

Optimal Release Strategies for Winter Flounder Stock Enhancement

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As part of a program to assess the feasibility of winter flounder, *Pseudopleuronectes americanus*, stock enhancement, optimal release size, site, season, and condition of cultured, juvenile winter flounder were evaluated.

To determine optimal release size, the predator-prey size relationship between winter flounder and the green crab, *Carcinus maenas*, was examined. The number of flounder killed per day was significantly higher (31%) in winter flounder < 20 mm compared to all other larger fish size classes (4-8% killed/day). Additionally, these fish were attacked at a faster rate than any other fish size class. These results suggest that only flounder > 20 mm should be released.

Field studies were conducted in three potential release sites in the Great Bay Estuary during 1999-2001 to determine optimal release site and season. Optimal site selection was based on growth and survival of caged, cultured fish in relation to water temperature, prey availability, and sediment composition. Optimal season was selected based on the temporal distribution, abundance, and sizes of wild flounder, and their primary prey and predators. Within the estuary, Broad Cove was chosen as the optimal release site due to high fish growth rates coupled with the high prey availability and sandy substrate.

Although predators were equally abundant throughout the summer months, early summer was

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determined as the most appropriate time for winter flounder releases because prey were most abundant and wild flounder sizes were similar to the optimal release size for cultured fish. The condition of the cultured flounder was studied through a series of experiments to evaluate their vulnerability to predation based on behavior, color, and substrate preference. Cultured winter flounder reacted differently than wild flounder when exposed to cues from a potential predator and were significantly more vulnerable to predation by birds, regardless of fish color.

Additionally, cultured flounder selected sediments consisting of small grains and of colors matching their own pigment.

Prior to any winter flounder enhancement effort, pilot-scale releases should be conducted to test release strategies.