MARINE RESERVE IMPLEMENTATION:
CENTRAL FOREST

BIOLOGICAL SURVEY OF THE MAJOR BENTHIC HABITATS OF THE GEOGRAPHE BAY-CAPES-HARDY INLET REGION (GEOGRAPHE BAY TO FLINDERS BAY) 28 JANUARY-8 FEBRUARY 1999

Field Programme Report: MRI/CF/GBC - 18/1999

A collaborative project between the University of Western Australia
and CALM Marine Conservation Branch

A project partially funded through the Natural Heritage Trust's
Coast and Clean Seas Marine Protected Area Programme
Project No: WA9703

Prepared by K P Bancroft
Marine Conservation Branch

January 1999

Marine Conservation Branch
Department of Conservation and Land Management
47 Henry St
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ACKNOWLEDGEMENTS

Direction

- Kieran McNamara - Director, Nature Conservation Division.
- Dr Chris Simpson - Manager, Marine Conservation Branch (MCB), Nature Conservation Division.

CALM Collaboration

- Kevin Bancroft - Marine Conservation Officer, MCB.
- Tim Daly – Marine Technical Officer, MCB.
- Mike Lapwood - Marine Operations Officer, MCB.
- Sue Elscot – Field Officer, MCB.
- Roger Banks - Manager, South West Capes District
- Charlie Broadbent - Senior Operations Officer, Southwest Capes District

External Collaboration

- Gary Kendrick - Project Leader, Botany Department, University of Western Australia.
- Anne Brearley, Botany Department, University of Western Australia.
- Cameron Simms, Botany Department, University of Western Australia.
- John Huisman, School of Biological and Environmental Sciences, Murdoch University.
- Laura Stocker, Institute for Science and Technology Policy, Murdoch University.
- Euan Harvey, University of Otaga, Dunedin, New Zealand.
- Mark Westera, Centre for Ecosystem Management, Edith Cowan University.
- Eva Boogard, Professional underwater photographer.
- Skipper and crew of the *MV Voyager*.

Funding and resources

- The Geographe Bay-Capes biological survey is partially funded by a grant of $72,000 through the Natural Heritage Trust's Coast and Clean Seas Marine Protected Area Program.
- Resources including scientific supervision, technical assistance, logistical support and instrumentation are being provided by the MCB.

This report may be cited as:

Bancroft K.P. (1999). Biological survey of the major benthic habitats of the Geographe Bay-Capes-Hardy Inlet region (Geographe Bay to Flinders Bay): 28 January-8 February 1999. Marine Reserve Implementation Field Programme Report MRI/CF/GBC - 18/1999. (Marine Conservation Branch, Department of Conservation and Land Management, 47 Henry St., Fremantle, Western Australia, 6160). Unpublished report.

Copies of this report may be obtained from:

Marine Conservation Branch
Department of Conservation and Land Management
47 Henry St., Fremantle, Western Australia, 6160

Ph: 61-8-9432 5100; Fax: 61-8-9430 5408

SUMMARY

This report presents details of a field survey to be undertaken aboard the vessel *MV Voyager*, from 28th January-8th February 1999, along the southwest coast of Western Australia. The survey, a systematic and quantitative investigation of the major benthic habitats from Geographe Bay to Flinders Bay, is being carried out to examine marine biota in nearshore waters in the proposed Geographe Bay-Capes-Hardy Inlet marine reserve.

Environment Australia under the Natural Heritage Trust's Coast and Clean Seas Marine Protected Area Programme funds this field survey. The Marine Conservation Branch in conjunction with the University of Western Australia, as part of the Marine Reserve Implementation process (MRI), is conducting this project in collaboration with CALM's Central Forests Region. It will contribute to a regional classification of the proposed marine reserve areas along the south coast, identified in the Wilson Report, according to ecological, economic and cultural criteria.

The objectives of this survey are to provide a quantitative description of marine biota at representative sites within the major benthic habitats and to investigate of the influence of physical parameters, such as substrate type and wave exposure, on community diversity. The survey will also involve the collection of fauna and flora density and biomass data, as baseline information for long-term monitoring of communities before and after marine reserve implementation.

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INTRODUCTION

GENERAL BACKGROUND

This report presents details of a field survey to be undertaken aboard the *MV Voyager* from the 28th January to 7th February 1999, in the waters off southwestern Western Australia between Geographe Bay and Flinders Bay. The survey, a systematic and quantitative investigation of the major benthic habitats is being carried out to examine marine biota in the nearshore environment. These waters include the Geographe Bay-Cape Leeuwin and Hardy Inlet areas recommended in *the Report of the Marine Parks and Reserves Selection Working Group* (CALM 1994) as worthy of consideration for reservation (Figure 1).

The CALM Act allows for the establishment of multiple-use marine conservation reserves for the purposes of conservation of marine flora and fauna and public recreation. Commercial activities, such as fishing, aquaculture and petroleum exploration and production, are also acceptable within specific zones of multiple-use marine conservation reserves. The Fisheries Department manages commercial and recreational fisheries in marine conservation reserves.

The CALM Act specifies the statutory process for the reservation of marine conservation reserves, including a public planning process for the development of management zoning schemes that allow for the spatial separation of incompatible activities in a marine park. In anticipation of this process the major marine resources and current uses of a number of the areas recommended for reservation in the Marine Parks and Reserves Selection Working Group Report, are being identified. Under the *New Horizons: The way ahead in marine conservation and management* strategy (WA Govt. 1998), the State Government requires biological, economic, usage and cultural assessments to be made of areas to be considered for marine reserve status under the CALM Act before the Notice of Intent (NOI) is issued. This revised process has been designed to reduce the level of user concern normally resulting from the release of the NOI for public comment. The data layers provide the basic information for a consultative process resulting in the determination of preliminary boundaries and zonings so that current users have a clear appreciation of how the proposed marine reserve will affect their current and future activities from the outset.

Little is known about the conservation values of the marine environment, although high levels of marine biodiversity and endemism has been reported from other parts of Australia's temperate marine environment (Edyvane, 1996).

In December 1997, the Western Australian Government, following advice provided by the WA Marine Parks and Reserves Authority, announced that the Geographe Bay-Capes-Hardy Inlet region as one of three priority areas for the establishment of marine conservation reserves under the *CALM Act*. Reservation of the waters of the Geographe Bay-Capes-Hardy Inlet region was also recommended in the Leeuwin-Naturaliste Ridge Statement of Policy Report (WAPC 1997).

SURVEY AREA

The area targeted for survey lies within the CALM (1994) Leeuwin–Naturaliste and the Hardy Inlet recommended areas of south west Western Australia (Figure 1).

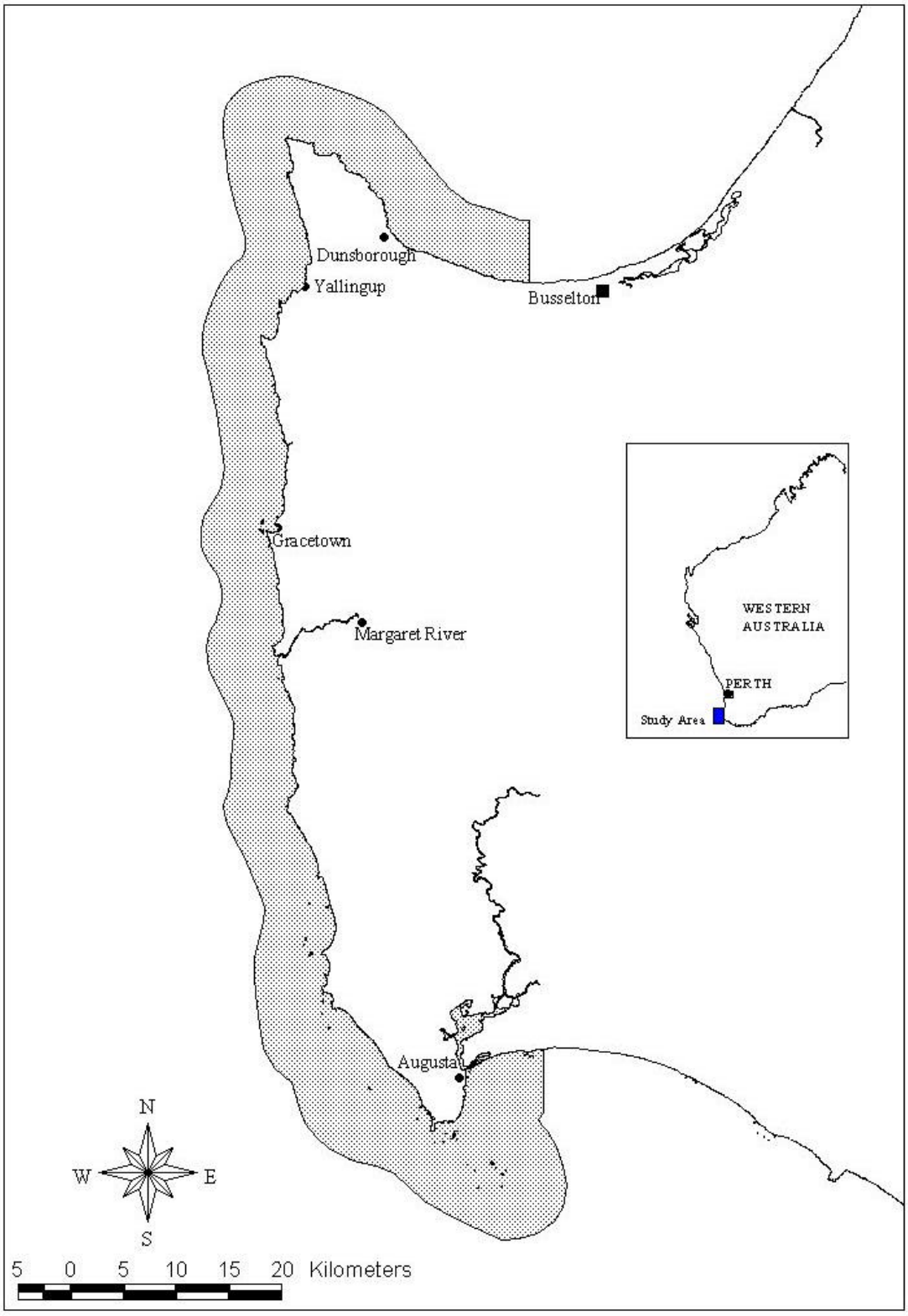


Figure 1: Study Site (Geographe Bay-Capes-Hardy Inlet region)

OBJECTIVES

Primary objectives:

The primary objectives of the survey are:

- quantitative description of marine biota at representative sites within the major benthic habitats;
- quantitative analysis of species richness within the major benthic community types;
- investigation of the influence of physical parameters, such as substrate type and wave exposure, on community diversity, and;
- collection of fauna and flora density and biomass data as baseline information for long-term monitoring of communities before and after marine reserve implementation.

Secondary objectives:

The secondary objective of the survey is the opportunistic collection of qualitative information on visually dominant marine fauna and flora.

METHODS

SITE SELECTION

The sites have been selected using the benthic habitat data collected in the Capes Benthic habitat survey (Bancroft & Colman 1998). A quantitative survey will be undertaken, with sampling at a total of 48 sites at 3 locations between Geographe Bay and Flinders Bay with varying orientation: north; west; and south aspects. At each location, sites are determined with varying environmental conditions:

- Depth: shallow (<10 m) and deep (10-16 m);
- Profile: high or low relief, and;
- Aspects: vertical or horizontal faces.

QUANTITATIVE SAMPLING

At each site the following will be surveyed:

- the abundance of large fishes and smaller cryptic fishes;
- the abundance of most dominant sessile invertebrates (sponges and ascidians);
- the abundance of mobile invertebrates;
- the percentage cover of macroalgae, and;
- the biomass of macroalgae.

A combination of visual censuses, quadrat sampling and benthic video quadrats will be employed to maximize the amount of data gathered within the short duration of the survey.

All data will be recorded on the appropriate data sheets (see Appendicies 3, 4, 5 & 6).

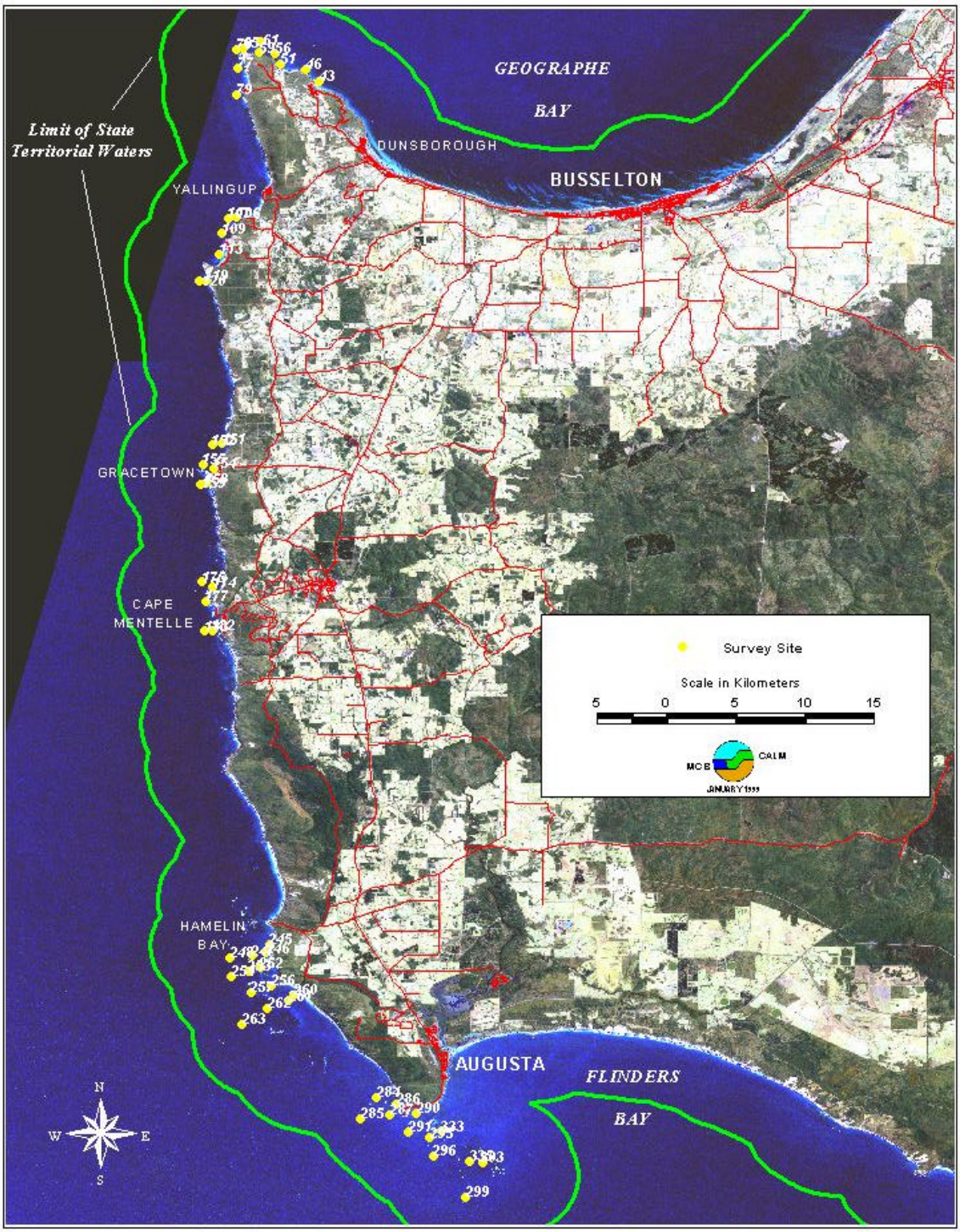


Figure 2: Sampling sites for the biological survey in the Geographe Bay-Capes-Hardy Inlet region

PROJECT MANAGEMENT

SURVEY VESSEL

Moonlight Charters: *MV Voyager*

Mr Warren Piggot	Skipper	Mob: 0417 970 958 A/h Ph: 9331 2839

SURVEY TEAM

The survey team will be comprised of 12 people.

CALM Marine Conservation Branch personnel

Kevin Bancroft	Marine Conservation Officer	Ph (w): 9432 5102 Mob: 0417 401 200 Fax: 9430 5408 Ph (h): 9448 8192
Tim Daly	Marine Technical Officer	Ph (w): 9432 5106 Sat Ph: 061 8816 531 12131 Fax: 9430 5408 Ph (h): 9388 2781
Mike Lapwood	Dive Supervisor/Marine Operations Officer	Ph (w): 9432 5108 Mob: 0419 045 285 Fax: 9430 5408 Ph (h): 9307 7631
Sue Elscot	Team Member	Ph (h): 9756 8260

External personnel

Dr Gary Kendrick	Project Coordinator, UWA	Ph (w): 9380 3998 Fax: 9380 1001 Ph (h): 9448 1143
Dr Jane Prince	University of Western Australia	Ph. (w): 9380 1469 Fax: 9380 1029 Ph (h): 9382 1786
Dr Anne Brearley	University of Western Australia	Ph (w): 9380 2265 Fax: 9380 1001 Ph (h): 9384 5006
Cameron Simms	University of Western Australia	Ph (w): 9380 2206 Fax: 9380 1001

Dr John Huisman	Murdoch University	Ph (w): 9360 2400 Fax: 9360 6303 Ph (h): 9339 5490
Dr Laura Stocker	Murdoch University	Ph (w): 9360 2889 Fax: 9360 6421 Ph (h): 9331 1081
Dr Euan Harvey	University of Otaga, NZ	Ph (h): 9335 3890
Mark Westera	Edith Cowan University	Ph (w): 9400 5147 Fax: 9400 5509 Ph (h): 9381 1152
Eva Boogaard	Professional underwater photographer	Ph (h): 9300 5174 Fax: 9571 3070

FIELD ITINERARY

The team will embark on the survey vessel on the afternoon of the 28th January 1999 and will follow the proposed field itinerary (Table 1), weather permitting. The vessel will then proceed to Augusta, where the field survey team will disembark on morning of the 8th February 1999.

Wind patterns along this stretch of coastline at this time of year may mean that the sampling work will be restricted to the first half of the day. A 5-20 kt offshore (E-NE) breeze usually gives way to a 10-25 kt S-SW seabreeze during the afternoon. Work will be commenced as early as possible in the morning and if wind/wave conditions prevent diving work in the afternoon the time will be spent sorting/preserving samples and collating field data. If weather conditions prevent diving altogether, sampling will be carried out at deeper sites using a small dredge.

SAFETY

General

All safety procedures relating to navigation and associated vessel activities, and the personal safety of crew and passengers of the *MV Voyager* during this field survey are the primary responsibility of the skipper of the vessel.

Alterations to survey procedures based on safety aspects related to weather conditions and sea state are the responsibility of the Project Leader in consultation with the boat Skipper.

Decisions to modify the methods of the field survey will be made by the project leader and dive master, in consultation with the vessel's skipper and the rest of the survey team.
Field operations shall be carried out in accordance with departmental procedures and protocols.

Overall responsibility of field procedures during this survey and the personal safety of all team members rests with the Project Leader.

Table 1: Field itinerary for the Geographe Bay-Capes-Hardy Inlet marine habitat survey, 28th January to 8th February 1999

Date	Activity
27/1/99	Equipment to be loaded on the survey vessel *MV Voyager*. Vessel steams to Dunsborough. Mike Lapwood to travel with vessel.
28/1/99	Survey team arrives at Dunsborough in afternoon. Team to board *MV Voyager*.
29/1/99	Field survey commences (am). Laura Stocker to board am.
29-31/1/99	Sites at northern location (Cape Naturaliste) are surveyed.
31/1/99	Laura Stocker leaves pm.
1-3/2/99	Sites at western location (Yallingup to Margaret River) are surveyed.
4-7/2/99	Sites at southern location (Hamelin Island to Cape Leeuwin) are surveyed.
4/2/99	Gary Kendrick leaves pm.
7/2/99	Field survey completed. *MV Voyager* arrives Augusta (pm). Start of unloading of survey vessel. Survey team overnights onboard.
8/2/99	Team disembarks from survey vessel (am) and departs for Perth.

Boating

All boating operations shall be carried out in accordance with Department of Transport regulations and also conform to CALM's Draft Departmental Boating Policy and Procedures. No policy in the latter document shall override the responsibilities of the master, provided under the maritime law in respect of the good navigation and safe operation of the vessel and to the duty of care for all persons on board.

Diving

The Dive Supervisor has primary responsibility for all personnel participating in diving operations and for ensuring that all diving operations are conducted according to the CALM dive code and to an approved dive plan. The departmental diving officer has approved the dive plan for this survey.

No decompression dives will be undertaken.

Non-CALM divers in this field survey will dive according to their own diving codes of practice where appropriate and are required to sign an indemnity form (CLM 154). They have a responsibility for their own personal safety and for the safety of other members of the diving team.

Any diving undertaken by the vessel skipper and crew is done so at their own risk.

COMMUNICATIONS AND EMERGENCY CONTACTS

General

- The survey team will log on with the local volunteer sea rescue upon launching and log off upon return.
- The vessel being used is equipped with marine VHF and 27 MHz radios.
- The dive supervisor will be in constant contact with survey vessel with hand held VHF radio.
- The vehicle is equipped with a CALM VHF radio.
- The survey team will also have mobile phones but coverage may be intermittent in places (Mike Lapwood 0419 045 285, Kevin Bancroft 0417 401 200).
- A satellite phone has been provided by Iridium for trial. Tim Daly can be contacted on 0061 8816 561 12131.

If communications with the survey team is required the mobile number should be tried first then sat phone. Messages can be left with survey vessel or local CALM offices. If urgent communications are required the relevant volunteer sea rescue group can be contacted and a message relayed by VHF radio.

CALM offices

Marine Conservation Branch, Fremantle:	Ph: 9432 5100 Fax: 9430 5408. CALM VHF channel 17 .
Busselton:	Ph: 9752 1677 Fax: 9752 1432. CALM VHF channels 8, 16, and 22.
Yallingup:	Ph: 9755 2144 Fax: 9755 2144. CALM VHF channels 8, 16 & 22.
Cowaramup:	Ph: 9755 5324 CALM VHF channels 8, 16 & 22.
Margaret River:	Ph: 9757 2322 Fax: 9757 2930 CALM VHF channels 8, 16 & 22.
Augusta:	Ph: 9758 1756 Fax: 9758 1275 CALM VHF channels 8, 16 & 22.

Volunteer sea rescue groups

ACRM Base Capel:	Ph: 9727 2451 Channel 88 (27 MHz) Channel 16 (VHF).
Geographe Bay Sea Rescue Group (Busselton):	Ph: 9752 4410 Fax: 9754 2866 Channels 88 and 91 (27 MHz) Channel 16 (VHF).
Naturaliste Sea Rescue Group (Dunsborough):	Ph: 9755 3594 Channels 88 and 90 (27 MHz) Channel 16 (VHF).
Yallingup Sea Rescue Group:	Ph: 9755 2145 Channel 88 (27 MHz).
Margaret River Sea Rescue Group:	Ph: 9757 3387 Channel 88 (27 MHz).
Augusta Sea Rescue Group:	Ph: 97581888. Channel 88 (27 MHz).

Fisheries Western Australia

Busselton Office – Kevin Johnstone	Ph: 9752 2152 Mob: 018 902 546

Medical services

Fremantle Hyperbaric/Diving Services:	Ph. 9431 2233 Ph. 9431 3333
Augusta Hospital	Ph: 9758 1502
Busselton District Hospital	Ph: 9752 1122
Margaret River Hospital	Ph: 9757 2000

Media contacts

Busselton –Margaret River Times Helen Allen	Ph: 9757 3111
Busselton-Dunsborough Mail Penny Hanley	Ph: 9754 3330

Survey vessel

Moonlight Charters – Warren Piggot
MV Voyager

Mob. 0417 970 958
A/h Ph. 9331 2839
HF call sign. VLW4960

BUDGET

This project is partially funded by the National Heritage Trust, Coast and Clean Seas Marine Protected Areas Programme, with support in kind being provided by CALM's Marine Conservation Branch and CALM's Central Forests Region, South West Capes District. The budget breakdown is described in Table 2.

Table 2: Budget breakdown for the Geographe Bay-Capes-Hardy Inlet biological survey

Budget Item			CALM ($ in kind)	MPA funds ($)	Total costs ($)
Travel					
Vehicles	MCB Triton - $0.45 @ km for 1200 km		540.00		540.00
	UWA - $0.33 @ km for 1200 km			396.00	
		Sub-total	540.00	396.00	936.00
UWA contract					
Dr Gary Kendrick	Overall design and algae quantitative sampling			4382.00	4382.00
Dr John Huisman	Algae ID, field collection and herbarium accession			4000.00	4000.00
Cameron Simm	Algae quantitative sampling			2078.00	2078.00
Dr Laura Stocker	Ascidian ID and museum accession			1000.00	1000.00
Dr Anne Brearley	Mobile invertebrate ID and museum accession			2500.00	2500.00
Dr Euan Harvey	Fish ID, sampling design and quantitative sampling			4000.00	4000.00
Mark Westera	Fish quantitative sampling			2078.00	2078.00
Dr Jane Prince/Dr Anne Brearley	Intertidal assemblages sampling design and quantitative sampling (date to be announce).			4000.00	4000.00
Dr Gary Kendrick	Data analysis			4250.00	4250.00
		Sub-total		28288.00	28288.00
Staff					
K.P. Bancroft	18 days @ $178		3204.00		3204.00
Tim Daly	15 days @ $149		2235.00		2235.00
Mike Lapwood	15 days @ $149		2235.00		2235.00
Sue Elscott	11 days @ $114		1254.00		1254.00
Hard living allowance	11 days x 4 staff @ $0.37		390.00		390.00
Diving allowances	10 days x ~3 dives x 4 staff @ $3.90		468.00		468.00
		Sub-total	9786.00		9786.00
Vessel & other equipment					
17 m charter boat *MV Voyager*	Moonlight Charter- 11 days @ $1400			15400.00	15400.00
MCB inflatable & 25 hp o/b	11 days @ $100		1100.00		1100.00
MCB inflatable & 25 hp o/b	11 days @ $100		1100.00		1100.00
Fuel & oil			500.00		500.00
GPS unit	11 days @ $10		110.00		110.00
Dive compressor	11 days @ $100		1100.00		1100.00
Benthic dredge	11 days @ $15		165.00		165.00
Handheld VHF radio	11 days @ $15		165.00		165.00
		Sub-total	4240.00	15400.00	19640.00
Consumables					
Ethanol	40 l		154.00		154.00
Formaldehyde	50 l		636.00		636.00
Specimen containers	200 x 500 ml		175.00		175.00
Specimen containers	300 x 100 ml		68.00		68.00
Data sheets	500		350.00		350.00
Digital video tapes	15 x DVM-E60 @ $25		375.00		375.00
Slide film	10 x Fuji Sensia 200 & processing		250.00		250.00
Other consumables	Gloves/pencils/chalk/erasers/batteries…etc		500.00		500.00
		Sub-total	2508.00		2508.00
Contingency					
Administration overruns	10% of funding			4500.00	4500.00
		Sub-total		4500.00	4500.00

TOTAL	**17074.00**	**48584.00**	**65658.00**

EQUIPMENT

Boating

- 2 x Zodiac inflatables
- 2 x 25 horsepower outboard motors
- 4 x 20 l fuel tanks
- 2 x boating safety gear
- 2 x 200 l drums of unleaded fuel
- Fuel hand pump
- 4 x 10 l two-stroke outboard oil
- Hand held VHF radio

Diving

- Compressor with spares, fuel, funnel, intake hose & earmuffs
- 20 SCUBA cylinders
- 5 BCDs
- 5 regulator sets
- 3 weight belts, each with 24 lb of weights
- Spare weights
- 2 dive computers
- 3 u/w torches
- 6 compasses
- 2 masks and snorkels
- 1 pairs of fins
- 1 underwater viewfinder
- 2 dive flags
- 2 x diving spares/repair kit

Sampling

- 4 x 0.25m^2 quadrats
- 4 x 1 m^2 quadrats
- 2 x photo quadrats (33 x 45 cm)
- 3 x random dot overlay for photo quadrat
- 4 pairs of clippers
- 100 large calico bags
- 100 small calico bags
- 30 hessian bags
- Pimple floats and lines
- Railway line weights
- 10 catch bags
- Dredge
- 230 m rope

Data recording

- 8 underwater slates, grips and pencils
- 7 small slates
- 300 sheets waterproof paper
- 1 box of rubber bands
- 3 box of pencils

Sample preservation

- 6 large sorting trays
- 6 small sorting trays
- 21 plastic screw-top containers (20 litre) with large plastic bags
- Nally crates with lids (35l, 55l)
- Plastic sample containers (100, 250, 500 ml)
- Sealable plastic bags (various sizes)
- Plastic tie wraps
- Permanent marker pens
- Labels
- Stationary
- 100% alcohol (40 litres)
- Formaldehyde (40 litres)
- Sodium bicarbonate
- 4 l bleach
- Sheep drench
- Disposable gloves
- Engel portable refrigerator
- Sartorius balance

Video camera

- Canon MV1 digital video camcorder, with batteries (6), battery charger (1), remote control and accessories
- Amphibico Explorer MV1 housing
- Blaupunkt CC894 Hi 8 video camcorders, with battery packs (6), battery chargers (4), battery discharger (2), yellow and orange filters
- StingRay SR-700 underwater video housings with colour monitor backs, super wide-angle and zoom-macro lenses, and built-in red filters
- 2 x SunRay underwater lighting system with battery pack, rechargable batteries (6), battery charger (2), and spare lamps (2)
- Instruction manuals

- 15 x 60 min digital video tapes
- 15 x 90 min Hi 8 video tapes
- Housing O-ring kits and silicone grease
- Cleaning kit

Still photography

- 2 x Nikonos V camera, 35 mm lens, SB102 strobe unit, close up kit
- 28 mm lens
- Canon EOS camera and lens
- 14 rolls of 36 exposure slide film - Fuji Sensia 200 (10) & Fuji Sensia 100 (4)
- Kit of camera spares

Safety

- Comprehensive diving first aid kit
- Emergency response flow-sheet
- Emergency contact flow chart
- Patient information log
- Log sheets for accidents
- Oxygen therapy equipment
- Spare oxygen D cylinder
- Sunscreen

Information

- Marine Charts
- Field identification guides for temperate water fishes, macro-algae, seagrasses, benthic invertebrates
- Reference books on southern Australian seabirds and marine mammals
- CALM GIS habitat maps
- Aerial photographs of coastline
- Habitat data log sheets
- Laptop computer and accessories
- 10 high density discs

Position fixing

- 1 Garmin hand held GPS

Mechanical/electrical repairs

- Comprehensive electrical repair kit

Accessories

- AA batteries
- C batteries
- 6 volt batteries

DATA MANAGEMENT

FIELD PROGRAMME REPORT

Hard copies of the Field Programme Report will be held at three locations:

1. Marine Conservation Branch, Department of Conservation and Land Management, 47 Henry St., Fremantle Western Australia, 6160.

2. Woodvale Library, Science and Information Division, Ocean Reef Rd., Woodvale, Western Australia, 6026.

3. Archives, Woodvale Library, Science and Information Division, Ocean Reef Rd., Woodvale, Western Australia, 6026.

The Marine Conservation Branch will hold digital copies of the Field Programme Report at three locations:

1. The Marine Conservation Branch Server:
   mcb on StreetTalk\User Data@CALM.FREM@CALM [T:/Reports/MRI/MRI_1899]

2. MCB Server full backup DAT tape [T:/Reports/MRI/MRI_1899]

3. CD-ROM [MRI_1899]

DATA REPORT

Collected raw data will be written into a Marine Reserve Implementation Data Report and copies will be held at the same locations as for the Field Programme Report. A database of the biological data will be stored digitally at three locations:

1. The Marine Conservation Branch Server:
   GIS Data@FREM.SHARED@CALM on StreetTalk [L:/GIS/MCB/CFR/Capes/]

2. MCB Server full backup DAT tape [L:/GIS/MCB/CFR/Capes/]

3. On GIS Information Coordinator's Computer. [H:/MCB/CFR/Capes]

VIDEO RECORDS

Collected video footage will be held at two locations:

1. Video masters (Hi8 or Digital) to be archived at the CALM Information Management Branch, Como.

2. VHS copies to be stored at CALM Marine Conservation Branch, Fremantle.

SLIDE RECORDS

All photographic slides to be stored at CALM Marine Conservation Branch, Fremantle.

Eva Boogaard will retain original slides produced by her. Duplicates to be stored at CALM Marine Conservation Branch, Fremantle.

REPORT DISTRIBUTION

Copies of this report will be distributed to:

- Dr Chris Simpson Manger, Marine Conservation Branch
- Bob Chandler Manager, Central Forests Region
- Roger Banks Manager, South West Capes District
- All survey team members (12)

PUBLICITY/EDUCATION

PUBLIC RELATIONS OPPORTUNITIES

It is intended that a short article regarding the field survey will be placed in various local newspapers (eg. Augusta Margaret River Mail, Busselton-Dunsborough Mail and Busselton-Margaret River Times). Opportunities for radio interviews will be identified and utilized (eg. Radio West Broadcasters, ABC regional office).

EDUCATION OPPORTUNITIES

No education opportunities have been identified.

REFERENCES

Bancroft, K.P. & Colman, J.G. (1998). Biological verification of the major benthic habitats of the Geographe Bay-Capes-Hardy Inlet region (Geographe Bay to Flinders Bay): 13-20 December 1998. Marine Reserve Implementation Field Programme Report: MRI/CF/GBC - 16/1998. Marine Conservation Branch, Department of Conservation and Land Management. (Unpublished report).

CALM (1994). A representative marine reserve system for Western Australia. Report of the Marine Parks and Reserves Selection Working Group. Department of Conservation and Land Management. June 1994.

Edyvane,K. 1996. The role of marine protected areas in temperate ecosystem management. In: *Developing Australia's representative system of marine protected areas: Criteria and guidelines for identification and selection* (ed. R. Thackway). Proceedings of a technical meeting held at the South Australian Aquatic Sciences Centre, West Beach, Adelaide, 22-23 April 1996. Department of the Environment, Sport and Territories: Canberra.

WA Govt.(1998). New Horizons: The way ahead in marine conservation and management. Prepared for the Western Australian Government by the Department of Conservation and land mangement.

WAPC (1997). Leeuwin-Naturaliste Ridge: Statement of planning policy. Prepared for the Western Australian Planning Commission by the Ministry of Planning in conjunction with the Shire of Busselton and the Shire of Augusta-Margaret River. May 1997.

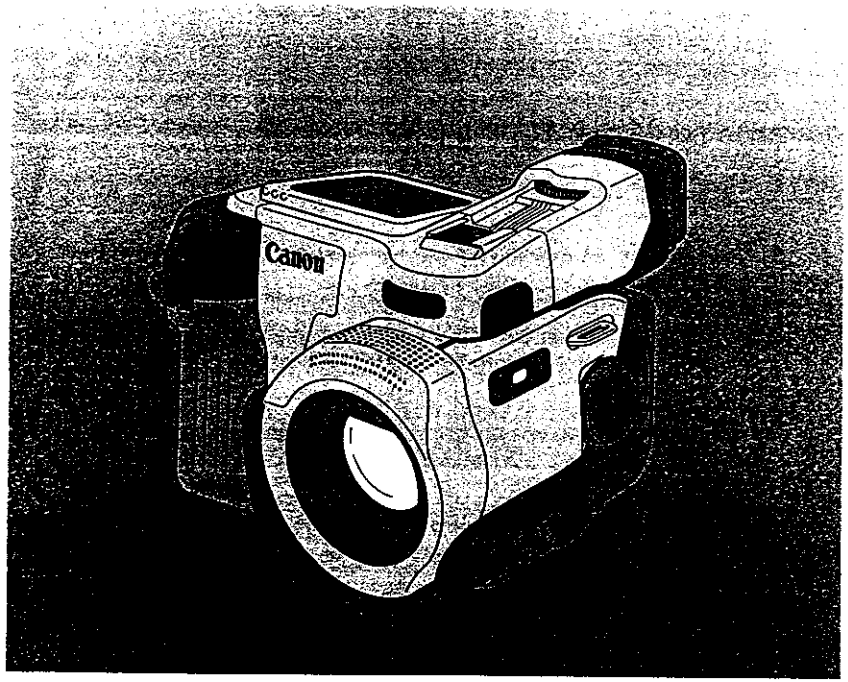
APPENDENCIES

APPENDIX I: DIGITAL UNDERWATER VIDEO SYSTEM OPERATING INSTRUCTIONS

Field Manual
To be kept with camcorder.

DIGITAL VIDEO CAMCORDER E

Instruction Manual



Introduction

Mastering the Basics

Using the Full Range of Features

Additional Information

Mini DV Digital Video Cassette

Canon MV1

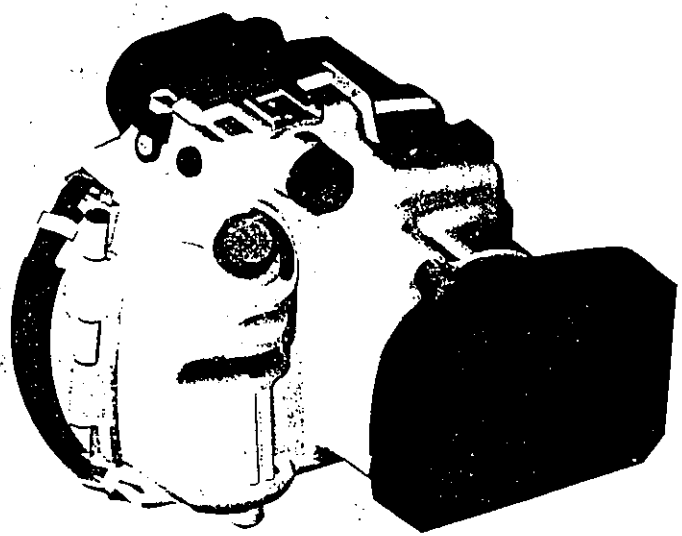
E (PAL)

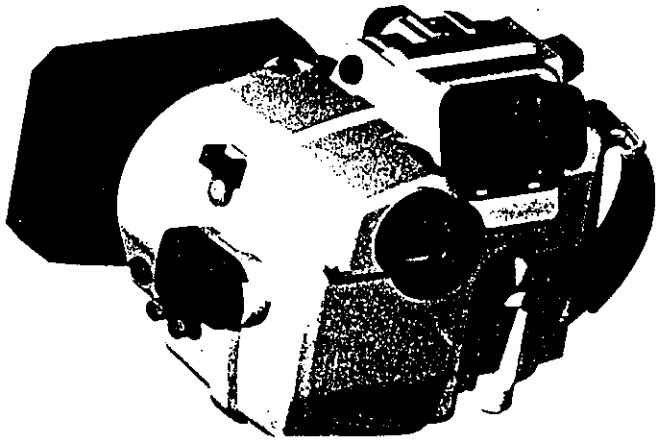
AMPHIBICO

Field copy. To be kept with housing

INSTRUCTION MANUAL FOR

EXPLORER MV1 HOUSING





APPENDIX II: HI 8 UNDERWATER VIDEO SYSTEM OPERATING INSTRUCTIONS

Preparation of underwater housing and video camcorder

Step-by-step instructions on preparing the StingRay SR-700 housing and Blaupunkt CC894 camcorder are given below. This procedure is adapted from the AIMS Standard Operational Procedure Number 2: "Surveys of sessile benthic communities using the video technique" (Christie *et al.*, 1996).

Where possible, store and prepare the equipment at room temperature to prevent condensation on the lenses of the camcorder and housing. Carry out these preparations in a dry, dust and spray-free environment. For more details refer to the relevant instruction manual.

Housing

1) Open the housing by simultaneously releasing and rotating the two black plastic catches at the rear of the housing. Carefully remove the monitor back and place to one side. Remove the camera tray by depressing the small black plastic catch on the left hand side and simultaneously sliding out the tray. Check the inside of the housing for any dust or other particulate matter, and clean out using a lens cloth and blower brush if necessary. Check the inside of the lens and the red filter and clean using blower brush, lens tissues and lens cleaning fluid if necessary. Check which lens is attached to the housing - super wide-angle (the shorter of the two available optics) or zoom-macro. **For transect work the super wide-angle lens is required.**

2) If using the SunRay lighting system, install a fully charged battery in each of the battery pods mounted on both sides of the housing (see StingRay instruction manual).

3) Remove the two O-rings from the monitor back, clean them with lens tissues and check for any cracks or scratches. If there is any damage to the O-rings, discard and replace with new ones. Apply a small amount of silicone grease (2-3 mm) between thumb and index finger and run the O-ring through several times to spread this evenly. Repeat with the second O-ring. **Ensure that you do not use too much grease as this could cause the seal to leak!** Remember that the grease is there to keep the O-rings supple and not to actually form a seal.

4) Clean out each O-ring groove with a cotton bud, and carefully replace the clean and greased O-rings back into the grooves without twisting them. Ensure that there is no particulate matter sticking to the O-rings. The housing is now ready for the camcorder to be inserted.

Camcorder

5) Place the camcorder on a clean, dry, flat surface and attach the StingRay battery adapter to the rear. Attach a fully charged Sony NP-78 battery pack to the battery adapter. Remove the lens cap, check the lens and clean if necessary. Attach a yellow or orange filter if required (see point No. 24).

6) If the housing zoom-macro lens system is being used, attach the zoom-macro adaptor to the front of the camcorder. This accessory lens pushes on in front of the camcorder lens, so that it lies flush with the manual focusing ring.

7) Press the eject switch (small switch with blue button on top of camcorder) and insert a blank Hi 8 video tape into the cassette holder, ensuring that the red copy protection switch is switched off. Close the cassette holder by gently pressing the 'PUSH' mark on the right side - the top section of the cassette holder will then close down automatically. **Do not push it down manually.**

8) Switch the camcorder on by sliding the OPERATE switch (front left side with green button) to CAMERA. Turn the REC switch (rear left side with red button) to STANDBY.

9) Select the camcorder settings. Turn the IMAGE STABILIZER switch (below the AUTO MODE cover on left side) to ON. Open the AUTO MODE cover and set the functions as follows:

FOCUS- the focus mode can be selected when the camcorder is inside the housing.

EXPOSURE - leave the exposure mode in automatic setting (no exposure indicator on the left side of the LCD display).

PROGRAM - select the desired shutter speed by pressing the PROGRAM button. The SPORTS setting (indicated by a running figure on the LCD display) gives a shutter speed of 1/50 to 1/500 of a second. **This will be suitable for most video transect work**. On occasions when camcorder shake may be excessive, or when trying to video fast-moving subjects such as marine mammals or fish it would probably be better to select the HIGH SPEED setting (indicated by a golfing figure on the LCD display), giving a shutter speed of 1/4000 sec.

WHITE- the white balance setting can be selected when the camcorder is inside the housing (see point No. 18).

10) Ensure the viewfinder lens is removed, and the viewfinder is locked in the down position (see camcorder instruction manual for details).

11) Ensure that the timecode function is switched on (TC displayed on the top right side of the LCD display). If it is off, press the COUNTER/TIMECODE button below the LCD display so that TC is displayed.

12) Mount the camcorder on the StingRay camera tray, ensuring that the camcorder is correctly aligned and that the screw on the bottom of the tray is tightened firmly. Attach the cables from the tray to the camcorder, in the following order:

i) attach the video cable (yellow label) to the VIDEO OUT plug (front right side), ensuring that it is routed snugly under the base of the battery and inside the camcorder grip strap (otherwise it will not reach the plug);

ii) attach the power-out cable (green label) from the battery adapter to the DC power jack on the camera tray;

iii) attach the remote cable (blue label) to the blue REMOTE plug (back right side);

iv) attach the microphone cable (red label) to the red MIC plug (front right side),ensuring that it is routed under the lens and clear of the camera tray.

13) Slide the camera tray assembly into the grooves in the housing and push forward gently until it will not go in any further. Check that the assembly is locked in place and cannot be withdrawn without depressing the small black plastic locking button at the rear left hand side of the camera tray.

14) Ensure that the two black plastic catches on the outside of the housing are in the vertical position with the slots facing towards you. Place the monitor back onto the rear of the housing, ensuring that the two black plastic guide pins go into the guide holes on the camera tray. Simultaneously rotate the locking catches towards you, ensuring that the stainless steel guide pins on the monitor back enter the slots on the catches. Continue to rotate the catches until they lock in the horizontal position. Inspect around the circumference of the monitor back to ensure that it is properly seated.

15) Assemble the monitor back screen shade and place it in the tracks of the monitor back. Slide it down until it locks in place.

Pre-filming checks

16) Power up the camcorder by sliding the PWR switch (right side rear) towards you and holding it in place for 2 seconds. A green LED comes on at the bottom centre of the monitor back, and the screen display

will come on. Check the screen display to ensure that all the camcorder functions are set correctly. At the top right side of the display there should be Hi8 and SP (indicating that the tape is Hi8 format and record mode is set for short play), and STBY (indicating that the camcorder is in standby mode). Underneath these symbols the time code indicator and the remaining tape indicator, will be displayed. At the bottom right side the battery indicator will be displayed. At the top left side there will be a hand symbol (indicating that the image stabilization system is on), and a running figure symbol (indicating that the shutter speed is set to SPORTS mode), and a hand symbol with the letter F inside (indicating that the manual focus mode is on). Check the manual focus by holding the focus switch (left side front) to both N (near) and F (far) positions.

17)To switch to autofocus mode, toggle (push and immediately release) the PWR switch towards you. Do not hold the switch in place or the camcorder will turn off. To return to manual focus mode, toggle the AF switch away from you. Use automatic focus for panoramic shots and manual focus for filming the transects.

18)Toggle the WB switch (left side) towards you repeatedly to change the white balance mode (as indicated by symbols in the top left side of display). The settings available are:

AUTO MODE- (no symbol): automatic white balance setting.

HOLD MODE - (HOLD): the last automatic white balance setting is locked and maintained, even if lighting conditions change.

OUTDOOR MODE - (sun symbol).

INDOOR MODE - (light bulb symbol).

For video transect work the most suitable settings are AUTO or OUTDOOR. Use the OUTDOOR mode in shallow (<3 m) water, on bright sunny days when the water visibility exceeds 8 m. Otherwise, leave the white balance in AUTO mode.

19)If there are any other symbols displayed on the screen check the camcorder instruction manual to determine what they represent.

20)Ensure that the zoom function is set to full wide-angle. Move the zoom switch (right side front) to the W position and hold it there. Check the zoom indicator on the left side of the screen display. (*Note: When using the super wide-angle lens and the auto focus mode, the camcorder will only zoom in and stay in focus for about 50 % of the full range before going out of focus. To zoom in closer than 50 % the zoom-macro lens system should be fitted).*

21)Turn the power off by moving the power/record switch to PWR and holding it there for 5 seconds. the screen display and the green LED will turn off.

22)Check that there is no condensation on the camcorder lens or housing lens. If condensation is present, delay filming until it disappears (approximately 10 minutes). The housing should be kept out of the sun during transport.

23)Once in the water, if visibility is good (>8 m) and transects are in water >3 m deep, slide the red filter down over the lens by turning the knob on the front plate of the housing. If transect is in water <3 m deep, or if the visibility is poor it will probably be necessary to use a yellow or orange filter that screws on to the camcorder, directly in front of the lens.

24)Check the housing for leaks. This may be indicated by a moisture condensation symbol on the screen display (refer to camcorder instruction manual), bubbles coming from the housing, or water droplets visible inside the housing when you look through the housing lens.

25)Before starting to film, check the front of the housing lens for small air bubbles. Gently wipe away any that are present

with your hand. Check for air bubbles regularly.

26)If lighting conditions are poor, switch on both SunRay lamps.

27)Turn the power on (move the power/record switch to PWR position and hold it there for 2 seconds) and commence recording (toggle the switch to the REC/STBY position. A red LED will come on at the bottom centre of the monitor back, and the REC symbol will appear at the top left side of the screen display.

Post-dive procedure

28)After every dive immerse the housing in fresh water. Leave it there for 10-15 minutes and wash the controls and monitor back with running water. Remove the monitor back screen shade.

29)Wipe the housing with a clean, dry towel and leave in a clean, dry, airy and salt-free environment to dry completely.

30)Wipe carefully around the rear seal of the housing before opening so that no water gets onto the camcorder. Open the housing by simultaneously rotating the black plastic catches at the rear of the housing. Remove the camera tray assembly by depressing the small black plastic locking button at the rear left side and sliding the tray out. Detach the cables and remove the camcorder from the tray. Attach caps to both housing and camcorder lens. **Do not open the housing where salt spray is present.**

31)Switch the camcorder to video by sliding the OPERATE button to VTR. Rewind the tape using the either the controls on the top of the camcorder or the remote commander. Connect the camcorder to the TV monitor (refer to camcorder instruction manual) and view the footage. Transcribe the system settings and time code information onto the main Video Transect Data Sheet (Appendix II). Label the tape clearly (using a permanent marker pen) with the designated tape number, the site number and the date of recording.

Tape numbering

The video tapes should be consecutively numbered according to the following coding system:

Project acronym (MRI/CF)/Site numbers - Date/Tape number (#1 onwards).

Thus, the first tape would be labelled as: **MRI/CF/GBC-5 – 30/01/99/TAPE#1**

If the tape contains footage spanning more than one day the tape number should indicate this.

32)A total of three sites should be recorded on each 90 minute Hi8 tape. Before commencing filming at another site, ensure that the tape is wound forward to the end of the footage recorded at the previous site. This will ensure that no data is recorded over accidentally. Once a tape is complete the red copy protect switch on the tape should be switched on to prevent any loss of site data. The tapes should be stored in a waterproof container and duplicated at the end of the field trip.

33)Clean the video heads with the head cleaning cassette after approximately 10 hours of use. Follow the instructions carefully to avoid damage to the video heads. Refer to the camcorder instruction manual for more details.

Recharging the battery packs

34)New batteries should be fully charged and discharged several times before use to prolong their life. The Sony NP-78 batteries should last between 75 and 90 mins, when using the monitor back. Before recharging a used battery, make sure it is fully discharged first (use the REFRESH function on the battery charger or a battery discharger). Once the battery is totally discharged, slide the indicator switch on the top of the battery so that a red dot is visible. This serves as a reminder that the

battery is totally discharged. Connect it to a battery charger and charge it completely. This will take approximately 2 hours and 20 minutes for a Sony NP-78 battery. Once it is charged, slide the indicator switch to hide the red dot, indicating that the battery is fully charged and ready to be used. At the end of the field trip, leave all batteries discharged.

APPENDIX III: VIDEO DATA SHEET

VIDEO DATA SHEET

Project					**Field Survey**		
Site No.		**Site Name**		**Date**		**Recorder**	
Start time		**Finish time**		**Depth (m)**		**Visibility (m)**	

Video System													
Focus mode				**Exposure mode**				**Program mode**				**White balance mode**			
Auto	☐	Manual	☐	Auto	☐	Manual	☐	Sports	☐	High-speed	☐	Auto	☐	Outdoor	☐
Lens system				**Filters**								**Lights**			
Wide-angle	☐	Zoom-macro	☐	None	☐	Red	☐	Yellow	☐	Orange	☐	On	☐	Off	☐

Video operator		**Tape no.**		**Height above substrate (cm)**	
Time coding for all video footage at site:		**From:**	: : :	**To:**	: : :

Transect time coding	**Start**	**Finish**	**Total time (mins/secs)**
T1	: : :	: : :	.
T2	: : :	: : :	.
T3	: : :	: : :	.

Notes:

APPENDIX IV: INVERTEBRATE DATA SHEETS

INVERTEBRATE DATA SHEET

Locality/area		**Site No**		**Date**	
Site Descriptor		**Recorder**			
Video Reference		**Slide Ref**			

	Quadrat No									
SPECIES	1	2	3	4	5	6	7	8	9	10

APPENDIX V: FISH CENSUS DATA SHEETS

RECORDER		DATE			LOCATION					DEPTH								
Buddy		REP No																
Species	2	4	6	8	10	12	14	16	18	20	25	30	35	40	45	50	55	60	65+
Maori Wrasse																			
Red banded Wrasse																			
Brown spotted Wrasse																			
Black spotted Wrasse																			
Western King Wrasse																			
Senator Wrasse																			
Little rainbow Wrasse																			
Pretty polly Wrasse																			
Brownfields Wrasse																			
False senator Wrasse																			
Snakeskin Wrasse																			
Western blue Groper																			
Sea Sweep																			
Footballer Sweep																			
Banded Sweep																			
Fusilier Sweep																			
Rough Bullseye																			
Common Bullseye																			
Slender Bullseye																			
Roughy																			
Six spined Leatherjacket																			
Blue lined Leatherjacket																			
Yellow striped Leatherjacket																			
Toothbrush Leatherjacket																			
Rough Leatherjacket																			
Fan bellied Leatherjacket																			
Horseshoe Leatherjacket																			
Mosaic Leatherjacket																			
McCulloch's Scalyfin																			
Common Scalyfin																			
Western Scalyfin																			
Zebra fish																			
Herring Cale																			
Rainbow fish																			
Western sea Carp																			
Old Wife																			
Moonlighter																			
Talma, Western																			
Dusky Morwong																			
Red lipped Morwong																			

RECORDER	DATE	LOCATION	DEPTH
Buddy	REP No		

Species	2	4	6	8	10	12	14	16	18	20	25	30	35	40	45	50	55	60	65+
Jackass Morwong																			
Westn crested Morwong																			
Magpie Perch																			
Drummer, Silver																			
Bream, Western Buffalo																			
Snapper																			
Queen Snapper																			
Toadfish, Blue spotted																			
Toadfish, Ringed																			
Tommy ruff																			

Marine Conservation Branch, Department of Conservation and Land Management

APPENDIX VI: MACROALGAE DATA SHEETS

MACROPHYTE DATA SHEET

Locality/area		Site No.		Date	
Site descriptor.				Recorder	
Video reference		Slide ref.			

Species	Quadrat number									
	1	2	3	4	5	6	7	8	9	10