

Estimating predation rates of restocked individuals: The influence of timing-of-release on metapenaeid (shrimp) survival.

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Commentary

Post-release mortality is one of the greatest obstacles in many aquaculture based enhancement programs [1-4], and often the downfall of stock enhancement efforts, regardless of great successes in hatchery culture. Predation is widely known to be a major factor in post-release mortality in hatchery-raised juveniles [5,6] accounting for up to 95 % of post-release mortality [7], and can quickly turn stock enhancement into an expensive exercise in making food for predatory species [8].

Juvenile penaeids are particularly susceptible to predation [9,10] with an estimated 25 % of the juvenile prawns in coastal inland waters lost each week, mainly to predation [11]. This high susceptibility could be attributed to their convenient size as a prey item for many coastal and estuarine fish species [12], as well as their relatively high energy content compared to other benthic macroinvertebrates [13].

In this study, we estimated predation rates by fish on hatchery-raised postlarval Western School Prawn (*Metapenaeusdalli*) to inform the development of effective release protocols (for overview of program, see Tweedley et al. [14] The fish faunal composition of the test release site; a *Halophila ovalis* seagrass bed in a temperate Western Australian estuary was determined by seine netting in the day and night, before and after the release of ~130,000 postlarval *M. dalli*. Gut content analysis of 16 abundant teleost species, showed that while six species consumed *M. dalli*, two species, *Ostorhinchus rueppellii* (Apogonidae) and *Atherinomorus vaigiensis* (Atherinidae), were responsible for ~99% of the predation, and that the total number of postlarval prawns consumed was 288% greater at night than in the day. This information and that from previous and past fish monitoring programs provides the basis for selecting optimal release sites. Although seagrass beds generally provide shelter as a nursery habitat [15-17], our results show that this is not always the case review by McDevitt-Irwin et al. [18] The current study demonstrates that by implementing a relatively simple and rapidly executable methodology, critical information about potential release sites can be obtained to inform management choices, overcoming this critical step in successful stock enhancement.

In addition, there is value in considering the predator-evasion capacity of the hatchery-raised stock when deciding age/size-at-release; effectively a trade-off between an early release to reduce hatchery mortality due to various factors; e.g. intraspecific competition, crowding stress, cannibalism, risk of disease [19,20], and sufficient fitness in the wild; having

developed the motility to escape predators, such as the tail-flip response in shrimp [21]. There is also great potential for increasing post-release survival by enriching the hatchery environment for postlarval and juveniles before release. This can increase predator awareness [22] and promote natural feeding abilities [23], leading to greater survival post-release and hence more effective enhancement strategies.

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