Alternative Uses of Aquaculture: Replenishing Depleted Fisheries

Ken Leber
Potential of Flounder Enhancement
Ecosystem-based blue crab enhancement in the Chesapeake Bay

- Restore spawning stock and recruitment
- Protect and restore critical nursery habitats
- Community-based management/Education
- Crab enhancement in nurseries
- Multi-species management

(Rom Lipschius, Virginia Institute of Marine Science)
Enhancing Saltwater Sport Fisheries

Example – Florida: “Snook Fishing Capital of the World”

Snook contribute to Florida’s $5.1 billion saltwater recreational fishing industry

Snook are Threatened by:
- Rapid Population Growth
- Cold Winter Freezes
- Red Tides
Florida Fish & Wildlife’s new statewide replenishment initiative

FLORIDA’S SALTWATER HATCHERY & HABITAT INITIATIVE

A Partnership to Ensure More Recreational Fishing Opportunities in Florida, Today and Tomorrow Through Sound Management Practices.

Welcome

WILDLIFE FOUNDATION OF FLORIDA
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Florida Fish & Wildlife’s new statewide replenishment initiative

INTENSIVE RECYCLING AQUACULTURE SYSTEM (RAS)

THE MODEL FOR SMALLER INDOOR FACILITIES

FWC is working with hatchery network partners to pursue the development of indoor Re-circulating Aquaculture Systems (RAS) for raising marine sportfish to larger sizes before release. Intensive re-circulating systems use an integrated water treatment process that allows most of the water used in aquaculture operations to be reconditioned and recycled. One of the major advantages of RAS technology is a smaller facility footprint that requires less land and can be built away from the coast.

This project has great promise to become a model for public-private partnerships and change the way diverse parties work as a team toward environmentally responsible and beneficial solutions—but we need your help to make it happen.

Businesses, civic organizations, sporting clubs and associations, communities, schools and concerned individuals must all become—and remain—actively involved.

We are actively searching for site locations. No fixed size is required, so if you know of a location that might work, please telephone 800-988-4689 or e-mail info@supportflorida спортfish.com.

Please take a few minutes to register to BE PART OF THE TEAM and help us sustain fish, their habitats, and sport fishing for future generations to enjoy.
A Responsible Approach to Marine Stock Enhancement *

Stay Within Context of Fisheries Management Plan:
1. Prioritize Species for Enhancement
2. Stocking Plan integrated with Fishery Management Plan

Develop Sound Enhancement Strategy:
3. Quantitative Measures of Success
4. Genetic Resource Mgmt. to Prevent Deleterious Effects
5. Disease and Health Management
6. Know Ecological, Biological, & Life-History Patterns
7. Identify Hatchery Fish & Assess Stocking Effects
8. Define Optimal Release Strategies
9. Policy Guidelines & Economic Impact
10. Use Adaptive Management

(* Blankenship & Leber, 1995)

Rationale for Pilot Studies to Optimize Release Protocol

Survival is highly dependent upon release strategies.

- Release Habitat
- Size-at-Release (SAR)
- Release Season
- Interactive Effects

Science Consortium for Ocean Replenishment
Hypothesis:
Marine Hatchery Releases Increase Fish Abundance

Predictions:
- Cultured Organisms Can Survive, Grow & Contribute to Fisheries  ✔
- Stocked Organisms Do Not Displace Wild Individuals  ❓
- Stocking to Increase Fishery Production is Economical  ❓
Mote Aquaculture Park

200 acre site, 17 miles inland

Commercial & Research Scale Marine and Freshwater Facilities

Focus on developing zero discharge technologies
Large-scale Growout Tanks
Low-Head/Low-Energy Filtration System
Marine Fish Breeding Systems

- Large breeding tanks
- Independent temperature, lighting, and filtration

![Image of breeding tanks](image-url)

![Diagram of marine broodstock building](image-url)
Probing the Potential of Marine Stock Enhancement

The Science Consortium for Ocean Replenishment (SCORE) is developing responsible, effective, and scientifically-based marine stock enhancement & restocking technologies. The consortium is a multi-state US initiative to help boost recovery of depleted fisheries.

What is stock enhancement?
The fish and invertebrates that support coastal fisheries are among our Nation’s most important natural resources. Sustaining these is much more challenging today than in the past. Stock enhancement entails releasing hatchery-reared juveniles into the wild to augment the natural supply of juveniles and help optimize fishery harvests.

But the effectiveness of stocking is not well understood and techniques for ensuring success have not been developed. To realize the potential of stock enhancement to rapidly replenish fish stocks, better science is needed about stocking juveniles into the sea.

SCORE is conducting the research needed to make stocking effective. The goal is to develop stocking into an economical, environmentally friendly fishery management strategy to be used, when appropriate, along with fishing regulations and habitat protection.
Florida’s model program for integrating aquaculture into fisheries management

- Promoting sustainable stocking practices
  - Regulatory incentives:
    - Genetic guidelines policy (& permit clause)
    - Health guidelines policy (& permit clause)
    - Stocking guidelines (adaptive management)
  - Market incentives:
    - Funding for Eco-Centers (joint fundraising effort)
    - Funding for zero-discharge research (FL, NOAA)
  - Management incentives:
    - Stakeholder involvement in planning
    - Strategic integration of stocking with fishery management; responsible approach
Sponsors & SCORE Partners

Science Consortium for Ocean Replenishment

Mote Scientific Foundation

SCORE Member Organizations

- Florida Fish and Wildlife Conservation Commission
- National Oceanic and Atmospheric Administration
- Mote Science Foundation
- NOAA
- Southwest Florida Water Management District
- University of South Florida
- State of Florida
- State of Georgia