



Title: Shark Handling and Research Diving Procedures

Purpose	To implement safety, training and diving requirements that will reduce the risk of injury to university employees during research and diving activities involving sharks.
Responsibilities and Authority	<p>Dive Safety Office: Is responsible for approving dive plans that involve interactions with sharks or put researchers in baited situations.</p> <p>Principal Investigators, Researchers and Divers: Are responsible for adhering to these standards and ensuring all personnel involved with shark research are properly trained and qualified in accordance with this policy.</p> <p>Institutional Animal Care and Use Committee: The Institutional Animal Care and Use Committee (IACUC) is a federally mandated committee that reviews all protocols involving animals to ensure that they are justified by their benefits and minimize any distress.</p> <p>Advisors: While the dive control board can be consulted, advice on a case by case basis can be sought from Dr. Yannis Papastamatiou (ypapasta@fiu.edu), Dr. Michael Heithaus (heithaus@fiu.edu), Dr. Demian Chapman (dchapman@fiu.edu), or Mr. Kirk Gastrich (kgastric@fiu.edu), researchers with extensive experience diving with and handling sharks.</p>
Scope	<p>Organization: This procedure defines roles, responsibilities and resources to manage compliance and safe practices associated with shark research handling and diving.</p> <p>Training: This procedure defines training requirements for all participants and authorized personnel within the scope of diving activities that involve sharks.</p> <p>Documentation: Records provide proof of compliance. Required records are identified throughout and should be used for program evaluation purposes.</p>



Definitions

The following are definitions for terms that are used in this document:

Term	Definition
Principal Investigator	The holder of an independent grant administered by a university and the lead researcher for the grant project.
Qualified Diver	A " Qualified Diver " for these purposes, is defined as "one who is capable of identifying existing and predictable hazards in the surroundings or working conditions involving sharks which are hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to mitigate hazards"
Safety Diver	A diver whose sole purpose is to observe the work area for potential hazards. The safety diver shall not be engaged in active research while assigned in this capacity.
Safety Observer	A snorkeler whose sole purpose is to observe the work area for potential hazards. The safety observer shall not be engaged in active research while assigned in this capacity.
Hazard	Personnel exposure to an associated condition that increases the risk of injury while diving with sharks
Baited Dive	A dive where dead fish, blood, or tissues are in the water
Dangerous Shark	All sharks should be considered potentially dangerous, but highlighted species are white, tiger, and bull sharks



Training	<ul style="list-style-type: none">• Principal Investigators, divers and support personnel who participate in shark research for their university sponsored, degree program or employment at FIU must be qualified through Dr. Papastamatiou and Dr. Chapman’s shark handling workshop or possess at least commensurate outside experience as determined by all of the advisors listed on page 1 of this document.• New divers and support personnel must take a shark species recognition and shark behavior orientation class prior to participating in any shark research activity.• All personnel involved in university sponsored diving and boating activities involving research, shall meet the requirements listed in the FIU Scientific Divers Safety Manual and the FIU Boating Safety Manual.• All snorkeling activities involving shark research will meet requirements listed in the FIU Boating Safety Manual.• Activities involving shark research will be conducted in accordance with university IACUC protocols.
Equipment	<p>In addition to standard equipment required on university sponsored diving activities, all shark research activities require the following additional equipment:</p> <ul style="list-style-type: none">• Emergency trauma kit including tourniquet and quick clot. The emergency trauma kit shall be standardized and a content list shall be available.• The trauma kit shall be inventoried prior to each shark research activity.• Pole spear or PVC pipe to fend off sharks

DIVING PROCEDURES	
Baited Dives	<p>Baited dives include the following: Divers deploying or retrieving Baited Remote Underwater Viewing (BRUV) frames, divers collecting reef fish via spearing, divers working with baited shark ecotourism dives. Dives where bait is used to draw in sharks for observation and filming. BRUV deployments generally use very small amounts of bait and risk is low.</p> <ul style="list-style-type: none"> • Buddy divers should face each other to ensure all zones are under observation. If > 2 divers, then one diver Must be assigned as a safety diver whose sole purpose is to observe the work area for hazards. • If a shark is seen it must be observed at all times. At least one diver must maintain eye contact and not let it get behind the diver. All divers should remain calm and not make dramatic movements. • If a shark is aggressive, the chum or bait should be released (e.g. chum container or bottle, speared fish). • Aggressive behavior consists of a shark making repeated approaches (3 or more) to within one body length of the diver, at high speed. • Divers collecting fish will never attach speared fish to themselves. Fish will be kept in a mesh bag which can be released immediately by the diver. • If a shark approaches a diver and is coming close to making contact, the diver will put a barrier between themselves and the shark. Ideally this would be a pole spear, PVC pipe, or large camera rig, but if not, the diver will raise their fin. Resistance will be applied if the shark makes contact, but the diver will resist striking the animal. Under no circumstances will a diver with a pole spear shoot or jab an approaching shark • Particular care should be taken during the ascent. Divers should watch for sharks leaving the bottom and following divers on ascent.
Non-Baited Dives	<p>The diving procedures for “baited dives” apply to non-baited shark research dives except an “attractant” or bait is not used to draw sharks to the work or observation area.</p>
Snorkeling with Sharks	<p>Care must be taken as snorkelers do not have access to shelter from the sea bed. The following procedures apply to shark research when snorkeling techniques are used.</p> <ul style="list-style-type: none"> • Two snorkelers are required at all times and they should face each other to ensure all zones are under observation. • In areas where dangerous sharks are abundant, it is preferable for snorkelers to wear slip on fins without booties. This enables the snorkeler to maintain a vertical position, increasing their maneuverability.

- If > 2 snorkelers, then one snorkeler **Must** be assigned as a safety observer whose sole purpose is to observe the work area for hazards.
- An independent **Safety Observer** is **REQUIRED** for any shark research activity involving snorkelers that includes tagging fish in the water and/or handling large amounts of bait (e.g. a crate or multiple bags).
- If a shark is seen it must be observed at all times. At least one snorkeler must maintain eye contact and not let it get behind the snorkeler.
- All snorkelers should remain calm and not make dramatic movements.
- If a shark is aggressive, the chum or bait should be released (e.g. chum container or bottle, speared fish).

If a shark approaches a snorkeler and is coming close to making contact, the snorkeler will put a barrier between themselves and the shark. Ideally this would be a pole spear or PVC pipe, but if not, the snorkeler will raise their fin. Resistance will be applied if the shark makes contact, but the snorkeler will resist striking the animal. Under no circumstances will a snorkeler with a pole spear, shoot or jab an approaching shark.

Note: Snorkel BRUV deployments: Snorkeler must have dedicated boat observer maintaining watch for shark hazards, however, are not required to have a “**Safety Observer**” in this instance, due to the short duration of in water time.

WARNING: No snorkeling will be conducted in areas where white sharks are abundant without special approval from the dive safety officer and approved advisors.

Underwater Shark Tagging

FIU Researchers tagging sharks underwater must qualify through Dr. Papastamatiou and Dr. Chapman’s shark handling workshop.

- Diving procedures for “**baited dives**” apply to **shark tagging** research dives as appropriate
- Tagging/sampling sharks underwater (using a pole spear) is a relatively low risk activity as the vast majority of sharks will rapidly leave the area after being tagged underwater.

Termination of water borne shark research activities

Conditions under which divers and snorkelers shall terminate shark research activities.

- If any of the following species are seen, the bait shall be discarded and the dive terminated: white shark (*Carcharodon carcharias*), bull shark (*Carcharhinus leucas*) and tiger shark (*Galeocerdo cuvier*). All divers working in areas where the above species may be seen are required to know how to identify these 3 species.

Boat- or shore-based shark research operations involving animal handling

- The exception may be organized baited ecotourism dives with tiger and bull sharks, where ecotourism staff (not FIU divers) interact with bait and the animals. Under no circumstances would an FIU diver or snorkeler remain in a baited situation if a white shark is seen. However, the ascent should not begin immediately. The seabed is a safer location, so ideally divers would wait till the shark has left before beginning their ascent.
- A shark being aggressive making directed movements to within 1 m of the divers. If this behavior is repeated > 3 times, the dive or activity should be aborted. When reviewing dive plans, the experience of the divers will be considered in terms of their interactions with sharks. For divers without the required experience, then divers should leave the area if > 20 animals are seen in the work area.
- If sharks are “bumping” into divers or snorkelers while foraging, the diver or snorkeler should ascend to shallow water or swim outside of the foraging area. If sharks follow the divers or snorkelers into shallower water or to the boat, then the dive should be aborted.
- For any dive being aborted because of an aggressive white, tiger or bull shark, extreme caution must be taken during the ascent. Midwater is far riskier than the seabed. Ideally divers should be back to back while ascending so that all zones are covered. In situations where a shark is being very aggressive, a safety stop should not be performed.

Researchers are far more likely to be injured by sharks during boat or shore-based handling operations. Injuries can occur from direct contact with sharks (bites, impact injuries, scrapes) and from fishing gear (hooks, leaders). The following requirements apply when handling sharks from shore or boat.

Note that boat handling includes working on sharks onboard a boat, with sharks alongside the port or starboard of a boat, or with sharks alongside an attached platform at the stern of a boat. Onboard handling should be limited to sharks smaller than ~ 120 cm total length. Platform based handling requires (a) prior approval of the platform by the majority of the advisors listed on page 1 of this document, achieved via direct inspection or inspection of images of the platform, (b) approval by the same of the personnel that will work from the platform and based on their experience level, and (c) the platform must be part of the hull of the boat.

Partial Restraint: Is defined as a situation where either the anterior part of the shark or the posterior part of the sharks is restrained by a hook, net, rope, or in the cases of sharks < 1 m total length in a researchers hands.



Full Restraint: Is defined as a situation where both the anterior and posterior portion of the shark is restrained, usually by a hook at the anterior end and a tail rope at the posterior end, but also including when a pectoral or anterior body rope is engaged or when a shark < 1 m total length is placed within a small cooler or measuring trough.

- All boat and shore-based handling operations are initiated when the shark is captured with hook-and-line or a net, which by definition means it is partially restrained. The first objective is to achieve full restraint as described above.
- Partially restrained sharks are more likely than fully restrained sharks to cause injury through direct contact or contact with fishing gear than restrained sharks. All personnel on the vessel must remain aware of their body position relative to the shark and the fishing gear holding it,
- Tagging, sampling, measuring and other research activities must not commence until full restraint is achieved.
- Situations can arise when a fully restrained shark reverts to a partially restrained state during handling operations (e.g., the hook or leader wire breaks, the tail rope slips). If this occurs and the posterior restraint fails, then it is acceptable to reapply the restraint. If this occurs and the anterior restraint is compromised it is highly advisable to remove the posterior restraint and let the shark go. The only situations where it may be acceptable to attempt to re-establish anterior control are when a surgical or tag application procedure is incomplete, there is significant risk of injury to the shark or researchers from not re-establishing anterior control, or the specimen itself is essential to the research project.
- Re-establishing anterior control on a partially restrained shark is extremely dangerous. Acceptable methods are applying a body or pectoral rope or inserting a new hook using a long-handled tool (e.g. a deep throat de-hooker).
- Once all research activities have been completed the shark can be released, ideally by simultaneous removal of anterior and posterior restraints.

Approval

Dr. Yannis Papastamatiou:

Yannis Papastamatiou

Print

Signature

FIU Diving Safety Officer:

ROGER GARCIA

Print

Signature

FIU Diving Control Board Chair:

James W. Fourqurean

Print

Signature