

Seagrass Communities of Geographe Bay



Numbfish - *Hypno monopterygium*

Jellyfish

Patterns of Diversity Ecological Importance Threats to Conservation

**Mark Westera, Peter Barnes, Gary Kendrick
and Marion Cambridge**



Busselton Jetty



Seagrasses: our hidden local asset?

Seagrass meadows are among the most productive ecosystems in nature and fulfil an essential ecological role. Often regarded as nursery grounds for juvenile fish, seagrasses also stabilise sediments and improve water quality through the absorption of dissolved nutrients.

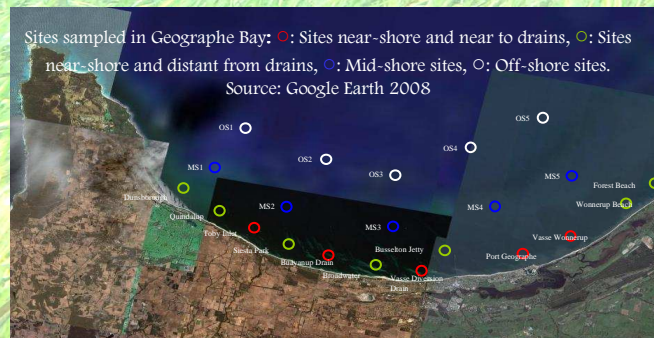


Rocky Reef – Geographe Bay

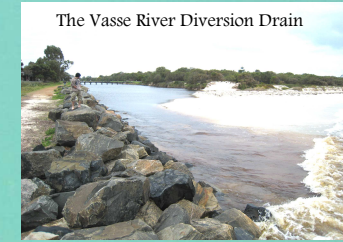


Smooth Ray – Geographe Bay

Geographe Bay is a shallow, north-facing bay 220 kms south of Perth that supports extensive seagrass meadows and rocky reefs with a high diversity of fish, sponge, coral and invertebrate life. Conservation of these habitats is essential in order to preserve the biodiversity of the bay.



Since the 1950's, population increases in the area have put pressure on these marine habitats, through extensive land clearing and the construction of drains emptying into the bay. Historically, this has corresponded with decreases in seagrass cover.



The Vasse River Diversion Drain

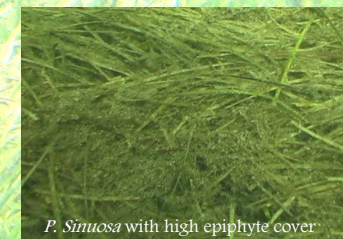
More recently, however, concerns have focussed on high levels of nutrients entering the bay through the drains from urban and agricultural run off. This can cause a rapid growth of very small sessile plants and animals - epiphytes - that smother the blades of seagrass, potentially impacting seagrass communities through the reduction of light to seagrass leaves.

The aim of this research is to establish benchmark data on the biology and ecology of the various habitats in Geographe Bay, in order to understand the natural condition, and to identify future disturbances.



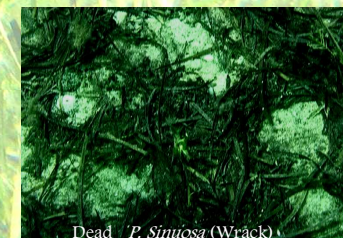
Posidonia Sinuosa – Healthy

Healthy seagrasses should have clean blades with few large epiphytes, vibrant colour and occur in high densities.



P. Sinuosa with high epiphyte cover

Epiphyte growth can occur rapidly, smothering the seagrass and reducing light availability.



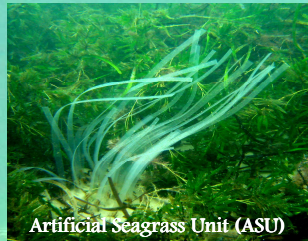
Dead *P. Sinuosa* (Wrack)

In severe cases, the seagrass will die, leaving patches of un-colonised sand and dead organic matter.

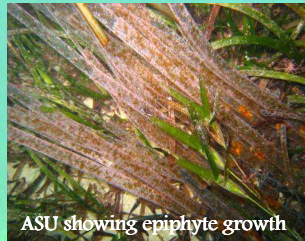
Epiphytes

The spatial variation in epiphyte biomass, between all sites was measured by collecting the seagrass *Posidonia sinuosa* from random quadrats and also by deploying Artificial Seagrass Units (ASUs).

ASUs were designed to mimic *Posidonia* and allow a standard measure for epiphyte growth and so provide a more accurate picture of variations between sites.



Artificial Seagrass Unit (ASU)



ASU showing epiphyte growth

Results so far have shown no significant difference between drain sites and non-drain sites, or with increasing distance from shore..

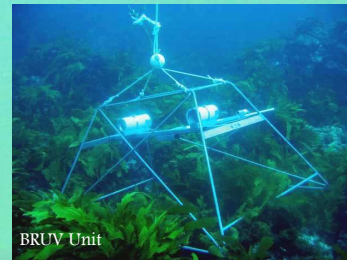
Water quality

Samples were taken from both the surface and the bottom to primarily measure chlorophyll content and nutrient levels at each site. Temperature, pH, dissolved oxygen and salinity were also recorded in the field. So far analysis has shown that turbidity is generally lower in summer months than in autumn.

The overall quality of the water in Geographe Bay is very high, but further measurements are necessary to evaluate the effects of drains during the wetter, winter months.

Fish diversity

Fish diversity was measured using Baited Remote Underwater Video Systems (BRUVS), where video footage is collected for at least 45 minutes and is later analysed in the lab. The system incorporates two video cameras attached to a frame, pointing toward a bait arm, that subsequently attracts fish. The maximum number of species at any given time was used for the analysis in order not to overestimate abundance, which may occur when individuals repeatedly leave and return to the field of view.



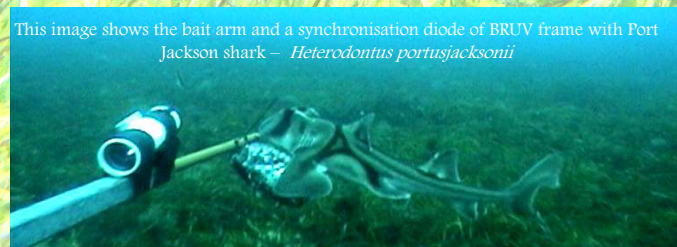
BRUV Unit



Striped trumpeter - *Pelates sexlineatus*

Seventy six species of fish were observed represented by 32 families, with the highest diversity coming from the off-shore sites.

No differences were found in the abundance of fish assemblages between sites close to and far from drains, while significant small scale variation was detected among sites. The most abundant species in-shore was the striped trumpeter (pictured) while the western king and maori wrasse were most abundant at off-shore sites.



This image shows the bait arm and a synchronisation diode of BRUV frame with Port Jackson shark – *Heterodontus portusjacksonii*

Benthic composition



Finger Sponge

The composition of the sea floor of Geographe Bay was recorded using a hand held video along six, 25 metre random transects, at each site.

This was to measure the percentage cover of organisms and inorganic substrata, to identify variation between sites, with distance from shore. Most sites were dominated by seagrass, but this trend changed the further offshore that was sampled. There were no clear differences between drain and non-drain site assemblages, although the seagrass *Amphibolis antarctica* was found in higher densities at sites located in proximity to drains.



Benthic communities can be made up of an array of colourful sponges and corals

In summary, this project has so far provided valuable data on the diverse range of habitats in the bay, and the creatures that live there. Invertebrate diversity is high when compared to other temperate seagrass meadows and fish abundance is higher than previous studies have suggested. Furthermore, this study has identified a number of important patterns in benthic assemblages across the bay. However, further research is crucial to identify the natural patterns of variation among habitats in Geographe bay.

This project is funded by the Natural Heritage Trust (NHT) which is a joint initiative of the West Australian and Australian Governments, and is managed by the South West Catchments Council.

For more information please contact Peter Barnes at peter.barnes@uwa.edu.au