Jun 23rd, 4:00 PM - 4:15 PM

Session B6: Seeking Better Fishways: the Pump Fishway Program

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Centre for Ecosystem Science

Never Stand Still

Seeking Better Fishways: the Pump Fishway Program

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Pump Fishway Objectives

- Design a better, cheaper upstream fishway
- Combine fish–passage knowledge with aquaculture fish–transport methods
- Optimize all four stages of fish passage:
  - **attraction, entry, passage, refuge**

Basic Design Principles

- Use existing fishways knowledge to raise fish above tailwater (~ 0.4 m)
- Enclose fish in a chamber that can be pressurized to achieve passage
- Use hydraulic head of reservoir to provide all flow & energy needs

Commercial Fish Pump in Operation

Tassal Salmon Farm, Bruny Island, Tasmania

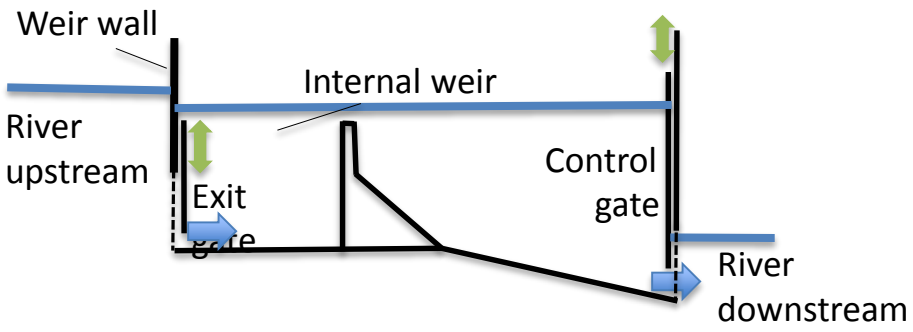
- Airlift pump relocating & grading Atlantic salmon
- 10,000 fish, 2–4kg moved without injury through 200mm pipe in 3 hours

- 4 kg Atlantic salmon passing through pipe

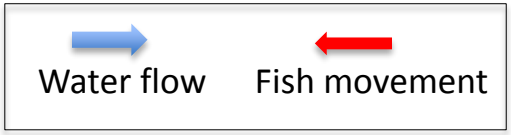
Deelder open-lock Fishway

Slide-gate movement Water flow

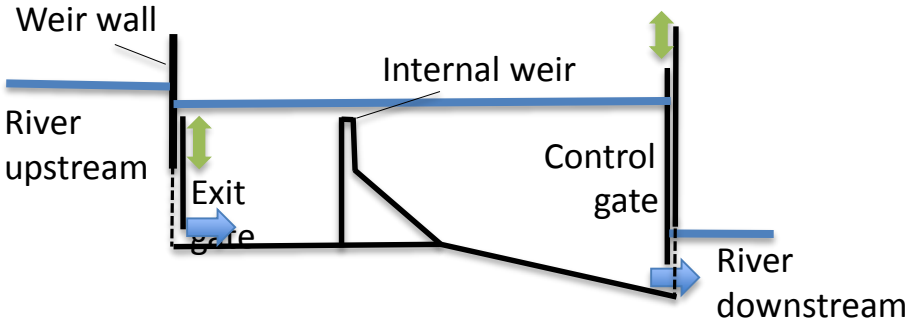
1. Basic structure



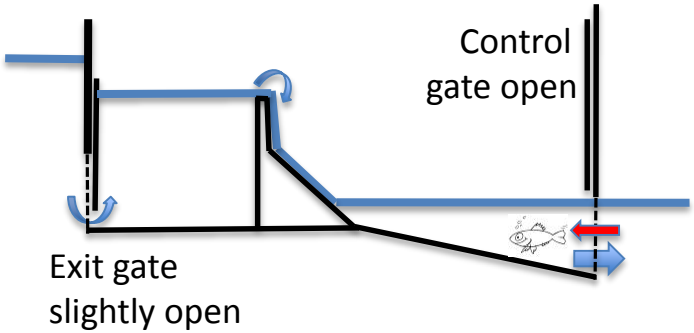
Deelder open-lock Fishway



1. Basic structure



2. Attraction stage



Deelder open-lock Fishway

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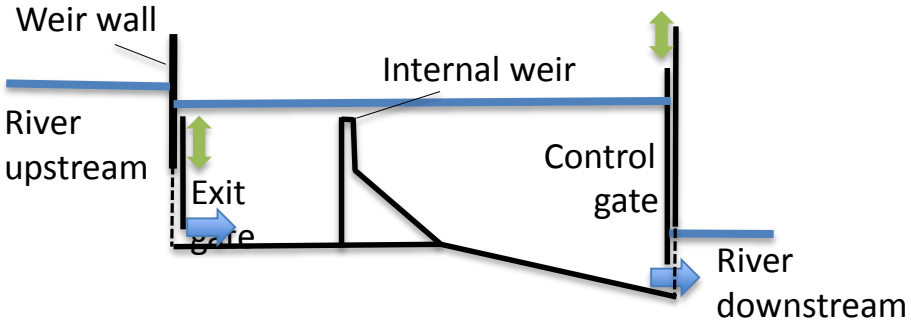
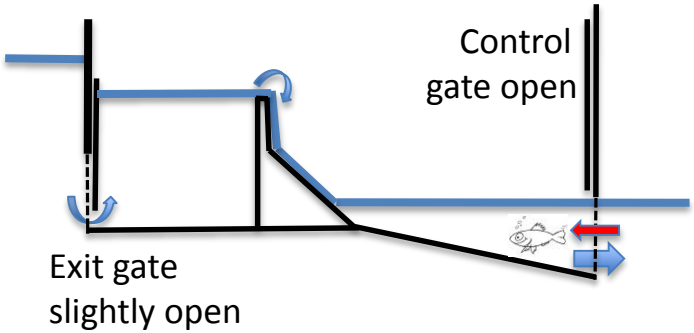
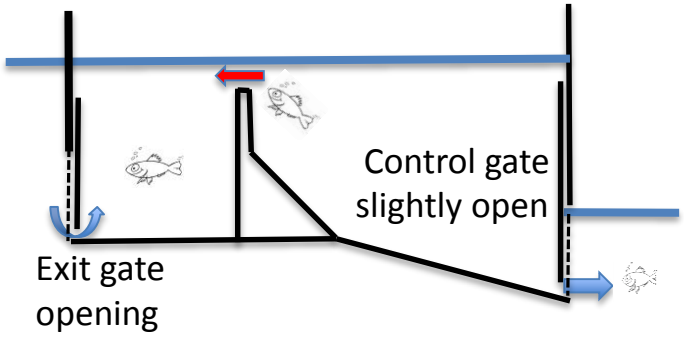


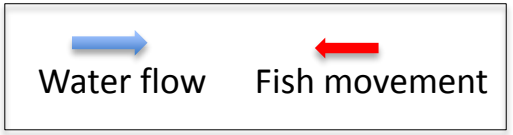
2. Attraction stage



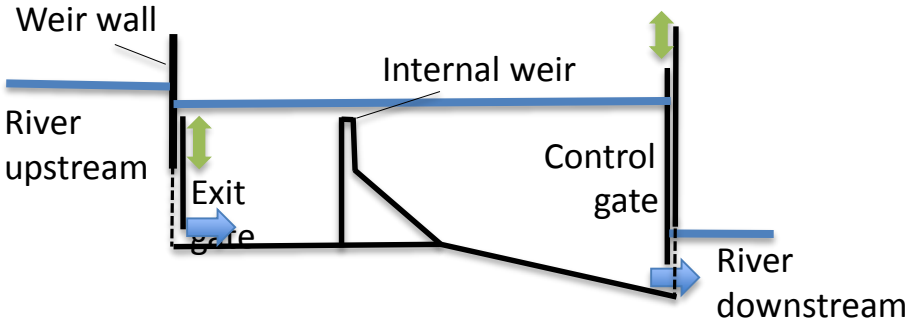
3. Filling stage



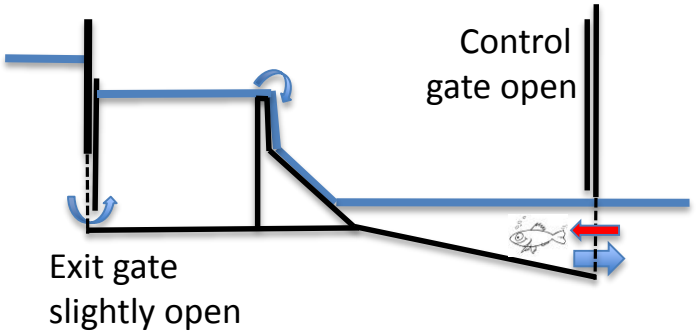
Deelder open-lock Fishway



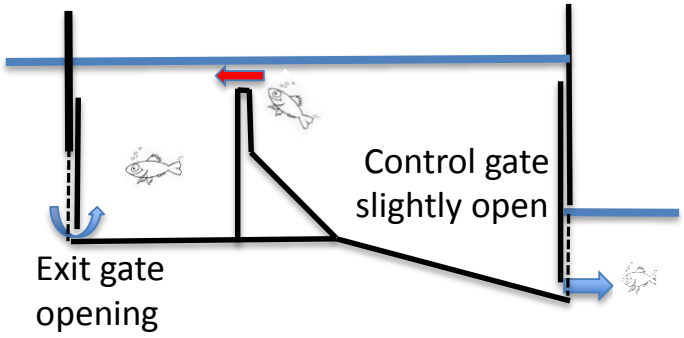
1. Basic structure



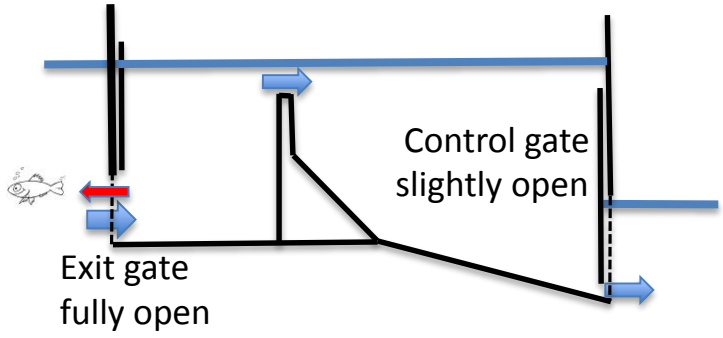
2. Attraction stage



3. Filling stage



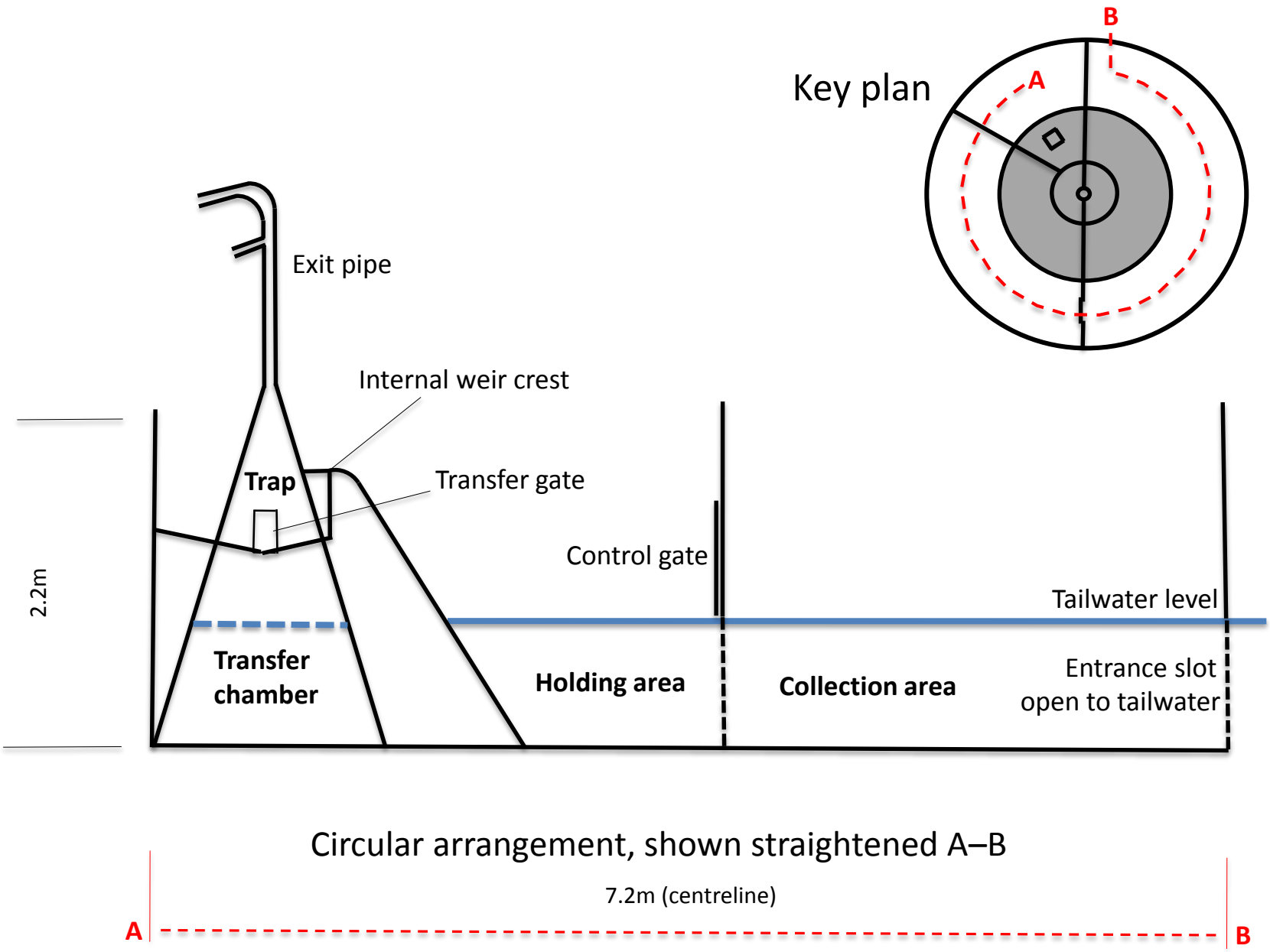
4. Exit stage



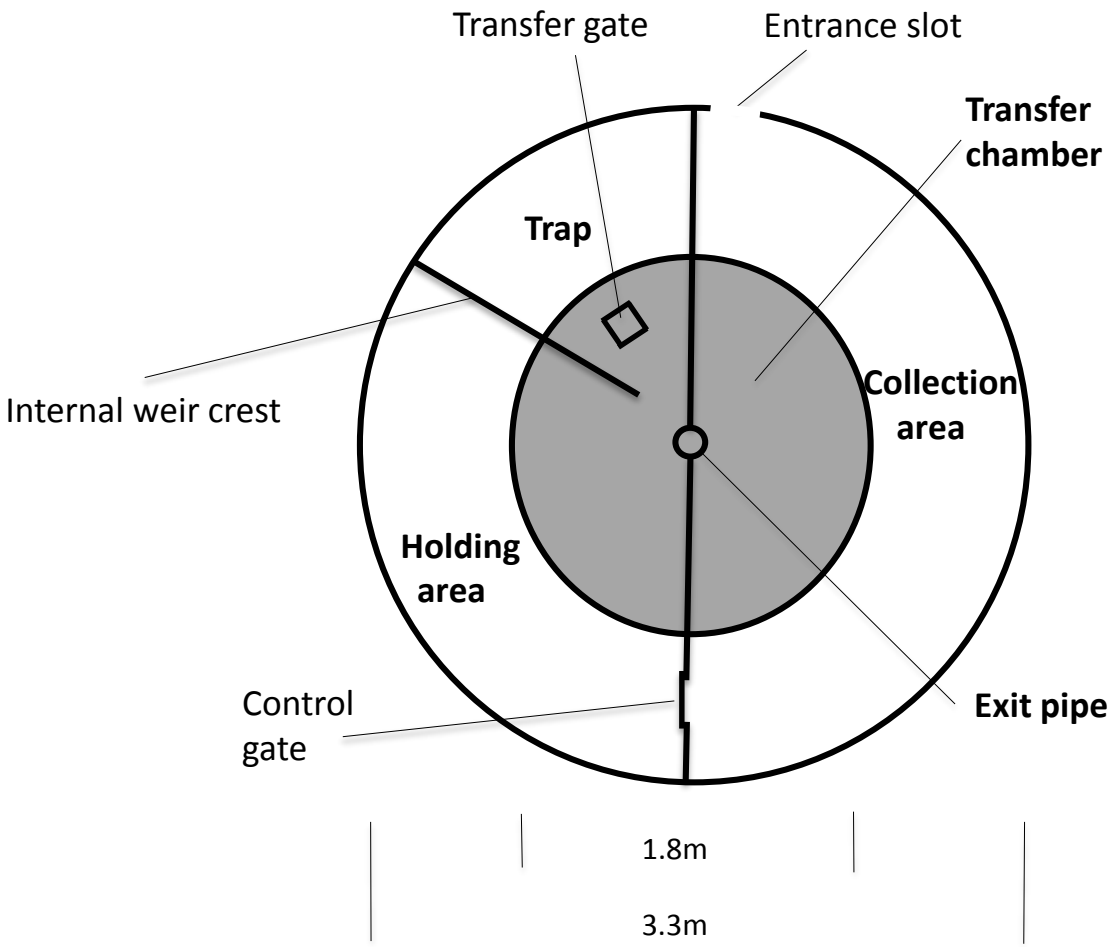
Modifications to Basic Open-Lock Design

- Translate linear layout to circular arrangement
- Collection area added at downstream end
- Fish trapped then enclosed in transfer chamber
- Fish transferred passively to reservoir

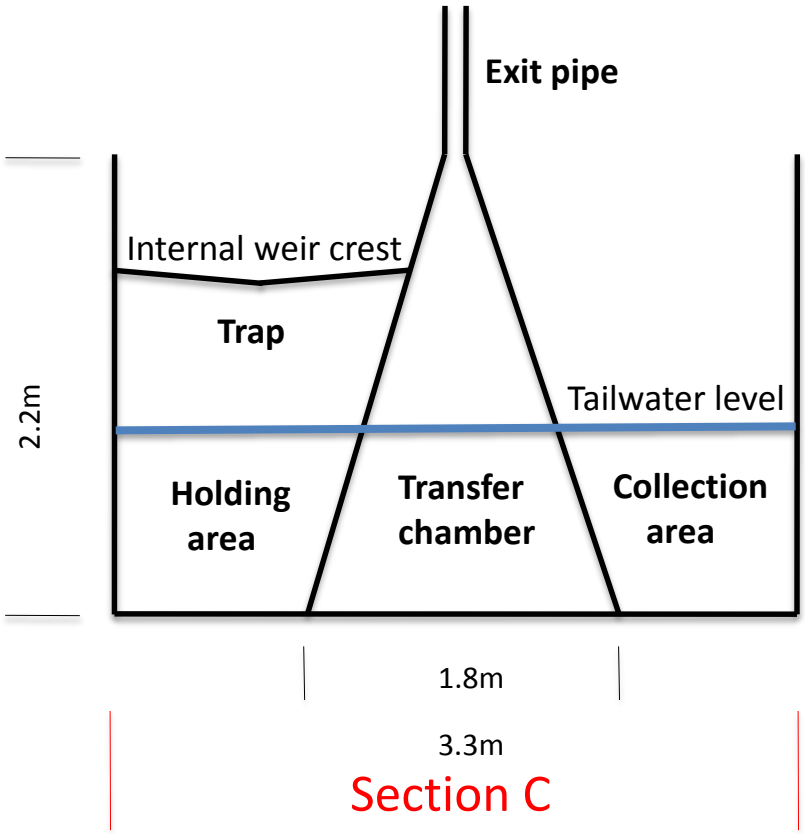
Lock-Base Pump Fishway: General Layout

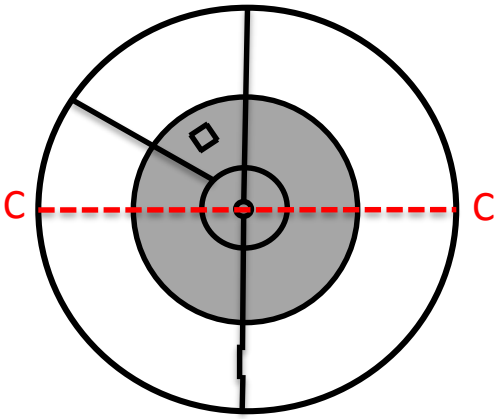


Lock-Base Pump Fishway: Plan View



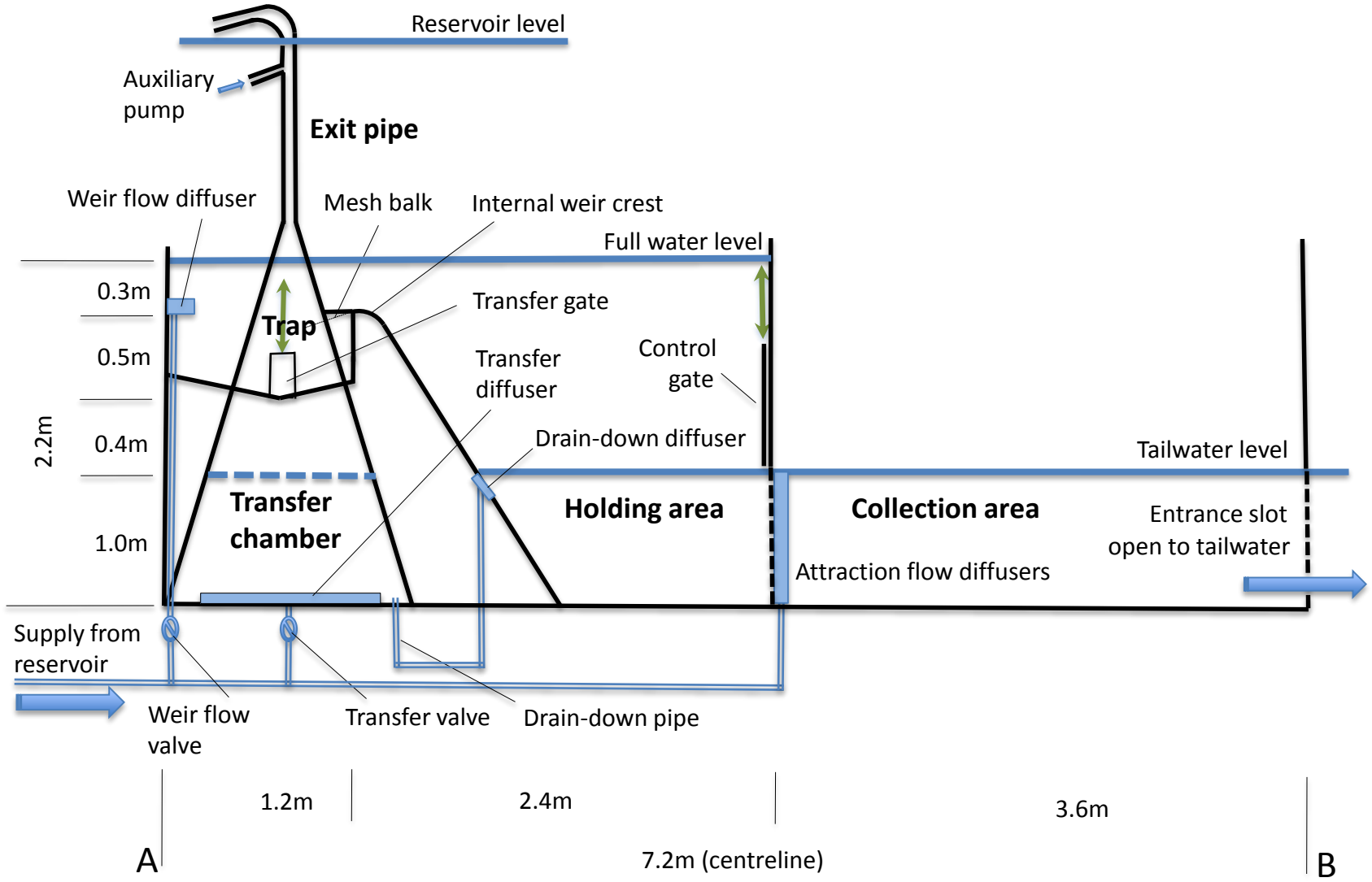
Lock-Base Pump Fishway: Elevation



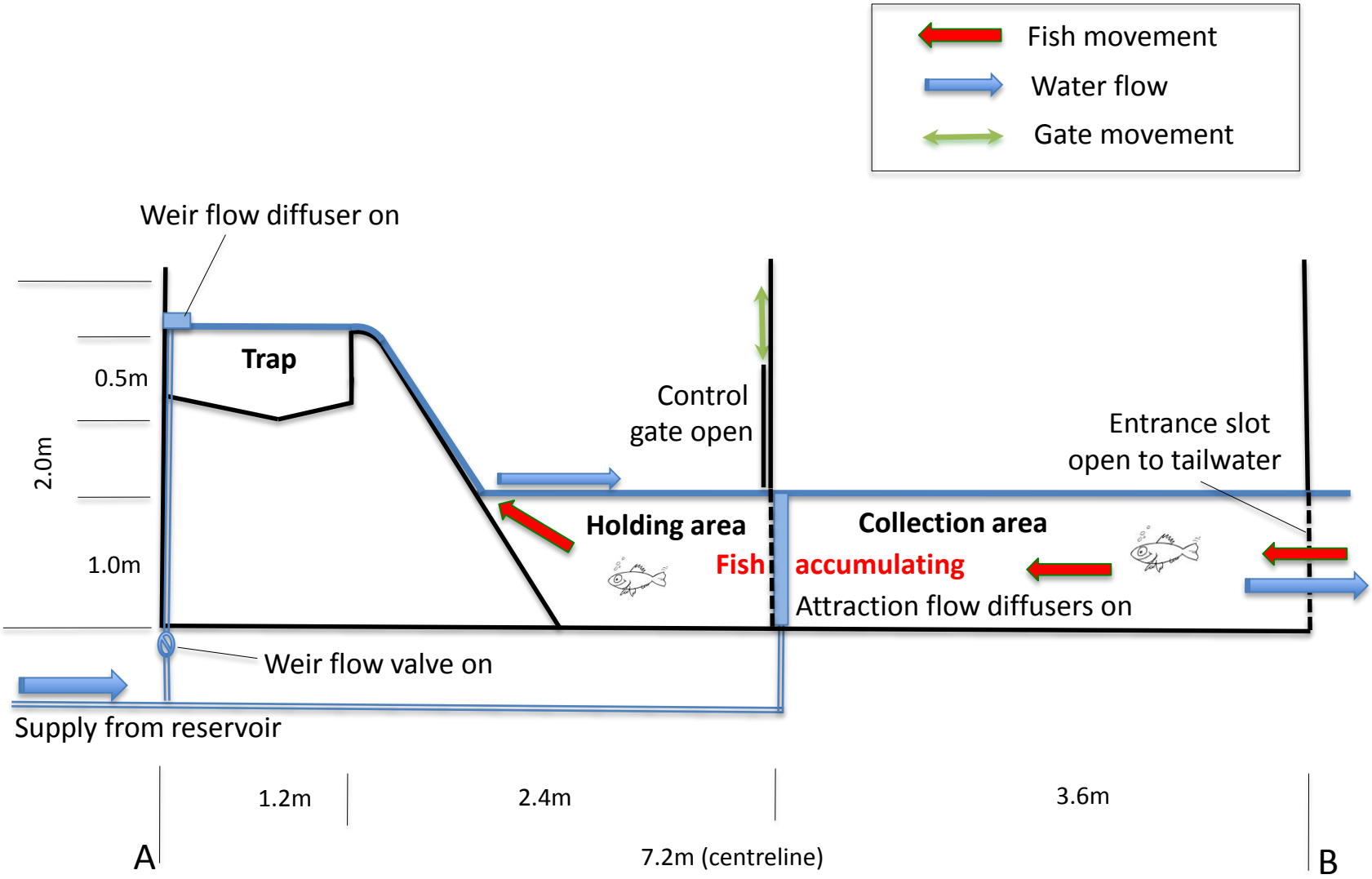


Key Plan

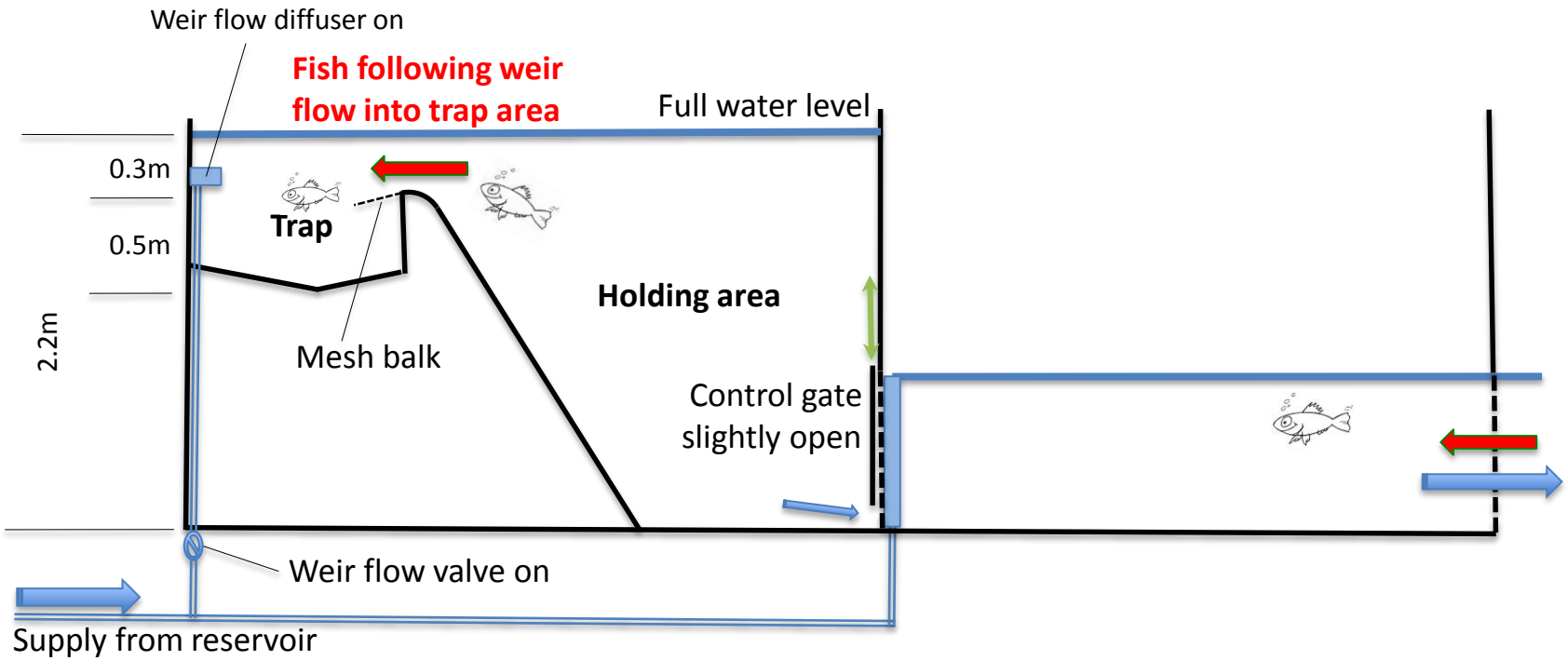
Fishway Components



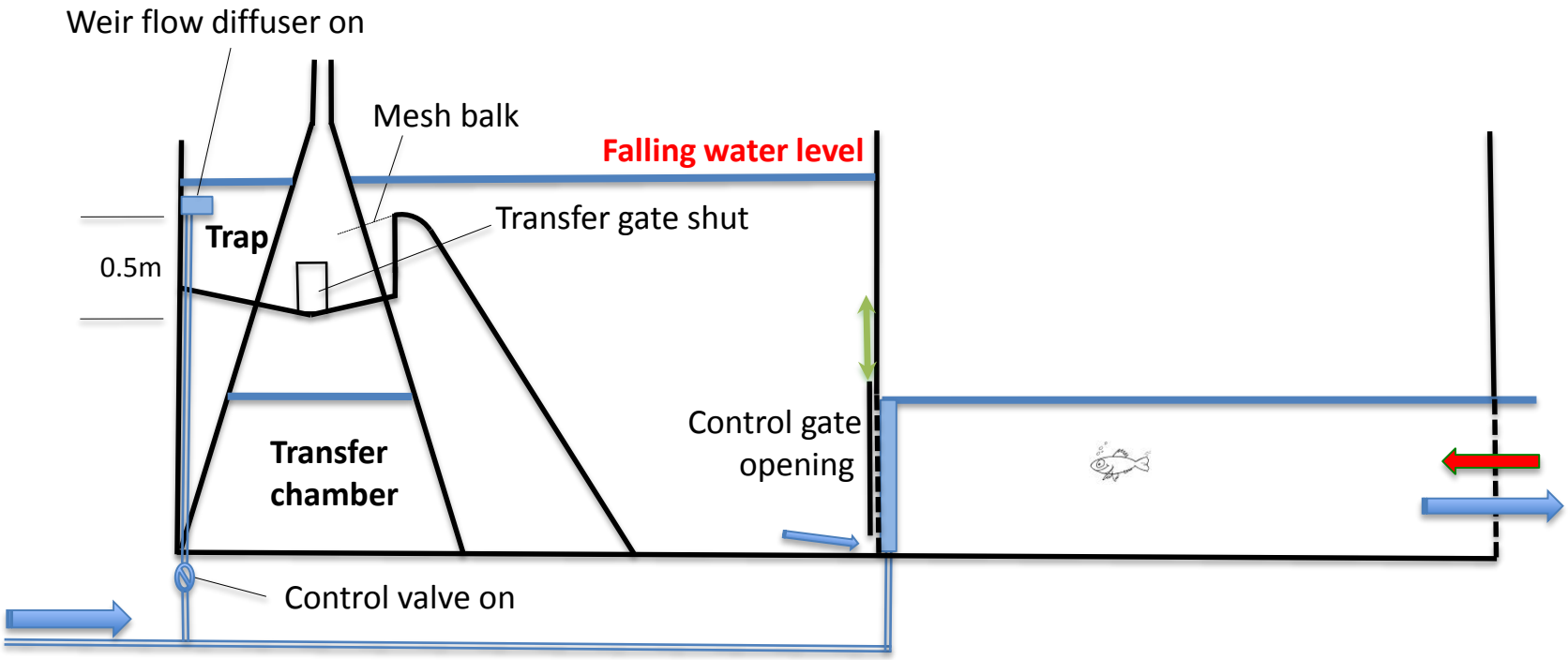
Operations: 1. Attraction stage



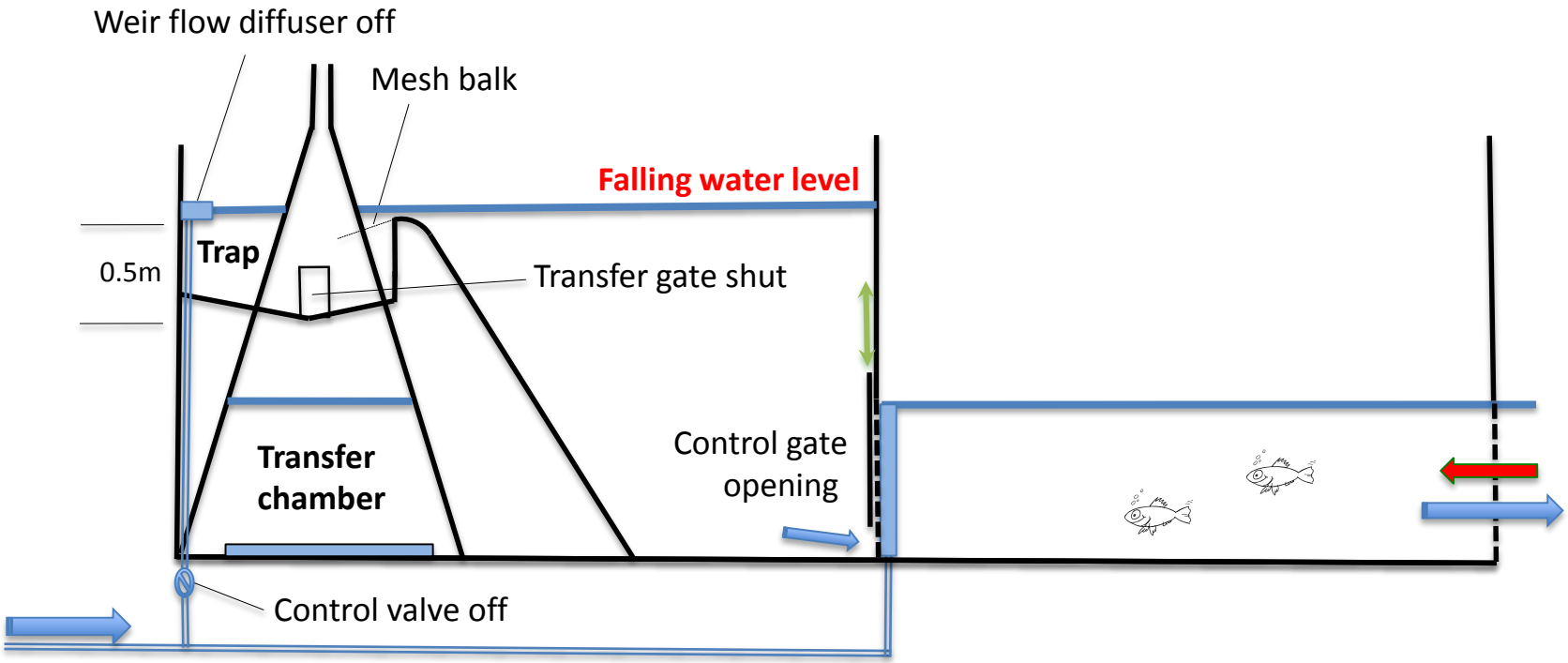
2. Filling stage



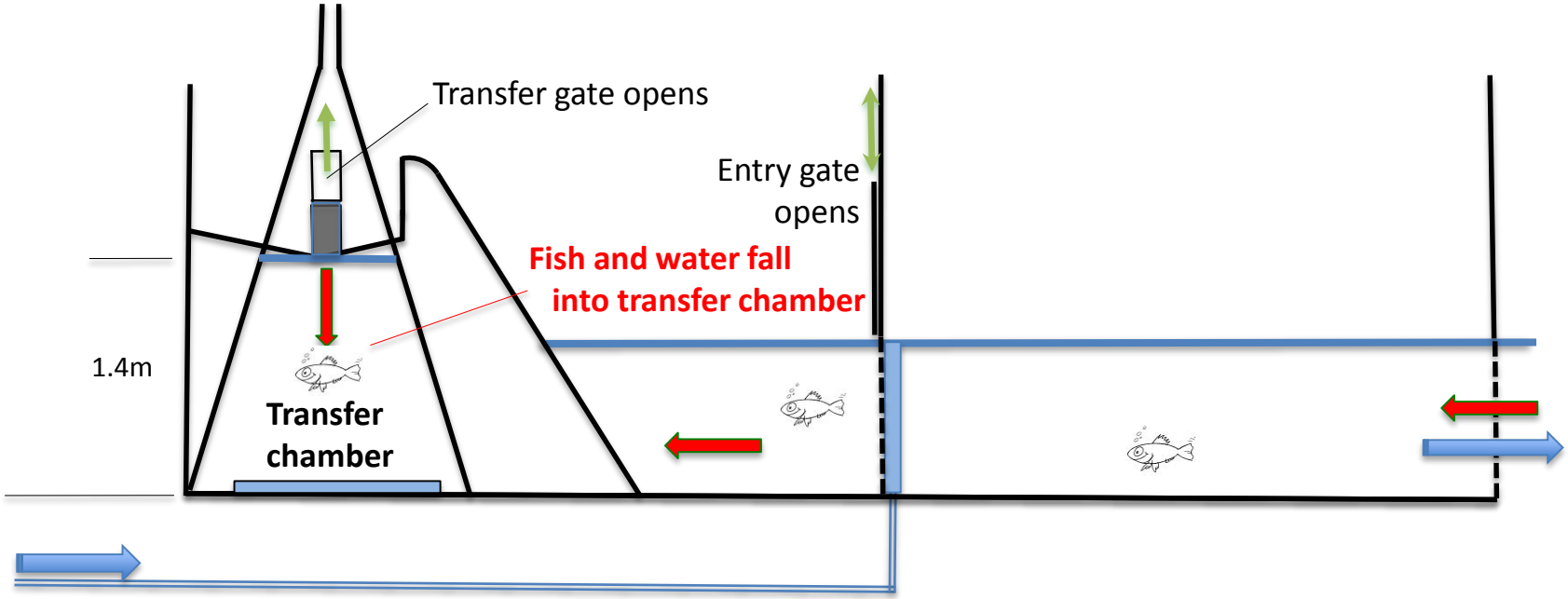
3. Trapping stage: Part 1



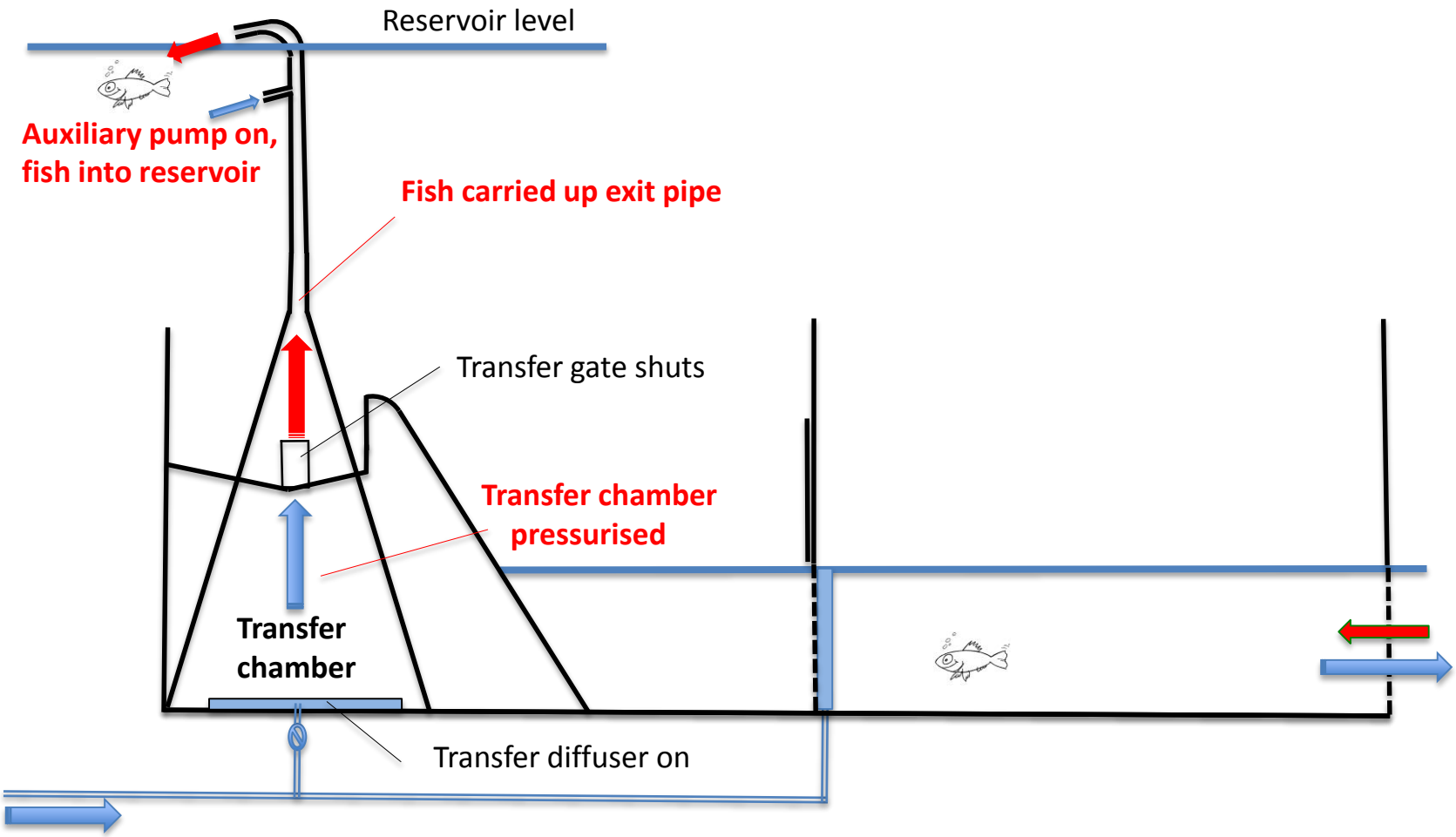
3. Trapping stage: Part 2



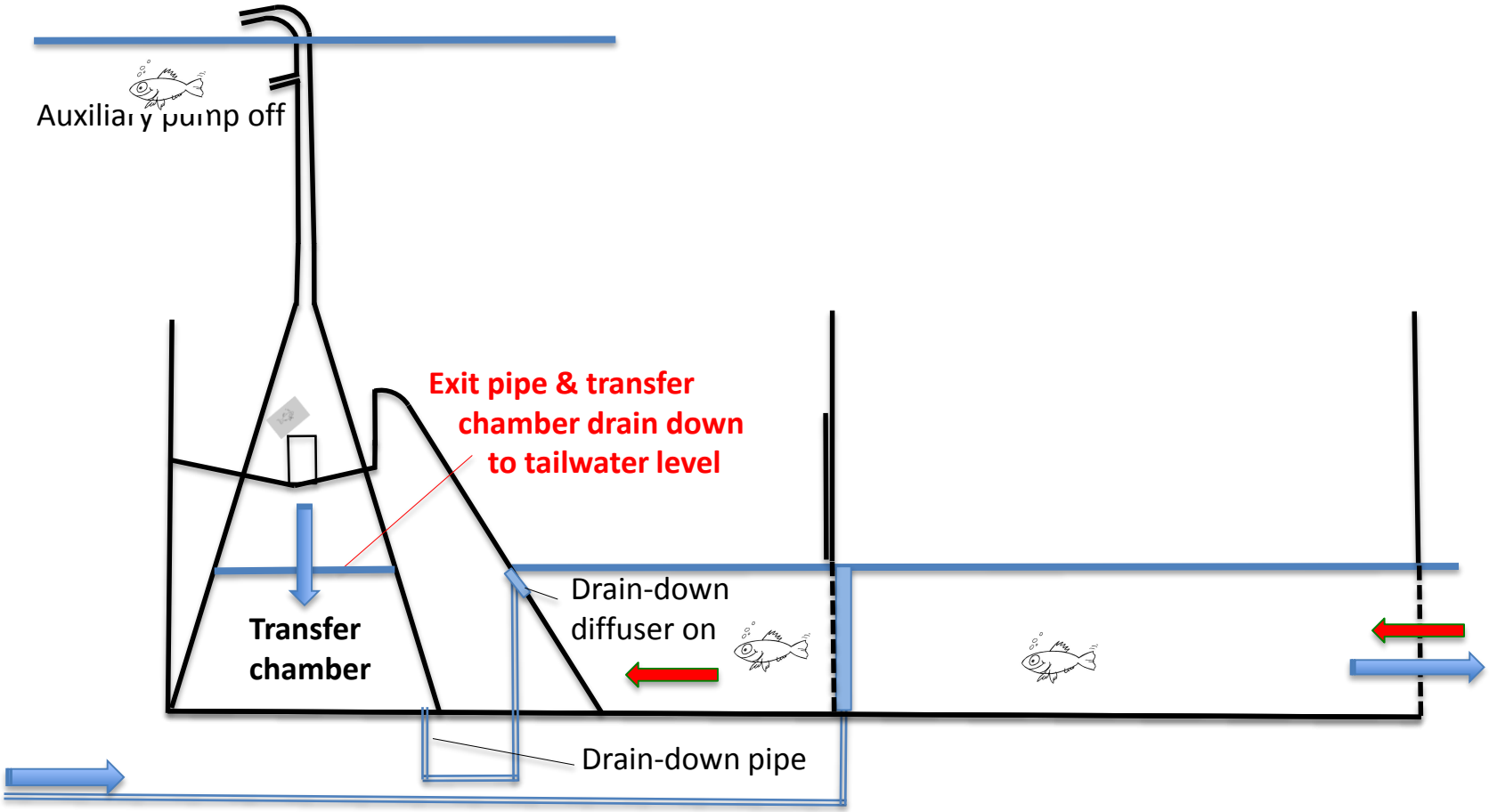
3. Trapping stage: Part 3



4. Transfer stage



5. Re-set stage



Features of Lock-Base Pump Fishway

- The Deelder open lock has a proven performance record with both large and very small fish (12mm)
- Innovation combines benefits of fish pumping & available head difference
- Passage stages less dependent on constraints of fish physiology & behaviour
- Compact, light-weight, potential modular construction
  - May be barge-mounted & re-positioned for optimal attraction
  - Independent of tailwater variation – floating (?)
  - Removable before floods
- Constant operation with short cycling period
- Few moving parts – 2 valves, 2 gates, 1 auxiliary pump (eliminate?)

Expected Benefits of Lock-Base Pump Fishway

- Versatile configuration, adaptable to new & existing sites >2m
- Low capital and operating costs
- Potential to serve all four critical fishway functions effectively:

attraction, entry, passage & refuge