A Look Thru The Fish's Eyes

By Jim Barta

In many respects, the typical fish eye is remarkably comparable to a human's. Just as in the human eye, a fish's eye is similar to a camera. Light rays enter the eye and are picked up by the lens, the transparent center of the eyeball. The lens directs the light rays to the back of the eye and focuses them on a light-sensitive screen called the retina.

The human eye has an iris, or diaphragm, in front of the lens that opens and closes depending on the amount of light entering the eye. The iris in a fish's eye is fixed. It is an opaque curtain of tissue with a small hole in the center. The iris allows light to enter the eye through the fixed center aperture only, while blocking out light coming in from beyond the edges of the fish's field of vision. Receptor cells in the retina make adjustments to any changes that may occur in the brightness of light.

There are two types of receptor cells in the retina that are used, depending on light levels: rod cells and cone cells. Each type sends signals to the brain describing any image that is flashed on the retina. The cone cells are the color receptors of the fish and are used in daytime or whenever the light source is brighter than one foot-candle. At night, or when the light level falls below one foot-candle, fish use the rod cells, which are ultra light sensitive receptors. Rod cells are about 30 times more sensitive than the cones but they detect and record only black and white.

During periods of brightness, the cones extend to the surface of the retina and the rods are withdrawn into dark pigments where these sensitive cells are protected from damage by bright sunlight.

In any species of fish, the most successful feeders are those fish whose eyesight is quickly adjusted to the natural cycles of night and day. Because many game fish have superior low-level eyesight compared to its prey, they have an advantage when light levels are low and prefer to feed at this time. This would explain the reason fishing is usually good at daybreak and again at dusk.

In marginal light, a game fish can stalk its prey with a higher degree of success than in brighter conditions. They will expend less energy feeding in marginal light, so that is the heaviest feeding time.

Even the cleanest water is a poor conductor of light when compared to air. Visibility underwater is limited substantially under the best of conditions. Particles from silt, mud, aquatic growth, and man-made debris reduce visibility. The particles in the water scatter the light and prohibit its entry in the same manner as smoke or fog does in air. Unless a fish is alerted to the approach of a lure by sound or vibration, it may only have a brief moment to react when the lure suddenly appears. That may explain why lures that rattle and those that give off a lot of vibration work well in dirty water conditions.

The eyes of a fish are round rather than slightly flattened like man's and cannot change its focus by adjusting its shape. The round-shaped lens causes nearsighted vision. When this occurs in man, we correct the lens' vision with glasses a surgical procedure. Having the other senses to rely on, fish don't require long range vision. They often use their eyes at short range for the final strike.

Since their eyes are located on separate sides of their heads, fish have a wide range of sight. Fish have the advantage of having each eye able to scan an arc of 180 degrees or more on each side of their body. A small blind spot appears in the rear where neither eye can see. Straight ahead, the arc of the two eyes overlap to provide a narrow area where the fish has binocular, or vision with both eyes. It is in this band of vision that a fish can be expected to have accurate depth perception. Clarity of vision is somewhat lost because the image is focused out near the periphery of the retina. The sharpest vision occurs when objects are at a right angle to the eye.

Recently I had an opportunity to watch a tape that was filmed with an underwater camera attached to a downrigger cannon ball. Time after time a fish would approach the lure and then turn to swim away. Not once did the fish take the presentation on its initial approach. Only after doing this a couple of times would the fish strike the lure. After researching the vision found in most game fish, I now believe it is entirely possible that the fish made its turn behind the lure to get a sharper look at it. Only after it was satisfied with what it saw, did the fish strike its intended meal.

If you remember nothing more about a fish's vision than how it sees your offering before the strike, you've gained a valuable edge. Sound or smell might direct it to your bait, but in many instances, the final attack is dictated by sight. Good luck fishing!