Ramsey Bay provides the perfect combination of important marine habitats and potential for benefiting local fisheries. The MNR is also well supported by marine users."

The entire MNR will be protected from aggregate extraction and dumping of dredged material. It is divided into different zones with different restrictions in each zone, but all zones will be protected from gill netting and all angling events will be catch and release.

Marine developments within the area will require approval from DEFA and an environmental impact assessment.

The Manx FPO first proposed Ramsey Bay as a potential MNR. Over 200 people responded formally to the consultation process and also provided a large amount of additional information to inform the development of this plan.

Over 85% of those who responded were active users of Ramsey Bay and the majority of responses were extremely supportive of the idea of establishing the MNR.

Tom Bryan-Brown, chief executive of the Manx FPO commented: "The fishing industry has been involved in the Ramsey Bay MNR from its inception.

"This particular MNR differs from the other closed areas around the island in that they have been created primarily for fisheries management purposes, whereas Ramsey Bay has been created for environmental reasons.

"However, we hope that there will be associated fisheries benefits from this MNR in Ramsey Bay and if that is the case then the industry will be able to take advantage and the environmental credentials of the island will be maximised."

IoM zonal restrictions

The Marine Nature Reserve will be divided into zones (see map right):

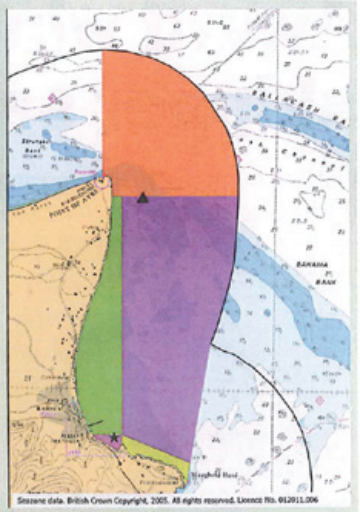
Conservation Zone
The Conservation Zone (inner Ramsey Bay) will be protected from all trawling and dredging and all extraction of scallops and queenies. Potting, recreational angling and bait collection will be permitted.

Horse Mussel Zone
The Horse Mussel Zone (off the Point of Ayre and Ballacash Channel) will be protected from all trawling and dredging and all extraction of scallops and queenies. The site will also be protected from potting. Recreational angling and bait collection will be permitted.

Fisheries Management Zone
The Fisheries Management Zone (the outer area of Ramsey Bay) will be managed to support sustainable fisheries. Trawling and dredging will be permitted to a level set by the Manx FPO and licensed by DEFA. Potting and recreational fishing will be permitted.

Eelgrass Zone
This small zone will be protected from all extraction of living resources. Catch and release angling will be permitted but bait collection will not be allowed.

Rocky Shore Zone
The coastal waters between Gob ny Rona and Maughold Head will be protected from all trawling and dredging and all extraction of scallops and queenies. Recreational fishing and bait collection will be permitted.



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MAP showing the Ramsey Bay MNR zone divisions

DEFA minister John Shimmin said the area would provide a replenishment area for important local fisheries and maintain and restore essential marine habitats.

It would also help to increase the carbon storage capacity of the seas because eelgrass meadows, kelp forests and reef habitats all store carbon in the same way as rainforests, contributing to lowering carbon dioxide in the atmosphere.

Mr Shimmin said: "I am especially pleased that at a time when fishermen across the British Isles are fighting a rearguard action against designation of marine protected areas, the close partnership we have developed with our fishermen means that we were able to put out a joint press release when we announced the proposals, and continue to work with our fishermen to ensure that the benefit they obtain from this designation is maximised."

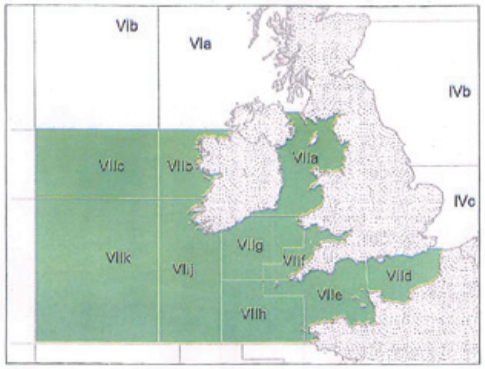
The Ramsey Bay designation is the result of a three-year process to involve the Manx community in identifying possible sites for the MNRs and to work with users of the sea and the wider public to choose the best site to protect.

Hundreds of people have attended workshops and presentations and responded to surveys and interviews, ensuring that the MNR is based on the best possible information.

The MNR came into effect on 1 October

Fishing News - 21 October 2011

Scallops are a highly valuable UK fishery and there is a pressing need to improve the understanding of various stocks so that management measures match the reality on the ground, says CEFAS' **Dr Ewen Bell**



Sea areas falling within ICES area VII (information adapted from ICES)

SCALLOPS

filling in the knowledge gap

In this article written for *Fishing News*, Dr Bell describes the new monitoring programme which is currently getting underway around the English coast.

King scallops (*Pecten maximus*) are one of the most commercially valuable fisheries to England, with an average first-sale value of nearly £21m over the past three years (MMO Annual Statistics).

Over the same period, fishing effort for scallops in ICES area VII (highlighted in Figure 1) has increased markedly and has reached the cap imposed by the EU Western Waters Effort regime, over the last couple of years.

In order to understand the implications of changes to fishing effort on the productivity of the stocks we need to determine the stock status and fishing rate for each of the stocks. This information will provide the scientific evidence on which proposals can be made (or indeed challenges to proposals) for effective fishery management.

The only data currently available to CEFAS scientists on these stocks are landings and effort data submitted to the MMO, which are sufficient to give qualitative advice. These data indicate that the catch rate of scallops (catch per unit effort or CPUE) in most ICES sub-divisions is roughly stable and therefore the stocks are probably not in decline (although changes in technical efficiency would mask population declines to some extent).

However, there are regions within area VII in which the catch rates have declined in recent years.

These simple 'assessments' only give an indication of the direction of stock development over several years and certainly cannot say whether all stocks are currently at high levels. In particular, these data do not give us an accurate indication of:

- how the stocks may have been impacted by the increase in effort in recent years;
- what might be the impact of further increases in effort;
- what the states of individual stock units are;
- where the fisheries are in relation to Maximum Sustainable Yield (MSY).

Defining a 'stock'

Effective fishery management needs to reflect the structure and biology of specific stocks. Factors such as how much individuals move around, how they breed and what influences their growth must be taken into consideration.

Although capable of swimming, king scallops generally stay put once they have settled on a particular ground as juveniles. Therefore, ocean currents are critical in the ecology of scallops, both in dispersing the larvae and transporting food (plankton) to the adults. When it comes to reproducing, scallops need other scallops close by in order for successful fertilisation of eggs (which are released directly into the water). Scallop stocks will therefore be influenced by events at a range of spatial scales.

English landings are dominated by the fisheries in the English Channel but there are fisheries spread over a wide geographical area including grounds in the North Sea, the Channel, the Western Approaches, the Bay of Biscay, Cardigan Bay and the Irish Sea.

After considering the dynamics of the biology and fishery, CEFAS has drawn up an list of seven different stock units, which will be the focus of enhanced monitoring and assessments:

1. North Sea
2. Eastern Channel (VIId)
3. Lyme Bay
4. East of Eddystone
5. West of Eddystone
6. Western Approaches
7. Irish Sea.

Red bag filled and ready for collection. Photo Kevin Webber, Falfish

Sampling and stock assessment

To establish whether a stock unit is being exploited sustainably, scientists look at the population age structure to see what proportion of individuals are surviving to maturity and the overall rate at which individuals are dying. For this we need to sample individual scallops from the fishery and determine their age and relative abundance.

We can determine not only the age, but also the growth rate of scallops by measuring the annual rings on the top shells. In some areas these are visible to the naked eye, but in other areas a microscope is required.

In conjunction with Seafish, CEFAS has developed a sampling scheme that involves collaborating with industry and processors to provide the best possible data for the minimum inconvenience to all.

The "Red Bag" scheme (so called because of the special red scallop bags to be used) aims to sample a minimum of four hauls per quarter from each area, preferably from a range of different boats.

Each sample requires around 200 flat shells from scallops picked at random from the haul. These are placed in a red scallop bag, on which is written the vessel name, the date and GPS location of the haul. (Positional information is required because the ICES rectangle does not give us the spatial resolution required for some of the stock definitions.) All data regarding catch rates and fishing positions will be held securely and will not be divulged to a third party.

The bag is then delivered to the processor with the rest of the catch as normal and the processor sets aside the flat shells for later collection by CEFAS.

This sampling approach means that, as far as vessels and processors are concerned, there are practically no cost implications related to the collection of scientific samples (bar a few minutes to sort the scallops and to fill in a few details on the paper form). For CEFAS (and taxpayers), it saves the cost of buying several thousand pounds worth of scallops.

Using the data collected in this exercise CEFAS can then start to assess the status of the stocks and the mortality rate. Although estimates of mortality can be obtained with only one year's worth of data, these will be rather approximate. The more years' worth of data collected, the greater the accuracy of our estimates.

Anyone from the catching or processing sectors who is interested in supporting scientists to produce robust stock assessments for scallops are urged to join in the scheme.

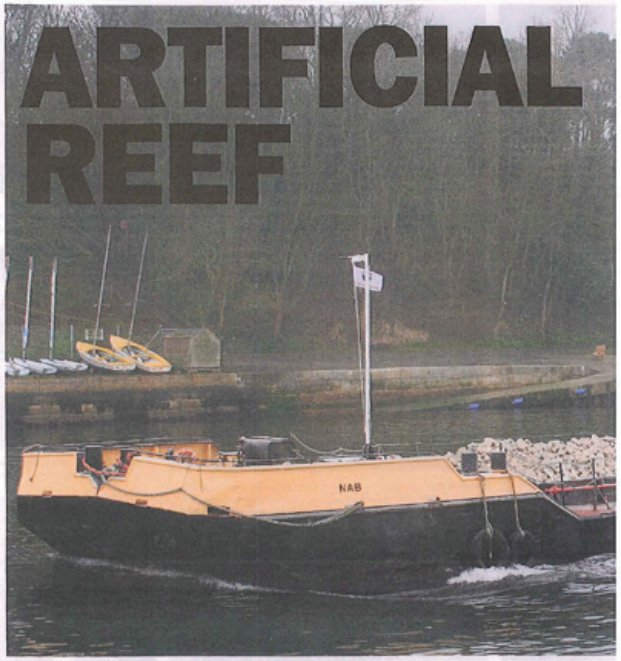
■ **For further details please contact Dave Palmer at CEFAS dave.palmer@cefas.co.uk / 01502 524231 or Gus Caslake at Seafish R_Caslake@seafish.co.uk 01750 362625.**

Fishing News - 16 March 2012

Press cuttings

Story and pictures
Quentin Bates

ARTIFICIAL REEF



A man-made habitat for sustainable lobster fisheries

Six loads of finest Portland stone have been meticulously dropped in six lines across a 200m diameter circle of seabed off the Dorset coast west of Weymouth as part of larger project that includes two reefs and two dive wrecks.

Neville Copperthwaite told *Fishing News* as the stone was being loaded for the second of the three days of drops that the project began almost three years ago and has changed along the way.

He explained that the root of it was the drop-off in divers coming to the area after the wreck of HMS Hood at Portland was made off-limits to divers. The original intention was to sink a disused ship for divers to visit, but obtaining a ship is no easy task and in the meantime, the idea of an artificial reef for lobster restocking arose.

The upshot was that a square kilometre of seabed was leased to Dorset County Council, which in turn sublet the area to Wreck to Reef, a not-for-profit company set up to manage the overall project, which now consists of the lobster reef. A second reef further to the south and plans to place two dive wrecks there.

Funding has been obtained through the Local Action Group towards the cost of the lobster restocking reef's 1760 tonnes of local Portland stone. The next step is for 6,000 juvenile lobsters from Padstow to be released on the reef in the summer of next year, as the stones need a year to mature on the site.

"Based on the tidal streams here, this is an opportunity to seed 100 miles of coast with lobsters," explained project co-ordinator Neville Copperthwaite, commenting that relatively little is known about the survival rates, but research in the 1990s indicatesthat around 45% of the juveniles can be expected to survive to breed in five to six years – by which time they are also large enough to be landed commercially.

Left: Loading 300 tonnes of Portland stone for one of six drops to form a restocking reef off the Dorset coast

Fishing News - 30 March 2012

Brown crab – an assessment

In a previous *FN* article **Dr Colin Bannister** summarised the management and policy background on crab. Here he reviews the assessment background

My previous article listed reasons why the SAGB believes it is time to be precautionary about brown crab management: most fisheries have expanded onto offshore grounds; the market is already periodically oversupplied and depressed; harvest rates appear high, and there is concern about how they will affect egg production long term. This article looks at details of the science described in my 2009 SAGB report *'On the Management of Brown Crab Fisheries'*, which was written with the generous assistance of scientific colleagues cited there. However, the views and interpretations described here are solely mine.

Landings

In England and Wales, annual brown crab landings jumped from 3,000 tonnes in 1970 to 14,000t in 1998, but have since fallen back to 10,500t in 2010. Initially, the main increase took place in the Western Channel, but since the mid-1990s landings there have levelled out.

For the North Sea coast the main increase came from 1998 to 2005, before falling back in the last five years.

In Scotland, landings increased from 2,000t in 1975 to 9,000t by 2000, with increases in the Hebrides, Orkney, Sule, Papa, and South Minch, but recently steadied between 8,000t and 10,000t (Scottish Sea Fisheries Statistics 2010).

For UK vessels as a whole, total landings home and abroad are fluctuating above 20,000t, with a peak of 24,436t in 2010.

Overall, there has been a five-fold increase since the 1970s, but the recent trend is either slowing (Scotland), or in some areas reversing (parts of England/Wales).

Potting effort

Increased landings are a product of increased fishing pressure, and the spread of effort to new grounds. My 2009 report noted that, for England/Wales, official data on potting effort do not capture the full picture because records are a mixed bag of pots owned, set, or hauled, and are difficult to correct for soak time.

Many crabbers admit, however, that they now work more than one set of gear, including more parlour pots; that the density of pots on grounds has increased; and that more gear is being left out all year.

This suggests that fishing intensity, efficiency, and cumulative time have been increasing, leading to questions on how this affects the stocks.

Stock biology

The 2009 report examined the structure of some crab stocks using results from larvae surveys, tagging, and genetic studies. CEFAS surveys found large patches of crab larvae from Flamborough to Race Bank off the east coast, and large patches south and west of Devon, and west and north of Cornwall.

Larvae were found in the eastern Channel but at lower density. A wide area of crab larvae has also been described off NW Ireland (Tully et al, 2006).

There is a genetic distinction between crab in the North Sea and the Channel, but not between the western Channel, Celtic Sea and southern Ireland (Defra Research project MF0230).

These results indicate that the appropriate scale for stock structure, assessment and management is regional rather than local, but they show that we need to know more about effects of fishing on mature hen crab that migrate through the summer and autumn fisheries en route to spawning areas.

We have little information about patterns of settlement and juvenile recruitment from spawning grounds, or where spawning occurs in areas not covered by these studies.

Stock assessment

Scientists are investigating the status of stocks using size-based assessments.

These use measurements of carapace width (CW) compiled regionally from routine quayside sampling (CEFAS, 2009; Mill et al 2009).

Data are averaged across years to smooth out sampling errors and variations in biological factors such as recruitment. In the 2009 CEFAS study, data from 2003 to 2008 showed that crab sizes ranged from 130-140 to 200-210 mm CW, except in the Western Channel where the growth rate is high and main sizes range is 150-230 CW.

The proportion of crab in size classes above regional minimum legal size depends on rates of growth, natural death, and fishing.

Assessment models calculate fishing mortality rate (F) in each size class by adjusting for assumed natural death rate (10% in the results cited here), and for the time taken to grow through each size class (based on tagging returns).

Using data from CEFAS 2009, I estimated that in most English crab fisheries the range of F in the main size classes was 0.6 to 1.0 or higher (45-63% per annum), although lower in the Western Channel, being 0.6-0.8 (45-55%) on hens, and 0.2-0.3 (18-26%) on cocks.

These are generally high fishing rates, whose potential impact on stocks is evaluated in the following way:

* Stock status

To evaluate stock status, size-based assessments model how crab size distributions change if fishing rate increases or decreases from the current level.

For each new fishing rate the model simulates new size distribution from which it calculates potential yield (catch X average weight, summed over the size classes) and potential egg production (the number of hen crab X number of eggs they carry, summed over the mature size classes).

For just one area, Figure 1 shows output from the English assessment for the Central North Sea.

The graph shows curves of yield against fishing rate for hen and cock crab separately (cocves curves), and a curve of potential egg production against fishing rate for hens (concave curve).

The fishing rate (bottom axis) is scaled as a multiple of the current value, labelled 1 below the vertical black line.

The right hand axis for egg production is scaled as a % of the peak value at zero fishing (i.e. "% of virgin egg production").

These plots are interpreted with the aid of reference points.

Figure 1: Brown Crab: Central North Sea.
Adapted from CEFAS 2009

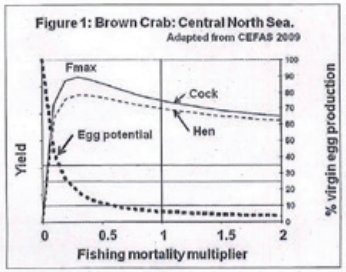


Fig 1: Egg potential at the current F is below the 10% limit, and this appears to be the case for all of the English stocks described in the 2009 report. Across the range of English stocks F would need to fall by 12-56% in order to increase egg potential above the 10% limit, and by 70-84% to reach a 25% precautionary threshold, based on the assumptions used

* Mortality reference point

The F reference point is Fmax, located at the peak of the yield curve. Current F is well to the right of the maximum for both cock and hens, so F needs to reduce substantially to generate maximum long term yield. Except for cock crab in the western Channel, where F is moderate and close to Fmax, English stocks assessed by CEFAS are all to the right of Fmax, and would require F to reduce by 50-76% to reach Fmax.

My 2009 report cites the results of broadly similar Scottish assessments, where some stocks are either at or close to Fmax, but others are to the right of Fmax, although the curves are rather more flat-topped.

The main conclusions are that further increases in fishing rate are unlikely to increase average yields in the long term, and may reduce it in some fisheries.

Conclusions and caveats

At face value crab assessment model suggests that in most of our fisheries the fishing rate is either at or above the value likely to produce maximum yield in the long term, and that potential egg production from female stocks is likely to be significantly reduced.

The precise values of fishing rate quoted, and reductions required to reach reference points, depend on assumptions about growth and natural death rate.

Different assumptions could produce different values, including less pessimistic ones, but at present these assumptions are hard to improve owing to lack of data.

Taking these uncertainties into account, a minimum conclusion is that in existing exploited areas further increases in crab effort are unlikely to increase average yield in the long term, and could well reduce it, and secondly that increased effort will further reduce potential egg production from the spawning stock.

The latter could have biological consequences that cannot be predicted because we do not know how the number of eggs in the sea translates into juvenile recruitment to the fishery. From the SAGB viewpoint these conclusions represent the case for capping the crab fishery on a precautionary basis.

Fishing News - 21 October 2011

About this publication

Shellfish News is published twice yearly as a service to the British shellfish farming and harvesting industry. It is produced and edited by the Centre for Environment, Fisheries and Aquaculture Science (Cefas) on behalf of the Department for Environment, Food and Rural Affairs (Defra)

Contributing to this publication

Articles, news and comments relating to shellfish farming and harvesting are welcomed from either government or industry.

All contributions should be sent to the editor by email or mail.

The views expressed in this issue are those of the contributors and are not necessarily those of the editors, Cefas or Defra; and the reference to proprietary products should not be construed as an official endorsement of these products. The editors reserve the right to edit articles or other contributions.

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Where to get help and advice

The following organisations and websites provide useful information to help your business or research

Policy and administration

Defra (Department for Environment, Food and Rural Affairs) - www.defra.gov.uk.

Welsh Government - www.wales.gov.uk.

The Scottish Government - www.scotland.gov.uk.

Department of Agriculture and Rural Development for Northern Ireland - www.dardni.gov.uk.

Marine Management Organisation - www.marinemanagement.org.uk/index.htm.

Crown Estate Commissioners - www.crownestates.co.uk.

Scientific and technical advice

Cefas - www.cefas.co.uk

Marine Scotland / Science - www.scotland.gov.uk/Topics/marine/Fish-Shellfish

SEAFISH - www.seafish.org

Shellfish hygiene

Food Standards Agency - www.food.gov.uk.

EU Reference Laboratory for monitoring bacteriological and viral contamination of bivalve molluscs - www.crlcefas.org.

UK National Reference Laboratory (NRL) for monitoring bacteriological and viral contamination of bivalve molluscs - www.cefas.defra.gov.uk/nrl.aspx.

Local environmental health teams within Local Councils - find your local council website from www.direct.gov.uk/en/Dl1/Directories/Localcouncils/index.htm.

Shellfish health

OIE Collaborating Centre for information on aquatic animal diseases - www.cefas.defra.gov.uk/our-science/animal-health-and-food-safety/aquatic-animal-disease/oie-collaborating-centre-for-information-on-aquatic-animal-diseases.aspx (also has links to main OIE site)

EU Reference Laboratory for Molluscan Diseases - www.eurl-mollusc.eu.

EU Reference Laboratory for Crustacean Diseases - www.crustaceancrl.eu.

Trade bodies

The Shellfish Association of Great Britain - www.shellfish.org.uk.

The Association of Scottish Shellfish Growers - www.assg.org.uk.

Wildlife conservation and status of on-growing sites

Joint Nature Conservation Committee - www.jncc.gov.uk.

Natural England - www.naturalengland.org.uk.

Countryside Council for Wales - www.ccw.gov.uk.

Scottish Natural Heritage - www.snh.org.uk.

Northern Ireland Environment Agency - www.ni-environment.gov.uk.

Other useful sites

United Kingdom Marine Climate Change Impacts Partnership (MCCIP) - www.mccip.org.uk.

The Scottish Aquaculture Research Forum - www.sarf.org.uk.

Seafood Health Facts - www.seafoodhealthfacts.org.