



Commercial Great White Shark Cage Diving New Zealand

Code of Practice

November 2015

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1.1	December 2014	Minor amendments to reflect feedback from permit consultation.
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Introduction

Marine based tourism offers opportunities for economic, educational and environmental benefits but is not without risks to people, animals and the environment. Worldwide there is growing interest in observing sharks /mango in their natural environment. This includes activities such as snorkelling, diving and, more recently, shark cage diving.

Shark cage diving involves divers observing large predatory sharks underwater from the relative safety of a cage. The activity provides a unique opportunity to observe sharks and occasionally other marine life in their natural environment. As with any activity undertaken at sea, and involving wild animals, there is an element of risk. Careful management and safe operating practices can greatly reduce this risk and makes good, sustainable business sense.

In New Zealand, shark cage diving operations generally target great white sharks (mangotaniwha) (*Carcharodon carcharias*), blue sharks (mangopounamu) (*Prionace glauca*), and shortfin mako (mako) (*Isurus oxyrinchus*). Of these species the great white shark is absolutely protected in New Zealand and New Zealand fisheries waters under the Wildlife Act 1953 and the Fisheries Act 1996. The Department of Conservation (DOC) is charged with the administration of the Wildlife Act 1953 and the protection of great white sharks under the jurisdiction of that Act. The Ministry for Primary Industries administers the Fisheries Act 1996 (visit: www.legislation.govt.nz).

Given the protected status of great white sharks, cage dive operators must ensure their operations are conducted in a manner that ensures the wellbeing of these sharks. This Code of Practice identifies activities associated with cage diving that pose a risk to great white sharks and how these must be mitigated. The list of risks should not be treated as definitive. Cage dive operators are encouraged to review their activities regularly and communicate to DOC any new developments or lessons learnt during their activities.

All incidents of shark entanglement, injury, ingesting material other than natural baits, or becoming trapped, or partially trapped, inside the dive cage, should be reported as soon as possible to marine@doc.govt.nz or to the local DOC office.

Aside from the Wildlife Act 1953, a number of legislative requirements are also applicable to cage diving. These include the Maritime Transport Act 1994, and associated Maritime Rules, Health and Safety in Employment (HSE) Act 1992, and the Marine Mammals Protection Act 1978.

Purpose of the Code of Practice

This Code of Practice must be complied with by all operators granted a great white shark cage diving permit, and forms the key conditions for those permits.

The permit (issued under the Wildlife Act 1953) and Code of Practice are intended as a means to ensure all potential risks to great white sharks from cage diving are identified and minimised.

However, it is beyond DOC's current mandate to regulate activities that pose a hazard to tourists, or persons in their place of work. These activities are covered under other legislation (e.g. Maritime Transport Act 1994; Health and Safety in Employment (HSE) Act 1992).

It is important to note that Maritime New Zealand (MNZ) has issued interim safety guidelines that cover the safety requirements for boating and personnel aboard commercial cage diving boats. Further information is available at www.maritimenz.govt.nz.

Review of Code of Practice

It is intended that this Code of Practice will be reviewed in 2016. This will enable DOC to consider any feedback from stakeholders over two diving seasons. It will also enable DOC to consider information on issues such as behaviour modification (attracting sharks to boats and providing non natural food sources) and conditioning (sharks associating boats and divers with food provision), both of which are subject to research outside of New Zealand.

Definitions

Decoy: For the purposes of this Code of Practice a decoy is any object made from artificial or natural materials towed or floating behind a vessel with the intended purpose of attracting the interest of great white sharks.

Berley: In the context of great white shark cage diving, berley is finely minced fish product discharged into the water to attract great white sharks. The fish product is to be so finely minced that it is not able to be consumed by great white sharks.

Bait: In the context of great white shark cage diving and this code of practice, bait is a fish product that is of a size that could constitute food, or a food reward to great white sharks (i.e. anything that is not finely minced).

Artificial lure: In the context of great white shark cage diving, an artificial lure is an object or contraption designed to imitate something a great white shark may be attracted to.

Appendix A: Great white shark conservation

Globally there is growing concern for the status of sharks. Many shark species have a low reproductive rate which means they are vulnerable to threats or pressures, such as overfishing or habitat degradation.

- Sharks and rays belong to the class of fish called Chondrichthyes – fish with skeletons composed of cartilage, not bone.
- Worldwide there are around 450 species of shark.
- About 110 species of chondrichthyans are found in New Zealand fisheries waters, of which 73 are sharks, 25 are rays and 12 are chimaeras (ghost sharks and elephant fishes); like other types of marine life these numbers will change as scientists continue to discover or recognize new species of sharks and rays from our waters.
- New Zealand sharks are diverse – they range in size from the tiny pygmy shark which grows up to 27 cm long, to giant basking and whale sharks.
- The two largest species of shark, the basking and the whale shark, feed almost exclusively on krill (small shrimp-like animals) and small bait fishes.
- New Zealand has in place a National Plan of Action for Sharks (<http://www.fish.govt.nz/en-nz/Environmental/Sharks/default.htm>).

Protection in New Zealand

Great white sharks are found throughout New Zealand's Territorial Sea and Exclusive Economic Zone. The species is absolutely protected within New Zealand and New Zealand fisheries waters under the Wildlife Act 1953. The species is also protected from take using New Zealand fishing vessels on the High Seas under the Fisheries Act 1996. In addition to great white sharks, currently whale sharks, basking sharks, smalltooth sand tiger sharks, oceanic whitetip sharks, giant/pelagic manta rays, and spinytail devil rays are some of the absolutely protected marine species under the Wildlife Act 1953.

It is not illegal to accidentally catch a great white shark provided that wherever possible, the shark is released alive and unharmed, and most importantly the incident is reported to DOC. Anyone who accidentally catches, kills or injures a great white shark must report the incident to marine@doc.govt.nz or to the local DOC office as soon as possible. Failure to report accidental or incidental death or injury of a great white shark may attract a fine of up to \$10,000 under the Wildlife Act 1953. Deliberate taking of a great white shark may attract a fine of up to \$250,000 and 6 months imprisonment, and to a further fine of up to \$10,000 for every item of marine wildlife illegal taken.

Trade in great white shark products is illegal in New Zealand. International trade in great white shark products outside New Zealand is regulated under the Convention on International Trade in Endangered Species (CITES).

Threat status

The New Zealand Threat Classification System classifies great white sharks as in “gradual decline” based on known by-catch in commercial and recreational fisheries and their life history. Great white sharks are assessed as “Vulnerable” globally by the IUCN Red List of Threatened Species.

Internationally, great white sharks are listed in Appendix II of the Convention on International Trade in Endangered Species of Fauna and Flora (CITES), in order to identify and minimize harmful trade practices. The species is also listed on Appendices I and II of the Convention on Migratory Species (CMS) to facilitate the development of conservation and management agreements between range States (i.e. States within the natural range of great white sharks).

Biology

Great white sharks are apex predators and as a consequence are much less abundant than other large sharks. The species' life cycle characteristics, such as late maturity, low fecundity, low natural mortality, and longevity, mean it has a particularly low rate of potential population growth. As a result, they are prone to depletion and are slow to recover from over fishing. Great white shark tendency to aggregate at particular sites increases their vulnerability to directed fisheries.

Great white sharks occur throughout New Zealand fisheries waters but are most commonly encountered around seal colonies in central and southern New Zealand. Research on their movements of New Zealand great white sharks suggests that they are most abundant from late summer to early winter. Most great white sharks tagged in New Zealand waters have undertaken long distance migrations to subtropical and tropical parts of the southwest Pacific, departing New Zealand over an extended period between February and September. The destinations of great white sharks migrating from New Zealand include Tonga, Fiji, Vanuatu, New Caledonia, Norfolk Island, reefs and seamounts in the Coral Sea, and northeast Australia. No movement has been observed between the Chatham Islands/Rekohu/Wharekauri and Stewart Island/Rakiura.

Research has confirmed that great white sharks found in Australia and New Zealand comprise a single genetic stock, but satellite tagging suggests that there may be separate populations in New Zealand, eastern Australia, and southern-Western Australia. Satellite tagging has shown that sharks from aggregation sites at the Chatham Islands and Stewart Island spend much of their time in oceanic habitats (e.g. islands, ridges, seamounts and over ocean basins) in the High Seas and the EEZ's of other SW Pacific countries.

Further information on shark conservation and the great white shark is available through the Department of Conservation website: www.doc.govt.nz.

Table 1: Estimated life history parameters of the great white shark

Age at maturity	female 18-21 years	male 9-10 years
Size at maturity	female 450-520 cm	male 350-410 cm
Longevity	unknown, likely to be > 36 years	
Maximum size	640-700 cm	
Size at birth	109-165 cm	
Gestation time	unknown, probably around 11 months	
Reproductive periodicity	unknown, probably 2-3 years	
Litter size	2-10	
Intrinsic annual rate of population increase	0.04-0.056	
Natural mortality	0.125	

The Wildlife Act 1953

The Wildlife Act 1953 relates to the protection and management of wildlife, and is administered by DOC. All marine species listed on Schedule 7A of the Act are absolutely protected in New Zealand and New Zealand fisheries waters. Visit: www.legislation.govt.nz

Appendix B: Cage diving risks to great white sharks and mitigation requirements

Due to the protected status of great white sharks under the Wildlife Act 1953, cage dive operators must conduct their activities in a manner which does not harm great white sharks. DOC has in this section identified and described risks to the sharks from activities that may be associated with a cage dive operation. Cage dive operators must abide by these mitigation points.

DOC expertise on great white sharks has been applied to categorise the risk as high, medium, or low. This description is based on DOC's view on the likelihood of a risk eventuating without mitigation, and the severity of that risk to the individual shark. With mitigation, the risk will lower. Impacts from the risks are described due to the varying numbers of factors that may influence the level of impacts.

Queries on the Code of Practice should be directed to marine@doc.govt.nz.

All incidents of shark entanglement, injury, ingesting material other than natural baits, or becoming trapped, or partially trapped, inside the dive cage, should be reported as soon as possible to DOC (marine@doc.govt.nz or the local DOC office).

Source of risk	Description of risk to great white shark	Risk level	Mitigation
Equipment			
1. Cage design and operation	Sharks may be injured when contacting the cage and/or associated equipment.	Medium - High	<ul style="list-style-type: none"> • Cages must be designed and constructed without sharp edges or protruding parts. • Welding points must be made smooth. • Sharp corners or edges must be covered with protective strips or caps.
	Sharks may be killed or seriously injured if they become trapped in a cage.	Medium - High	<ul style="list-style-type: none"> • Viewing window height must be no greater than 400 mm. A gap of 300 mm is recommended by DOC to ensure smaller sharks cannot enter the cage. • Ensure all diver entry points are covered by doors and

			<p>that these are closed while the cage is in the water.</p> <ul style="list-style-type: none"> • There must be a rail around the top of the cage and at least 300 mm freeboard when fully loaded to reduce the risk of a shark getting trapped when the cage is at the surface. • Baits must not be allowed to drift or be pulled inside or in front of the cage, as per section 5 of this table. • If filming is undertaken from an open door, a safety diver must be present to close the door if required.
Sharks may be killed or seriously injured if they become entangled in ropes or other gear.	Medium - High		<ul style="list-style-type: none"> • Cages must be securely attached to the boat by an arm, ramp or chain or wire ropes. • Ropes and hoses must not be allowed to trail from the boat or cage. • Excess slack in lines securing the cage to the vessel must be avoided. • Cages must have sufficient integral floatation so that they can be cut free and recovered later should this be necessary to release an entangled shark.
Use of attractants			
2. Use of attractants			<ul style="list-style-type: none"> • It is illegal to use any protected species, or part of a protected species, as bait or berley to attract sharks. • Mammalian based products must not be used as berley or bait. • Only legally obtained fish products may be used to attract sharks.
3. Berley or chum	Obstruction of alimentary canal	Medium	<ul style="list-style-type: none"> • Berley must be dispensed from the vessel using a

	resulting from ingestion of berley containers.		<p>ladle or pump, or from a robust container fixed to the inside of the vessel.</p> <ul style="list-style-type: none"> • Sacks filled with berley or bait must not be hung from the side of the vessel, or from a float or any other device, to attract sharks.
	Behavioural modification or conditioning.	High	<ul style="list-style-type: none"> • Berley must be minced finely enough to ensure it does not provide food for sharks attracted to the vessel.
4. Decoys or artificial lures	<p>Obstruction of alimentary canal resulting from ingestion of the decoy /lure, or parts of it. Sharks may be killed or seriously injured if they become entangled in attachment ropes.</p> <p>DOC has considerable concern over the use of decoys or lures. Information indicates these are constructed principally from man-made material. The impact of ingestion or entanglement is likely to be serious.</p>	High	<ul style="list-style-type: none"> • Artificial lures or decoys must not be used to attract or film sharks. Instead, use berley, as described above.
5. Throw baits	Behavioural modification or conditioning.	High	<ul style="list-style-type: none"> • The use of bait must only occur once the vessel is anchored. • The sharks must not be fed, or allowed to take throw bait. • Only one throw bait to be used at a time. with a maximum of three baits used by an operator in a day • Baits must not be left in the water unattended, or left

		<p>hanging from the side of the vessel.</p> <ul style="list-style-type: none"> • The crew member manipulating the bait must wear sunglasses with polarizing lenses so that they can see sharks approaching the bait. • The use of bait must be minimised once a shark or sharks have been attracted to the boat. • In the event that a great white shark takes or consumes any part of a throw bait for whatever reason, no further throw baits are to be used at all on that day.
Injury caused by collision with the cage; injury or death resulting from a shark becoming trapped in a cage.	High	<ul style="list-style-type: none"> • Baits must not be pulled or allowed to drift inside or in front of the cage. • Baits must not be recovered in a manner that is likely to cause a shark to collide with the cage. • Throw bait lines must not pass over or through the cage. • Baits must not be deployed from within or on top of the cage, nor attached to cages. • For further explanation and clarity regarding the above points, see Figure 1 for areas in relation to the boat and cage where it is safe to deploy and recover bait.
Obstruction of alimentary canal resulting from ingestion of ropes attached to throw baits.	Low-Medium	<ul style="list-style-type: none"> • Baits must be attached to ropes in a way that minimizes the chances of a shark ingesting rope should it bite the bait. • Throw bait lines must be securely attached to the

			<p>vessel.</p> <ul style="list-style-type: none"> • Light lines and/or traces must not be used as throw bait lines, or as part of a throw bait line. • Throw bait lines must have a leader of at least 600 mm made of hemp or other natural biodegradable fibre, between the bait and the rest of the line, with only 1 small float at the join.
6. Anthropogenic (man-made) sounds, chemical or electrical attractants	Unknown.	High	<ul style="list-style-type: none"> • As the potential effects of these attractants on sharks and other protected species are either unknown or potentially harmful only natural berley and baits may be used to attract sharks.

Operational procedures

7. Boat strike	Death or serious injury should a boat strike a shark	High	<ul style="list-style-type: none"> • Reduce speed when entering or exiting an area in which sharks may have congregated. • Maintain observation at rear and front of boat when departing an area following cage diving.
8. Fishing	Ingestion of fishing tackle (sinkers, hooks, trace and mainline material); hook and trace injuries	Medium	<ul style="list-style-type: none"> • Fishing must not take place during or immediately following cage diving operations. For more information about fishing and great white sharks, see the Fisheries Act 1996. Visit: www.legislation.govt.nz
9. Littering, discharge of rubbish and waste	Obstruction of alimentary canal resulting from ingestion of indigestible materials; entanglement and necklacing; poisoning.	Medium	<ul style="list-style-type: none"> • Ensure that all rubbish is retained aboard and disposed of at an appropriate onshore facility. • Ensure that packing straps, waste loops of rope, netting, etc. cannot entangle and/or necklace wildlife should they be lost overboard. • Do not throw, pour or discharge any type of liquid or

			<p>solid waste or pollutant into the ocean.</p> <ul style="list-style-type: none"> • Fish scraps and old bait must not be discharged to the sea within the permitted cage diving zone.
10. Approaching sharks outside of cage diving activities e.g. during a feeding congregation	Disturbance to natural behaviour, interruption of life history processes.	Low	<ul style="list-style-type: none"> • Approach slowly, 5 knots or less, until close enough to determine what is happening. • Do not interfere with natural behaviour or attempt to remove natural prey from the shark. • Observe from a discrete distance and keep disturbance to a minimum.
11. Diver interactions with sharks	Any interaction between a diver and great white shark can pose serious risk to diver and to the shark.	Low	<ul style="list-style-type: none"> • Divers must not attempt to touch the sharks at any time. • Divers must remain completely inside the cage at all times. • Dive supervisors must terminate the dive any time that they consider diver conduct constitutes harassment or is potentially harmful to the shark/s. • Dive supervisors must terminate the dive if any great white shark shows signs of becoming distressed or alarmed.

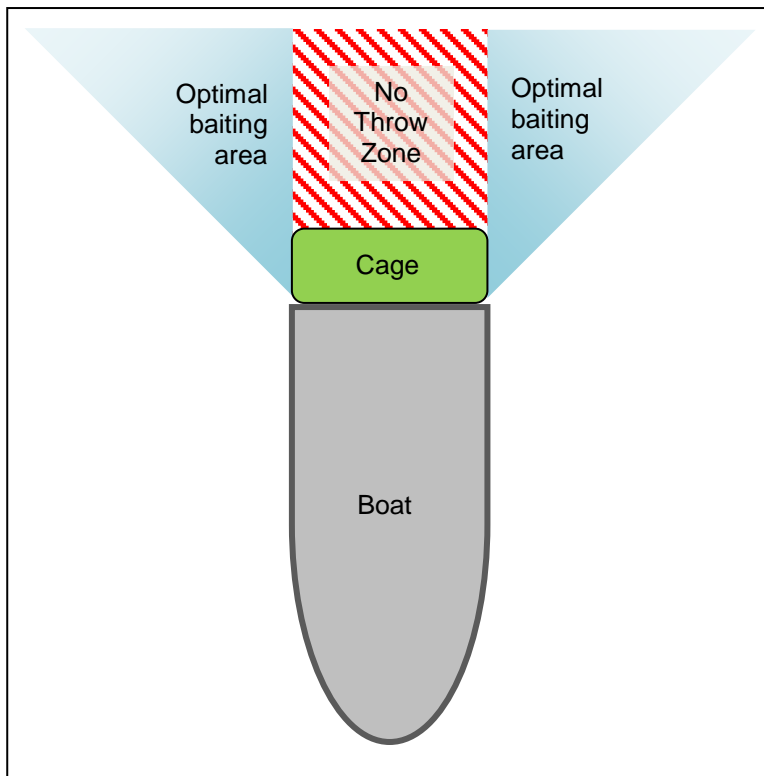


Figure 1: Areas shaded in blue indicate the zones where throw-bait can be deployed and retrieved, in order to prevent sharks coming into contact with the cage due to poor throw-bait handling. Throw bait must not be deployed, allowed to drift into, or be retrieved from the area shaded in red.

Conditioning

Classical conditioning is the repeated presentation of a neutral stimulus (in this case the cage diving boat/shark cage containing a diver) combined with a biologically important stimulus (food) which elicits a response (attempted feeding). After repeated presentation, the response is then elicited with the presentation of the neutral stimulus, even in the absence of the biologically important stimulus. In the context of shark cage diving, conditioning can only occur when great white sharks are provided with significant and predictable food rewards. It is not fully understood what impact conditioning can have on great white sharks. By mincing berley as finely as possible, dispensing the berley via ladle or pump, minimising the amount of throw bait used, using only one throw bait at a time, and not intentionally feeding the sharks (all mentioned above), it is likely that the risk of conditioning of great white sharks will be minimised.

The risk to other water users in the vicinity of great white shark cage diving through conditioning of the sharks has not been demonstrated. Johnson & Kock (2006) conclude that due to the visual and olfactory dissimilarity between other water users (i.e. swimmers, surfers, scuba divers and kayakers) and the shark cage diving set up (the neutral stimulus), it is highly improbable that there would be an increased risk to other water users, even if sharks do become 'conditioned'.

Interaction with other species

Interaction with seabirds

All seabirds, except black backed gulls, are protected under the Wildlife Act 1953. Cage dive operators should ensure their operation is conducted so to avoid injury to the birds through entanglement, ingestion of foreign objects, disturbance, behaviour modification and conditioning. Visit: www.legislation.govt.nz

Interaction with marine mammals

All marine mammals are protected under the Marine Mammals Protection Act 1978. It is recommended that the operator become familiar with their obligations under the Marine Mammals Protection Act 1978, and the Marine Mammal Protection Regulations 1992, in order to prevent entanglement of marine mammals, boat strike, behaviour modification, or disturbance to marine mammals. Any intention to view marine mammals as part of the commercial trip experience requires a marine mammal tourism viewing permit. Visit: www.legislation.govt.nz

Appendix C: Research and reporting

DOC is interested in working alongside all parties to better understand and improve the conservation management of great white sharks (as well as all other protected species).

DOC is aware there are concerns that cage diving may lead to behavioural changes in great white sharks, and potentially conditioning. DOC has reviewed available information (e.g. Bradford & Robbins 2013; Johnson & Kock 2006; Laroche et. al. 2007), considers the issue requires further examination, and will be consulting with relevant experts, including those undertaking research overseas.

In order to better understand great white sharks and the cage diving industry, permittees are required to undertake a daily trip log. These records should be submitted to DOC at least once during each month of operation:

- through the web application (<https://sharkcagediving.doc.govt.nz>); or
- via email to marine@doc.govt.nz. A daily record sheet is outlined in this Code.

DOC requests access to copies of any photos or film taken of great white sharks to assist ongoing research. Copyrights will be acknowledged and adhered to in all instances.

All incidents of shark entanglement, injury, ingesting material other than natural baits, or becoming trapped, or partially trapped, inside the dive cage, should be reported as soon as possible to DOC (marine@doc.govt.nz or the local DOC office).

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GREAT WHITE SHARK CAGE DIVING TRIP LOG – to be completed for each cage diving trip, and supplied to the Department of Conservation at marine@doc.govt.nz at least once per month of operation

Date	
Vessel	
Skipper	

Number of passengers	
NZ	International

Data	LOCATION DETAILS		
	Anchor 1	Anchor 2	Anchor 3
Location name			
GPS (Latitude)			
GPS (Longitude)			
Time of arrival at location			
Time departed location			
Start time (berleying)			
Stop time (berleying)			
Time of sighting first shark			
Maximum number of sharks observed around boat at one time			
Type of throw bait used			
Number of throw baits taken by sharks			
Total weight of bait taken by sharks			
Non-bait items ingested by sharks			
Water temperature			
How is old berley/bait disposed of?			

SHARK SIGHTING DETAILS			
Ref. no.	Size (m)	Sex	Site
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			

New Zealand Government