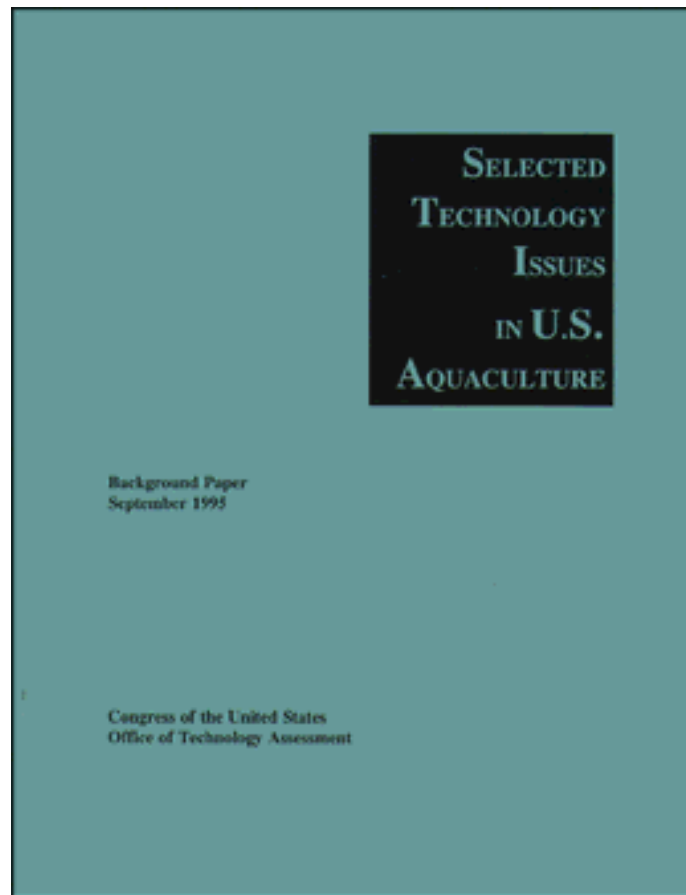


*Selected Technology Issues in U.S.
Aquaculture*

September 1995

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Foreword

As U.S. capture fisheries are declining, interest in aquaculture is again growing. Private, commercial aquaculture--the production of aquatic organisms (finfish, shellfish, and plants) by one or more individuals or corporate bodies that have owned them through all or part of their rearing period--is being considered for its potential to provide employment and income to declining coastal and rural communities, to help improve the U.S. balance of trade, and to provide consumers with a plentiful, safe, and nutritious protein source.

The United States lacks a strong national aquaculture policy and supporting federal presence. Over the years, levels and foci of agency involvement in aquaculture development have shifted in response to legislation and its differing interpretations. The National Aquaculture Act (NAA), the primary piece of aquaculture-related legislation, is slated for reauthorization in 1995 as part of the Farm Bill. One issue that underlies reconsideration of the NAA and related legislation is the federal role in research and regulation of this emerging industry.

Congress requested this Background Paper to provide information on technology issues of immediate importance to the U.S. aquaculture industry. This is a companion piece to the Background Paper on *Current Status of Federal Involvement in U.S. Aquaculture*. Committees requesting the assessment were the House Committee on Merchant Marine and Fisheries (since disbanded), the House Committee on Agriculture and its Subcommittee on Livestock, and the Senate Committee on Governmental Affairs.

OTA greatly appreciates the contributions of the Advisory Panel, authors of contracted papers, workshop participants, federal liaisons, and the many additional people who reviewed material for the report or gave valuable guidance. Their timely and in-depth assistance allowed us to explore some of the complex issues related to the federal role in aquaculture. As with all OTA studies, the content of this report is solely the responsibility of OTA.

ROGER C. HERDMAN
Director

HIGHLIGHTS

CHAPTER 2: AQUATIC ANIMAL HEALTH

- Disease is responsible for major economic losses to aquaculture, making disease prevention and treatment a critical need for the industry and an important focus for research needed to support aquaculture development.
- Approaches to prevention include good husbandry and management to minimize stress and exposure to pathogens; vaccines, if available; and culture of disease-resistant or certified disease-free stocks.
- Inadequate resources for disease treatment impedes the growth of aquaculture. Few approved drugs are available, and those that exist are targeted to specific organisms and diseases. Veterinary and diagnostic services are patchily available nationwide, and many states lack adequate resources of this kind. The expertise involved in introducing and gaining regulatory approval of new aquaculture drugs and the small market for these drugs discourage pharmaceutical industries from pursuing their development.
- Federal regulations regarding aquatic animal health treatment attempt to serve many goals: protection of aquatic animals (cultured and wild), human consumers, and the environment.
- Greater coordination of agencies and programs with a stake in aquatic animal health in aquaculture can improve performance with respect to regulatory goals. Changes in the new drug approval process could remove a significant impediment to industry development.

CHAPTER 3: BIOTECHNOLOGY

- Use of biotechnology in aquaculture is an essential tool in the maintenance and growth of the aquaculture industry. Established methods will continue to be important; new techniques may permit increased production and other benefits with costs and potential for adverse effects that must be evaluated carefully.
- Federal policy and regulations regarding biotechnology have developed in response to risk and safety issues that arise in aquaculture as well as other industries that might benefit economically from manipulating plant and animal characteristics. However, many genetically modified aquatic organisms do not fall under the umbrella of any legislation. Transgenic aquatic organisms also pose special problems for regulators because they may cross national boundaries.
- The risks and benefits of developing aquatic transgenics are subjects of considerable controversy, signaling the need for further research. In addition to risk/benefit analyses, critics call for exploration of numerous moral and ethical issues related to the use of biotechnology in the aquaculture industry.

CHAPTER 4: BIRD PREDATION

- Bird predators can cause significant economic problems at some aquaculture facilities. Accurate data to document their toll and to establish relationships between facility type/species and losses to predation are scant, making it difficult to design effective controls.
- Responsibility for regulation and monitoring activities related to predation at aquaculture facilities lies with several federal agencies and state governments. Coordination among all governing bodies sometimes is not apparent; record-keeping is cumbersome and lacks systematic collection and ready access.
- Possible impacts of aquaculture and of attempts at predator control on predator population trends are poorly understood. Data are lacking to assess population trends and cause/effect relationships.
- Given the lack of knowledge and data on predator levels, behaviors and population trends; and in light of the diversity of aquaculture operations, a multifaceted and integrated approach to predator control may be most effective. This would involve combining several deterrents used in rotation with the understanding that complete elimination of predation problems is unrealistic. Reducing losses to economically tolerable levels is the only feasible goal.

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