

# From Oysters to Ecosystems: adaptive marine plant management in Queensland

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## ABSTRACT

Marine plants, including mangroves, saltmarshes, seagrasses and algae drive the primary production within the food chain in coastal waters. These highly visible marine plants have a variety of roles including the uptake and export of nutrients, feeding, spawning and shelter sites for aquatic species, filtering and consolidating sediment, controlling shoreline erosion, and buffering coastal communities against tidal surges. Historically mangroves were harvested for timber to supply the fledgling oyster culture industry in Moreton Bay. Research over the last 3 decades has confirmed the links between marine plants and fisheries productivity. Forming vital estuarine and marine fish habitats, marine plants support all the fishing sectors: recreational, commercial and indigenous. Mangrove communities in Queensland were first protected within the 1914 fisheries legislation to manage timber harvesting. Further legislation in 1976, 1989 and 1994 led to the protection being extended to other marine plant communities, including saltmarsh and seagrass. This crucial change was in response to community recognition of the broader ecosystem roles of marine plants and the connectivity between these diverse vegetated habitats and those habitats of the adjacent sand or mud flats. The initial single focus of management has evolved over the last 95 years to adopt a broader ecosystem approach. Partnerships with key stakeholders have adopted a more strategic management approach with agreement on areas of foreshore protection and of development. At the forefront of the fish habitats that are being impacted by climate change, marine plant communities require adaptive management if these are to continue to support coastal fisheries resources and fishing. Buffers appropriate to allow landward and poleward shifts of the marine plant communities are a critical element of contemporary management. Recognition of the economic contributions that marine plants bring is long overdue.

## INTRODUCTION

Within the food chain of estuaries and coastal waters, marine plants drive primary production. Mangroves, seagrasses and saltmarsh plants are now recognized as key contributors to near shore productivity that supports fish and fisheries (Skilleter & Loneragan 2007). In this paper we discuss the evolution of the recognition and management of these key coastal assets in Queensland. Australia has the third largest area of mangrove habitat in the world after Indonesia and Brazil with over 75% growing in the tropical north of the country (Duke 2006). Queensland's protected coastline (by the Great Barrier Reef) provides many sheltered estuaries that support large tracts of mangroves forests in a relatively pristine state. However, Queensland is also experiencing strong development pressures and high population growth that is mainly centered along the coast. Mangroves and other marine plant communities often form the interface between the sea and coastal development and therefore are subject to impacts from the provision of maritime infrastructure such as boat ramps, ports and marinas. Retaining and enhancing the connectivity of the coastal habitat mosaic is critical to ensure ongoing fisheries production (Skilleter and Loneragan 2007; Mckinnon et al 2003) and also to provide for the landward and poleward migration of fish habitats due to climate change and sea level rise.

The management focus early in the 20<sup>th</sup> century was on a single issue, to protect mangrove stands for continued provision of timber for the oyster industry. Since that time, community understanding and recognition of the role of marine plants has evolved to the point where today these plant communities are acknowledged for the pivotal roles they play in sustaining fisheries and providing essential ecosystem services to the community. Legislation has followed community expectations with the result that today the management focus is very much on developing strategic partnerships with coastal developers (e.g. local government urban mangrove management strategies) to ensure impacts to marine plant communities are avoided or minimised and where losses are unavoidable, offsets for the impacts to these and other fish habitats are provided as part of the development.

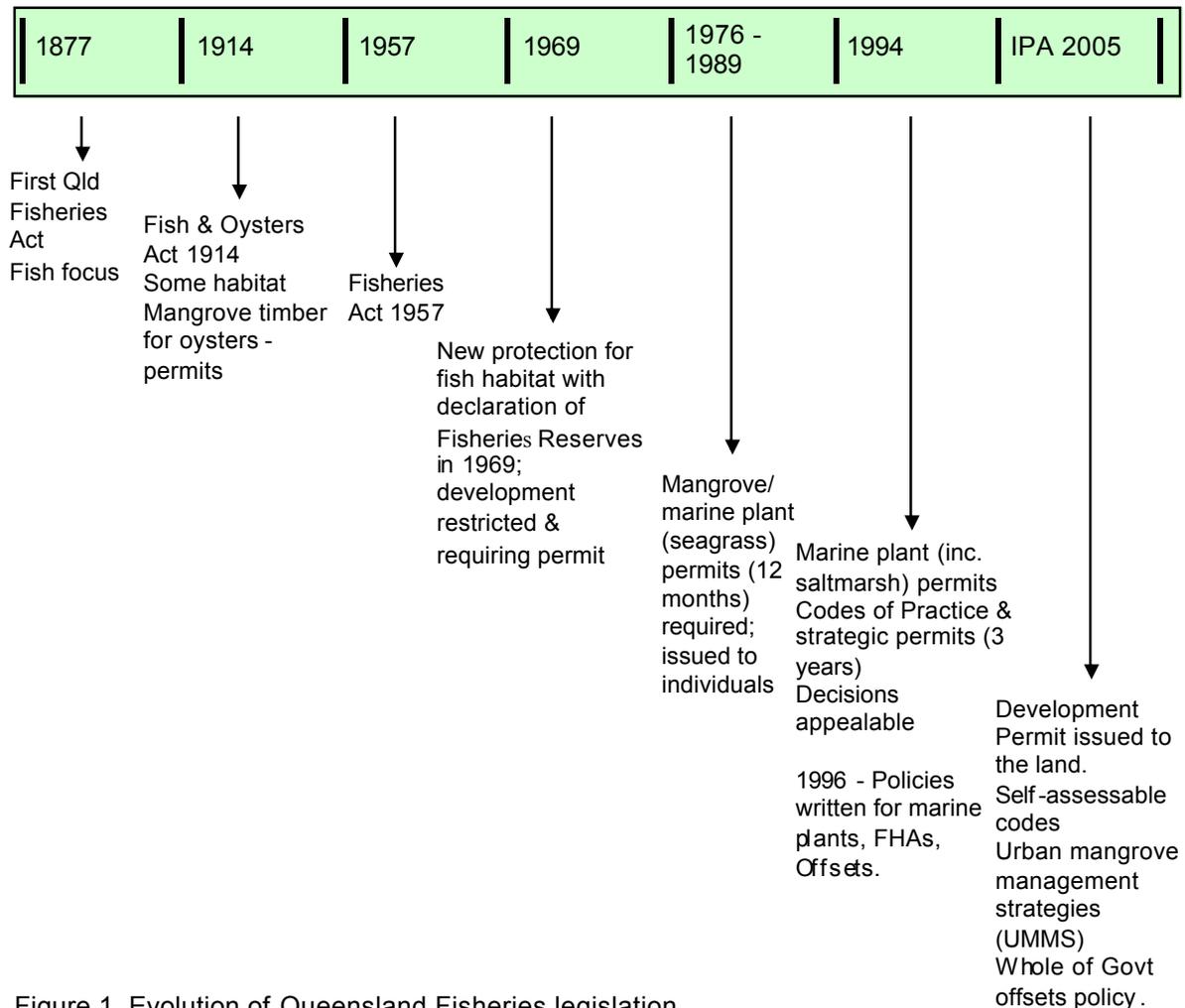


Figure 1. Evolution of Queensland Fisheries legislation

## EVOLUTION OF MARINE PLANT MANAGEMENT

### Management and Legislation

Figure 1 is a chronology that summarises the evolution of the protection of marine plants in Queensland and subsequent requirement for approvals under the various Fisheries Acts and now under the *Integrated Planning Act 1997*. Initially, the Fisheries Act of 1877 was brought in to regulate fishing in all Queensland waters and was fish focused with a total of 16 regulated species listed in a schedule. The total Act was only 4 pages long. Legislation for the protection of mangroves in Queensland was developed because of a demand for use of mangrove timber for commercial oyster culture and included in the Fish and Oyster Act of 1914. Interestingly the early legislation was quite broad and included penalties for damaging

or destroying mangroves or “any other timber growing upon any part of the foreshore of any Queensland Waters...”

The emerging recognition of the direct contribution that fish habitats (vegetated and non-vegetated) make to local fisheries production was officially recognised in 1969 with the declaration of the first batch of Fisheries Reserves. These marine protected areas pre-dated marine parks and other marine conservation areas in Moreton Bay and were supported by a surprisingly far-seeing Government of the day. The declared Fish Habitat Area Network was born during this time (Mckinnon et al 2003) in response to the rapid development along the Gold Coast that saw hundreds of hectares of tidal fish habitats destroyed to create canal estates and other residential development.

The 1976 Queensland Fisheries Act included provisions for protection of mangroves and marine plants (seagrass). In 1989 an amendment to the definition of mangroves also included a botanical list prescribed in a schedule to the *Fisheries Regulations 1977*. Any disturbance of mangroves or marine plants required a specific approval (permit) under the Act.

In 1994, the new Fisheries Act broadened the provisions of protection for mangroves and marine plants to include species from the entire marine plant community, including saltmarsh species. Examples of types of disturbance to marine plants were included. Marine plants were included in the definition of fisheries resources in the Act. In addition, decisions about approvals became open to appeal and Fish Habitat Management Operational Policies were developed to provide a transparent assessment and decision making process that could be consistently applied to permit applications throughout the State. Permits were granted for 12 months for one-off, single purpose works that disturbed marine plants.

The operational policies (FHM OP 001; FHM OP 002) provided guidance about the types of developments and associated impacts on marine plants and other tidal fish habitats considered acceptable or unacceptable from a Fisheries perspective and promoted the management and protection of tidal fish habitats for the sustainable production of fish stocks. A key policy that would set the benchmark for the recently released Queensland Government Environmental Offsets Policy (QGEOP) was the Fish Habitat Management Operational Policy for the Mitigation and Compensation for Works or Activities Causing Marine Fish Habitat Loss (FHMOP 005).

To support the management policies, technical guidelines were developed that provided information on best practice in relation to buffers and set backs between fish habitats and development, restoration of marine fish habitats, mangrove nursery construction and propagation and fish friendly designs for structures.

### **Management evolution**

During the 1990s the Queensland Government recognized the need to develop a more integrated approach to planning for development and providing for timely assessment and decision making for development proposals. The development industry lobbied to reduce the number of separate agency applications and processes that were required, in particular in the coastal zone where in some instances all three tiers of government may require an application under legislation within their jurisdiction.

By the late 1990s, DPI&F had embarked on a strategic risk-management approach to development proposals involving marine plant disturbance through the implementation of specific industry-based Fish Habitat Codes of Practice linked to a multi-works site Strategic Permit. These codes were developed in consultation with the sugar cane industry, local government and electricity suppliers and contained standard requirements for identified operational works and included best practice to minimise impacts to marine plants and fish habitats. Strategic permits were then granted for three years for multiple purpose works.

In 1997, after nearly a decade of earlier planning legislation which sought to streamline approvals, the *Integrated Planning Act* (IPA) commenced; this was followed by the *Integrated Planning Regulation* 1998. IPA has since sought to integrate all approvals related to development assessment in Queensland into one process – the Integrated Development Assessment System (IDAS).

In 2002 the *Fisheries Act* was amended to include as its primary legislative objective the principles of Ecologically Sustainable Development (ESD) and includes the precautionary principle in its approach to management and protection of the State's fisheries resources and fish habitats. Following on from this, in 2005, all development related approvals under the Fisheries Act (including marine plants, aquaculture, water way barrier works and declared Fish Habitat Area approvals) were rolled into the IPA. The integration of these approvals and subsequent resourcing requirements to meet the statutory timelines for The IDAS assessment processes as set out in the IPA and IPR, saw DPI&F adopt a greater risk management approach to the assessment of development impacts on fisheries resources and fish habitats.

The Codes of Practice formed the basis of the development of IDAS self-assessable codes for fisheries approvals (MP01 – MP06), where minimal impact developments that can comply with the criteria of the relevant code are able to be undertaken as self-assessable works, subject to prior notification. Many of these works would involve the prescribed removal of marine plants.

All marine plants are protected under the provisions of the Fisheries Act whether they occur on private or public lands and any disturbance to marine plants requires prior approval. Where marine plants or other tidal fish habitats have been damaged by unauthorised activities, the Fisheries Act includes provisions for the restoration of marine plant communities and other fish habitats. Restoration may be undertaken by the Department, with costs to be met by the person who caused the damage, or a restoration notice may be issued to the person responsible, directing them to undertake specific restoration works.

### **Management through Partnerships**

In May 2004, DPI&F promoted its Urban Mangrove Management Strategy (UMMS) approach to local governments at a workshop held in Brisbane. This workshop sought to increase awareness among local governments of the important roles that marine plants play in supporting regional fisheries and that local governments have in managing development impacts on marine plant communities within their local government area. Subsequently the then Bundaberg City Council developed and implemented its Mangrove Management Strategy (MMS) for the city reaches of the Burnett River in December 2005 (Lupton, 2007). Bundaberg Regional Council is now conducting the 3-year review of its MMS in consultation with DPI&F. Several other local governments are preparing their own UMMS and the Port of Brisbane and Bundaberg Port are also preparing strategies for consideration by DPI&F.

The partnership approach to delivering more effective marine plant and fish habitat protection has benefits for both local government and DPI&F. Since the implementation of the self-assessable code for minor impact new works MP06 in December 2007, DPI&F endorsed marine plant management strategies can be listed in a schedule to the code. All operational works as detailed in site-based operational plans as endorsed by the MMS are able to be undertaken as self-assessable works. This reduces the requirements for assessment of fisheries development approval applications and significantly reduces costs in both time and application fees.

More recently, DPI&F has been successful in promoting fisheries interests and values in the new regional statutory planning instrument (State Planning Policy) for north Queensland FNQ 2025. This statutory regional plan will be the blue print for the development of further

regional plans for the State and will strengthen the promotion and protection of fisheries values. Of critical importance is the recognition that planning must take into account the predicted impacts of climate change and sea level rise on the distribution and function of fish habitats. FNQ 2025 has provisions that require setbacks and buffers from development of a minimum 100 metres from the predicted (CSIRO modeling) 2070 level of the highest astronomical tide in coastal areas, and 50 metres from freshwater fish habitats. These setbacks will allow for the transition of fish habitat communities landward and poleward as sea levels rise.

## RESEARCH

Research into the roles of marine plants in supporting fisheries production has been ongoing and a large body of work now identifies many of the links between habitats and fish (e.g. Proceedings of First International Symposium on Mangroves as Fish Habitat 2006, Skilleter and Loneragan 2007; Robins, Halliday et al. 2005; Meynecke et al 2007) and the importance of maintaining connectivity between habitats (the habitat mosaic) for species to be able to successfully complete their life-cycles. Research underpins the ecosystem management approach adopted by DPI&F for fish habitats and dependent fisheries. As research demonstrated the specific links of different marine plant communities with fisheries the management and legislation was adapted to reflect these findings

## TAKE HOME MESSAGES

In summary, DPI&F through this paper and its associated poster would like to offer the following take home messages to readers:

1. Fish habitats, especially marine plant communities, are integral to fish and fisheries production.
2. To maintain fisheries productivity into the future DPI&F must manage adaptively for the protection of marine plants and other fish habitats within a rapidly changing environment, both in terms of planning for development and in terms of community perceptions and values.
3. The future will require greater involvement of the community and partnerships with all levels of government to achieve the objectives of maintaining and enhancing fish habitats along the land-sea interface.

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