

FISH SCREENING CRITERIA FOR WATER DIVERSIONS

The information below describes ODFW fish screening criteria for all fish species. Contact the local ODFW Screens Coordinator (<https://dfw.state.or.us/fish/screening/contacts.asp>) for free technical assistance when planning a fish screen. For more details on fish screening requirements see Chapter 8 of the 2022 (or most current) NOAA Fisheries WCR Anadromous Salmonid Design Manual (<https://www.fisheries.noaa.gov/resource/document/anadromous-salmonid-passage-facility-design-manual>).

Screen Material Openings

All screen material must provide **at least 27% open area**:

- **Circular openings** shall not exceed 3/32 inch in diameter.
- **Slotted openings** shall not exceed 0.069 inch (1.75 millimeters [mm]) in the narrow direction.
- **Square openings** shall not exceed 3/32 inch as measured on a diagonal.

Hydraulic Performance Requirements

Screen area must be large enough to prevent fish impact. Wetted screen area depends on the water flow rate, water depths, and the approach velocity.

- **Approach velocity:** The water velocity perpendicular to and approximately three inches in front of the screen face.
- **Sweeping velocity:** The water velocity parallel to the screen face.
- **Bypass system:** Any pipe, flume, open channel or other means of conveyance that transports fish back to the body of water from which the fish were diverted. Also note it's importance to transport debris away from the screen. If debris has no where to exit, it just builds up and clogs the screen.
- **Active screen:** Self cleaning screen that has a proven cleaning system.
- **Passive screen:** Screen that has no cleaning system other than periodic manual cleaning.
- **Effective screen area:** the total wetted screen area minus the area obstructed by major structural elements.

Screen sweeping velocity for ditch screens shall exceed the approach velocity. Screens greater than 6 feet in length must be angled at 45 degrees or more relative to flow. An adequate bypass system must be provided for ditch screens to safely and rapidly collect and transport fish back to the stream.

Additional Design Requirement

Screens shall be equipped with a **baffle system or other porosity control** to provide even flow distribution across the screen face. This reduces localized high velocity "hot spots" that could impinge fish against the screen surface.

- **Active screens:** approach velocity shall not exceed 0.4 fps (feet per second) or 0.12 mps (meters per second). To calculate the required effective screen area*, divide the maximum water flow rate in cubic feet per second (cfs) (1 cfs = 449 gpm) by 0.4 fps.
- **Cone screens:** approach velocity shall not exceed 0.33 fps or 0.10 mps. To calculate the required effective screen area*, divide the maximum water flow rate in cfs by 0.33 fps.
- **Passive screens:** approach velocity shall not exceed 0.2 fps or 0.06 mps. To calculate the required effective screen area (in square feet)*, divide the maximum water flow rate in cfs by 0.2 fps. Diversion rate shall be less than 3 cfs.

**Effective screen area calculations result in minimum area required to meet criteria. Oversizing a screen whenever possible is encouraged to accommodate for blockages and inefficiencies.*