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Natural History Notes

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THE MOST CRITICAL TIME OF A FISH'S LIFE

Within the past 75 years the northern pike has invaded many musky lakes. In most lakes the musky has declined as northern pike numbers have increased. In some lakes the northern pike has completely taken over. This is the third in a series of five "Natural History Notes" that reviews the biology of these fishes and reasons why northern pike have displaced muskies in many waters.

Have you ever thought about how many eggs a musky, northern pike, or any other fish lays and what happens to them? Female muskies from 25 to 53 inches long produce 22,000 to 180,000 eggs and a 40-pounder produces 225,000 or about eight quarts. A musky egg is about 3/16 of an inch in diameter. Northern pike eggs are somewhat smaller in size and females commonly lay from 8,000 to 100,000 eggs. If the billions upon billions of fish eggs laid in our lakes hatched and grew to become adults the world would be "wall to wall" fish; it wouldn't be safe to go fishing! Obviously, a very large fraction of these eggs die. With fish, as with all living things, the earliest life stages are the most critical. This is the time when the greatest numbers die. A study on Murphy Flowage estimated that 600 northern pike laid 9,000,000 eggs in early spring. By mid-summer about 18,000 individuals were left. And only a small percentage of these 4-inch fingerlings will live to grow large enough to be caught by anglers or to reproduce.

Here are just a few of the many reasons why such an overwhelming percentage of fish do not survive their first few months of life. Let's think about the egg and where things can go wrong. The egg has three major parts: (1) the germinal disc or the genetic contribution from the mother; (2) the yolk or source of food and energy which makes up the largest portion of the egg; and (3) the egg shell or membrane which holds it all together. Not all eggs produced by all females are viable. Old fish often produce eggs whose germinal disc is missing or malformed. These are often genetic mistakes that can be compared to the greater risk of a woman over 40 having a deformed baby. The amount of yolk in the egg is important. If the content of yolk is low the developing fish will be small and undernourished,

greatly reducing its chances of survival. When the yolk is used up the tiny fish must be strong enough to capture its own food or die. Eggs produced by females during their first season of spawning are often smaller and contain less yolk, therefore producing weaker fry. Egg shells must also be strong enough to protect the developing embryo. The best quality eggs are produced by mid-sized fish and hatchery operations prefer to use mid-sized females as a source of eggs.

With muskies and northern pike the spawning act itself may account for very high egg mortality. Studies have indicated that with both species in nature only 30-40% of the eggs laid are actually fertilized. There must be split second timing in the expulsion of eggs and sperm by the female and males. In the male's body the sperm is dormant but when expelled is instantly activated by the water and remains active for only about 50 seconds. If the sperm cell doesn't penetrate an egg in this very short time it loses its ability to fertilize an egg. It just runs out of energy. It is interesting to note that male muskies, for their size, produce a much smaller volume of sperm than northern pike or other fish species. Based on this information it is likely that the initial reproductive potential of muskies is less than that of northern pike.

Now assuming that many thousands of eggs have been successfully fertilized, predation is the next big problem. Fish eggs are an underwater delicacy, packed with nutrition. They are caviar to all sorts of critters that are very much in tune with the spawning of larger fish. Schools of minnows and other small fish can be seen following muskies or northern pike, gobbling up yolk laden eggs as they slowly settle to the bottom. In addition to these small fishes, crayfish and a large number of other invertebrates feast on the eggs. This points out another important biological concept. Balanced fish populations in lakes is very important. Stunted panfish populations take their toll on the large predator fish during these early life stages. So when we have too few large predators we end up with an excess of prey species which eat the eggs and young of the predators and the problem worsens.