Marine Research and its Links to Nature Based Recreation & Tourism Research in WA

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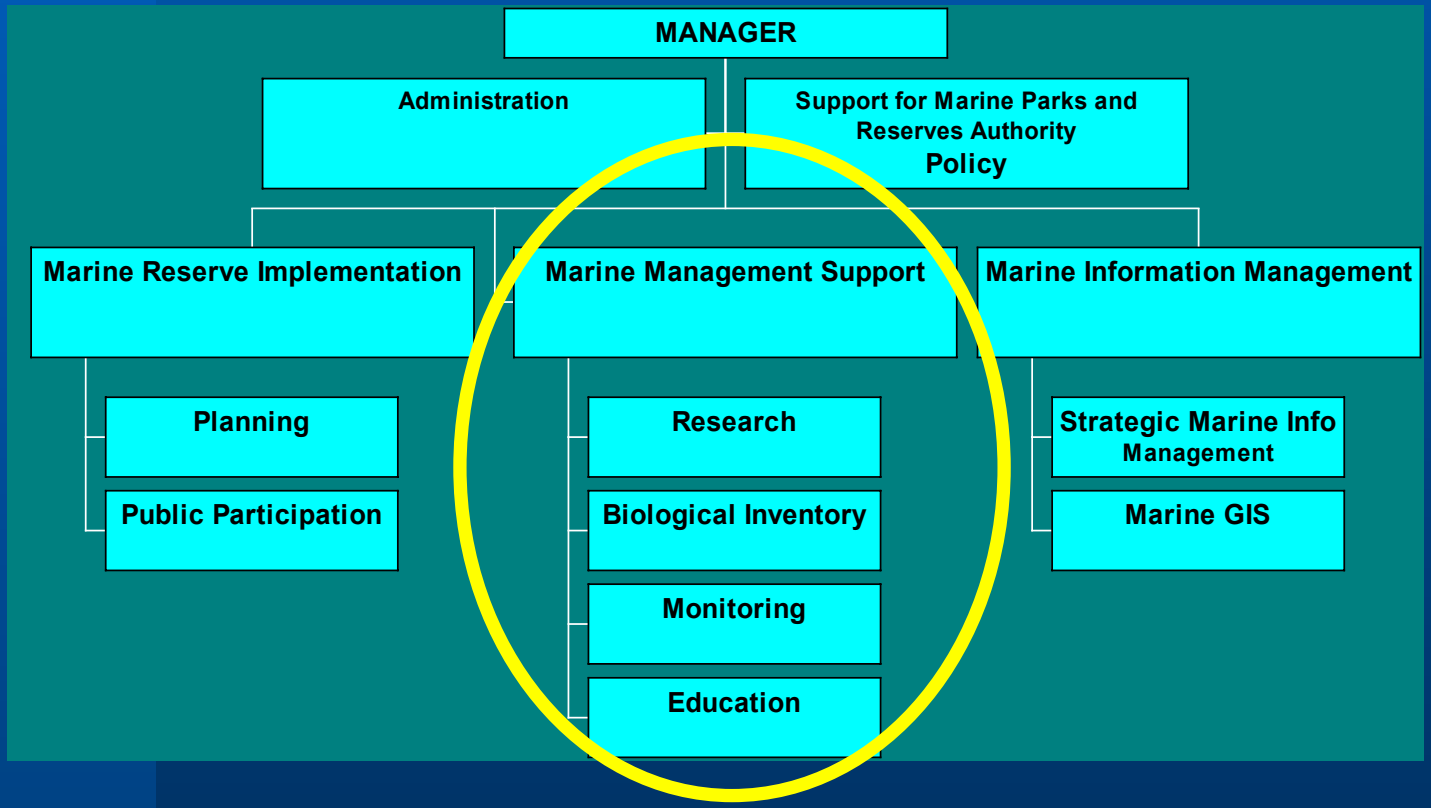
Areas covered today

- Talk on R&M for 'management support', rather than implementation of new reserves
- Understanding biological and physical processes, their influence on the way human usage is managed (how do we protect humans from natural dangers? how do we protect nature from human usage?) CALM conserves ecological values & manages human usage re: social values
- A way to prioritise what needs to be done (how do we assign limited resources?)
- Human usage and carrying capacity (people's attitudes? environment's ecological capacity?) - Note the MPRA audit requirements for key values in management plans

What does DCLM manage?

- **Management plans** specify what's important
- **MPRA** audits DCLM's performance in management of values, concentrating on the most important things
- **ecological** values - eg wildlife, water quality, habitats etc
- **social** values - eg recreation, nature based, cultural (indigenous), tourism, commercial, industrial
- ***??Wilderness, aesthetics, etc??*** - probably belongs in the ecological list because the ecology is more fundamental to them

Marine Conservation Branch (strategic, tactical, coordination, liaison, policy)



MCB Marine Management Support section

MCB MMS section takes a primary role in *RESARCH & MONITORING:*

- ***Coordination: internal and external***
- ***Research (inventory/baselines, processes)***
- ***Monitoring (strategic role plus on-the-ground)***

CALM's coastal network of regional ('District') offices:

- ***Facilitate research and monitoring***
- ***Carry out compliance monitoring***

Collaborations: MCB, Districts, CALMScience, Nature Protection Branch, Parks and Visitor Services, Corporate Relations

Government

Minister for Environment and Heritage

Marine Parks and Reserves Authority (vesting of MPAs)

CALM (manages MPAs)

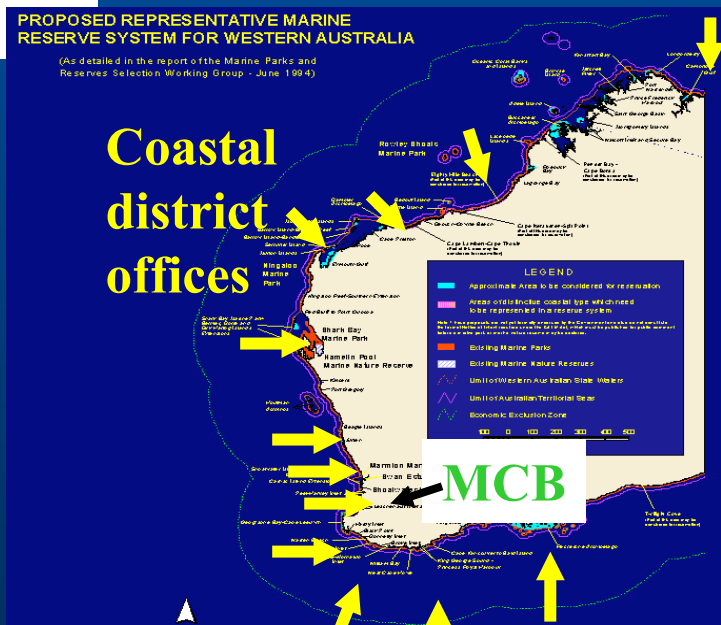
MPRA Scientific Adv Comm

Nature Conservation Division

Marine Conservation Branch

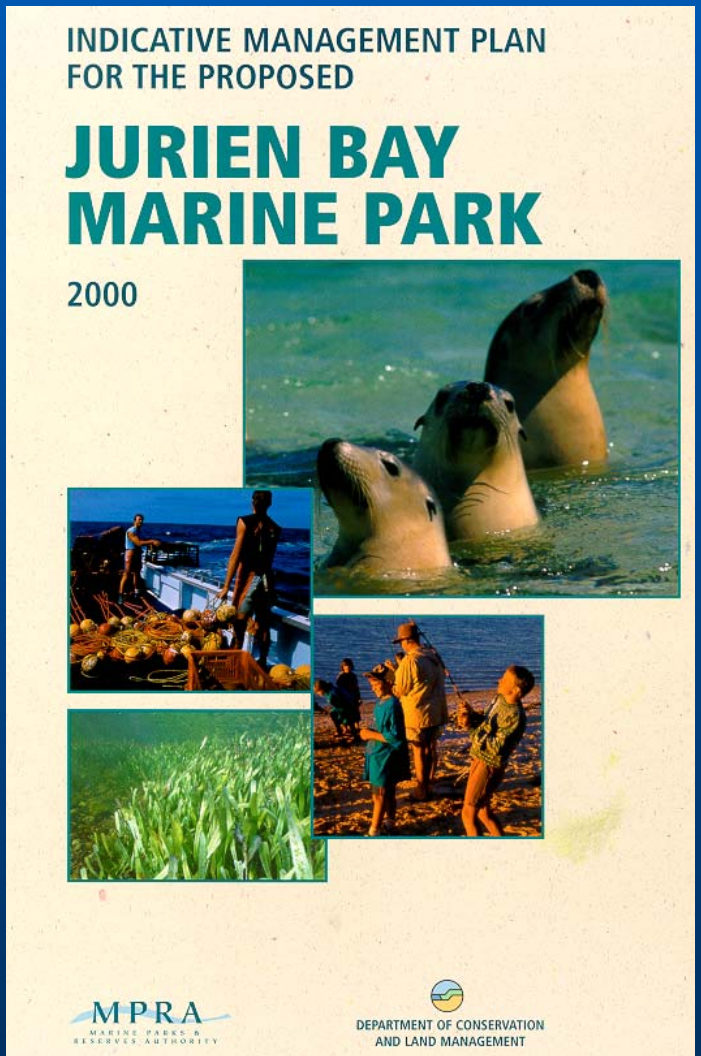
- Regional Services (District offices)
- CALMScience
- Strategic Development and Corporate Affairs

Parks & Visitor Services



7 generic types of management strategies in mgt plans

- **Administration** *(infrastructure, policies etc)*
- **Intervention** *(board-walks etc)*
- **Surveillance and enforcement** *(on-the-ground, warnings, penalties etc)*
- **Education and interpretation** *(brochures, posters, visitor centres, extension, touch pools etc)*
- **Public participation** *(MACs, 'friends of' groups etc)*
- **Research**
- **Monitoring**



R & M - what do we mean?

- ***Fundamental Research*** **(characterise ecological and cultural values - resource inventories, social surveys, key ecol and social processes, spatial and temporal extent of natural variability ie baselines [to provide context for assessing 'impacts' due to human induced changes)**
- ***Applied Research*** **(info on 'how natural systems respond to human pressures' - eg wastewater - nutrients - phytoplankton blooms - light limitation - seagrass death)**
- ***Monitoring*** **(ongoing info on the response of natural systems to human pressures [*DCLM's stethoscope*]- info on the effectiveness of management in conserving/maintaining values - a means for DCLM to measure management performance - link to MPRA auditing requirements - provides trigger for remedial actions)**

Monitoring – health and pressures on values

Key Performance Indicators

- Monitoring enables CALM to report to MPRA on management performance

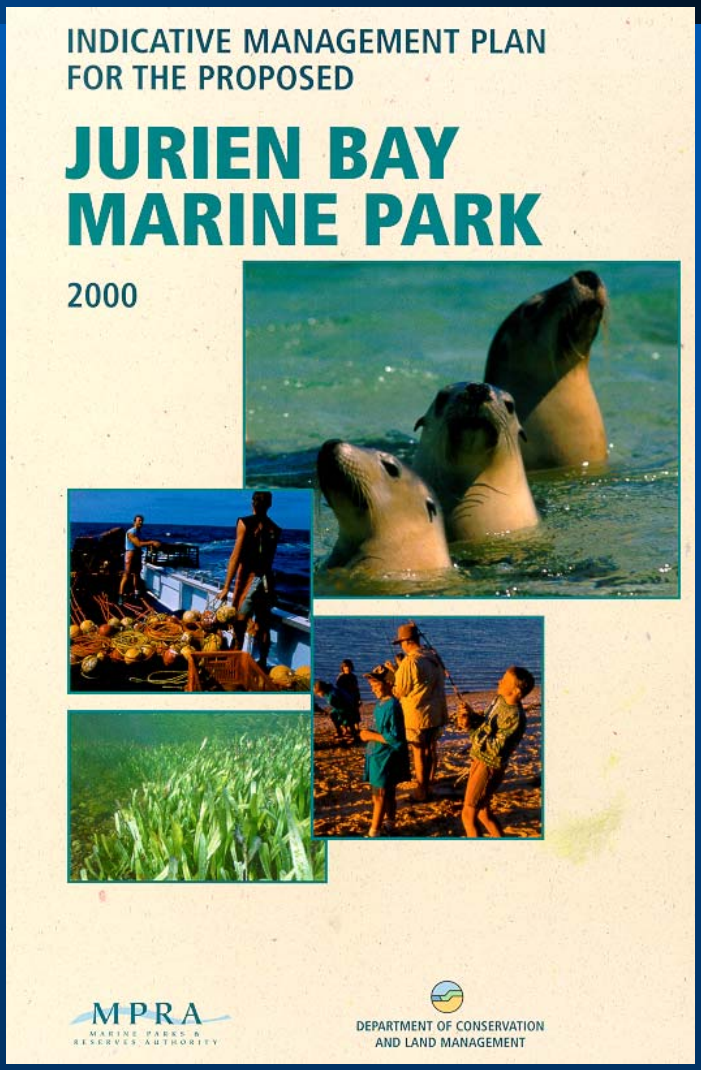
- ***Surveillance monitoring***
  - ***- broadscale and on-going***
  - ***- Provide regular 'status reports' on health of values***
  - ***- Safety net to pick up unpredictable events/phenomena***
  - ***- Provide 'background' context to assess human-induced change given by 'compliance monitoring***

- ***Compliance monitoring***

- targeted (in space and time) to keep a check on industry compliance with agreed management targets for approved activities

IMPORTANT
Management performance??

- MPRA audits CALM (3-yearly)
- CALM manages via mgt plans - reviewed 10-yrly
- Mgt plans are law - need parliament to change
- Mgt Plans - ANZECC best practice model in performance reporting in NRM
- MPRA & CALM work under an MOU
- MPRA audits **Key Performance Indicators**



MCR management plan: best practice model (ANZECC, 1997)

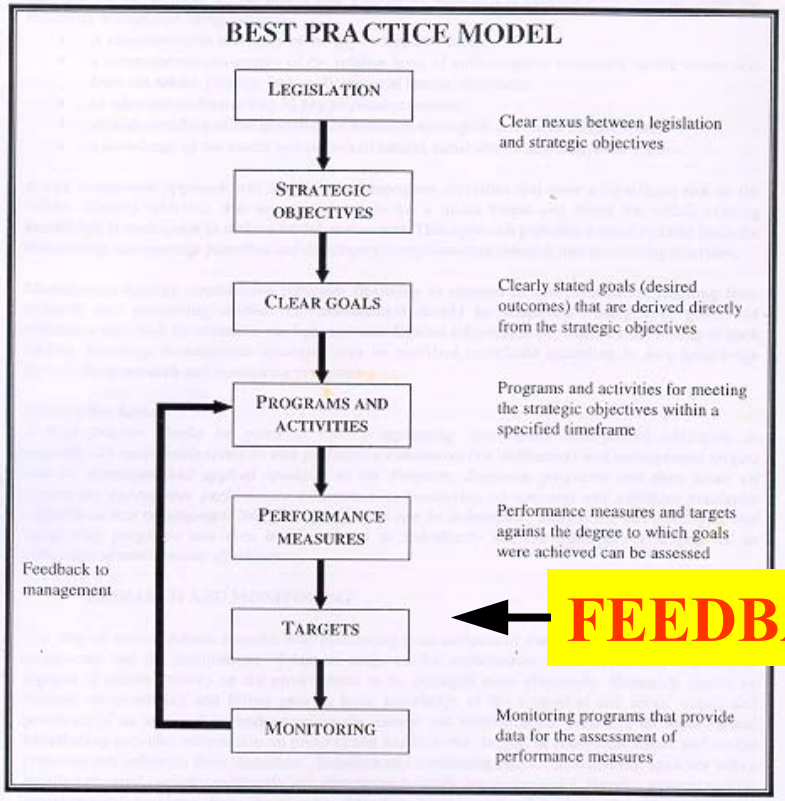


Figure 1: Best Practice Model (ANZECC, 1997)

The ANZECC document outlines the rationale for an outcome-based management approach that will facilitate more effective auditing of management performance and, as such, provide better management

FEEDBACK: to adjust management

Rec & Nat-based Tourism

- Question: effect of human pressure on ecological & social values?
- DCLM conserves ecological values
- DCLM manages human usage so as to maintain social values

- Statutory drivers - management plans, MPRA , ***the legislation***

Human usage: a fundamental information layer for management (what is the impact or potential impact (ie risk) of usage on the health of the values??

- Details of human usage required for - recreation, NB Tourism, cultural, commercial, industrial
- DCLM needs adequate data acquisition strategies and associated data management systems for human usage intensities, patterns, trends (MCB working on this) -
- Resources for such are LIMITED - hence, need a prioritising framework (see *Simpson et al 2002 - R&M Framework for Shark Bay*: copies available from MCB) - need to do the most important things first

Ecological values

- How does human usage impact on ecological values? There is a carrying capacity, quantified through Limits of Acceptable Change (see the management plans and the 'targets')
  - Contaminants
  - Habitat cover, health
  - Animal behaviour, reproductive potential

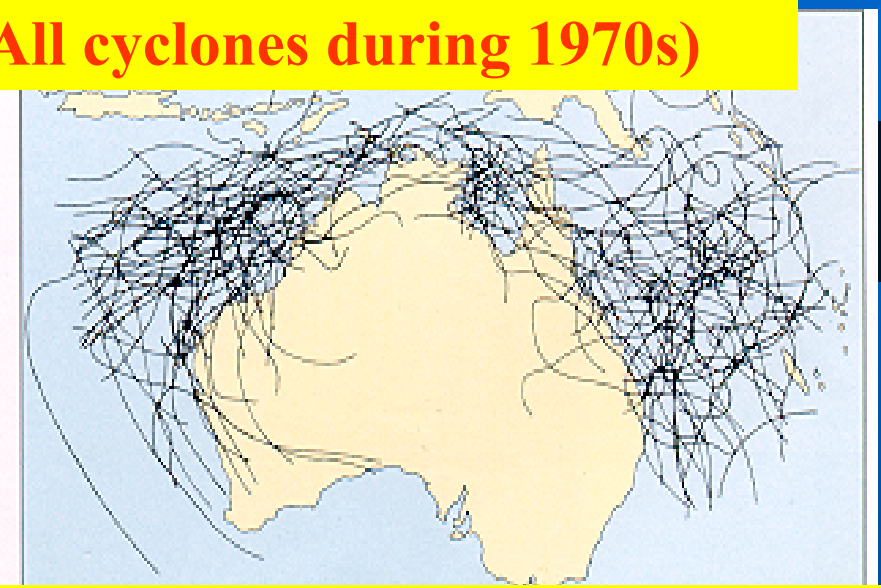
- Need RESEARCH to characterise how human usage influences cause-effect pathways and processes & trends in human usage (projections-models)
  - Recreation, sightseeing, fishing, vessels, contaminants (spills), toxic contamination, diseases, physical disturbance, health of the values

Social values

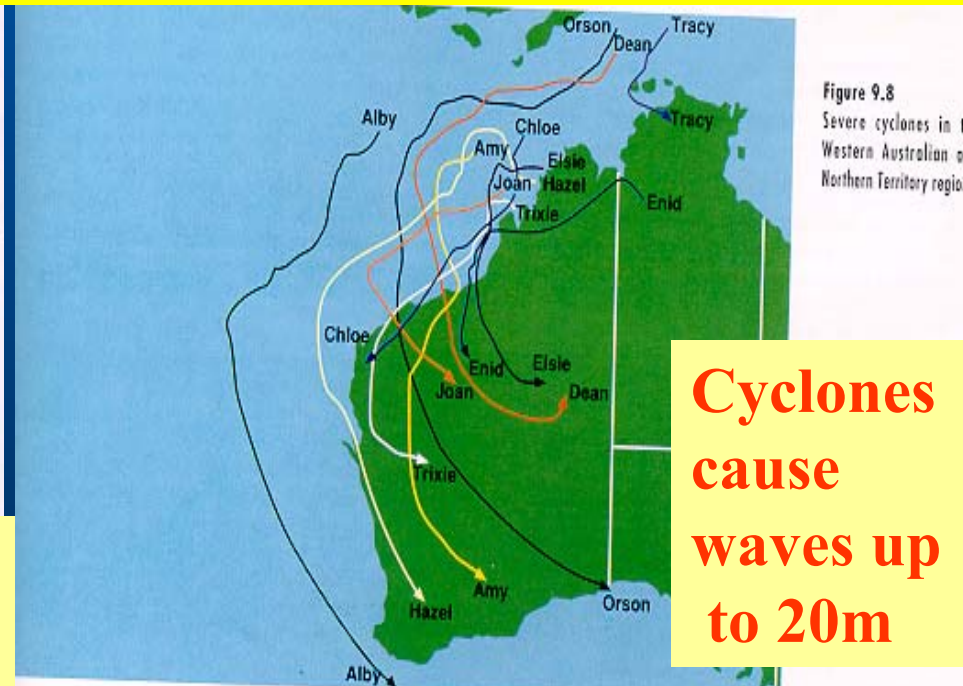
- How do natural processes impact on humans who use DCLM-managed waters? DCLM has a Duty of Care
  - Safety? - swimmers, snorkellers, divers,
  - Relates to Physical and Biological dangers
  - Currents, cyclones, rips, waves, spills, pathogens, vessel traffic, poisonous animals
- Hence, need RESEARCH to understand fundamental bio-physical characteristics and their natural variability - relates to risk analyses
  - eg oceanographic models are necessary for predictions

SOME EXAMPLES OF THE INTERACTION BETWEEN THE ECOLOGY AND HUMAN USAGE

(Waves typically <2 m, but storms cause waves up to 5m)



Severest cyclones (~150mph) 1975-90



Cyclones cause waves up to 20m

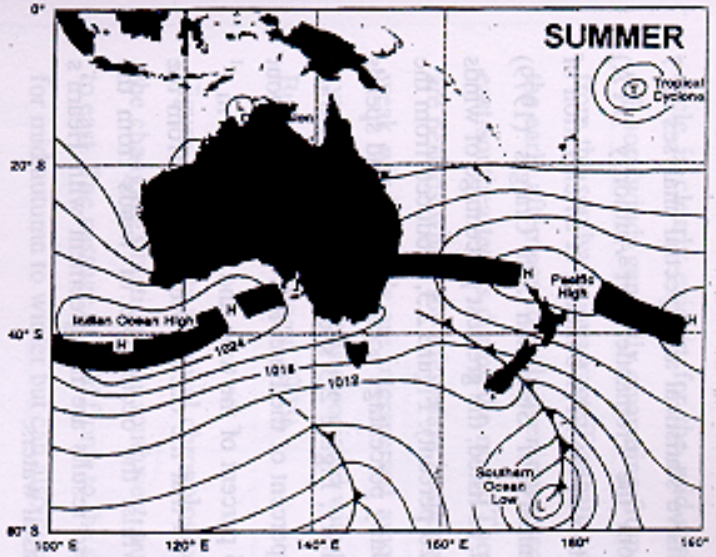


Figure 2.2 Typical summer (top) and winter (bottom) isobaric weather charts over the Australian and western Pacific regions highlighting the latitudinal difference of the Sub-tropical Ridge of high pressure (ie the anti-cyclonic belt, shown as a thick black line). (www.bom.gov.au)

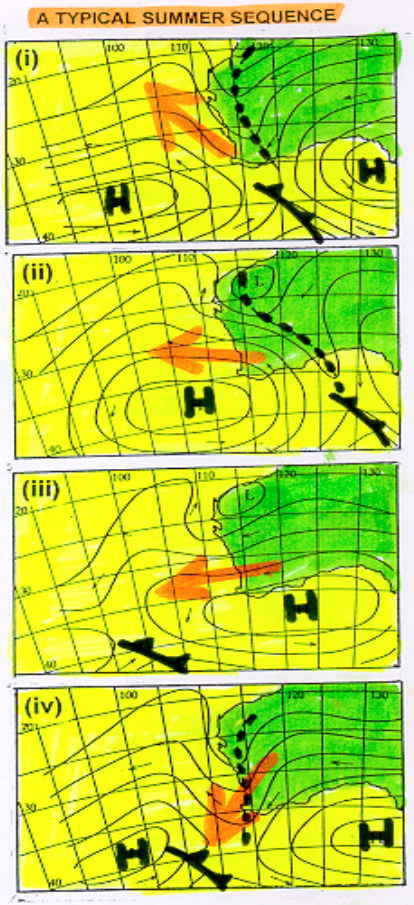


Figure 2.5 A typical chronological sequence of isobaric charts during the passage of a high pressure system from west to east across southwest Australia in summer (Commonwealth Bureau of Meteorology, 1993).

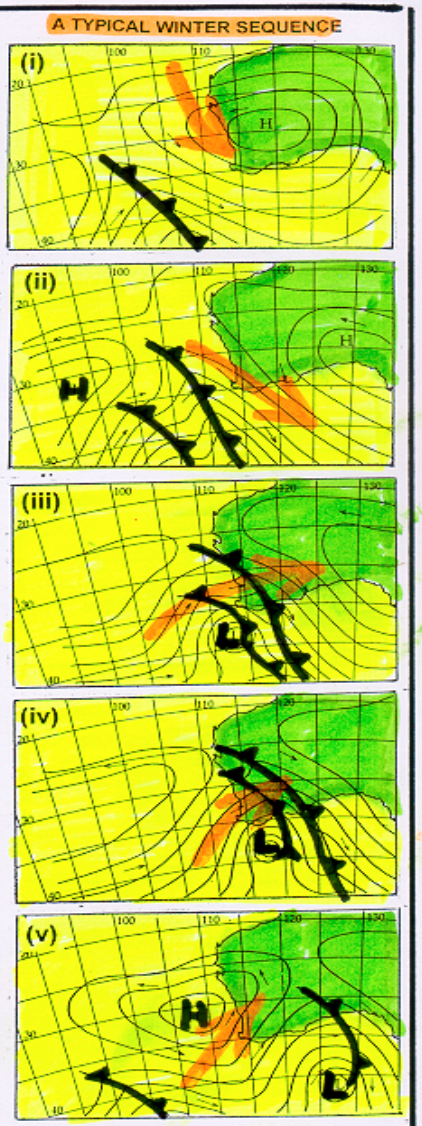
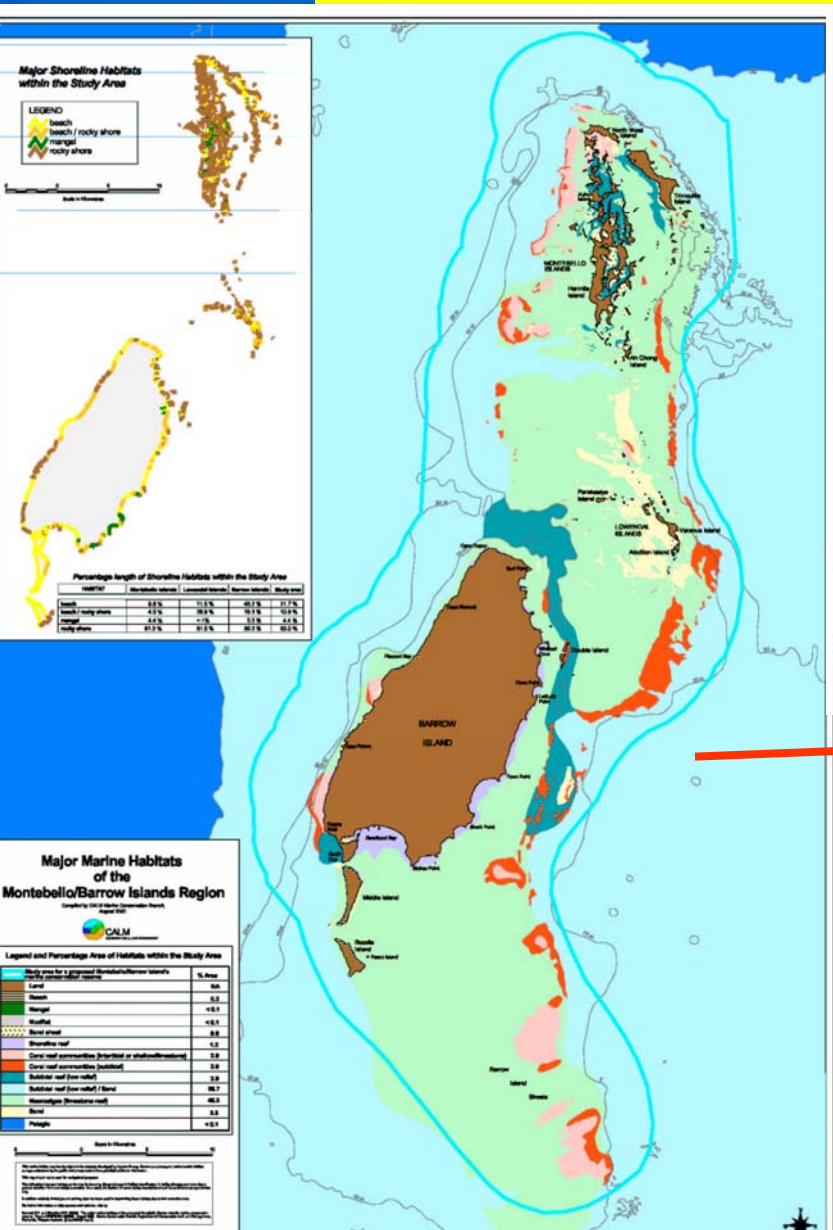
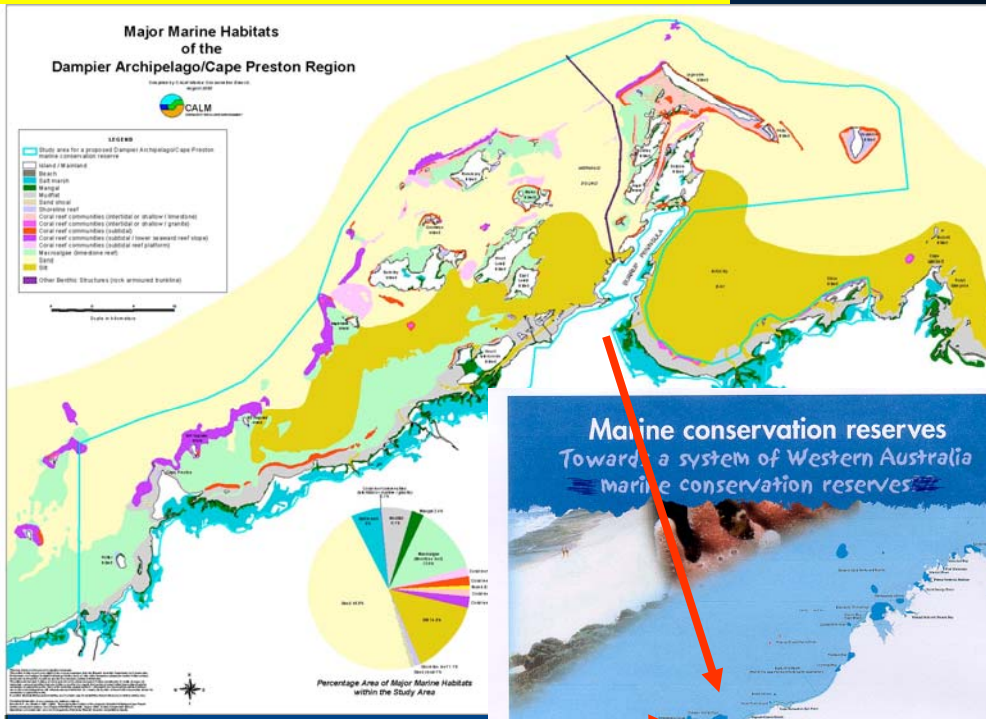
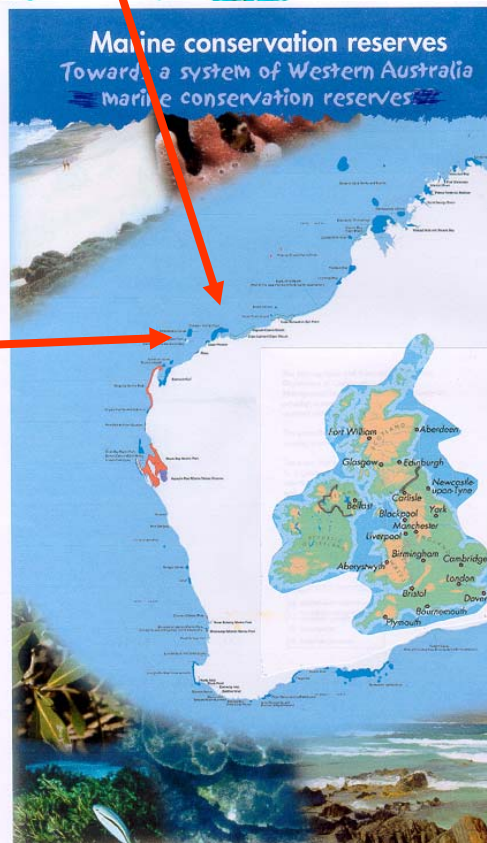


Figure 2.6 A typical chronological sequence of isobaric charts during the passage of a low pressure cold front system and adjacent high pressure system from west to east across southwest Australia in winter (Commonwealth Bureau of Meteorology, 1993).

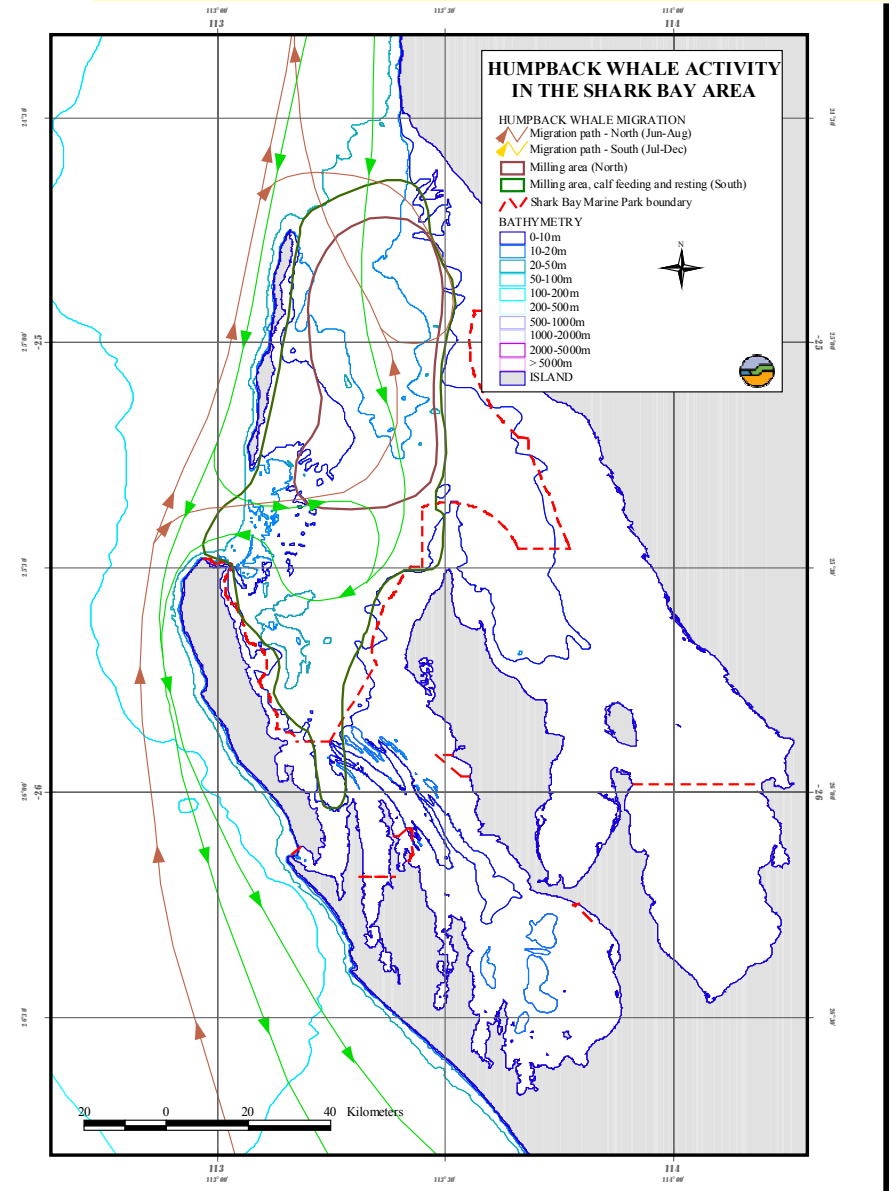
TYPICAL WORK: PLANNING A NEW RESERVE
(eg off the Pilbara coast of NW Australia)







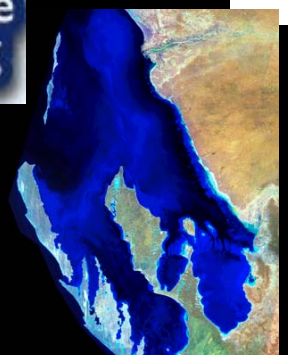
Whale paths - related to regional scale currents



Physical oceanographic processes in Shark Bay with implications for marine fauna

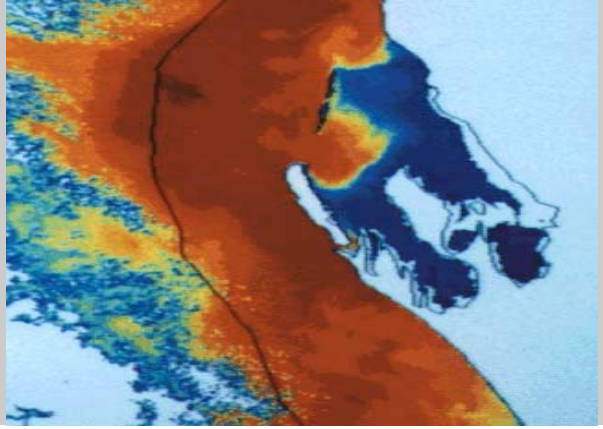
- Charitha Pattiaratchi
  - Coordinator, Marine Science and Engineering Program
  - Centre for Water Research
  - The University of Western Australia

MSE Marine Science & Engineering



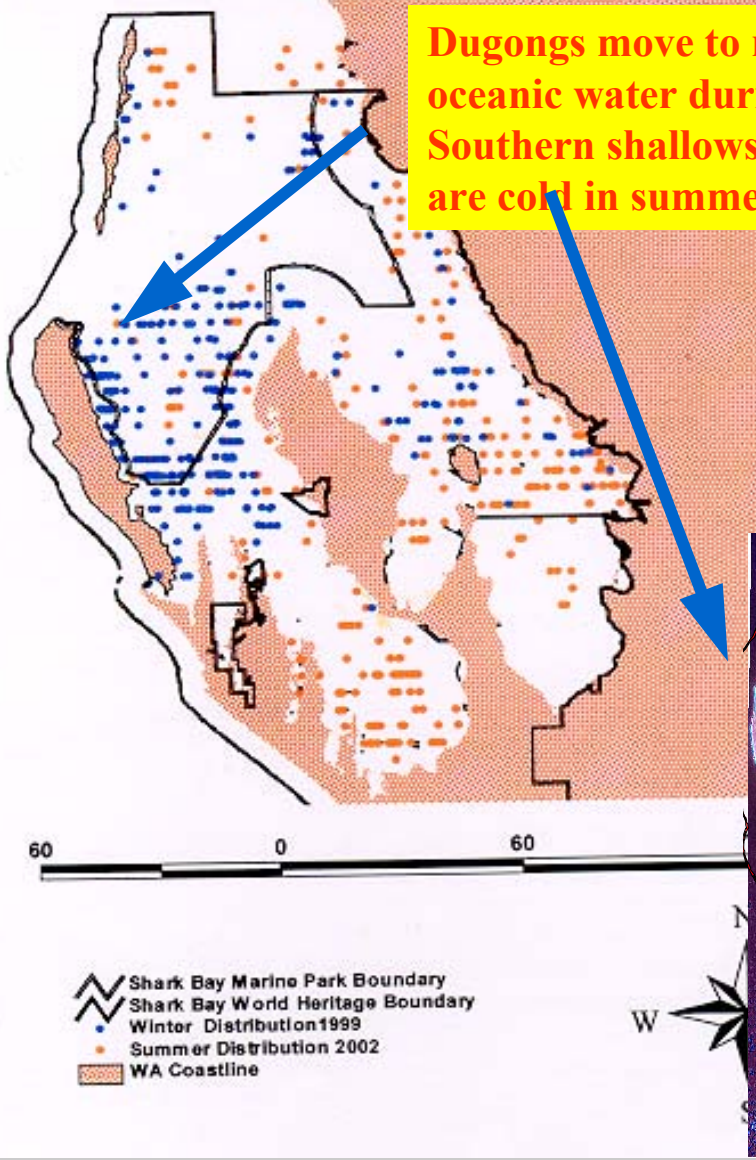
Dugong Distribution Determined From Aerial Surveys

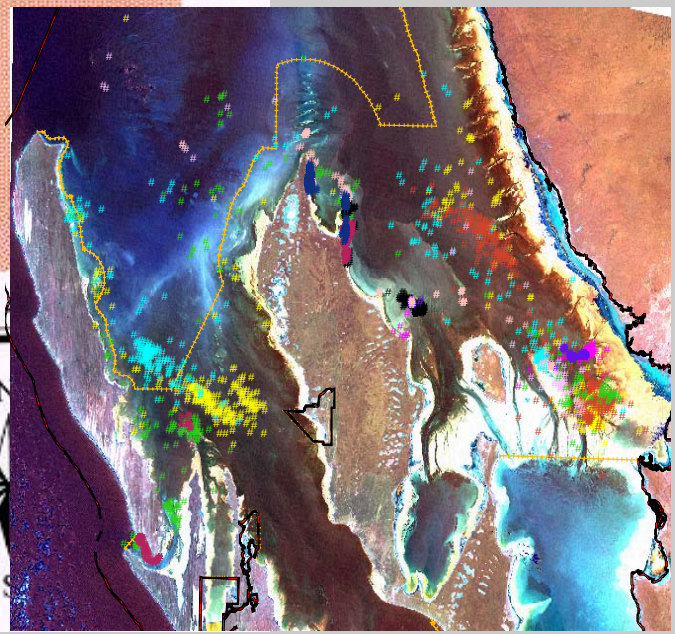
Dugongs move to reside in warm oceanic water during winter. Southern shallows are cold in summer



Dugongs tracked by satellite/GPS tags

Shark Bay Dugong Movements 2000/2001





Unit 8005
Unit 8004
Unit 8003
Unit 8002
Unit 8001
Unit 5537
Unit 5536(1)
Unit 5535
Unit 5534
Unit 5519
Unit 5065
Shark Bay World Heritage Boundar
Shark Bay Marine Park Boundary

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A CALM - UNIVERSITY COLLABORATION

THE UNIVERSITY OF NEW SOUTH WALES
water research laboratory
Manly Vale N.S.W. Australia

MONKEY MIA:
A HYDRODYNAMIC INVESTIGATION

by

D A Luketina , L M Lyons and I P King

Research Report No. 196
June 1998

MODE
GRID

Figure 3 Grid mesh for Shark Bay

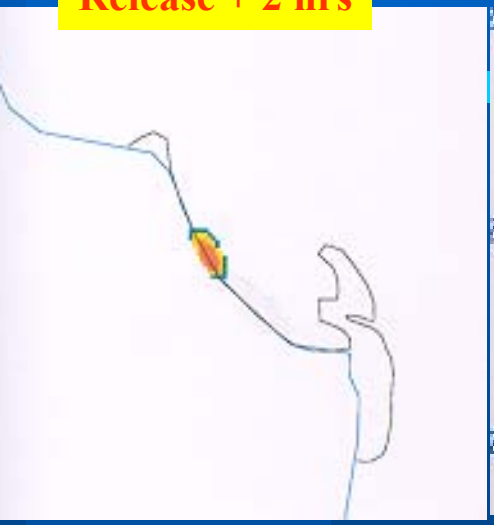
HUMAN-DOLPHIN
INTERACTION

d Red Cliff Bay

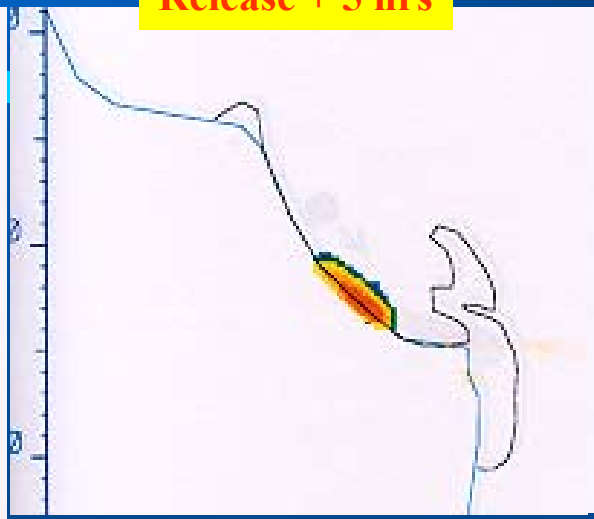
MEASURED SALINITY FIELD

Modelled dispersion of a tracer (contaminant introduced at the beginning of flood tide) Tides semi-diurnal…..2 ebbs and 2 floods per day

Release + 2 hrs



Release + 5 hrs

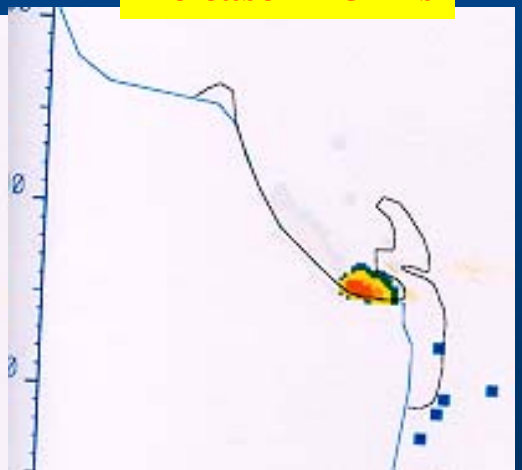


Release + 8 hrs

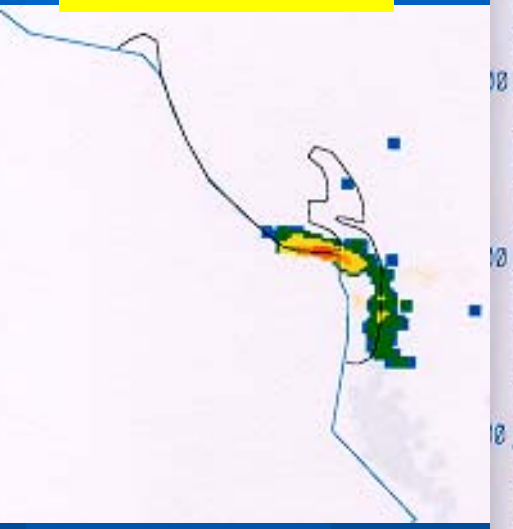
Release + 11 hrs

Release + 12 hrs

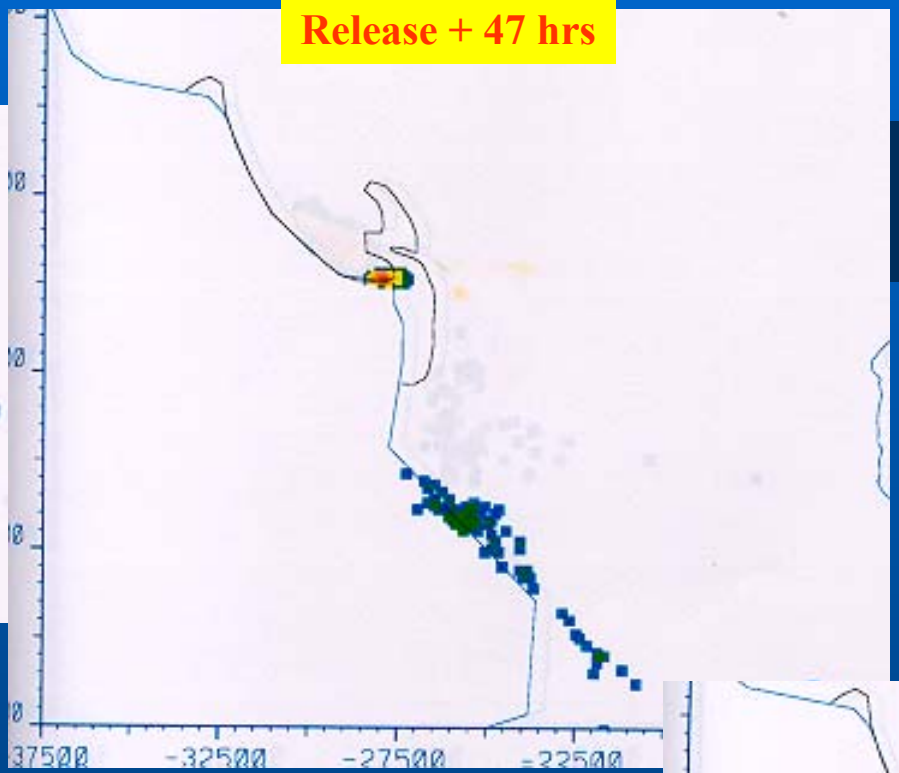
Release + 23 hrs



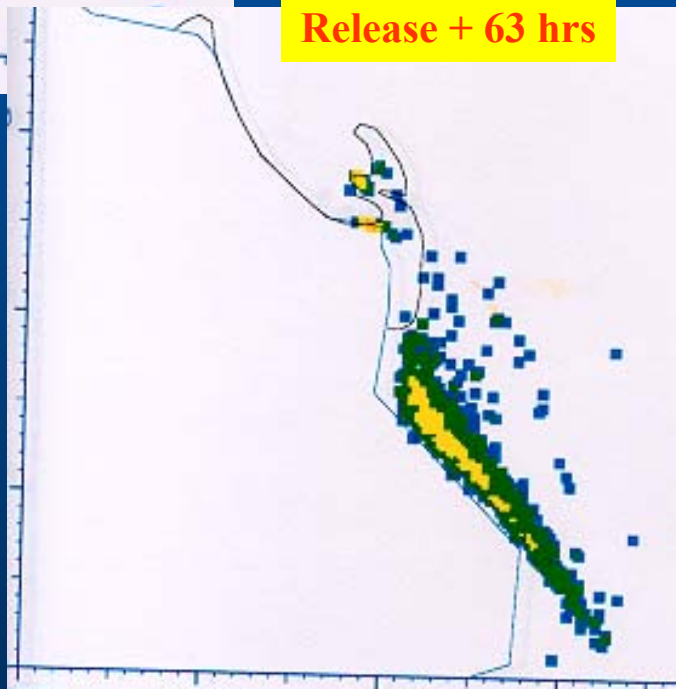
Release + 32 hrs



Release + 47 hrs



Release + 63 hrs



MODEL PREDICTS THAT THE LAGOON RETAINS TRACER FOR UP TO 60-70 HRS

DOLPHINS VISIT THE LAGOON UP TO 10 TIMES IN THAT PERIOD

20/12/2002

FLUSHING OF MONKEY MIA LAGOON
(a human - dolphin interaction area)
up to 6 dolphins visit the lagoon every day

A MORE FOCUSSED OCEANOGRAPHIC STUDY

MANAGEMENT RELATED (TACTICAL)

FLUSHING OF MONKEY MIA LAGOON

FIELD WORK AND MODELLING

APPLICATION: PROTECTING THE MONKEY MIA DOLPHINS

ISSUE - FLUSHING OF CONTAMINANTS

VISITATION 100000 PEOPLE PER YEAR

VALUE OF THE DOLPHINS?? $100M per year (~ 35M POUNDS)

The oceanographic work assists managers in their consideration of what level of human usage (vessel activity, waste discharge) the lagoon (and hence the dolphins) can tolerate.

Ditto for the biological processes work

There are proposals current to expand the adjacent resort to accommodate twice the amount of hotel accomodation

Wilderness/aesthetic values - special cases

- These mean different things to different people
  - Need research to work this out on a case by case basis so that DCLM can set appropriate management objectives & targets for 'sustainable usage'
- Relates to MPRA auditing function

Some generic issues for consideration

- Human behavioural patterns and related attitudes to conservation are critical informational needs for management - points to 'social' R & M requirements
- Building support for DCLM's conservation objectives helps in:

  * Establishing, maintaining & strengthening DCLM's constituency (ie its clients, its support base)

  * Monitoring the effectiveness of management through social surveys

  * Engage the community in monitoring

  * Promoting sustainable usage
- RESEARCH needed to determine the attitudes
- MONITORING to gain an understanding of how attitudes change in time (so DCLM can adapt its management strategies)

Food for thought

- DCLM's NBTRRG an ideal model for identifying and promoting social research - more can be done through this type of group at a strategic level
- MCB plans to soon review and report on DCLM's current status/capacity to address its R&m needs for marine conservation (with CALMScience)
- Rec and Nat Base Tourism needs to & will be integrated in this review
- Might be worth revisiting DCLM's strategic approach to R&M in relation to Rec and Nat Based Tourism - eg consider the current R&M Framework paper of Simpson et all (2002) as a model for generic application for Rec and Nat Based Tourism - a good job for MCB/PVS
- Identify priorities through the application of the proposed strategic framework

R&M prioritising methodologies

- Fundamental research priority (basic info)

  (relates to V and K)

  FR = V(1-K)

- Applied research priority (pressure related)

  (relates to V, P and K)

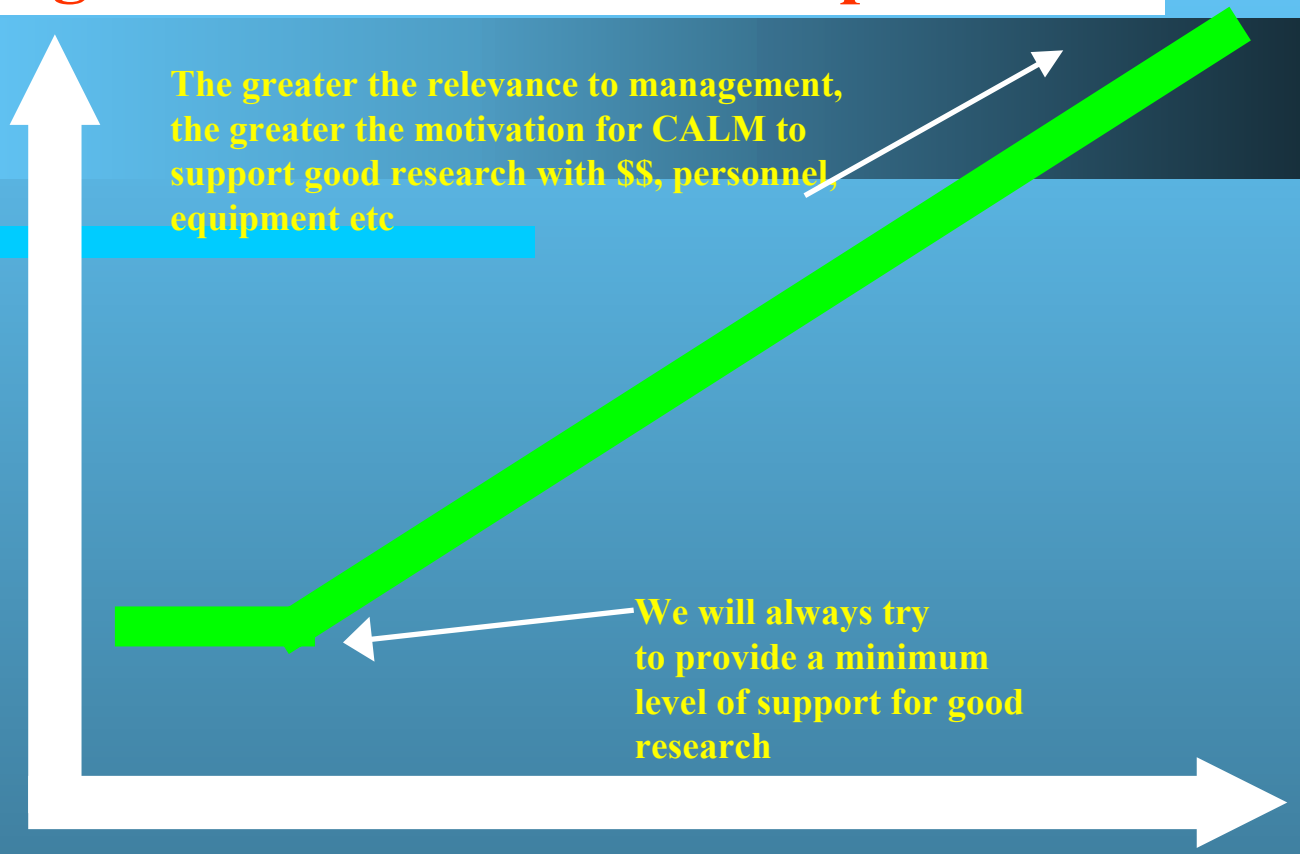
  AR = VP(1-K)

- Monitoring priority (MPRA related)

  (relates to V and P)

  M = VP

Working with external research providers



Discussion