

RECRUITMENT PATTERNS OF CULTURED JUVENILE PACIFIC THREADFIN, *POLYDACTYLUS SEXFILIS* (POLYNEMIDAE), RELEASED ALONG SANDY MARINE SHORES IN HAWAII

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ABSTRACT

Release-recapture studies were conducted with Pacific threadfin, *Polydactylus sexfilis*, the species given highest priority for stock-enhancement research in Hawaii. Their purpose was to evaluate recruitment potential, dispersal, growth, and differential recapture rates of cultured fingerlings released into shoreline juvenile nursery habitats along the windward (eastern) coast of Oahu, Hawaii. We varied fish size at release, release site, and the seasonal timing of releases using a balanced, randomized-block experimental design. After releases of 20,000 tagged Pacific threadfin in 1993 and about 81,000 in 1994, we recaptured 1705 cultured juveniles in net collections made over a 17-mo period. Presence of cultured fish in net samples depended strongly on the interactive effects of release variables. Size at release had an important effect on recapture rates at all release sites, but this effect varied seasonally. At one of the release sites, larger fish apparently had better survival after winter releases and smaller fish had better survival after summer and fall releases. Release site affected dispersal patterns, recruitment, and recapture rates. The percentage of cultured fish in samples of Pacific threadfin taken 8 mo after release varied from 0% to 64%. Cultured fish showed strong site fidelity at some sites, weak at others. What we considered "pilot"-scale releases clearly were large enough to approach swamping wild recruitment at Kahana Bay. A key question from this study is how many cultured juvenile Pacific threadfin the Kahana Bay site can support without displacement of wild individuals.

Worldwide declines in coastal fishery landings (FAO, 1994) have prompted a resurgence of interest in evaluating the potential of hatchery-based marine stock enhancement (release of cultured juveniles to increase abundance of wild stocks that spawn in seawater) as a tool to help replenish depleted fisheries (see symposium proceedings edited by Lockwood, 1991; Danielssen et al., 1994; and Schramm and Piper, 1995). Recent studies indicate that released cultured organisms can make substantial contributions to fishery landings of some coastal stocks (e.g., Kitada et al., 1992; Honma, 1993; Leber and Arce, 1996). Because of increased marine stocking, more information is needed for evaluation of the desirability and effectiveness of such releases (Peterman, 1991; Cowx, 1994; Blankenship and Leber, 1995; Munro and Bell, 1997).

Release-recapture studies in Hawaii are evaluating hatchery-release effects on marine and estuarine species with different trophic and habitat preferences. In 1988, Pacific threadfin, *Polydactylus sexfilis* (Polynemidae), was given the highest research priority in Hawaii among species evaluated for studies to examine the potential of marine stock enhancement as an additional fishery-management tool (Leber, 1994). The species is a marine carnivore. Juveniles prefer inshore, sandy marine habitats. Adults feed in sandy patches among reefs and in the surf zone along Hawaii's sandy and rocky shores. Pacific threadfin is a very popular sport fish that also supports a small subsistence fishery in Hawaii. Historically, this species was prized by the kings of Hawaii, who built saltwater fish ponds to grow wild juveniles for food. During this century, Pacific threadfin have declined