Do environmentally-friendly vessel moorings reduce impacts on fish habitats? A Moreton Bay case study.

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ABSTRACT

Moorings management in Queensland can be complex, with multiple agencies involved depending on the location. A key and ongoing management issue is that traditional vessel mooring designs disturb marine habitats through scouring of the sea bed. This can affect fisheries productivity and other important ecosystem services provided by marine habitats such as seagrass. Environmentally-friendly moorings (EFM) protect marine habitats by keeping the mooring tackle and the vessel off the sea bed at all times. EFM had not previously been used in Queensland so a project consortium was formed to trial EFM designs at four sites in Moreton Bay over an 18 month period. The consortium included State government agencies, SEQ Catchments, the University of Queensland, Tangalooma Resort, Seagrass Watch, the Moreton Bay Seafood Industry Association and the Moreton Bay Access Alliance. The trials determined the efficacy of the EFM in securing boats in Moreton Bay's environmental and maritime conditions and reducing impacts on marine habitats. Outcomes of the trials, including industry uptake, will be presented, along with plans to promote greater use of EFM and to extend EFM trials to other parts of the Queensland coast.

INTRODUCTION

Boating and related recreational activities such as fishing, diving and other aquatic pursuits are iconic parts of the Queensland lifestyle and an important contributor to local and regional economies. Safe storage of and ready access to vessels are essential elements of this lifestyle.

Buoy moorings are a means of securing vessels, providing a safer alternative to anchoring and a more cost-effective option than marina storage. A buoy mooring includes a block or screwed anchor system, with a system of ropes, cables or chains and a float or buoy on the surface. Buoy moorings are typically used to permanently secure private vessels of up to 15 m length.

There are currently about 4000 approved buoy moorings in Queensland. Rapid population growth centered on coastal areas is causing great challenges for coastal management, including managing the demand for vessel moorings.

The approvals process for buoy moorings in Queensland can be complex and uncoordinated. Cooperative planning in Moreton Bay resulted in Designated Mooring Areas (DMAs), streamlined approvals for use of EFM and a project to trial EFM designs (Derbyshire et al. 2009).

BACKGROUND

Mooring chains of 'traditional' block and tackle buoy moorings drag on the substrate around their moorings, resulting in significant scouring of sediments and disturbance to seagrass and other benthic marine plants. The amount of disturbance can be more than 0.1 ha per vessel, in the shape of a halo. Given the large number of moorings currently present and predicted demand for new moorings, this represents a significant area of seagrass and other benthic habitats being disturbed in Queensland.

Plate 1. Disturbance halo of traditional block and tackle mooring on seagrass habitats in Moreton Bay.

At least three ‘environmentally-friendly mooring’ designs are available in Australia, which may be installed and used with minimal impact to seagrass and other marine habitats. These are the:

- Seagrass Friendly Mooring System (http://www.seagrassmooring.com.au/)
- Ezy-Rider Mooring (Global Moorings) (http://www.ezyridermooring.com/)
- Seaflex Mooring (http://www.seaflex.net/).

These designs are used to varying extents in other states, but had not been used in Queensland.

Fisheries Queensland, a service of the Department of Employment, Economic Development and Innovation, the Department of Environment and Resource Management, Maritime Safety Queensland and SEQ Catchments worked collaboratively with other key stakeholders including the Moreton Bay Seafood Industry Association, Moreton Bay Access Alliance, Tangalooma Resort, University of Queensland and Seagrass Watch, on a project to trial EFM in Moreton Bay. The project had funding and in-kind support from project partners, as well as Community Coastcare funding.

The purpose of the project was to trial EFM to:

- determine their efficacy in securing boats in Moreton Bay
- assess their impacts on marine habitats, if any.

TRIAL METHODOLGY

Site selection

A key component of the trial was selection of suitable trial locations. Locations were first shortlisted by analyzing current Moreton Bay DMAs with suitable:

- numbers of moorings
- water depth
- seagrass presence
- sediment type
- relative proximity to other potential trial locations.

Expression of interest applications for participation in the trial were sent to 275 private buoy mooring authority (BMA) holders in the shortlisted areas. Seventy-five expressions of interest were received (27%), indicating a significant interest in EFM.

Expressions of interest were then assessed for suitability for the trial. Tangalooma Resort was also contacted to arrange project participation at Moreton Island. Trial locations were selected (Figure 1) as Point Halloran, near Victoria Point; Dalpura Bay at Macleay Island; One Mile at North Stradbroke Island and Tangalooma at Moreton Island. These locations were chosen to represent a range of habitat types and ensure that results were broadly applicable in Queensland.

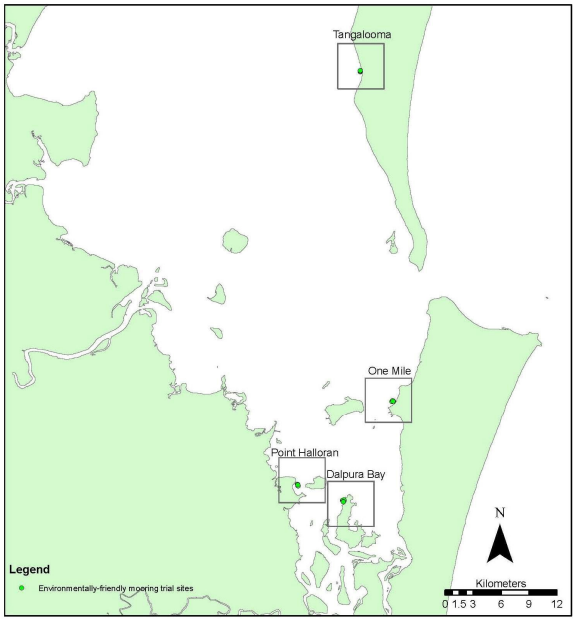

Figure 1. EFM trial locations in Moreton Bay.

Legal agreements were established with the successful EOI applicants in order to conduct the trials. Between January and March 2010, one of each of the three EFM designs was installed at each of the four locations, 12 trial moorings in total. These replaced 12 traditional moorings which were removed. Where possible, EFM were installed in close proximity to, but not at the site of the (removed) traditional moorings. BMAs were amended by Maritime Safety Queensland in cases where the EFM was installed at a different position to the (removed) traditional mooring.

Servicing inspections

Inspections of EFM were undertaken at nine (October 2010) and 18 months (July 2011) after installation. This allowed for routine maintenance and to rectify any identified issues with the moorings.

Ecological studies

Ecological studies performed by the University of Queensland focused on monitoring of benthic animal (animals living in and on the sediment) communities prior to, and twice after, EFM installation. Studies were structured to determine:

- if installation and use of EFM caused a significant impact on the nearby benthos
- which, if any, type of EFM caused the least damage to the environment
- differences between areas with moorings to adjacent areas without moorings.

Engineering study

The aim of the engineering study was to investigate the ability of the Seagrass Friendly Mooring screw anchor to hold boats in the environmental conditions of Moreton Bay, as it was the least tested anchor system used in the trials.

The study comprised a literature review, site visits to the Seagrass Friendly Mooring at Point Halloran, a theoretical analysis of the uplift capacity of screw anchors, investigation of wind and wave conditions in Moreton Bay, and estimates of wind and wave loads for such conditions.

Questionnaires and interviews

Questionnaires were sent to each of the trial participants after the first EFM service, for interim feedback on the project and moorings performance to date. Face to face interviews were also conducted with the trial participants and mooring designers / contractors after the second EFM service event.

Forum

An EFM Forum was held on 12 September 2011. The purpose of the forum was to communicate outcomes and lessons learnt from the trial. A range of stakeholders including trial participants, project partners and other interested parties were invited to the forum.

OUTCOMES

EFM performance

Each mooring design proved suitable for the environmental conditions in Moreton Bay and no major issues were reported with nine of the 12 moorings.

However three moorings failed. This appeared to be due to:

- the failure of shackles on two Ezy Rider moorings. There may also have been prior damage to one of the Ezy Rider moorings as a nearby vessel that had come off its mooring was observed to tangle with the EFM
- a plastic sleeve coming off the shaft of one Seaflex mooring, which caused the rope to rub on the shaft and wear through.

At the time of paper submission discussion between manufacturers and the contractor about the cause of the moorings failures was ongoing. A key issue is that there must be a close relationship between parties, with a clear understanding of EFM installation and operation based on detailed instruction manuals.

Other moorings required minor repairs due to wear and tear, faulty materials, user error and possible boat strike, illustrating the importance of regular servicing inspections.

Ecological study - preliminary results

Preliminary results of the ecological study indicate that the benthic assemblages found within Moreton Bay are dominated by polychaetes, malacostracans (crustaceans), molluscs and echinoderms (Walker & Skilleter 2011). Early indications suggest that there was no detectable effect of installing the trial EFM within existing mooring areas.

There were consistent differences in the composition of benthic assemblages between some mooring areas and nearby non-mooring areas. This could indicate a more systemic effect of mooring areas in general. The benthic assemblages in areas where EFM were installed appear to be in recovery, becoming more similar to the fauna in areas without moorings (G. Skilleter, pers comm 2011). These results were evident at all locations, and therefore likely to be applicable outside of Moreton Bay.

Engineering study

Wind speeds and wave heights in Moreton Bay can reach 50m/s and exceed 2m, respectively. The stated anchor capacity for the screw anchor of the Seagrass Friendly Mooring was found to exceed the expected wind and wave conditions of Moreton Bay, with a good safety factor (Ash et al. 2011). This EFM anchor design is therefore sufficient to hold private pleasure vessels in Moreton Bay.

Questionnaires and interviews

Half of the trial participants returned their questionnaires about the moorings and project performance. Feedback was very positive, with respondents happy with the reduced environmental impact of the moorings and ease of use.

To date interviews have been completed with five trial participants, two EFM companies and a moorings contractor. Those interviewed felt strongly about the importance of EFM and supported the uptake of them within Moreton Bay. Most owners were satisfied with their mooring although some design and installation issues had been encountered which had required input from moorings designers / contractors. One owner of a failed Ezy Rider elected to replace the EFM with the original traditional mooring on completion of the trial. All noted the need for local contractors/EFM industry, and for EFM to be cost competitive. The need for detailed installation and operation manuals for EFM was also identified.

Forum

Seventy people attended the forum, representing a broad range of stakeholders including government, the boating community, marine industry, research and natural resource management groups. Topics covered were project background, ecological and engineering studies, EFM installation and maintenance issues and industry development. A key outcome from the Forum was the need for government agencies to work together and with industry to facilitate uptake of EFM. Forum outcomes will be included in the final project report.

CHALLENGES AHEAD

The EFM trial has raised awareness of the issue of marine habitat disturbance from buoy moorings and has demonstrated the effectiveness of all three designs for use in Moreton Bay. There are a number of issues that may slow the uptake of EFM in Moreton Bay and in Queensland in general. These include:

- the higher cost of EFM, especially when only small numbers are being constructed and installed
- the absence of local EFM manufacturers / contractors in Queensland
- mooring modifications may need to be made due to differing environmental conditions throughout the state, however the flexibility of existing EFM designs may allow this.

These issues may be resolved by confirmation and awareness of the benefits of these moorings, increased demand and economies of scale, and establishment of a local EFM industry. Additionally the streamlined approval process and lower application fees for EFM may offset the higher purchase prices of these moorings.

TAKE HOME MESSAGES

- Traditional block and tackle buoy moorings can have a significant impact on seagrass and other habitats.
- EFM reduce the impact to seagrasses and other benthic organisms around the moorings.
- Three EFM designs were trialed in Moreton Bay and were found to be suitable at securing vessels although insufficient installation manuals contributed to the failure of three moorings.
- A close relationship between EFM manufacturers and installers is essential.
- Government and the EFM industry must work together to facilitate uptake of EFM.

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