Fish Detection and Sizing

•*I am interested in using a DIDSON unit for monitoring fish migrations in Maine. I was wondering if a DIDSON would be able to depict smaller fish, around 8 inches, and at what range.*

Using our LR (700 kHz and 1.2 MHz), Debby Burwen, Alaska Department of Fish and Game, believes she can see 8-in. (20 cm) long fish at ranges up to 30 m. The water was more than 10-ft deep and the current was slow (less than 5-ft/s). Using our Standard version (1.1 MHz and 1.8 MHz) the ranges would be less — around 15 meters.

•*Can fish 8 inches in length be estimated with a DIDSON?*

Yes, but the resolution decreases with range, so the accuracy of the estimate decreases with range. At 1.8 MHz, the cross-range pixel size is approximately 0.5R/100 where R is the range from the sonar to the fish in meters. At 1.1 and 1.2 MHz, the cross-range pixel-size is approximately 0.5R/50.

For 700 kHz, the centers of the beams are spaced 0.5R/50 but the beamwidths are 0.5R/25 so the image is not as sharp.

The acoustic pixels are not round or square. They are like thin rectangles. The cross-range pixel length (explained above) varies with how far the target is from the sonar. The down-range pixel length is determined by the window length. Approximately 500 pixels fit into a window length (down-range direction).

Example:

1) Assume you are looking at an object 25 meters out, while using a 20 meter window length with a start range of 7 meters. You are using the 1.1 MHz opening frequency. A 20-m window length has a down-range pixel size of 2000/500 = 4 cm. The cross-range resolution is 0.5*2500/50 = 25 cm. So the object is imaged with pixels 25 cm wide by 4 cm long.

2) Assume you are looking at an object only 7 meters from the sonar. You use a 5 m window with a start range of 4 meters. The down-range resolution is 500/500 = 1 cm and the cross-range resolution is 0.5*700/100= 3.5 cm

3) Assume you are looking at an object only 2 meters from the sonar. You use a 1.25 m window with a start range of 1.0 m. The down-range resolution is 125/500= .25 cm. The cross-range is 0.5*200/100 = 1 cm.

•*Does the longer range DIDSON perform with the same resolution as the standard unit?*

No, the beamwidths get wider with lower frequency.

•*How far from DIDSON can you see fish?*

It depends on the size of the fish, the operating frequency of DIDSON, and the environment. We have video of fish 30 cm to 70 cm long clearly seen at 60 meters using the LR at 700 kHz (see the Gallery/Fisheries Management page). They were seen in the Kenai River, Alaska, during rising tide when the river depth had increased by 10 feet.

Our Standard Frequency DIDSON can see 30 cm fish out to 12 meters with the 1.8 MHz frequency and out to 18 m with the 1.1 MHz frequency.

If you are interested in smaller fish, we can detect 5-cm objects at ranges between 3 m and 10 m depending on the environment using the 1.8 MHz frequency.