

Kelp Barrier Project 2009

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PROJECT *KELP* BARRIER

1. INTRODUCTON

The great white shark (*Carcharodon carcharias* L.) is a predator at the top of the marine food chain, distributed worldwide in temperate and temperate cold's zones. This animal has an international reputation as a species particularly dangerous to humans, fame that continues to be an alibi for his capture, to make it a trophy or to sell its jaw. At international level, despite the trade is regulated by 'Appendix III of CITES, regulations and controls to prohibit or reduce fishing upon sharks are still scarce. **In a single year**, due to fishing (both legal and illegal) and mainly because of *finning*, **are killed more than 200 million sharks**. In addition to commercial fishing, we must add the fishing for the sale of the jaws and teeth as a trophy and sport fishing.

The last, but not the last, **cause of shark's killing are anti-sharks nets**: a nets barrier that is used to "protect" the coastline from shark attacks. With a politic of "protection by eradication" this kind of nets aren't a real barrier for sharks, but a trap where them and other marine animals get **trapped to die choked**.

In the New South Wales between 1995 and 2004, 48 great white sharks and 24 tiger sharks were killed in nets. During the same period 1.485 other marine animals, including turtles, whales, dolphins rays, manta rays, and harmless species of sharks have been caught and killed in anti-sharks nets.

In Queensland, during the first 15 years of the program of "Shark control" 14.328 marine animals, different kinds of sharks have been caught in nets (Data provided by Shark control program).

The simultaneous presence of white sharks and kelp forest is a situation that is found in different parts of the world. From the personal observations of expert divers in South Africa, is common knowledge that the **great white shark never enter inside the barrier formed by the kelp**, and their preys, including sea lions *Arctocephalus pusillus pusillus*, exploit the presence of the large algae for hiding away from this predator.

Michael Rutzen, of the Shark Diving Unlimited (Gansbaai), has been working with great white sharks since 1994, and is the one of the three people in the world who actually make free-diving (out from the cage) with the great white sharks. Michael Rutzen have been featured in numerous documentaries including "Beyond fear" (National Geographic), "Sharkman" (Discovery) and Living Legend (BBC Natural World) and from 1998 until 2009 **he use the kelp as a barrier**, when he has to film the actions under the water, in presence of great white sharks.

"We put the kelp in our blind spots, where come the sunlight, as a protection, and always it deflect the white sharks swim" (M.Rutzen).

2. OBJECTIVES

Being aware of the vast number of animals that are killed by anti-sharks nets along the coast with high tourist inflow, this project aims to discover if and how much the white sharks, animals with a very developed view, avoiding a kelp barrier. The aims is to demonstrate the **effectiveness of an alternative and less invasive method at the anti- sharks nets**, to protect the coastline from the great white sharks.

3. MATERIALS AND METHODS:

3.1 AREA OF STUDY:

The area chosen for the project is the **Marine Reserve of Dyer Island (South Africa)**, area with a large number of white sharks. The area includes a complex ecosystem, which begins with endless forests submerged, formed by Kelp (*Ecklonia maxima*), a seaweed that can reach the 12m hight.

The spot to building the kelp barrier is the “Shark alley”, the sea-space between Dyer Island and Gayser Rock, where usually are present an high number of white sharks (Fig.1) and where a permanent longshore current can help the propagation of a smell line to attract the sharks.

The deep is about 6-9 m and the longshore current go from west to east.



Fig.1 Aerial map of the study' s area.

BUILDING THE FAKE KELP BARRIER:

The main quality of the kelp barrier is to be **enough strong to resist at the oceanic tidal current** and enough roach to permit the crossing of the same current. The barrier for the first test, will be 10m length, and 9m tall. The tall depends from the sea deep (8m) and calculating the tidal' s excursion and that the current moved the barrier, it must be 1m taller than the sea deep.

For the base will be used a cement block built up in a tyre, (Fig.3_A), it will be connected by a clip and a rope to a PVC tube (Fig.3_B), keeping erected by a float on the top (Fig.3_C) . The PVC is used to increase the algal growth, in that manner, after a few, **the fake kelp barrier will assume the aspect of a real kelp forest**.

Every single structure will be connected each other, and at least every PVC tube will have 50 cm of gap between them.

The final barrier will be formed by 3 line of twenty single structure each line, disposed at zig-zag (Fig.4).

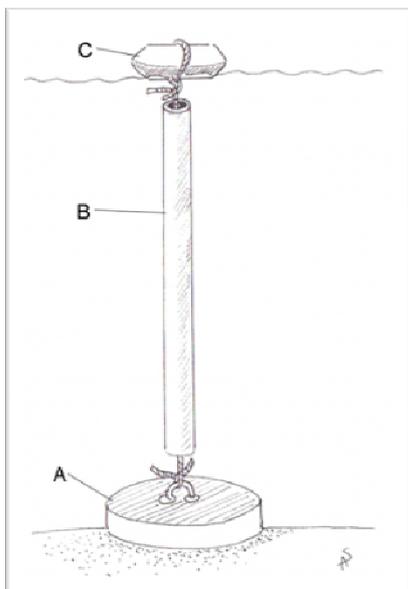


Fig.3 Single kelp barrier element. (A_ Cement block; B_ PVC tube and rope; C_ Float).

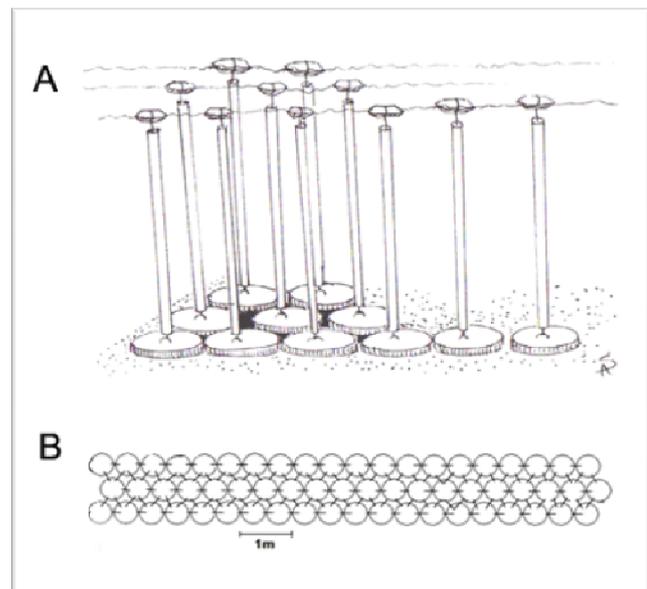
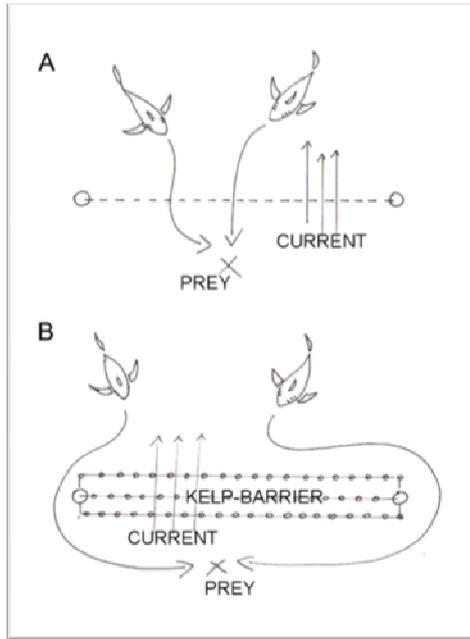


Fig.4 Structure of the kelp barrier. (A_ Frontal view; B_ Aerial view)

3.2 RESEARCH DEVELOPMENT:

The research will be developed during the **winter season** in order to better collecting videos datas thanks of the better water visibility.



The estimated time to complete the project is **16 weeks, until 15 August**, calculated over the animals that would be possible to see.

For attracting white sharks will be used a bait stem full of shark liver, pieces of tuna and fish oil, in order to create a chum line along the current.

The control test will be count how many sharks cross the line where the kelp barrier will be building (Fig.5_A).

The datas about the deflecting effect of the kelp barrier will be collected counting how many sharks cross, or try to cross, the same line and how many sharks avoid it (Fig.5_B).

The expected result is that the most of sharks avoids the barrier, the results of the observations will be processed by a χ^2 test.

Fig.5 Research development (A_Control; B_Test).

4. CONCLUSIONS:

Founding that the great white sharks avoid a barrier they known and considered potentially dangerous, could begin a **radical change in the management of coastal areas** affected by the "problem" of sharks. Replacing harmful anti-sharks nets using a less invasive solution already present in nature, to solve a problem of human nature.

5. ESTIMATE BUDGET FOR THE KELP BARRIER PROJECT

Total cost of the project: R 2.636.430,00

Total requirement: R 592.430,00

A-Stockable material (R 391.560,00)

A1-Digital cameras: R 302.400,00

- Samsung SC-MX20 (R 2.400,00) for the external videos
- Sony hdv 1080i with diving suit (R 300'000,00) for the underwater videos

The digital cameras will be used for collecting datas about shark behavioural' s patterns.

A2-DVD-R, RW (R 1.560,00)

Due to the vast amount of video data, it is necessary to buy many external digital media store.

A3-Purchased books (R 2.400,00)

For the principles of the biology and behaviour of *Carcharodon carcharias* and proper analysis of the ecological study, were purchased the following books:

- "*Two Oceans: A Guide to the Marine Life of Southern Africa*" (2007) by George Branch, Charles Griffiths, Lynnath Beckley, and Margo and Branch. Struik.
- "*Field guide to the Great White Shark*" Martin, RA (2003). Vancouver (Canada): Reef Quest Center for Shark Research, Special Publication No.1.
- "*Great White Shark: the biology of Carcharodon carcharias*" (1996). Klimley A.P. Ainley and D.G. San Diego: Academic Press.

A4-Diving equipment for two person (R 84.000,00)

The two operators who will position the fake kelp barrier will need all the scuba material.

A5-Print (R 1.200,00)

B-Not stokable material (R 200.870,00)

B1-Material for construction of artificial kelp's barrier (R 53.820,00)

Looking at the shape of the biggest species of *Laminaria* in the areal (*E. maxima*) will be made a fake kelp barriers. They must be made enough strong to resist at the oceanic tidal current and enough roach to permit the crossing of the same current.

The cost of the single elements (for a sea deep of 6m): **R 897,00**

1. Base: R 300,00
2. Clip: R50
3. Ropes: R 3,00 x1m = R 27,00 x 9m
4. PVC tubes (50mm \varnothing): R 65,00 x 1m = R 520,00 x 8m

The cost of a line of 20 elements: R 17.940,00

The cost of the complete barrier (3 lines) : **R 53.820,00**

B2 – Materials to attract the sharks (R147.050,00)

1. Chum and fishes: (20 kg x day) = R 1.500,00 x day = **R 147.000,00** x 12 weeks
2. Bait stem = R 50,00

C-Cooperations (R 2.044.000,00)

The Shark Diving Unlimited (Gansbaai) will supports the project with R 2.044.000,00 that will be used to rent two boats and the crew.

C1- Rent of the first boat: R 38.000,00 x day = R 1.064.000,00 x 28 days (4 weeks)

For the heavy of the cement block, the first boat (12 m length) will be necessary to position the fake kelp barrier.

C2 - Rent of the second boat: R 10.000,00 x day = R 980.000,00 x 98 days (14 weeks)

For the rest of the project, especially for the collecting datas phase will be used a littler boat, 7,9 m lenght.

The estimated time to complete the project is **16 weeks**, calculated over the animals that would be possible to see: 4 weeks are requested to position the barrier and 12 weeks are requested to the observations and collecting datas.