Executive Summary

1. Our preliminary trials show that acoustic techniques can be used for mapping some types of tropical seagrass habitats. They cannot be used for determining above-ground seagrass biomass in these habitats.

2. The remote acoustic sensing technique can potentially minimise total in-water time and associated safety risks for divers in areas where dangerous marine animals and other obstacles are common.

3. Boundaries of seagrass meadows can be successfully mapped using a fan beam system, combined with ground-truth information. In these trials 13 percent of low-density ($<5 g.m^2$) seagrass sites were not interpreted as seagrass with the acoustic technique. Meadow boundaries interpreted from fan beam data are at a higher resolution than is possible from dive-based surveys.

4. Refinement of the conical beam technique is also required before it is possible to discern low-biomass seagrass habitat from bare substrate. We recommend that modifications be made to reduce transducer instability, ensure the use of real-time dGPS systems and reliable satellite data capture, and to measure the effects of seagrass species, sediment type and bottom topography on acoustic signal strength.

5. Acoustic techniques can provide sediment mapping information at spatial resolutions better than normally available from traditional sediment grab mapping methods. Acoustic data can be used in some situations as a proxy for percent mud - a useful sediment parameter in marine ecology studies.

6. Acoustic data show stronger statistical relationships with some parameters of sediment composition (eg., percent coarse sand, and weighted average of sediment grain size), but cannot be used to describe details of sediment grain-size composition (eg., range, variance and distribution).

7. Acoustic signals provide a measure of changes in benthic parameters, but in tropical seagrasses calibration to absolute biomass measures has limited potential. Some form of calibration is usually necessary in every survey event to interpret graphs and images created with the acoustic technique. The frequency and intensity of ground-truth sampling to calibrate and interpret acoustic data will depend on the spatial scales at which parameters change and can be minimised once an area is initially mapped.

8. Advantages of the acoustic techniques for habitat mapping may be greatest where the scales of variation in seagrass species, sediment type and bottom topography are known and calibration sampling can be minimised. Acoustic data also has a higher spatial resolution than dive-based survey data.

9. Dive-based sampling will always be required in combination with acoustic surveys of seagrass habitat to a) interpret the acoustic signal, and b) collect information on species composition and faunal use (eg., dugong feeding trails) of seagrass habitats.