

MCC Resolutions 2007

2007/2/MCC01 The Working Group on Pathology and Diseases of Marine Organisms [WGPDMO] (Chair: S. MacLean, USA) will meet in Galway, Ireland, 4–8 March 2008 to:

- a) provide an assessment of fish disease in the OSPAR maritime area for inclusion in the QSR 2010 to the extent possible by testing the fish disease index developed by ICES and reported at WKIMON III through application in an evaluation of data collected by OSPAR Contracting Parties. (OSPAR request 13);
The assessment should consider the prevalence of externally visible fish diseases, macroscopic liver neoplasms and liver histopathology in common dab (*Limanda limanda*);
- b) produce a report on new disease trends in wild and cultured fish, molluscs and crustaceans based on national reports;
- c) review the status of proliferative kidney disease (PKD) epidemics caused by *Tetracapsuloides bryosalmonae* in wild salmonid populations;
- d) review the information on *Francisella* sp. and visceral granulomatosis in farmed cod and the potential for disease interaction between wild and farmed cod;
- e) provide a progress report on studies carried out on hyperpigmentation in common dab (*Limanda limanda*) from the North Sea with special reference to pathological findings and possible causes;
- f) review the evidence for increased tolerance by *Lepeophtheirus salmonis* to chemotherapeutants;
- g) provide an update of international collaborative actions involving fish and shellfish disease and pathology activities;
- h) provide an update on the validation and integration of molecular diagnostic and confirmatory techniques for pathogens of bivalves;
- i) provide update on the use of the fish disease index for other fish species (e.g., Baltic cod and flounder) and other sets of available disease data (e.g., liver histopathology data);
- j) provide an update on the status of ICES publications on pathology and diseases of marine organisms;
- k) provide expert knowledge and advice on fish disease and related data to the ICES Data Centre (possibly via sub-group) on a continuous basis.

WGPDMO will report by 20 April 2008 for the attention of the Mariculture Committee and ACOM.

Supporting information

PRIORITY:	High. The development of the fish disease index has also increased the interest of HELCOM of developing the index into an indicator
SCIENTIFIC JUSTIFICATION AND RELATION TO ACTION PLAN:	<p>Term of Reference a) This is a response to OSPAR request no. 13.</p> <p>Term of Reference b) New disease conditions and trends in diseases of wild and cultured marine organisms continue to appear and an assessment of these should be maintained. (all WGPDMO members)</p> <p>Term of Reference c) Epidemics of proliferative kidney disease with mass mortalities in wild salmonids are a major concern as a potential threat to the sustainability of anadromous populations. Information on the extent of fish mortalities, distribution of bryozoan hosts harbouring the infectious stage of the parasite, identification of salmonid populations at risk and improved understanding of the role of environmental factors, particularly temperature on the severity of epidemics, is urgently required. (T.A. Mo, S. Jones, and S. Feist)</p>

	<p>Term of Reference d) A systemic granulomatous disease in Atlantic cod (<i>Gadus morhua</i>) related to the presence of <i>Francisella</i> sp. has emerged and currently is one of the main bacterial diseases for farmed stock in Norway. This intracellular Gram negative bacterium has also been isolated from wild cod in Sweden. It is recommended that WGPDMO review the current status on control and diagnosis in farmed cod, the available literature regarding the potential for interaction between wild and farmed cod, and information on a visceral granulomatous condition in wild cod attributed to <i>Francisella</i> infection (T.A. Mo, A. Alfjorden, and D. Bruno)</p> <p>Term of Reference e) Hyperpigmentation has continued to increase in the common dab (<i>Limanda limanda</i>) populations in the North Sea. At the 2007 WGPDMO meeting a report was reviewed providing information on spatial and temporal trends in prevalence in North Sea areas, on histological and ultrastructural features of the condition, on host-specific effects on the prevalence and on effects of hyperpigmentation on the condition of the host. There still is a need for more information on pathology associated with hyperpigmentation, on possible causes of the condition (e.g., if pathogens are involved) and on similar conditions involving pigmentation anomalies in wild and farmed fish. Since more in depth studies on these issues are carried out at present, the results of which will be available for the next WGPDMO meeting, it is recommended to revisit the issue of hyperpigmentation at the 2008 WGPDMO meeting. (T. Lang, S.W. Feist, D. Bruno, W. Wosniok, and N. Ruane)</p> <p>Term of Reference f) The extensive use of chemotherapeutic agents against parasitic copepods in marine reared fish has led to a loss of susceptibility of sea lice to some of these agents. The limited availability of alternative medicines has raised a concern regarding the inevitability of increased tolerance. (S. Jones, T.A. Mo, and N. Ruane)</p> <p>Term of Reference g) WGPDMO is working collaboratively with other ICES and non-ICES groups in the field of diseases and pathology of marine organisms. It is always critical to keep WGPDMO members aware and able to review such international activities and report back to ICES. (T. Lang, S.W. Feist, N. Ruane, and A. Mansour)</p> <p>Term of Reference h) The effective control of pathogens infecting molluscs requires diagnostic tests that are specific, reliable and sensitive, and that can discriminate between genera and species. Several methods are used to identify and characterise molluscan pathogens, among them, newly developed molecular methods appear very useful. Due to their specificity and sensitivity they allow species and strain identification. International standards proposed by the OIE now include such molecular techniques. Criteria used to identify molluscan pathogens should, however, include basic biological and ecological characteristics of pathogens as well as information on their genetic sequence. Thus, schemes for differential diagnosis incorporating molecular techniques have been developed. (T. Renault and S. Ford).</p> <p>Term of Reference i) This ToR might be of interest to HELCOM. For the 2007 meeting, the WGPDMO produced a report on the application of the Fish Disease Index (FDI) on externally visible diseases in common dab (<i>Limanda limanda</i>) and on the assessment of geographical areas by FDI-based criteria. It was recommended to extend this assessment to other species (e.g. Baltic cod and flounder) and to other sets of diseases (e.g. liver histopathology), for which empirical data is available, in order to assess the applicability of the FDI under more general conditions. (W. Wosniok and T. Lang).</p> <p>Term of Reference j) A number of ICES publications, either web-based or in ICES publication series, are being prepared or updated at present, the progress of which has to be reviewed by WGPDMO. It will be necessary to consider ways by which these can be linked to each other. New publications have to be considered. (S. Feist, T. Lang, and W. Wosniok)</p> <p>Term of Reference k) This is in compliance with a request from the ICES Data Centre. (W. Wosniok, T. Lang, S.W. Feist, D. Bruno)</p>
RESOURCE REQUIREMENTS:	None required, other than those provided by the host institute.
PARTICIPANTS:	Representatives of all Member Countries and specialists invited by the Chair with expertise relevant to pathology and disease of wild and cultured finfish and shellfish. In total, normally 20 participants
SECRETARIAT FACILITIES:	Required to a limited extent, e.g. for data and publication issues

FINANCIAL:	None required
LINKAGES TO ADVISORY COMMITTEES:	ACOM
LINKAGES TO OTHER COMMITTEES OR GROUPS:	MCC, MHC, DFC, WGBEC
LINKAGES TO OTHER ORGANISATIONS:	BEQUALM, OIE, EU

2007/2/MCC02 The **Working Group on Marine Shellfish Culture** [WGMASC] (Chair: P. Cranford, Canada) will meet in Aberdeen, UK, from 1–3 April 2008 to:

- a) identify emerging shellfish aquaculture issues and related science advisory needs for maintaining the sustainability of living marine resources and the protection of the marine environment. The task is to briefly highlight new and important issues that may require additional attention by the WGMASC and/or another Expert Group as opposed to providing a comprehensive analysis;
- b) complete the development of a recommended framework for the integrated evaluation of the impacts of shellfish aquaculture activities in the coastal zone by identifying a suite of tools (e.g. modelling, technologies) and indicators (ecosystem and shellfish performance) specific for monitoring ecosystem status in relation to shellfish aquaculture and for evaluating ecosystem quality objectives and effects on the productive capacity of coastal systems. This will also provide guidelines for monitoring programmes and the selection of management reference points (operational objectives) and mitigations;
- c) review knowledge and report on the significance to wild stocks of bivalve aquaculture transfers between sites/countries. This will include information on what species are transported where, what records are kept, and what guidelines are in place in ICES countries related to the transfer of cultured species. Also, review and assess: the potential for transfer of non-indigenous species and diseases; the potential genetic implications for wild stocks; the impact on recruitment to existing stocks by large scale transfers, and scientific tools for decision support on cultured shellfish transfer issues; and
- d) review the state of knowledge on the evidence for and effect of climate change on shellfish aquaculture distribution and production in ICES and countries world wide.

WGMASC will report by 28 April 2008 for the attention of the Mariculture Committee and ACOM.

Supporting Information

PRIORITY:	WGMASC is of fundamental importance to ICES environmental science and advisory process and addresses specific issues of the ICES Strategic Plan.
SCIENTIFIC JUSTIFICATION AND RELATION TO ACTION PLAN:	<p>Action Plan No: 1.</p> <p>a) 1.1, 2.1, 3.1, 4.1</p> <p>b) 2.2, 3.14, 3.3, 4.14, 4.11.3, 4.11.4</p> <p>c) 2.5, 2.6, 2.10, 4.7</p> <p>d) 1.3, 1.6</p> <p>Term of Reference a) For the WGMASC to be responsive to the rapidly changing science advice needs of aquaculture and environmental managers, important emerging shellfish aquaculture issues need to be rapidly identified and screened for potential science advisory needs to maintain the sustainable use of living marine resources and the protection of the marine environment. The intention is for this activity to flag issues that may require future attention and communication between one or several ICES Expert Groups. The Chair of the WGMASC will cross-reference all work with the Chairs of the MCC and relevant Working Groups.</p> <p>Term of Reference b) Shellfish production accounts for half of the mariculture production in ICES. As such, issues related to shellfish production, in relation to the</p>

	<p>environment and technological development of the industry need to be addressed within ICES. A framework is needed for the integrated evaluation of the effects of shellfish aquaculture activities in the coastal zone consisting of a suite of tools (e.g. modelling, technologies) and indicators (ecosystem and shellfish performance) specific for monitoring ecosystem status in relation to shellfish aquaculture and for evaluating ecosystem quality objectives and effects on the productive capacity of coastal systems. Science-based decision support is needed for the development of an environmental monitoring framework, based on identification of predetermined impact limits (operational thresholds) intended to trigger shellfish culture management actions. The Chair of WGMASC will cross-reference all work with the Chairs of the MCC and the WGEIM.</p> <p>Term of Reference c) Different shellfish life stages are transported from hatcheries and field sites to new culture sites, and often cross international boundaries, with potential implications for the introduction of non-indigenous species and diseases and the potential for interactions with wild stocks (impact on recruitment, genetic composition, diversity and polymorphism, and physiological and morphological traits). There is a need to identify the significance of shellfish relocations on the geographic distribution of wild stock traits. The significance to wild stocks of such transfers requires information on what species are transported where, what records are kept, and what guidelines are in place in ICES countries related to the transfer of cultured species. Scientific tools for decision support on cultured shellfish transfer issues should be reviewed and assessed. The Chair of WGMASC will cross-reference all work with the Chairs of the MCC, WGEIM, WGPDMO and WGITMO.</p> <p>Term of Reference d) Climate variability affects the recruitment and production of important commercial species and affects site suitability for shellfish culture. Increased knowledge on the effects of climate change on shellfish culture is needed to predict and assess impacts on aquaculture distribution and production. The Chair of WGMASC will cross-reference all work with the chairs of the MCC and the WGEIM.</p>
RESOURCE REQUIREMENTS	None
PARTICIPANTS:	Representatives of all Member Countries and specialists invited by the Chair. The Group is normally attended by some 8-12 members and guests.
SECRETARIAT FACILITIES:	Meeting facilities for 2008 WGMASC meeting and joint session with WGEIM.
FINANCIAL:	Hospitality for health breaks and lunches during 2008 meeting.
LINKAGES TO ADVISORY COMMITTEES:	ACOM.
LINKAGES TO OTHER COMMITTEES OR GROUPS:	There is a working relationship with the WGPDMO, WGEIM and all the groups of the Mariculture Committee.
LINKAGES TO OTHER ORGANIZATIONS:	The work of this group is closely aligned with similar work in GESAMP, WAS, and EAS.
SECRETARIAT MARGINAL COST SHARE:	ICES:NASCO – 80:20.

2007/2/MCC03 The Working Group on Environmental Interactions of Mariculture [WGEIM] (Chair F. O’Beirn, Ireland) will meet at the University of Victoria, British Columbia, Canada, from 14–18 April 2008 to:

- a) further evaluate the examples of sustainability indices proposed for mariculture activities and critically evaluate those SI’s recommended by WGEIM and other for a;
- b) further investigate fouling hazards associated with the physical structures used in mariculture with a view to developing integrated pest management strategies;
- c) evaluation of the outputs of a number of integrated aquaculture (multi-trophic culture systems) projects including an commentary on the environmental and regulatory effects;
- d) review the use of seed stock quality criteria in mariculture and their applications in term of ecological performance;

- e) conduct a joint session with PICES and/or WGMASC whereby subjects of mutual interest will be discussed.

WGEIM will report by 20 May 2008 for the attention of the Mariculture Committee and ACOM.

Supporting Information

PRIORITY	The activities of this group are fundamental to the work of the Mariculture Committee. The work is essential to the development and understanding of the effects of man-induced variability and change in relation to the health of the ecosystem. The work of this ICES WG is deemed high priority.
SCIENTIFIC JUSTIFICATION AND RELATION TO ACTION PLAN	<p>ToR a) Sustainability indexes have, among other uses, been offered as a methodology to integrate large amounts of scientific information to underpin management and regulatory decisions. Some current research in the EU are evaluating an extensive range of environmental indicators and assessing their utility relating to aquaculture systems. However, sustainability implies that we have a notion of projection of impacts of activities and while this information can ultimately be garnered from monitoring or modelling activities for specific areas there are broader implications relating to the sustainability of activities that these methods cannot consider. However, in order to assess overall sustainability a broader approach to the sustainability issue should be considered to include specific targets such as 1) sustainable development of aquaculture (government perspective), 2) sustainable management of aquaculture areas (regional management), 3) sustainable operation of fish farms (operator's perspective) and, 4) Certification of sustainable aquaculture products (market view). The ultimate goal will be to define specifically what is sustainable in the context of aquaculture and advise on the specific criteria for SI to inform sustainable management of mariculture operations. Lead: Barry Costa-Pierce, USA.</p> <p>ToR b) Structure associated with mariculture activities can provide considerable surface area for colonisation of species not typically found in the culture area. This is presumably due to the increased habitat complexity and appropriate substrate for epifaunal organisms. In addition to the potential to provide a pathway for the introduction of an exotic nuisance species to a system, additional problems encountered are those associated with the management of the nuisance to reduce the impact on the culture activity. This ToR will highlight existing examples and will address the management implications and potential mitigation strategies. Lead: Chris McKindsey, Canada.</p> <p>ToR c) Integrated aquaculture systems (encompassing a wide variety of types of multi-species systems) have been proposed as a direct way to utilise the wastes to create additional products of significant commercial/-environmental value. Nutrients from fish farms could support algal production; solid wastes from fish farms support bivalve production, etc. Some practical developments are starting to occur, and the EU has supported work in this area. However, the benefits do need to be fully elucidated and whether they are more applicable to open or closed systems. In addition, the co-culture of species may provide some regulatory conflicts that need to be clearly identified and addressed. Lead: Steven Cross, Canada.</p> <p>ToR d) For economical reasons, mariculture development is based on the continuous improvement of seed and fry, being wild or produced in hatcheries. How these improvements, particularly those which contribute to increase the physiological fitness and food efficiency may impact the use of the resources from the natural environment is a question of high relevance for decision making. The trade off between the economical and the ecological performance of mariculture, and consequently the regulations (e.g. licensing) to follow, is consistent with the objectives of sustainability and responsible natural resources management. The aim of this work will be to review the use of seed stock quality criteria in mariculture and their applications in term of ecological performance. Lead: No lead assigned yetf) The management of environmental impacts from mariculture can be based on policies that are difficult to interpret particularly as they relate to interactions with conservation driven objectives. 'No net loss', 'habitat replacement' and maintenance of 'good conservation status' are some of the terms used to govern management of traditional and mariculture activities in both North America and Europe. The ambiguity attached to these management objectives lead to confusion and has been described as an impediment to aquaculture development. Lead: No lead assigned yet.</p> <p>e) The upshot of all these situations and scenarios is that there is considerable confusion regarding the impact conservation goals might have on the management of mariculture activities and the potential for conflict of legislation is high. It would appear that a review of national policies and indices used to measure sustainability of mariculture (ToR B) should also include as a driver, i.e., legislative constraints, particularly those imposed by conservation related policies. From a more practical perspective the development of indices and subsequent setting of standards that have relevance to both the conservation objectives and mariculture management strategies, would seem to be an important end point. Lead: No lead assigned yetg) The next meeting is proposed for British Columbia thus presenting an opportunity to liaise with PICES.</p>
RESOURCE	None

REQUIREMENTS	
PARTICIPANTS	The Group is normally attended by some 12–15 members and guests
SECRETARIAT FACILITIES	None
FINANCIAL	No financial implications
LINKAGES TO ADVISORY COMMITTEES	ACOM
LINKAGES TO OTHER COMMITTEES OR GROUPS	WGEIM interacts with WGMASC, WGAGFM, MARC
LINKAGES TO OTHER ORGANISATIONS	The work of this group is undertaken in close collaboration with the DFO Gesamp group, BEQUALM, OIE, EU, EAS, PICES

2007/2/MCC04 The **Working Group on the Application of Genetics in Fisheries and Mariculture** [WGAGFM] (Chair: E. Eg Nielsen, Denmark) will meet in Pitlochry, UK from 1–4 April 2008 to:

- a) review the potential for application of SNP's (single nucleotide polymorphisms) in fisheries genetics and aquaculture;
- b) review current and future prospects of QTL based studies in fisheries and aquaculture;
- c) update progress on the establishment of a meta-data base for genetic data
- d) review progress for optimizing the storing of otoliths and scales;
- e) evaluate prospects for genetic monitoring for evaluating the conservation status, intraspecific biodiversity and population health in fishes.

WGAGFM will report by 28 April 2008 for the attention of the Mariculture and Diadromous Fish Committees, ACOM and WGEICO.

Supporting Information

PRIORITY:	The current activities of this Group will lead ICES into issues related to the ecosystem affects of fisheries and mariculture, especially with regard to the application of the Precautionary Approach. Consequently these activities are considered to have a very high priority.
SCIENTIFIC JUSTIFICATION AND RELATION TO ACTION PLAN:	<p>Action Plan references: a)-2.5, -2.6 b) -2.5, - 1.10, c)-1.10 , d)-1.10,-3.7 e) 1.10</p> <p>Term of Reference a)</p> <p>Single nucleotide polymorphisms (SNPs) seem to have become the marker of choice for most genetic studies, and the marker have had an increasing popularity in population genetic studies. These markers can be analysed in large numbers and access variability around the chromosomes. Most present population genetic studies normally include a number of SNPs. The Gene Conservation Laboratory in Alaska routinely performs SNP analyses during the fishing season for stock identification studies. The laboratory provides inseason estimates of the composition of the Cook Inlet sockeye salmon commercial harvest and of the Kenai River to aid in the management of the drift and set net fisheries. WGAGFM acknowledge the need to review the present state of these markers, including the possible applications and limitations, in addition to possibilities for fisheries management.</p> <p>(lead: J. G. Dahle, T. Johansen)</p> <p>Term of Reference b)</p> <p>An increasing number of studies aim to identify quantitative trait loci (QTLs) in species of interest for fisheries and/or aquaculture. Such studies imply the availability of medium to high density linkage maps, informative biological material and high through-put genotyping facilities. Until now, most of these studies relate to marker assisted selection (MAS) in</p>

species of major aquaculture interest. QTL mapping is also of more general interest to better understand the genetic architecture of quantitative traits. The identity and number of loci controlling quantitative trait variation are indeed central to the understanding of their evolutionary potential and patterns of population differentiation. However, the usage of QTL-based approaches in the assessment of genetic variability in adaptive traits and for prediction of trait values from known QTLs in natural populations of fish and shellfish remains largely untested. We will review the present status and prospects of QTL mapping in fisheries in aquaculture in the light of the current research in plant and animal genetics and breeding.

(lead: E Gosling, P. Boudry)

Term of Reference c)

An initiative was put in place as part of the response to the 2006-2007 ToR e) to set up a metadata base on genetic information related to Atlantic salmon stocks. This ToR will provide an update on this initiative. (Lead E. Verspoor, J. Martinsohn).

Term of Reference d)

Understanding the impact of fishing pressure and climate change on a fish population relies on identifying biological changes incurred by that population over time. Such a task is potentially possible for fisheries molecular geneticists due to the availability of unique sources of time series data in the form of scales and otoliths collected over the decades and subsequently stored in cupboards. Technical advances mean DNA can now be extracted and analysed from these hard tissues, and in some instances the collections provide very comprehensive time series of molecular data. The WGAGFM accepts that such sources of data are invaluable and that the optimal conditions for storage of these samples be considered as a priority. At present samples are generally stored in uncontrolled environmental conditions. This ToR aims to identify optimal conditions for the storage of these tissues to ensure minimum DNA degradation until such time as the samples are used.

(lead: M. O'Sullivan, E. Cross, E. Gosling).

Term of Reference e)

Advances in molecular biology over the last decade provide fisheries geneticists with cost-effective tools for resolving unprecedented levels of genetic diversity within the genomes of marine fish and shellfish species. Analysis of the amount and distribution of this diversity can be highly informative, not only as regards the structuring of a species into breeding populations but also, potentially, about the reproductive status of the populations themselves. Departures of the distribution association of alleles within and among loci from random reflect historical levels of mutation, natural selection, gene flow, patterns of mating, numbers of breeders and variance in the contribution of breeders to the next generation family survival to breeding (genetic drift). Theory indicates that these factors, and how they have acted historically, have characteristic effects on the pattern of distribution of allelic variation within and among individuals and loci, in a population. Using recently developed Bayesian statistical methods it is now possible, in principal, to assess the pattern of distribution to determine parameters such the effective numbers of breeders, effective population sizes, and levels of gene flow, in addition to classic indicators such as allelic diversity and heterozygosity. Estimation of these parameters using cost-effective molecular markers offers a potentially valuable approach to monitoring the reproductive and evolutionary "health" of a breeding population, and therefore has the potential to be a valuable management tool. The extent to which this is, and is likely to be, the case in practise is considered in this ToR.

	(lead: E. Verspoor, P. McGinnity)
RESOURCE REQUIREMENTS:	None required other than those provided by the host institute.
PARTICIPANTS:	The Group is normally attended by some 15–25 members and guests
SECRETARIAT FACILITIES:	None required
FINANCIAL:	None required
LINKAGES TO ADVISORY COMMITTEES:	ACOM.
LINKAGES TO OTHER COMMITTEES OR GROUPS:	SIMWG , WGECCO, WGMAFC, WGMASC
LINKAGES TO OTHER ORGANISATIONS:	Linkage with the EC Joint Research Centre at Ispra, Italy.