

## PREDICTING FISH PASSAGE DESIGN DISCHARGES FOR ALASKA

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Improper placement of highway culverts may selectively or totally block fish migration, thereby decreasing available spawning and rearing habitat. Blockage will occur with a combination of excessive culvert water velocities, lack of fish resting areas upstream and downstream of the culvert, and scour at the culvert outlet, creating perched conditions. Previous studies of fish passage culverts have determined fish swimming abilities and profiles of culvert water velocity. There are limited studies of the hydrologic relationship among frequency, duration, season, and magnitude of discharge for the design of fish passage through culverts in northern regions. We analyzed streamflow records from 14 gaging stations in south central, interior, and arctic Alaska (drainage area  $<260$  km<sup>2</sup>) to determine the highest consecutive mean discharge with 1, 3, 7, and 15 day durations. Streamflow during three periods were analyzed: spring, April 1 to June 30; summer, July 1 to August 31; and fall, September 1 to November 30. The Lognormal distribution, using the Blom plotting position, predicted flood frequency values. Regionalization, with the index-flood method, of single station values provides a method for predicting discharges from ungaged drainage basins. Regressions developed to predict the 2-year return period discharge found that the significant basin characteristics were basin area and forest cover in the spring period, and basin area, forest cover, and mean annual precipitation in the summer and fall periods.