

# Summary

AFS Policy Statement #21:  
Transgenic Fishes  
(Abbreviated)

The advent of gene transfer techniques has introduced the development of lines of fishes, as well as other aquatic organisms, bearing introduced genes. Such modifications are typically aimed at substantial changes of performance characters (e.g., faster growth), extension of environmental tolerance (e.g., cold resistance), or expression of novel proteins. Most fisheries professionals would agree that (1) traits other than those targeted by gene transfer are likely to be affected, (2) overall phenotypic performance of such fishes is virtually uncharacterized, and (3) introduction of such fishes into natural aquatic communities may cause ecological or genetic impacts.

Based on current understanding of community-level impacts of stocking non-transgenic piscivorous fish, the release of certain transgenic fishes, especially those exhibiting substantially altered performance, could destabilize and reorganize aquatic ecosystems. Because aquatic ecosystems function through complex interactions involving transfers of energy, organisms, nutrients, and information, it is reasonable to expect difficulty in predicting the community-level impacts of releasing transgenic fishes that exhibit one of more type of phenotypic change. Ecological risks of releasing transgenic fishes could be reduced by making them sterile. When sterilization is accomplished via induction of triploidy or administration of hormones, however, there is the added risk that not all individuals are truly sterile. Further, releases of sterile transgenic fish would still involve short-term risks because sterile fish might alter community dynamics through processes such as competition and altered predation.

Because the performance and ecological impacts of transgenic organisms in natural ecosystems are unknown, their uncontrolled release is undesirable. Public policies for regulating development, patenting, and release of transgenic organisms are currently being formulated, and it is important that fisheries scientists become involved in evaluations of the performance and ecological impact of transgenic fishes. Public policies must be established which ensure that rational, carefully considered decisions are made regarding development and release of transgenic fishes. While this position statement focuses on transgenic fishes, the concerns and recommended courses of action apply to all genetically modified aquatic organisms.

The AFS policy regarding transgenic fishes is to:

1. Support research to provide data for rational policy decisions. Research needs include phenotypic characterization of transgenic lines, evaluation of the performance of transgenic lines, improvement of sterilization techniques, and development of ecological risk assessment models and protocols.
2. Advocate caution in uses of transgenic fishes including support for (a) completion of well-defined studies in secure facilities, (b) completion of case-by-case risk assessment studies, (c) development of criteria for sterilization or containment of fertile transgenic broodstocks, and (d) prevention of stocking into natural waters until supported by adequate research, public review and comment, and approval of appropriate fish management agencies.
3. Advocate policies improving comprehensiveness of the Coordinated Framework for the Regulation of Biotechnology in the United States. Support full application and revision of National Institutes of Health (NIH) and U.S. Department of Agriculture (USDA) guidelines regulating production and handling of transgenic organisms including:

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- requiring the production of transgenic animals in non-federally funded laboratories to follow NIH or USDA guidelines or performance standards (monitoring and enforcement provisions of the guidelines should be strengthened);
  - expanding the scope of policies regarding environmental release of transgenic animals to include experiments not specifically funded by USDA;
  - establishing mandatory federal oversight of proposed releases of transgenic species, including public involvement and monitoring in the permit process and monitoring by an AFS committee of technical experts of both the regulatory process and early releases of transgenic fishes;
  - developing policies regulating distribution and final use of transgenic fishes, pressing for adoption of an ecologically conservative philosophy which includes (a) granting of separate permits for distribution and final use of transgenic organisms on a case-by-case basis and (b) completion of risk assessments that consider particular genetic and phenotypic modification and the accessible environment at issue;
  - designation of a lead agency, including AFS representation on appropriate advisory committees, for policy development and enforcement regarding distribution and uses of transgenic fishes.
4. Support the policy put forward by the Department of Fisheries and Oceans in Canada, "Transgenic aquatic organisms: policy and guidelines for research with, or for rearing in natural aquatic ecosystems in Canada," and support development of a Canadian "National policy on introductions and transfers of aquatic organisms," which will address concerns presented by aquatic organisms genetically modified by other biotechnological means.
5. Advocate clear and narrowed definition of proprietary rights for genetically novel animals by:
- narrowly defining patents granted for novel animals to avoid stifling subsequent work and to limit them to cases where use of new genetic elements or new production processes are key innovations;
  - strengthening legal provisions of the Patent Act for use and reproduction of patented novel animals for bona fide research purposes;
  - establishing in legislation or agency regulations the philosophy and structure of royalty obligations regarding uses of transgenic animals before such animals enter agricultural production.