

TECHNICAL NOTES

U.S. DEPARTMENT OF AGRICULTURE STATE OF COLORADO NATURAL RESOURCES CONSERVATION SERVICE

BIOLOGY TECHNICAL NOTE NO. 29

August 21, 2001

To: All Area Offices
All Field Offices

From: Terri Skadeland
State Biologist

Re: Fish Passage Design

Fish Passages

General Information:

The focus of this technical note is culverts and the needs of migratory, cold-water fish species. Fish passage or fishway designs should account for the fish species expected to use the passage and the life stage of these fish. Generally the passage should be designed to allow passage of the weakest or youngest fish expected to use the passage (OFW 2001).

Things to consider when designing and installing culverts to be used as fish passages are: 1) the water velocity and/or turbulence in the culvert, 2) water depth in the culvert, 3) the jump height, 4) the quality of the jump pool, and 5) debris at the culvert inlet.

Water Velocity in the Culvert:

Culvert Length	Adult Trout	Juvenile
60 feet	4.0 fps	2.0 fps
60-100 feet	4.0 fps	2.0 fps
> 100 feet	Consult NRCS Area or State Biologist	

The culvert pipe should be set at a 1 percent grade or less to avoid excessive velocities.

Minimum Water Depth:

Trout and kokanee need 8 inches of water in a culvert in order to successfully use the passage.

Maximum Vertical Jump Height at Culvert Entrance and Jump Pool:

Where juvenile trout are expected, the maximum jump height should be 6 inches. Sites where only adult trout are expected may be up to 1 foot height. Depth of the jump pool should be 1.5 times the height of the jump or a minimum of 2 feet. (Use the largest value of the two numbers).

Debris at Culvert Inlet:

An accumulation of debris at the culvert inlet may prevent migrating fish from reaching their goal. Inlets should be inspected regularly and cleaned as needed.

References:

OFW. 2001. Oregon Department of Fish and Wildlife guidelines and criteria for stream-road crossings. <http://www.nwr.noaa.gov/1salmon/salmesa/4ddocs/orfishaa.htm>

WDFW. Upstream fish passage at dams and culverts. Washington Department of Fish and Wildlife. <http://www.wa.gov/wdfw/hab/engineer/habeng.htm>

Wiest, R.L. 1998. A landowner's guide to building forest access roads. USDA-Forest Service, Northeastern Area. NA-TP-06-98, Radnor, PA.
<http://www.na.fs.fed.us/spfo/pubs/stewardship/accessroads/accessroads.htm>