

**PROGRESS REPORT**  
**OF THE**  
**WORKING GROUP ON MARINE FISH CULTURE**

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## **1 MEMBERS**

The current membership of the Working Group on Marine Fish Culture (WGMAFC) is as follows:

Australia:	K. Williams
Belgium:	P. Coutteau, P. Lavens, P. Sorgeloos
Denmark:	I. Fjallstein, P. Laussen, J. Støttrup
Canada:	J. Castell, R. Penny, C. Clarke, E. Trippel
Finland:	A. Soivo
France:	B. Chatain, J. Person-le-Ruyet
Germany:	M. Bleil, H. Rosenthal, B. Ueberschaer
Iceland:	B. Björnsson
Ireland:	R. Fitzgerald
Latvia:	A. Mitans
Norway:	A. Mangor-Jensen, I. Opstad, T Harboe, J.C. Holm, T. van der Meeren, T.H. Næss
Portugal:	P. Pousao-Ferreira, A. Ramos
Spain:	J. Iglesias, C. Fernández-Pato, J.B. Peleterio
Sweden:	H. Ackefors, J. Andersson
UK:	M. Gillespie, B. Howell, R. Johnstone, A. Munro
USA:	M. Fulton, G. Scott

Contact information for members of WGMAFC can be found in Annex 1.

## **2 TERMS OF REFERENCE**

The following terms of reference were approved by the ICES Council (C.Res.1998/2:43) during the 1997 Annual Science Conference in Baltimore, USA:

The Working Group on Marine Fish Culture [WGMAFC] (Chair: Dr B.R. Howell, UK) will meet in St Andrews, New Brunswick, Canada from 14–16 June 1999 to:

- a) report on the current status of marine fish cultivation in Member Countries and on the factors which are likely to constrain the further development of the industry;
- b) review technological developments in relation to fish production and their application to various species;
- c) report on the establishment of behavioural criteria which can be used to evaluate on-growing systems and operational procedures;
- d) assess the prospects for establishing predictive criteria of juvenile quality;
- e) report on the establishment of a nutrient database for larval feed compositions and establish standard protocols for nutrient analysis;
- f) review progress toward the identification of alternative protein and lipid sources for marine fish diets.
- g) Select and prepare proposed Theme Sessions for the 2000 Annual Science Conference on 'Diversification of Aquaculture Production' and 'Long-term Effects of Cultivation of Juveniles'.

The WGMAFC will report to the Mariculture Committee at the 1999 Annual Science Conference.

### 3 ACTIVITIES OF WGMAFC

#### 3.1 Introduction

The planned meeting of WGMAFC in St Andrews, New Brunswick, Canada could not take place this year because of lack of support from the membership. This did not reflect a lack of enthusiasm among the members but more a commitment to major aquaculture events (notably the World Aquaculture Society (WAS) meeting in Sydney, Australia) that imposed a drain both on time and resources.

Therefore, little progress was made towards the terms of reference and the members agreed (by correspondence) that the meeting would be deferred until 2000. Consequently, this brief report comprises only a summarial statement of the continued development of marine fish culture within the ICES community and a reiteration of the proposals for the next meeting.

#### 3.2 Fish Production in ICES Member Countries

Sea bass, sea bream and turbot remain the main species farmed in ICES Member Countries, with a combined production now exceeding 18,000 tonnes (Table 1). ICES Member Countries are responsible for all European production of turbot and about 20 % of the European production of sea bass and sea bream. The growth of the sea bass and sea bream industry continues at a rate of about 10 % per year while the turbot industry has remained relatively static over recent years. The vast majority of these fish are produced in the more southern countries (France, Spain, and Portugal), but there are indications that an increase in production of turbot and sea bass will become evident in the next few years in more northern countries, including the British Isles, Denmark, and Norway. Much of this will be supported by the use of recycling systems that effectively remove the principal environmental constraint of water temperature.

**Table 1.** Production (tonnes) of farmed marine fish in ICES Member Countries in 1998. Data for 1997 are given in brackets. [Main source: Federation of European Aquaculture Producers.]

Country	Sea bass		Sea bream		Turbot		Cod	Halibut
Iceland								<100
Norway					<100			150 (138)
Denmark					<100			
UK					<100			<50
Ireland					<100			
France	2300	(1650)	1250	(1016)	1000	(950)		
Spain	1200	(829)	6900	(5530)	2250	(2225)		
Portugal	1000	(902)	1900	(1700)				

Diversification into new species is also likely to be a feature of the development of marine fish culture over the next few years. Small quantities of farmed halibut are already being produced in Norway, Iceland, and the UK and there is growing interest in farming cod in several northern countries. Further south, there is a considerable resurgence of interest in the farming of sole as well as other species such as breams, grouper, and yellowtail. Canada has become among the more active countries with regard to the development of techniques for novel species. In 1998 Canadian hatcheries produced significant numbers of juvenile halibut, haddock, cod, and yellowtail flounder, in addition to work on other species, and this should lead to the production of modest tonnages of fish in the next few years.

#### 3.3 Preparation for the 2000 Meeting of WGMAFC

There was a consensus at the 1997 meeting that the next meeting of the WGMAFC should be in St Andrews, New Brunswick, Canada during June 1999. This would enable a greater level of participation by Canadian members than has been possible in the past as well as allow all participants to learn more about the rapidly increasing marine culture activities in this country. This meeting has now been deferred to 2000.

The issues to be considered at the next meeting were identified at the 1997 meeting because of their relevance to the further development of marine fish culture in ICES Member Countries. The specific objectives of the meeting were defined and justified as follows:

- a) report on the current status of marine fish cultivation in Member Countries and on the factors which are likely to constrain the further development of the industry;

*It was agreed that the Working Group should continue to review the current status and problems of marine fish cultivation activities. This provides a continuing mechanism for focusing its activities.*

- b) review technological developments in relation to fish production and their application to various species;

*The continued expansion of marine fish cultivation is dependent on the development of novel systems which will reduce production costs and site and species constraints. Such developments will be reviewed and the extent to which they are applied across species will be evaluated.*

- c) report on the establishment of behavioural criteria which can be used to evaluate on-growing systems and operational procedures;

*Recent studies of fish behaviour in culture systems suggest the importance of behavioural criteria in evaluating both systems and operational procedures. Progress towards the establishment of such criteria will be evaluated.*

- d) review studies of the effect of events during early development on the phenotype of the juvenile stages and re-assess the prospects for establishing predictive criteria of juvenile quality;

*It is becoming increasingly evident that the phenotype of reared fish is highly dependent on events during early development. Such events may influence physical characteristics, physiological processes (e.g., thermotolerance and disease susceptibility), behaviour and gender. This increasingly active field should be reviewed and the prospect for establishing predictive criteria of juvenile quality re-assessed.*

- e) report on the establishment of a nutrient database for larval feed compositions and establish standard protocols for nutrient analysis;

*There is a need to establish a nutrient database for larval feed compositions which takes adequate account of protocols for nutrient analysis. This will serve to facilitate both intra- and inter-specific comparisons of nutritional requirements.*

- f) review progress toward the identification of alternative protein and lipid sources for marine fish diets.

*Feed cost, determined largely by that of its major components of protein and lipid, is one of the most important determinants of the economic viability of intensive rearing methods. The influence of the future availability of these materials and the progress toward the identification of suitable substitutes will be assessed.*

Dr B.R. Howell (UK), the current Chair of WGMAFC, will step down in 1999 having completed more than five years in that position. Nominations for a successor were sought from the membership and, on the basis of the responses, it is recommended that Dr J. Castell (Canada) take over as the new Chair of WGMAFC.

#### 4 RECOMMENDATIONS

The Working Group on Marine Fish Culture will carry out the terms of reference agreed by the ICES Council at the 1997 Annual Science Conference. To reiterate, WGMAFC (new Chair: Dr J. Castell, UK) recommends that it meet in St Andrews, NB, Canada from 5-7 June 2000 to:

- a) report on the current status of marine fish cultivation in Member Countries and on the factors which are likely to constrain the further development of the industry;
- b) review technological developments in relation to fish production and their application to various species;
- c) report on the establishment of behavioural criteria which can be used to evaluate on-growing systems and operational procedures;
- d) assess the prospects for establishing predictive criteria of juvenile quality;
- e) report on the establishment of a nutrient database for larval feed compositions and establish standard protocols for nutrient analysis;

- f) review progress toward the identification of alternative protein and lipid sources for marine fish diets;
- g) select and prepare proposed Theme Sessions for the 2000 Annual Science Conference on 'Diversification of Aquaculture Production' and 'Long-term Effects of Cultivation of Juveniles'.

The WGMAFC will report its progress to the Mariculture Committee at the 2000 Annual Science Conference.



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