

"The underlying principle in the construction of fishways is the retardation of the current velocity of a waterfall so as to enable fish to surmount it. Innumerable devices with that end in view have been invented and proved more or less successful. Certain physical conditions in the location and a proper method of construction are the important factors.

"Of the physical conditions, the two principal ones are (1) accessibility of the fishway free from disturbance, its outlet being located in a pool at the bottom of the falls where fish would naturally pass in ascending the river, and (2) an abundant discharge of water through the outlet so as to attract the fish. It is to be noted that fish as a rule do not ascend rivers at low-water stage, but between mean and high water, and preferably during sunshine and warm weather.

"In style of construction fishways may be classed in four systems:

"I. The inclined plane system, in which a series of baffle or deflecting plates are so arranged in an inclined flume as to cause the water to follow in its descent a long sinuous route.

"II. The pool and fall or step system, in which the water is brought down to a lower level by a series of short falls with intervening pools.

"III. The counter current system, in which the descending volume of water is being checked by meeting a current opposing it at certain intervals.

"IV. The lock and gate system, in which a higher or lower level is reached through one or more locks operated by gates.

"In all four systems of fishways certain general rules governing the construction must be observed.

"1. The slope of a fishway built on the inclined plane system should not be steeper than 1 foot vertical to 10 feet horizontal; the pool and fall system, as well as the counter current system, should not have a slope of more than 1 vertical to 4 horizontal, so as to insure a current velocity of not exceeding 10 feet per second in any portion of the fishway. The lock and gate system deals merely with a vertical lift. The width of a fishway somewhat governs the slope, and the wider the fishway the more gradual the slope should be.

"2. The available volume of water and the size of the fish must be considered in the dimensions adopted for the fishway; small fish, like herring, bass, trout, etc., may not require over 6 inches in the clear at the narrowest points or openings in the fishway, while for large fish, like shad, rockfish, salmon, etc., the clearance spaces should not be less than 9 inches in any direction.

"3. A fishway for small fish does not need to be more than 2 feet wide by about 1 foot deep, while that for large fish ought to have a least width of 4 feet with a depth correspondingly large.

"4. Plenty of light should be admitted in a fishway, both for