DOWNLOAD PDF BOTANY BAYS SEAGRASS MEADOWS

Chapter 1 : New South Wales seagrass

Long-term changes of seagrass meadows (Posidonia australis Hook. f. and Zostera capricorni Aschers.) in Botany Bay, Australia, were investigated using historical aerial photography (), field observations () and in situ sediment coring for fibrous remains of Posidonia.

Their abundance and the important roles they play earn them the title of third most valuable ecosystem on the planet after estuaries and wetlands. These extensive meadows are made up of a group of flowering plants that are unique in their ability to thrive submerged in salty seawater. Tossed about by the tides, they feed and harbor an incredibly diverse world of marine life and help protect neighboring ecosystems by stabilizing sediments and mitigating pollution. Seagrasses are often confused with seaweed, but they are very different organisms. Seagrasses are plants that at one point in their evolutionary history lived on land but then retreated back into the waters of their ancient ancestors. Seagrass meadow in Wakaya, Fiji photo credit: Seagrasses depend on light for photosynthesis, so they generally occur in shallow areas. How far seagrass meadows extend out into the ocean depends on light availability and the shade tolerance of the seagrass species. Their presence at the shoreline is limited naturally by how exposed they become at low tide, the frequency and strength of waves and associated turbidity, and low salinity from incoming fresh water. Seagrass meadows benefit life on earth in many ways. As ecosystem engineers they create habitat and produce food for countless species, sequester a remarkable amount of carbon, and help maintain the health of neighboring estuaries, mangroves, coral reefs, and other ecosystems. They are home to commercial fisheries, which provide food for billions of people. Like many ecosystems on the planet, they are threatened by human activity. Pollution, development, recreation, and climate change jeopardize the health and existence of seagrass meadows. Thus, it is imperative that we learn as much as we can about them so that we are better equipped to protect them. Turtle grass Thalassia testudinum growing in an estuary on the coast of San Salvador Island, Bahamas photo credit: When levels of the bacterial pathogen Enterococcus were compared between seagrass meadows and control sites, a three-fold difference was detected, with the seagrass meadows harboring the lowest levels. This has implications for the health of both humans and coral reefs, the latter of which face many threats including bacterial diseases. Cushion sea star in seagrass meadow photo credit: Additional Resources on Seagrass and Seagrass Conservation:

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Chapter 2 : Seagrass - Wikipedia

Seagrass meadows can be composed of a single seagrass species or multiple species, with some meadows consisting of a dozen species or more. Seagrasses depend on light for photosynthesis, so they generally occur in shallow areas.

Jul 8, 16 Jul Sat: Wei Ling finds a dugong feeding trail on the seagrass meadows of Chek Jawa Come for the talk to learn more about our seagrasses and our work. Bring your friends along! She will share about her much loved mangroves in this talk. Shufen manages the special effort to restore our mangroves and will have lots of interesting stories and insights about them! Shufen works tirelessly for the mangroves even in the rain! Here she is with the rare Avicennia marina at Pulau Semakau. Otters, wild dolphins, sea turtles! Nemos, sea snakes, living corals and more. From accessible shores like Changi and Tanah Merah, to our many huge submerged reefs. I hope to share photos and stories of recent adventures on our living shores. How can we visit our shores? Are there special shore events for kids? And find out how you CAN make a difference for our little-known shores! The speaker will tell you how sponges rank among the oddest and most fascinating animals in the world. Yes, sponges are animals! The sponges in your kitchen and bathroom are actually their skeletons! What are the other kinds of sponges that can be found in Singapore waters, where are they and just how many are there? Lim Swee Cheng is author of the Guide to Sponges of Singapore and he will share his discoveries from two years of searching and identification of sponges in Singapore waters. Reliable observations from South-east Asia are also welcome, and will help TMSI study whether Singapore contributes to seasonal trans-national migration routes. This talk is free and is open to the public. For MORE exciting biodiversity talks see wildsingapore happenings.

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Chapter 3 : Kurnell's Tipping Point: Case Study: Towra Point- Importance of Seagrass

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The list is updated at least biannually. Trophic transfer in seagrass systems: Marine Ecology Progress Series, Effects of seed source, sediment type, and burial depth on mixed-nnual and perennial Zostera marina L. Estuaries and Coasts, 38 3: Biodiversity mediates top-down control in eelgrass ecosystems: Ecology Letters, 18 7: PLOS One, 9 7. Field experimental evidence that grazers mediate transition between microalgal and seagrass dominance. Limnology and Oceanography, 59 3: Impacts of varying estuarine temperature and light conditions on Zostera marina eelgrass and its interactions with Ruppia maritima widgeongrass. Estuaries and Coasts, 37 1: Persistence of Zostera marina L. Journal of Experimental Marine Biology and Ecology, Modeling loss and recovery of Zostera marina beds in the Chesapeake Bay: The role of seedlings and seed-bank viability. Patterns of seagrass community response to local shoreline development. Estuaries and Coasts, 37 6: Temporal shifts in top-down vs. Seed burial in eelgrass Zostera marina: Marine Ecology Progress Series Estuaries and Coasts 36 4: Broad-scale association between seagrass cover and juvenile blue crab density in Chesapeake Bay. Marine and Coastal Fisheries 5 1: Marine Ecology-Progress Series Seedling establishment in eelgrass: Recovery trajectories during state change from bare sediment to eelgrass dominance. Eelgrass survival in two contrasting systems: Seed addition facilitates eelgrass recovery in a coastal bay system. Eelgrass restoration by seed maintains genetic diversity: Estuaries and Coasts 34 4: Biological Conservation 7: Eelgrass Zostera marina L. Challenges in Conservation and Restoration. Estuaries and Coasts 33 1: Seasonal and interannual change in a Chesapeake Bay eelgrass community: Insights into biotic and abiotic control of community structure. 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Chapter 4 : Experimental transplanting of seagrasses in Botany Bay, Australia | Dan Roberts - calendrierde

Multiple instances of overgrazing by sea urchins have contributed to losses of Posidonia spp.-dominated seagrass meadows on the scale of hectares in Cockburn Sound, Western Australia since

Ecosystem services[edit] Seagrass bed with several echinoids, Grahams Harbour, San Salvador Island , Bahamas Seagrass bed with dense turtle grass Thalassia testudinum and an immature queen conch Eustrombus gigas , Rice Bay, San Salvador Island , Bahamas Evolution of seagrasses Seagrasses partly create their own habitat: Their importance for associated species is mainly provision of shelter through their three-dimensional structure in the water column and to their high rate of primary production. As a result, seagrasses provide coastal zones with a number of ecosystem goods and services , for instance nursery habitat for commercially and recreationally valued fishery species, [3] fishing grounds , [4] wave protection, oxygen production and protection against coastal erosion. Yearly, seagrasses sequester about Global warming models suggest that some seagrasses will go extinct â€" Posidonia oceanica is expected to go extinct, or nearly so, by This would result in CO2 release. In the early 20th century, in France and, to a lesser extent, the Channel Islands , dried seagrasses were used as a mattress paillasse filling - such mattresses were in high demand by French forces during World War I. It was also used for bandages and other purposes. In February , researchers found that seagrass meadows may be able to remove various pathogens from seawater. On small islands without wastewater treatment facilities in central Indonesia, levels of pathogenic marine bacteria â€" such as Enterococcus â€" that affect humans, fishes and invertebrates were reduced by 50 percent when seagrass meadows were present, compared to paired sites without seagrass, [8] although this could be a detriment to their own survival. Seagrasses display a high degree of phenotypic plasticity , adapting rapidly to changing environmental conditions. The main cause is human disturbance, most notably eutrophication , mechanical destruction of habitat, and overfishing. Excessive input of nutrients nitrogen , phosphorus is directly toxic to seagrasses, but most importantly, it stimulates the growth of epiphytic and free-floating macro - and micro - algae. This weakens the sunlight , reducing the photosynthesis that nourishes the seagrass and the primary production results. Decaying seagrass leaves and algae fuels increasing algal blooms , resulting in a positive feedback. This can cause a complete regime shift from seagrass to algal dominance. Accumulating evidence also suggests that overfishing of top predators large predatory fish could indirectly increase algal growth by reducing grazing control performed by mesograzers , such as crustaceans and gastropods , through a trophic cascade. Macro algal blooms cause the decline and eradication of seagrasses. Known as nuisance species, macroalgae grow in filamentous and sheet-like forms and form thick unattached mats over seagrass, occurring as epiphytes on seagrass leaves. The most-used methods to protect and restore seagrass meadows include nutrient and pollution reduction, marine protected areas and restoration using seagrass transplantation. Seagrass is not seen as resilient to the impacts of future environmental change.

Chapter 5 : Seagrass Meadows and Their Role in Healthy Marine Ecosystems â€“ awkward botany

Seagrass meadows are important breeding and feeding grounds for large numbers of fish and invertebrate species, and provide critical habitat for dugongs and turtles. They also play an important role in the food web of inshore coastal areas.

Organic carbon and carbonate distri- E. Cul- Heavy metals in Ligurian Sea sediments: Trace metals in Knauer, G. Immediate industrial effects on sediment metals sediments from the Ligurian coast, Italy. Factors affectin, 0 the concentration of thirteen Crecelus, E. Particulate lead contamination rare metals in sea water. Partial extraction of metals from aquatic sediments. Process affecting Morel, F. Fate of trace metals in Los Angeles County waste water discharge. The geochemistry of trace elements in M. Survey of metals in sediments near Quonset Point. Rhode pelagic sediments from the Central Pacific Basin. Diapenesis, metals and pollution in Piper, D. The distribution of Co. Fe, Mn, Ni and Zn estuaries. Effect of sewage effluent on the sediment of Acra Nordasvatnet a land-locked fjord , Norway. The depositional environment of zinc, S 5 -s 8 lead and cadmium in reservoir sediments. Wafer Rex 9, The accumula- Red Sea, Egypt. Geology and geochemistry of reefs, carbonate Ann Prog. Biological availability of metals to marine An in- Wedepohl, K. Spuranalytische untersuchungen an tiefsee- expensive titration method for the determination of organic carbon tonen aus dem Atlantik. Sources of trace Hershelman. In Cycling and Control of,Me[als, pp. Box , Sydney, NSv! Australia panying major engineering works to reduce the effect of storm erosion, which has been exacerbated by pre- vious large scale dredging and port construction. The Zusfera capricorni applicability of seagrass transplanting as a means of and Posidonia australis at three depths were evaluated. In addition, small scale historical seagrass mapping was carried out to determine site suitability. For both species and at all depths, survival of transplants was highest when simple wire anchors were used. Although Seagrasses are a dominant plant community in many the transplanting seemed successful and plantsshowed sheltered coastal and estuarine environments through- some initial growth, they were destroyed by storms after out the world den Hartog, , providing food only 4 months. Consequently, restoration of the seagrass meadows The highest species diversity and possibly the largest in Botany Bay is considered impractical without accom- areas of seagrasses occur in Australian waters Larkum M a r i n e P o l l u t i o n Bulletin et al. Sites especially juveniles Pollard, A donor site was chosen beds see Larkum et al. These nearby at 1 m depth ISLW. Obviously the biology of indi- which included the transplant site D-D in Fig. Nevertheless, several sea- Posidonia australis were used for transplanting. As Posi- grass transplant projects have achieved considerable donia is a large seagrass with a robust rhizome, single success Thorhaug, ; McLaughlin et al. Zostera is considerably smaller, allowing a plug Botany Bay, an estuary near Sydney, Australia, has of about shoots to be used as the transplant suffered large seagrass losses in recent years. Randomly collected apical shoots were gently f. Wire pegs were 30 cm lengths of 4 mm light areas from an aquatic reserve site, led to recommenda- gauge steel rod and steel pegs were 30 cm lengths of tions that seagrasses should be artificially established Thus a number of Trials indicated that the steel anchoring pegs required experimental plantings were planned to assess the feasi- considerably more force to be dislodged from the sedi- bility of a large scale restoration using the two indigen- ment than wire pegs. To investigate whether physical protection increased A first consideration was whether to use seed or survival of transplanted seagrass, we used artificial sea- vegetative transplants. Although little information is grass units ASUs , into which we planted steel available concerning natural colonization and develop- anchored transplants of both Zostera and Posidonia. Zostera capricorni has mesh as a base 2. On the other hand, Posidonia tape see Bell etal. After reviewing these observations we decided units were used to test effectiveness of the various pegs that transplanting from vegetative portions offered the and of the ASUs Table 1. A total of transplants best chance of success for both Zostera and Posidonia. At monthly intervals the survival of each We report here results of experimental seagrass transplant was recorded. D e p t h s relative to [SLW. Botany Bay, which has an area of approximately 49 Species: Posidonia Zostera km 2 and is at the entrance of the Georges River, is used Depth: Surrounding lands are largely developed for Treatment: The donor site Site A near Quibray Bay and the outer limit of Posidonia australis in and are also shown. In the same period Posidonia has receded to Observations made during the course of the experi- the shoreline. Figure

2 summarizes these changes in ment offered explanations for these results. Firstly, Posi- relation to the transplant site. Plants took longer to remove and the Seagrass transplants larger shoots are easy to damage and quickly suffer As an example of comparative survival of seagrass from dehydration. Posidonia also has large lacunae transplants, the percentage survival of transplanted which tend to make unanchored plants float. Secondly, Zostera and Posidonia units for each treatment at Site 2 the use of steel anchors appeared to cause abrasion and are shown in Fig. At this site, highest survival loss of transplants. A difficulty encountered in fixing the larger anchors in the surprising result was the high survival rate of trans- sediment. Thirdly, the ASUs proved very efficient at planted but unanchored Zostera units. The 3-way ANOVA revealed a significant interaction The survival of the transplanted seagrasses was between depth, species and treatment Table 2. Analy- monitored for four months between April and August sis of pooled means using SNK procedure revealed a In August severe storms caused an early number of significant results 0. For example, termination to the experiment. Indeed large losses in the natural occurred. Pooled means across treatments for survival after 3 months of Posidonia and Zosreru transplant units at 1 m. Pooled means across species for survival after 3 months of transplant units for the four treatments at 1 m, 2 m and 3 m depth locations. Pooled means across depths for survival after 3 months of Posidonia and Zosteru transplant units for the four treatments. Recent Posidonia losses appear to be over the past years. At present, it seems unlikely that problems such as T on survival of transplant units. However, transplanting may be useful in providing accelerated recovery of suitable Depth 2 3. In larger areas, Species 1 Where possible, Treatments 5 9. The latter establishes the need to transplant in light of natural changes. Once such erosion has begun for future seagrass transplant programmes in the region, in a seagrass bed, the process may be self perpetuating but has also revealed the futility in carrying out a large in that unstable sand is removed from the system and scale seagrass transplant programme for either Zostera allows destabilization of new areas. A long term loss of Posidonia australis was processes resulting in the loss of ha of seagrasses identified at this site and transplanting Posidonia near Adelaide, in the Gulf of St. Transplanting Zostera capri- The aim of the present study was to assess the feasi- corni could be more successful, however, at this site, bility of large scale seagrass transplanting to the Towra Zostera undergoes large natural fluctuations in area due Point area as a means of mitigating fish habitat losses. For these reasons, The early termination of the experiment due to storm seagrass transplanting is not considered a practical damage indicates that large scale transplanting at this solution to the problem of losses to Posidonia meadows time would not have been successful. However, the at Towra Point, and a large scale transplant programme study also provided additional useful information. This species was difficult to trans- damage and associated erosion. Evidence from the historical mapping The authors would like to thank members of the staff at the Fisheries also showed that Posidonia had steadily declined along Research Institute and State Pollution Control Commission for assist- the transect at Towra Point for many years Fig. Maclntyre There is also reasonable evidence to suggest that this for editorial comment on the manuscript. Trudy Walford and Tony species has a comparatively slow rhizome growth rate Roach helped in preparation of the diagrams. Cooper has extensively transplanted areas of Posidonia oceanica over many years and has found a slow maximum hori- Bell, J. Ecological studies on seagrasses of south To add to these problems, both Cooper working western Australia with particular reference to Cockburn Sound. Thesis, University of Western Australia. Jardinier de la Mer. The Seagrasses of the World. Thus not Dennison, W. Photoadaptation and growth only is spreading slow in these two species but it may be of Zostera marina L. A low cost scale Posidonia transplanting programme could take planting technique for eelegrass Zostera marina L. US Army Corps Eng. The ecology of submerged aquatic angio- sperms within the Tuggerah Lakes system of N. Secondly, the experiments also demonstrated that the University of Sydney, Australia. Reciprocal transplant of the independent of species and depth, was the use of wire seagrass Zostera marina L.

Chapter 6 : Bay Grasses: VIMS Journal Articles | Virginia Institute of Marine Science

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Saturday, October 9, Case Study: Towra Point- Importance of Seagrass A significant area of seagrass lies adjacent to the Towra wetland. Dredging in Botany Bay in the s and s caused ongoing detrimental effects to Towra Point by altering wave patterns. This increased the erosion rate at Towra Beach and changed sedimentation patterns. There are two projects that involved dredging of Botany Bay recently; the first is the desalinated water distribution pipeline for Sydney Water and the second is two underground electricity cables for Energy Australia. Dredging not only affects wave patterns, it changes the way in which water moves throughout the system, therefore changing the physicochemical processes and sedimentation patterns. The seagrass meadows in Botany Bay are relatively large for the Sydney area and are sensitive to turbidity. Turbidity is particularly relevant to Towra Point and surrounding seagrass meadows as it determines the conditions for seagrass growth and is a major factor in aquatic biodiversity. Increased turbidity reduces light available to seagrasses on the seabed or river bed. Seagrass form a critical component of the Towra Point ecosystem as they protect the shoreline from erosion, provide shelter for juvenile fish and crustaceans and assist in nutrient and energy transfer. Seagrasses stabilise the seabed and reduce the effects of waves, and a reduction in seagrass area could have a deleterious effect as the effects of waves on the area increase Larkum Therefore, dredging may cause loss or change of habitats and may lead to loss of species MS Towra Point supports a large number of interactions between organisms and the transfer of nutrients and energy, and the biodiversity of the reserve is a consequence of this. Seagrass meadows adjacent to Towra Point Nature Reserve and mangrove and saltmarsh communities are critical links in the food chain due to the large amounts of organic matter, or detritus, they produce Connolly et al. The hydrological cycle in Botany Bay is dynamic and continues to change with anthropogenic influence. Most of the plants and animals of Towra Point have adapted to the current hydrological regime. However, some species such as the green and golden bell frog have been lost in certain areas due to hydrological changes. Maintenance and monitoring of a hydrological regime within natural variation is critical in maintaining the biodiversity and sustainability of the wetland. Anthropogenic alterations to Botany Bay and Kurnell Peninsula have changed how water moves throughout the system which has resulted in alteration of the ecological character of the Ramsar site since it was listed in Pollutants and nutrients suspended in the water affect the growth of seagrass by inhibiting light for growth. These seagrass meadows are largely outside the Ramsar site boundaries except for in Weeney Bay. Once found along the northern and southern shores of Botany Bay, seagrass areas have varied due to natural and anthropogenic activity. Within Botany Bay, seagrass is found to colonise seabeds to three metres in depth, which is shallow in comparison to seagrass beds in similar environments, such as Pittwater seven metres , Port Hacking eight metres and Jervis Bay nine metres. Pollution may be the limiting factor in seagrass depth in Botany Bay as the suspended sediments increase turbidity in the water. The presence of seagrass meadows adjacent to the mangrove and saltmarsh communities at Towra Point is a critical link in the food chain and helps to maintain the biodiversity of the wetland. In addition, they stabilise the seabed, act as a buffer against wave energy and improve water quality through nutrient uptake Larkum ; SPCC a; West Smaller areas of seagrass meadows are less able to withstand wave and tidal energy. Therefore loss of sections of seagrass may have a negative effect on the whole community Larkum Seagrass meadows can change in response to chemical e. Seagrass meadows may also contract when mangrove areas expand in response to increased suspended sediment loads. Extraction, filling, dredging and sand mining activities also cause direct damage to seagrass areas. Four species of seagrass are to be found on the seabed, the two most important being strapweed Posidonia Australia and eelgrass Zostera capricom. The entire seabed in the aquatic reserve was carpeted with sea grasses, but more than one-third has been lost due to erosion. Growth of Posidonia australis Brown Hook. Population dynamics of juvenile tiger prawns Penaeus esculentus and P.

Chapter 7 : Massachusetts Bays Program

Seagrasses thrive in shallow waters of New South Wales estuaries, so they are easily degraded. Often the places they love to grow are the same spots where people like to visit. As a result, Botany Bay's once vast seagrass meadows are drastically diminished.

Chapter 8 : seagrass meadows â€“ awkward botany

Consequently, restoration of the seagrass meadows in Botany Bay is considered impractical without accompanying major engineering works to reduce the effect of storm erosion, which has been exacerbated by previous large scale dredging and port construction.

Chapter 9 : Seagrasses of Australia

Experimental seagrass transplant trials were carried out to assess the feasibility of a proposed large scale transplant programme in Botany Bay, Australia.