BOUNDARIES AND BARRIERS: MANAGING THE INTERTIDAL ZONE

BOTANY BAY- A CASE STUDY IN MANAGING THE INTERTIDAL ZONE FOR CONSERVATION AND RECREATION

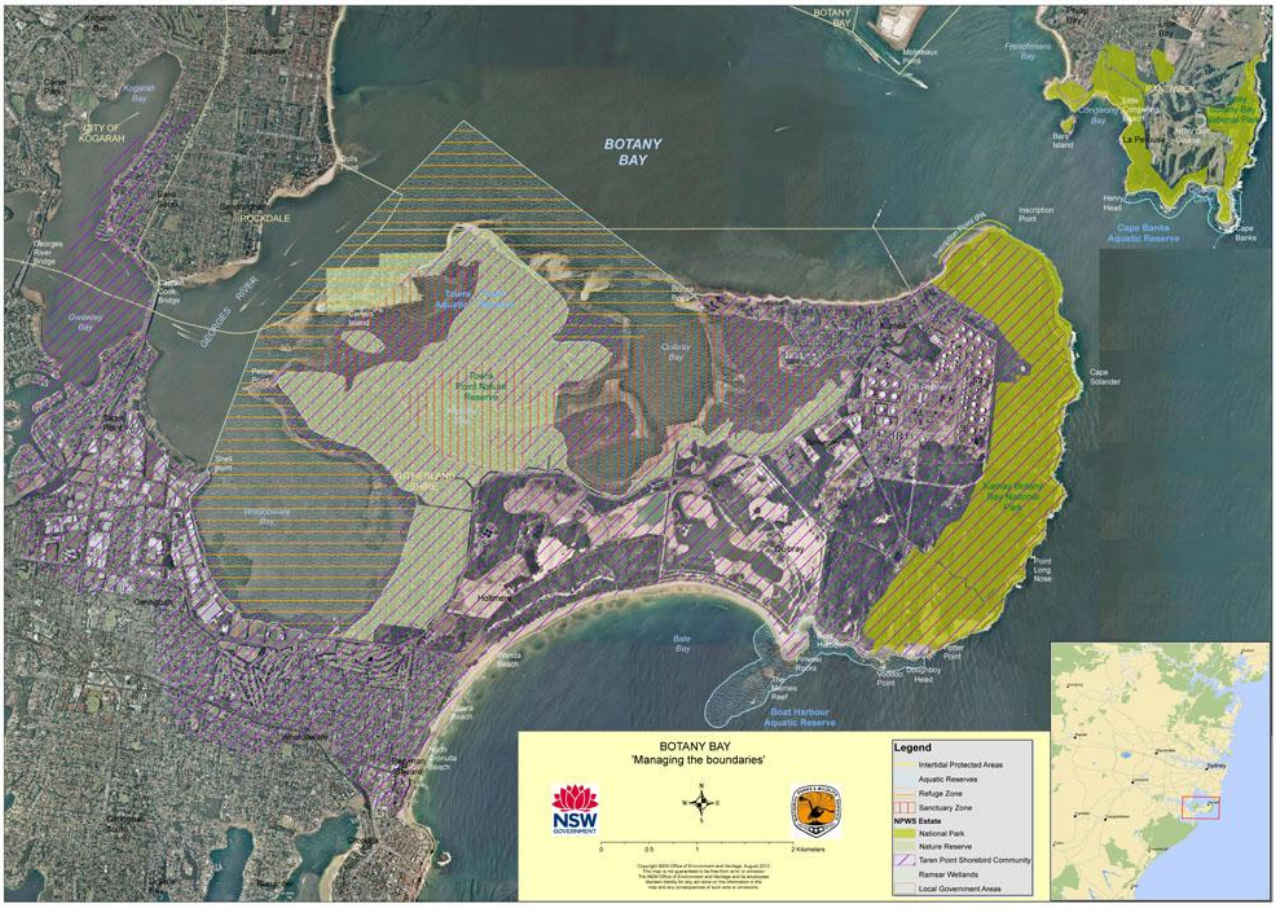
Introduction

In this presentation I will be looking at the management issues confronting a series of intertidal sites around Botany Bay.

There are several reasons for selecting Botany Bay as a case study. Firstly, the bay offers a remarkable mix of major infrastructure, industry, residential suburbs and public lands that are managed for a variety of conservation and recreational outcomes.

Secondly, it is a coastal landscape that includes a surprising number of places that are significant at the state, national and international level. These range from infrastructure assets such as Kingsford Smith Airport, Port Botany and the Kurnell Oil Refinery; to the historic sites of the first meetings between Aborigines and the 18th century maritime expeditions of Cook, Phillip and Laperouse; to wetlands listed as of international significance on the RAMSAR convention.

Finally, and most importantly for the purpose of this case study, the bay's most significant conservation and recreational assets are very much concentrated in the intertidal zone. The management of that intertidal zone is a matter of genuine consequence if we are to protect the bay's natural, cultural and recreational values.



Botany Bay Reserves

One of the extraordinary features of Botany Bay is the number and extent of areas that have been set aside as conservation reserves. Starting in the southwest corner where the

Georges River enters the bay is Towra Point. Towra Point is a complex of relatively mobile sediments that rise to a maximum of a couple of metres above the high water mark. The area above the mean high water mark is gazetted as a nature reserve under the National Parks and Wildlife Act, while the surrounding mangroves, mud and sandflats and deeper waters are gazetted as an aquatic reserve under the Fisheries Management Act.

Moving up the Georges River to the west is an extensive area of mudflats and sandflats along the southern shore of the river. This area has been gazetted as an Endangered Ecological Community under the title 'Taren Point Shorebird Community'. It was the first EEC in NSW to be based upon an assemblage of fauna rather than a vegetation community.

Crossing the Georges River northwards is a long low lying sandy shoreline, commencing in the suburb of Sandringham and stretching northwards all the way to the Cooks River in the northwest corner of the bay. This is one of the most popular stretch of beach in Sydney, supporting a wide variety of water sports ranging from swimming and angling to kite surfing. The area around Sandringham is important for migratory waders and shorebirds.

The northern entrance of the bay is gazetted as Kamay Botany Bay National Park. The seaward third of the national park adjoins the Cape Banks Aquatic Reserve. Heading south across the heads the southern headland of the bay is also part of Kamay Botany Bay National Park. The northern fringe of the headland is gazetted as an Intertidal Protected Zone, while another aquatic reserve, Cape Banks Aquatic Reserve starts near the southern tip of the park and continues around to the privately owned Boat Harbour and Merries Reef.

The result is that a remarkable proportion of what is one of the most intensively developed and actively utilised harbours in Australia has been recognised as such conservation values as to warrant statutory protection of one form or another. I'll now turn to some of the different scenarios that play out amongst the Bay's intertidal zones

Towra Point wetlands

The optimum situation for managing an area for conservation outcomes is one where all of the core landscape and habitat components sit within a statutory framework that provides control of potential threats, and each component is secured at a spatial scale sufficient to enable long term ecological stablility. The Towra wetlands are an example of such a situation.

The Towra wetlands were owned by the Commonwealth and private landholders prior to the gazettal of Towra Point Nature Reserve. Indeed, the last sections have only been transferred from sand mining interests in the last decade.

The Towra wetlands contain the full succession of coastal wetland habitats including coastal forest; littoral rainforest; freshwater lagoons and swamps; extensive saltmarsh flats; mangrove forest; sand and mudflats; and seagrass meadows.

The key point is that this full succession is now under tenures that protect them from inappropriate uses. The terrestrial component is gazetted as Towra Point Nature Reserve, while the surrounding marine habitats are gazetted as Towra Point Aquatic Reserve.

It is not unusual to have different reserve categories abutting one another. However, in the case of coastal wetlands systems, such complementary reserves are essential if we

are aiming to preserve those attributes of the wetland system that are concentrated around and reliant upon the intertidal zone.

In the case of the Towra wetlands the habitats that occur around the intertidal zone are the saltmarsh, mangrove forests, sandflats, mudflats and the upper reaches of the seagrass meadows. These habitats and their associated faunal and vegetation assemblages are all considered significant at the state, national and international scale.

Saltmarsh, Towra Point Nature Reserve

Saltmarsh, Towra Point Nature Reserve

Saltmarsh, Towra Point Nature Reserve

The broad saltmarsh flats of Towra Point represent around 5% of the remaining extent of this vegetation community in NSW. Saltmarsh has been highly impacted by coastal infill and residential development, and is even vulnerable to displacement by mangroves.

Saltmarsh tends to occur in sheltered locations where mangrove forest provides protection from wave action and allows the deposition of fine sediments.

Saltmarsh occupies the interface between marine and terrestrial habitats. This is reflected in the dual declaration of saltmarsh communities as an Endangered Ecological Community under the *Threatened Species Conservation Act* and as protected marine plants under the *Fisheries Management Regulation*.

Fauna associated with Towra saltmarsh includes threatened species such as White Fronted Chat and Masked Owl and migratory waders such as the Pacific Golden Plover.

The next intertidal habitat in the typical sequence is mangrove forest. The Towra mangroves provide roosting for migratory species such as Whimbrel and Terek Sandpiper and nesting sites for endemic waterbirds such as Pied Cormorant.

Mangroves and Saltmarsh, Towra Point Nature Reserve

Mangroves, Towra Point Nature Reserve

Mangroves, Towra Point Nature Reserve

On the bay side of the mangrove forests Towra is fringed by extensive areas of sandflat and mudflat. These habitats are critically important as the primary foraging sites for a variety of migratory waders and shorebirds. These low lying systems are not wholly contained within the nature reserve and aquatic reserve. The flats to the west have been declared as an Endangered Ecological Community under the Threatened Species Conservation Act, the Taren Point Shorebird Community.

Towra Beach view west

Towra Beach view east

Towra Beach, Royal Spoonbills

Where the sandflats rise into dunes they provide nesting opportunities for threatened species including Little Terns, Pied Oystercatchers and Red capped Dotterel.

Below the intertidal zone Towra is fringed by the largest remaining seagrass meadows along the Sydney coast. These include substantial areas of the deeper meadows dominated by Southern Strapweed, a threatened species under the Fisheries Management Act.

The entire Towra wetlands are listed under the RAMSAR convention as a wetland of international significance. The listing reflects the presence of the major wetland habitats as well as the suite of migratory waders and threatened species. The migratory waders and shorebirds that visit Towra are also covered under the Japan Australia and China Australia Migratory Shorebird Agreements. The result of this international dimension is that any actions within the wetlands potentially trigger the need for approvals under the Commonwealth *Environment Protection and Biodiversity Conservation Act*.

The other important point about the seamless interplay of nature reserve and aquatic reserve is that notional boundary at the mean high water mark. If we consider dynamic nature of coastal wetlands systems, based as they are on highly mobile sediments, it is clear that this is point changes from year to year. Indeed, areas such as the Towra Spit Island have 'migrated' between nature reserve and aquatic reserve. Either legal tenure offers much the same level of protection.

Towra is very much a 'Rolls Royce' situation when it comes to managing intertidal zones of high conservation significance. The multiple layers of statutory protection and recognition over the site ensure a high level of community awareness about the vulnerability of the system and greatly reduce the likelihood of development proposals with the potential to seriously impact upon the core values of the site.

Habitats, selected species and statutory controls

Habitat	Species	National Parks and Wildlife Act	Threatened Species Conservation Act	Fisheries Management Act	Environment Protection and Biodiversity Conservation Act	RAMSAR	JAMBA	CAMBA
Littoral rainforest		Y	Y		Y			
	Magenta Lilly Pilli	Y	Y		Y			
Coastal Forest		Y	Y		Y			
	Masked Owl	Y	Y		Y			
Freshwater Wetland		Y	Y		Y	Y	Y	Y
	Green and Golden Bellfrog	Y	Y		Y			
Coastal Saltmarsh		Y	Y	Y	Y	Y	Y	Y
	Beaded Glasswort	Y	Y	Y	Y	Y	Y	Y
	Golden Plover	Y	Y		Y	Y	Y	Y
Mangrove Forest		Y		Y	Y	Y	Y	Y
	Grey Mangrove	Y		Y	Y	Y		
	River Mangrove	Y		Y	Y	Y		
Sand Flats and Mudflats			Y	Y	Y	Y	Y	Y
	Pied Oystercatcher	Y	Y		Y	Y		
	Eastern Curlew	Y	Y		Y	Y	Y	Y
	Terek Sandpiper	Y	Y		Y	Y	Y	Y
	Whimbrel	Y	Y		Y	Y	Y	Y
	Red necked Stint	Y			Y	Y	Y	Y
	Red capped Plover	Y				Y		
Seagrass Meadows		Y		Y	Y			
	Southern Strapweed	Y		Y				
	Little Tern	Y	Y		Y	Y	Y	Y

However, Towra is still part of a broader landscape and like any natural system is vulnerable to impacts from outside that system. In the case of Towra these range from the insidious impacts of grasses introduced in the late 19th century in an attempt to establish sheep on the site through to the alterations in wave regime as a result of dredging at the bay entrance and the construction of reflective surfaces on the northern shore. The result of the latter has been accelerated erosion rates on the seaward flank of Towra, necessitating a round of beach nourishment back in the mid 2000s.

Nonetheless, the questions of managing the intertidal zone are as straightforward as you can ask for in the case of Towra. A not dissimilar situation exists in the other Botany Bay case where an aquatic reserve directly abuts a terrestrial one, in this case Kamay Botany Bay National Park and Cape Banks Aquatic Reserve.

The management of the intertidal is not so straightforward elsewhere around Botany Bay and I'd now like to turn to some of the more difficult, but typical, conservation and recreational issues confronting public land managers.

Sandringham

Towra Point forms the southern shore at the discharge of the Georges River into Botany Bay. The variable flows of salt and freshwater through the Georges is one of the factors which drives the complexity and dynamic nature of the wetlands. The opposite northern shore at the entrance to the Georges River is Sandringham. It had a different character to the Towra side: instead of mangroves and saltmarsh it appears to have been a series of low sanddunes leading to the river across a low beach and broad sandflats. The sand dune system is now the residential suburbs of Sandringham and Ramsgate and the foredune area is road and concrete pathway. However the interface between bay and land, the beach and sandflats, are still there at the water's edge.

From the perspective of the migratory waders and shorebirds that use the area the key habitat attributes are still intact. This shore is a regular haunt of migratory waders such as Bar tailed Godwit and Eastern Curlew over the summer season. The Little Terns nesting over on Towra Spit Island use the shallows as hunting grounds.

Sandringham, view south to Towra

The most distinctive feature of this area is the aggregations of Pied Oystercatchers that congregation to roost over the high tide and at night. As many as 70-80 Pied Oystercatchers can be observed roosting along this section of shoreline. This is somewhere between 25 and 50% of the estimated population of the threatened species in NSW.

Sandringham, Pied Oystercatchers

The remarkable thing about Sandringham is that this shoreline is one of the most heavily utilized pieces of coast around Sydney. The walking track around the shore sees a constant procession of walkers, joggers and cyclists, many with their dogs in tow. The actual beach is used by swimmer, anglers, and sailors and is probably the most popular kite surfing site in the city. Nonetheless, most evenings as the light falls the oystercatchers fly in from their foraging sites around the bay to sleep on the beach.

Part of the reason why these activities can all coexist so well is undoubtedly down to the nature of the beach, which is more than a hundred metres wide in most places allowing the birds plenty of notice of approaching hazards. Council has also played an important role, providing advisory signage about the shorebird communities and actively discouraging the use of the beach by dogs.

Merries Reef

The Boat Harbour Aquatic Reserve starts near the sewerage outfall at Potter Point, as which point it is adjacent to Kamay Botany Bay National Park. The reserve continues west to a long rocky reef known as Merries Reef. The reef is of low relief and much of it is inundated by the tide. it stretches south in a series of disconnected reefs interspersed with deeper water, with the most extensive area of reef that connected to the mainland. Merries Reef is especially important for a group of migratory waders that prefer to forage over rocky habitats, including Ruddy Turnstone; Red necked Stint, and Double banded Plover and the complex of Sand Plover species. The only other site with similar characteristics and usage by these waders is Long Reef on the northern beaches.

The attraction of the reef to waders seems to be a combination of the extensive areas suitable for foraging, the low relief and the lack of structures or vegetation abutting the reef. What this means is that roosting waders have long view lines to detect and avoid predators.

The terrestrial area adjoining Long Reef is probably unique in the Sydney region in that the dunes and beach are privately owned all the way down to the low tide mark. This unusual tenure has allowed the beach to be declared as a recreational 4WD park.

Aquatic Reserve sign, Kamay Botany Bay National Park

Merries Reef, Boat Harbour Aquatic Reserve

The owners have made serious attempts to limit adverse impacts on the waders and shorebirds in the face of the serious challenges in managing the impacts of vehicles, people and dogs upon the reef. Advisory signage and the presence of their beach rangers are testimony to that intent.

Signage, Merries Reef, Boat Harbour Aquatic Reserve

4WDs, Merries Reef, Boat Harbour Aquatic Reserve, August 2012

Walkers with dogs, Merries Reef, Boat Harbour Aquatic Reserve, August 2012

Migratory waders, Merries Reef, Boat Harbour Aquatic Reserve, August 2012

Double Banded Plover and Red necked Stint, Merries Reef, Boat Harbour Aquatic Reserve, August 2012

Double banded Plover, Merries Reef, Boat Harbour Aquatic Reserve, August 2012

The dominant recreational uses of Boat Harbour are four wheel driving along the beach,

dog walking, angling and fossicking along the shoreline. Merries Reef acts as a natural attractor for visitors with their vehicles and pets. Even on the worst of days of winter, such as during the gale force system that hit the Sydney coastline in mid August 2012, there is a steady stream of visitors to the reef.

Migratory waders live on a metabolic tight rope. If you fly across the equator twice every year energy management becomes critically important. Waders feed whenever possible, and when they are not feeding they need to minimize their energy expenditure by roosting in locations with minimum disruption.

The current pattern of visitor activities at Merries Reef does not help this energy equation. There is no questioning the land manager's efforts to manage the situation, however there remains a fundamental question about the compatibility of this range of recreational uses with the needs of the migratory waders. The basic conclusion I'll draw from Merries Reef is that we are very fortunate that the majority of the intertidal zone is under public ownership and with management regimes that limit high impact activities on site dependant species such as the migratory waders.

I now want to turn away from the challenges of managing the land and water interface for conservation outcomes to look at some of the issues involved in provision of public access and recreational opportunities.

The Leap

The Leap is located on the southern headland at the entrance to Botany Bay in Kamay Botany Bay National Park. It faces east to the open sea, however immediately to the north the shoreline curves westwards and into the bay. This location makes it extremely popular for two very different activities, scuba diving and fishing.

The Leap, Kamay Botany Bay National Park

The name ‘The Leap’ comes from the entry into the water, which requires a drop of, depending on tide, 1.5- 2.5 meters. The attraction for divers is the steep slope immediately below the Leap. This descends to the sand line at around 24m depth. This depth, combined with the nutrient rich location at the head of a major bay has encouraged the establishment of extensive sponge gardens complete with soft and gorgonian corals, ascidians and other encrusting organisms. It is really a remarkably rich patch of reef, possibly the most so around Sydney waters.

These attractions are made even more appealing to divers by the action of the tide as it enters the bay. Provided divers get into the water during the rising tide the currents basically carry them into the bay and to the exit point within minimal effort. It is nonetheless a relatively long swim to the first available exit point, around an hour. In combination with the moderately deep start the dive requires good air management. I’ll come back to the point shortly.

Divers, The Leap, Botany Bay

The other key user group for the Leap is anglers. Deep water at the entrance to a bay is a recipe for great fishing, with a long cast past the reef and onto the sand providing good prospects of species such as snapper and morwong. Predatory surface species such as kingfish, tailor, salmon and bonito are even more abundant especially at dawn and dusk.

The rockplatforms around the Leap are both comfortable for fishing and high risk. The reason is the vertical walls around the edge of the platform. This has the effect that many waves lap against the vertical wall without spilling onto the platform, which is broad and relatively flat. The risks in this situation are twofold: firstly the platform is covered in a fine layer of extremely slippery algae; and secondly any wave that does crest the edge then rolls over the platform with great force. There is nowhere to retreat and if swept into the water the angler is faced with an impossible task of scaling the vertical walls, requiring a swim of several hundred meters to find a safe exit point.

Gorgonian corals and sponges, The Leap, Botany Bay

Crested Port Jackson Shark, The Leap, Botany Bay

The rockplatform at the Leap sits below a nearly vertical slope that rises to the coastal escarpment around a hundred meters above. Access was by an informal 'Goat Track' that zigzagged its way down the cliff and through piles of boulders. There is no doubt that the track was dangerous, especially when you consider that the divers are usually carrying around 25-30 kilograms of gear and clad in restrictive wetsuits. Around 2 years ago the inevitable happened and a young woman was injured after falling several meters while

circumnavigating one of the boulder piles.

In response to this accident the NPWS allocated funding to improve access to the site. This involved the installation of a series of steps as well as cutting through boulders and bedrock.

These works have done a wonderful job of reducing the risks involved in the climb from the carpark above to the rock platform. It undoubtedly addresses the risk of visitor injury within the national park, that is, the land above the high water mark.

However, the Leap also serves to illustrate the compromises that scan happen when we make interventions to manage risk. The immediate effect of installing the new pathway and steps is that the Leap has become far more accessible to the general public. The previous 'Goat track' required a good mobility and fitness, the new one far less so. Compounding this reduced threshold of physical ability is the message that a high quality track provides to park users, the 'invitation by implication'.

This has implications for both divers and anglers. For divers, the length and depth of the dive required good air management skills, while it is also a rare shore dive where it reasonably easy to breach no decompression limits. It is not a site that suits inexperienced divers.

Similarly, the easier access to the rock platform for anglers has seen an increase in usage by anglers, potentially including those with less experience in managing challenging platforms.

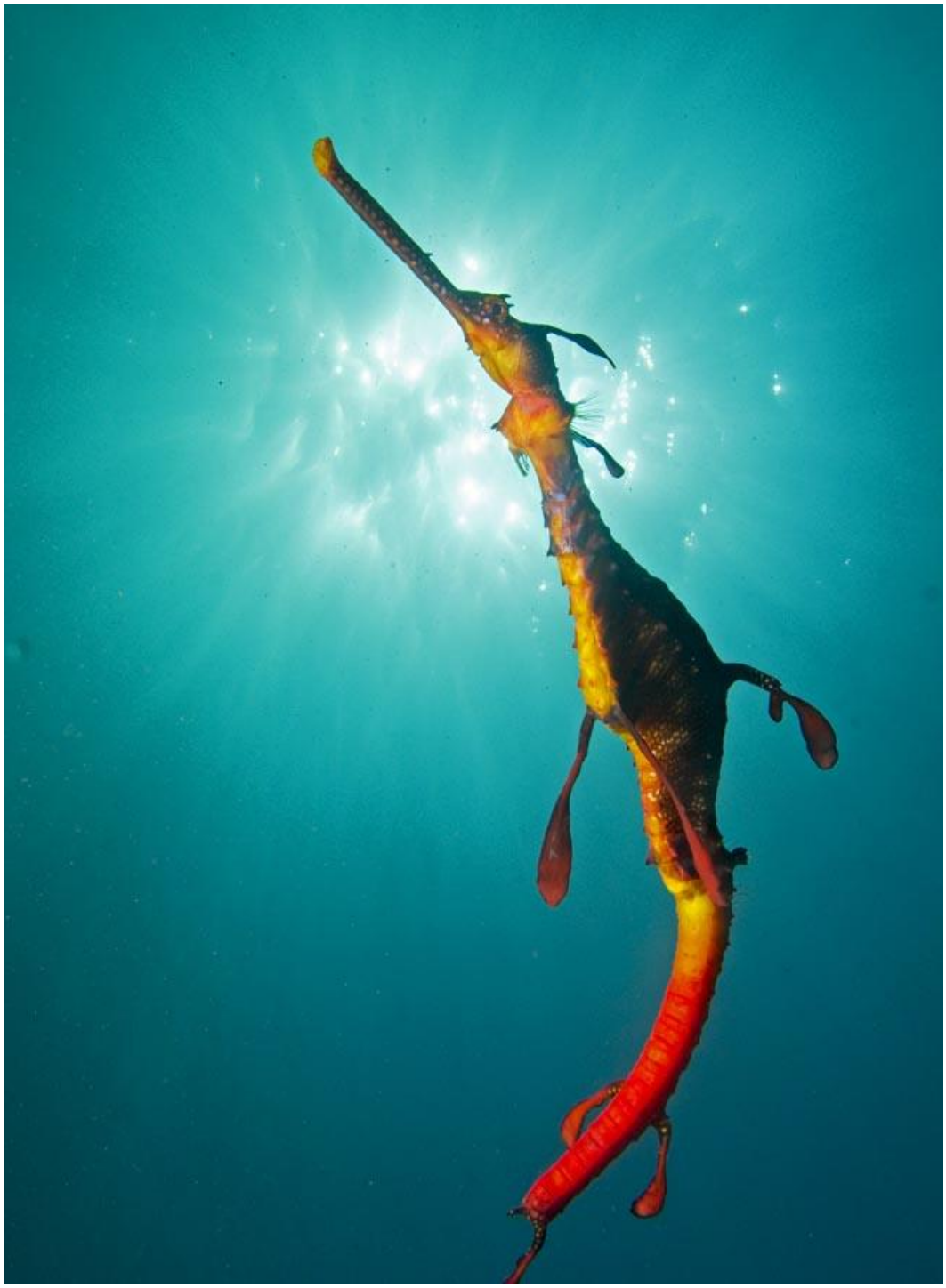
The risk of a fall while climbing down the cliff face has unquestionably been reduced. The net benefit to public safety clearly falls on the side of addressing the dangerous climb. However, any intervention in respect to access to the intertidal does generate new hazards and risks that need to be managed.

Conclusion

Botany Bay contains some of the most important natural and cultural heritage sites on the NSW coast, made all the more remarkable by the fact that the bay is one of the more developed landscapes in Sydney.

A large part of why the bay's conservation attributes has endured can be attributed to the retention of critical parts of the bay ecosystem in a largely unmodified and functional state, including the two headlands and the Towra wetlands. However, simply putting a line on a map does not achieve conservation outcomes in its own right, nor can it possibly capture all of the habitats and places that are necessary for a healthy environment.

The bay needs to be managed in the knowledge that it is an integrated and mutually system of habitats and species assemblages. The entire bay, and in particularly those key habitats of the intertidal zone, requires our sensitivity to the presence of the splendid array of species and habitats with which we share Botany Bay.



Weedy Seadragon, The Leap, Botany Bay