

Mariculture Committee (F)

Chair: Tom Sephton (Canada)
Rapporteur: Ellen Kenchington (Canada)

The Mariculture Committee met on Tuesday 23 September 2003 from 14:00 to 18:00 and on Friday 26 September 2003 from 10:30 to 12:30. Thirteen participants attended the meetings, including six Committee members.

Opening and introduction

The Chair presented a brief overview of the origins of the Mariculture Committee and its role, function, and structure within ICES for the benefit of the new WG chairs and the observers.

Appointment of Rapporteur

E. Kenchington was proposed as Rapporteur and accepted by the Committee.

Adoption of agenda and timetable

The meeting timetable and agenda were circulated prior to the meeting, discussed briefly and adopted.

Arrangements for the 2003 ASC

After a high profile in the 2002 ASC, the Committee had no theme sessions at the 2003 ASC. This was thought to be a factor in the low attendance at this meeting. The Chair then provided housekeeping details for the week ahead.

Committee business

Consultative Committee and Mariculture Committee business

The Chair provided background information on the ICES Action Plan and Strategic Plan and products as they relate to working group activities.

The Committee has been tasked to assess the activities of the working groups against the Action Plan. The Chair, with assistance from working group chairs prior to the meeting, compiled a provisional table of the terms of references for each working group from 2002-2003 against the Action Plan and is in the process of compiling a similar table for the 2003-2004 terms of reference. The tables will be circulated to Committee members and working group chairs for review and comment. One outcome from this exercise is to undertake a gap analysis and will be used to help identify symposia and theme session topics to resolve gaps. Also, it will identify those action items which have been completed.

A discussion was held on the ability and impediments of ICES to deliver advice on 'fast-track' requests. From

time to time, ICES is asked to provide assessment, advice, and information on very short time frames that do not fit into the normal annual review timeframe. It was suggested that in the future, *ad hoc* teams may deal with fast-track reports. Alternatively, urgent requests could be sent to relevant Expert Groups intersessionally, for input. Resource limitations are anticipated.

The Committee noted a proposal to establish integrated assessment groups that could be based on a geographic area. This would allow fast tracking of requests to regional specialist teams, as many requests are specific to one region. ACE is actively pursuing this proposal as it is a part of their mandate. The Committee was sceptical that this would work for the kinds of information generated by its working groups which requires consensus building among experts and evaluation of global trends and developments. Having only one expert in an integrated regionally-based assessment team would lead to divergence of advice on related topics between groups. In general, the Committee did not meet with this suggestion enthusiastically.

The Committee was asked to identify experts to participate in an ICES Case Study for the European Environmental Agency (EEA) Driving forces, Pressures, States Impacts and Responses (DPSIR) Framework. A theme session will be organised at the 2005 ASC on this framework and how it applies to particular ecosystems and settings. The DPSIR framework has relevance to the WGPDM, and to the WGEIM. ICES would like to see case studies presented at the theme session, if possible. It was suggested that salmon loss due to algal blooms and/or to jellyfish might be good case studies, as these events resulted in catastrophic losses of 1.8M fish in the Isle of Skye and in the Shetland Isles in the 2005 ASC host country (Scotland). These events also occur in Norway. Furthermore, as the cause has been established, it would be possible to follow the DPSIR framework. The Committee membership will be contacted to identify participants and issues.

The Chair provided an update on requests referred by ACME and ACE. HELCOM and OSPAR expressed an interest in some items in the reports from WGPDMO and WGEIM, but no specific requests were made. ACE, in its December 2002 report, summarized the contribution made by WGAGFM (1995-2000) and WGEICO (2000) on the protection of genetic diversity in response to a request for advice from the EU Commission.

Discussion of strategic directions for the Committee and its Expert Groups

The Chair provided the meeting with a summary of the official functions and the four key tasks of the Committee, as posted on the ICES website. The

membership was asked their opinion on whether these tasks reflect the Committee's working group activities sufficiently. The Committee's remit is as follows:

Area of responsibility is biological, ecological and engineering aspects of mariculture systems. Includes effects of humans on mariculture systems and the effects of mariculture on marine habitats. Also covers scientific aspects of stock enhancement, and the transport and introduction of non-indigenous species and stocks.

It was noted that stock enhancement is not specified in the key tasks although it is in the general description of the Committee. The following additional tasks were proposed: Evaluate the occurrence of diseases in wild fish and shellfish; Evaluate the effects of contaminants on the health status of wild fish. It was suggested that a new task be added to reflect the new WG on shellfish culture, and that Task 3: Develop environmentally sound mariculture methods, be expanded to highlight the hatchery components of our activities and the suggestions for improving the quality of fish produced. It was also suggested that there is a need to distinguish the different environments for culture, i.e., marine and freshwater. It was generally concluded that the key tasks were largely focussed on interactions between mariculture and the environment and do not reflect the considerable work done by working groups on improving the quality of the fish or shellfish product itself and the contributions made to regulatory aspects (disease, introductions and transfers, GMOs, etc.). These comments will be used to draft a revised list of Committee key tasks and circulated to members and working group chairs for review.

There was some discussion on the strategic directions that individual working groups might take over the next few years, each one developing a 5-year action plan to address the issues. A representative from the Working Group on Marine Fish Culture (WGMAFC) suggested that looking at implications for fisheries using different sources of feed – alternate sources of protein – might be relevant. It was further suggested that a review of the health aspects of cultured fish for people could be useful, given the decreasing amount of plant materials and plant oils utilized, creating different products that are visually indistinguishable. This could be dealt with in the working groups of fish culture and shellfish culture. It was noted that in the current ICES newsletter, there is an article on using worms as an alternative to fish to feed. If alternative foods are a way of the future it would be a good direction for the Committee's working groups to explore. This was encapsulated by the following proposed Term of Reference: Evaluation of alternative protein sources as key ingredients for all types of fish. It was further suggested that the Working Group on Marine Shellfish Culture (WGMASC) consider documenting the sources of broodstock (i.e., location) and the way in which broodstock is managed (e.g., replaced annually, used for selection, etc.). For shellfish culture there is still

a strong emphasis on wild spat collection in many parts of the world and it would be of interest to try to get a review detailing sources of spat.

Discussion of report highlights and review of terms of reference of Expert Groups

Prior to the meeting the Chair asked that working group chairs prepare short presentations on the activities of their working groups, highlighting significant results and bringing forward outstanding issues for discussion. This approach was proposed after the 2002 Committee meeting as an alternative to longer presentations addressing all terms of reference, given the fact that all reports are circulated to the Committee prior to the meeting. It was noted that each working group should conclude its meeting with the ratification of the draft working group report and that it should be available for each member to leave with a copy for further review and comment. Working groups are given two weeks after concluding the meeting to complete their draft report.

Working Group on the Application of Genetics in Fisheries and Mariculture (WGAGFM)

E. Kenchington (Canada) presented the highlights of CM2003/F:01. This Working Group, together with the Working Group on the Ecosystem Effects of Fishing Activities (WGECO), completed a term of reference on protecting genetic diversity. Specifically, Term of Reference (d): Review and report on issues in relation to practical management options for the conservation of genetic diversity in marine fish and shellfish of economic importance, was further developed. This topic is one that the Working Group has addressed several times in various reports over the last years and which has resulted in primary publications by its members.

The Working Group was pleased to see that ACE significantly drew on previous Working Group reports (1995-2000) in providing advice to the European Commission's Directorate General of Fisheries in its December, 2002 report. The advice generated by ACE was:

- Fishing mortality should be kept sufficiently low to maintain large populations;
- The harvest should be widely distributed geographically and among all of the recruited populations to avoid local depletions and fragmentation;
- Fishing effort should be reduced rather than applying alternative management approaches that result in fisheries becoming even more selective;
- Case by case evaluation of risks associated with loss of genetic diversity vs. benefits of imposed action.

The Working Group concurred with these recommendations and addressed the Term of Reference (d) by proposing categories of marine organisms which

have differing threats to genetic diversity (e.g., contrasting issues between long-lived sharks and rays, and those of highly fecund marine species such as mackerel). At the subsequent WGECO meeting it was resolved that the working groups had probably gone as far as possible in generating general advice. WGECO, in their 2003 report, proposed that the Working Group provides: 1) a list of species for which we have reason to be concerned for loss of genetic variation; and 2) a list of species for which we have good genetic information from which to advance management advice. These have been added to the Group's 2004 Terms of Reference and will provide the foundation for WGECO to return to this topic at their 2005 meeting, with specific advice for specific stocks.

The Working Group also reviewed the current status and applications of genome mapping in cultured species and in model fish and made four recommendations. This is an important topic as considerable research money is being invested in genome mapping initiatives. Lastly, the Working Group considered the important topic of genetic contamination between cultured and wild marine fish and shellfish. In salmonids, there is a spatial separation between the freshwater spawning environment and the locations of grow-out pens in the marine environment. While escapees can and do enter the freshwater rivers to spawn, interaction with wild stocks during spawning is dependent upon escapement. In contrast, marine fish and shellfish from hatchery stocks may interact with wild spawning stocks while contained, particularly when grow-out sites are near spawning sites for wild fish. The Working Group compiled two case studies, one for cod and one for oysters, examining potential interactions and possibilities for genetic contamination of wild stocks. Two recommendations were made. The Working Group was unable to address one of its terms of reference, related to a review of the SALGEN project and a review has been scheduled for 2004, presumably subject to the same constraints.

The Working Group discussed a number of issues which it felt impeded its ability to address its Terms of Reference. The meeting attendance in 2003 was relatively low and it felt that there could be two possible reasons for this: 1) the list of members was outdated and did not reflect the actual membership, making it difficult for "unofficial" members to attend, while "official" ones lapsed, and 2) the timing of the meeting was poor for academic members as it either conflicted with teaching schedules or spring break. With the help of the ICES Secretariat, the membership list has been overhauled. Those on the current membership list have confirmed their interest in attending, and have had their contact information corrected. The proposed date for the 2004 meeting in Hamburg is 3-5 May. This date was determined by poll of the membership. Response from the membership has been positive and greater attendance at the 2004 meeting is anticipated.

An outstanding issue is the lack of quantitative geneticists on the Working Group and within the ICES community. These are people with expertise in breeding.

At one time the Working Group had subgroups for quantitative and qualitative (e.g., population genetics) genetics, but loss of key people led to dissolving these subgroups and dealing with the Terms of Reference collectively.

Working Group on Pathology and Diseases of Marine Organisms (WGPDMO)

Thomas Lang (Germany) reviewed Doc. CM2003/F:03, in particular the significant highlights for each of the Terms of Reference. The Working Group was faced with twelve Terms of Reference, which proved to be too many for the meeting. Consequently, the Working Group had to do a lot of intersessional work. Fortunately, as the Working Group has a long history of working together (established 1976), the working structures function very well. Members are committed to working on the task they are assigned to and they prepare working documents to bring to the meeting. The 2004 Terms of Reference have been somewhat reduced in number (nine), but a similar workload is anticipated for 2004.

The Working Group produces an annual update on new disease trends in wild and cultured fish, molluscs and crustaceans and this resulted in a manuscript for submission to ICES for publication in the *Cooperative Research Report* series. The focus of this manuscript is a review of the disease trends from 1998-2002. Concern was expressed over the observation of ISA for the first time in Ireland, massive fish kills due to harmful algae and jellyfish and the finding of two oyster parasites (*Haplosporidium* spp.) in Canada in 2002. Sea lice are still a major problem for salmon culture. For the first time data from a disease survey in wild fish in the Barents Sea over three years was presented. Different prevalences were found in the Barents Sea from those in the North Sea or Baltic Sea. The second Term of Reference was related to the effect of temperature on *Bonemia*. At low water temperature the infection is favoured compared to at high water temperatures. The Working Group reviewed existing strategies to assess the prevalence of shellfish diseases in parallel with fish disease and chemical contaminant levels. However, few examples were available. This has been done in the Mussel Watch programme, but is not common in ICES countries. The Working Group reviewed new evidence for the number of species in *Perkinsus*. Molecular tools have been used to re-evaluate species circumscription in *Perkinsus*. Previously, 7 species have been described but these have been reduced to 4, based on molecular evidence; all are virulent. The Working Group also considered a herpes-like virus found in oysters and concluded that it was not similar to the human herpes virus, and so cross contamination is not a concern. The Working Group contributed to BEQUALM (Biological Effects and QUALity in Monitoring) quality assurance guidelines on biological effect techniques, fish disease and liver pathology. The impact on wild stocks of the diseases of farm-fished stocks was addressed, but the WG views this as a two-way interaction as there is evidence for disease transfer in both directions. The Working Group examined the spread of *Ichthyophonus* in

herring stocks and the distribution and possible causes of the M74 syndrome. A massive epidemic occurred in the 1990s which effected herring stocks in Baltic. The Working Group concluded that the species is endemic; occurring at low prevalence at all times in herring stocks. Therefore, another epidemic with associated fish kills cannot be excluded. M74 seems to be related to a deficiency of the B1 vitamin, but the causes for this deficiency are not yet clear. The Working Group made a strong recommendation that those member countries affected (Sweden and Finland) should carry on research to understand the cause of M74, as it may be increasing again in the Baltic Sea. The Working Group has a principle of trying to publish their work as much as possible. Currently they have a web-based report on diseases and parasites and they propose to develop identification leaflets for ICES in 2004.

Working Group on Marine Fish Culture (WGMAFC)

The Committee Chair presented Doc. CM2003/F:02 in the absence of the WG Chair A. Mangor-Jensen (Norway). The Working Group had planned to meet in Spain last year but cancelled due to very low participation and agreed to meet by correspondence to deal with the existing Terms of Reference. The meeting in 2004 is planned for Vigo, Spain.

The Working Group reviewed and adjusted the Terms of Reference for 2004 to reflect more realistic workloads and to identify products. A lead has been assigned the responsibility to gather information from other members and initiating the preparation of material for the next meeting. In 2004 the Group will examine microdiets and alternate live feeds, amongst other activities.

Working Group on Marine Shellfish Culture (WGMASC)

The Committee Chair presented Doc. CM2003/F:05 in the absence of the WG Chair, A. Bodoy (France). This is a new Working Group which met for the first time in 2003 to determine the Terms of Reference for 2003-2004. The Group met in association with the European Aquaculture Association Annual Conference in Norway. The Committee expressed some concerns over the breadth of the four Terms of Reference identified by the Group. A. Bodoy was able to clarify issues with Term of Reference (c): Review the ecological factors affecting shellfish production (carrying capacity, fouling, predation, HAB, disease, pollution, and water quality) and alternative solutions to mitigate effects. This was meant to be an over-arching term of reference and in the coming year only carrying capacity and fouling would be addressed. The Committee suggested that the Terms of Reference reflect what will be in the report, while the justification for the Terms of Reference can present the rationale and longer-term goals of the Group. The Terms of Reference were amended to alleviate the concerns.

Working Group on Environmental Interactions of Mariculture (WGEIM)

The Committee Chair presented Doc. CM2003/F:04 in the absence of the WG Chair E. Black (Canada). The Group prepared a draft discussion summary of the MARAQUA report and concluded that the implementation of the Water Framework Directive (WFD) in EU member states, could lead to significantly different outcomes dependent on how a number of key WFD activities were standardized among member nations. Three aspects of WFD implementation were identified as critical to the impact the WFD would have on mariculture in the context of MARAQA and the EU Commission's Strategy for Sustainable Development of European Aquaculture. These were: 1) the scale used to define a water body, 2) the classification system used to describe water bodies, and 3) the consideration given to methods for improving water quality in a water body. The Group was requested by ACME to continue to monitor the implementation of the WFD in member states and to expand its response to the Terms of Reference in future meetings.

The Group was also tasked with preparing a review of the potential impacts of escaped non-salmonid candidates for aquaculture on localized native stocks, in order to develop, at an early stage, risk assessment and management strategies. However, the Group found that the body of the literature was very incomplete for most species. It was decided that the Group would look at cod, halibut, turbot, sea bream, and sea bass in 2004 to permit early advice on these species with the intent of expanding advice through subsequent efforts of the Group.

Finally, the Group prepared a report that identifies some highly useful forms of decision support tools available for managing environmental interactions with aquaculture. However, the Group requires clarification on what the role of ICES will be in advising on coastal zone management (ICZM) before proceeding further with this term of reference. Similarly, Term of Reference (c) was not addressed pending this clarification.

A concern was raised over the issue that the Group looks at national reports on all kinds of aspects that they think might be relevant to their Working Group. Unfortunately, the national reports on disease are not consistent with those submitted to the WGPDMO. The use of further national reports *per se* (production stats, chemical use, etc.) will be curtailed in the future as it is not a requirement of the Working Group in order to perform its activities.

Forthcoming symposia and proposed theme session topics

Symposia relevant to the Committee

In 2004 there will be an ICES symposium: "Gadoid Mariculture: Development and Future Challenges" (C.Res 2001/2FSY01). This will take place 13-16 June

2004 in Bergen, Norway. The organization of this Symposium is going well. Pamphlets advertising the meeting were circulated at the ASC and through ICES mailing lists.

In 2005 there will be an ICES Symposium: "Interactions of Wild and Cultured Atlantic Salmon" (C. Res 2002/2ISY01). The Diadromous Fish Committee is further developing this proposal and seeks the active involvement of this Committee. The meeting will be held in Bergen, Norway at a time to be decided.

The Committee were informed of a proposal for a Symposium in 2006 on "Marine Bioinvasions". It is planned to hold this meeting on the east coast of the USA should ICES approval be granted*.

Theme sessions at the 2004 ASC in Vigo, Spain

Plenary Speaker

Mariculture has a prominent place amongst the theme sessions, given the importance of mariculture to the host country. A Plenary Speaker, Ernesto Penas (EU DG Fish, Brussels) was proposed by the Spanish delegation and endorsed by MARC. E. Penas has a broad background and work experience in Spain.

Relevant theme sessions

Each theme session was reviewed to discern the status of preparation:

"Towards Sustainable Aquaculture" (Ackefors, Kamermans, Doyle) – This theme session needs to be promoted through the WGs and MARC with distribution lists to confirm participation. J. Doyle reported that there has been a good response by WGPDMO on sustainable elements of finfish culture, but she would like to see major contributions from the shellfish group (WGMASC).

"Shellfish Culture: Perspectives and Limitations" (Bodoy, Smaal) – The two conveners would like to have a Spanish co-convenor. The theme session is expected to be relevant to Vigo, as it is the centre for mussel culture in the world. MARC, through CONC, will request the Spanish delegates to identify a co-convenor.

"Water Treatment in Intensive Fish Cultures" (Mangor-Jensen, van der Meeren, Harboe, Geller, Trippel) – This session was proposed by WGMAFC.

"The Effects of Human Activity and Disease on Marine Fish Populations" (Lang, Hylland) – This session will be withdrawn. The original proposal was not developed enough to warrant a session at this time. T. Lang felt that holding it now might actually be detrimental to the field.

"Mariculture in Integrated Coastal Zone Management Systems" (Black, Støttrup) – This is still being developed by the conveners.

A discussion ensued on the number of sessions at the meeting and the need to make sure that the sessions are not overlapping, as much as possible. At present there may be too many themes but these will be reviewed at Consultative Committee meetings later in the week, and changes are expected. The Committee felt that there is a need to have a balance in themes, and to have sessions that would be attractive to younger scientists.

2005 ASC (Aberdeen, UK)

The Committee and working group chairs were asked to provide input into session topics prior to June 2004. ICES suggested that each working group examine their terms of reference to determine whether a theme session would be of benefit in addressing certain issues or knowledge gaps. Conveners are encouraged to consider a special publication following the theme sessions. It is also anticipated that the Action Plan gap analysis (see above) will identify topics where additional expertise could be brought together through this venue. Given that the meeting will take place in Scotland, a major emphasis on the integrated assessment of the North Sea is being planned with topics related to ecosystem changes and effects.

The Committee proposed an overall theme entitled Sustainable Aquaculture, with theme sessions:

- Large-Scale Mortalities and Impacts on Sustainability
- Large-Scale Environmental Events and Impacts on Aquaculture.

These sessions (see discussion above) have direct relevance to the mariculture industry in Scotland and elsewhere. The Committee will consolidate its preparations of a justification for these for the mid-year Consultative Committee meeting.

Identification of cross-cutting issues of concern among Science and Advisory Committees

ICES will be giving specific working groups directed terms of reference so that they can provide the integrated advice through their normal parent and advisory committee process. At present there are no plans to dissolve or re-organize working groups into regional units (see discussion within MARC above). This will require working groups to respond to terms of reference promptly. This approach will be evaluated after two or three years to determine its effectiveness in delivering the desired products.

* This proposal was approved by the Delegates (C. Res 2003/2ACMESY01).

Committee and working group membership and participation

The Committee was asked to recommend when they would like to hold their business meetings: during the next ASC or outside of it. It was advised that the plan for the 2004 ASC was to open the meeting with a plenary lecture on the first day and to have business meetings on the following day. It was not clear whether these would overlap with ASC meetings or not. Given that Committee members and especially working group chairs play a prominent role in the ASC meetings (as conveners, etc.), the Committee endorsed holding the business meetings as a separate activity not overlapping ASC sessions.

The Chair discussed membership and advised that some members have not responded to e-mail requests. It was requested that the membership list be updated through ICES with Delegates annually to ensure participation and effective discussion. It was noted that this had been done for working group membership with a very positive result for the WGAGFM.

Review and adoption of draft resolutions (Expert Group terms of reference)

The terms of reference for the working groups were revised through the week and reviewed at the meeting on 26 September 2003.

WGAGFM has been given a new Term of Reference (e), arising from the report of the WGECHO asking for advice, and the appropriate justification has been added. Some questions were raised over the Term of Reference (c): Recommend the conservation targets for eels based on conservation genetics information, with respect to the activities of an ACFM assessment group that has a term of reference on glass eels. The Committee Chair will ensure that there is no duplication.

Minor changes were made to the Terms of Reference for WGPDMO and it was noted that ToR j was missing a justification.

WGEIM was given an additional Term of Reference (e) by the Committee, asking for an analysis of the literature and research on bath treatments and in-feed additives used to treat salmon for sea-lice and to produce a synthesis report on their effects on non-target organisms and their fate in the environment.

The WGMAFC Terms of Reference were accepted without change.

The WGMASC Terms of Reference were re-formulated, as discussed above, for clarification, but were not substantially altered.

Other business

Participation on the Baltic Committee

Committee members and working groups have been requested to become involved in the Baltic Committee where there is direct interest. The BSRP will officially start on 15 March 2003 and is a major international effort to develop a holistic, integrated management of the Baltic Sea ecosystem in order to ensure its long-term sustainability.

One component of the BSRP will be to foster biological effects monitoring, including studies on fish diseases and histopathology in the Baltic Sea. Baltic countries/institutes carrying out biological effects monitoring by applying standard techniques, such as those recommended by ICES, will have to participate in the self-funding BEQUALM programme.

Committee membership

The Committee asked the Chair to make a case to the Consultative Committee for working group chairs to become formal members of Science Committees. The bulk of the Committee activity occurs within the working groups and it was felt that this change would formally acknowledge their contributions. They may also be asked to participate in Advisory Committee meetings, especially where terms of reference arising from their working groups are being addressed.

The meeting was adjourned at 11:25 on 26 September 2003.