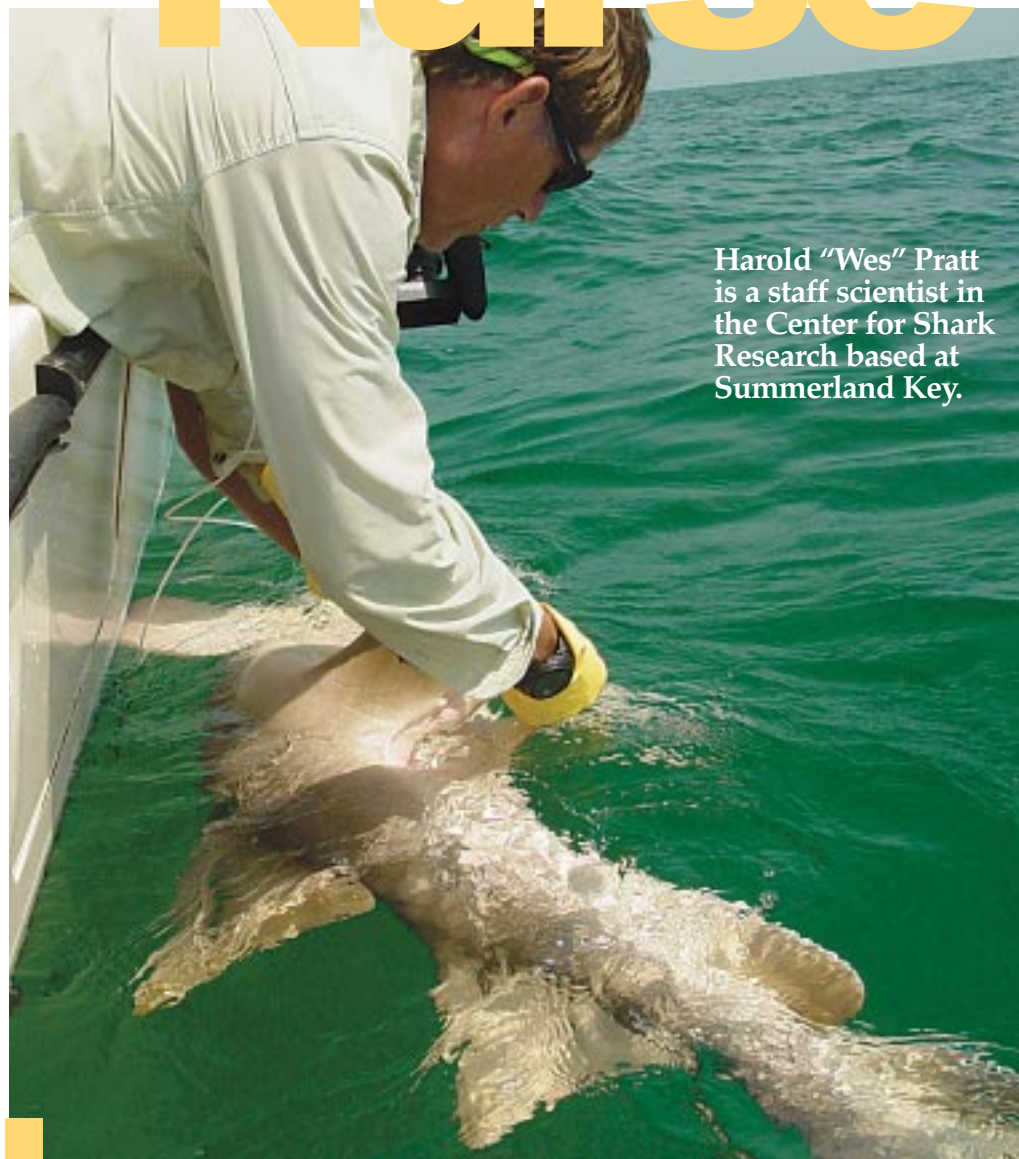


# The Private Lives of the Nurse Shark



Harold "Wes" Pratt is a staff scientist in the Center for Shark Research based at Summerland Key.

In 2003, Mote's outstanding shark research group welcomed another member to its elite ranks. Retired NOAA researcher Wes Pratt, author of numerous scientific articles on the biology of several shark species and the subject of three *National Geographic* magazine articles, now carries the Mote standard. As the world's leading expert on shark mating behavior, Wes has discovered several unknown and important facets of the complex behavior of nurse and other sharks. Now with Mote, Wes hopes to expand his research on the nurse shark and our understanding of this unique apex predator of South Florida waters.

## When did you really zero in on nurse sharks as your primary research focus?

I spent the first 35 years of my career studying sharks for the Apex Predators Program at NOAA's National Marine Fisheries Service, Narragansett Laboratory, based in Rhode Island. I studied their general life history — information like reproduction, age and growth, migrations and distribution, and then in 1991, I came with a colleague to the Dry Tortugas to study nurse sharks in the Keys. I've been focused on nurse sharks ever since. When I retired from NOAA, I relocated to Summerland Key to continue nurse shark work as a scientist with Mote Marine Laboratory, especially the study of mating behaviors of Keys nurse sharks.

## Wasn't that the subject of your last article in *National Geographic*, "Wild Mating of the Nurse Sharks"?

Yes it was. Dr. Jeffrey Carrier of Albion College and I were the first to document the details of sharks mating in the wild.

Results have been reported in several scientific papers as well as *National Geographic* (May 1995) and N.G.S. Explorer Television, N.G.S. Online and on the Discovery Channel.

We found some behaviors that were more unusual and complex than anybody had found anywhere before. That's partly because what people saw in captive sharks was incomplete behavior. That's always a danger when you're working with animals in captivity. In this case, the females in captivity did not have access to shallow water. What we saw in the Tortugas, couldn't be observed in captive animals.

To us this was the Rosetta Stone, because sharks live in a concealing medium and are large elusive animals and actually somewhat retiring.



## You consider sharks retiring?

Well, maybe not during feeding, but when they go to mate, yes. It is a time of vulnerability for them. From a research perspective, we had a lucky combination of circumstances in that the nurse shark is an animal that mates in shallow, clear water so we were able to observe it.

One of the peculiarities of sharks as members of the fish family is that sharks have internal fertilization. Unlike salmon or, say, trout. Like mammals, sharks have to copulate to insure the safe transfer of sperm.

## What were some of the more interesting things you observed?

Some of the most interesting I think, are refuging behaviors by females and blocking behaviors by males.

Refuging behavior may be a way for females to avoid mating in order to rest or a way to select males. In order to mate, the male shark grabs the side fin of the female with his mouth. Ideally the female relaxes and they mate. But the female can swim into very shallow water and put her fins into the bottom. If the tip of her fin is in the grass or gravel on the bottom, the male can't grab it.

## What about "blocking"?

Middle-aged males sometimes band together to try to coerce females into mating. Several males come to court a female, and one or two will grab, or attempt to grab, her side fins. The third shark will position himself in front of the mating pair and stop the female or couple from moving forward. It helps make mating successful. This is almost "altruistic" behavior, which is very unusual in the animal kingdom.

## What about tagging? How does that research tool come into play?

At first we just observed the behaviors, but we didn't know who was who. Now when sharks engage in mating or refuging or blocking behavior, we're able to identify them and try to learn about the social structure of these interacting groups. For example, we've learned that we have three dominant males out of approximately 25 males in the Tortugas group. As of June 2003, 222 adult and juvenile nurse sharks have been tagged in the Tortugas study population.

By using a variety of tagging techniques we are putting the behaviors in the context of the social structure. We are expanding our tagging program — both the passive tags (nylon tags on fins) and

## SOUTHERN-MOST SHARKS

Mote scientists have conducted shark studies in other areas of the Gulf and Atlantic coasts, investigating sharks as far north as the Gulf of Maine. Now, Mote is expanding its commitment to shark research in the Florida Keys. Summerland field researchers will capture, tag and release sharks, gathering data to help quantify shark numbers, distribution, activities and behavior.

the electronic tags. We put transmitters on selected animals to enable us to look at their patterns of movement and interactions.

## What was the advantage of moving to the Keys?

I did this kind of work in Rhode Island. But my location here increases my access to the animals. Mote gives me a platform and a facility to launch expeditions to study this population.

Nurse sharks are abundant here. They're an important part of the coral reef ecosystem. Nurse sharks are the shark that divers and fishermen are most likely to see. And because they are apex predators, it's very important that we understand their role.

## Are nurse sharks your only research subject?

The other part of what I'll be doing here is monthly surveys to assess local populations of blacktips, reef sharks, hammerheads, bull sharks and lemon sharks, in addition to nurse sharks.

Sharks are a vulnerable resource that needs to be managed and conserved and the best way to do that is to periodically sample them using conventional commercial gear. We will be catching, tagging, identifying, measuring and releasing sharks as members of the local population. And we'll learn about them as we re-catch and re-measure them.

Tagging is the key to understanding all of these species, and you have to look at the tags over time to understand the shark distribution. We're going to put tags on all the different sharks we catch. Next year we will conduct a blacktip initiative.

## Why blacktips?

The Keys are unique for mixing of blacktip stocks. The east coast and west



coast sharks move south and meet. We'll be tracking them with tags, transmitters, and DNA research.

**You're not exactly focused on the most endearing of creatures. Why is shark research so important?**

Because sharks are what we call "apex" predators they very quickly show the effects of diminished environmental quality and overfishing. It shows up quickly in changes in their abundance, distribution or life habits. In order for our governmental organizations to be able to better manage and conserve shark populations, we need to know more about their distribution, migration patterns, stock structure, reproduction, nursery grounds, age and growth.

**Does handling hurt the animals?**

We have video that was shot right after we released a big male to go about his

**LADIES' CHOICE**

*In order to mate, the male shark grabs a female's pectoral with his mouth. Ideally, the female relaxes and they mate. Sometimes females swim into shallow water and put their fins on the bottom, preventing the males from grabbing them.*



Nurse shark: *Ginglymostoma cirratum*

**SURPRISING COOPERATION**

*Middle-aged males sometimes band together to coerce females into mating. Several males court a female, and one or two will grab her side fins. A third shark will position himself in front of the mating pair and stop the female or couple from moving forward. That helps make mating successful.*

**Sounds pretty ambitious.**

It is ambitious, but this isn't anything new for Mote. For example, Mote already has a shark sampling plan in place in the Gulf of Mexico.

Mote has a long history as a leader in shark research. I remember reading Clark and VonShmitt and Genie Clark and Perry Gilbert in the 1960s. These are giants in the field who have made huge stepping stones that we current researchers get to walk on. Hopefully, we can extend their work and add a legacy of research that the next generation of biologists can build on.

**Is there anything non-scientists can do to help you?**

Mote has an 800 number (800-691-MOTE) so people can report tagged sharks. Over time, that information combined with our own research will help us understand the extent of migrations and get a picture of seasonal fluctuations.

**Is Mote alone in this effort?**

No, Mote is doing this research in conjunction with Albion College in Michigan. I've been working with



Crittercam research conducted on Keys nurse sharks in 2001 and 2002.

**SHARK CAM SCIENCE**

*"After we learned about nurse sharks mating in shallow water, we wondered how the process would change in deep water," says Wes Pratt. To find out, Pratt approached National Geographic about equipping nurse sharks with a critter cam. Mike Hiethaus, a former Mote scientist, had worked for National Geographic and for Greg Marshall, the crittercam inventor. Hiethaus, his wife, Linda (also a biologist), and Pratt worked together to equip eight nurse sharks with the standard crittercam package. The package included a laptop and instruments that would provide data on depth, temperature and other environmental parameters. The team captured sharks, attached cameras and rolled tape.*

*What happened when the animals came to deep water? At about 50 to 60 feet — they rested. The cameras recorded no mating activity whatsoever. Says, Pratt: "Now we know."*

Dr. Carrier for about 13 years. Mote is building on that research. Hopefully, we'll learn enough about these amazing sea beasts to solve some of the problems they're facing in our rather overpopulated world.

**From a shark's point of view, it's a shrinking world?**

Every time they turn around, there's another human activity that infringes upon their environment. That's why it's so important that we continue our ongoing study of reproductive biology, mating behaviors and nursery grounds.

Our work has demonstrated the importance of habitat to successful breeding in this species. We now know

that adult animals return faithfully to the same small, warm, shallow area. Males return annually and females return on two or more year cycles.

We get results every time we gather data, but the big picture requires collecting enough data over a long enough period of time. That's why we're focused on regular, long-term, sampling in the Florida Keys. That's why we're hoping to get assistance from other shark researchers and why we're hoping to involve volunteers from Florida Keys Community College and other institutions.

The challenge is huge.

**BOOK REVIEW**

**THE SHARK CHRONICLES**

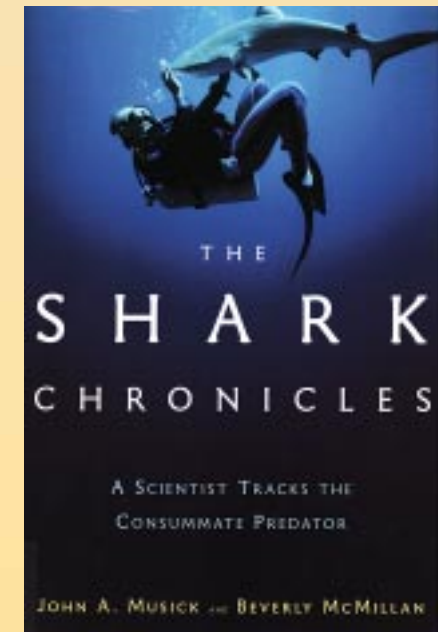
*A scientist tracks the consummate predator*

By John A. Musick and Beverly McMillan  
Times Books, Henry Holt & Company, LLC, 2002

REVIEW BY:  
Susan M. Stover, R.N., M.A., Mote Librarian

*Sharks are among the most fascinating creatures in the world. Musick, a shark researcher at the Virginia Institute of Marine Science, and McMillan, a science writer, have put together an authoritative and fascinating story of the evolution, physiology, and behavior of this elusive animal. The story begins in summer 1961 with a shark research cruise, then explains why, 40 years later, the author spends much of his time trying to save and restore the population of this misunderstood predator.*

*The book is interesting reading and provides an abundant amount of information from shark fossil history to facts on how a bountiful population has been depleted through overfishing. Shark enthusiasts will enjoy numerous morsels of information, such as the possible origin of the English word "shark." For readers interested in Mote history, there are frequent references to the shark staff's scientific research, including Dr. Perry Gilbert's early studies on shark behavior and Dr. Carl Luer's biomedical research program*



*Available for member checkout in Mote's library and in the Aquarium gift shop.*