



Tuggerah Lakes is in fact a lagoon! Council is currently implementing the Tuggerah Lakes Estuary Management Plan to manage the estuary and educate the community about one of the Shire's most unique environmental, economic and social assets. Based on extensive community consultation and years of scientific research and trials, Council's Plan identifies direct and tangible ways to improve the water quality, the health of the foreshore, public facilities and sustainable fish and prawn populations for recreational and commercial fishing. This sheet provides general information about Australia's three main types of estuary.

**Australian Estuaries** are semi-sheltered coastal bodies of water with a connection to the sea, where seawater mixes with freshwater run-off from surrounding lands. Estuaries are always a mix of seawater and fresh catchment water. For example, Sydney Harbour is an estuary but Botany Bay is a not, it is a bay.

**Coastal Lagoons** like Tuggerah Lakes Estuary, Wamberal Lagoon and Dee Why Lagoon are the most common type of estuary and are found along the southern coastline of Australia. Separated from the ocean by a barrier, usually of sand, these estuaries can be smaller in size and are found in coastal valleys. Coastal lagoons can develop with or without ocean openings. They are non-tidal, brackish water environments, which are generally brown in colour. Freshwater enters from the catchment with large amounts of sediment from upstream. Most coastal lagoons have soft sediments of a sandy mud consistency. As coastal lagoons have little or no entrance to the ocean, freshwater enters the lagoon through creeks and rivers and can not get out. Large amounts of water evaporate from the estuary or percolate through the sands into the ocean. Salinity levels in coastal lagoons fluctuate. In times of drought, the salinity rises and in times of flood, salinity is reduced and the rise in water levels breaks through or expands the ocean entrance. This allows saline water to enter the estuary from the ocean and a brief tidal exchange occurs.

# Helping the lake help itself



**Drowned River Valleys** – such as the Hawkesbury and Port Stephens are formed by the drowning of river valleys. Usually featuring steep rocky sides, most are found in the central part of the NSW coast. The mouth of the estuary has sediments deposited from the upper estuary and sand from the ocean. They are tidal and usually have a small intertidal zone within the estuary that the tide reaches and impacts on. Intertidal areas in drowned river valleys consist of mud and sand flats. As these sediments settle the estuary basin fills in and a salt wedge is formed where the saline water downstream separates from the freshwater upstream.

**Barrier Estuaries** like Lake Macquarie in NSW and Harvey Estuary in WA usually sit parallel to the coastline and have a 'barrier' or area of land between them and the ocean.

These estuaries develop mud and sand flats and long twisting channels. Tidal exchange decreases as you move upstream in the estuary. With flooding, large volumes of freshwater causes a stratification of estuary water and the lighter freshwater sits above the heavier saline water.

#### Some tips for responsible use of the foreshore:

- Stick to the paths when cycling
- Only launch boats at boat ramps
- Always take a bag for dog poo when you walk your dog
- Don't mow to the foreshore or dump green waste in the water

#### As part of the Estuary Management Plan Council will:

- Rebuild wetlands to filter nutrients, sediments and stormwater run-off;
- Install new sediment traps to collect larger waste;
- Install improved systems into residential and industrial areas to reduce excess stormwater run-off;
- Plant thousands of native trees to reduce erosion;
- Continue scientific investigations and monitoring of water quality;
- Continue aquatic-harvesting of wrack in areas it accumulates;
- Rehabilitate saltmarsh growth to assist with the reduction of 'smell' & 'black ooze'.

#### Snap shot - Tuggerah Lakes Estuary

Tuggerah Lakes Estuary is a series of three interconnected shallow coastal lagoons that are open to the sea at The Entrance. The estuary consists of:

- Three lakes, Tuggerah, Budgewoi and Munmorah,
- The channels connecting the lakes to each other,
- The entrance channel, connecting the lakes to the sea,
- The lower, saline parts of Wyong River, Ourimbah Creek, Wallarah Creek and other creeks which flow into the lakes.

Coastal lagoons like Tuggerah Lakes Estuary are predominantly non-tidal and water movement around the estuary is wind driven.

At 80 km<sup>2</sup> in area Tuggerah Lakes Estuary makes up 10 per cent of the Wyong Shire. It has a long narrow entrance channel that requires dredging to remain open. It has a low average depth of only 1.7 metres. With a few exceptions, such as the Budgewoi sandmass, it tends to have two distinct depth zones, a shallow (below 1m) nearshore zone and a deeper (approx 2m) central zone.

The shallow zones support seagrass beds, although these have been declining in recent decades. Large floodplains have formed on the landward sides of the lakes and in the past these were fringed with saltmarsh, which helped to capture wrack (dead seagrass material) so it could breakdown naturally and quickly. Deltas protrude toward the centre of Tuggerah Lake from the mouths of Wyong River and Ourimbah Creek.

Tuggerah Lakes catchment is the 710 square kilometres of land, which drains into Tuggerah Lakes Estuary. All but 27 square kilometres of this is in Wyong Shire. The catchment area comprises 80 per cent of the Shire. Add this to the area of the lakes and we find the estuary and its catchment area cover 90 per cent of the Shire. Over the last 160 years, the natural environment of the catchment has been modified by many different types of landuse, including forestry, farming and urban development.



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