

SHARK HAZARD REPORT

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1 INTRODUCTION

This Report has been prepared following a request from the Premier that the Department of Local Government and Regional Development "...coordinate beach safety issues relating to shark incidents and facilitate the development of policies and procedures in consultation with other stakeholders". The Premier also asked the Department to consider whether the Western Australia Police Service and the Department of Fisheries require the establishment of effective shark attack response protocols.

The need for this Report follows the recent fatal shark attack in November 2000 at Cottesloe Beach. To enable an appropriate response to be made to the Premier, the Department initiated the bringing together of all government agencies and other organisations with an interest in management issues relating to sharks. As a result, a Committee was set up on which were represented officers from the Department of Fisheries (WA); the Department of Conservation and Land Management (CALM); Ministry for Planning and Infrastructure (Marine Safety); WA Police Service; Department of the Premier and Cabinet; and the Department of Sport and Recreation. At the first meeting of the Committee it was decided to also invite Surf Life Saving WA; the Rottnest Island Board; the Town of Cottesloe and City of Stirling to join the Committee. The two local governments were invited as representatives of the local government industry to provide their perspective on the threat of shark attacks through their experience and extensive involvement with the control and management of activities on beaches.

This report gives an outline of the hazard sharks pose to public safety in estuarine and marine waters in the Perth metropolitan area and how the risk to human safety can be minimised. The report identifies which sharks pose a risk to human safety; outlines the risk of shark attack; addresses issues associated with shark attacks and identifies possible options on how to reduce the risk to public safety and respond in the event of an attack. The options identified within the report are listed in Part 5.

2 BACKGROUND

This Part presents the background information about the habitat of sharks, the risk of shark attacks and describes the commercial shark fishery in Western Australia.

2.1 Sharks

It has been reported that there are over 370 species of sharks worldwide and more than 160 species are found in Australian waters, with new species still being discovered. It is believed though, that most sharks are entirely harmless to humans, preferring a diet of fish and invertebrates. Given that they are at the top of the marine food chain they are considered to play an essential role in maintaining the health of that environment (WA Sharks, Shark Fisheries and Safety Tips).

While all sharks are capable of biting and should be left alone, of the more than 160 species of Australian sharks, only three are considered to pose a significant risk to human safety. These include the great white (also known as the white pointer or white shark), the tiger shark and the bull shark (also known locally as the Swan River whaler). Other species that pose some risk include species of whaler shark (family Carcharhinidae), wobbegong (family Orectolobidae) and hammerhead (family Sphyrnidae), which are known to have bitten people.

Of the three sharks considered to pose the most risk, the great white is the largest, and the largest predatory shark in the world, growing up to 6 metres in length. The diet of young great whites consists almost entirely of fish while adult sharks have a generally broader diet comprising of large fish, other sharks and rays, seals, dolphins and have occasionally been observed scavenging whales. The great white shark is a widespread but scarce species which occurs in most temperate waters of the world. Its concentration in Australian waters is highest on the south coast even though it is not common. Its range up the west coast appears to generally extend as far as Perth but it has been recorded as far north as Shark Bay.

The tiger shark is also large (to 6m), and the largest member of the whaler shark family with a worldwide tropical and sub-tropical distribution. It is the most common species of large shark in the northern half of Western Australia and, during the periods of warmer water, its range extends as far south as Perth, or sometimes further. It has an omnivorous diet consisting of fish, turtles, snakes, seabirds, crustaceans, cephalopods and marine mammals. It is reported to have been implicated in one fatal attack in Western Australia in recent years.

The bull shark is a medium-to-large whaler shark (to 2.25m) that is common worldwide throughout the tropics and sub-tropics and is known to occur far into fresh water systems. It appears to be relatively rare in Western Australia except in river and estuarine systems in the Kimberley. It is known locally as the Swan River whaler and it is suggested that this aggressive species of shark is probably responsible for more attacks on humans than have been accredited to it due to the confusion with other species of whaler sharks.

The importance of sharks in the marine ecosystem has led to some concern about their possible over-exploitation. An increase in the number of sharks caught in southern Western Australia in the 1980's prompted the Department of Fisheries to begin assessment of the main species caught south of Shark Bay. These early assessments indicated concerns for some of these species. Further, more detailed research has since been carried out and concern over the status of some commercially targeted shark species has led to significant reductions in the fishing effort in the shark fishery over the past few years. A committee set up to advise the Western Australian Minister for Fisheries has recommended that the aim in the Southern and West Coast fisheries is to rebuild and then maintain targeted stock levels at 40 percent of the original.

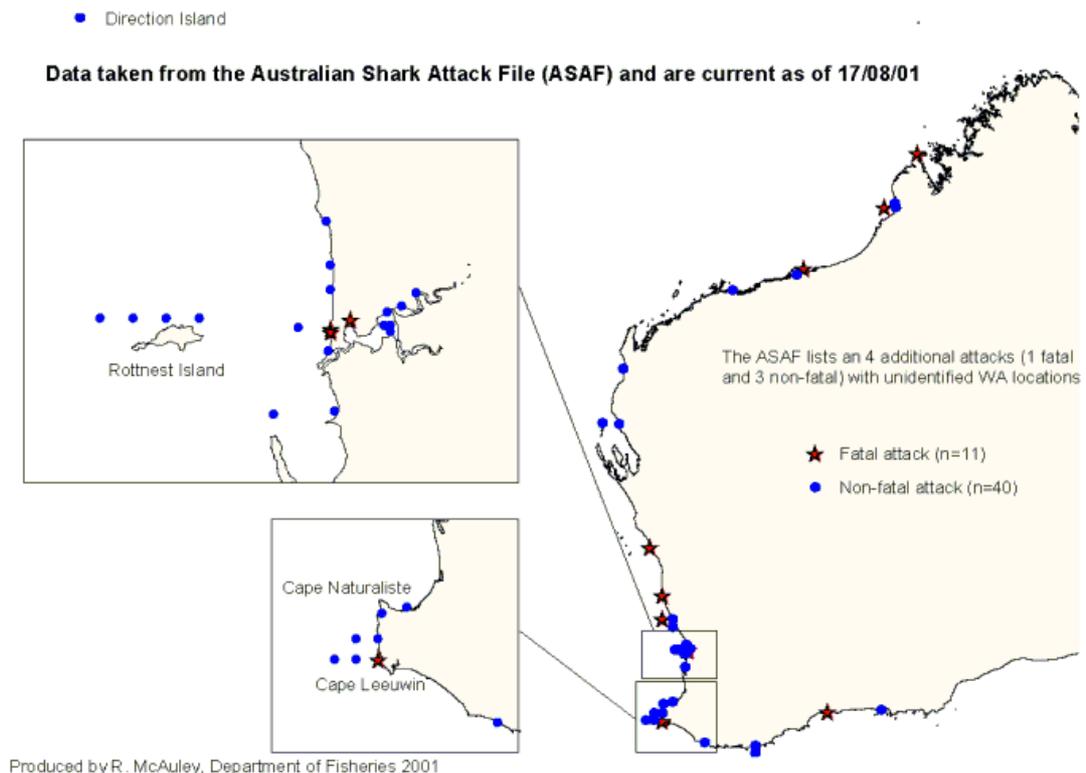
Three shark species are now protected in Western Australian waters. The grey nurse shark, a relatively harmless but easily over-fished coastal species, and the whale shark have been protected throughout Australian waters. The great white

shark has also been protected, largely because of its scarcity and its biological characteristics, which make it very vulnerable to population depletion. Further, anecdotal evidence has indicated a decline in their numbers over the last 20 years. The Commonwealth and State Governments have therefore protected the great white in almost all of Australian waters.

2.2 Risk of Shark Attack

It has been asserted that the risk of shark attack is extremely low. On average, there is less than one fatal shark attack in Australian waters per year while 77 people died from drowning in the surf in the period from July 2000 to June 2001. Worldwide, more people die each year from bee stings and lightning strikes than are killed by sharks. The Natal Sharks Board in South Africa has reported that in the last 20 years only nine people have lost their lives to shark attack on the South African coast, whereas in 1996 alone, some 85 persons drowned at sea.

In Western Australia there have been 51 recorded shark attacks since 1803 of which 11 were fatal (see Appendix 1). Of the fatalities, only three, one of which was in the Swan River, have occurred in the metropolitan area. That is, one fatality in every 66 years since recording commenced. Of the non-fatal attacks, 5 have occurred along the metropolitan beaches (ie 1 in approximately every 40 years), 6 in the Swan River and 6 out to sea as far as Rottnest Island. The frequency of attacks (both fatal and non-fatal) along the metropolitan beaches is one in approximately every 28 years. In contrast, 20 people drowned in the surf in Western Australia in the period from July 2000 to June 2001.



2.3 Commercial Shark Fishery

The Department of Fisheries has advised that sharks have been caught commercially in southern Western Australia since the 1940s. The industry began as a long-line fishery that gradually expanded and by the late 1960s had reached 400 tonnes per annum. In the 1970s gillnets were introduced into the fishery. These nets are designed to sit on the seabed to a height of approximately two metres and may be as long as seven kilometres. While initially those in the fishery mostly operated part-time, by the 1980s some had moved to full-time using larger dedicated boats with radar and colour sounders leading to greater effectiveness with the catch reaching 1100 tonne per annum. The fishery continued to grow and reached a peak in 1987. Then in the following year, a management plan was introduced for the fishery south of Mandurah. A management plan followed in 1997 for the fishery between Mandurah and Shark Bay.

The Department of Fisheries asserts that the shark fishery is mostly fully exploited and in some cases it is over exploited. The annual catch is now around 1300 tonnes with the catch trend declining.

The main species caught in the fishery south of Shark Bay are dusky whaler, gummy and whiskery sharks. Other species commonly caught include thickskin (sandbar), school, spurdog, Australian blacktip, hammerhead, spinner and wobbegong. The three sharks that pose the greatest risk to swimmers (great white, tiger and bull) are not included although two out of the three which pose a lesser threat (hammerhead and wobbegong) are. Given its relative scarcity, it is perhaps not surprising that the great white does not appear in the list of commonly caught species. Nor is it surprising with the tiger shark given that it has a tropical and sub-tropical distribution, although in warmer water months its range extends to Perth. The absence of the bull shark from this list can perhaps be explained by its apparent rarity in and around Perth and, except for its presence in river and estuarine systems in the Kimberley, its relative rarity in other areas in Western Australia.

3 MAIN ISSUES

This Part considers the matter of shark hazards in terms of three main issues including prevention, response mechanisms and education.

3.1 Prevention

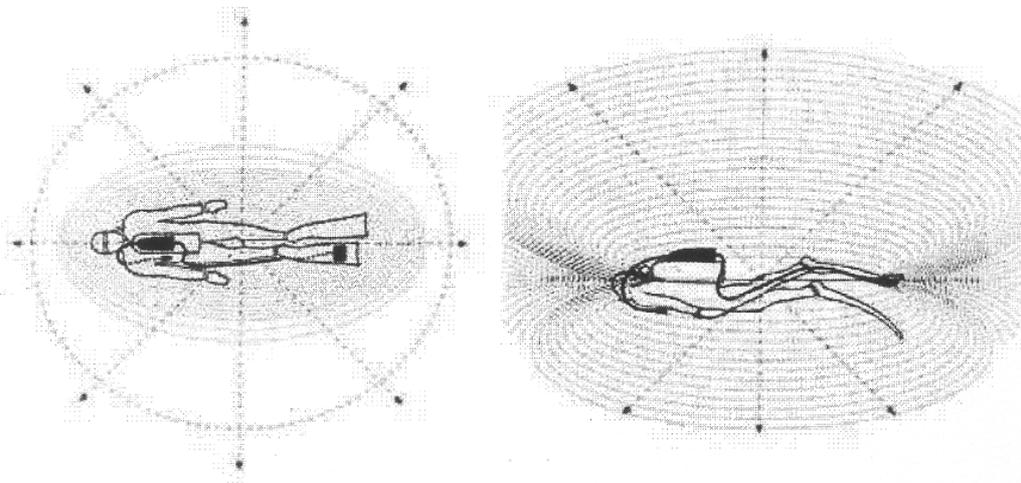
In considering the issue of prevention the Committee considered electronic shark repellent technology, nets, aerial and marine surveillance, beach patrols and the removal of carcasses.

3.1.1 Electronic shark repellent technology

Electronic shark repellent technology was developed by the Natal Sharks Board as an alternative way of protecting people from shark attack. This

technology uses electrical fields to repel sharks which have specialised organs that can sense the minute electrical fields generated by all marine animals and thereby assist in the detection of prey. This sensitivity to electrical fields is believed to be the key to the repellent effects of this technology.

The Natal Sharks Board initially built a unit, known as a SharkPOD (Protective Oceanic Device), for use by divers. The unit has been on the market for approximately five years and consists of three components linked by cables. The main body of the unit, which includes an electrode, is strapped to the back of the diver while the other electrode is attached to one of the diver's fins and the switch brought over the shoulder to make it easily accessible. When switched on, the two electrodes create an electrical field around the diver which is designed to repel sharks approaching from any direction. The manufacturers claim that the electrical field does not cause any undue discomfort to humans (although WA abalone divers generally refuse to use them due to the discomfort they cause in dental fillings and from electric shocks transmitted through metal equipment contacting the device). The Committee is unaware of any published research into the effects of these devices on electronic medical devices such as heart pacemakers although a video supplied by one of the promoters of this technology did refer to the possibility of these devices being interfered with. It appears that the effectiveness of the device varies from one species to another, even to the extent that some sharks show little reaction to the electrical field. Of the three potentially most dangerous sharks to humans, the promoters claim that tests against the great white have *been extensive and the results convincing* while those against the tiger and bull sharks have been *limited* but the *results have been good*. Other tests have shown that once a shark has commenced feeding the desire to keep eating overrides any discomfort suffered as a result of the electrical field (Taylor 2001).



Simulated electrical field created by the SharkPOD Diver Unit

SeaChange Technology Pty Ltd in South Australia has acquired a licence from the South African joint venture company that produces the SharkPOD to design and produce variations of this product. At present, this company is

developing a “personal” product unit which will be one tenth the weight, one fifth the size and cheaper than the South African version. The company is also planning to include devices for protecting aquaculture and beaches in its range of products. SeaChange has conducted field trials in the aquaculture industry using multi arrayed units and has reported that, apart from installation problems in one trial, the units *proved completely effective in deterring sharks*. It appears no field trials have yet been undertaken in respect to protecting beaches although the company has shown some interest in applying this technology for this purpose in Western Australia.

It would be desirable for the effectiveness of the electronic repellent technology for protecting beaches to be trialed in New South Wales and Queensland where nets and drumlines are currently used. Given the cost of these existing preventative measures and the problem they have with the netting of non-targeted species, it would have been thought that these areas would have been ideal locations for conducting field trials.

While it appears that electronic devices are effective at deterring some types of sharks at a personal level, the usefulness of the technology on a larger scale requires further testing. If its level of deterrence, environmental worth and cost effectiveness could be determined then there may be an argument for using the technology. However, as it is leading edge technology and still developing, further investigation is necessary before any decision could be made to have it installed at beaches. In this regard, it is noted that research and development assistance may be available through the Western Australian Innovation Support Scheme or through the Federal Government Department of Industry Science and Resources. Both provide assistance by way of grants while the latter also provides concessional loans and 125% research and development tax concessions.

Option 1

That the Department of Fisheries (WA) monitor the development of electronic repellent technology and advise the State Government when its effectiveness has been determined.

Option 2

That relevant local governments and the Department of Fisheries (WA) consider opportunities to assist the developers of electronic repellent technology if requests for assistance are made.

3.1.2 Nets/barriers

3.1.2.1 Barriers

In Western Australia only a few barriers have been placed in the ocean to protect bathers from sharks. Perhaps the first such device was that which was to be constructed at Cottesloe Beach in the 1930s. It was to consist of a net strung from a concrete pylon at the southern end, across three

wooden dolphins to another concrete pylon (the remains of one can still be seen) and back across two timber piles to the beach at the northern end. However, the southern concrete pylon was irreparably damaged and the three wooden dolphins were washed up on the beach during a storm. Schemes to repair the damage and complete the project were continually deferred and the plan was never completed.

Another barrier was built in Dampier by Hamersley Iron in the late sixties/early seventies. It was built entirely of steel and consisted of posts and horizontal rails extending from one rocky headland to another. It was designed so that at least part of it always remained exposed in high tides. Apparently due to changing public expectations and the high cost of maintenance the barrier has now been demolished. A similar structure had been built in Durban in South Africa in 1907 but it was demolished in 1928 when damage caused by the ocean made maintenance prohibitive.



A swimming enclosure in the late 1950s

In the late 1950s local authorities south of Durban built other structures made with poles, wire and netting which enclosed the bathing areas. However, these too succumbed to heavy seas and were soon abandoned. Nevertheless, a contract was awarded to the Natal Sharks Board to install small-mesh barrier nets, which are suitable in calm conditions only, around a number of Hong Kong beaches. (Gribble et al, 1996).

In Western Australia, a barrier was constructed between groynes in still water at the Hillary's Boat Harbour but, unlike the other two, this one was designed as an enclosure for marine animals and not for the safety of swimmers.

In addition, a number of "baths" were built out over the Swan River in the early 1900s which, while allowing the free flow of water, were enclosed for the protection of swimmers. These structures were built out of timber and would have been costly to maintain. The last of these ceased operating as "baths" in the early 1960s and the only structure that remains is that of the old Nedlands Baths.

3.1.2.2 Nets

Contrary to popular belief, nets are not fixed and they do not fully enclose an area. As such, they do not act as barriers but as a means of catching

sharks and reducing the number. Such nets are large-mesh gill nets which do not discriminate between types of animal caught. The effect of this catch of unintended species is collectively known as the “by-catch”. While this effect can be reduced to some extent by altering the size of the mesh, it can not be eliminated. This has consequences related both to the environment and to the effectiveness of the nets in reducing the danger of people being attacked by sharks. In regard to this latter aspect, the nets can entangle prey thereby possibly attracting the very predators that the nets are designed to minimise. In addition, the nets are expensive to deploy and maintain.

Nets are used in New South Wales and Queensland in Australia, and in KwaZulu-Natal in South Africa as a means of reducing the number of large sharks in a particular area and thereby lessening the probability of an encounter between a shark and a bather. The programs are administered by the New South Wales Fisheries, the Queensland Department of Primary Industries and the Natal Sharks Board, respectively. It appears that these programs have been successful in reducing the number of shark attacks.

Systematic netting commenced in Sydney in New South Wales in 1937 and spread to Newcastle and Wollongong in 1949 and to the Central coast beaches in 1987. By 1992, 49 bathing areas were protected by netting. Nets are 150m long and 6m deep, have a black mesh of 50-60cm and are bottom-set parallel to the coast in about 10m of water around 500m from the shore. Nets are not permanently in the water at each beach (average of only 9 days in the water per month) and are removed completely from the water from May to August inclusive.

At Newcastle’s beaches that are now netted, there were 11 attacks (four fatal) between 1918 and 1949 prior to netting being installed. Since the introduction of nets in 1949 there have been only two attacks. At Sydney’s beaches 18 attacks (10 fatal) occurred between 1897 and 1936. Since nets were installed in 1937 there have only been two attacks. In Wollongong there have been no attacks before or since the installation of nets.

Based on 1995 figures, around 190 sharks annually are caught in nets in New South Wales operating under an annual budget of US\$0.3m.

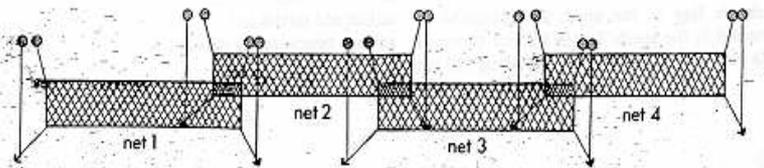
In Queensland, the program began in 1962 with the use of nets and, where conditions were unsuitable for nets, baited drumlines. In November 1994, 74 bathing areas between Cairns and the Gold Coast were protected by means of 36 nets and 296 drumlines. The nets currently installed are 189m long by 3-5.6m deep with a white mesh of 50cm and are set raised off the bottom in 3.5-15m of water about 200m from the surfline. They are required to be inspected 20 days out of a 28-day cycle, weather permitting. Nets are removed from the water in June and July from Mackay to Bundaberg while netting occurs throughout the year south of Rainbow Beach. No nets are set for sharks in Cairns or Townsville during the cyclone season although they are set for box jellyfish.

There were 42 attacks (27 fatal) on the Queensland coast between 1919 and 1961. Since 1962 there have been a further 39 attacks (9 fatal) but it is believed none of these occurred at beaches inshore of shark control devices. At Townsville there were 11 attacks (9 fatal) between 1919 and 1962, but none since nets were introduced in 1962. However, the pre-netting attack rates may have been affected by abattoir discharge (Townsville) and whaling (near North Coast and Gold Coast).

Based on 1995 figures, around 990 sharks annually are caught in nets and by drumlines in Queensland operating under an annual budget of US\$0.8m.

In KwaZulu-Natal, netting commenced in Durban in 1952 (following the success of the New South Wales program) and by 1994 there was a total of 41 km of netting at some 64 bathing areas between Richards Bay and Mzamba. The nets are 213.5m long by 6.3m deep and have a black mesh of 51cm and are set parallel to the coast in 10-14m of water 300-500m from shore. The nets used at Durban, Anstey's Beach and Brighton Beach are yellow and are 304.8m in length. The nets are set in two parallel rows approximately 20m apart and staggered, with an overlap of some 20m. They are set at the surface but tend to sink as they become fouled. Each net is replaced with a clean one approximately every 10 days. Netting is maintained in the water throughout the year, except for a period during the winter influx of pilchard.

*Plan of a shark-net installation. The nets are set in two rows parallel to the shore so that the nets in the second row overlap the nets in the first row by about 20 m at each end. The nets are suspended vertically in the sea from buoys and secured at both ends by an anchor.



Despite some difficulties in measuring the effectiveness of netting in KwaZulu-Natal it appears that the program can be shown to have been effective in reducing the number of shark attacks. One study has considered only fatal attacks or attacks which have caused serious injury (ie loss of limb or muscle bulk; Dudley, 1997). Using these criteria this study found that there were 7 fatal attacks in the pre-netting period at Durban, and 16 fatal attacks and 11 resulting in serious injury at other beaches. After nets were installed in 1952 at Durban there were no further incidents of this nature, and after they were installed elsewhere in the 1960s there were no fatal attacks and only 3 resulting in serious injury. It is pointed out that the cessation of fatal/serious attacks at Durban after nets were installed took place despite the continuation of whale processing in the area until 1975.

Based on 1995 figures, around 1410 sharks annually are caught in nets in KwaZulu-Natal operating under an annual budget of US\$3.2m.

Although the above data appears compelling, even where qualified, the use of nets is not free of problems. One of these concerns the environmental effect, which was referred to above but is well worth reiterating here. There appears to be considerable concern, and controversy, in the community about the netting of unintended species. This by-catch includes harmless sharks, dolphins, sea turtles, guitarfish, rays, whales, dugong and other relatively harmless marine animals. While some argue that the by-catch is relatively small and environmentally sustainable others dispute this and posture that any catch containing non-target species is unacceptable. Several species of endangered, vulnerable and otherwise protected fauna are susceptible to capture in 'protective' nets, including species of whales, dolphins, seals, sea lions, turtles, sea birds and fish. These species are defined as facing a very high risk of extinction in the wild in the near to medium-term future. Drumlins were introduced in Queensland both as a substitute for nets where conditions were not suitable and, as a means of being more target specific, although they do not completely eliminate the capture of protected species. Another problem with nets is the danger they pose to people and there have been reports of entanglement where they have come adrift. For this reason policies have apparently been implemented which restricts their use to patrolled beaches. Perhaps the most significant problem with nets is the ongoing capital and operational costs. In this respect it is worth reiterating that in Wollongong there have been no attacks before or since the installation of nets. Nevertheless, even given the high cost there could be arguments about an abrogation of duty of care if they were to be removed. Consideration of accepting the ongoing high costs involved in implementing netting is also affected by the irony that a significant portion of the shark catch occurs not on the outside of the nets but on the inside. It should be reiterated that a commercial shark fishery operates throughout most of Western Australia, including in metropolitan waters, which has already reduced the numbers of sharks that would otherwise be expected.

Option 3

Nets appear to provide some protection to bathers and could be considered for installation at certain metropolitan beaches with the costs of installation and maintenance shared between the relevant local government and the State Government following negotiations over the extent of netting considered appropriate.

Option 4

That because of the potential for nets to catch and kill marine animals other than sharks, because animals caught in the nets could attract sharks and, because of their high ongoing capital and operational costs, nets should not be installed.

3.1.3 Aerial surveillance

The effectiveness of aerial surveillance in spotting sharks depends on a number of factors including having appropriate aircraft, clear water, contrasting seabed and the type of shark. Advice suggests that it is difficult to spot sharks from the air when the water conditions are turbulent or where rocky substrate and/or seagrass provide an unsuitable background or lack of contrast. Turbulent or murky conditions are related to tides and wind and are commonly associated with onshore weather patterns. These sorts of conditions are common around midday when the sea breeze comes in.

Another factor which affects the effectiveness of aerial surveillance in spotting sharks relates to the type of shark involved. Given that all large predatory sharks are well camouflaged against the bottom when viewed from above, except where viewed against a contrasting background (uncommon off metropolitan beaches), aerial surveillance is unlikely to spot a shark except under very favourable conditions. The effectiveness of aerial surveillance will therefore not only depend on the clarity of the water but also the water depth, surface conditions and the substrate against which the shark is moving.

A third factor concerns the amount of time an aerial patrol spends over any particular part of the coast at any specific time. On each sweep an observer would only have a twenty to thirty second window of opportunity in which to spot a shark in any one particular area. Based on the aerial surveillance conducted in 2000/01, this would effectively provide only a two to three minute period per three hour sortie during which any one location could be observed.

The fourth factor relating to the effectiveness of aerial surveillance concerns the type of aircraft used. It appears that rotary winged aircraft are by far the most appropriate given that they can hover and manoeuvre both vertically and horizontally while providing a relatively unobstructed platform from which to observe. Fixed wing aircraft on the other hand do not have the same manoeuvrability or provide the same degree of observability, although this latter aspect will vary according to the type of aircraft. Further, for fixed wing aircraft, the lapsed time between the spotting of a shark and the plane returning to the location of the sighting can mean the difference between staying with a shark, as would be possible with a rotary winged aircraft, and losing sight of it. However, the costs of using rotary winged aircraft are significantly higher than fixed wing aircraft.

Given the above factors there are some reservations about the effectiveness of using aerial surveillance for spotting sharks. It can also be debated that the money involved in mounting such an exercise would be better applied in providing other services (eg surveillance from observation towers). On the other hand, aerial patrols are useful for

detecting carcasses of marine animals which can attract sharks, they can assist in the direction of operations (emergency or otherwise) and act as a means of reassuring the public. However, it is considered important that the public not be given any false expectations about what aerial surveillance can deliver.

Last year the State Government provided a grant to Edith Cowan University's aviation school to provide aerial patrols through the 2000/01 summer school holiday period. The aviation school operated two three-hour sorties from six in the morning until noon seven days a week and each plane carried a surf lifesaver as an observer who was in full communication with Surf Life Saving WA and other appropriate organisations. Sorties would fly Jandakot, Rottnest, Burns Beach, Mandurah, Burns Beach, Mandurah, Rottnest and back to Jandakot with each alternate sortie following the reversal of this order. The effect of this was that, when the conditions were right, the aerial patrol would pass, on average, along the metropolitan coast once every hour. Once sea conditions restricted visibility then flights would be transferred to another section of the metropolitan coast or discontinued altogether for the day. During the entire period of patrol flight operation, only 2 or 3 confirmed shark sightings were recorded.

There are a number of examples in other States where aerial surveillance is carried out. In New South Wales aerial surveillance is provided by the Australian Aerial Patrol which covers the area between Batemans Bay on the south coast to Broken Bay on the north coast. The area is divided into two sectors both commencing from Wollongong. Two dedicated planes patrol on weekends and public holidays, each flying 2.5 hour sorties in the morning and in the afternoon. Each sortie involves between two and four circuits of each sector. In Queensland on the Gold Coast, surveillance is carried out using helicopters at between \$700 and \$1000 per hour. This service is considered expensive and does not allow for continuous observation. As a consequence, serious consideration is being given to other forms of surveillance. In South Australia, a helicopter was used for surveillance from January to the end of March following two deaths from shark attacks. The cost of the aircraft was high at approximately \$950 per hour and consideration of other forms of surveillance is now occurring. It is understood that in South Australia there are plans for putting a rotary winged helicopter on patrol during the forthcoming summer.

If aerial surveillance is to be used in the Perth Metropolitan area then there are five options from which to choose. These include a Surf Life Saving WA/Sport Aircraft Builders Club arrangement; an arrangement with the Australian Aerial Patrol (see Appendix 2); a continuation of the 2000/01 service financed by the State Government; a possible arrangement with the State Government giving access to a helicopter used by the Police Service's Air Support Unit; a scheme which encourages pilots to report sightings of sharks; and a possible arrangement with commercial surveillance companies. These arrangements are as follows.

Surf Life Saving WA has a tentative arrangement with the Serpentine based Sport Aircraft Builders Club to supply pilots and aircraft for aerial surveillance. The Club has a range of aircraft types which, however, may not all be suitable.

- The Club would provide pilots and aircraft for the aerial surf patrol.
- Surf Life Saving WA would support the service with air observers and radio communication. This would be directly linked to beach services.
- Weekend pilots would operate on a volunteer basis while pilots working midweek would operate on a commercial basis.
- This service would operate approximately 6 hours per day between October and March, 7 days per week. Regular aerial surveillance would occur during peak swimming times, and focus on the most popular swimming beaches along the metropolitan coastline, between Yanchep and Mandurah.
- It is anticipated that this program would cost \$150,000 annually to meet direct costs associated with fuel, aircraft maintenance, and pilot salary. In addition, insurance requirements for volunteers need to be provided, as air observation falls outside the activities of SLSWA's current public liability and personal accident schedules.
- This plan appears to depend on support being obtained from the State Government for fuel and maintenance.

Another alternative would be to establish some type of agreement with Australian Aerial Patrol (see Appendix 2), Wollongong, New South Wales, to commence surveillance along the Perth metropolitan coast. The Australian Aerial Patrol:

- is a registered charitable, non profit organisation that relies on local government funding, sponsorship and community support;
- four local governments currently contribute \$10,000 each;
- neither State nor Federal governments contribute towards operational costs;
- has an operating annual budget exceeding \$500,000;
- has been operating for almost 45 years;
- operates 24 hours per day, 7 days per week all year round; and
- used for beach safety patrols (including shark surveillance); safety watch over recreational boating and fishing; bush fire support; searching for bush walkers and adventurers; air transport of emergency personnel; and fisheries surveillance.

Another possibility would be to reinstate an arrangement that was put in place last year where the State Government provided a grant of up to \$100,000 to Edith Cowan University's aviation school. Aircraft were hired by the University, flown by volunteer pilots, equipped with siren and linked by radio to the Water Police and Surf Life Saving WA patrols. The purpose of the grant was to provide patrols through the 2000/01 summer school holiday period. It operated from six in the morning until noon seven days a week and each plane carried a surf lifesaver as an observer who was in full communication with Surf Life Saving WA and other appropriate organisations.

Another prospect would be for some arrangement to be made with the Police Service WA Air Support Unit. At present the Police Service WA Air Support Unit has use of a light helicopter which costs \$600 per hour to operate. It is used on average 1.5 hours per 24-hour period. Currently, the Helicopter Task Force is considering the feasibility of acquiring the use of another, twin engine, helicopter that would have a range of 200km and cost \$1500 per hour to operate. While the use of a twin engine helicopter for surveillance may not be able to be justified, its acquisition would have the effect of freeing up the single engine version for other uses such as monitoring metropolitan marine and estuarine waters for sharks. At a minimum, consideration could be given to using the helicopter(s) for this type of surveillance concurrently when these helicopters are involved in undertaking their primary role.

Also a scheme could be implemented to encourage pilots flying with aero clubs or who have a private pilot licence to report any sightings of sharks. This could operate in much the same way that drivers are encouraged to report accidents or traffic congestion. Incentives could be offered for this type of community service.

There is also the possibility of other arrangements with commercial companies who can supply aerial surveillance services.

Option 5

That Surf Life Saving WA, in conjunction with the Sport Aircraft Builders Club provide aerial surveillance for metropolitan beaches at appropriate times when people are most at risk from shark attack.

Option 6

That the Australian Aerial Patrol, based in Wollongong, New South Wales, be approached to extend its services to metropolitan Perth.

Option 7

That aerial patrols provided by Edith Cowan University's Aviation School be continued.

Option 8

That the Police Service's Air Support Unit be used for ad hoc surveillance.

Option 9

That the Department of Fisheries (WA) contact all aircraft clubs operating in Western Australia seeking the support of their members to keep watch for sharks when flying over coastal waters and report sightings.

Option 10

That aerial patrols not be used because of their high costs and doubts about their effectiveness when waters are murky, when sharks are swimming near the bottom and because of the limitations associated with flight paths.

3.1.4 Marine surveillance

At present the Department of Conservation and Land Management, the Department of Fisheries, the Ministry for Planning and Infrastructure and the Police Service all have vessels which operate from a homeport at Fremantle.

The presence of vessels along the metropolitan coastline during the peak swimming season between October and January would complement the existing beach patrols and any aerial surveillance that is conducted. The presence of these vessels would help alleviate public safety concerns along metropolitan beaches in the event of a sighting of a shark.

The Premier has sought the support of the relevant State Government Ministers with responsibility for sea going vessels to cooperate in ensuring daily marine patrol coverage of metropolitan beaches from Fremantle to Mindarie between November and January. This period coincides with peak swimming/holiday periods. It is anticipated that the Marine Operations Council, chaired by the Department of Fisheries and including representation from all relevant State agencies, will finalise a marine patrol roster for this period.

Option 11

That the Marine Operations Council finalise a coordinated marine surveillance roster along the metropolitan coastline between Fremantle and Mindarie.

3.1.5 Beach Patrols (volunteer lifesavers and professional lifeguards)

Perth metropolitan beaches are patrolled by well-trained and competent lifesavers and lifeguards whose main objective is to ensure the safety of individuals in the water. They play a critical and fundamental role in closely monitoring and controlling activities that are related to beach safety and are seen as central to Australia's beach culture. Being at, or close to, the scene they will in most cases offer the first line of assistance in an emergency situation and be the best placed to coordinate a response involving other agencies and organisations.

Surf Life Saving WA is the principal controlling organisation in respect to the above activities and, as such, supervises all of the surf clubs which provide volunteer services on weekends and public holidays. Surf Life Saving WA also manages the lifeguard contracts for five of the six local governments who employ

lifeguards to patrol their beaches on weekdays. While these patrols take place in the busier times of the summer and usually on the most popular beaches, the Town of Cambridge and City of Stirling also employ full time Beach Inspectors who patrol their coastal beaches 365 days a year.

All surf life saving clubs have access to the Surf Life Saving WA Beach Services Coordinator who is available to lend assistance in emergency situations. The Coordinator also supervises all mid-week lifeguards employed by Surf Life Saving WA and is available to lend assistance in emergency situations. The Beach Services Co-ordinator's main role is to liaise with media, police and other agencies involved in a particular situation.

Both life saving clubs and lifeguards have access to the following resources:

- Fully equipped first aid room.
- 3.8m Inflatable rescue boat equipped with 25hp outboard motor (lifeguards may only have limited access to this equipment).
- Beach access for suitably equipped and authorised vehicles.
- Radio communications centre, licensed as a 'Limited Coastal Station' with access to phone, fax and communications with other marine emergency agencies.
- Change rooms, showers, telephone, fax and computers.

In most cases local government rangers will be authorised to enforce local laws on the beach, and where the appropriate approval has been obtained, out over the water. While it varies from one local government to another, lifesavers, lifeguards and other suitable persons may also be authorised to enforce this type of legislation.

Surf Life Saving WA will support weekend volunteer beach patrols from 29th September 2001 to 1st April 2002. The days of operation are Saturday, Sunday and public holidays between the hours of 9am to 5pm. Times may vary slightly from beach to beach depending on weather and time of the season. The beaches that are covered by the 14 metropolitan clubs are:

- Pyramids Beach, Mandurah.
- Secret Harbour Beach, Secret Harbour.
- Port Beach, Fremantle to Mullaloo Point, Mullaloo.
- Mindarie Beach, Mindarie.
- Yanchep Lagoon, Yanchep.

Each club operates their patrol in the most popular, central, area and performs roving/mobile patrols to areas at the borders of their beach. Each club must position one qualified lifesaver in an elevated position so that the water can be viewed for dangers and swimmers in distress. All metropolitan clubs have access to the radio communications centre and regularly transmit and receive information during their patrols. Lifesavers are trained and qualified in resuscitation, first aid, rescue techniques, radio communications, rescue scenarios and beach management skills. All mid-week lifeguards employed by Surf Life Saving WA are required to hold that organisation's highest award, the Gold Medallion.

Mid-week lifeguards cover the following beaches:

- Secret Harbour Beach, Secret Harbour (City of Rockingham);
- Cottesloe Beach, Cottesloe (Town of Cottesloe);
- City Beach & Floreat Beach, City Beach; (Town of Cambridge);
- Scarborough Beach, Scarborough; Trigg Beach, Trigg (City of Stirling);
- Sorrento Beach, Sorrento; Hillarys Beach Harbour, Hillarys; Mullaloo Beach, Mullaloo (City of Joondalup);
- Mindarie Beach, Mindarie; Yanchep Lagoon, Yanchep (City of Wanneroo).

As part of their duties, volunteer lifesavers and professional lifeguards have always, as indicated above, monitored the water for signs of people in difficulty or for indications of danger such as sharks. While they observe from the beach they also provide a continuous watch from an elevated position such as a tower which provides a highly effective and low cost means of detecting any dangerous or emergency situations. It is in this way that lifesavers and lifeguards have sought to protect beach goers from the threat of sharks which venture into swimming areas. Both lifesavers and lifeguards have dealt with such situations in a highly effective way. Given that this system has worked well, it is worth considering how it could be enhanced and extended. For example, there appear to be sound reasons for extending the hours during which beaches are patrolled to take account of those factors which are more likely to lead to a shark attack eg change of light in the morning and evening. Also, further consideration could be given to the quantity, location and design of observation towers. These considerations could apply to all metropolitan beaches or to a select number.

Surf Life Saving WA has been considering how it could improve its services and is currently investigating the practicalities and feasibility of establishing an emergency response team. The emergency response proposal being considered by Surf Life Saving WA would consist of an elite, highly skilled and motivated team of lifesavers who would operate 24 hours, 7 days a week. The team would act as a stand-by call out service that would be deployed to the following type of situations:

- Emergency situations as requested by Water Police or other emergency services.
- Beaches that were experiencing larger than normal rescues.
- Special operations in which the team may lend assistance.
- Weekend coastal patrols.
- Other situations that may require an extra presence of lifesavers on the beach or to a specific area.

This team would have access to the equipment at all surf lifesaving clubs plus specialised equipment. It would be led by an Emergency Service Officer and coordinated by the Beach Services Coordinator. The team would operate in conjunction with weekend lifesavers or mid-week lifeguards, if deployed during their operating times.

The above proposal appears to have potential as a practical means of responding to a shark threat, especially where this has occurred outside normal patrol times, outside patrol areas or where extra resources are required. It could also provide an important interface between the Police Service, the Department of Fisheries, emergency response organisations, and other relevant agencies.

Option 12

That Surf Life Saving WA's proposal to establish an emergency response team to support lifesavers and lifeguards and which would provide a vehicle for a rapid response to a shark threat is commended.

Option 13

That Surf Life Saving WA and metropolitan coastal local governments examine the number and effectiveness of surveillance towers now in use on metropolitan beaches and take action to improve surveillance posts where necessary.

Option 14

That Surf Life Saving WA and metropolitan coastal local governments implement extended hours during which beach patrols operate to coincide with those periods when people are most at risk from shark attack.

3.1.6 Removal of carcasses

It is recognised that dead whales and other types of carcasses attract sharks and should be removed as quickly as possible. The problem, however, is determining whose responsibility it is to remove them. It appears that various jurisdictions would have an interest depending on the situation. For example, it is the responsibility of the Ministry for Planning and Infrastructure (Marine Safety) to put out navigation warnings if a carcass was a boating or shipping hazard but it would not necessarily remove the carcass. Conversely, if a carcass was in a marine park such as the Marmion or Shoalwater Islands marine parks then the Department of Conservation and Land Management would take responsibility. However, if a carcass became stranded inside a local government area then it would be the responsibility of the local government. In such a situation, a local government would have little choice other than to remove the carcass if it became a health hazard. However, the cost of disposal could be quite significant and outside a local government's budget. The ultimate expenditure would depend on a number of factors including the size of the carcass (eg Humpback whale weighs 40-50 tonnes), its location and method of disposal. Disposal of a carcass could include being processed into meat meal, buried (although this could cause environmental problems) or being left stranded on a beach away from the public.

It is not clear however, whose responsibility a carcass would be if it were found floating just outside a local government area, where it was outside a marine park and where it was not considered to be a danger to boating or shipping. These sorts of jurisdictional dilemmas could possibly place the public at risk given that

the carcass would remain and provide a lure to sharks. Assuming the burial of a marine mammal carcass, it is unknown at what rate decomposition products will leach into the surrounding ocean and to what extent they will act as an attractant to sharks. However, given what we know about sharks' olfactory sensitivity, it is likely that only small concentrations of effluent would be necessary to attract sharks.

Because of the large non-budgeted costs and jurisdictional problems associated with removing carcasses it has been suggested that a contingency fund be set up to cover the costs incurred by any State Government agency or local government which disposes of the carcass of a large whale. Alternatively, an individual agency could be made responsible for disposal of all large whale carcasses and receive funding for this task from the contingency fund. With a contingency fund in place any disincentive to act should be removed enabling a rapid response to remove a carcass.

Option 15

That the State Government establish a contingency fund within the Department of Treasury and Finance which would be used to cover the costs of a State Government agency or a local government which finds a large whale carcass and disposes of it.

3.2 Response Mechanisms

In considering the issue of response mechanisms this Part looked at emergency response, local laws and medical equipment.

3.2.1 Emergency response

A shark threat does not appear to fit neatly into the various categories of hazards considered by the State Emergency Management Committee (see Appendix 3). However, this Committee's policy statements relating to emergency management planning and arrangements do provide a guide to the setting up of an emergency protocol (see Appendix 4 & 5). For example, Policy Statement No. 7 entitled Emergency Management Arrangements defines an emergency as:

“an event, actual or imminent, which endangers or threatens to endanger life, property or the environment, and which is beyond the resources of a single organisation or which requires the coordination of a number of significant emergency management activities.”

This definition clearly includes a situation where people are threatened by a shark as a consequence of which the responses of more than one agency or organisation may need to be coordinated. Further, Policy Statement No. 3 entitled Emergency Management Planning Policy suggests that an effective management plan should be based on, among other things, the utilisation of existing community resources and organisations and should involve only minimal organisational change. That is, *wherever possible, emergency management responsibilities should be allocated to single existing organisations and only under exceptional*

circumstances should organisations be combined to carry out a specific responsibility. This would appear to be an important tenet that should be kept in mind when considering an emergency response protocol to deal with a shark threat. That is, rather than a complex set of rearrangements, the protocol should be a simple and practical set of arrangements based on existing organisational structures and involvement. The State Emergency Management Committee's policy on Emergency Management Arrangements also provides a hazard management structure that includes a list of responsibilities that should be dealt with. While this list may include responsibilities which may be irrelevant and others which may not be handled by a controller dealing with a shark threat it does provide a checklist of those things that could be considered when designing an emergency response protocol.

Having outlined some underlying policy issues, it is necessary to consider the current system that is in place to deal with a shark hazard, or threat, along the Perth metropolitan beaches and foreshores. As described above (see 3.1.4 Beach patrols (volunteer lifesavers and professional lifeguards)), volunteer surf lifesavers, operating under the auspices of Surf Life Saving WA, would normally provide patrols on weekends and public holidays while lifeguards employed by local governments would patrol on weekdays. Surf Life Saving WA advises that its members provide services in accordance with nationally accredited standards in all areas of operation. Further, this service is guided by policies and procedures that are complemented by training carried out, and equipment provided, in accordance with Australian Standards.

In respect to shark incidents, both lifesavers and lifeguards in Western Australia follow a protocol provided by Unit 10 (shark alarms) and Unit 13 (closing of beaches) in the Surf Life Saving WA manual. The protocol relating to shark alarms refers to the displaying of a red and white quartered flag and the sounding of a bell or siren until everyone is out of the water. When the alarm is over the protocol states that the flag should be removed and a brief sounding of the bell or siren made.

While there is little specific guidance relating to sharks in the Surf Life Saving WA manual it does contain general instructions which can be applied to multiple situations and which would apply equally to a shark incident eg signs and signals, first aid. However, it appears there are no instructions about coordinating with other beaches (ie warning that a shark is in the vicinity) or in advising Police, Surf Life Saving WA, Department of Fisheries or the relevant local government. While it is noted that the primary role of Surf Life Saving WA is to ensure beach users are removed from the water when there is a shark sighting and to provide basic first aid it may be of benefit to consider formalising what other action should, or should not, be taken. For example, should there be instructions relating to whether the shark sighted should be located? Further, should these instructions specify what action should be taken once the shark is found (ie should it be followed, chased or should the Department of Fisheries be notified etc). Another matter that could be considered is the wider publicity issues (ie when to warn people through media announcements? what information should be provided?). At the moment it appears that lifesavers and lifeguards may, in these

situations, follow unwritten rules or rely on their training, knowledge and good judgement which has, to date, equipped them well to handle such threats.

One coastal local government in the metropolitan area has reported that it has about 20 shark sightings and sounds between 15 and 20 warnings on its beaches per year. While the warnings are given in accordance with the above protocol it also considers enlisting the support of the media to assist in informing swimmers that a shark alarm has been sounded and that they should not enter the water until the all clear has been given. The local government obtains its authority to get people out of the water from a local law which provides that no "...person shall bathe at any place or in the vicinity thereof after a shark alarm has been given and before the all clear signal has been given".

Surf Life Saving Queensland (SLSQ) has a specific policy (see Appendix 6) which provides a guide to shark related incidents. This policy is in addition to the instructions provided in the Surf Life Saving Australia Manual. The policy relates to all sharks although it recognises that not all sharks are dangerous and that nearly all fatal attacks are attributed to just three species: bull, tiger and white pointer. This policy provides in the event of a shark sighting that

- all swimmers be requested to leave the water;
- the beach be closed and appropriate signage posted;
- visitors to the beach be advised to remain clear of the water;
- no attempt be made to kill, capture or injure the shark; and
- as much detail as possible be recorded.

It also provides some straightforward and self-evident instructions that should be followed in addition to the above in the case of an attack. They are that the victim be brought to the beach as quickly as possible; that immediate first aid be applied; that hospital transport and pre-hospital emergency care be coordinated; and that the Department of Primary Industries be advised as soon as practicable. The policy also includes some rules to help swimmers avoid sharks. In contrast to SLSQ, Surf Life Saving New South Wales (which has shark related issues similar to Queensland) follows a process similar to that followed by Surf Life Saving WA.

It appears that the presence of sharks and the inherent dangers associated with such presence may be a far greater issue in Queensland than in Western Australia. Further, Surf Life Saving WA policies, procedures and training appear to have adequately equipped its members to deal with shark threats. However, the SLSQ protocol and the way it treats the issue may provide some indication as to how procedures could be fine tuned to deal with the matter in the Perth Metropolitan Area.

The Department of Fisheries has a Draft Shark Incident Emergency Response Plan (see Appendix 7) which was completed in February 2001. This Response Plan makes it clear that it is designed to guide the Department's own operations in an efficient and effective response to a shark sighting or attack incident and, as such, is for internal use only. The Response Plan is not an overall strategy for the management of a shark hazard but an adjunct that is designed to slot into an overarching emergency response protocol. The Response Plan points out that the Department of Fisheries does not have a direct beach patrol or public safety

function and that it would only take a controlling role where the WA Police Service or other agencies were not available. It also asserts this function is in fact the responsibility of the WA Police Service in that it has:

... the legislative mandate of ensuring public safety, which extends to shark sightings off the coast of Western Australia. This is undertaken in conjunction with Surf Life Saving WA and local government authorities. Responsive actions to sharks sighted that are perceived as an immediate or potential threat to members of the public is the responsibility of members of the WA Police Service, Surf Life Saving WA and local government authorities.

The Response Plan, under the Department of Fisheries Dangerous Shark Operational Response Protocol, divides shark threats *off the coast or offshore islands, adjacent to town centres or metropolitan beaches* into three categories “*offshore sightings*” (between 5 and 10 miles - classified as no threat); “*inshore sightings*” (between .5 and 5 miles - classified as a possible threat) and “*swimming area sightings*” (between high water mark and .5 miles (*including inland waterways such as estuaries and rivers*) - classified as an immediate threat). Both the inshore and offshore situations only cover the sighting of sharks “...larger than 3 metres by the Department of Fisheries vessels...” while the swimming area sighting category covers any sighting “...of any shark by Fisheries WA...”. In all cases the Plan provides for Fisheries officers to immediately advise the WA Police Service and Surf Life Saving WA, although in the case of an “inshore sighting” they are also to advise the Department of Conservation and Land Management.

In both “*inshore sightings*” and “*swimming area sightings*” the Department of Fisheries would attempt to drive the shark offshore with the aid of the agency’s vessels while in the other category it would just provide logistical support if requested. The Response Plan provides that in the event of a shark attacking, or attempting to attack, a person, Fisheries officers would, upon verification of the identity of the animal, immediately attempt to kill the shark.

In the past, the killing of a shark has been met with difficulties where the shark was a protected species. Such difficulties have arisen in respect to great whites, the only one of the three species which are the biggest threat to humans, as it is protected. To be able to kill a great white in the interests of public safety, it had previously been necessary for Fisheries Officers and Police Officers to obtain an exemption under the *Fish Resources Management Act 1994* from the Minister for Fisheries. This problem has now been overcome through the Minister for Fisheries issuing a Standing Order, which authorises WA Police and Department of Fisheries officers, in the event of an attack, or attempted attack, to immediately kill the shark responsible for the attack. The Response Plan also outlines the process for capturing and destroying a shark using a firearm by a WA Police Service Officer, or where this is not possible, by a Department of Fisheries officer. The exemption to kill sharks only applies in WA State waters (ie in an area up to three nautical miles off shore). There is no such exemption in Commonwealth waters.

The Department of Fisheries Response Plan also provides for alerting the agency’s Executive Director, the Minister for Fisheries; allocating

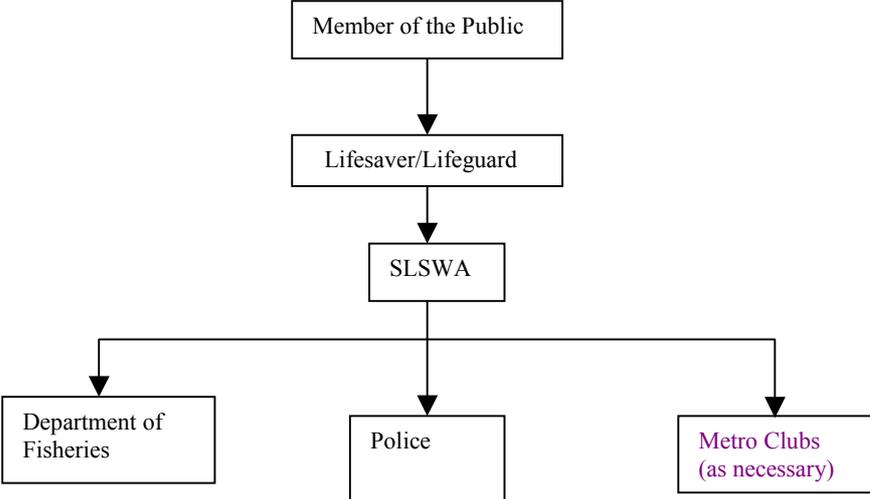
responsibilities and roles within its own organisation; the convening of the agency’s incident team; the agency’s on ground operations; and internal and external communications. The Response Plan does not provide a course of action for people other than Department of Fisheries staff to follow in the event of a shark incident. As stated above, the Response Plan has in fact asserted that this role rests with the WA Police Service operating in conjunction with Surf Life Saving WA and local governments. This assertion is logical given that in most cases the Department of Fisheries is less likely to have any of its officers at the scene of an incident at a metropolitan beach or foreshore. It is far more likely that an officer from the WA Police Service, a surf club or a local government ranger will be present at either the location or somewhere in the vicinity. Further, of these three it is most likely that someone from Surf Life Saving WA will be closest to the scene.

Given the above circumstances, it is imperative that emergency protocols or policies of the various agencies which could be involved in a shark incident have coordinated linkages between them. For example, given the responsibilities outlined above in relation to the Department of Fisheries and its acknowledgment of the responsibilities of Surf Life Saving WA, it would be logical for Surf Life Saving WA to include linkages to that agency in its protocol. This could be done indirectly through the WA Police Service or directly to the Department of Fisheries in the same way that SLSQ operates (ie that SLSQ advise the Queensland Department of Primary Industry).

In considering emergency protocols and linkages it is necessary to take into consideration the initial contact point through which a response should be coordinated. However, a number of factors will influence the approach including whether the beach is patrolled, whether the incident is an attack or an alleged sighting and the time of the year it occurs.

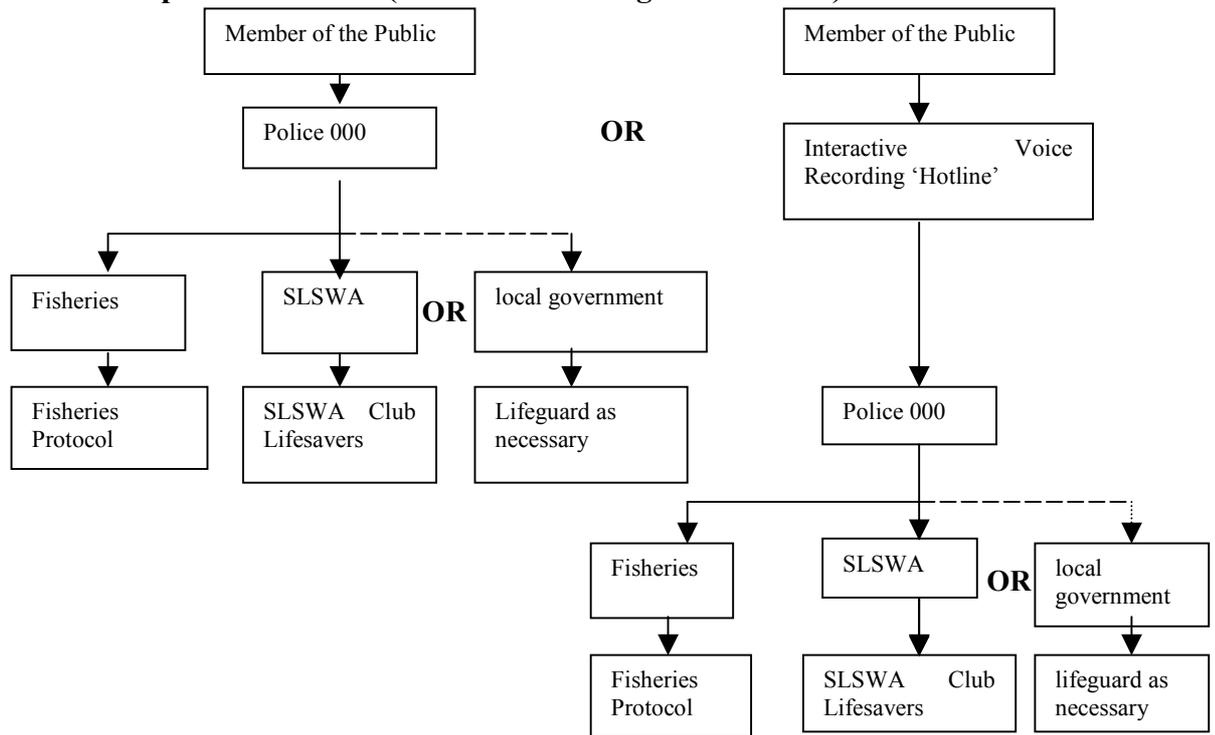
In situations where a beach or foreshore is patrolled and a shark threat occurs, lifesavers or lifeguards would be ideally placed to take control of the situation and follow the emergency protocol. This situation is represented diagrammatically in the following scenario.

**Scenario 1
Patrolled Beach (shark attack /sighting)**



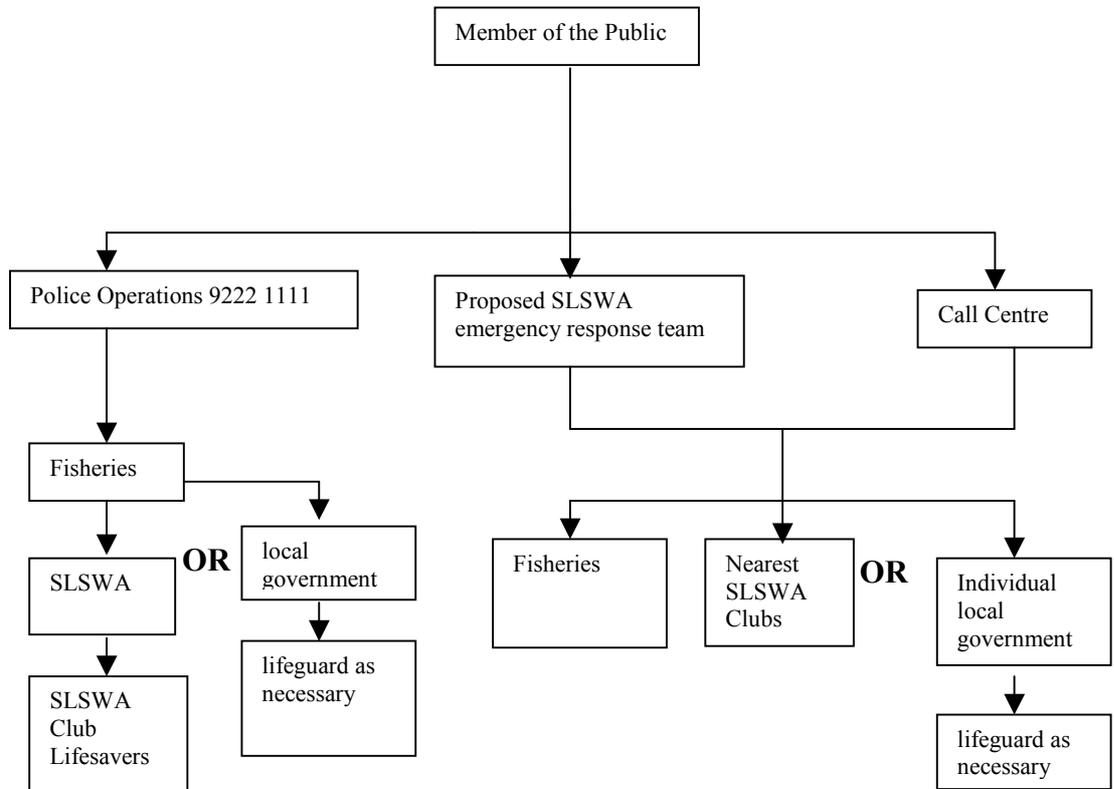
On the other hand, an incident may occur away from a patrolled beach or foreshore or at a time when patrols are not occurring. If this happens a member of the public would need to be able to call a central telephone number. If the incident involves a shark attack then it would be preferable to call the Police Service emergency number direct. However, it could also be done under a proposal being put forward by the Department of Fisheries involving a Shark Hotline initiated with an ‘interactive voice recording’. This can be demonstrated diagrammatically in the following scenario.

Scenario 2
Unpatrolled Beach (situation involving shark attack)



However, if the incident only related to a shark sighting, there are several options available. One would be for the person to call the Police Operations number 9222 1111. An alternative would be for the member of the public to contact the Emergency Response Team currently being considered by Surf Life Saving WA (see 3.1.4 Beach Patrols). A third option would be for a person to call a number handled through a call centre which could be established for reporting sharks and shark information (an example is provided in Appendix 8). This option is similar the Department of Fisheries’ Shark Hotline proposal. Under this proposal a hotline would operate during peak risk periods (4 months) and provide a contact point for the public to report shark sightings, and provide up-to-date information on sharks and beach safety. This is represented diagrammatically in the following scenario.

Scenario 3
Unpatrolled Beach (situation involving shark sighting)



If the initial contact number is used for reporting both shark attacks and sightings then the Department of Fisheries proposed voice initiated ‘Shark Hotline’ would enable a member of the public to:

1. Report a shark attack;
2. Report a shark sighting;
3. Access beach closure information; and
4. Access answers to frequently asked questions (FAQs) on sharks and beach safety.

The process through which this would work would be as follows:

1. If someone wants to report a shark attack or a shark sighting they will be put through to the water police emergency number.
2. If someone wants to inquire about whether a beach is open or closed due to a shark sighting, they will be automatically put through to the Surf Life Saving Association.
3. If a person wants answers to frequently asked questions they will be presented with a list of frequently asked questions, with answers.
4. If a person wants more information they will be directed to the Department of Fisheries web site and/or the Department of Fisheries telephone number.

The Department of Fisheries has advised that the anticipated costs of this option would be approximately \$6,000 annually (including set up and operational costs) to run over the 4 month period.

Any thought of including the reporting of shark attacks in the ‘Shark Hotline’ proposal would need to consider whether it would be the most efficient and effective method of handling an emergency, especially one with life threatening consequences. Further, the establishment of a hotline, or call centre arrangement, which operated during peak periods only, would lead to difficulties in reporting incidents in off peak periods. Should this proposal be implemented, and dependent upon its success, consideration should be given to extending the hotlines operation.

Option 16

That the Department of Fisheries Draft Shark Incident Emergency Response Plan be adopted and implemented.

Option 17

That Surf Life Saving WA make minor amendments to its emergency protocols to codify a linkage with the protocols established by the Department of Fisheries (WA).

Option 18

That the Department of Fisheries (WA), the Police Service and relevant local governments consider developing an emergency protocol to deal with reported shark incidents in the Swan, Canning, Mandurah and Harvey Estuaries and in the Peel Inlet.

Option 19

That Surf Life Saving WA review the Queensland policy in relation to sharks and consider whether elements could be adopted in Western Australia.

Option 20

That the Department of Fisheries (WA) establish a Shark Hotline for the high risk months when shark attacks may be more likely.

3.2.2 Local laws

Local governments are responsible for the care, control and management of beaches and foreshores in all but a few situations in Western Australia. They obtain most of their power to control activities on beaches and foreshores through the adoption of their own individual local laws. Each local government is free to adopt legislation that it believes is for the good government of its district. As a consequence, some local governments have local laws for the control of activities on beaches while others do not. Further, the types of local laws, like any other local laws, may vary from one local government to the next. While the Western Australian Municipal Association has developed a standard local law to deal with beach activities, it is up to individual local governments to determine whether they adopt it, and if so, whether to do so without amendment.

Local laws may not be seen by some as critical to the management and control of people in respect to a shark threat. They may even argue that anyone silly

enough to remain in the water when in danger of being attacked by a shark should be prepared to suffer the consequences. However, there are good arguments for this type of legislation for the benefit of society at large (eg driving without a seatbelt). Anyone who ignores instructions to leave the water may not only place their own life in danger but also the lives of others who may try to rescue them. They may also tie up resources that could otherwise be deployed elsewhere.

Local laws generally apply throughout a local government district or, in some cases, part of a district. In most cases district boundaries will end at either the low or high water mark. However, some local governments adjoining inland waterways have boundaries that reach out past the low water mark (eg East Fremantle – centre of the Swan River; Mandurah and Murray boundaries adjoin in the Peel Inlet and Harvey Estuary; Perth varying distance into Perth Water). While the Cities of Wanneroo, Joondalup, Cockburn and Rockingham have boundaries that extend into the sea, their districts only consist of land, including islands, which extend down to the low water mark within these areas. Where district boundaries end at the low or high water mark then so does the authority of the local government to apply a local law. In these cases, if a local government wants to control activities in or on the water then it must apply to extend its boundary in accordance with section 3.19 of the *Local Government Act 1995*. Commonly, this takes the form of extending the area of application of a particular local law so many metres (usually 200) past an existing boundary. Approximately three-quarters of the local governments along the coast in the metropolitan area have either not extended their boundaries under section 3.19 or have incorrectly assumed that the application of these local laws applies to a specified offshore area. This applied under the *Local Government Act 1960*, however, any existing local laws will now need a further Governor's approval under section 3.19. Where local governments have not sought approval under the new legislation there will be doubt as to the validity of any existing order that reportedly provides them with the power to apply local laws to activities in the water adjacent to their boundaries.

All metropolitan local governments along the coast have adopted local laws to control activities on beaches and, in most cases, on foreshores. While these local laws provide for the closing of beaches they, generally, do not specifically deal with the issue of their reopening. Such decisions are more normally handled under policy directives and in cognisance of duty of care considerations. The local laws chosen by local governments tend to be of several different types. In the following example, a local government has adopted local laws relating to restricted bathing areas, the closing of beaches "...at any time the weather conditions are sufficiently dangerous...", and to a shark alarm. While the latter provision is to some extent restrictive and inflexible it still has the effect of being able to prohibit people being in the water.

Shark Alarm.

- (1) If it is suspected that a shark be in the vicinity of a beach a Ranger or a member of a Surf Life Saving Club may cause a shark alarm to be given and may when the danger is believed not to exist cause the all clear signal to be given.
- (2) The following shall be shark alarm signals:-
 - (a) A prolonged ringing of a bell.
 - (b) A long blast of a siren or whistle.

- (c) The hoisting of a red and white quartered flag.
 - (d) From a surfboat at sea—the waving of a red and white quartered flag or the raising of oars.
- (3) The following shall be "all clear" signals:-
- (a) A series of short rings of a bell.
 - (b) A series of short blasts of a siren or whistle.
 - (c) The removal of the red and white quartered flag.
- (4) No person shall bathe at any place or in the vicinity thereof after a shark alarm has been given and before the all clear signal has been given.

The following provision provides for a Council to prohibit certain activities, including bathing, in certain localities, and also provides for an authorised person to prohibit bathing for any reason. It allows for this to be done as follows:

- 3.3.1 For the safety, decency, convenience or comfort of persons in respect of bathing and other recreational conduct, the Council may set aside specific localities wherein all or any of the following things are prohibited, or are prohibited without the prior approval of the Council in writing—
- (a) entry by persons;
 - (b) entry by animals;
 - (c) bathing;
 - (d) fishing;
 - (e) the use of any bathing appliances or any particular kind of bathing appliance;
 - (f) the entry and use of vehicles;
 - (g) the launching of vessels;
 - (h) the playing of games; and
 - (i) the selling or displaying for sale or hiring of goods and merchandise.

3.3.2 The Council may set aside a specified locality for the purpose of subsection 3.3.1 or section 3.6 for a particular period or until further notice by causing notices to that effect to be placed in the vicinity of the locality.

3.3.3 Without limiting the generality of subsection 3.3.1 an Authorized Officer or Authorized Person may set aside specific localities in which bathing is prohibited, by the placement of notices, flags or such other indicators as are from time to time provided or required by the Council.

Another metropolitan local government has a similar provision although it differs in that rather than the Council “an authorised person” may take action. This has the effect of increasing the flexibility of the local law.

- 6.7 For the safety of persons in respect of bathing and other recreational conduct, an authorised person may set aside specific areas where all or any of the following things are prohibited—
- (a) entry by persons;
 - (b) bathing;
 - (c) the use of any bathing appliances or any particular kind of bathing appliance;
 - (d) the entry and use of vehicles;
 - (e) the launching of boats and other watercraft;
 - (f) the playing of games; and
 - (g) the selling or displaying for sale or hiring of goods and merchandise.
 - (h) fishing.

In contrast, the following provision, which has been adopted by two local governments, is less flexible than the preceding provision in that it specifies that an authorised person must be a beach inspector or a member of a surf life saving club. It is also less flexible in respect to prohibiting bathing and other activities in the water, in that it specifies under what conditions the prohibition can be applied. This provision is similar to the Western Australian Municipal Association model local law.

Surf lifesaving activities

42. The local government may appoint beach inspectors and authorize members of surf lifesaving clubs to perform all or any of the following functions in the interests of maintaining safety at beaches in the district—
- (a) patrol any beach;
 - (b) take onto any beach any life saving gear including vehicles or boats that are used for life saving activities;
 - (c) indicate by signs or patrol flags, any areas of a beach and the adjacent water beyond the beach, where bathing is permitted;
 - (d) indicate by signs any areas of a beach and the adjacent water beyond the beach where—
 - (i) riding of surfboards or any other bathing appliance is prohibited;
 - (ii) driving of boats is prohibited;
 - (iii) fishing is prohibited;
 - (e) regulate, prohibit, restrict or set aside by signs, rope, wire, cloth or other flexible sheeting, any areas for the following activities—
 - (i) entry by any persons;
 - (ii) playing of games;
 - (iii) conduct of training or surf club carnivals;
 - (iv) establishing a first aid or command post;
 - (f) direct any person to—
 - (i) bathe within the designated permitted bathing area indicated by signs or patrol flags;
 - (ii) leave the water adjacent a beach during any period of potential dangerous conditions or sighting of a shark.

The Western Australian Municipal Association model local law is as follows. It provides, in a subsequent clause, that any person who is competent to perform these functions can be authorised.

Division 2—Beaches

Powers of surf life saving club members

1. Subject to subclause (2), the local government may authorise under section 9.10 of the Act the members of a surf life saving club to perform all or any of the following functions in relation to a beach—

- (a) patrol any beach;
- (b) carry out any activity on any beach;
- (c) erect signs designating bathing areas and signs regulating, prohibiting or restricting specified activities on the whole or any part of a beach or in or on the water adjacent to the beach and to direct persons on the beach or in or on the water to comply with such signs;
- (d) temporarily enclose any area with rope, hessian, wire or any other means for the conduct of surf life saving club activities; and
- (e) direct persons to leave the water adjacent to a beach during dangerous conditions or if a shark is suspected of being in the vicinity of a beach.

2. Under subclause (1), the local government shall authorise only those members who have been recommended by the surf life saving club as competent to perform the functions referred to in that subclause and in respect of which they are authorised.

3. Under subclause (1), the local government may authorise members generally, or in relation to particular times, days or months.

5.14 Authorising other persons

1. A local government may authorize, under section 9.10 of the Act, a person to perform all or any of the functions referred to in clause 5.13(1) in relation to a beach.

While all of the above local laws and the model provide for bathers to be required to leave the water, in some way they all have individual differences which affect the way they are put into operation. The standardisation of these types of requirements may therefore have some benefits when considered from both an individual local government and regional perspective. For example, the portability of expertise obtained in respect to these types of requirements in one local government area would be easily transferable to another. Further, there

may be some argument for considering the drafting of these types of requirements in a way that would allow them to be applied simultaneously for a particular shark hazard in one or more local government districts. Additionally, it may be of considerable benefit to the public in its understanding of these requirements.

Option 21

That the Department of Local Government and Regional Development encourage all metropolitan local governments whose boundaries end at the high or low water mark to obtain approval from the Governor under section 3.6 of the *Local Government Act 1995* to enable them to apply a local law controlling activities over water.

Option 22

That the Department of Local Government and Regional Development encourage all metropolitan local governments with beach and/or foreshore areas in their districts to adopt the Western Australian Municipal Association's model local law provisions relating to the control of activities in these areas.

3.2.3 Medical equipment

It is clear that every precaution should be taken to avoid shark attacks through all practicable means available. However, in the event that an attack does occur, one of the most critical responses must be to provide immediate medical assistance. While the severity of injuries suffered in an attack will vary, in the more traumatic cases victims will lose large quantities of blood leading to a life-threatening situation known as hypovolemic shock. It is imperative therefore that victims be given immediate first aid to stem the loss of blood and maintain the person's life. The availability of, and access to, appropriate first aid or medical kits is therefore something which needs to be given consideration.

In Western Australia, Surf Life Saving WA has made it mandatory for all surf life saving clubs to have as part of their patrol equipment a portable first aid kit. The supply of this equipment and training in its use is provided in accordance with Australian Standards as provided by Surf Life Saving Australia. Where these clubs have first aid rooms then they are also required to have it stocked with particular items (see Appendix 9). While these requirements provide for well supplied first aid kits and first aid rooms it appears that the contents would be of limited use in the case of major trauma. That is, it appears that the contents are to provide for the treatment of basic medical problems such as cuts, breaks, sprains, minor bites, stings, sunburn and other types of similar complaints. These sorts of supplies are standard issue and relate to the training and level of first aid that lifesavers are expected to provide.

Surf lifesavers in Queensland carry comprehensive equipment and supplies including a first aid kit for a patrol area, a mobile beach patrol kit and an emergency first aid kit (see Appendix 10). The latter is specifically designed to

be used where major trauma has occurred (eg large loss of blood). At one stage the stocking of such kits was compulsory and even though that decision is now made on an optional basis most clubs apparently continue to carry them. These kits are an advanced form of first aid kit and contain items such as intravenous solutions, IV fluid administration sets, cannulae, needles and syringes, compression bandages, and tourniquets. The kits are designed for use by doctors or trained paramedics. However, the stocking of these first aid kits involves additional costs associated with their purchase and ongoing maintenance.

St John Ambulance has examined the above emergency first aid kit and suggested that large universal dressings, together with large crepe bandages, would be absolutely vital to apply pressure on large wounds. The ambulance service also advised that the intravenous cannulae are too small and should be replaced with a larger size to allow for the rapid and life saving administration of fluid. Lastly, the ambulance service emphasised the overwhelming need to control bleeding as soon as possible. Such treatment may even have to be applied in the water and may include direct pressure right into the wound to control a rapid loss of blood from an artery. Once the bleeding is controlled, the situation is to some extent stabilised. It has suggested therefore, that instructions include the advice to “control bleeding – *as soon as possible*, even if this means putting pressure right inside a wound.”

While this report is concerned with incidents which occur in the metropolitan area where there is generally relatively quick access to hospitals, delays measured in minutes are critical. With ambulances taking possibly around 10 minutes to arrive and perhaps evacuation taking just as long, there may be a case for equipping all metropolitan beaches with the emergency first aid kits referred to above. While certain equipment and procedures can only be administered by doctors and trained paramedics it is thought that, at a particular time, there may be any one of these professionals nearby who can offer assistance. Their assistance should not be hampered simply because of an absence of equipment and supplies.

Option 23

That Surf Life Saving WA consider providing all its clubs with emergency first aid kits designed to deal with major trauma situations.

Option 24

That Surf Life Saving WA and local governments review the content of the first aid training courses provided to their members and rangers and provide specific training to address major traumas as considered necessary.

3.3 Education

The importance of a campaign to educate swimmers and bathers about the risk of a shark incident occurring is recognised as an important, if not the most important, issue in relation to sharks. An education campaign should emphasise factual information relating to sharks, the risk of attack and its avoidance, contact numbers and emergency action. The medium through which this message could be conveyed includes the print and electronic media, posters, brochures, videos, displays, presentations or talks, telephone help line and electronic service delivery (ie internet).

The type of factual information about sharks that might be contained in an education campaign might include details about their numbers, type, degree of risk posed by type, preferred food source (see 2.1 Sharks), and senses sharks use to analyse the environment and detect prey. Information provided to the public should also attempt to put the risk of a shark attack into perspective (see 2.2 Risk of Shark Attack) to reassure the public of the unlikelihood of such incidents occurring. It should also point out that the risk can be further reduced if certain precautions are taken.

The Department of Conservation and Land Management in its Policy Statement No 24 Conservation and Management of Crocodiles states that it will:

maintain a high level of public awareness of crocodile conservation values, distribution, habits and dangers and educate people concerning safe behaviour in crocodile habitat.

It also states that this will be achieved through an *active* and *ongoing* program directed at both residents and tourists using a range of techniques and avenues which may include some of the following:

- literature (eg. posters, brochures and drink coasters), videos (eg. Northern Territory Conservation Commission documentary "Living with Crocodiles") and slide kits;
- media releases, feature articles, advertisements and announcements, directed towards Kimberley and State-wide media (newspapers, newsletters, tourism publications, radio and television), at appropriate intervals and particularly at the onset of the Saltwater Crocodile breeding season and the Kimberley tourism season;
- warning signs at sites frequented by people within Saltwater Crocodile habitat (eg. boat ramps, river crossings, camping grounds) and sale of warning sign replicas as souvenirs;
- literature and signs at appropriate outlets (eg. CALM offices, National Park Ranger stations, Shire and Police offices, crocodile farms and parks, tourist centres and information bays, roadhouses,

tour operators, hotels and motels, fishing charters, air charters, airports and air ticket sales outlets);

- talks to school, service club, community and tour groups;
- displays at town and agricultural shows.

Most of the techniques used in the above program would be relevant in any strategy aimed at reducing the risk associated with sharks. However, there are distinct differences between the habitat of a shark (water) and that of a crocodile (land and water) which has implications for any education program aimed at reducing risk. For example, crocodiles are known to be territorial and move, bask and nest on land. As a consequence, there are sound reasons for displaying warning signs at sites frequented by people. Sharks, on the other hand, are confined to a marine environment and travel large distances and may be anywhere at any one time thereby presenting less compelling reasons why warning signs should be erected.

3.3.1 Media

The electronic and print media has a high level of interest in sharks, an interest which is related not so much to the risk of a shark attack but to the public's perception of the shark as a feared "killer". This interest is illustrated by recent high profile reports of a great white shark seen swimming off the Perth Metropolitan coast and the coverage of the three separate shark attacks that caused the loss of as many lives in Australia in 2000. In comparison, each of the approximately 70 lives that were lost by drowning in the surf during the same period in Australia appear to have passed with barely a mention.

The high level of interest in sharks shown by the print and electronic media has the potential for significant positive spin-offs. For example, this interest could allow for factual information relating to sharks to be conveyed to the public. Such information could be communicated as a rider to a main news story, such as that involving the sighting of a shark or a shark attack. This would be cost effective, efficient, and provide a ready opportunity to impart knowledge to a "captured" audience.

The media interest in sharks also provides an opportunity for regular community announcements to be made in the public interest. For example, the media could provide advice on how best to try and avoid sharks, what sort of action to take in an emergency and who to contact. Community announcements are an important part of some programs and there would be little reason why this service could not be utilised in this way. Such a service could be compared to that relating to snakes. Every year in spring items appear in the media warning people to watch out for snakes which become active as the climate begins to warm.

Given the above it would be important that key agencies and organisations follow standardised formats when dealing with the media. These formats would vary according to whether the matter related to a sighting of a shark or shark attack. In respect to a shark sighting it would be vital that information of a factual nature is provided (ie as outlined above: biology of sharks, risk of attack and its avoidance, contact numbers and emergency action). It may also include advice on what action has been taken by the State Government, agencies and other organisations to deal with the possibility of a shark threat. This information should be readily accessible in a useable form for relaying to the media.

With respect to an appropriate format for communicating with the media in the event of a shark attack it is useful to consider how another body in another jurisdiction deals with the matter. The Natal Sharks Board has a protocol for communicating with the media the objective of which is to try and defuse the sensationalism and negative publicity associated with a shark incident. The points covered below in the protocol are rational and provide a methodical way in which to deal with the subject. It may be viewed by some as common sense and may also be followed to some extent already by the Police Service and perhaps by some lifesavers and lifeguards. However, it would make sound reasoning to formalise the following arrangements that should apply when having initial contact with the media:

- *Provide the basic facts and avoid sensationalism.*
- *Ascertain sex and age of victim. Be careful of giving name and address of victim, especially if next of kin have not been informed.*
- *Identify the activity of victim (surfing, diving etc).*
- *Identify the extent of injuries (in minor detail; avoid pronouncements on victim's prognosis; leave that to the doctors).*
- *Obtain information on the identity (appearance) and size of the shark and its behaviour (don't sensationalise); A take home message in the form of a recommendation to general public recreating in the area, ie keep out of the water.*
- *Determine the possible reason for the attack or the shark's presence in that locality.*
- *Don't make up information - a detailed press release can be provided later with shark attack statistics, identity of the shark and any other information not available initially.*

Detailed press statement

- Repeat all the information provided initially.
- Provide more information on identity and behaviour of the shark.
- Provide recent shark attack statistics and the history of shark attacks in that region.

- Consider any additional information to determine possible motives for the attack.
- *Again, do not dramatise or make up information.*

Another means of using the media is to actually buy time or space in which devices such as advertisement, reports or articles are used to convey a message. While such means can be effective they also have the potential to be expensive and their cost effectiveness would have to be convincing. An example of this type of media usage and its associated costs is provided in Appendix 11.

Option 25

That the State Government develop, produce and air a series of community service announcements relating to shark hazards which can be run across all major communication mediums - including television, radio and the print media - throughout Western Australia.

Option 26

That the State Government appoint a person to coordinate a media and education campaign during the months when people are regarded as being at ‘highest risk’ of shark attack. This should be done in association with the literature program.

3.3.2 Other

New South Wales Fisheries, the Queensland Department of Primary Industry, the Natal Sharks Board and the Department of Fisheries in WA all publish information to help people reduce the risk of encountering a shark while in the water. The Department of Fisheries has provided the following advice in a pamphlet *WA Sharks, Shark Fisheries and Safety Tips*:

- Avoid swimming in other than protected areas around dawn and dusk. These are the times of day when most fish prey species are feeding, and sharks of all species are likely to be active.
- Avoid swimming in areas where there are large schools of fish, or among seals or sea lions close to rookeries.
- Avoid swimming in areas where animal, human or

fish waste enters the water.

- Avoid swimming in areas where there are deep-water channels or drop-offs nearby.
- Do not remain in the water with bleeding wounds.
- If you are spearing fish, do not carry dead or bleeding fish attached to you, and preferably remove all speared fish from the water as quickly as possible. Determine if there is an obvious reason for the shark to be in that locality (eg presence of prey).
- If you do see a large shark, leave the water as quickly and as calmly as possible. Avoid excessive splashing and noise. Remain out of the water until the shark has left the area.

This advice is very similar to that provided in other jurisdictions. However, there are some slight differences in content. For example, the Queensland Department of Primary Industry also advises people not to swim alone, at night, in murky waters or near a river mouth. It also warns people to keep away from shark control equipment (a factor not relevant in Western Australia). The Natal Sharks Board on the other hand also advises people to avoid swimming with an open wound, in the vicinity of flooding rivers and that they should seek local advice when visiting an unfamiliar area.

An education campaign would need to consider the circumstances and the manner in which the above type of information would be presented to people. For example, any information that was to be conveyed in print form to people at the beach would preferably need to be brief, clear and to the point. Both the Queensland Department of Primary Industry and the Natal Sharks Board appear to be aware of the priorities of beach goers and present the information in short, snappy, one liners as in the following examples.

- Always swim at patrolled beaches and between the flags
- Leave the water immediately if a shark is sighted

- Never swim alone
- Never swim at dawn, dusk or at night
- Never swim when bleeding
- Do not swim in murky waters
- Do not swim near schools of fish
- Do not swim in canals or near a river mouth
- Do not swim near, or interfere with Shark Control equipment.

On the other hand, if information is to be provided to people in, for example, their homes, local libraries, schools and other such places then there is a need for more detailed information as provided by the Department of Fisheries in its pamphlets.

The Aquarium of Western Australia (AQWA) is particularly interested in the issue being considered in this report and has offered to coordinate an education and awareness campaign on sharks and beach safety. Under its proposal AQWA would produce a handy reference guide (either a card or sticker than can be applied to beach bags, boats, boards etc, possibly with an accompanying leaflet). The sort of information that would be included would be:

- Details on the types of large sharks found off our local coastline and their risk to humans;
- What you can do to lessen the risk of coming in contact with a shark;
- What to do if you do see a shark; and
- Contact details for more information.

AQWA has also offered to run a series of free public information sessions at AQWA for the general public and groups (such as surf lifesavers and lifeguards) to increase their awareness of sharks including their identification and understanding of safety issues. In conjunction, AQWA would coordinate a marketing campaign to spread the information to the wider community. Its main aim would be to provide balanced, useful and non-sensational information to enable both people and marine animals to coexist safely.

The type of factual information about sharks referred to under 3.3 Education could also be conveyed through the setting up of a specific web site, or using part of a web site such as that used by the Department of Fisheries. This method is used by the Natal Sharks Board in South Africa which operates an informative and easy to use site. Another way of conveying this type of information would be through the establishment of a help line. These are now commonly handled through what are referred to as call centres which provide services of the type proposed in Appendix 8. This proposal has in fact been specifically designed to deal with shark related issues. This is also similar to the Department of Fisheries proposal to implement a voice initiated 'Shark Hotline' referred to above under 3.2.1 Emergency response. This would enable a person to obtain answers to frequently asked questions and if they wanted more information they would be directed to the Department of Fisheries web site and/or the agencies telephone number.

Option 27

That the Aquarium of Western Australia's proposal to coordinate an education and awareness campaign on sharks and beach safety as outlined in the report be accepted.

Option 28

That the State Government develop and produce relevant literature that can be used across a range of 'audiences' to raise awareness and educate the public about sharks. This material would be used as part of a package that would complement a campaign of talks/meetings with groups such as surf life saving clubs, local governments, school groups etc.

Option 29

That the Department of Fisheries' web site be used to convey factual information on the biology of sharks, degree of risk associated with sharks, avoiding shark attacks, contacts for further information or assistance etc.

4 CONCLUSION

The various options included in this Report are submitted to Government for consideration and the development of proposals for approval.

Should various proposals be agreed to, then it is essential that a lead agency be appointed to coordinate and implement the various actions that will need to be undertaken. The Department of Fisheries (WA) would appear to be the most appropriate organisation to do this in view of its expertise and role in this area.

The various agencies and organisations that have assisted in the preparation of this Report are commended for their valuable input and interest in achieving arrangements for dealing with shark hazards.

5 OPTIONS

Option 1

That the Department of Fisheries (WA) monitor the development of electronic repellent technology and advise the State Government when its effectiveness has been determined.

Option 2

That relevant local governments and the Department of Fisheries (WA) consider opportunities to assist the developers of electronic repellent technology if requests for assistance are made.

Option 3

Nets appear to provide some protection to bathers and could be considered for installation at certain metropolitan beaches with the costs of installation and maintenance shared between the relevant local government and the State Government following negotiations over the extent of netting considered appropriate.

Option 4

That because of the potential for nets to catch and kill marine animals other than sharks, because animals caught in the nets could attract sharks and, because of their high ongoing capital and operational costs, nets should not be installed.

Option 5

That Surf Life Saving WA, in conjunction with the Sport Aircraft Builders Club provide aerial surveillance for metropolitan beaches at appropriate times when the people are at most risk from shark attacks.

Option 6

That the Australian Aerial Patrol, based in Wollongong, New South Wales, be approached to extend its services to metropolitan Perth.

Option 7

That the aerial patrols provided by Edith Cowan University's Aviation School be continued.

Option 8

That the Police Service's Air Support Unit be used for ad hoc surveillance.

Option 9

That the Department of Fisheries (WA) contact all aircraft clubs operating in Western Australia seeking the support of their members to keep watch for sharks when flying over coastal waters and report sightings.

Option 10

That aerial patrols not be used because of their high costs and doubts about their effectiveness when waters are murky, when sharks are swimming near the bottom and because of the limitations associated with flight paths.

Option 11

That the Marine Operations Council finalise a coordinated marine surveillance roster along the metropolitan coastline between Fremantle and Mindarie.

Option 12

That Surf Life Saving WA's proposal to establish an emergency response team to support lifesavers and lifeguards and which would provide a vehicle for a rapid response to a shark threat is commended.

Option 13

That Surf Life Saving WA and metropolitan coastal local governments examine the number and effectiveness of surveillance towers now in use on metropolitan beaches and take action to improve surveillance posts where necessary.

Option 14

That Surf Life Saving WA and metropolitan coastal local governments implement extended hours during which beach patrols operate to coincide with those periods when people are most at risk from shark attack.

Option 15

That the State Government establish a contingency fund within the Department of Treasury and Finance which would be used to cover the costs of a State Government agency or a local government which finds a large whale carcass in its area of responsibility and disposes of it.

Option 16

That the Department of Fisheries' Draft Shark Incident Emergency Response Plan at Appendix 7 be adopted and implemented.

Option 17

That Surf Life Saving WA make minor amendments to its emergency protocols to codify a linkage with the protocols established by the Department of Fisheries (WA).

Option 18

That the Department of Fisheries (WA), the Police Service and relevant local governments consider developing an emergency protocol to deal with reported shark incidents in the Swan, Canning, Mandurah and Harvey Estuaries and in the Peel Inlet.

Option 19

That Surf Life Saving WA review the Queensland policy in relation to sharks and consider whether elements could be adopted in Western Australia.

Option 20

That the Department of Fisheries (WA) establish a Shark Hotline for the high risk months when shark attacks may be more likely.

Option 21

That the Department of Local Government and Regional Development encourage all metropolitan local governments whose boundaries end at the high or low water mark to obtain approval from the Governor under section 3.6 of the *Local Government Act 1995* to enable them to apply a local law controlling activities over water.

Option 22

That the Department of Local Government and Regional Development encourage all metropolitan local governments with beach and/or foreshore areas in their districts to adopt the Western Australian Municipal Association's model local law provisions relating to the control of activities in these areas.

Option 23

That Surf Life Saving WA consider providing all its clubs with emergency first aid kits designed to deal with major trauma situations.

Option 24

That Surf Life Saving WA and local governments review the content of the first aid training courses provided to their members and rangers and provide specific training to address major traumas as considered necessary.

Option 25

That the State Government develop, produce and air a series of community service announcements relating to shark hazards which can be run across all major communication mediums - including television, radio and the print media - throughout Western Australia.

Option 26

That the State Government appoint a person to coordinate a media and education campaign during the months when people are regarded as being at 'highest risk' of shark attack. This should be done in association with the literature program.

Option 27

That the Aquarium of Western Australia's proposal to coordinate an education and awareness campaign on sharks and beach safety as outlined in the report be accepted.

Option 28

That the State Government develop and produce relevant literature that can be used across a range of 'audiences' to raise awareness and educate the public about sharks. This material would be used as part of a package that would complement a campaign of talks/meetings with groups such as surf life saving clubs, local governments, school groups etc.

Option 29

That the Department of Fisheries' web site be used to convey factual information on the biology of sharks, degree of risk associated with sharks, avoiding shark attacks, contacts for further information or assistance etc.

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