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International collaboration on marine bioinvasions – The ICES response

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Abstract

The International Council for the Exploration of the Sea (ICES) noted the risks associated with uncontrolled species introductions and transfers more than 40 years ago and launched two working groups to address the issue, i.e. the ICES Working Group on Introductions and Transfers of Marine Organisms (WGITMO) to deal with the movement of non-indigenous species for e.g. aquaculture purposes and the ICES/IOC/IMO Working Group on Ballast and Other Ship Vectors which focuses on species movements with ships. Both groups are actively working until today and the key achievements of the groups are outlined.

Keywords: Species introductions; Aquaculture; Ballast water; Hull fouling

1. Introduction

When addressing marine bioinvasions, international cooperation is essential, as species spread across political boundaries. This is especially needed in regions where several jurisdictions join coastlines of seas, such as along the North and Baltic Seas. A lack of cooperation will likely result in un-harmonised (research) efforts including work duplication. Further, management programmes, mitigation measures and eradication efforts on introduced species do only make sense when being undertaken jointly by all affected countries.

Key introduction vectors of non-indigenous species are importations for aquaculture and species transfers with ships. In aquaculture efforts non-native species are frequently in use and a risk that these species escape from their containment sites exists. Further, non-target species (e.g. disease agents, parasites and other accompanying species such as fouling organisms on oysters) may unintentionally be imported. Ships are well known as introduction vectors and species are transported in, e.g. ballast water tanks and as fouling on the ships hulls. In European studies, approx. 1000 taxa have been sampled from ballast tanks (e.g. Macdonald and Davidson, 1998; McCollin et al., 2001; Gollasch, 2002; Gollasch et al., 2002; David et al., in press).

In this paper international cooperation efforts relevant to biological invasions are discussed by considering the response of the inter-governmental organisation International Council for the Exploration of the Sea (ICES). Noting the risks posed by uncontrolled species invasions ICES (see also www.ices.dk) launched two working groups to address the issue. As a fishery-oriented organization, ICES has early been confronted with issues related to the introductions of non-indigenous species, in particular diseases and parasites transferred with live transport of fish and shellfish for relaying, stocking and aquaculture purposes. During the late 1960s and early 1970s, the need to assess the risks associated with deliberate transfers of species was of concern to several ICES committees. Consequently, the ICES Working Group on Introductions and Transfers of Marine Organisms (WGITMO) was launched. WGITMO has been actively working until today.

Since the mid-1990s ballast water came more and more into focus as a species introduction vector and ICES linked

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with IMO (the International Maritime Organization, the United Nations body which deals with shipping), IOC (Intergovernmental Oceanographic Commission) and other organisations to address this problem of ship-mediated species introductions which lead to the establishment of the Study Group on Ballast Water and Sediments (SGBWS). To address the growing concern of other ship vectors such as hull fouling the Study Group was renamed to Study Group on Ballast and Other Ship Vectors (SGBOSV) in 1999, and to allow for a longer term operation the group was reorganized as working group (Working Group on Ballast and Other Ship Vectors – WGBOSV) shortly thereafter.

Both WGITMO and WGBOSV to a large extend benefit from the input of guests originating from outside the ICES area, including representatives from the Baltic Marine Biologists (BMB), International Commission for the Scientific Exploration of the Mediterranean Sea (CIESM), North Pacific Marine Science Organization (PICES), and the European Research Network on Aquatic Invasive Species (ERNAIS).

2. Species introductions related to aquaculture, and the development of WGITMO

Global interest in marine aquaculture (mariculture) began to increase dramatically in the 1950s and 1960s. A natural consequence of this interest was the search for fish, shellfish (molluscan, crustacean, and echinoderms), and plant species which already had achieved or could achieve success in extensive aquaculture use elsewhere. Once identified, these species were potential candidates for a movement to new locations world-wide for the purpose of establishing new fisheries and new mariculture resources.

2.1. ICES code of practice

ICES, through its WGITMO and in cooperation with other ICES Working Groups and with the European Inland Fisheries Advisory Commission (EIFAC) of the Food and Agriculture Organization of the United Nations (FAO), has addressed the concerns of introducing non-native species which resulted in the preparation of a Code of Practice. The first version of this code was adopted by ICES in 1973 as *Code of Practice on the Movement and Translocation of Non-native Species for Fisheries Enhancement and Mariculture Purposes*. The Code was set forth to reduce the risks of adverse effects arising from introductions of non-indigenous marine species. Subsequent modifications, proposed by the ICES Working Group on Pathology and Diseases of Marine Organisms in 1978 and by the then newly reconvened ICES WGITMO in 1979, led to the publication of a "Revised Code", adopted by ICES in 1979. The 1979 Code became the standard for international policy and the code was extensively used, cited, and translated for the next 10 years. Minor revisions and additions over the next decade resulted in the adoption of a 1990 Revised Code, followed by the 1994 Code. The 1994 Code took into account several updates and included genetic issues for the first time.

The 2005 Code, i.e. *ICES Code of Practice on the Introduction and Transfers of Marine*[1] *Organisms*, is the most up-to-date version (ICES, 2005). It includes all concerns expressed in the 1994 Code and follows the precautionary approach adopted from the FAO principles, with the goal to reduce the spread of exotic species. It accommodates the risks associated with current commercial practices including trade of ornamental species and bait organisms, research, and the import of live species for immediate human consumption. It also includes species that are intentionally imported to eradicate previously introduced invasive species (biocontrol), as well as genetically modified organisms (GMOs) and polyploids (specifically triploids and tetraploids). The latter sections were prepared together with WGITMO and the ICES Working Group on the Application of Genetics in Fisheries and Mariculture.

The code outlines a consistent, transparent process for the evaluation of a proposed new introduction, including detailed biological background information and an evaluation of risks. It is structured in 10 sections of recommendations relating to:

- I, a strategy for implementation;
- II, the steps to take prior to introducing a new species;
- III, the steps to take after deciding to proceed with an introduction;
- IV, policies for ongoing introductions or transfers which have been an established part of commercial practice;
- V–IX, the steps to take prior to releasing genetically modified organisms; and
- X, recommended actions to take when releasing GMOs.

ICES Member Countries planning new species introductions are requested to present to the ICES Council a detailed prospectus on the rationale and plans for the introduction. The prospectus content is described in Section II of the Code of Practice and in the detailed code appendices.

ICES may request WGITMO and/or other Working Groups to evaluate the prospectus and, if needed, more information may be requested from the proposer. In case a species introduction is approved, ICES requests to update the Council on the progress of this initiative.

ICES views the voluntary Code of Practice as a guide to recommendations and procedures. This latest version of the code reflects the past 30 years of experience with the evolution of new fisheries and genetic technologies. While initially designed for the ICES Member Countries concerned with the North Atlantic and adjacent seas, all countries across the globe are encouraged to implement this

[1] For the purpose of the Code marine species are defined as "Any aquatic species that does not spend its entire life cycle in freshwater", thereby including brackish water species and species which migrate between marine and freshwater habitats.