

From: Edl, Michele
Sent: Wednesday, October 12, 2011 10:24 AM
To: Hemenway, Sandy
Subject: FW: approach velocity and fish screening

Sandy,

Here is the email response I received from Bryan Nordlund of NOAA. The link to Mr. Nordlund came from Keith Kirkendall, (NOAA Fisheries, South Idaho Branch Chief) here in Boise. Mr. Nordlund refers to IDFG criteria in this message so I expect that Walt Poole already has Mr. Nordlund as one of his contacts.

From: Bryan Nordlund [<mailto:Bryan.Nordlund@noaa.gov>]
Sent: Monday, August 22, 2011 1:49 PM
To: Keith Kirkendall
Cc: Edl, Michele; Lynn Stratton
Subject: Re: approach velocity and fish screening

Michele - the basic reasoning behind the 0.4 fps approach velocity criterion is that it was found to be the maximum velocity a salmonid fry (as small as 27 mm) could swim against for an exposure time of 60 seconds in cold water (4 degrees C). In other words, this criterion protects the expected weakest swimming salmonids in the expected coldest water. Since approach velocity is the component of water velocity perpendicular to a fish screen, this theoretically keeps the fish from becoming impinged on the screen. Field testing of this theory has variable results - but generally results indicate that over 98% of the fry survive these screens in mark/recapture tests.

The minimum velocity used to be 0.5 fps, but was reduced to 0.4 fps when a U of W study showed that this really didn't provide optimal protection of the smallest fish expected in Northwest waters. I do note that IDFG uses 0.4 fps in waters that contain anadromous salmonids, and I think for ESA listed bull trout as well.

The simplest way to determine approach velocity is to calculate it - divide the measured flow rate (in cfs) by the effective screen area (in sq. feet). Effective screen area is submerged and not occluded by major structural members. In the case of non-vertical screens, it is the projection of the screen in the conveyance cross section parallel with the screen face. For example, a rotating drum screen would have a rectangular (or maybe square) projection as an effective area. There are many other subtleties, but that's the basics.

Hope this helps. You can also call me at 360-534-9338 if need be.
Bryan

Keith Kirkendall wrote:
Hi Michele,

I am going to ask that you take up this conversation with one of my most seasoned hydraulic engineers and the primary force behind our criteria document - Bryan Nordlund. Bryan is cc'd on the email. He is out on a little vacation time currently but should be back in soon. If you

$$\frac{.03 \text{ cfs}}{.5 \text{ sq ft}} = .06 \text{ fps}$$

approach
velocity

SK

have a pressing need I can work with you and a couple other of our senior engineers.

We're always looking for ways to help out in this specific area.

-keith

On 8/12/2011 9:22 AM, Edl, Michele wrote:

Mr. Lind,

Thank you very much for providing me this link. I really appreciate this timely, up to date information. I will be digesting it this weekend.

Mr. Kirkendall,

I would appreciate any information you can provide which would assist me with the reasoning behind the approach velocity of 0.5 fps, and with general alternatives for determining approach velocities without putting on scuba gear.

Michele Edl