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Wedgewire screens utilize "V" or wedge-shaped, cross-section wire secured to a framing system to form a slotted screening element. In order for cylindrical wedgewire screens to reduce impingement and entrainment, the following conditions must exist: (1) sufficiently small screen slot size to physically block passage of the smallest lifestage to be protected (typically 0.5–1.0 mm), (2) low through-slot velocity (typically less than 0.15 m/s), and (3) ambient currents providing high velocity cross-flow to provide continuous flushing of debris. Where all of these conditions are present, wedgewire screens can reduce entrainment and impingement (Hanson et al. 1978; Lifton 1979; Weisburg et al. 1987; Cumbie and Banks 1997; Ehrler and Raifsnider 1999).

Full-scale cooling water intake structure (CWIS) applications of wedgewire screens to date have been limited to two facilities with large-flow, once-through cooling systems (>20 m^3/s). These two facilities used slot openings of 6.4 and 10 mm to primarily reduce impingement (EPRI 2007b; Blye et al. 2006). In addition to the reduction in impingement, these two installations have also reported some reduction in entrainment. However, it is unknown how much of the reduction can be attributed to moving the point of withdrawal within the source water body. Other sites, with smaller intake flows have demonstrated substantial reductions in entrainment with many different target species using narrow-slot wedgewire screens (Ehrler and Raifsnider 1999; Cumbie and Banks 1997; EA 1986). There are no reports of unusual maintenance problems associated with the use of wedgewire screens.

Based on laboratory evaluation of narrow-slot wedgewire screens, (EPRI 2003), relationships associated with the various factors that affect impingement and entrainment of aquatic organisms were identified. In general, (1) impingement decreased with increases in slot size; (2) entrainment increased with increases in slot size; (3) entrainment and impingement increased with increases in through-slot velocities; and (4) entrainment and impingement decreased with increases in channel velocity. EPRI (2003) identified several biological factors including size and swimming ability of the test organisms.

In the field, environmental variables such as nonuniform flows, debris, and biofouling, could impact the effectiveness of the screens. Field evaluations to look at these effects were undertaken using barge-mounted narrow-slot wedgewire screens (EPRI 2005, 2006b). Test locations included Narragansett Bay (Rhode Island, USA) the Portage River (Ohio, USA) and Chesapeake Bay (Virginia, USA).

A number of general conclusions can be drawn from the data: (1) using a smaller slot width reduced larval and egg entrainment densities; (2) entrainment density was not significantly affected by slot velocity (0.15 and 0.30 m/s); (3) An increase in ambient velocity resulted in an increase in both control and test larval entrainment densities, while egg entrainment densities were unaffected; and (4) entrainment densities decreased with increasing larval length.

In general, consideration of wedgewire screens with small slot dimensions for CWIS application should include in situ pilot-scale studies to determine potential biological effectiveness and identify the ability to control clogging and fouling in a way that does not impact station operation (EPRI 2007b; Smith and Ferguson 1979).