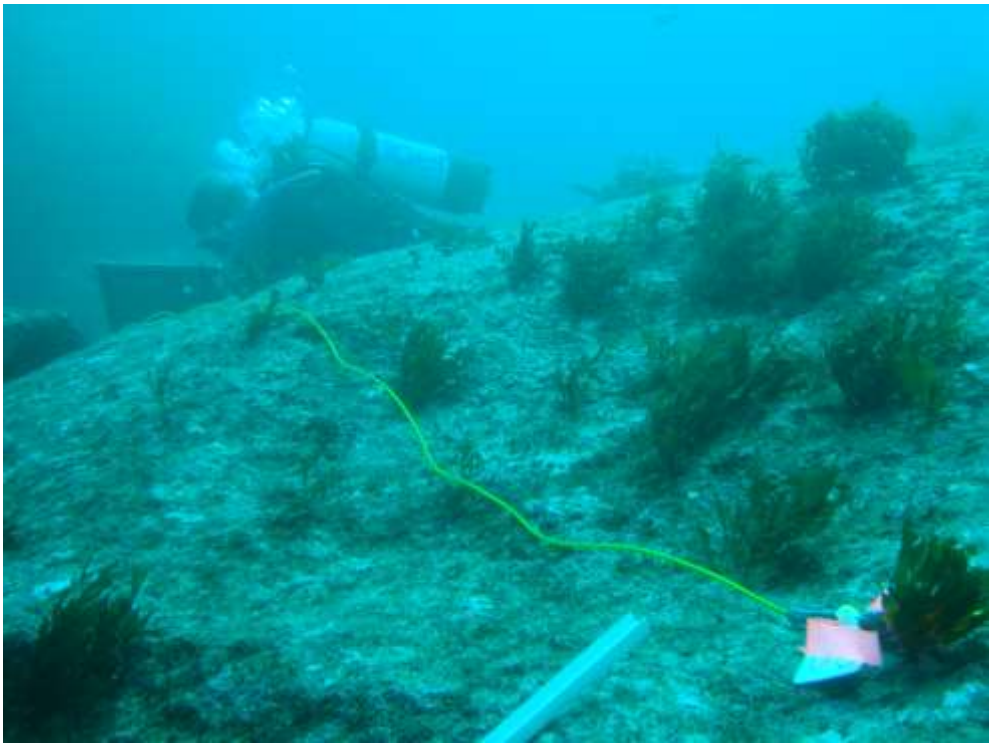
FINAL REPORT

30 September 2009

Tasmanian Recreational Dive Clubs

Subtidal Reef Monitoring and Community Awareness Project

A Project supported by the Tasmanian Government's Fishwise Fund.



Don Humphries, Leven Scuba Club at Elephant Rock St Helens

Tasmanian Scuba Diving Club (co-ordinator)
Leven Scuba Club
Oceans Plus Divers
Tasmanian Marine Naturalists Association
Tasmanian Sub-Aqua Club
TDA Crabs Dive Club
University of Tasmania Dive Club

BACKGROUND

Many divers have seen disturbing changes in the oceans over the last few decades including the loss of Giant Kelp beds, declines in some fish species, more invasive marine pests and the effects of climate change warming the East Coast of Tasmania. The prevalence of urchins barrens in the North of the State was a catalyst for the decision to initiate ths project.

Local recreational dive clubs have decided that they want to do more to assist scientists in gaining a better understanding of our changing marine environment. In consultation with the scientific community it was decided that sub-tidal reef monitoring is an area where recreational divers can do vital work to add to the body of knowledge on sub-tidal reef ecosystems and the threats to these systems.

Monitoring the spread of urchin barrens down Tasmania's East Coast has been selected as the priority task for the first stage of this project. This project will initially focus on mobilising, training and educating volunteers. It will also provide useful sea urchin density data from initial surveys. Regular monitoring, which it is hoped will flow from this project, will provide hard data on the urchin threat over time. This information will become a valuable management tool in determining the long-term changes in the reef ecosystem. It is hoped that divers will gradually learn to add more complex measurements and be able to participate in a wider variety of scientific surveys in the longer-term.

It is also hoped that the project will encourage ongoing engagement between recreational divers and the scientific community and this will ensure that scientific, educational and training benefits flow on beyond the initial life of the project.

GENERAL INFORMATION ON APPROACH TAKEN

The project has consulted with the local scientific community to create an education and training program. Particularly important input came from the Scientific Advisor employed by the project, Scott Ling of the University of Tasmania School of Zoology. A survey methodology was refined that would maximise the benefits to be obtained from the limited resources, in a manner that took into account the skills and limitations of the participant organizations.

Divers were invited to marine awareness and survey methodology training that achieved a solid penetration within the local recreational diving community. At training days run at St Helens in the North and Tinderbox in the south of the State, representatives from all of Tasmanian's dive clubs attended the training, with approximately 50 divers attending overall. This became a core of trained divers that later led the survey transect dives in the next phase of the project.

After training, participants adopted responsibility for different regions along Tasmania's East Coast. These regional boundaries corresponded with the regions identified in earlier FRDC surveys.

The clubs took responsibility for the following areas;

1. Eddystone Point – Leven Sub-Aqua Club (Devonport)
2. St Helens – joint survey on training day (later dropped to avoid overlaps with TAFI programs)
3. Chain of Lagoons area – TSDC (Hobart)
4. Bicheno - ODP (Launceston)
5. Cape Tourville - ODP (Launceston)
6. Schouten – ODP & TSDC (Hobart)
7. Eastern Maria TSAC and TUDC – (Hobart)
8. Lagoon Bay-Cape Surville - TSDC (Hobart) (later dropped to avoid overlap with TAFI programs)
9. Fortescue - TDA Crabs and TSDC (Hobart)
10. Wedge/Salters - TUDC (University)
11. North Bruny – joint survey on training day
12. Adventure Bay/Fluted Cape - TUDC
13. Recherche Bay/Actaeons – not proceeded with due to apparent lack of urchin activity in favour of duplication further north

The surveys were split into two types with density counts along lines being done north of Tasman Island where the Eastern Australian Current is strongest. South of Tasman Island the surveys were often done as free-range dives looking for barren spots, rather than as full survey counts.

A decision was taken to attempt to duplicate some of the sites from the earlier FRDC study in 2001, so that participants could obtain immediate comparative information. Other sites were new sites selected largely to investigate a deeper depth range where urchins are known to be more dense generally.

Participants were also encouraged to collect and report further information on barrens encountered during regular social dives on the East Coast.

A website was created to store the information for public dissemination, and also to advertise the need for social dive reports. Information on urchin biology and project aims was also displayed. This site can be accessed at www.otsweb.net/divesurveys.

A number of surveys were successfully completed in each of the regions. In southern areas this was generally 4 transect lines. In the northern area survey trips were duplicated to provide more information on the most active areas.

In the final phase of the project divers from within and without the organised recreational diver community were invited to a marine naturalist course which focussed on information useful for scientific and survey diving. Divers were encouraged to participate in further survey programs and particularly the TAFI Reef Life Survey (RLS) and the TAFI Climate Change Redmap (CCRedmap) project.

AIMS AND OBJECTIVES

The project initially set the following aims and objectives;

- Monitor the effect of invasive marine species, particularly the long-spined sea urchin *Centrostephanus Rogersii* on representative sites.
- Identify major shifts in biodiversity at representative sites (main focus initially will be on the formation of urchin barrens) and provide an 'early warning system' for threats to that biodiversity.
- Educate divers and the general community about the marine environment.
- Provide other information collected during surveys, such as seaweed samples and photographs of unique animals to scientific bodies for further research.
- Provide reliable data (initially on urchin barrens) that will complement any studies planned to be undertaken by scientific bodies.
- Analyse and refine methods for volunteer participation in volunteer research projects.
- Build up a volunteer skills base for further community research projects.

RESULTS

Monitoring of Centrostephanus Rogersii barrens

The late commencement of the project has meant that much of the training was completed only towards the end of the 2007/2008 diving season. As a result only 4 areas were able to be scheduled for survey, which included two areas surveyed during training seminars. In total nine survey transects were completed in these areas, two planned survey weekends being marred by poor weather. Of these, the most thoroughly surveyed was the Eddystone area with 4 transects (Leven Scuba Club).

In the following 2008/2009 diving season the project aims were largely completed and in many areas exceeded. A high spot of enthusiasm resulted in 4 surveys being completed in nearly all regions. This identified 'hot spots' which were revisited such as Eddystone, Maria Island and Fortescue Bay.

In summary, these surveys have shown the following results by comparison to the FRDC survey in 2000;

Eddystone – 4 transects and several free-range dives, mixed results with some areas showing worrying barrens formation. Georges Rocks and Lipstick Rocks are heavily damaged by urchin barrens.

St Helens – 2 surveys and many social dives. Survey dives at Elephant Rock showing total barrens coverage and urchin densities well above the 2000 FRDC study regional average for similar depths. The site later became a closed research area. TAFI indicated they intended to do intensive surveys of their own in the area, further surveys were discontinued although a number of further social dive reports were received from recreational divers and charter boat operators in the area. Urchin barrens cover much of the seabed from Sloop Rock to St Helens Is

(including offshore reefs) in depths between 15-40 M on exposed coast and also many shallower patches in sheltered coves such as Skeleton Bay. Despite the low number of surveys done they support anecdotal evidence that this area has suffered from increasing urchin density and spread of damage since the 2000 FRDC survey to a considerable degree.

Four Mile Creek – 4 survey lines, black urchins encountered but no barrens. Urchin density has not changed to a significant degree. No major change was expected in this inshore site relatively isolated from the Eastern Australian Current.

Bicheno- 4 surveys and many social dives. The survey lines showed little change from the average density for that depth at that region, or perhaps even a slight decrease. Social dives showed some concerning spot damage in many areas including the Governor Island Marine Reserve (in deeper areas), Muirs Rk, Blue Waters Rf, Traps Rf, and Waubs Bay.

Cape Tourville – 4 surveys. A large barren affected area was identified in the sheltered side of The Nuggets. When averaged across the other sites, it did not result in a marked change in average densities for that region.

Schouten Is – 4 surveys and several social dives. The eastern side of the island was subject to a number of social dives which reported barrens in parts of Chain Locker Bay and a site near Cape Sonnerat known as the Pinnacles. Surveys in the sheltered SW side at Sarah Anne Bay and Taillefer Rks showed no marked increase in average densities.

Eastern Maria – 8 surveys and several social dives. Average urchin densities had not altered but several small sites of incipient urchin formation were discovered. Reliable reports show increases in barren formation at the North East bommie and Isle De Phoques in the last 12 months. Small incipient barrens were also apparent in parts of Mistaken Cape, Haunted Bay and shallows at the Boy in the Boat.

Lagoon Bay/Cape Surville – This site was not formerly surveyed by this project due to the announcement of a nearby TAFI research area and the likelihood that it would be extensively surveyed by TAFI. Further down the coast towards Pirates Bay several social dives reported urchins, but not in great densities. A charter operator in the area has not noticed any significant barrens south of Deep Glen Bay to Fortescue.

Fortescue Bay – 8 surveys and numerous social dives. This area has caused considerable concern due to the appearance of a number of incipient barrens and the proximity of a threatened kelp forest bed. Surveys in the area did not identify significant urchin densities but social dives in the area reported small but concerning barrens at the Thumbs, the Lanterns, and the Fortescue Boat ramp. High densities were also noted in inshore areas of Bivouac Bay. Many rocky outcrops currently supporting the remnant kelp forest holdfasts also supported small but concerning numbers of urchins.

Wedge Is – 2 free range surveys did not detect ant urchins, which is not unexpected in this sheltered southerly location isolated from the Eastern Australian Current.

North Bruny – 2 transects, no black urchins encountered.

Adventure Bay- 2 free range surveys. Surprisingly one small incipient barren was found south of Adventure Bay. Some minor damage sighted at The Friars.

Recherche Bay – due to the low urchin numbers encountered south of Tasman Is, this area was not investigated in order to allow for more surveys in more active northern regions.

In our view it would appear that average densities in many areas have not increased since 2000 except for St Helens and Eddystone where high densities occur and there is evidence that densities have been increasing, even possibly within areas that are already barren. The 2000 densities were high in these regions, and it would appear that this population density 'head start' has advantaged urchins in these areas, whereas in other areas their population growth appears to be relatively static.

Email discussions with Dr Neville Barrett in relation to a recent NRM surveying project in generally shallow areas (5M & 10 M only) appears to support the conclusion that the concerning high levels of localised incipient 'spot' damage have not been sufficiently widespread to show up as higher overall average urchin densities within the areas selected for survey.

While there has been no general spread of urchins outside of St Helens and Eddystone, there has been widespread and probably growing damage from small incipient barrens that are relatively common down the East Coast as far as Tasman Island. This should be of concern because it augers poorly for the health of reefs in the event of more favourable recruitment events in future years. It also creates concerns where these relatively small barrens coincide with areas of high biodiversity and fisheries importance, eg, the Fortecue Bay kelp forest, Marine Protected Areas, Handfish habitat.

It would also appear to be the case that urchins are appearing almost everywhere in small numbers. It was surprising that shallow sites outside the EAC such as Boltons Beach reported urchin sightings, although not in great numbers.

It should be noted that these surveys have not been reviewed by a scientific body and should be seen as indicative only at the present time. Further results are displayed in Appendix A.

Identifying other threats/changes to biodiversity at representative sites.

Divers were provided with information on identifying marine pests. They were also given photos and information on species of fish that are likely to be indicative of range extension from warmer northern waters.

Divers attending the St Helens seminar were also given a basic marine environment and oceanography seminar to focus on current issues in marine science.

The primary focus of the project was to provide detail on the biodiversity effects of urchin barren formation and we submit that this goal was achieved with high levels of participation and involvement from a broad cross-section of diving club members.

While focussing on surveys, divers rarely noted species other than the common exposed reef fish species. The project did however raise awareness of the need to

report unusual animals, with the project leader becoming an informal 'clearing house' for sightings made on social dives. These included Handfish sightings in the Derwent, Channel (first sighting for approx 40 years) and Norfolk Bay. All these sightings were referred to the CSIRO.

Aberrant sightings of northern species in the south such as Magpie Perch, Old Wife, Mado Sweep, Ringed Pufferfish were also reported to the project leader and will be reported to the CCRedmap project once the website for that project is active.

A Blue Morwong, normally resident in NSW was also filmed during surveys, confirming an earlier scientific report of range extension of this species to St Helens.

Educating divers and the general community about the marine environment.

Two formal training seminars have been held at St Helens and Tinderbox. The southern training was well-attended, attracting 21 divers. Bad weather marred the St Helens training which discouraged participation, the course attracting only 9 divers. To compensate for the effects of this poor weather, the participants went back to their clubs and organised 3 further impromptu training sessions at Bicheno, Devonport and Low Head. This has resulted in a good spread of information throughout all the participant clubs. Thus far, approximately 40 or more divers have received training of some kind. In addition to this training, the project coordinator, and/or scientific advisor, have visited all the recreational clubs involved, to discuss the project and particularly the significance of the urchin threat. In this way, it is believed that a further 70 divers have received detailed information on this subject matter.

Information on the project has also been submitted to "Dive Log" a free diving news magazine which is published in Victoria and widely circulated in the Tasmanian diving community.

A local Tasmanian diver with IT skills has also created the "Dive Surveys" website at [insert details]. This website currently provides information on the urchin threat and the project. It is hoped that the website can be further developed for on-line submittal of results and sighting reports.

Provide other information collected during surveys

Contact was made with several marine scientists and organizations in relation to the information that might be usefully provided by the project, but for many was seen as a commendable if secondary project of interest, or a project that they lacked the resources to take advantage of.

The Tasmanian Herbarium was interested in receiving seaweed samples for presence/absence reporting at representative sites, but they were unable to process the results due to insufficient trained staff for species identification.

Scott Ling of the School of Zoology has collated information for range extension species to be reported during surveying. This presence/absence information could be stored in the Bluenet database currently being developed by Prof Craig Johnson. A better fit may well be the CCRedmap project which intends to focus on reports from the non-scientific community and engage actively in seeking the input of divers. Contact has been made with project organisers who have attended club meetings to promote the project. Heavy emphasis has been put on this project in subsequent training to ensure that divers are aware of the project and use the website to report findings of interest. The project leader has been collecting reports to date for future referral to the CCRedmap website.

The project generated some modest interest in the marine science community and links have been forged between dive clubs and particularly the RLS and CCRedmap projects. While the urchin project itself was not of primary interest to any of these project leaders it did act to build confidence in the bona fides of dive clubs. From the comments of some scientists, clubs divers are sometimes seen as somewhat cray-diving obsessed and not very engaged or curious about issues relevant to their research. This project has been useful in giving recreational divers some limited 'street cred' in relation to research issues. Conversely the project has allowed divers to interact with scientists to a greater extent and see research diving to some degree as a 'mainstream' activity of equal importance to photography, wreck diving, or some other recognised diving-related activity.

Provide reliable data (initially on urchin barrens) that will complement any studies planned to be undertaken by scientific bodies.

All data collected will be reviewed by Scott Ling, University of Tasmania School of Zoology, and interpreted by him for final reporting purposes. Scott has already reviewed early responses as a quality control measure. All results received to date have been essentially compliant with the quality standards set by the scientific advisor during training. We have been advised that the information will be stored on the University's new database system.

In addition we will make the information available on our website in an easy-to-understand format.

Significant changes have been made to the project to avoid duplication of effort with Prof Craig Johnson's urchin management (crayfish translocation) experiment, which will include extensive resurvey of areas around St Helens.

We have also added additional transects that will duplicate the 2001 FRDC surveys to provide some immediate comparative data and continue that earlier work.

Analyse and refine methods for volunteer participation in volunteer research projects.

While the project is at an early stage of development several issues for refinement/correction have been identified.

Line building – the costs of survey line construction/repair/replacement was not provided for in the budget and this has required some adjustment of priorities.

Bad weather contingencies – a method for fairer reimbursement for failed survey trips needs to be considered in future budgeting processes.

Survey expense reimbursements generally – the project made certain assumptions about the manner in which participants will carry out their dive program which will need refinement in future.

Training Locations – locations closer to home bases of participating organizations produced better turnouts.

Training Participation – There are some early indications that formal seminars may not end up attracting the people who will actually undertake all the diving. Training methods will require further review at the end of the project to ensure that it can achieve a broad coverage of participants.

Organisational 'Tailoring' – Budgeting in particular, has been approached in a uniform way when some groups have significant difficulties with access to resources (eg, tow vehicles, boats and GPS sets). For others the principal limiting factors are time away from work or family commitments for core experienced divers. Each groups has different limitations and skills and gaining knowledge of these very individual limitations is important for framing workarounds and allocating monies. It is likely that a successful future budgeting 'model' will be a slightly more flexible one than that originally proposed.

Build up a volunteer skills base for further community research projects.

While there have been mixed responses at various times, the project has gained sufficient momentum to be an idea widely supported within the recreational diving community. It is yet to be seen whether this will be translated into effective and sustained commitment to surveying in the future, but the early signs are very encouraging.

As far as we can tell, this project may be the first time all of Tasmania's recreational dive clubs and marine naturalist groups have cooperated in a single undertaking.

PROJECT MILESTONES

The project has achieved ;
- all of its approved milestones and has completed its work under budget.
- completed surveys in excess of the originally proposed number of survey dives
- full participation of all organised diving groups within the State, the first time this has been achieved for any project.