

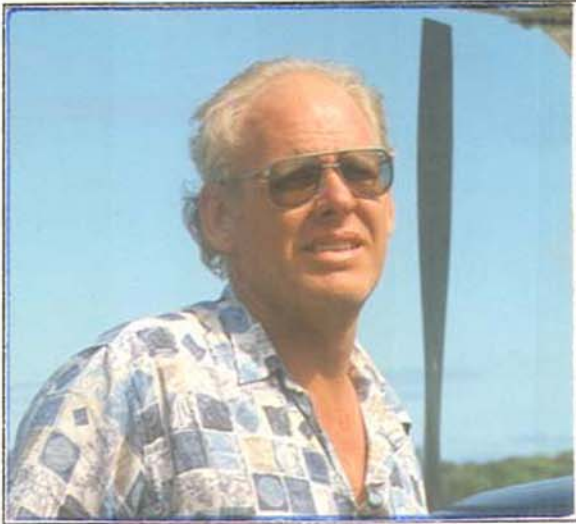
PRELIMINARY  
WHALE SHARK  
TAGGING  
& SURVEY PROGRAM

For the period DECEMBER 1, 1993 to APRIL 30, 1994

by **ANDREW GIFFORD**



# THE TEAM



PIETER GENT



ROB ALLEN



SUE SMITH

# WHALE SHARK TAGGING & SURVEY PROGRAM

## A INTRODUCTION

At a meeting held in Princeton, New Jersey on April 28, 1993 it was decided to investigate what progress had been made with the whale shark tagging program initiated by Rob Allen, who was employed by the Natal Parks Board, until his resignation from this conservation body, effective May 1991. As at this date it would appear that a total of six whale sharks had been tagged over a single season. Subsequent to this date, it is our understanding that a number of attempts were made by other employees of the Natal Parks Board to continue with this program but these were terminated when problems were experienced with the implanting of the tags.

A generous amount of R7 000,00 was apparently made available by the Rand Merchant Bank to fund the project, but this money was never fully utilised as the tagging program had effectively come to a halt.

Based on the limited amount of information that is available on whale sharks, with specific reference to their biology, habits, distribution and seasonal migration patterns, it became apparent that further

research into these animals would be both desirable and should be ongoing and the decision was taken to provide sufficient practical and infrastructural support to ensure its success in local waters.

**B PROPOSED RE-STRUCTURING OF THE WHALE SHARK TAGGING PROGRAM**

An analysis of the difficulties that were experienced when the original tagging program was started identified several existing and anticipated problem areas.

With these in mind the following remedial action was taken :

1. The nucleus of a dedicated and self-motivated project management team was recruited with each member being a specialist in a specific field of activity.

**Mr PIETER GENT**

a qualified pilot, diver and  
a successful entrepreneur

**Mr ROB ALLEN**

a qualified ski-boat skipper,  
scuba-diver, experienced spearfisherman  
and successful entrepreneur

and

**Miss SUE SMITH**

a qualified scuba-diver and recent graduate  
of the University of Natal

The overlap with regard to scuba-diving  
was entirely fortuitous.

- 2) A variety of sample shark tags were acquired from America but these were found to be unsuitable because of their size and application method. Rob Allen then volunteered to design and manufacture tags and a delivery system for specific use on whale sharks.
- 3) In order to ensure operational continuity without having to prevail on the resources and facilities available from either the Natal Parks Board or the Oceanographic Research Institute, which could prove disruptive to their own research and work programs, it became apparent that a separate but a complementary infrastructure should be set up for the whale shark tagging and survey project.

## **C PROGRESS TO DATE**

- 1) Sue Smith has been trained in the competent and safe use of the tagging equipment and has thus far successfully tagged a total of six whale sharks. She is also fully conversant with the use of our data recording documentation and can accurately spot whale sharks from both the air and the sea.
- 2) Pieter Gent has gained considerable experience in aerial whale shark spotting and is completely conversant with the topography of the Kwazulu / Natal coastline.
- 3) After an initial period of informed experimentation, Rob Allen designed, developed and manufactured a tag and delivery system that he has proved to be very successful and suitable for use on a world-wide basis.

(Kindly refer to the relevant specification diagrams).

- 4) Plans with regard to establishing a separate but complementary infrastructure are well advanced and should be complete and operational by October 1994.
- 5) The process of screening and training volunteer understudy teams is ongoing but essentially complete for both aerial surveys and the actual tagging program.

#### **D TAGGING PROGRAM**

- 1) During the season under review, a total of 12 whale sharks were tagged. (Two in the Cape Vidal area, six between Durban and Reunion and four in the Bazley area). This was accomplished during four separate but specific diving excursions that were undertaken primarily to test the equipment and to train the members of the team.

Though the number tagged was well below the target figure, it must be remembered that the tags and their delivery system were still in the developmental stage and apart from Rob Allen all of the team members were totally inexperienced in finding and dealing with whale sharks. This situation was aggravated by the fact that our primary infrastructure was only operational by December 4, 1993 which was approximately halfway through the season.



- 2 A total of five tagging trips were undertaken that were "dry" runs. (Two were in the Cape Vidal area, one was between Umhlanga Rocks and Amanzimtoti and two were in the Bazley area).
- 3) One combination aerial survey/tagging excursion was undertaken on March 10, 1994 with a view to establishing the viability of using an aircraft to talk a dive-boat onto any whale sharks for tagging purposes.

The results received were not very successful for the following reasons :

- a) the hired aircraft did not have a suitable externally mounted aerial so two-way radio communication between it and the dive-boat was difficult ;
- b) weather and water conditions were not ideal;
- c) this aspect of the project was undertaken too close to the end of the whale shark season.

Mr Ricki Schick of **TRIDENT DIVING** very kindly provided the dive-boat, crew and the walkie-talkies.

## **E AERIAL SURVEYS**

During the period commencing December 31, 1993 to April 14, 1994 a total of 12 air surveys were conducted. Five of these related to the coastline north of Durban and seven to the coastline south of Durban.

Four trips were "dry" runs during which no sightings were recorded. Total sightings for the balance were 184 whale sharks with the most notable being that recorded on January 15, 1994 when the positions of 95 of these animals were documented between Durban and Umtentweni - a distance of approximately 110 kms.

Of the total number of sightings made 59% of the animals were heading North; 36% were heading South; 4% were heading East and 1% were heading West.

<b>F      UPGRADING THE EXISTING WHALE SHARK TAGGING AND OBSERVATION PROGRAM</b>
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When the program was reinstated, we experienced a tremendous groundswell of support from scuba-divers, spearfishermen, dive-boat operators and conservationists. We were also inundated with unsolicited offers of assistance but it was decided to maintain a low profile until such time as most of the "bugs" in our data gathering system had been eliminated, academic neutrality had been established and our operational efficiency was completely cost-effective.

With this in mind, we are endeavouring to achieve the following objectives :

1. Reliable observation points to be set up on both the North and South Coasts to keep us advised of water visibility, sea conditions and of any whale shark sightings made by either fishermen or scuba-divers ;



2. Education of scuba-divers and spearfishermen about the correct methods of identifying, sexing and sizing the whale sharks ;
3. The provision of photographs of what whale sharks look like from the air for display on the notice boards of the airports at Richards Bay, Virginia and Margate together with report back telephone numbers. In this regard we also intend approaching and providing the South African Airforce based at DF Malan Airport with similar documentation;
4. It is also the intention to explore the possibility of using carefully screened commercial scuba-diving schools for purposes of tagging whale sharks under strictly controlled and supervised conditions.

Whilst this aspect of the program may be controversial, we are of the view that it can make a meaningful contribution towards additional data collection at very little cost, if handled correctly. The operational parameters of all potential parties involved will be prescribed and monitored so as to ensure that the whale sharks are not unduly disturbed or harassed by over-enthusiastic divers ;

5. In the coming season, it is the intention to use a fixed wing aircraft for long distance aerial surveys on the northern and southern coastlines of the present survey area and a microlight to take the dive-boat/boats onto any whale sharks for tagging purposes. Recent experimental flights done with the latter aircraft proved that despite its limitations, it was infinitely more suited for this task than a fixed wing for the following reasons :

- a) ability to fly low and slow for long periods of time;
- b) improved manoeuvrability with specific reference to being able to perform much tighter turns ;
- c) ability to land and take off from any beach or relatively open piece of ground ;
- d) ease of operation and transport to any area using a specifically designed trailer ;
- e) very cost effective operational capabilities in terms of fuel consumption and maintenance ;
- f) clear all round vision for both observation and photographic purposes.

<b>G MEDIUM TERM OBJECTIVES OF THE WHALE SHARK TAGGING PROGRAM</b>
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1. By establishing contact with other marine research institutions in countries where whale sharks either seasonally or permanently occur, it is the intention to extend the existing tagging program on a world-wide basis using standardised tags that have been distinctly colour coded to reflect the country of origin.

2. The feasibility of extending the aerial surveys to include the coastlines of MOCAMBIQUE, TANZANIA and KENYA is being investigated.

At the present time, we have received feedback from divers, who operate off the coastline of Mocambique that both adult and juvenile whale sharks are sighted on what would appear to be a regular basis.

3. We currently receive no information from the coastlines of both Tanzania and Kenya but we are working on the problem.
4. A recent diver survey off the coastline of Somalia revealed no whale shark sightings.

Details of this expedition will be made available as soon as they are to hand.

## **H ACKNOWLEDGEMENTS**

We would like to thank Warden LIONEL VAN SCHOOR and Ranger DEON SLATER of the Natal Parks Board for their co-operation and assistance whilst we operated in the Cape Vidal area and -

Senior Rangers JOHN DIVES and JOSS JOSLING and Ranger RICHARD POOLE for helping us when we worked in the Durban area. In this regard a very useful symbiotic relationship developed inasmuch as the previously nominated rangers acquired valuable sea time and training under the guidance of a qualified ski-boat skipper whilst we were afforded the opportunity to look for and tag whale sharks.

We would also like to express our appreciation to :

**DR LYNNATH BECKLEY**

of the Oceanographic Research Institute for modifying our aerial survey data collection sheets to render them more computer compatible;

**RICKI SHICK**

for the use of Trident Diver, its crew and radio equipment during the experimental tagging excursion undertaken on March 10, 1994

and

**NATAL SHARKS BOARD**

for the use of their caravan during one of our Cape Vidal expeditions.

## I CONCLUSION

Whilst we may not have achieved all of our objectives insofar as it concerns the number of whale sharks actually tagged, we still regard the first phase of this reconstituted project as being very successful -

- a) The development of a specific whale shark tag and delivery system that ranks amongst the best in the world;
- b) the refinement of aerial survey techniques and according to the information at our disposal ;
- c) Sue Smith, who is an integral part of the team, was the first woman in the world to have implanted six tags into six whale sharks in approximately 60 minutes.

A notable achievement by any standard  
and a tribute to her dedication

However, the most important part of this project was the formation of a well motivated and disciplined team who in their spare time and with only limited resources available, were able to develop this program into an efficient and cost effective operation in approximately 4 months.

Based on the preliminary results that have been achieved thus far, it is quite clear that this project can function independently any other research programs being conducted in the survey areas without causing academic disruption to any of the various organisations involved in the field of marine conservation and without making any superfluous demands on either their time or resources.

Co-operation and consultation  
forms an essential part  
of this project equation as does  
the feedback  
of any information derived from it  
to both

The Natal Parks Board

and the

Oceanographic Research Institute.

THE planned expansion of the tagging program will be done in a very strictly controlled manner to ensure that no over-extension occurs and each phase will be properly monitored and consolidated before the next phase begins so as to ensure acceptable standardised project continuity.



# WHALE SHARK TAGGING PROJECT AERIAL SURVEY DATA SHEET - SOUTH ROUTE

FLIGHT DATE	HEIGHT	TIME	FLIGHT NO

LOCATION	NO	SIZE metres	DISTANCE FROM BACKLINE(m)				
			50	100	150	200	250

VIRGINIA (390)
VETCH'S PIER (401)
BRIGHTON BEACH (412)
UMBOGINTWINI (424)
WARNER BEACH (433)
UMZIMBAZI RIVER (439)
MAHLONGWANA RIVER (450)
SCOTTBURGH (460)
PENNINGTON (472)
IFABA (483)
MHLUNGWA LAGOON (495)
UMZUMBE RIVER (506)
UMZIMKULU (520)
ST MICHAELS (531)
RAMSGATE (541)
PENJATI RIVER (552)
PORT EDWARD (564)



# WHALE SHARK INFORMATION CARD

TAG NO \_\_\_\_\_ DATE \_\_\_\_\_

LOCATION \_\_\_\_\_ TIME \_\_\_\_\_

G.P.S. \_\_\_\_\_ SIZE (EST) \_\_\_\_\_

SEX : MALE \_\_\_\_\_ FEMALE \_\_\_\_\_ UNKNOWN \_\_\_\_\_

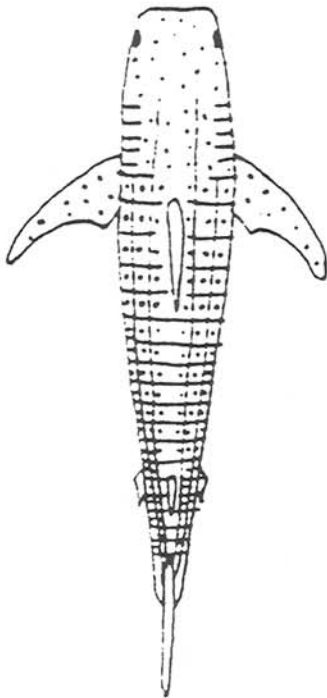
DIVER \_\_\_\_\_ SKIPPER \_\_\_\_\_

VISIBILITY \_\_\_\_\_ TEMPERATURE \_\_\_\_\_

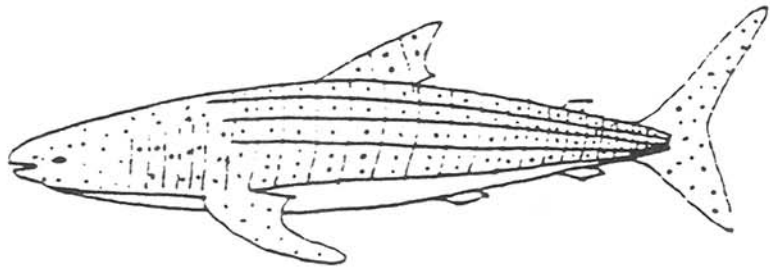
MARKINGS \_\_\_\_\_

\_\_\_\_\_

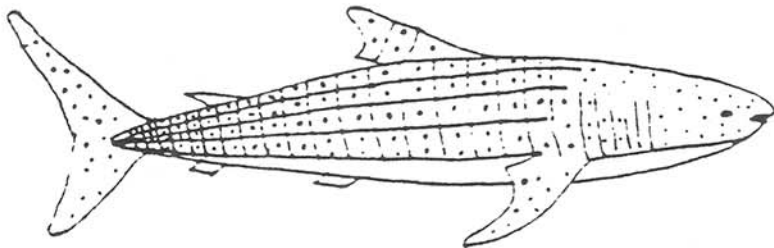
## WHALE SHARK TAGGING PROJECT



DORSAL VIEW



LEFT HAND VIEW



RIGHT HAND VIEW



# **TAG ANALYSIS**

**(COLOUR CODE - LIGHT GREEN)**

## Tag Number

## AREA of APPLICATION

i) WS0001-WS0002	CAPE VIDAL, KWAZULU
ii) WS0003-WS0006	BAZLEY BEACH, South Coast, NATAL
iii) WS0007-WS0009	Between DURBAN & REUNION
iv) WS0010-WS0011	EXPERIMENTAL TAG HEADS - still to be used
v) WS0012	DAMAGED during manufacture
vi) WS0013-WS0015	Between DURBAN & REUNION

**NOTE :** The tag numbers reflected under sections (i), (ii), (iii) and (vi) were all successfully implanted into whale sharks.

# WHALE SHARKS

by Rob ALLEN

First attempts at tagging whale sharks with marlin tags at Cape Vidal proved to be impossible. This was attempted when the sharks would come up to the boat on occasions to "quiz" the occupants. The marlin tag pole broke on two occasions, which indicated that the skin of the whale shark was tough.

A second attempt was made a short while later with a hand applicator but this also failed to penetrate the shark's skin, with the end result being a bent applicator.

During a later incident a spear was accidentally shot into a whale shark. In this case the barb was damaged but the spear did not penetrate any further, once again illustrating the toughness of the animal's skin.

A while later, a whale shark washed ashore north of Cape Vidal. When examined it showed just why we were experiencing problems. The skin was found to be between 100 and 150mm thick in the area around the dorsal fin where tagging was scheduled to take place.



This skin was not blubber but pure epidermis, (sharks do not have blubber), and its' toughness could be compared to that of a soft leather with a hypothetical similar thickness.

A system was then developed to shoot a tag into the whale sharks using a spear which would pull the tag into the shark instead of pushing a plate in like the marlin tag which bent and was inaccurate when shot.

This tagging system worked but in some cases the tough skin caused the double wire to skear off between the spear and the skin when implanted.

A third tag was then later developed when the tagging program was revived. This tag was larger and stronger in all aspects. It was also pushed into the shark by the spear, similar to the marling tag, but it fitted **over** the spear instead of being slotted into it.

The style is similar to the "drop-head" used on spears by spearfishermen (see drawings). The difference is in the way the fins protect the cable and the coatings on the cable whilst being shot into the shark. Also in the way that the tag is positioned in the skin/flesh of the animal.

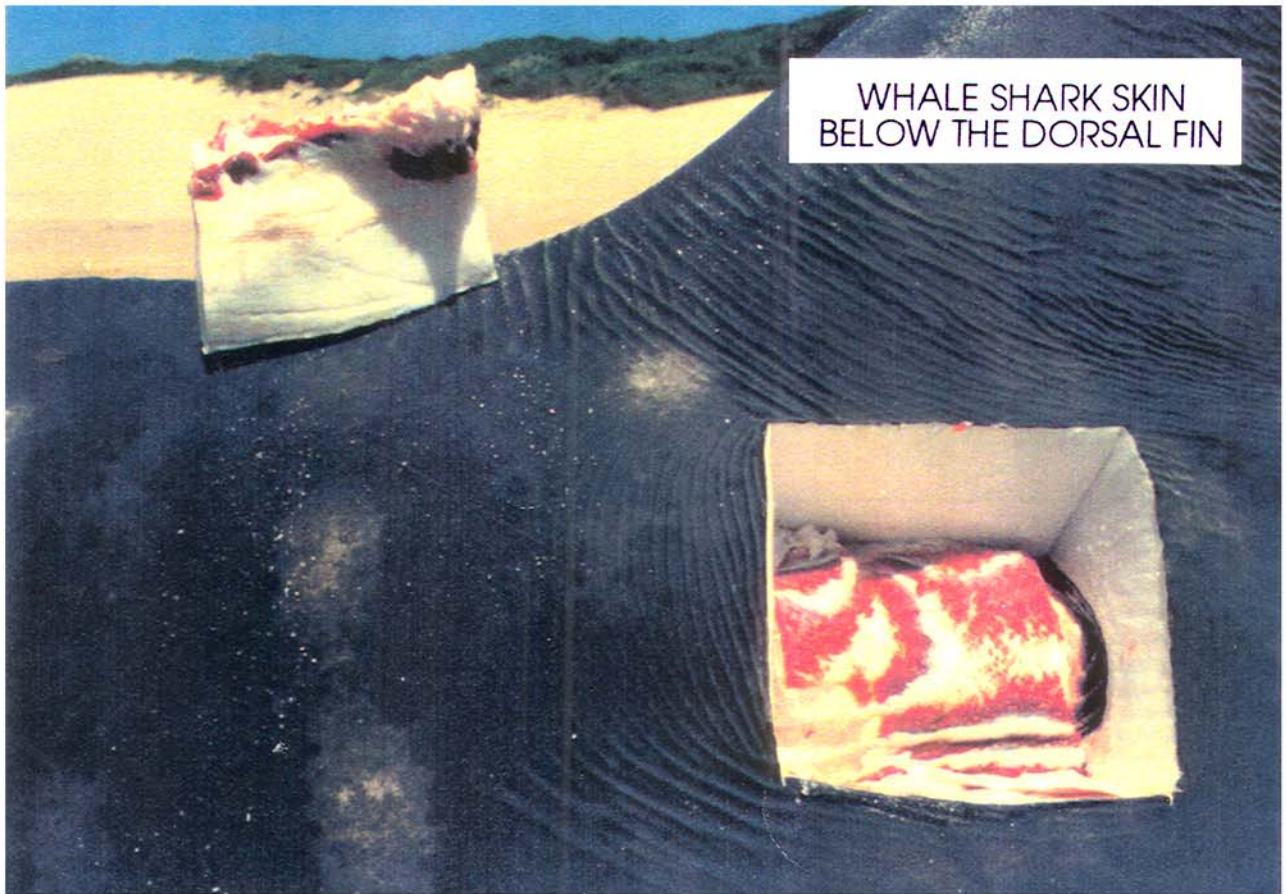
The force required to penetrate sufficiently is about the same as that of a medium-strength speargun. The gun has shorter than normal line attached to the spear, which means that you have to get close to the shark before shooting (less than one gun length away). This enables the spear to be retrieved faster, before the shark has a chance to move too far forward and cause the spear to jam in the tag which could result in it bending on retrieval.

When tagging it is better to be between 90-60 degrees above and behind the chosen tagging area. This sets the tag proud and prevents it from chaffing on the rough outer-surface of the skin. It also enables the tagger to swim up and forward as soon as possible, enabling the spear to be retrieved correctly and allowing the tagger to move away from the large tail which at this stage may now be in a hurry and potentially dangerous.

An angle of less than 45 degrees will cause the spear to bounce off the skin of the animal with the possibility of the tag being lost and the tagger being positioned much too close to the tail. The tag should be aimed at one of the ribs on the skin below the dorsal fin because in this area the skin is thickest and less likely to cause tissue damage.

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WHALE SHARK SKIN  
BELOW THE DORSAL FIN

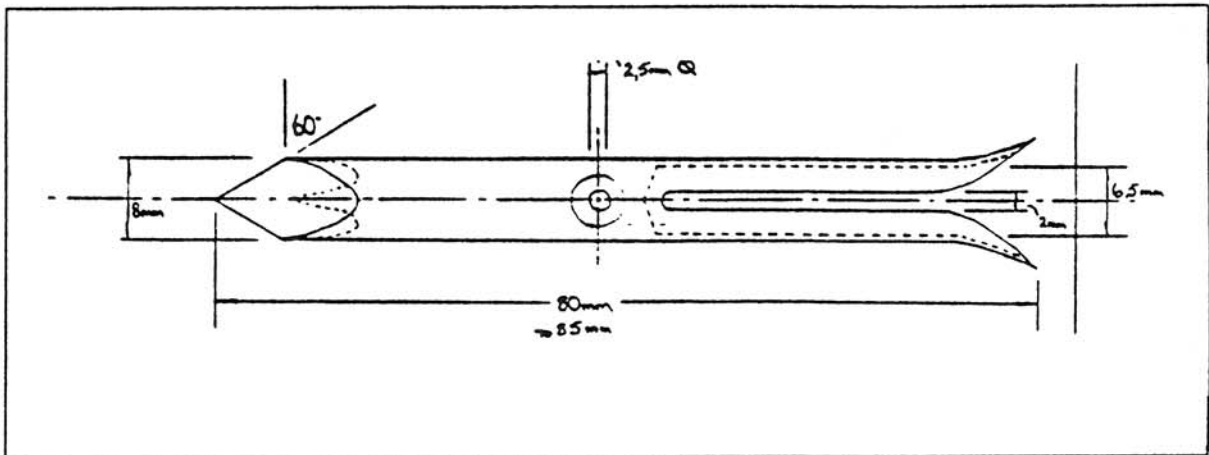
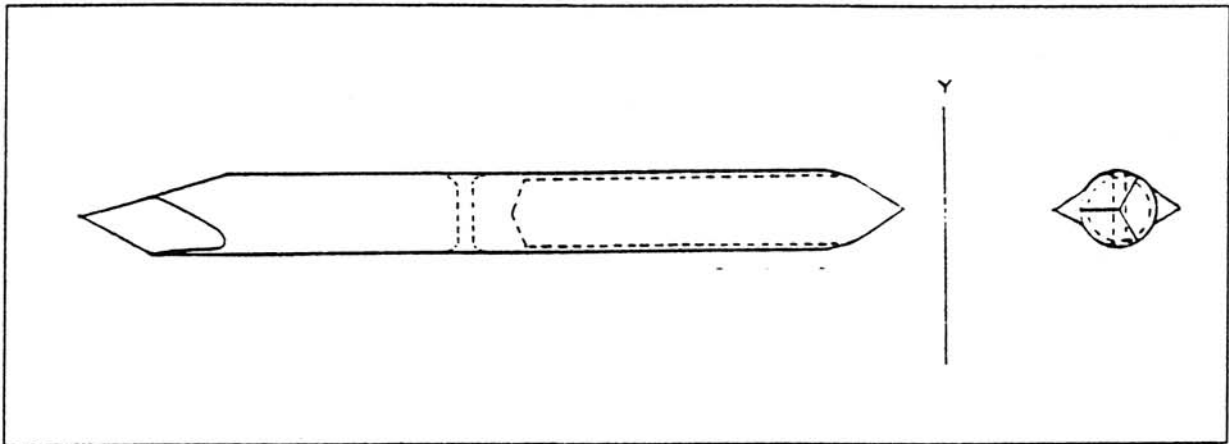


CAPE VIDAL

# WHALE SHARK TAG

by Rob ALLEN

Material 8mm 316 S/S



SCALE 2:1 Date 020594

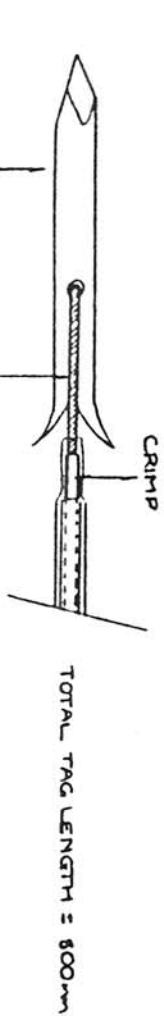
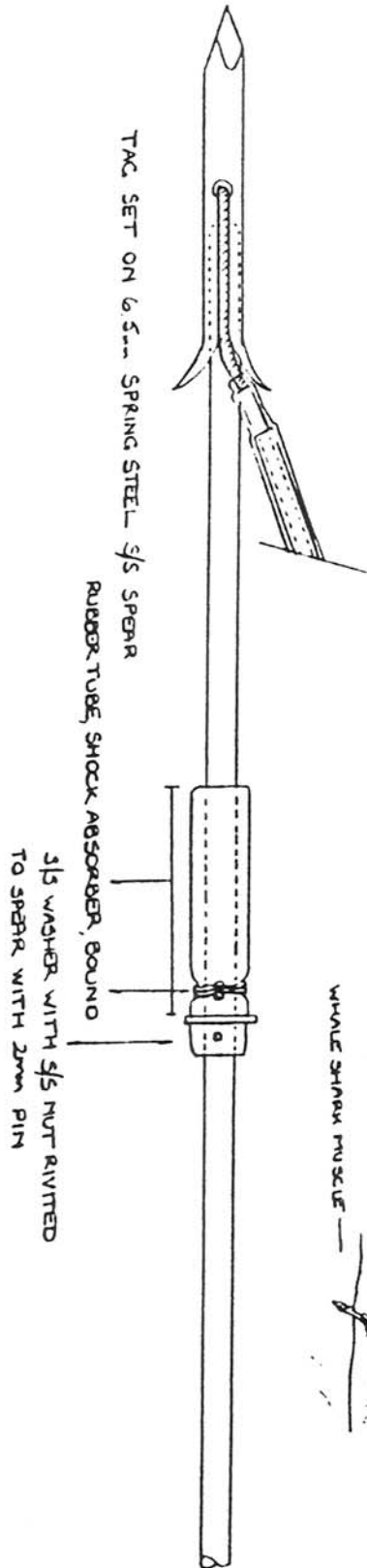
# WHALE SHARK TAG

## by Rob ALLEN

WHALE SHARK TAG BY ROB ALLEN

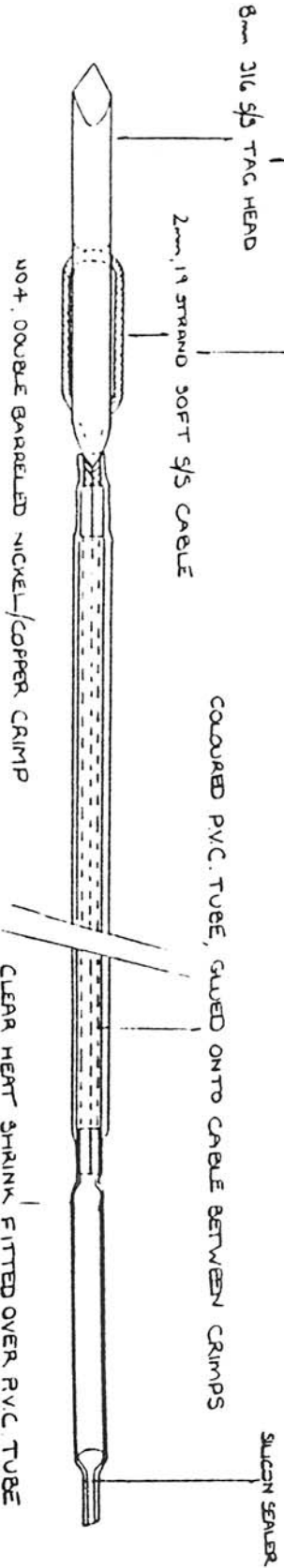
DATE 050594  
SCALE 1:1

TAG SET IN WHALE SHARK



GROSS SECTION OF TAG  
CENTRE, 2x 2mm 5/16 CABLE  
COLOURED P.V.C. TUBE OVER CABLE

CLEAR HEAT SHRINK OVER CABLE + P.V.C. TUBE



CLEAR HEAT SHRINK FITTED OVER P.V.C. TUBE SEALED AT ENDS, CREATING AIR POCKET AT END AND PROTECTING LABELING



**STATEMENT OF INVOICE & EXPENDITURE**  
FOR THE PERIOD 3 DECEMBER 1993 to 31 JULY 1994

<b>A. INCOME</b>	<b>R</b>	<b>R</b>
Insrep Construction (Pinetown)	44 288,00	
Highwater Enterprises	4 500,00	
Interest	<u>237,32</u>	<u>49 025,32</u>
<b>B. EXPENDITURE</b>		
Aircraft rental & fuel	3 807,04	
Bank charges	214,05	
Consumables	1 197,84	
Equipment Purchases (cutting knives)	71,20	
Film processing & purchases	201,38	
Motor vehicle expenses	150,00	
" " "	3 585,73	
Motor vehicle (asset acquisition)	10 464,76	
Office Administration	2 442,95	
Printing	142,50	
Projects:		
i) Jewellery Development	827,95	
ii) Poster charges	1268,77	
iii) Surfboard (K Anderson)	<u>750,00</u>	2 846,72
Subscriptions	190,00	
Sundries	1 900,00	
Yacht Maintenance	<u>1 588,90</u>	<u>28 803,07</u>
	<b>CREDIT Balance c/d</b>	<b><u>R20 222,25</u></b>

**C. NOTES ON THE ACCOUNTS :**

- 1) Actual aircraft hire costs were R7 614,08 of which we were liable for 50% or 13% of total expenditure.
- 2) Tagging expenses amounted to the following : Food etc R507,84; fuel R342,72; film & processing R201,38 & equipment purchases R71,20. **TOTAL R1 123,14** or 4% of total expenditure. This figure does not include tag development costs or the use of the Natal Parks Board facilities.
- 3) Asset Acquisition in the amount of R10 464,76 or 36% of expenditure involves the purchase of a Toyota 4x4 Double Cab for independent tagging & transport purposes.
- 4) Project expenses of R2 846,72 or 10% of expenditure relates to the dispatch of posters for sale in the USA, the development of shark charms & pendants as an additional source of revenue for research purposes and the purchase of a surfboard damaged by a shark.
- 5) The primary source of income was obtained by foregoing a percentage of the profit entitlement from a business in which I have an interest.