



## Project profile: Exposure of freshwater sharks to human pharmaceuticals.

The bull shark is often considered to be the “most dangerous shark in the world” due to its unique ability to survive in freshwater habitats for extended periods of time, providing the opportunity to be in close proximity to human populations on a regular basis. Ironically, this same trait also makes the bull shark more like to be “in danger” from the impacts that human populations can have on coastal ecosystems than most if not all other shark species. For example, recent studies conducted by Mote Marine Laboratory’s Center for Shark Research have shown that newborn bull sharks use Florida rivers that are highly impacted by wastewater effluent as “nursery grounds” and remain within these rivers for at least the first 6 months of their life and possibly up to 18 months or longer. Because of this, these sharks are regularly exposed to greater levels of wastewater-related pollutants than most coastal shark populations generally encounter. This raises concern about the possible health effects that these pollutants may have on young bull sharks, especially because many wastewater-related chemicals are capable of altering growth or reproduction in animals.

Recently, there has been growing concern about the presence of human pharmaceuticals in the aquatic environment. These chemicals include the parent compounds and break-down products of prescription and non-prescription drugs, such as contraceptives, antidepressants, anti-inflammatory drugs, and lipid-regulating agents. Pharmaceuticals are continually introduced into coastal ecosystems, mainly by excretion from human users and transport in wastewater discharge. Despite this, a large majority of the most widely prescribed drugs in the United States have never been surveyed in the aquatic environment and little is known about the uptake and effects of the chemicals in aquatic wildlife. Since many pharmaceuticals function by altering important biological processes that are common in humans and many animals, it is important to determine the levels at which wildlife populations are exposed to these chemicals. This information is especially important for wildlife residing in coastal habitats bordering highly populated regions, such as Florida southwest coast.

To determine the health risks that human pharmaceuticals pose to juvenile bull sharks and other wildlife inhabiting wastewater-impacted rivers, Mote Marine Laboratory’s Center for Shark Research has just initiated a new study on pharmaceutical exposure in bull sharks from Florida’s Caloosahatchee River. In this study, Mote researchers will be examining the exposure of bull sharks to synthetic estrogens used in human birth control pills by tagging sharks with standard fish tags bearing **passive sampling devices** similar to personal exposure badges, which are commonly used to measure chemical and radiation exposure in humans. These devices are designed to accumulate environmental pollutants and, if the shark is recaptured, they can be used to examine the chemicals that an individual fish was exposed to. In addition, Mote scientists will also be measuring the uptake of synthetic estrogens and a number of other human drug-related compounds in juvenile bull sharks by measuring the presence and concentrations of these chemicals in shark blood, which can be sampled using non-lethal approaches. The study is funded by the Charlotte Harbor National Estuary Program and the National Shark Research Consortium and is being led by Mote scientist, Dr. Jim Gelsleichter, and Dr. Nancy Szabo of the University of Florida’s Analytical Toxicology Core Laboratory.



Anglers that frequent the Caloosahatchee River and catch bull sharks bearing these unique tags are asked to remove the entire tag from the animal and store it in a standard freezer in aluminum foil or a clean plastic bag and contact Mote’s Center for Shark Research at 941-388-4441, Extension 576.