



GENIMPACT

Evaluation of genetic impact of aquaculture activities on native populations: a European Network

The Challenge

Although it is generally assumed that fish farming relieves the pressure on wild fisheries, its effects – direct or indirect – on aquatic resources are not yet fully understood, and indeed have been the subject of intense debate. Particular focus has been placed on the potentially negative genetic impacts of escaped farmed finfish/shellfish and/or deliberate introductions of farmed and non-native organisms into wild stocks.

The perceived risks are often associated with interbreeding with natural populations and the adverse effects of ecosystem interactions. Public health issues are also a matter of concern. Due to the mass-scale application of biotechnology to increase production – a step which implies the use of transgenic, genomic and cellular technologies – the question of the safety of transgenic fish has entered the debate on genetically modified organisms (GMOs). It would therefore be in everybody's interest to increase the knowledge necessary to assess the genetic effects of aquaculture on biodiversity, and to disseminate this information to a wider public.

Project Objective

The aim of the GENIMPACT project was to integrate current knowledge of the impact of aquaculture on the genetics of wild fish stocks and identify future research needs. The project focused on the 12 species that already are, or are on their way to become, important aquaculture species in Europe: Atlantic salmon, Atlantic cod, European sea bass, gilthead sea bream, turbot, carp, halibut, scallops, mussels, oysters (European flat oyster and Pacific cupped oyster) and European lobster.

Key Points

- To review and compare the genetic structure and biology of wild and cultured stocks of the selected species.
- To evaluate current methods for identifying the genetic origin of fish and monitoring their occurrence, as well as the fitness of aquaculture individuals, in the wild
- To review the state of the art on the use of modelling tools for assessing the risk of genetic impacts and for evaluating management and conservation strategies for wild populations



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EATiP Thematic Area of Relevance

TA1: Product Quality, Consumer Safety and Health

TA2: Technology and Systems

TA3: Managing the Biological Lifecycle

TA4: Sustainable Feed Production

TA5: Integration with the Environment

TA6: Knowledge Management

TA7: Aquatic Animal Health and Welfare

TA8: Socio-Economics and Management

Key Words

Genetics, Environment, Aquaculture

Project Information

Contract number:

22802

Contract type:

Coordination Action

Action line:

POLICIES-1.3 The modernisation and sustainability of fisheries policies

Duration:

24 Months (01/11/2005 – 31/10/2007)

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Output Highlights

New applications

The genetics of domestication, breeding and enhancement of performance of fish and shellfish were discussed at workshops. The phenomenon of triploidy, whereby organisms have three sets of chromosomes instead of two, was assessed as a possible tool for the protection of genetic resources from aquaculture escapees.

The risks associated with the farming of transgenic fish, and more in particular the probability that they escape and establish self-sustaining populations, were evaluated, as well as the potential benefits and risks of DNA-vaccines (in terms of their applicability and cost-effectiveness, possible transfer by vaccinated escapees into wild fish, and so on).

Monitoring tools

Tools for the evaluation of genetic impact of aquaculture activities on wild populations were discussed. EU fisheries and aquaculture have had damaging impacts on both commercially harvested fish stocks, and on non-target species and habitats. By collating scientific information on the genetic impact of fish farming on wild fish stocks, GENIMPACT developed consensus statements on the genetic impact of fish farming activities and its implications. It aimed to establish preventive measures for important aquaculture species, so as to contribute to the conservation of genetic diversity in the long term.

Wild/cultured interaction

Summaries of current knowledge of the interaction between cultured and wild populations of Atlantic salmon, Atlantic cod, European sea bass, gilthead sea bream, turbot, carp, halibut, scallops, mussels, oysters and European lobster were generated. Summaries included information on basic biology, distribution, fishery, aquaculture, and implications for practice.

The Full Report:

For a comprehensive description of the research project, and a copy of the project book "Genetic Impact of Aquaculture Activities on Native Populations" visit <http://genimpact.imr.no/>

Next Steps – Suggested Actions/Follow On



Environment

- The project increased awareness of the negative genetic impact on wild populations and increased focus on how to prevent such negative impact. The merits of the genetic effects of culture practices and domestication as well as their implications for community biodiversity need to be further assessed. The use of triploid individuals needs further investigation in terms of their applicability and cost-effectiveness, possible transfer by vaccinated escapees into wild fish, and so on.
- It provided knowledge to industry to assist in developing more environmentally sustainable production of fish and shellfish



Policy

- Information gathered during this project details the genetic impact of aquaculture production on native populations, and can be used by aquaculture, breeding, environmental and animal welfare organizations, and to provide policy makers with useful information.