

Fish Passage via Navigation Locks: Potential for Improvement on Large Urban Rivers?

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Abstract: Navigation lock and dam systems on large rivers have historically impaired long-distance fish movements. Commonly-used fish passage structures are often infeasible in developed areas given insufficient adjacent land to build upon, due to human habitation, nearby public utilities, railroads paralleling rivers or other high-cost constraints. Since removal of active navigation locks and dams on large rivers is unlikely in the foreseeable future, innovative fish passage strategies are needed. Some fish passage occurs through lock chambers and opportunities for such movement have been significantly increased using assisted lockages; however, such efforts require dedicated lock operations and may interfere with commercial navigation. We investigate whether navigation locks could be modified to improve native fish passage during normal commercial lockages, without accelerating the expansion of aquatic nuisance species, such as silver or bighead carp. Existing information from several locks and dams indicate fish can enter and pass through lock chambers and lock culverts by various means. Also, relatively small design elements or operational procedures appear to have significantly increased passage efficiency and species selectivity. For example, sturgeon appeared unwilling to rise in the water column to clear a high entrance sill at a dam's fish lift, but perhaps sills could be lowered enough to allow sturgeon passage, and still deter passage of small benthic nuisance species, such as tubenose or round goby. The behaviors of native fish such as sturgeon, paddlefish, sauger, freshwater drum, skipjack herring, mooneye, and bigmouth buffalo are being considered to identify navigation lock chamber or culvert features that may facilitate fish passage. Any fish passage system may eventually pass unwanted nuisance species; however, a system favoring native fish when standard fish passage structures are not feasible should provide environmental benefits.