



Safe, Timely, and Effective



What do these terms mean?

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Safe, Timely, and Effective

1. Statutory Basis
2. Definition of a Fishway
3. Safe, Timely and Effective and other relevant definitions



Statutory Basis for Fishways

- **Section 18 of the Federal Power Act:**
 - “The Commission shall require the construction, maintenance, and operation by a licensee at its own expense of
 - such lights and signals as may be directed by the Secretary of the Department in which the Coast Guard is operating, and
 - such fishways as may be prescribed by the Secretary of the Interior or the Secretary of Commerce,
 - as appropriate.”
- **Endangered Species Act**
- **Clean Water Act**
- **State fishway laws**



What is the Purpose of a Fishway?

- a) Enable **movement** of fish past a stream barrier
- b) Provide **safe, timely, and effective** access to and from habitat for the purposes such as spawning, rearing, feeding, growth to maturity, dispersion, seasonal use of habitat, fish host services for mussels.
- c) Fishways are **not** intended to protect or improve fish habitat



Congress's definition of a fishway is very broad...

In 1992, Congress provided guidance on what constitutes a fishway in the National Energy Policy Act, Section 1701(b):

“...**items** which may constitute a "fishway" under section 18 for the safe and timely upstream and downstream passage of fish shall be limited to physical **structures, facilities, or devices** necessary to maintain all life stages of such fish, and **project operations and measures** related to such structures, facilities, or devices which are **necessary to ensure the effectiveness** of such structures, facilities, or devices for such fish.”



A Fishway is the Sum of its Parts!

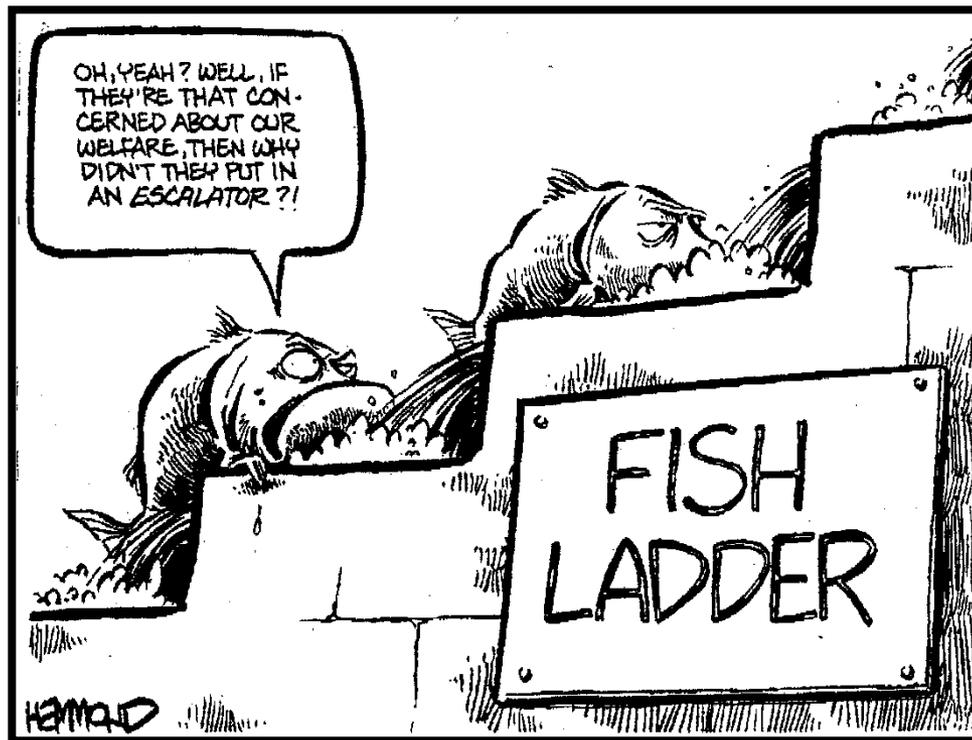
Five Elements of a Fishway

- **Structures**
- **Facilities**
- **Devices**
- **Project Operations**
- **Measures**



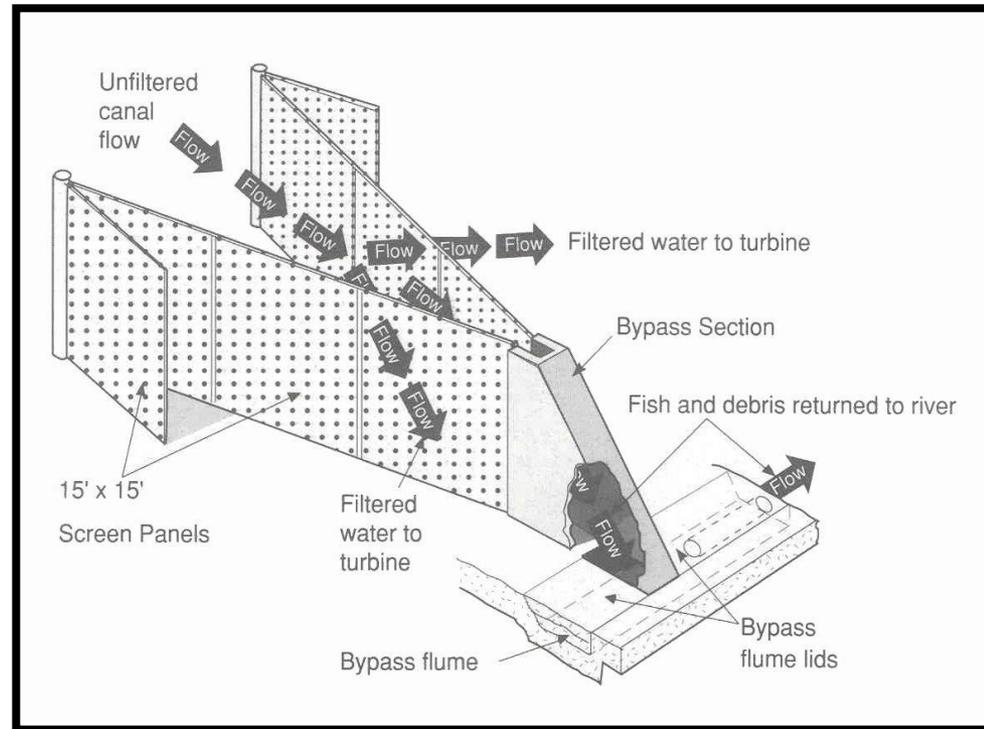
Structure

- A constructed physical feature.



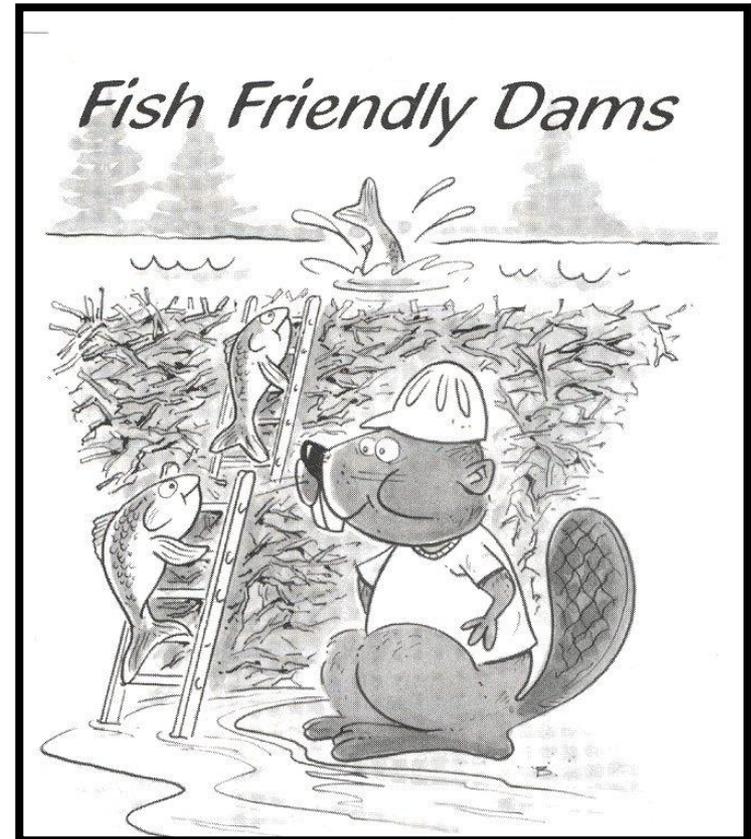
Examples of Structures

- Fish-ladder, -life, -trap;
- Fish screens or barriers that guide or exclude;
- Trash racks;
- A notch, spillway, or gate.



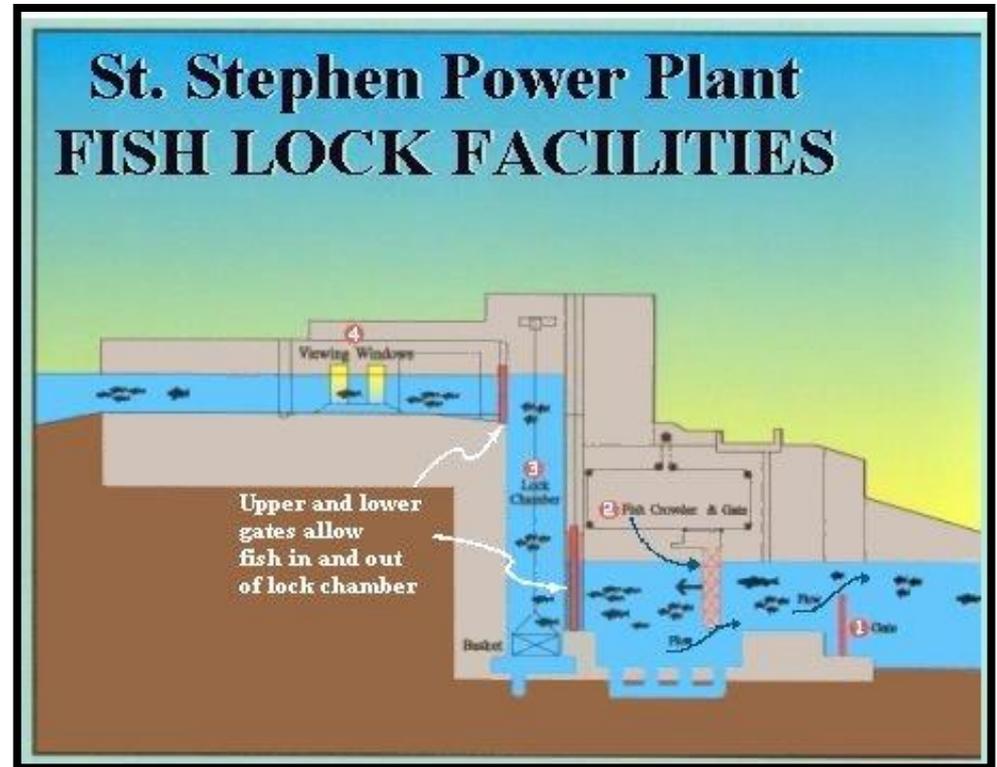
Facility

- A specific combination of structures, devices, project operations, and/or measures designed to work together to perform a function.



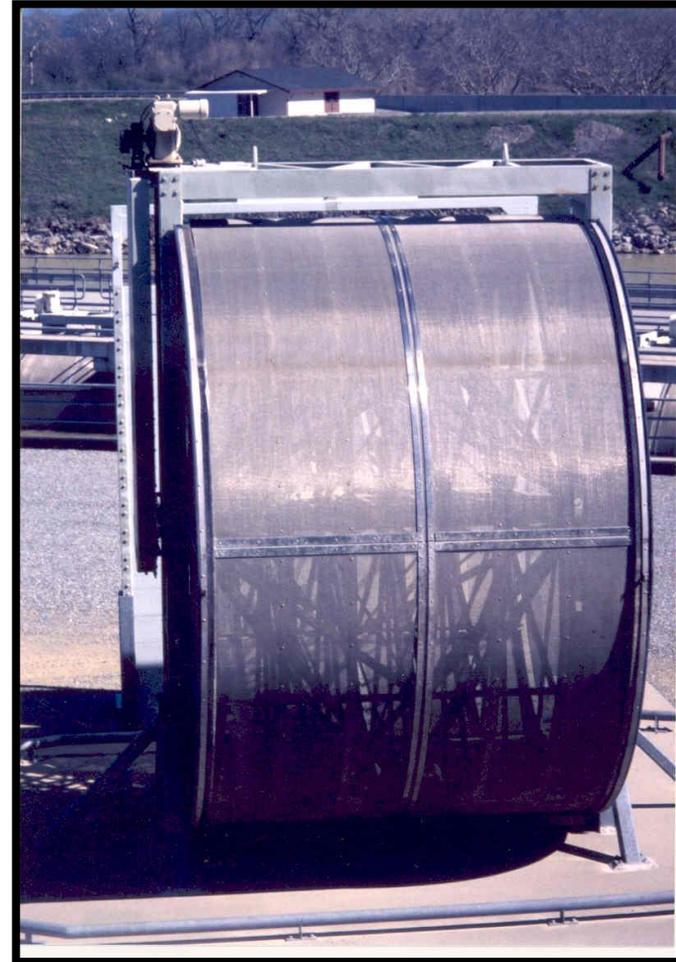
Examples of Facilities

- Juvenile fish bypass;
- Fish collection gallery;
- Fish counting station;
- Trap and transport.



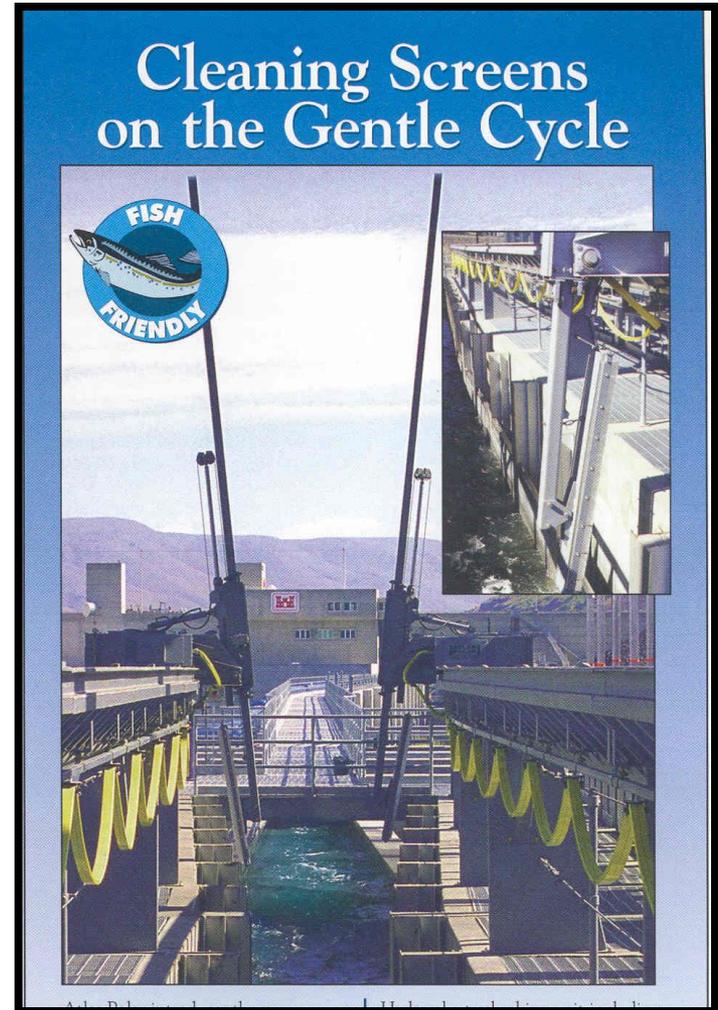
Device

- A piece of equipment or a mechanism designed to serve a particular purpose or perform a particular function.



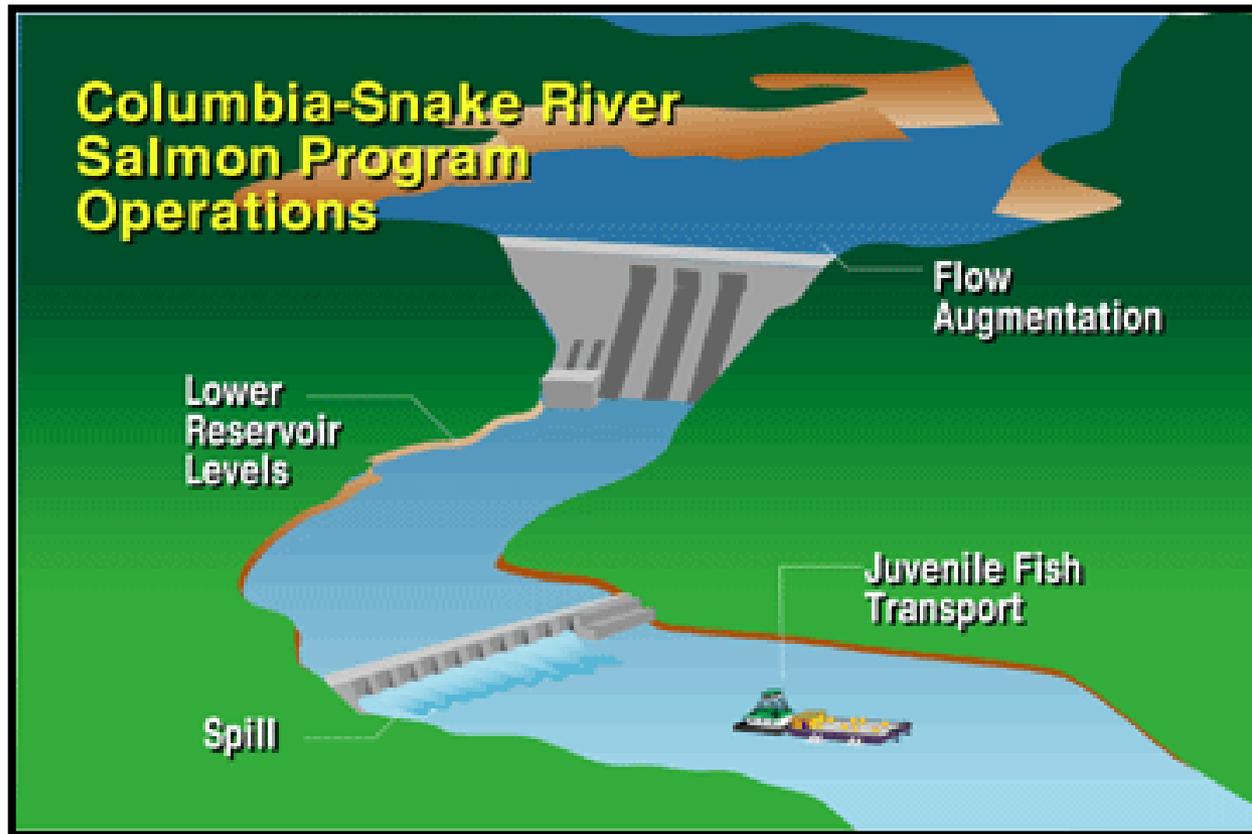
Examples of Devices

- Attraction flow systems;
- Pumps and conduits;
- Hoist and hopper on a fish lift;
- Screen cleaner.



Project Operations

- A method or manner of functioning or performing.



Examples of Project Operations

- Turbine sequencing (first unit on; last off);
- Generation or gate timing or ramping to shape flows;
- Number of lifts per unit time;
- Flow augmentation;
- Cessation of generation.



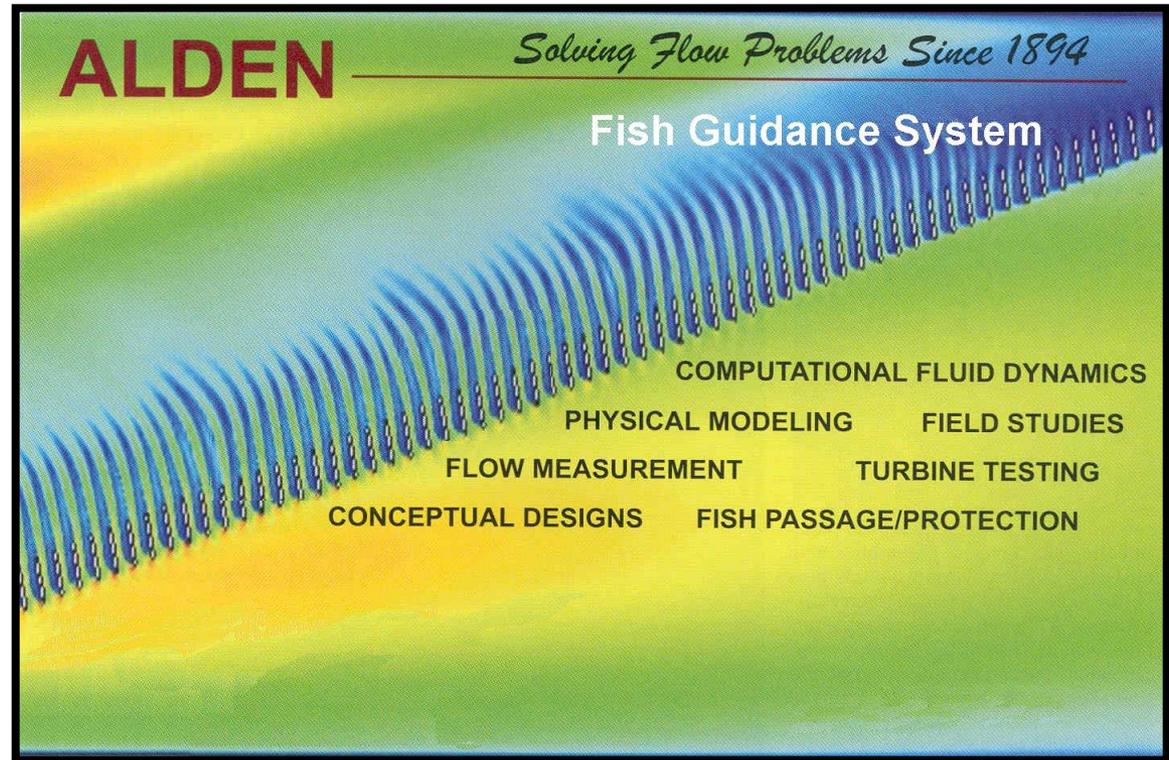
Measure

- An amount, allotment, capacity, evaluation, intensity, measurement, schedule, size, study, or action calculated to achieve an end.



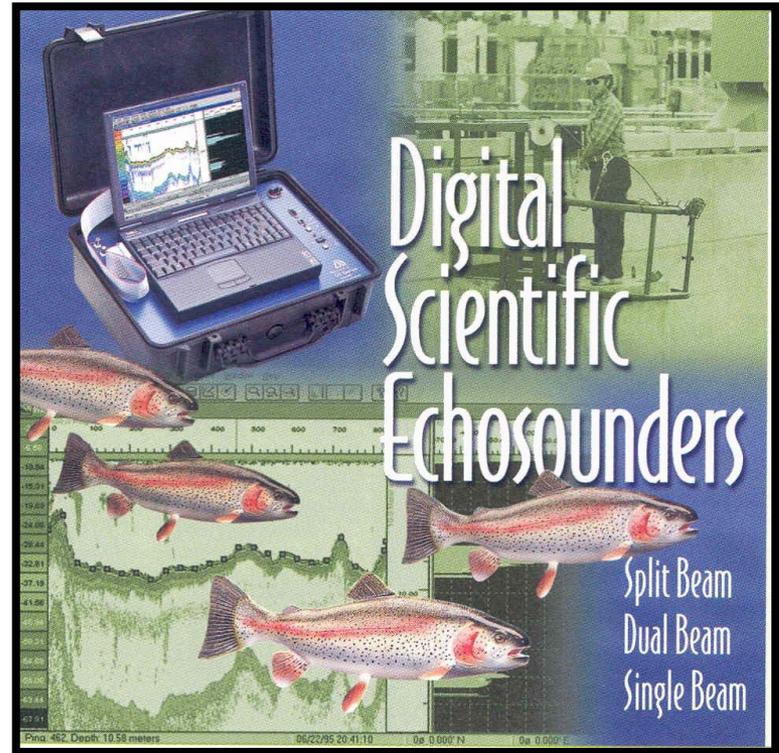
Examples of Measures

- Water Flow;
- Hydraulic modeling;
- Schedules;



Examples of Measures, cont.

- Monitoring, evaluations, and inspections;
- Design features;
- Channel modifications;
- Consultation.



Summary: What Is a Fishway?

- A fishway is the combination of ingredients (structures, facilities, devices, project operations, and measures) necessary to insure the safe, timely, and effective movement of fish past a barrier.



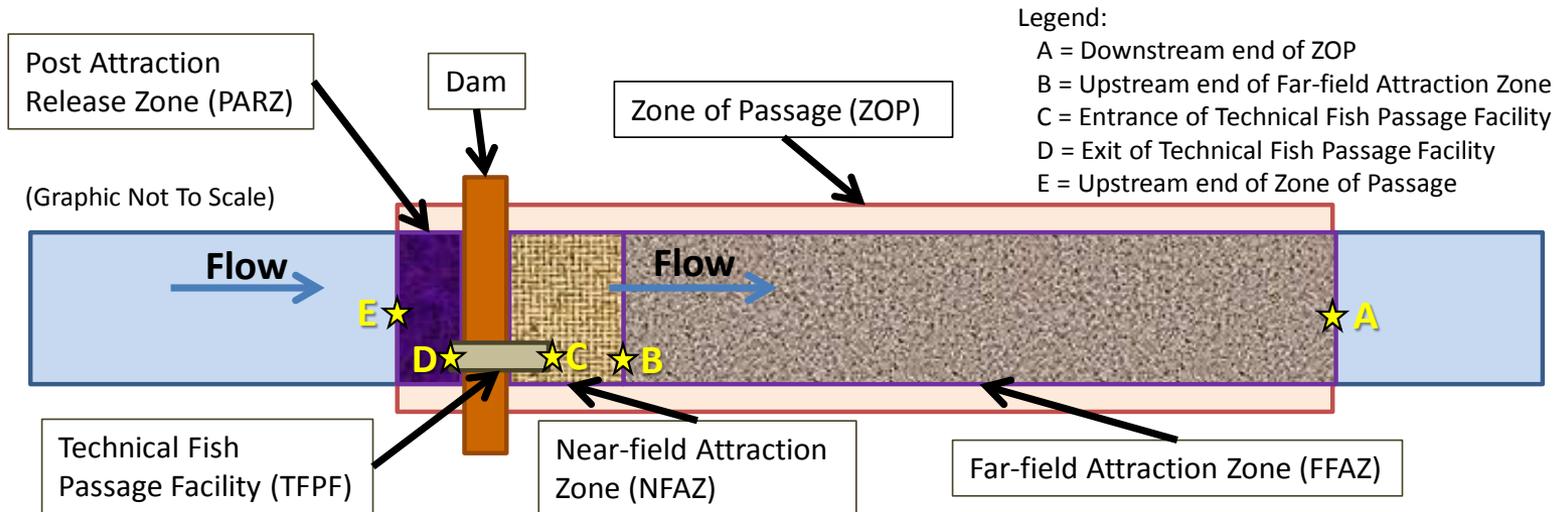
Congress's definition of a fishway is very broad...and includes many project elements, and can be simplified by introducing a few concepts.



1. Zone of Passage (ZOP)

Refers to the contiguous area of sufficient lateral, longitudinal, and vertical extent in which adequate hydraulic and environmental conditions are maintained to provide a route of passage through a stream reach influenced by a dam (or stream barrier).





Far-field Attraction Efficiency. The proportion of the migrating population that successfully passes through the area of the Far-field Attraction Zone; e.g., the proportion of fish that start at A and travel to B.

Entrance Attraction Efficiency. The proportion of the migrating population which has passed the Far-field Attraction Zone and successfully enters the Technical Fish Passage Facility; e.g., the proportion of fish that pass B and enter C.

Technical Fish Passageway Efficiency. The proportion of the migrating population that has entered the Technical Fish Passage Facility and successfully exits it; e.g., the proportion of fish that start at C and pass D.

Total Passage Efficiency. The proportion of the migrating population that successfully passes through the entire Zone of Passage; e.g., the proportion of the fish that start at A and travel to E without falling back.



Safe, Timely and Effective

- Primary attributes of good passage
- Linked to the concept of ZOP
- Safe and timely are in Congress' definition
- Safe, timely, and effective introduced years ago by the Service biologists in R5
- Terms are widely used in practice up and down the eastern seaboard (and beyond)





Safe Passage

- requires that movement through the zone of passage does not result in any unacceptable stress, incremental injury, or death of the fish.

Timely Passage

- occurs when successful movement through the zone of passage proceeds without significant impact to essential behavior patterns or life history requirements.



Effective Passage



- results when project operations and environmental conditions align during the migration period to allow all target species to move through the zone of passage.

Effectiveness may include both qualitative and quantitative components; however, efficiency is a term typically reserved for quantitative evaluations of effectiveness.





Efficiency

Efficiency or overall efficiency, is a (quantitative) measure of the proportion of the population that has successfully passed the barrier (e.g., hydroelectric project) in order to maintain a self-sustaining population, restoration target, or other fisheries management goal.





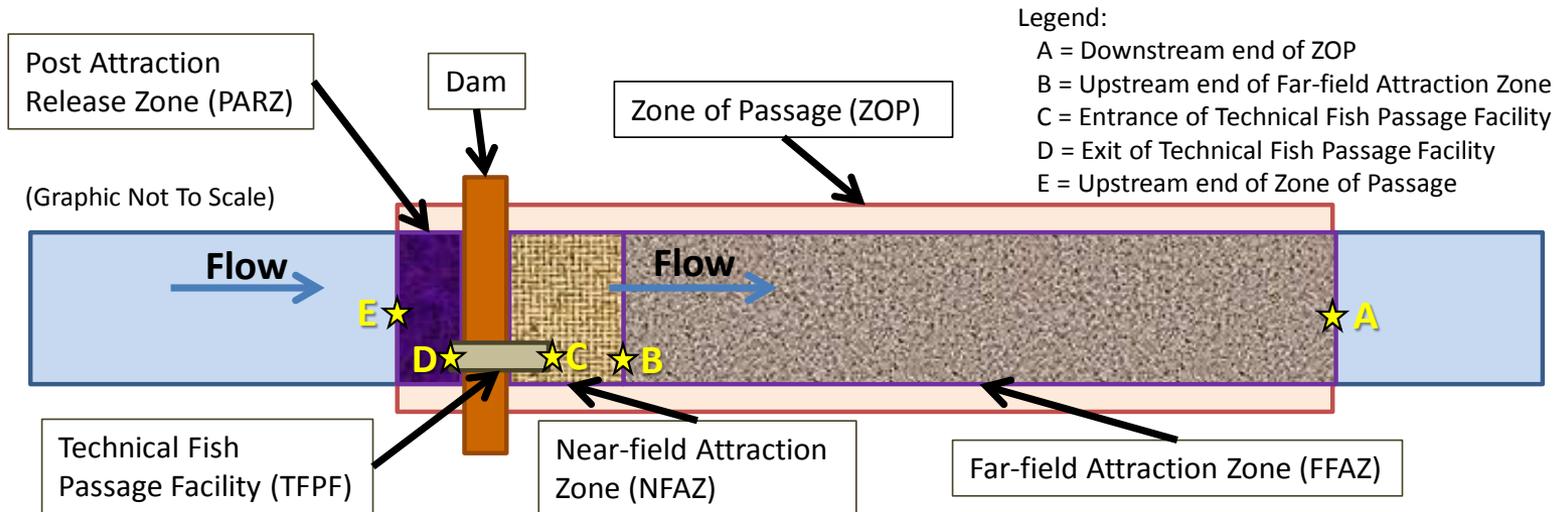
Passage Efficiency

Passage Efficiency is a measure of the proportion of the fish attracted to the fishway that successfully move through the fishway or zone of passage.

Attraction Efficiency

Attraction Efficiency is a measure of the proportion of the stock that is successfully attracted to the fishway or zone of passage.





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Questions

5:15:00

