

Solution for moving fish over discharge sills with rotating cylinders

Fish Passage Engineer- PhD- Răzvan Voicu

A compact (fixed) concrete ramp or made of a metal plate or a concrete slab (with variable geometry) must be made. On both sides of the concrete slab, two sheet piles of metal or plastic resist perpendicular to the concrete slab (fig. 1) are fixed by means of metallic bolts.

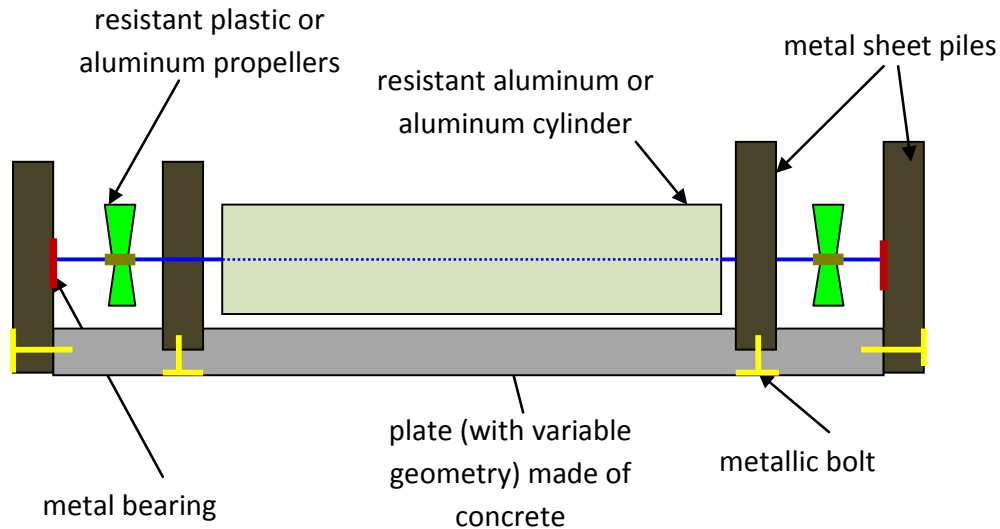


Figure 1 Positioning of metal sheet piles, metal rod(bar) and aluminum propellers

The rod to which the hard plastic or aluminum cylinder is attached rotates due to the propellers and bearings fixed also on the metal shaft (metal rod). The propellers are fixed on metal cylinders which in turn are fixed to the metal rod. The rods lying perpendicular to the metal sheet piles support the propellers which are partially above the water course to be able to effectively can reverse (fig. 2). The jets can be made of aluminum or plastic.

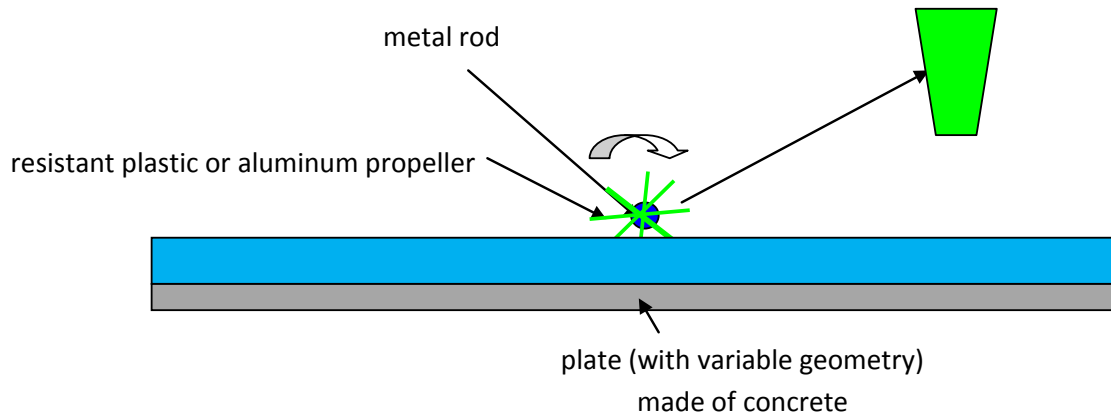


Figure 2 Positioning the propeller on the metal rod

Aluminum rotating cylinders have a diameter of 6cm and a length that can vary between 50cm and one meter depending on the species of fish to be transported over the spillway. Plate (with variable geometry) made of concrete has a thickness of 10 cm and the rotating cylinders are positioned at a distance of 1 cm from the concrete plate and 2 cm between them (fig. 3).

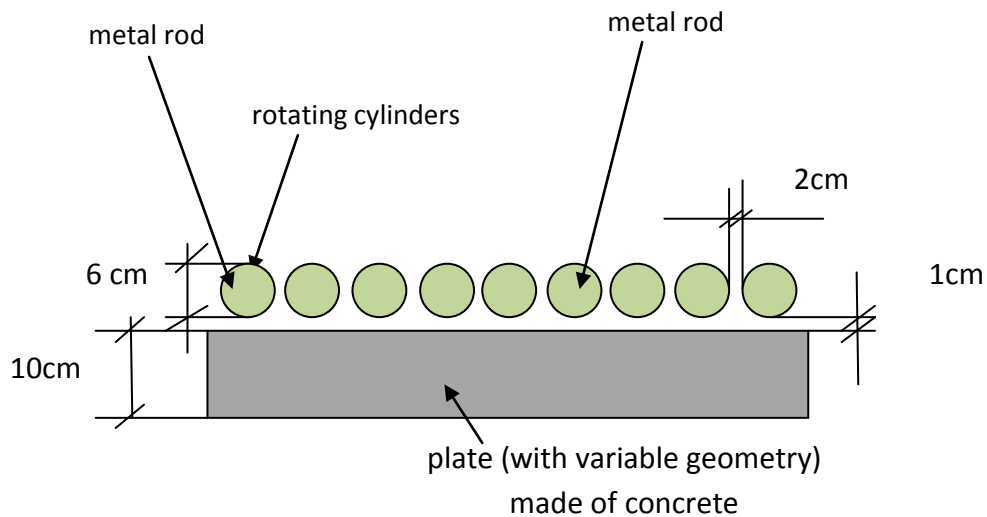


Figure 3 Positioning of rotating cylinders

A surface of highly adherent material (rubber) is attached to each cylinder, but at the same time a material that does not scratch or injure (fig.4).

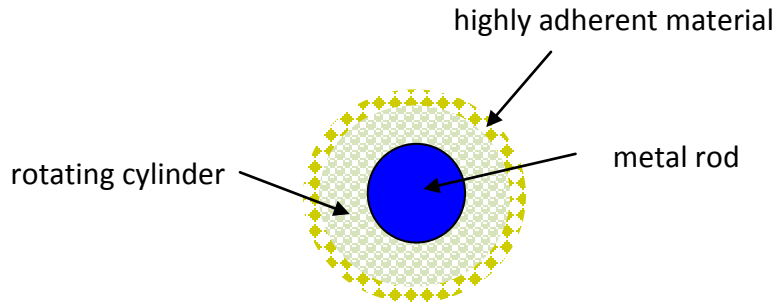


Figure 4 Adherent material positioned on the rotating cylinder

The two channels, which due to the fall of water in the metal cylinder with propellers / blades have direct connection with the water column on the discharge sill. And the concrete plate has direct connection with the water column on the spillway. The levels are different (fig. 5). At the top of the palm trees, a thin metal grid is fixed on the system so that the fish can not leap (fig.5). Plywood thickness is 2cm and the height of 40cm (fig.5).

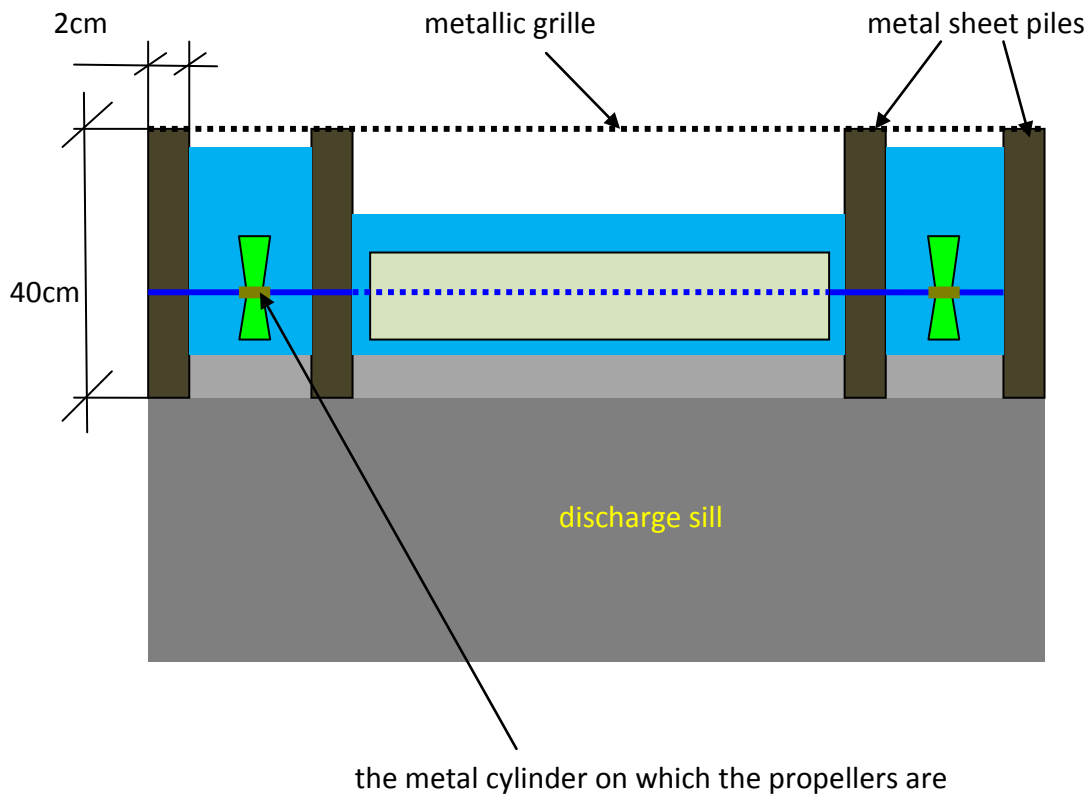


Figure 5 Positioning of the metal cylinder on which the propellers are fixed

The water level in which the two channels where the propellers are fixed is higher than the water level where the rotating cylinders are attached. The water passes over the rotating cylinders by approximately 2 cm. Under the rotating cylinders the water level is 2cm. This level is for fast-paced medium fish. For those who move well an anchor such as the pasture, salmon, herring etc the water level over the rotating cylinders is 5cm. Upstream of the spillway, a tight and semi-transparent glass tank basin must be secured. The glass basin is taller than the spill threshold about 1m (fig. 6). The only open surface of the glass basin is the one that has direct connection with the fish migration system (fig. 6). In this pool, windows will be created to circulate fish when they exit the system to get into the watercourse. Several outlets (windows) must be made in the glass basin (fig.7). To achieve a constant water level in the migration system (2cm above the height of the rotating cylinders), several windows (with closure) are made in the glass basin where the fish can reach the river must be made and inclined pipes through which the same flow rate (see Figure 8). Only a window provides flow for the fish migration system. The two channels where the cylinders on which the blades are fixed (the welded) have metal grilles on both ends to stop the pet and the fish to climb these channels (fig. 6). The (fixed) portion of the plate that is fixed by the hollows of the discharge sill and the other portion of the concrete slab which is located in the oblique plane is connected by a metal hinge. (fig.8) The metal pallets that form the two channels (for propellers and for the migration of fish) are joined to the hinge by a resistant rubber surface (fig.8).

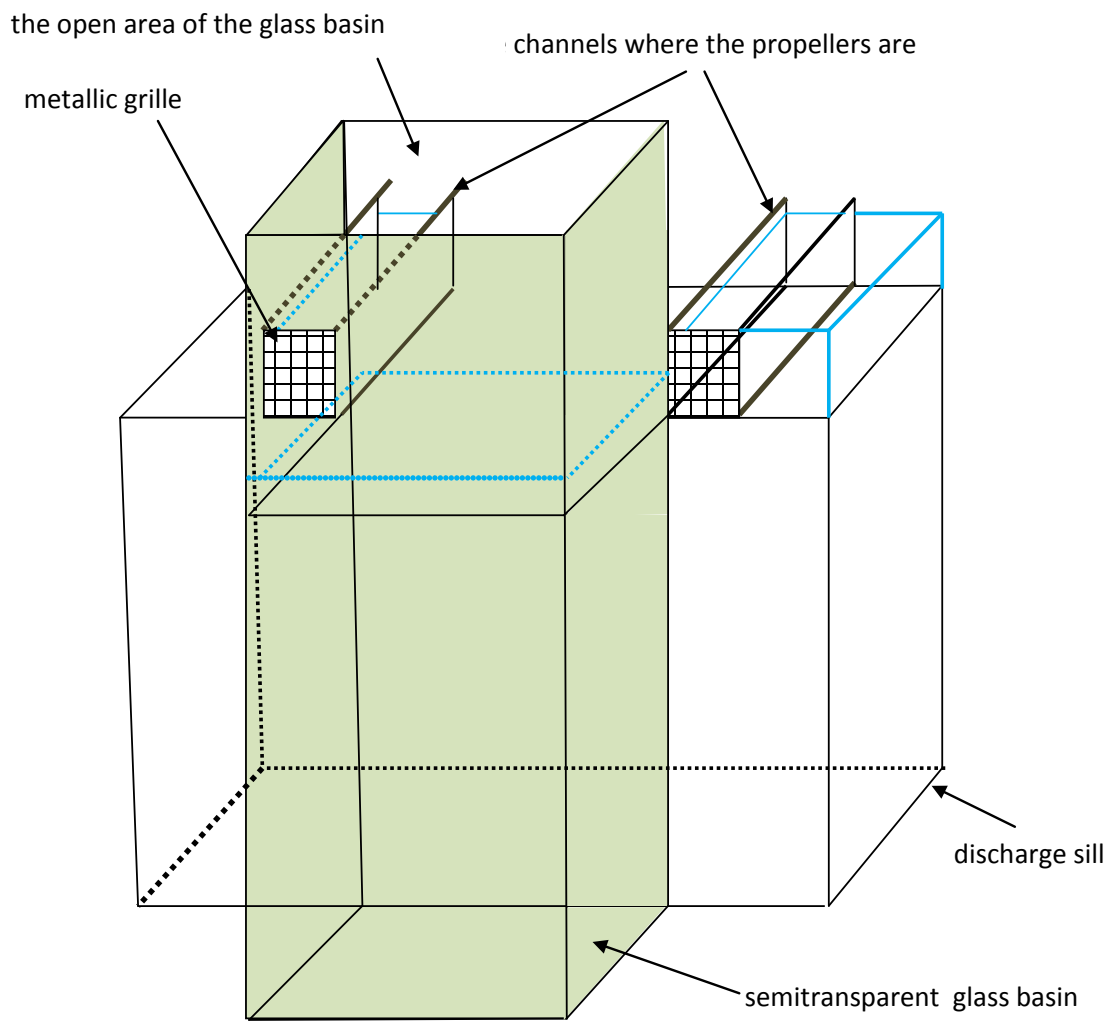


Figure 6 Positioning of the basin of glass at the front of the spillway

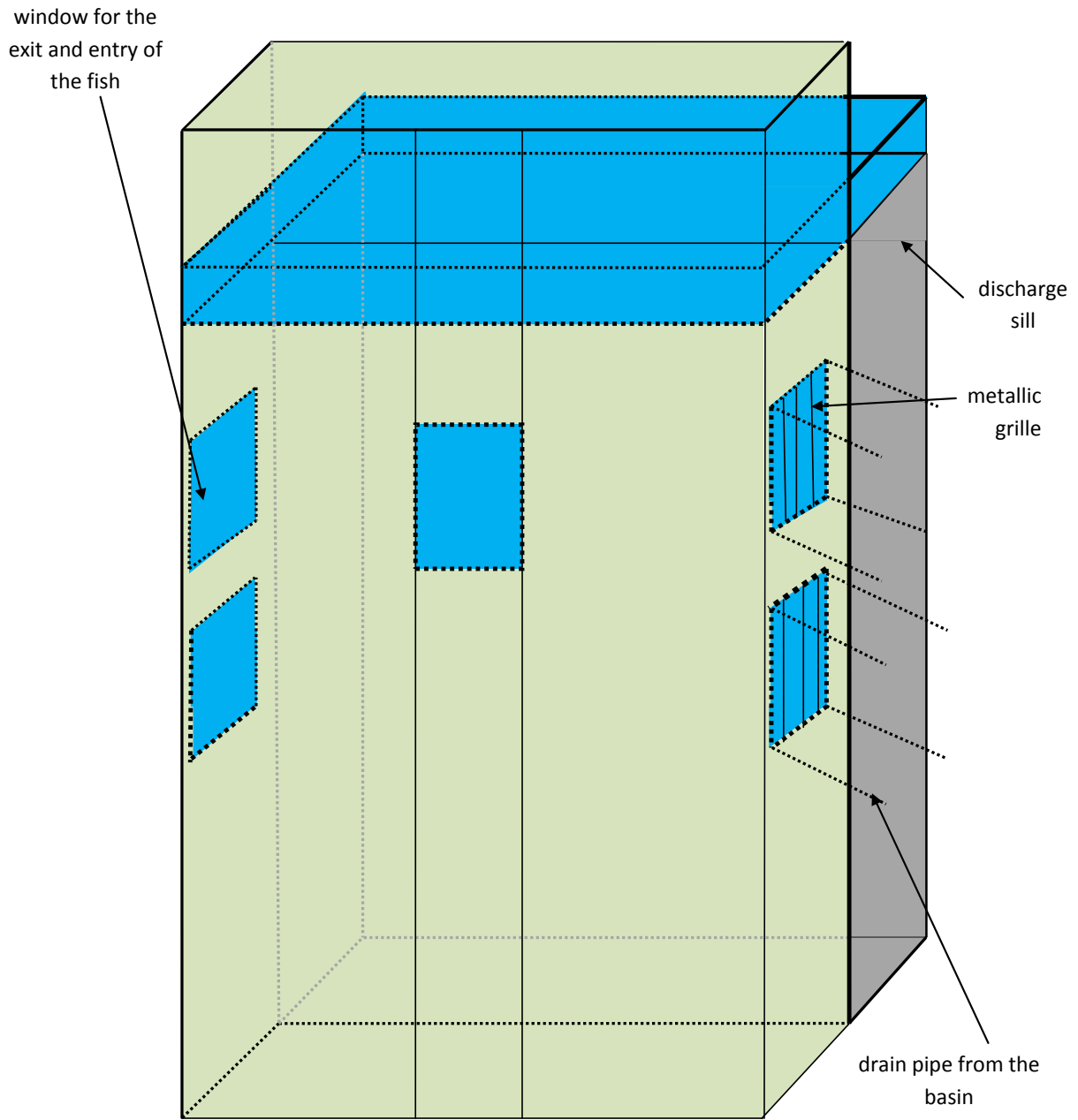


Figure 7 Positioning the windows inside the glass basin

Each exhaust duct has a metallic grille so as not to penetrate the fish through them and use only the windows. The basin through the windows and evacuation pipes system is a constant level in the fish migration channel. .

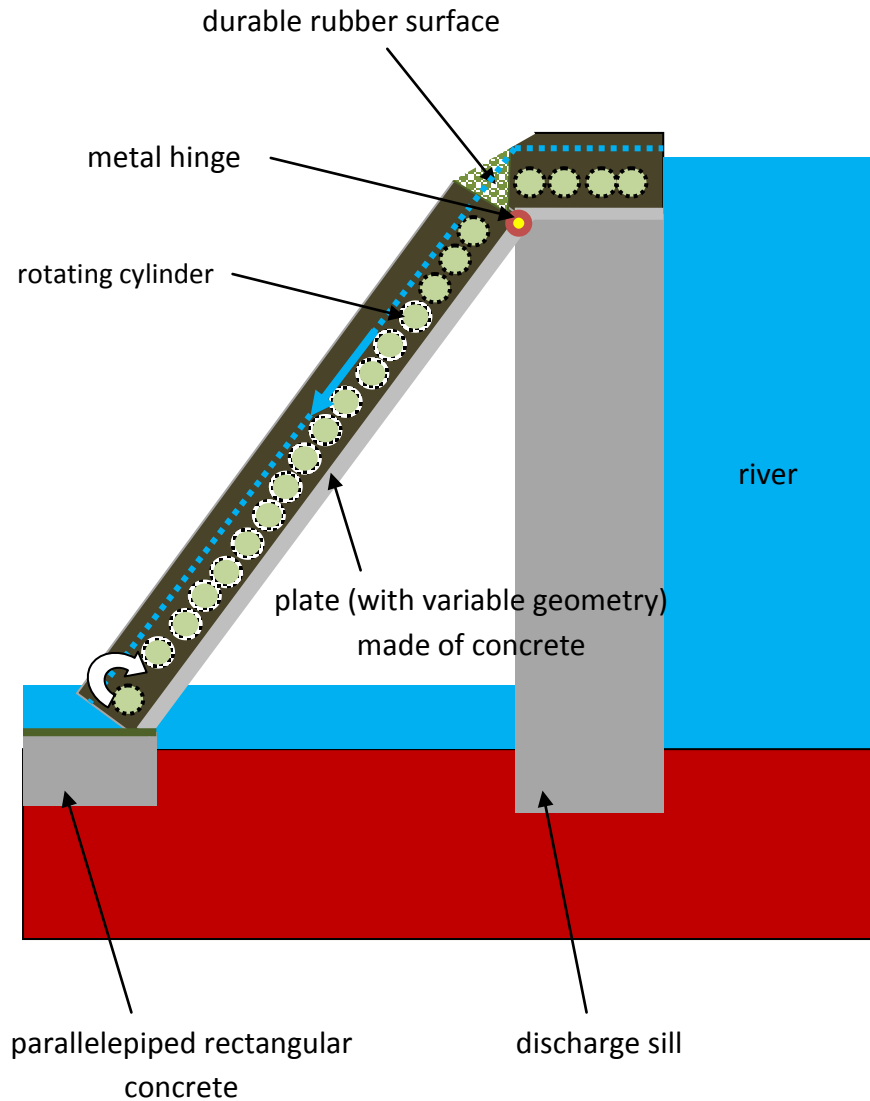


Figure 8 Positioning of the metal hinge and the rubber-resistant surface

The downstream end of the concrete slab will be supported by a concrete rectangular parallelepiped built in the bed or will be supported directly in the bed if the bed structure is durable (in mountain areas). On the surface of the rectangular parallelepiped that is directly connected to the concrete concrete slab, a 5 cm thick rubber-coated surface will be secured using the holsters. Thus the concrete concrete slab can be fixed according to the needs of the migratory fish, depending on the species, of the maturity.

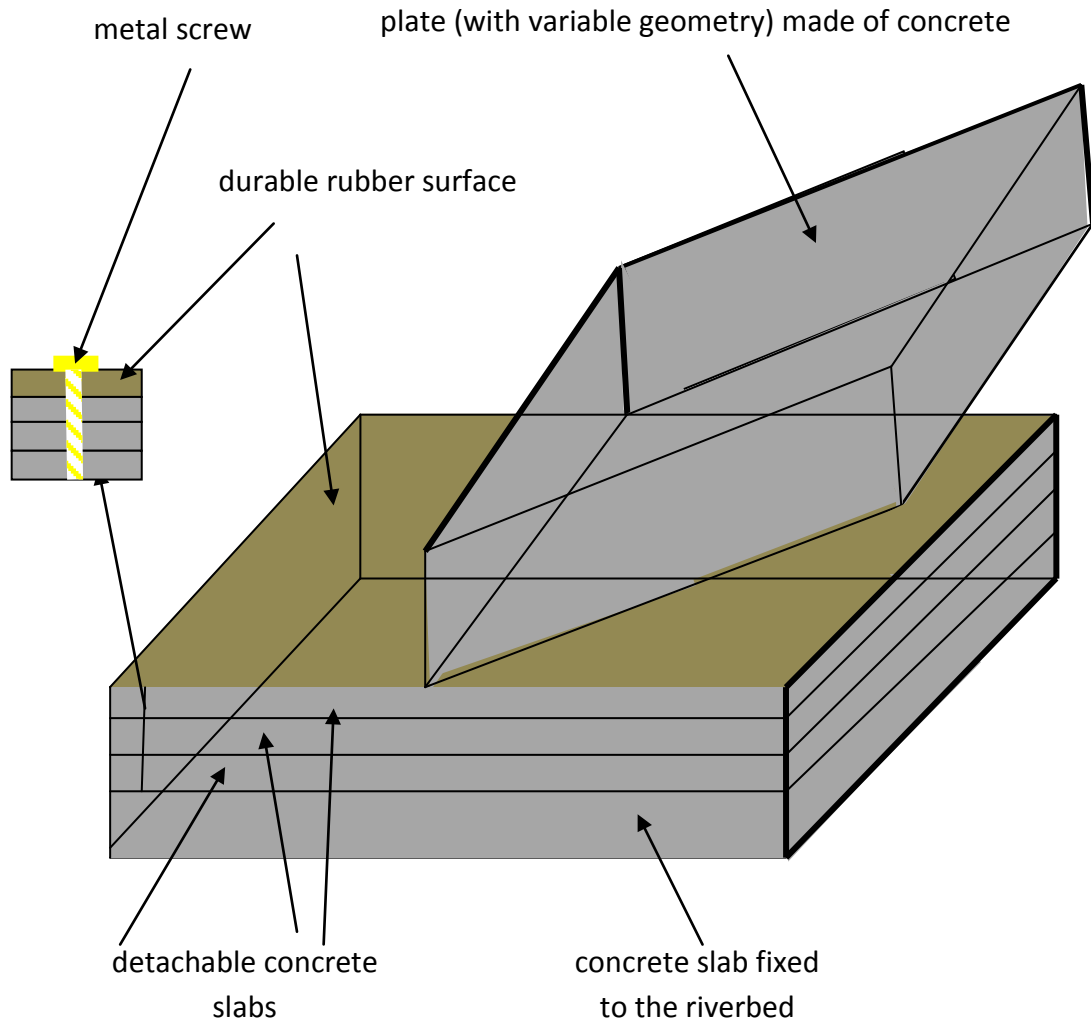


Figure 9 Positioning the downstream end of the mobile plate

In fact, the concrete parallelepiped is made up of several concrete sheets piles together by metallic bolts. These plates are added or removed depending on the slope change of the concrete slab. Splines throughout the system are interleaved. (Figure 10). For fish can not enter the channels are metal grills (fig.10).

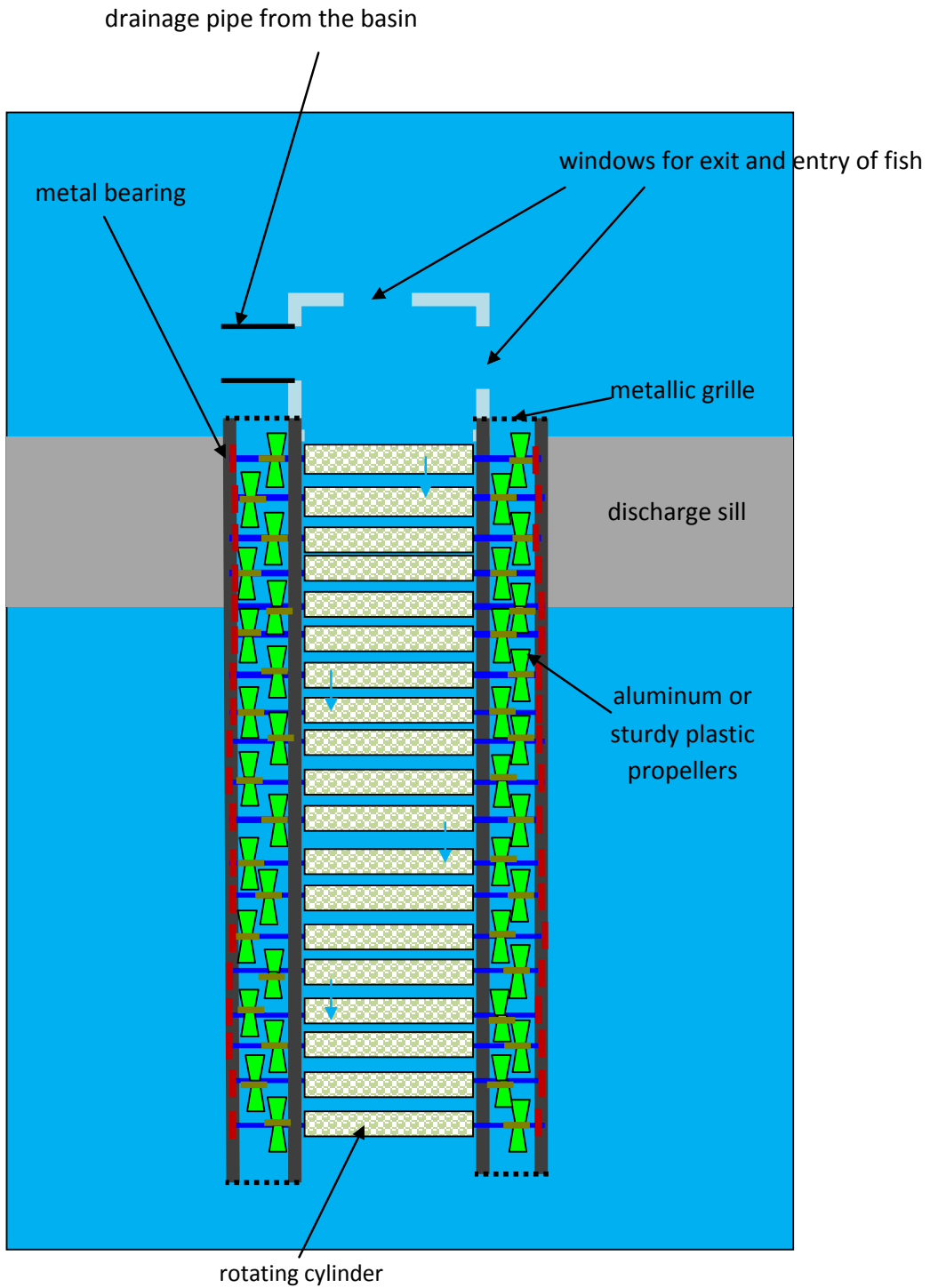


Figure 10 General scheme of the fish migration system

CONCLUSIONS

This system can be applied anywhere in the world at the spill thresholds with the spill blade.

Benefits:

- The same system can be used at multiple spill thresholds, so it has multiple uses
- It is operating relatively easily and is decommissioned as easily
- winter windows can be closed to avoid damaging the propellers
- Besides the essential help of rotating cylinders and the mobile plate, it helps various fish species to pass over the overflow thresholds
- the cost of running the system is medium but it has a long question and maintenance
- it does not consume electricity

does not affect anything from the functionality and the structure of the spill threshold

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