Working with Municipalities to Initiate Stocking Activities: Winter Flounder in the Northeast US

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Winter Flounder
*Pseudopleuronectes americanus*

Important to both commercial and recreational fishermen in the Northeast US
SSB < $SS_{BMSY}$

All overfished

SNE/MA SSB 2007
$\sim 9\% \ SS_{BMSY}$

If $F = 0$ for 2009-2014, only 1% chance stock can be rebuilt to $SS_{MSY}$ for 2014

(GARM III Report, NEFSC, 2008)
Stricter Regulations

• In federal waters:
  – No possession of SNE fish for federal multi-species permit holders

• In coastal waters:
  – Addendum I to FMP (ASMFC): help rebuild inshore stocks, protect spawning stocks
  – Daily limits

• CCA pushing for total closure, including state waters and recreational fishers

<table>
<thead>
<tr>
<th>STOCK</th>
<th>COM.</th>
<th>REC.</th>
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<tbody>
<tr>
<td>SNE/MA</td>
<td>50 lbs</td>
<td>2 fish</td>
</tr>
<tr>
<td>GOM</td>
<td>250 lbs</td>
<td>8 fish</td>
</tr>
<tr>
<td>GB</td>
<td>250 lbs</td>
<td>8 fish</td>
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</tbody>
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Culturing Techniques

FROM WILD

TO WILD
Size at release

- Many predators
- Fewer predators

Fish Size

Low → High

Survival post-release

Many predators → Fewer predators
Release Size

![Graph showing predation rates for culturing and wild fish, with carapace width in mm and predation rate per day.](image)

**Cultured Fish**

**Wild Fish**

Flounder Sizes (mm)

- 11-20
- 21-30
- 31-40
- 41-50
- 51-60
- 61-70

(Witting & Able 1995)

(Flounder Sizes (Fairchild & Howell 2000)

(Crab)

(Crab)
Size at release

Optimal release size

Hatchery costs
Survival post-release

Fish Size

Many predators  Fewer predators
Tagging Methods

(Sulikowski et al. 2005)
Conditioning – Cryptic Behavior

Graph showing the proportion of buried fish over time.

Bar chart showing the proportion of fish eaten in light versus dark conditions.

Images of fish in light and dark conditions.
Conditioning – Foraging Behavior

(Walsh, 2012)
Conditioning – Foraging Behavior

- Nereidae
- Paraonidae
- Unid. Polychaete
- Amphipoda
- Isopoda
- Mytilidae
- Unid. Bivalvia
- Crangon
Release Site
Figure 2 Mean growth (± 1 SEM) in length of cultured winter flounder held in pens at the three sites.

Figure 3 Mean growth (± 1 SEM) in weight of cultured winter flounder held in cages at the three sites.
Early Season Beam Trawl Catch - Paired with Cores

BR 1
BR 7
BR 9

BWR 3
BWR 5
BWR 7
BWR 9

HR 3
HR 5
HR 7
HR 9

MG 3
MG 5
MG 7
MG 9

TMC 3
TMC 5
TMC 7
TMC 9

Stress: 0.09

Release Site
Benefits of Acclimationization

- Unconditioned Hatchery Fish
- Wild Fish & Cage-Conditioned Hatchery Fish
- Release spot
Modified Kernel Home Ranges

132-Modified
- 50
- 95

133-Modified
- 50
- 95

135-Modified
- 50
- 95

137-Modified
- 50
- 95

50% P = 0.14
Similar Habitats

- **Cultured Fish**
- **Wild Fish**

**Temperature**

- Celsius
- Measurements from 08/16/05 to 11/04/05

**Depth**

- Meters
- Measurements from 08/16/05 to 11/04/05

**Dissolved Oxygen**

- mg/l
- Measurements from 08/16/05 to 11/04/05

**Salinity**

- ppt
- Measurements from 08/16/05 to 11/04/05
Research Phase - Experimental Releases

- Culturing techniques established
- Tagging studies completed
- Acclimation needs researched
- Acclimation benefits known
- Release strategies determined

Next step... large-scale pilot releases to validate experimental studies

Problem: Space limitations at UNH
A Regional Effort
Martha’s Vineyard Group

Wampanoag Tribe of Aquinnah

Martha’s Vineyard / Dukes County Fishermen’s Association

2 potential release areas
East Hampton, NY Group

Town of East Hampton

Multi Aquaculture Systems Inc.

2 potential release sites
Action Plan

• Employ local work force to carry out project
• Use responsible approach
• Begin with eco-system analyses at potential release sites
• Evaluate if restocking makes sense
  – Habitat quality, prey availability, predator complexes, wild flounder population, water quality, carrying capacity
• Determine if subpopulations exist to determine broodstock origin
Potential Problems

• Lack of control of municipalities
  – Maintain scientific approach
  – Reign in gung-ho participants

• Common resource but municipalities feel ownership

• Expensive
  – Who pays? How?

• Regulatory framework for regionally stocked species doesn’t exist yet
Bottom Line

• Still lots of uncertainties

“A good solution applied with vigor now is better than a perfect solution applied ten minutes later.”

– George S. Patton, Jr.

• Option of conserving marine resource
• Provide economic value
• Transfer technology and implementation
Thanks!