Executive summary

The ICES Working Group on Aquaculture (WGAQUA), chaired by Peter Cranford (Canada), Pauline Kamermans (Netherlands), and Karin Boxespen (Norway) held its third meeting at the Narragansett Bay Campus of the University of Rhode Island (USA) on 16–20 March 2015 and was attended by 19 members and three guests. Pauline Kamermans had to cancel attendance at short notice for family reasons.

The ICES response to the special advisory request from OSPAR (OSPAR 4/2014 Interactions between wild and captive fish stocks) was the first formal advisory process for WGAQUA. WGAQUA noted large inconsistencies in the science advice developed by WGAQUA and the advice provided by ACOM to OSPAR. WGAQUA subsequently recommended and suggest a more integrated and transparent Advisory process that better promotes the establishment of an ICES science consensus on aquaculture issues and increases transparency, efficiency and confidence in the advice provided to clients.

A synthesis was prepared of reports by ICES SGs and WGs related to sustainable aquaculture on the environmental dependence and effects of aquaculture. This activity clearly demonstrates that ICES has been highly active over the last decade in reviewing the state of knowledge on the environmental dependence and effects of aquaculture and in the provision of advice and recommendations related to the integrated management of sustainable aquaculture (e.g. performance indicator selection, risk assessment approaches, generic and specific management frameworks). The review was helpful in identifying aquaculture issues that have not yet received adequate attention from ICES. It was observed that the present expertise of WGAQUA does not cover all topics that were identified (Product quality, Consumer Safety & Health, Aquatic Animal Health & Welfare).

Evaluating tools for monitoring changes in marine benthic habitats associated with aquaculture is seen as an important area of advice that requires further refinement and development within a new cycle in order to direct scientific recommendations to improve our ability to establish environmental monitoring programs using appropriate tools to assess the impacts of mariculture in non-traditional ecosystems. State-of-the-art sampling methodologies and tools need to be established for the different habitats types, which should be adopted into an international standard that could be utilised as a platform by ICES member countries and other countries globally to establishing monitor programs in substrate types not reflective of soft sediments.

In order to develop an evidence based protocol for the evaluation of the environmental effects of pest management WGAQUA recommends the use of a formalized risk analysis approach. Several protocols exist for estimating environmental risks arising from aquaculture (developed by NOAA, or FAO, or GESAMP, or Fisheries and Oceans Canada). Risk analysis is a decision support tool which focuses management efforts on mitigating potential environmental effects.

Attraction and repulsion of wild populations by finfish and shellfish farms was reviewed. Fish and shellfish farms can attract wild fish, marine mammals, and birds through the addition of food (for fish) to the environment and through the addition of physical structure (farm infrastructure as well as the shellstock that is being grown).
Husbandry activities may also attract fishes and other wild populations. At the same time, husbandry operations and the addition of feed and structure may repel some species through various mechanisms. Studies also indicate that fish farms may influence the reproduction of wild fish.

Ecosystem services associated with aquaculture were categorized by examining the interactions of aquaculture and the environment in the context of the ecosystem where these systems exist. The United Nations Millennium Ecosystem Assessment developed a scheme to categorize the benefits of ecosystems. The four categories of benefits include: provisioning, regulating, cultural, and supporting services. Examples for all four categories were provided. In addition, methods for valuating services were described.