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The Ecology of the Tuggerah Lakes Historical Records

By Anthony Scott

SAINTY & ASSOCIATES

CSIRO Land and Water, Canberra
Technical Report 4/99 January 1999

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Produced by Sainty & Associates and CSIRO Land & Water
for Wyong Shire Council.

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Finally, I would like to acknowledge the foresight of **Edward Stinson** in spending so many years collecting and recording a wealth of valuable historical records that he subsequently published in his books "A Pictorial History of Wyong Shire". We are all indebted to him for this tremendous effort.

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Front cover photo; View of Tuggerah Lakes from Killarney in Sept 1927. (Mitchell Library)

Abstract

The Tuggerah Lakes are on the Central Coast of NSW and consist of three interconnected coastal lagoons, Lake Munmorah, Budgewoi Lake and Tuggerah Lake. There has been rapid urban development over the last 20-30 years and this has resulted in a number of environmental pressures being placed on the lakes' ecology. One of the problems facing the managers of the Tuggerah Lakes is the lack of scientific data available that provides an indication of what the lakes were like in pre-development times. To overcome this problem, a project was commenced which had the aim of collecting any historical information which might provide an insight into the long term ecological changes of the lakes. Information was collected from historical documents, old newspapers, and by interviewing residents who have lived in the area for up to 90 years. This report presents the information collected from historical documents.

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1 Introduction

1.1 The Tuggerah Lakes

The Tuggerah Lakes are on the Central Coast of NSW and consist of three interconnected coastal lagoons, Lake Munmorah, Budgewoi Lake and Tuggerah Lake (Figures 1a,1b). The three lakes cover a total area of 80 sq km and have a perimeter of 110 km. The largest of the lakes is Tuggerah Lake with an area of 54 sq km (IDC 1979). The lakes are shallow, the average depth being 1.9 metres. There is only limited interchange of water between the lakes and the sea through a narrow channel at The Entrance, and hence tides in the main body of the lakes are negligible.

The total area of the catchment serving the lakes is 670 square kilometres (IDC 1979). Freshwater flow into the lakes comes mainly from Wyong River, Ourimbah Creek and Wallarah Creek. The lakes contain a diversity of aquatic plants and animals and are not only an important aesthetic and recreational resource but also support a local fishing industry.

1.2 Objective

Only forty years ago, the Tuggerah Lakes district consisted of a few small villages and towns which catered for the annual influx of visitors during the summer holidays. Over the last few decades these towns have been transformed into large urban centres, with an associated population increase from 13,000 in 1954 to over 100,000 in the 1990s. This rapid development has resulted in a number of environmental pressures, and in the late 1980s - early 1990s the Tuggerah Lakes suffered from eutrophication, with macroalgae blooms being common within shallow nearshore habitats.

Management actions to alleviate the excessive macroalgal growth resulted in the "Tuggerah Lakes Restoration Project" in the late 1980s and early 1990s. However, this project was only partially successful. It is now clear that to develop management plans for the lakes, a better understanding of their ecology is required, and in particular how the lakes have changed since European settlement.

Hence, the objective of this project was to:

"Investigate the ecological history of the Tuggerah Lakes. The results of the study will assist in the management of the estuary and its catchment by providing an insight into ecological changes since European settlement in the region."

Information was collected from historical documents, old newspapers, and by interviewing residents who have lived in the area for up to 90 years. This report presents the information collected from the historical documents. Other reports which present the information collected from the newspapers and the interviews have also been produced (Allison and Scott 1998, Scott 1998).

Figure 1a: Tuggerah Lakes in 1941

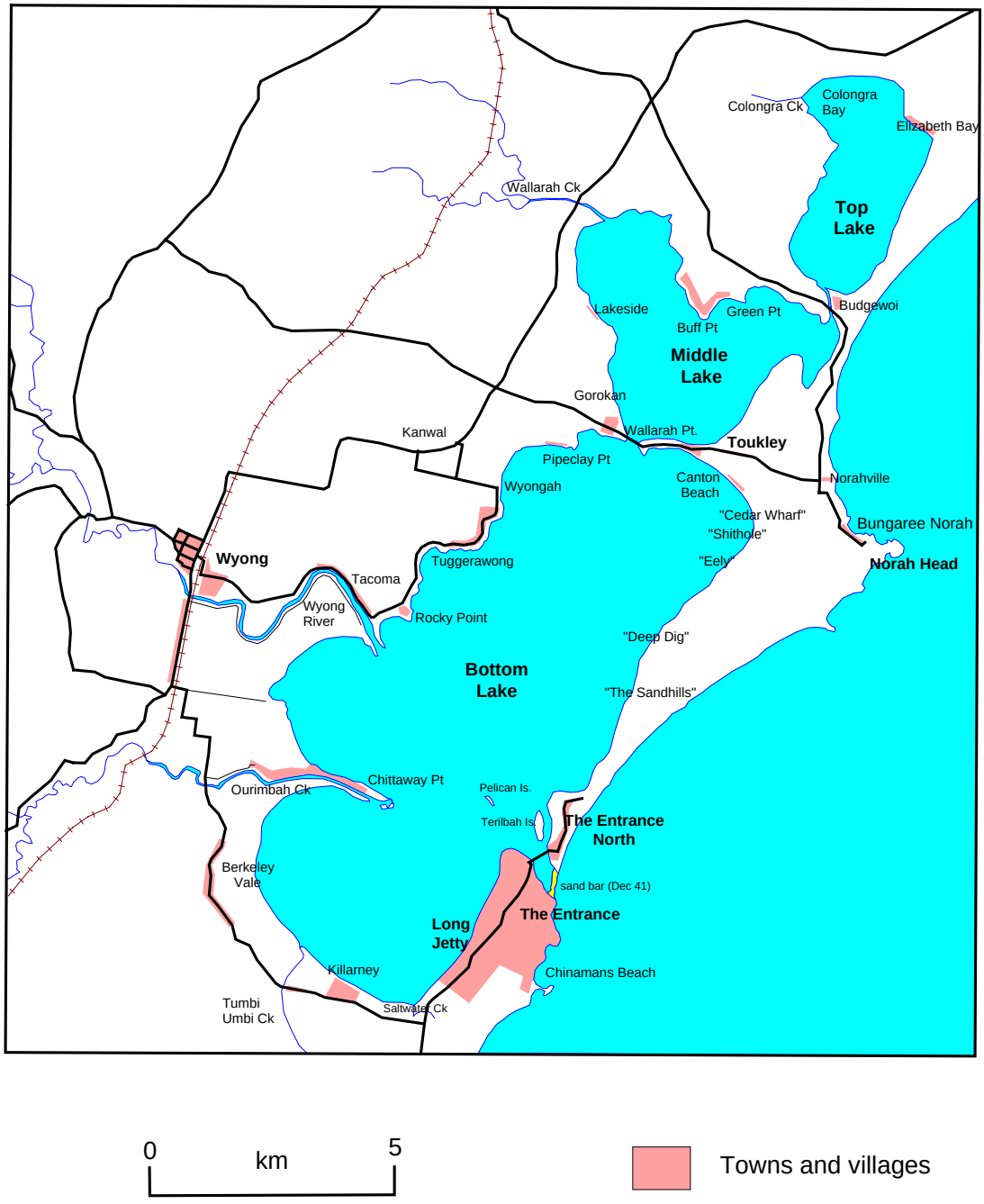
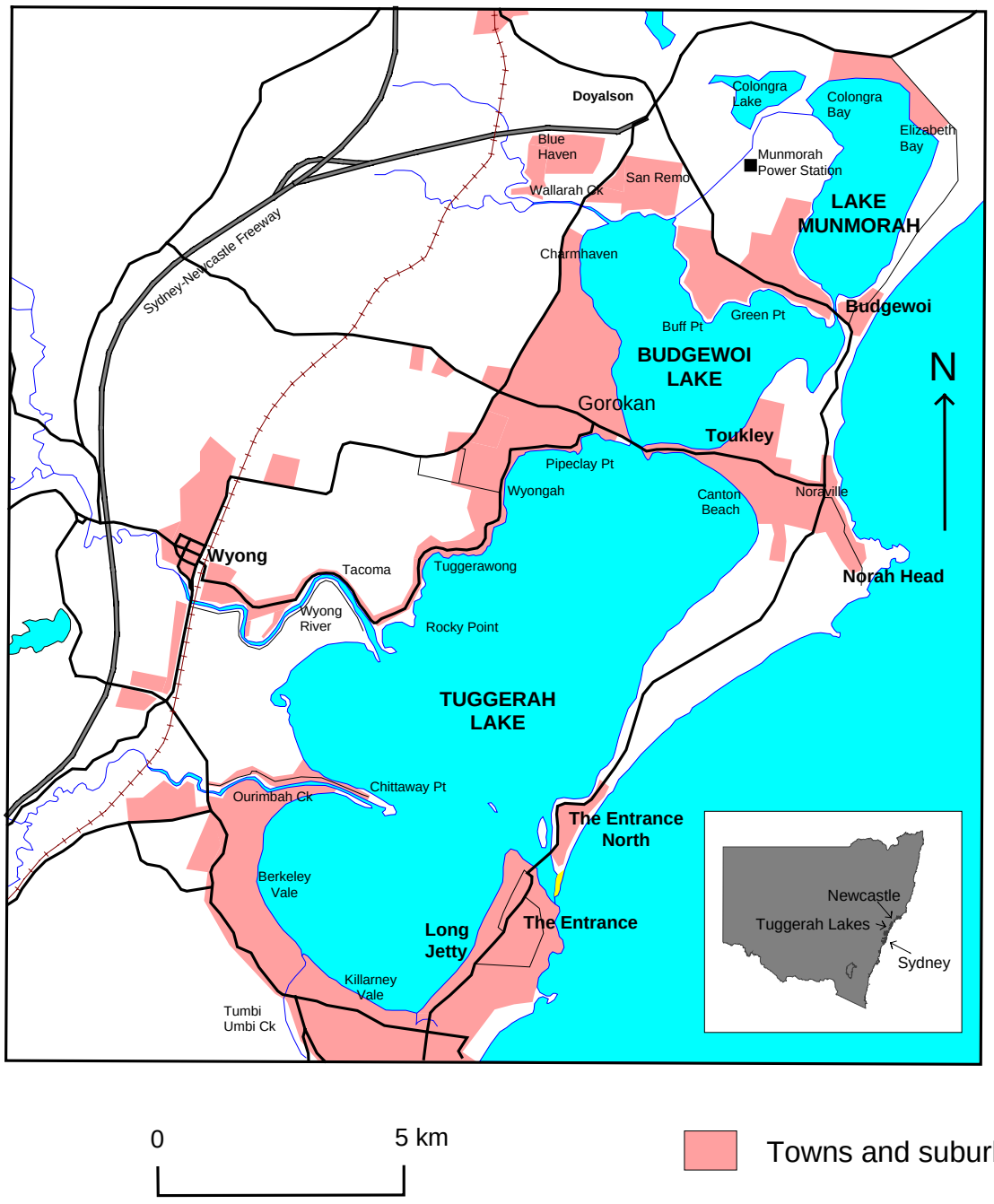


Figure 1b. Tuggerah Lakes in 1998



1.3 Method

Historical records were collected from the following sources;

- Local history books. A large amount of research has already been undertaken by a number of local historians (for example, Stinson and Swancott) and the books they have published contain a wealth of valuable information. This was the major source of information for this report.
- Fisheries annual reports (these were obtained from the NSW Fisheries Library at Cronulla and the National Library in Canberra)
- Records and files of the Wyong Historical Society (this search was kindly undertaken by Mr Phil Morley)
- Early scientific papers (up to approximately 1960).
- Newspapers – only a few selected articles have been included. For a more complete record, refer to an earlier report by Allison and Scott (1998)

Emphasis was placed on documents written prior to the 1960s. From the 1960s onwards, there have been a number of scientific studies of the Tuggerah Lakes. Most of these studies have not been discussed in this report since they have already been reviewed in detail by other authors (refer to: IDC 1979, Batley *et al* 1990, Thresher *et al* 1993, and Kennedy 1997).

2 Settlement of the Tuggerah Lakes

The ecological history of the Tuggerah Lakes over the last 200 years is closely linked to the pattern of European settlement both around the lakes and within the upper catchment. As settlement spread throughout the district, activities such as the clearing of land, logging, fishing and urban development have all had impacts on the ecology of the lakes. To understand when each of these impacts occurred, the settlement of the Tuggerah Lakes and its catchment has been divided into four broad time periods. These are;

- Aboriginal settlement
- The first European settlers (1820s – 1870s)
- Settlement after the opening of the railway (1880s – 1950s)
- Urban Development (1960s – 1990s)

Historical documents which provide an insight into the rates of settlement and associated activities during each of these time periods, are presented in the following sections. Table 1 provides a summary of some key dates in the development of the region.

Table 1. Significant events in the development of the Tuggerah Lakes and its catchment

Date	***Activity***
1825	**First settlers arrived.**
Early 1830s	**Logging commenced in the upper catchment**, principally for cedar.
Early 1830s	**Felton Mathews surveyed the district.**
1832	**The Great North Road was opened**, principally as a means of providing access to the Hunter District from Sydney. There were two branches from this road into Wyong.
1830s	**Cabbage Tree Harbour provided a shipping point** for cedar from the 1830s onwards. Gosford was another such departure point.
Early1850s	**Hargraves residence** at Noraville constructed using cedar from the valleys behind Wyong.
1854	**Jane Taylor acquired all the land of what is now The Entrance**. The property was operated as a dairy for the next three decades.
1875	**Billy Faulkner, the last full-blooded aboriginal of the district died.** (Stinson, vol 1, 1979)
Early 1880s	**Fishermen took up residence at Canton Beach**. The fish were sent by steamer to Sydney from the jetty at Cabbage Tree Harbour. When the railway opened in the late 1880s, many of the fishermen moved to Tacoma.
1885	**The Taylor family moved to their property at The Entrance**, to raise cattle for the bullock teams being used to haul timber in the valleys behind Wyong.
1887-89	**The completion of the Sydney-Newcastle railway** was the greatest change for the district. Trains came to Wyong in 1887, but the link across the Hawkesbury River to Sydney was only opened in 1889.
1888	**Wyong Public School** was opened in 1888 in temporary premises. A new school building was opened in 1898 when the enrolment was about 70. (Swancott 1963)
1889	**Telegraphic communication**: The railway station at Ourimbah had telegraphic facilities and the public were permitted to send messages from there as from 9th April 1888.

Table 1 continued

1892	**Tuggerah Post Office opened**. (Swancott 1963)
1895	**The first guest house at The Entrance**, Dunleith, was opened by Mr and Mrs Walter Denniss. Visitors were transported by boat across the lake from Wyong.
1898	**Wyong population reached 200** (Stinson, vol 5, 1984)
1900	**Bayview Guest House was built** on the southern side of The Entrance by Mr and Mrs Dening. Mrs Dening was the eldest daughter of Richard Taylor. In 1903 Pinehurst was built by Richard Taylor's eldest son, Les Taylor. By 1912 the adult members of the Taylor family were operating 4 guest houses, and Bayview could accommodate 150 guests and also offered tent accommodation.
1901	**A stone jetty (Woodbury's Jetty) was built at Tuggerah** to allow dispatch of fish from the lakes to Tuggerah Railway Station. (This avoided the access problems caused by siltation at the mouth of Wyong River.)
Early 1900s	**Timber industry was at its peak**. Large export orders for timber, including an order for 540,000 sleepers for South Africa in 1903.
1901	**A traffic bridge across Wyong River was opened**. (This bridge was only single lane.)
1902-3	**The first bridge across Budgewoi Creek** was constructed by the Freeman family.
1903	**Norah Head lighthouse** was completed.
1903	**Alison Estate** (all the land around Wyong) was subdivided and auctioned.
Approx. 1903	**First motorised boats** used by fishermen. Previously, all fishing was done from rowing boats and sailing boats.
1905	**Rocky Point land sale** - Rockleigh (Rocky Point) subdivision advertised for sale.
1905	**Ourimbah Creek Bridge** was completed (to allow logs to be hauled from Berkeley Vale to the sawmills). In 1980 this old single lane bridge was replaced by a new concrete two lane bridge.
1906	**The first direct road link was formed between Wyong and The Entrance** via the Ourimbah Creek bridge.
1907	**Butter factory at Wyong** commenced operation. Dairy industry was expanding.
1908	The **snags in Wyong Creek were removed** allowing boat access from the lake to the township of Wyong.
1912	**Duplication of railway line** to Wyong was opened (Stinson, vol 2, 1980).
1915	**A long jetty was built** on Tuggerah Lake, just south of The Entrance, at what is now known as Long Jetty. This jetty was destroyed in the 1927 flood and replaced by a new one.
1916	**The bridge across Wallarah Creek**, of timber, was built in 1916, and replaced by the present concrete bridge in 1933. Prior to the construction of the wooden bridge, the road between Wyong and Budgewoi was via the top of Wallarah Creek and across to Doyalson.
1920	**Subdivision of 200 lots at The Entrance**. The Entrance had become a popular holiday resort. People would arrive by train to Wyong and then by boat across the lake. There were 15 guesthouses operating. During holidays, The Entrance also became a tent city, as the Taylors had created a large camping ground.

Table 1 continued

Early 1920s	**Budgewoi subdivided.** East Budgewoi, an area of 13 acres was sold by the Hargraves in the early 1920s and the new owners subdivided it into 39 blocks.
1920s	**Ferry service to Toukley.** In the 1920s Henry Hargraves was running a regular daily ferry service from Toukley, Buff Point and Wallarah Point to Wyong, using a launch called the "Helmar" (Stinson, vol 4, 1983).
1922-23	**The Entrance-Wyong road.** A road that could be used by vehicles was opened between Wyong and The Entrance in about 1922. Previously the route was only a bush track through the scrub. The first bus service from Wyong to The Entrance commenced in 1923, and another from Gosford to The Entrance. This eventually led to the decline in the ferry boat service between Wyong and The Entrance.
1925	**Work commenced on the Pacific Highway.**
1927	**Entrance Hotel completed.**
1929	**Electricity.** The Erina Shire Council made arrangements to buy power from Newcastle and transmit it by high tension line to the Shire. In that year electricity was switched on at Wyong.
1929	**Construction of the Wyong water supply commenced.** A reservoir was built on Chapman's Hill above the town and water was pumped to it from the Wyong River.
1930	**Pacific Highway was opened** through Mooney Mooney and Gosford. Previously traffic from Sydney went through Wisemans Ferry along the Great Northern Road to Wollombi and the Hunter.
1934	**Single lane, wooden bridge across The Entrance** completed.
1939	**Wallarah Point Bridge** (or Toukley Bridge) was opened.
1940s	**Electricity connected to Tuggerawong, Wyongah, Tacoma and Toukley.**
1945	**First vehicular bridge over the Hawkesbury** was opened. Previously, vehicles were transported across the river on a punt and at busy periods there could be delays of a few hours.
1952	**Electricity connected to Budgewoi.**
1954	**Wyong Shire population reaches 13,100.**
1956-67	Wyong Shire Council began **piping water to the northern areas of the shire**, and Budgewoi connections began in 1956 and were completed in 1967.
1957-58	**New railway bridge** built at Wyong. Old railway bridge became traffic bridge in 1963.
1959	**Noraville sanitary depot opened.** Other depots were located at Mardi and Bateau Bay.
1960	**Electrification of Gosford to Sydney railway line.**
1961	**Reticulated water supply to The Entrance**. Work commenced on the construction of a dam at Mardi which was the initial stage of "The Entrance Water Supply Scheme". This scheme eventually provided reticulated water throughout the Shire.
1962	**Population**. Gorokan had a permanent population of 400 in 1962. (Swancott 1963)
1965	**Completion of the road between The Entrance and Toukley.**
1967	**Munmorah Power Station** commenced operation.

Table 1 continued

1969	**New concrete bridge at The Entrance** completed.
mid to late 1960s	**Sewerage scheme commenced**. Wyong Sewage Treatment Plant completed in 1969.
1982	**Population**. The Shire had a population of 72,000 in 1982.
1982	**Railway line electrified** from Gosford to Newcastle. This allows regular services from Sydney to Wyong.
1983-85	**Freeway west of Wyong opened**. This, combined with the new electrified rail line, opened up the area to urban development as a satellite town of Sydney. Freeway bypassing Peats Ridge, including the Mooney Ck Bridge, opened in 1985. Many new residents started commuting to Sydney for work.
1980s	**Urban development.** Large areas of land developed for housing including Berkeley Vale, Killarney Vale, Chittaway Point, Lake Haven.
Late 1980s – early 1990s	**Tuggerah Lakes Restoration Project.** $13 million spent on restoration of foreshores. Included deepening of nearshore zone by dredging of ooze and mud, using this material to extend the foreshore up to 50 metres into the lake, and major reclamation work at Picnic Point and near Terilbah Island at the North Entrance. (Some reclamation work caused acid sulphate problems.) Dredging of the entrance channel to maintain a permanent opening. Installation of silt traps at the outlets of stormwater drains.
1990	**Munmorah Power Station**, two of the four units taken off line.
1990	**Wyong Shire sewerage scheme completed.**
Mid 1990s	**Munmorah Power Station reduces its operations – one unit remains operational as a standby plant.**
1990s	**More urban development** -Blue Haven, Lake Haven, Watanobbi, Warnervale, Kanwal, Tuggerah, Glenning Valley. Shire population is 116,000 in 1996.

2.1 Aboriginal settlement

The Wyong District was occupied by three aboriginal language groups, the Kurringgai, Darkingung and Awabakal tribes. Bennett (1968) estimated that the peak population in the Central Coast would have been about 360 people. However, the arrival of Europeans brought new diseases and an inevitable clash of cultures.

As early as 1828 it was reported that only 65 aborigines belonging to five separate tribes (probably family groups) remained in the district, and by 1875 the last full blooded aboriginal of the Wyong district had died.

Ecological Impacts:
With a peak population of only 360 people spread throughout the Central Coast District, the ecological impact of their hunting and gathering activities on the Tuggerah Lakes was probably negligible.

The Story of the Aboriginal People of the Central Coast of New South Wales

- *From the signs of settlement left and from other evidence, it appears that the peak Aboriginal population included 12 groups with a maximum of 30 souls in each group. This represents a total population of 360 people. This does not include the nearby and related groups who were on visiting terms, ie the Pittwater group (south of Broken Bay), the Wollombi group (in the mountain section of Wollombi Brook and its tributaries), the Bah Bah group (north of Lake Macquarie), and the Boun group in the area of the Brunkerville Gap. …*

- *A smallpox epidemic was transmitted to the native population of the Sydney area by the First Fleet and many of them died in consequence. Records show that the natives at Pittwater were affected and that natives on both sides of Broken Bay were in close and continuing contact. It is therefore probable that the disease was transmitted to the people of the Central Coast. If so, the losses would have been heavy and the population reduced considerably at the outset of this period.*

- *The first census of the native population was taken in the Brisbane Water district by the local magistrate, Willoughby Bean. It was taken at the end of 1828. He reported five family groups of natives (which he referred to as tribes). These obviously covered only the groups on the coastal plain nearest Brisbane Water and did not include any of the mountain groups or any groups in the terrain on the borders of Lake Macquarie. The groups mentioned are;*

  The Mial or Broken Bay
  Narara
  Erina
  Tuggerah Beach
  Wyong

  He estimated a total of 65 persons.

- *The numbers of natives in the Central Coast area decreased considerably during the decade of the 1830s. …..It is pretty evident that the native population was drastically reduced both by unofficial and official reprisals in this period. …*

- *In 1842 John F Mann reported visiting the site of the modern Tacoma and observing the proceedings of the annual get together by the natives of whom he estimates only 60 souls attended. Most of these had come from the inland areas and the mountains.*

- *Members of the family groups inland continued for several decades their annual pilgrimage to the coastal region.*

- *In the late 1880s, records of only a few individuals can be traced.*

(notes from 'The story of the Aboriginal people of the Central Coast of New South Wales' by FC Bennett. 1968)

Conflicts between Aboriginals and European settlers - 1828

Brisbane Water, May 25th 1828

Sir,

I have the honor of receiving your letter of the 18th April on the 20th inst, requesting me to report on Mr Cape's robbery by the Blacks….I am very doubtful whether his statement be properly correct:- even should the Blacks have robbed him to the extent he states, I have every reason to believe that his men have encouraged them to the deed…… He has provoked the Aborigines to many acts of violence by his conduct – menacing them almost on all occasions, with a loaded musket. I am fearful that there will be some trouble yet with the strange tribes, who, I have no doubt have been invited, from distant parts, by some of those, who have been illtreated by Mr Cape or others in the district, to retaliate upon their enemies, by pilfering from them….

Bean, J.P.

(Letter written to the Colonial Secretary in 1828 by Willoughby Bean, magistrate of Gosford, reprinted by Stinson, vol 6, 1988)

Aborigines – feasting on seafood
Tribes from the valleys and hills to the west of Wyong would every so often go walkabout to the lakes and the ocean (probably for a change of diet) to feast on the seafoods which were readily available along the Noraville beaches and in the lakes. Their traditional crossing place was the southern end of the channel at Budgewoi which they used to ford. In the 1830s George Bloodsworth used the same crossing to take timber to his wharf at Cabbage Tree. (Stinson, vol 3, 1981)

Old Billy Fawkner
The last of the full-blood Aborigines in the Wyong area died more than one hundred years ago. The Town and Country Journal of March 6th 1875 reported; "Old Billy Fawkner, the last of the Brisbane Water blackfellows, was drowned in Tuggerah Beach Lake about six months ago. He supported himself for many years by means of a small garden, and faithfully adhered to the habits, vicious and otherwise, of his white bethren." (Stinson, vol 1, 1979)

2.2 The first European settlers (1820s – 1870s)

The first European landholders in the Wyong Shire acquired their land in the 1820s. However this was only a handful of people and in the 1830s much of the district remained largely unknown and unexplored. The farms generally consisted of a small area of cleared land for cultivating crops, and a herd of cattle which would graze through the surrounding bushland. When the 1828 census was taken, there were only 15 households in the Gosford and Wyong districts; 8 around Gosford, and others at Erina and Narara Creeks, Wyong, The Entrance, Budgewoi and Tuggerah Lakes (Strom 1984).

At the same time, groups of men had moved into the valleys west of the Tuggerah Lakes to cut cedar, a much valued timber. Most of these groups were operating illegally.

In the 1840s Australia fell into an economic recession, and development of the Wyong and Tuggerah Lakes district stagnated (Strom 1984). The national economy recovered in the 1850s after the gold discoveries, and locally settlement started to spread through the valleys behind Wyong and around the Tuggerah Lakes.

By the 1870s, farms had been developed throughout much of the Tuggerah Lakes district, including Norah Head, The Entrance, Budgewoi, Warnervale, Kanwal and Gorokan. However, despite the increasing number of farms in the district and the establishment of small villages, it is clear that much of the area remained forested and that settlement was still relatively sparse. The earliest settlers practised mixed farming, including the grazing of sheep and cattle, dairying, pigs, poultry, and crops such as wheat, corn and potatoes.

While some settlers were establishing farms and raising cattle, many others were felling timber and hauling it out of the valleys with teams of bullocks. Most of the cedar had already been taken by the 1850s and attention turned to other types of timber. The timber industry steadily expanded, and in 1855 a sawmill started operation in the Ourimbah valley. During this time, all timber and produce was transported to Sydney by boats which travelled regularly along the coast.

Commercial fishing on the lakes became established in the late 1850s, initially at Canton Beach (near Toukley) by a group of Chinese fishermen, who were smoking the fish and exporting it to China or sending it to the goldfields.

Development of the region, however, remained slow until the Sydney-Newcastle railway was opened in the late 1880s.

Ecological Impacts:
In the 1820s and 1830s the clearing of small areas of land for cultivation, and the selective cutting of cedar in the valleys of the upper catchment, would have been the first ecological impacts of European settlement in the district. However, during this period these activities were on a relatively small scale and any impact on the Tuggerah Lakes would have been negligible. The quality of water reaching the Tuggerah Lakes from the upper catchment would have remained high.

From the 1850s onwards, as logging and clearing slowly expanded throughout the catchment, the Tuggerah Lakes would have experienced a very gradual increase in the rates of sediment and nutrients entering via the Wyong River and Ourimbah Creek. Around the lakes themselves, there was still very little disturbance of the land and hence very little impact from these areas.

The only other impact on the ecology of the lakes during this period would have been caused by the commencement of commercial fishing in the 1850s.

First settlers move into the district

In 1825-26 the first grants were given in the northern section of the Central Coast to members of the Cape family at Wyong, and Percy Simpson at Cooranbong. In 1825 Frederick Augustus Hely, Principal Superintendent of convicts in the colony, bought land and obtained grants in the area; and in 1826 he became the first land holder in the Tuggerah Lake district, to the south of the Wyong River. ….

In 1826 Jeremiah Warlters bought at an auction sale a tract of some 600 acres near Erina. He had arrived in the colony as a bachelor in 1825, and had obtained a promise of a grant of 1920 acres in the upper Tuggerah Lakes area. …

When the 1828 census was taken, Warlters owned 2520 acres of which 30 acres had been cleared and cultivated. He owned three horses, 128 cattle, and on his properties there were four free and three bonded persons. In fact he had become one of the top five settlers in the Central Coast area. He had second position as regards land cleared, first position as regards land cultivated, fifth position as regards persons employed, and third position as regards number of cattle. …

In 1828 …John Slade was promised a grant of 640 acres which he selected with frontages to both Lake Munmorah and Lake Budgewoi and to the west of the channel. … By May 1830 he had cleared and cultivated 15 acres, fenced 35 acres, erected stockyards and huts for his men; built pigsties, a cornhouse, and a verandahed cottage; and 65 head of cattle were then running on the property. ….

Robert Henderson, the district constable, … applied to rent 1,920 acres at Tuggerah Beach Lakes in 1828. In the next year he took 2,000 acres at Norah Head. (Stinson, vol 4, 1983)

First settlers at The Entrance

Henry Holden took up 640 acres at the present site of The Entrance in the late 1820s. Thomas Battley obtained the land in 1836 and he developed a 40 acre farm and built a fine brick residence on the corner of the present Oakland and Battley Avenues. The principal crop was wheat. (Swancott 1963)

Illegal cedar cutting in 1830

As early as 1830 there were parties of men engaged in cutting cedar in the valleys westward of the Tuggerah Lakes. Many of these gangs were unlicensed. In 1830, William Cape of Wyong complained about their activities. He reported that the sawyers were carting the cedar to the nearest navigable creek, and either floating or sailing the logs across the Tuggerah Lakes to a point less than half a mile overland from Cabbage Tree Harbour, a small protected bay just north of Norah Head. From this harbour the timber was shipped to Sydney. (K Clouten 1967)

Cedar getting

Surveyor Felton Matthew reported to the Surveyor General on Feb 17th, 1831 that a Sydney publican named Bloodworth had been for some time felling and conveying to market large quantities of cedar from Wyong Creek.

In 1832 it was reported that the cedar getters were still at work carrying devastation throughout the neighbourhood. They were said to have cut as much as 15,000 feet of cedar and were shipping it as fast as possible at Cabbage Tree Hollow, a small bay at Bungaree Norah. (Swancott 1963)

Timber cutters move in for the cedar and forest oak

The local timber industry, by far the greatest industry this area has ever known, began way back in the 1830s - and that was a hundred and fifty years ago, when the cutters came in from the Wollombi end of the area to exploit the timber resources of the district; and so it has continued without cessation until the present day, but now on a much reduced scale.

The Great Northern Road, built by convict labour and linking Sydney with the Maitland area via Wisemans Ferry and Wollombi, was completed by 1830, and a small settlement was established at Wollombi. Timber-getters from that vicinity were soon in this area seeking two timbers mainly; the forest oak which was used principally for shingles, which were in great demand; and cedar which was eagerly sought after as an ideal timber for making furniture of many kinds. The forest oaks grew profusely along the mountain ridges and the slopes (but not in the valleys), and the cedar trees abounded in the big scrubs in the Yarramalong and Dooralong valleys.

Within thirty years or so, the accessible cedar from the Crown Lands had been cut out; but shingle splitting lasted for about fifty years, until by about 1880 galvanised iron was coming into extensive use as the principal roofing material. (Stinson, vol 1, 1979)

First tracks in the district

The New South Wales Calendar and Directory for the year 1833 contained a description of most roads in the colony, including the track linking Brisbane Water to Maitland which passed through Jilliby and Dooralong. It also mentions a dray track from Wyong passing through the scrub around Tuggerah Lakes to a farm called 'Podgewoy" (now Budgewoi), and another one near Norah Head. This track was probably utilised by the cedar gangs operating in the valleys west of Wyong. (K Clouten 1967)

The first commercial fishing

In the late 1850s some Chinese fishermen settled at Canton Beach which was named after the big city of their homeland. Later in the century professional white fishermen from the Dapto area settled there; but following the opening of the railway line (in the late 1880s) they moved to South Tacoma where a wharf was established near the mouth of the river. (Stinson, vol 4, 1983)

Population in Yarramalong valley in 1850s-60s
Being born near Maitland in the year 1855, 2 years later came with my parents to Yarramalong when the place was practically a wilderness, there being only about ½ dozen settlers between Wyong place (latterly known as Allisons) and Yarramalong with no roads only a bush track. (Memoirs of William Joseph Waters, written in 1917, reprinted by Stinson, vol 1, 1979)

Farming for home use in 1850s - 1860s
In those days there was little farming done by the few settlers for commercial purposes. What grain there was grown was principally used for home consumption in the way of feeding pigs and poltery (sic) not forgeting the old steel mill which was used for grinding some of the grain (corn and sometimes wheat) for making bread. Of course they very often sold a few pigs and eggs to some of the business people of Gosford and at Scotts saw mill at Ourimbah. (Memoirs of William Joseph Waters, written in 1917, reprinted by Stinson, vol 1, 1979)

Rich alluvial land waiting to be developed
… At Wyong Creek, 14 miles north of Gosford, there are thousands of acres of the richest alluvial land, which would be immediately bought up if the Government expended a few hundred pounds in making a road along the creek … (Australian Town and Country Journal, 10th Aug 1878)

The small village of Wyong in 1878
A newspaper correspondent said; "The small village of Wyong is situated between Gosford and Cooranbong, on the Wallsend Road, and close to Mr Allison's estate. The village itself consists of only 7 or 8 houses, but there are many houses scattered about in the neighbourhood, the breadwinners being engaged in sawing, splitting and woodcutting. (Sydney Morning Herald April 16, 1878, reprinted by Jervis 1948)

2.3 Development accelerates after the opening of the railway (1880s – 1950s)

The opening of the Great Northern Railway in the period 1887-89 was the single most important factor in the development of the district. Timber could now be transported rapidly and efficiently to Sydney and the industry started to boom. There were some very large orders for timber during this time, particularly for export overseas. This led to the development of the Wyong township as large quantities of timber were hauled into the yards at the railway station.

Agriculture also expanded rapidly, as the railway now allowed fresh farm produce to be sent to the Sydney markets. By the 1890s citrus farming was expanding into the district and eventually became an important industry in the Yarramalong and Dooralong Valleys. Dairying was also expanding, and in 1907 a butter factory was opened at Wyong.

In the 1920s the timber industry started to decline and mixed farming became the major focus for the district. In 1926 the butter factory commenced the supply of milk to Sydney and in the 1930s and 40s the industry was flourishing with two hundred farmers sending their milk to the factory for processing. Poultry farming also became popular, particularly at Kanwal and Warnervale, and the district became one of the largest egg producers in the state.

The railway was also used to transport the fish caught by an increasing number of professional fishermen now living at the mouth of the Wyong River (Tacoma).

Throughout the first decades of the twentieth century the Central Coast evolved as a favourite holiday destination, particularly The Entrance where a number of guesthouses were built. By 1920 subdivisions were being made at The Entrance with a high proportion of the lots devoted to future holiday home accommodation. Other subdivisions occurred around the lakes, including Rocky Point, Wyong, Budgewoi and Gorokan.

The Depression years, quickly followed by World War Two, slowed all development in the district, particularly the timber industry.

By 1954 the resident population of the Wyong Shire had only increased to 13,100 and the region was still regarded as a holiday destination rather than an urban centre.

Ecological Impacts:
The main impacts on the Tuggerah Lakes during this period would have been caused by increased sediment and nutrient loads entering via the creeks and rivers. (Although erosion is a natural geological process, most of the sediment is the result of man's activities on the land, which accelerate the process far beyond background levels.) The highest loads probably occurred in the early 1900s when large areas of land were being cleared for the rapidly expanding agricultural industries, and the logging industry was at its peak.

Other impacts during this period would have included:
- The development of small towns and villages around the lake shores with associated land clearing, street runoff and waste disposal problems;
- Expansion of commercial and recreational fishing activities;
- Hunting of waterbirds.

Four hours sea journey restricts tourism - 1885
…..When the railway to Gosford is finished, I shall expect to see the Tuggerah and Wamberal lakes become favourite resorts for visitors from the metropolis. At present, letting alone the fact of the locality being so little known, the four hours sea journey, although not at all rough from a sailor's point of view, is yet quite sufficient to debar the great bulk of excursionists from attempting the trip. (Sydney Mail, 21/3/1885, reprinted by Jones and Eyers, 1988)

Opening of the Railway - 1889
The opening of the Sydney to Newcastle railway line on May 1, 1889, was, I believe, the most important single event in the 150-odd years of white settlement here. A small town soon became established on the western side of the line as a transport centre for the dispatch of fish and timber to the outside markets; and also as a supply centre for the settlers in the Yarramalong and Dooralong valleys, who previously found it necessary to travel all the way to Gosford or to Mangrove Creek and back for their requirements. For many it was a day's journey by saddle horse and pack horse. (Stinson, vol 3, 1981)

Little cultivation has been attempted - 1898
Practically speaking, very little has been attempted as yet in the way of cultivation, and that chiefly noticeable near Gosford, Ourimbah and Wyong. Hitherto the energies of the scattered inhabitants have been devoted to timber-getting and to its conversion into girders, sleepers telegraph poles etc. ….. As the timber lands of Narara, Ourimbah and Wyong Creek districts are clearing, the plough of the husbandman will certainly follow, and a vast district which now lies in a dormant state will in a short time be smiling with fields of waving corn and flourishing orchards. (Gosford Times, 9th Sept 1898, reprinted by Jones and Eyers 1988)

Timber industry flourishes after railway opens

For some twenty years after that historic event, the hardwood timber industry flourished; and it became the biggest industry ever known here. It reached its peak about the turn of the century, which continued on for another decade or so, when something like 100 bullock teams were operating in the district hauling their heavy loads to the railway yards, from where piles, sleepers, girders, telegraph poles, fellies, etc., were sent to fill intrastate, interstate and overseas orders.

Timber merchants and sawmillers were organising and supplying the timber market, and many hundreds of timber workers, - perhaps as many as a thousand of them - were engaged in the industry as cutters, teamsters, mill hands and the like. O'Neill and Goldsmith alone had about 600 men employed cutting sleepers. Big steam-powered sawmills were established. O'Neill and Goldsmith in Wyong, and the Stinson family along the southern bank of the lagoon in Stinsons Lane at Yarramalong, were the big operators; but there were many smaller ones. The timber industry was really humming here some 70 to 80 years ago, and it was the big timber merchants and sawmillers like O'Neill and Goldsmith, and the Stinson family, with their mills and their bullock teams and their horse teams and their organising expertise and their business acumen that were making it hum. (Stinson, vol 3, 1981)

Timber industry - Gosford Times quotes from the early 1900s

When the timber industry here was at its peak there were numerous references in the Gosford Times to large orders that were despatched from our local forests and mills. What follows is a selection from those and other references. (from Stinson, vol 3, 1981)

February 2, 1899: The timber trade is very busy which fact is made clear by Messrs O'Neill and Goldsmith having started to build a new mill at Jilliby.

June 22, 1900: It is estimated that about 400 sleeper cutters are at present employed in the Wyong district, but the wet weather has greatly retarded operations in drawing, teamsters being unable to get upon the ground.

August 31, 1900: The timber trade is very brisk at present. Railway sleepers, sawn timber, tramway poles, turpentine piles, and girders, all are in great demand.

November 9, 1900: The timber trade is very brisk at present; about 100 teams are engaged in carting it to the station. If the present run on timber lasts it will begin to get scarce in about 20 years' time.

April 19, 1901: Messrs O'Neill and Goldsmith are erecting another sawmill at the head of Wyong Creek and they expect to have it going in about a month's time.

February 21, 1902: The timber trade still continues very brisk. The railway yard is completely blocked with sleepers and turpentine piles owing to a scarcity of (railway) trucks.

August 1, 1902: Ourimbah. The sleeper trade has been very brisk during the past week. Twenty or thirty teams and carts are engaged carting them in. Sleeper getting is the principal industry here at present. Should that go down, the effect would be keenly felt throughout the whole district. In consequence of the demand for sleepers. farming has been neglected to a certain extent.

March 3, 1903. The Minister for Works, Mr O'Sullivan, has received a report respecting the orders for sleepers for South Africa. Contracts have already been entered into for 540,000 sleepers, seven feet by ten inches by five inches, and in addition thereto it is probable that an order for a further 140,000 will be placed.

August 14, 1903: Mr Bradley's sawmill is busy cutting fruit cases to supply the demand caused by the extra heavy crops of oranges along the creek this year.

October 28, 1903: Sleeper cutters are being knocked off in the locality owing to the cutting out of the present South African sleeper contract, and work is likely to be very scarce in the near future.

December 18, 1903: South African Sleepers, Cape Railways. Tenders are advertised for sleepers: 20,000, Capetown; 65,000, Port Elizabeth; 45,000. East London. Total, 130,000. Delivery 20,000 a month, commencing June. Tenders close January 23.

June 9, 1905: For many years it has been a not uncommon thing to hear old bush hands say that all the timber of the Brisbane Water had been got out. It might be news to these, and others interested in the timber industry, to know that at the present time Messrs. Connolly of the Ourimbah Saw Mills, are getting blue gum ships' planking 50 feet in length, from 14 inches by 2¼ inches to 10 inches by 2¼ inches and what is of even more significance is that the timber is for export to Tasmania, where blue gum is said to be plentiful. This mill is also turning out some splendid beech planking. of which valuable timber the proprietors say there is any quantity procurable in the district.

December 15, 1905: Last week Messrs O'Neill and Goldsmith were very busy trucking a shipment of 25,000 sleepers for the Indian markets. A similar quantity is expected next week.

Wyong Timber Industry in 1906

The Wyong district has been, and still is, primarily a timber-getting country, and among the inhabitants there are to be found quite a sprinkling who believe the prosperity of the place depends solely upon the timber industry. "When the timber is gone, Wyong is done." said a well known resident to the writer. But happily that is not the universal opinion. "When the timber is done, Wyong is begun," - was the comment of one whose interest, perhaps more than any other person's, is bound up in the district.

And, without in any way wishing to depreciate the value of the timber resources of Wyong, the close observer cannot shut his eyes to the agricultural possibility of this small but thriving district. The soil which has, unaided by man, produced these forest giants - tall, straight as an arrow, sound and even in growth - is surely capable of growing most crops in equal profusion.

As the straight growth of the trees suggests, there is an abundant rainfall and no long periods of dry weather, such as are experienced in other less favoured districts but little removed from the coast. The average rainfall is 52 inches.

Let us glance at some of these trees and see what their possibilities are. A single blue gum has recently yielded 240 sleepers. Two ironbark girders cut within the last few weeks and supplied to one of the largest northern collieries by Messrs. O'Neill and Goldsmith measured respectively 84 feet and 76 feet in length, and squared from 14 in. by 14 in. to 12 in. by 12 in. A tree … situated on Mr Robert Smith's farm, Wyong Creek, tapes 58 feet in circumference six feet above the base, and is probably over 140 feet in height. This is, however, useless for timber purposes and has been ringbarked, but a couple of miles further up the creek on land of M. J. Woodbury's there is a splendidly sound tree very much higher; and others at least equally good may be found about, notwithstanding that very much of the best timber has been cut out.

Turpentine piles have been furnished from this district measuring 90 feet in length. These are not carefully collated figures, but facts which have incidentally become known to the writer during the past few weeks.

On the better parts of Wyong and Jilliby Creeks an average large well grown tree runs to nearly 100 feet in height and may go over that measurement. Over 30 varieties of useful timber grow in the neighbourhood. Many magnificent trees, ringbarked and bleached by the sun and wind, look down on the grass flats of standing corn like armies of giant spectres.

As before indicated, timber getting is still the chief industry of the district, although it is probable that agriculture in general and dairying in particular will surpass it in importance at no distant date.

It must not, however, be supposed that the industry is on the decline. Possibly it was at the height some five or six years ago when millions of sleepers were sent to New Zealand; but the trade is still very brisk, and some large contracts are in hand at the present time for China and the East.

From the cutter's point of view the remuneration is extremely varied. Good men may earn from 7s up to - in exceptional cases - as high as 25s per day, a very great deal depending upon the class of timber worked; but there is much lost time, and the life is necessarily rough, though an eminently healthy and vigorous one apart from the risks of accident inseparable from such an occupation.

At present, work of this sort is plentiful for good men and it has the advantage of greater freedom and independence than other more settled fields of labour. Many timber getters, probably a considerable majority, are nomadic, wandering from district to district, as demand for their labour occurs; while a number of farmers put in a great deal of their time at this work, sometimes, we fear, to the neglect of their farms.

There are sawmills at Wyong and Jilliby, also at Cedar Brush Creek above Yarramalong, and at the latter place two felloe factories. Messrs Waters Brothers have a most complete felloe plant, and send their products, bearing the well-known TP brand, all over the Commonwealth. Strange to say, some farmers put in much of their time cutting felloes, cross-cutting and flitching the logs by hand, and doing the actual cutting by band-saw driven by horse-gear, or in some cases by small engines. Some felloes are cut in the bush entirely by hand. The prime factor in this branch of the timber industry is the quality of the local blue gum. As a matter of fact, the timber industry of the district is older than the new Wyong of the railway. It began from the upper end of the creek. The outlet was through Wollombi to Maitland, and over the Penang Range to Mangrove.

At the upper end, with the exception of the Olney Reserve, the timber is almost cut out now. There is, however, still plenty in Wyong and Jilliby Creeks, and in the neighbourhood of Tuggerah. In fact, some places, like McPherson's Brush, containing as good timber as any yet cut are either locked up or have only just been opened out. (Australian Town and Country Journal dated May 23, 1906, reprinted by Stinson, vol 1, 1979)

Cattle raising at The Entrance in the 1890s – 1900s

My father's cattle were a special breed developed by himself. He used Ayrshire Shorthorn cross cows and mated them with an Ayrshire bull, so that they were mostly Ayrshire with a touch of Shorthorn. These 'Tuggerah bullocks', as they were called, were known far and wide and were in great demand. The property was unfenced so that the cattle were able to roam over hundreds of acres but very few of them ever strayed, and we never had any trouble from cattle duffers. From the junction of the Wyong and Gosford roads running south (towards Gosford) from there for about a mile, and for several hundreds of yards on either side of the road in the vicinity of what is now the high school and beyond, was a favourite grazing area for the cattle, and we used to call it "the big plain". (Memoirs of Raymond Taylor, presented by Stinson, vol 1, 1979)

Mixed farming at Jilliby in 1904

Jilliby;….The settlers now, instead of depending upon grain as the only product, have taken a lesson from other places and have gone in for mixed farming-dairying, pig and poultry rearing, passion fruit growing and orchard work. …. That pretty little spot of Little Jilliby which only a couple of years ago was a mere bush, is now studded with dairy farms and orchards and forms a picture worthy of our Wyong photoartist's attention. Another industry which is occupying the attention of our settlers is bee culture. … The timber industry also serves as a fall-back by those whose crops fail when the unfavourable season sets in. This has without a doubt formed the staple industry of the people ever since it has been a village… (Gosford Times 23rd Dec 1904; reprinted by Stinson, vol 4, 1983)

Agriculture at Wyong in 1906

Wyong has a larger and more important industry before it than the timber trade, viz, agriculture. Patchy as it is some of the land… will bear favourable comparison with much land in the state which is being assiduously cultivated. The land suitable for agriculture consists of the larger flats adjacent to the railway, bounded in the east by Tuggerah Lake, and the narrow but exceptionally rich belts following the creeks for many miles into the hills. The lowest hillsides are, in most places, suitable for fruit growing and there are some thriving orchards in the district, though others have been sadly neglected and some have disappeared….. On the cultivated land, maize is the chief crop and some excellent results are obtained even where the land has been continually cultivated without change. On the dairy farms sorghum, farmers' friend, millet, rape, oats, pumpkins, grammas and cowpeas are all grown successfully….

Dairying is the coming industry and is attracting outside capital. The oldest and largest dairy is that of Messrs Chapman & Sons who milk at Yarramalong and Wyong, at the present time, over 90 head - a great herd..… Among others are some experienced dairy farmers from the South Coast who have settled at Jilliby. Clearing the land is the chief expense, and where the new land is cleared right off, costs from 25 to 30 pounds per acre. The plan usually adopted is, however, to ringbark the large timber, clear out the small, and sow grasses or cultivate between the dead trees. After ten or more years the trees may be burnt out at a comparatively small cost. Not much land is completely cleared at present. (The Australian Town and Country Journal, May 23, 1906, reprinted by Stinson, vol 1, 1979)

Growing fodder on the dairy farms

Dairy farmers here grew their own fodder. Oats were grown extensively. Some people cut it up into hay. Thousands of acres of corn were grown. It would mature by February or mid to late summer. Several people let it mature on the stalks, pulled the cobs off, and put the grain through threshing machines. When the stalks matured they were put through chaff cutters and were very good for cows for fodder. (Memoirs of William Braithwaite, whose father bought a farm at Brush Creek in about 1905. Stinson, vol 1, 1979)

Pollution from milk factory enters Wyong River

The weir in the river behind the milk factory separates the fresh water from the salt. Effluent from this factory used to pour into the water below this weir and was a major source of pollution of what was once a beautiful clear stream of water. (Stinson, vol 4, 1983)

Holiday resort at Tuggerah Lakes - 1898

…But ere I lay my pen to rest I feel in duty bound to make some slight reference to our beautiful pleasure resort – the charming Tuggerah Lakes – where hundreds of people during the summer months avail themselves of every possible opportunity of visiting; and is there any wonder, situated as it is bordered with the swamp-oak, green mossy banks and sparklings and banks, while floating serenely upon its silvery crest can always be discerned the ever numerous swan, pelican, duck coot and various other sea birds, with abundance of fish always available, being constantly fed by means of a beautiful entrance to the sea. In fact I think we might justly agitate its inclusion as one of the most lovely pleasure resorts of New South Wales. (Last paragraph of article written by AT Hawkins entitled "Ourimbah and its surroundings" in the Gosford Times, 9th Sept 1898. Reprinted by Jones and Eyers 1988)

Holiday resort at The Entrance;

Every year at this season can be seen between 400 and 500 people camped at The Entrance on Mr Taylor's property, and even Rabbit Island is dotted with tents. It is one of the finest camping grounds, being well sheltered by trees and having a fine carpet of grass right down to the edge of the lake with plenty of freshwater springs. …. Mr H Dening has since last year erected a large

boarding house near the lake shore, but finds it is not large enough. (Gosford Times, April 19, 1901, reprinted by Stinson, vol 1, 1979)

Early years of The Entrance

There were only three dwellings at The Entrance when I was a little boy (1890s)*; and only one between The Entrance and Ourimbah Creek at Chittaway; and only one between The Entrance and Wamberal. Apart from our family, there was the fisheries inspector, a man named Charles Gordon, living alone in a bark roofed hut down near the lake; and over at North Entrance, Walter Denniss who had married Edith Hargraves of Noraville had established Dunleith guest house. They were the only ones in that vicinity. In 1900 my sister Adele (known as Delly) who had married Henry Dening opened Bayview guest house; and about 1903 my brother Les (later the shire councillor) opened Pinehurst; and about 1911 my sister Gertrude (Mrs. Tom Denniss) opened Tuggerah House right where Woolworths is now.*

When the Great War started in 1914 there were only about fifty permanent residents at The Entrance; but of course in the holiday season there were hundreds of them staying in the guest houses and camping in tents along the channel. In 1900 the only house between The Entrance and Chittaway was at Killarney Vale on the heights overlooking the lake. It was built by Tom Davis for one of his sons Abel who was managing the sawmill on Tumbi Creek. The other house was on the Gosford road about two and a half miles past the junction of the Wyong and Gosford roads. People named Swadling lived there in a big two-storey stone building that had been the Wamberal Hotel or Wamberal Inn or the Ten mile Hotel operated by William Long. It was at the junction of Bellevue Road and the Gosford Road....

About 1913 our father divided his property among his twelve children, each of us receiving a fair share. He donated the land one hundred feet in depth along the foreshores of the channel and the lake to posterity - a most generous thing to do; and it was thanks to his generosity and his foresight that these foreshore reserves belong to the people today. ...

About 1920 the first Taylor subdivisions took place when house lots were offered to the public. That was the beginning of the real development of The Entrance as an urban area. The lots, usually of 50-feet frontage, were sold for 60 to 80 pounds each, with some choice blocks fetching up to 200 pounds. The lots sold readily, and soon there was a big influx of permanent residents who built their own homes here; and so The Entrance quickly grew into a town. (Memoirs of Raymond Taylor, born at The Entrance 1892, printed by Stinson, vol 1, 1979)

The Entrance in 1915

The late ex-councillor Arthur McClure told me a few years ago; "When I came to The Entrance in 1915 there were 57 residents there – and I made the 58th". (Stinson, vol 1, 1979)

Shire Figures - 1934

As to the progress of The Entrance during the past four years, the following information is taken from Council's records:-

At the end of 1929, the total number of dwellings in the Scavenging area, which includes The Entrance, Long Jetty and Toowoon villages, but does not include The Entrance North, was 435; Number permanently occupied 122; 28% permanently occupied. Total buildings (dwellings only), 1933, 631; number permanently occupied, 243; 38% permanently occupied.

As most of the boarding houses, hotels, &c, are connected with septic tanks, our sanitary records do not include these buildings.

The actual number of dwellings erected during the period: 1930, 57; 1931, 35; 1932, 38; 1933, 66. Total for four years 196.

The sanitary removal services for 1929 were 13,346; 1933, 20,534. Increase of 7,188. It might be mentioned that during that period, several buildings adopted the septic tank system, this would account for at least 1,000, thus the effective increase would be about 8,188.

It may also be noted that during the four years mentioned, the depression was much in evidence, but latterly the building movement seems to be greater, as we have had 20 applications for approval of plans for new dwellings to date this year. ….(Guardian 17/3/1934)

Toukley in the late 1940s - a village of 400 people

It was in November 1947 that Ron and I and our two sons moved to Toukley to take over the rundown Post Office Cash Store. The shop was situated in West Toukley, where the second-hand furniture shop now stands. What a shock to come from the amenities of Sydney to a home with tank water, no electricity and not even a sanitary service!! ….…The population of Toukley was about 400, largely made up of fishermen and their families, pensioners, the three lighthouse keepers and their families and itinerate prawners. (Recollections of Raff Alt, printed in Gambrill and Gambrill 1991)

Budgewoi was a quiet village

In 1949 Budgewoi was a quiet village, consisting of probably not more than forty houses and weekenders, two shops, a boatshed and a tin shed where oil and petrol were sold. (Bruce Russell, 1984)

Seepage from sanitary depot at Noraville

The sanitary depot at Noraville was commissioned in 1959. It was used for treating night soil and septic effluent. Trench and lagoon disposal methods were used. Effluent leaked through to Eel Haul Bay causing an increase in nutrient inputs. (IDC 1979, Appendices)

2.4 Urban development (1960s – 1990s)

During this period the focus of the district shifted from agriculture and timber to urban development, while tourism continued to play an important role.

The dairy industry started to decline in the 1970s and 80s as land prices climbed and farmers sold their properties to wealthy investors from Sydney. In 1982 there were only 12 local dairy farms remaining and by the mid 1990s the last dairy farm in the district had ceased operation. Citrus farming also declined in importance, due to the high land prices and a declining price for oranges.

In recent years hobby farms, consisting primarily of grazing land, have become an important land use. In the valleys along the alluvial flats, turf farming has also become an important industry. Closer to the Tuggerah Lakes, rural land is being converted into residential areas.

In the 1990s the timber industry continues in the State Forests of the upper catchment, but at a reduced intensity compared with its peak period in the early 1900s.

Urban development commenced in the 1960s with the construction of the Munmorah Power Station and the associated coal mines. The social structure of the coastal communities started to change, with the holiday-makers being replaced by a permanent residential population living in urban centres.

In the 1970s the Central Coast became the fastest growing urban district in south-eastern Australia. The Wyong district was an important contributor to this growth.

Urban development continued through the 1980s largely due to the extension of the Sydney-Newcastle freeway and the electrification of the Gosford-Newcastle railway. This enabled people to live in the Wyong Shire and commute to Sydney for work. By 1990 the population had risen to 102,000. This population growth has continued through the 1990s with new residential areas being developed around the western shores of Budgewoi Lake and southern shores of Tuggerah Lake, and also extending westward through Warnervale, Wyong and Tuggerah.

Ecological Impacts:
During this period (1960s to 1990s) there was a rapid increase in the ecological impacts on the Lakes from urban development. Impacts from urban development included;

- High nutrient loads entering the lakes from septic systems in the 1960s, 70s and early 80s.
- Nutrients and other pollutants from urban runoff, particularly during storms.
- Reclamation of surrounding wetlands for urban and rural development.
- Loss of riparian vegetation around the lakes caused by housing developments.
- Dredging and reclamation activities along the shorelines of the lakes.

While impacts from urban development were increasing, impacts from the agricultural and timber industries in the upper catchment were probably declining.

In the last few decades many agricultural activities such as dairying and citrus growing have declined and land clearing in the upper catchment has slowed. This would have resulted in less disturbance to the land and hence less erosion. There is also an increased awareness of erosion control in the farming districts through the introduction of 'catchment management' principles and better protection of riparian lands. However, in recent decades there has been an increasing use of artificial fertilisers, some of which would end up in the creeks and rivers, and ultimately in the lakes.

Logging still occurs but at a much reduced rate, and erosion control measures have been introduced to help reduce the quantity of sediment reaching streams.

Overall, the present rates of sediment and nutrients reaching the lakes from the valleys and hills of the upper catchment have probably declined from the peaks that would have been experienced during the late 19th and early 20th century when there was little consideration for erosion control and the timber and farming industries were rapidly expanding.

Other impacts on the Lake system during the 1960s to 1990s include;

- Operation of the Munmorah Power Station from the late 1960s until the early 1990s, which increased the temperature of lake water passing through the condenser tubes, and changed water circulation patterns in Lakes Munmorah and Budgewoi.
- Commercial and recreational fishing activities (both within the lakes and offshore).
- Dredging operations associated with the Lakes Restoration Project in the late 1980s and early 1990s. This deepened nearshore areas, resulting in the loss of some mudflats which had provided good waterbird habitat. Also caused acid sulphate problems in some areas when lake sediment was pushed onto the shore. On the other hand, removal of nutrient rich sediment might have assisted with control of macroalgal blooms, and with water circulation in the nearshore zone.

Budgewoi grows in the 1960s

When the Power Station and the two coal mines began to be prepared in the early 1960s, there was a rapid increase in the local population, to work on the construction sites, and so began the development of Budgewoi. The development gained impetus once the Power Station and coal mines began operating. (Bruce Russell, From Pudgeway to Budgewoi, 1984)

Council claims septic water flows into lake 1966

Wyong Shire Council has decided to take legal action against Astor Hotel Motels Ltd., owners of the Beachcomber Hotel at Toukley. Reason for the action is council's claim that the company is allowing septic tank effluent to flow into Budgewoi Lake. …(The Advocate, 4/5/1966)

Munmorah Power Station – official opening in 1969

Munmorah Power Station is planned to have a total generating capacity of 1400 MW consisting of four 350 MW units. Construction on the site started in December 1961, and generation of power began just over five years later, in February 1967, with the commissioning of No. 1 unit. Nos. 2 and 3 units were first synchronised in February 1968 and May 1969 respectively and No. 4 unit is scheduled for operation towards the end of 1969. …

The Power Station overlies seams of the Newcastle coal reserves and two new collieries have been established with the sole purpose of providing coal for the station. …

Cooling water for station use is taken from Lake Munmorah, which is one of the Tuggerah Lakes, and is discharged into Lake Budgewoi. The cooling water is able to return to Lake Munmorah via Budgewoi Creek which connects the two lakes and has been enlarged by the Commission to cater for the higher water flow conditions. …..…

The distance between the intake and discharge is approximately 6 ¼ miles measured along the shore line and ample lake surface area is available for dissipation of the heat added to the cooling water in its passage through the turbine condensers.

To minimise the pick-up of silt and other material from the lake, the water velocity at the mouth of the intake canal was restricted to less than 1 foot a second. This resulted in a channel 195 feet wide and 10 feet below average lake water level at the mouth of the intake. As a further precaution the lake bed was dredged at a slope of 1 in 100 for about 1,900 feet from the shore line.

Seven cleansing screens are located in the intake canal. The screens are drum type, 27 feet in diameter and 18 feet wide, with stainless steel screening mesh to remove seaweed and jellyfish which otherwise would block the tubes in condensers and other heat exchangers.

<u>Ash and dust handling plants</u>: Furnace ash is collected in the ash hopper located under each boiler. The ash hopper is constructed from stainless steel and contains about 16,000 gallons of water. The ash is removed from the ash hoppers by dumping the water and ash into a sluiceway and sluicing it to an ash pit. From the ash pit it is pumped as a slurry through a pipeline about 2,000 feet long to the furnace ash disposal pond. ….. The furnace ash disposal pond consists of a 200 acre storage area formed by an earthen embankment 18 feet high and 6,100 feet long. …. A concrete spillway, 40 feet wide and 40 feet long returns water to Lake Munmorah and provides for normal run-off from the surrounding catchment area.

<u>Condensers</u>: Steam from each turbine is condensed in a twin condenser situated beneath the low pressure exhausts. The steam passes over aluminium brass tubes through which the salt cooling water is circulated. … The salt water is periodically dosed with a chlorine solution to prevent any marine growth building up on the inside of the tubes and reducing the efficiency of the condenser. (Munmorah Power Station, Tuggerah Lakes, NSW. October 1969, published by the Electricity Commission of NSW)

Sewer opening date is set - 1969

The final date for the official opening of the Wyong Sewerage Scheme has been set. The scheme will be opened on Friday, March 7 ….(Wyong and Lakes District Advocate, 22/1/1969)

Urban development - 1979

In 1954 the Shire's population was 13,097. In 1971 this population had increased to 32,967 and in 1976 the population had increased to 47,362. Of this figure, some 31,000 were located in residential areas on the perimeters of the lake system. Two-thirds of the Shire's population live on or around the lake foreshores with approximately 13km of lake foreshore in private ownership. This desire for people to live close to the lakes, is further reinforced by the high growth rates being experienced in areas such as Berkeley Vale, Buff Point, Budgewoi, Gorokan and Bateau Bay. For example, in Buff Point and Berkeley Vale, population increased by over 95% between 1971 and 1976. The existing residential areas at The Entrance, Long Jetty, and Toukley/Norahville are to a very large extent fully developed, although much of the housing in these existing areas is comprised of older type cottages which are likely to be rebuilt within the next twenty years. It is likely that as this existing housing is replaced, new development will be built at a much higher density, since much of the land is zoned for medium-high density development. (IDC, 1979)

Sewerage - 1979

At present there are three Council owned sewage treatment plants and four privately owned plants servicing areas within the Wyong Shire. These are located at;

Council	*- Toukley*
	- Bateau Bay
	- Wyong
Private	*- Wyong Abattoir*
	- Walu Caravan Park, Budgewoi
	- Lakeland Caravan Park, Budgewoi
	- Munmorah Power Station

Sewage from the Toukley-Gorokan area is treated at Toukley Treatment Plant. After secondary treatment the effluent is discharged into a tertiary pond and ultimately to a dune infiltration disposal area near Soldiers Beach.

Sewage from The Entrance area is treated at Bateau Bay Sewage Treatment Plant. The secondary treated effluent which has been chlorinated, is disposed to the ocean at Wonga Point.

The Wyong system extends north from Wyong Creek and includes the Wyong township and the North Wyong industrial area. Sewage is treated at Wyong Treatment Plant. After secondary treatment the effluent receives tertiary ponding treatment before discharge to the Wyong Golf Course swamp.

Other domestic and industrial sewage is disposed of either by on-site disposal through ground absorption, pans or pump-out septic tank. Depots for the disposal of nightsoil and pumped out septic tank effluent are located at Mardi, Toukley and Bateau Bay. In addition, some septic tank effluent is introduced to the sewerage reticulation via special receiving wells. (Inter-Departmental Committee report, 1979)

Concern on lake nutrient levels - 1984

The combined run-off of rain water from both rural and urban areas results in water with above recommended nutrient levels entering Tuggerah Lakes. This was a finding of the Wyong River water quality survey which is now being completed by Wyong Shire Council.

The survey was conducted over a six month period from April to October 1983, when certain chemical, physical and biological parameters of the Wyong River were assessed and recorded. Eight sampling sites were chosen along Wyong River and it's main tributary, Jilliby Creek.

The main objectives of the study were to determine the extent of rural and urban contamination in the creeks and establish baseline chemical, physical and biological data. The Shire Health surveyor, Mr Palmer, told council's December meeting that from available evidence it could be said that the human activity thus far engaged in within the valleys had not lowered the water quality of the river system below current Health Department chemical requirements.

"However, ecologically, the nutrients in the river system are often higher than those recommended," Mr Palmer said. "As such, the combined run-off from both rural and urban areas results in water with above recommended nutrient levels entering the lakes' system."

Councillors adopted his recommendations that:

- *Further regular testing be carried out during summertime to establish the extent of nutrient out-fall into Tuggerah Lakes.*
- *Further regular sampling be carried out during summertime to ascertain possible pesticide levels in Wyong River at the Mardi Reservoir draw-off point.*
- *Studies be undertaken to determine the nutrient loads in stormwater run-off which enters the river from the township of Wyong*
- *Every assistance be given to the Soil Conservation Service of NSW in it's efforts to have the Wyong Valleys designated as "protected lands" under the Soil Conservation Act.* …(The Lakes Advocate, 11/1/1984)

Always a close eye on the struggling Tuggerah system – Elcom keeping cool in the lakes

Tempers might be running hot throughout the Electricity Commission, but in one respect, the Commission is uncompromising about keeping its cool. One of the major by-products of the generating process is heat, lots of it! The problem is getting rid of it and doing so in a way which does not damage the environment.

Munmorah Power Station sucks large volumes of water every day from the lake, some 54,000 litres of water in a boiler to steam. The steam is forced into a turbine at high temperature and pressure to run the generator which in turn produces the electricity.

<u>Water re-cycled</u> - The steam is cooled back into water to be re-cycled through the system by passing through a series of condensers in which cold water is pumped from Lake Munmorah.

According to the Commission, during the past two years the average increase in temperature between the water in the inlet and outlet canals has been 6.4 degrees Celsius. The temperature rises by about 10 degrees Celsius when the station is running at full power.

The water spreads out from the outlet canal into Lake Budgewoi and into a small part of Lake Munmorah. The further it extends into the lake the more heat it loses. The cooling field extends not only across the surface of the lake but beneath it. Because hot water from the outlet canal is lighter than the cold water of the lake, it rises too and stays near the surface.

The Commission said the cooling field of water did not extend into the shallow water weed beds around the edge of the lake. The weed beds reduce water movement and as a result, the water does not readily mix with the deeper water of the lake. Since the Munmorah Power Station began operation, the Commission has been studying the cooling fields in the lakes. …(Central Coast Express, 26/10/1988)

Scheme on line - 1990

The commissioning of the Charmhaven Sewerage Treatment Works last week was heralded with great fanfare. Officially opened by Deputy Premier and Public Works Minister Wal Murray, the treatment works plant is the last plant in the enormous $127 million Wyong Shire Sewerage Scheme. ... (Wyong Shire Advocate, 12/7/1990)

Progress on pollution - 1997

More than 200 businesses have embraced Wyong Council's solutions to pollution program. The program began two years ago in conjunction with the NSW Environmental Planning Authority. It is aimed at promoting environmental education in co-operation with industry and increasing the water quality of Ourimbah Creek by reducing the amount of waste oil, degreasers, process water and other pollutants which find their way into the creek. …(Central Coast Express Advocate, 25/6/1997)

Landuse distribution in Wyong Shire by area – 1990s

Landuse	*Area (hectares)*	*Proportion (%)*
Forestry	30,000	36.3
National Park	2,451	3.0
Residential	3,451	4.2
Commercial	132	0.2
Industrial	1,018	1.2
Urban Other	8,297	10.0
Rural	37,351	45.1
Total	82,700	100.0

(from 1996-97 State of the Environment Report, Wyong Shire Council)

Agricultural landuse in Wyong Shire's valley areas in the 1990s

Landuse	*Area (hectares)*	*Proportion (%)*
Pasture	8,814	89.5
Orchard	617	6.2
Turf farms	268	2.7
Nurseries	30	0.3
Poultry	21	0.2
Other	96	0.1

(adapted from 1996-97 State of the Environment Report, Wyong Shire Council)

3 Weed growth, sand and mud

There are not many historical documents prior to the 1960s which provide a description of the 'weed' (seagrasses and macroalgae) in Tuggerah Lakes, with the exception of a few passing comments in the Fisheries Annual Reports of the 1880s and 1890s. These referred to 'slimy weed' interfering with netting, and to the presence of small fish in the weed around the edge of the lake.

From the 1960s onwards 'weed' growth (or more specifically macroalgae) became an increasing problem, and a number of scientific studies and surveys were undertaken (for example Higginson 1965, 1968, King and Holland 1986, IDC 1979, Cheng 1979, 1980, 1984, 1985, 1986a, 1986b, 1987). For detailed reviews of these studies, refer to IDC (1979), Batley *et al* (1990), Thresher *et al* (1993), King and Hodgson (1995) and Kennedy (1997). There have also been many newspaper articles from the 1960s onwards which report on the increased weed growth in the lakes, and these have been documented by Allison and Scott (1998).

The first reference to the mud flats and sand bars in the lakes was made by Sarah Mathew, wife of the surveyor, Felton Mathew, in a description of their attempt to cross Tuggerah Lake in 1834. However, there are few other references from the 19th century or early 20th century.

There are some historical records from the 1930s and 1940s which describe the sandy beaches around the lakes, particularly Canton Beach, but perhaps the best evidence of the sandy beaches is provided by the large number of old photos and anecdotal reports which have been presented separately (Scott 1998).

Sandbanks and mudbanks hinder the first surveyor - 1834

Wednesday 29th (camped at The Entrance). *Started early, and packing our things on a cart brought them down to the shores of the Lake, and with some trouble got them all stowed in the boat, but she was so small that there was scarcely room to pull the oars, however the wind was fair and we hoped soon to get across; we spread our sail as soon as possible, and were proceeding tolerably, when unfortunately we missed the channel, and struck on a sand-bank, with great exertion we got her off, and at length fairly through the channel, and beyond the middle of the Lake, when the wind freshened very considerably, the sea rose, and the waves broke, in rather an alarming manner, considering the little frail, heavily-laden boat we were in: we were however nearing the mouth of the Creek and we hoped if we could once get into the smooth water we should do very well; the wind shifted a few points and blew still stronger, till our spirit broke, and the sail dropped useless; we were then obliged to take to the oars, but the sea was so high and the waves broke every moment against the boat with such violence, that we momentarily expected she must be swamped, for so loaded was she, that had a wave gone over her, she must have sunk at once; in this state we were forced to run for the nearest land, the point, at the mouth of Tuggerah Beach Creek, this however we could not make, we stuck on a mud bank, and with difficulty pushed off again; resolved to attempt returning to the point whence we had started in the morning, we turned the boat, and by dint of great exertion made some little progress, till we found ourselves again in shoal-water, for most sand-banks extend from many points all over the Lake, leaving very narrow channels which are not easily found by those who are unaccustomed to crossing this lake; besides in our case the wind blew so strong, that we had no power to guide the boat whatever even if we had gained the channel: our boat now stuck fast, and every wave threatened to beat in her side; all the men got out, and by main strength dragged her through the shoal upwards of two miles, the depth of water being scarcely above the waist, and in some parts not higher than the knee: they were all so terrified that I believe we should all have been lost, but for Felton's presence of mind; his directions were promptly obeyed, and they all exerted themselves, as men conscious, that their safety depended on their obedience and energy: one poor fellow was too seasick to be of the slightest use; he was incapable of moving; I had been suffering much, but the excitement of terror at the moment of danger almost restored me to health; just as the boat again reached the deep water, one of the men exclaimed he felt something touch his leg, another instantly declared he saw a shark, and pale with fright they all scrambled into the boat at once, at the imminent risk of upsetting her; fortunately we had just cleared the shoal, and they again took*

their oars, the sea had subsided a little, and we made some progress, though slowly, towards the shore, the wind however would not allow us to reach the point we had left in the morning, obliging us to direct our course more towards the western shore; at length the violence of the sea abated and as we approached the land, became quite calm; our boat would not take us within a quarter of a mile of the shore, but luckily there happened to be another small boat drawn up on the shore, so two of the men waded through and brought her out to us, and after making several voyages the little skiff landed all our baggage by degrees, while after each load, our boat being so much lighter, was enabled to approach nearer to the shore, till I was easily carried safely over the mud and placed on dry land, most thankful for the happy termination of an adventure which at one time was so little to be expected: we had spent the whole day, in attempting to effect a crossing, and now we encamped within a mile of the spot whence we started: it was provoking enough, but we felt too thankful for our safety, to mind that much. (Journal of Sarah Mathew – wife of surveyor Felton Mathew, Jan 1834. Reprinted in Stinson, vol 4, 1983. Original manuscript is in the National Library)

Slimy weed in 1888

The lakes themselves are in a very dirty state owing to a slimy weed which is very destructive to the nets. I do not expect improvement until a flood occurs. (1888 Fisheries Annual Report)

Weed in the shallow water - 1891

The sea entrance, Ourimbah Creek, Wyong Creek, and the big flat on the eastern side of Budgewoi Lake, which were swarming with young fish, especially mullet, in fact young fish were very plentiful all round the shores of the Lake, where the nets could not disturb them owing to the shallow water and the weeds. (1891 Fisheries Annual Report)

Less weed and slime - January 1898

The young fry are first seen in shallow water on the flats of rivers or lakes and bays. I have seen large shoals of small fish, from ½ to 1 inch, in drains and round the edges of the lake behind the weeds, and the water has been so hot that I could scarcely bare to wade in it. Still the young fish seemed to enjoy it. …. At present the waters are in fair condition, there not being so much slime and weeds on the bottom; but the weather is very much against getting good hauls. ….. (Memo from Charles Gordon, January 1898, Fisheries Annual Report for 1897)

Toukley in the 1930s – sandy beaches

Toukley main road was a gravel road. Toukley was then heavily timbered bushland, but the lakes were something beautiful to see and swim in, crystal clear water and white sandy beaches. (May Stenner - nee Blade - recalling life in Toukley. Presented by Gambrill and Gambrill 1991)

Mud clogged the sampling nets of scientists

Nets of varying degrees of coarseness were used, from the finest mesh bolting silk to nets of coarse stramine. Since overseas work had indicated that the eggs (of the Greasy Back prawns) *were probably demersal, various methods such as attaching of heavy iron sledges to the nets, had to be devised for taking hauls just above the bottom layer of mud. This was extremely difficult since the floor of the lakes, which was only about 8 feet deep in the deeper parts, was very uneven. On more than one occasion in heavy southerly weather, the hauls had to be abandoned and a fresh start made after the net had become clogged with mud from the bottom.* (A description of the field work by Professor Dakin, who was investigating the Greasy Back prawn in 1945-46. Morris and Bennett 1951)

Toukley in the late 1940s – a sandy beach virtually free of weed

It was in November 1947 that Ron and I and our two sons moved to Toukley to take over the rundown Post Office Cash Store. …..A good catch was always to be had when one went fishing, there was an abundance of prawns in the season and our backyard ran on the golden sands of Canton Beach, then virtually free of weed, making it an ideal playground for our boys. … (Recollections by Raff Alt, from Gambrill and Gambrill 1991)

Beautiful white sand at Canton Beach

Canton Beach once had a beautiful white sand which is shown in the picture. It has since, in my opinion, been greatly spoiled, and the sand there is no longer the beautiful sight it once was. (An accompanying photo of Canton Beach shows a wide expanse of clean sand.) (Stinson, vol 3, 1981)

Council lacks money to clear seaweed - 1957

"We have not enough money to do all the work required on land without going into the lake," commented the President, Cr. HG Fulcher, this week when a ratepayer asked Wyong Shire Council to remove rotting seaweed along Prawn Beach. The Chief Health Inspector, Mr H.P. Walker, pointed out that the department had advised that no funds were available to assist council with such work. ….. Cr. Fulcher said it would cost at least £1000 to clean the seaweed from the foreshores at Killarney. Cr. Duncan: The best approach might be to encourage people to clean up the seaweed themselves. … (Wyong and Lakes District Advocate, 29/5/57)

Seaweed industry for Tuggerah Lakes likely - 1958

Toukley Progress Association last night displayed lively interest in a suggestion to develop an industry out of seaweed as fertilizer. The meeting, after hearing an address on the subject from Mr J.R. Bray, one of its members, resolved to sponsor the scheme. ... Mr Bray told members that natural seaweed bounding the shores of Tuggerah Lakes had for years been both a "blessing and a curse". He said the tourist attraction of the lakes was impaired by the accumulation of weed on the shores at some places, rendering the beaches there unusable and creating foul smells. ... It was proposed to erect a suitable shed on land on the lakes' edge and install bins, racks, cutting machines and other facilities for processing. (Advocate, 21/5/1958)

Canton Beach – golden sands on the foreshore

The Canton Beach reserve on the foreshores covers a reserve extending for nearly a half mile. The beach is shaded by lovely trees, almost down to the water's edge, and makes the area an ideal picnic site. Throughout the year thousands of holidaymakers picnic under the trees and enjoy frolicking on the golden sands on the foreshores. Canton Beach is part of the Tuggerah Lakes and, like many of the foreshores, children can wade out for hundreds of yards without going over their knees…..(Swancott 1963)

Weed Growth in the early 1960s

Electricity Commission
Box 5257, GPO, Sydney
8 Apr 1964

The Shire Clerk,
Wyong Shire Council
Box 74
WYONG, NSW

Dear Sir,

Weed Growth in Tuggerah Lakes
In replying to your letter of 9th March 1964, I wish to thank you for the information attached thereto. As you will be aware, this Commission is also concerned at the weed growth in the Tuggerah Lakes, particularly in Lake Budgewoi, and has recently allocated 10,000 pounds for an investigation by the School of Biological Sciences of Sydney University.

Some 18 months ago, a survey of the weed population in the Tuggerah Lake showed that the major varieties were Ruppia spiralis (Stack Weed) and Zostera capricornii (Ribbon Weed), together with a varied assortment of Algae, such as Enteromorpha (Green Weed or Bait Weed). All these plants are inhabitants of salt water or brackish water while it is noted from the literature sent to the Wyong and District Council of Progress Associations by the United Stated Department of Agriculture that it deals rather more with fresh water weeds. Consideration has been given by my Commission, in consultation with the University, to the possibility of dealing with the weeds by the use of poisons but it is felt that, having regard to the fact that the Lakes area is used both as a fishing ground and by swimmers, the effects of control by poison would require to be extremely carefully evaluated before use. It is, therefore, currently thought that poisoning would be a last resort after all other measures had been found unsuccessful.

Arrangements are being made by the University for continuing the investigation commenced early in 1963 into the problem of the weed infestation and I have conveyed to Professor Mercer of the Botany Department, who is directing the work, your Council's interest in the problem as it may well be that at some stage during the investigation the Council may be able to assist the project.

Yours faithfully
K. C. Fraser
Manager & Secretary

Algal studies in the 1970s and 1980s

Dominic Cheng undertook a number of algal studies in the Tuggerah Lakes during the 1970s and 1980s (Cheng 1979, 1980, 1984, 1985, 1986a, 1986b, 1987). His first survey was in the littoral shallows of Canton Beach and Long Jetty in the period December 1978 to June 1979 (Cheng 1979), and his results are summarised below;

Both areas contained the two seagrasses Zostera capricorni and Ruppia megacarpa, and a variety of algal species, including the two filamentous green algae Chaetomorpha linum and Enteromorpha intestinalis. The seagrasses and algae in the littoral shallows formed almost continuous carpet covers extending from the edge of the lake to considerable distances off shore. At Canton Beach the width of the weed belt ranged from 120 metres off Dunleigh St, at the north-western end, to over 300 metres off Crossingham St, further east. The results of transect studies at Canton Beach indicated that filamentous algae covered about 70% of the weed belt, either as large algal mats or in association with seagrasses. At Long Jetty the percent cover of filamentous algae was lower, at about 33%.

The lake floor within the weed belt was usually covered by a fine black sediment near the lake edge and gradually changed to clean sand towards the outer fringe.

In the littoral shallows, the seagrasses and algae were found to be receiving high concentrations of nutrients from urban stormwater. This included seepage from septic tanks and urban runoff from roads and gardens. Under wet weather conditions discharges from stormwater drains along Canton Beach showed total phosphorus concentrations averaging 180 ug/L (and dissolved phosphorus at 40 ug/L), and for some stormwater drains the total phosphorus was above 1000 ug/L. The nitrate nitrogen figures were also high, averaging 1440 ug/L with a maximum of 3600 ug/L.

Therefore, during wet weather, when large volumes of urban runoff were flowing into the littoral shallows of the lakes, there was a significant input of nutrients, both in dissolved form and attached to sediment.

The nutrients entering the littoral zone via urban stormwater were eventually deposited or incorporated in the sediment, where it slowly accumulated. Analyses of sediment samples confirmed that the nitrogen and phosphorus concentrations were very high. This store of nutrients in the sediment were sufficient to maintain a large quantity of algal matter, even without further inputs from the catchment.

Seagrass survey in the summer of 1985

King and Holland (1986) surveyed the seagrasses of the Tuggerah Lakes in the summer of 1985. Seagrasses were recorded as covering 19.11 km^2 or 25% of the area of the lakes. Zostera capricorni was the most widely distributed seagrass occurring over 12.26 km^2 or approximately 16% of the lake area.

The areas of seagrass recorded were lower than those found by Higginson in the 1960s (Higginson 1965, 1968). He recorded in 1963, 1965 and 1966 seagrasses covering 42%, 31% and 28% of the lake area respectively.

Not only had the area occupied by seagrass decreased but also the relative importance of the different species had changed. Higginson's survey in May 1963 (Higginson 1965) showed Lake Budgewoi almost filled with seagrass (76.2% of lake covered compared with 36% in the present study). The whole central region was occupied by Ruppia (42% of lake area). Ruppia was also dominant in deeper water in the southern part of Tuggerah Lake so that approximately one-third of the beds were Ruppia-dominated communities. By 1966 there was no Ruppia in the lake system (Higginson 1968).

The results of the 1985 survey by King and Holland showed that Ruppia had again become established in Tuggerah Lake but it was not found in deeper water; rather in shallow areas inshore of the Zostera beds. The central portion of each of the three lakes was devoid of seagrasses.

4 Fish, prawns and other marine species

Some of the earliest historical records of the Tuggerah Lakes include descriptions of an abundance of fish. In the diary of Sarah Mathew for instance, there is an account of the aboriginals hunting for fish at The Entrance in 1834. In 1842 John Mann observed a large canoe-full of fish at a corroboree on the edge of the lake.

The abundance of fish in Tuggerah Lakes attracted a group of Chinese to Canton Beach in the 1860s, and they smoked and dried fish and prawns for export. In the 1880s, professional fishermen from the South Coast set up camp at Saltwater Creek in the south of Tuggerah Lake and also at Canton Beach. After the opening of the railway most of the professional fishermen moved to Tacoma.

Early this century the abundance of fish was one of the main attractions for holiday makers from Sydney and Newcastle, and there are a number of newspaper articles and tourist brochures that refer to this.

In about 1904 the professional fishermen started to target the prawns on a commercial basis and sent them fresh to the markets in Sydney. By the 1930s and 40s prawning had become an important summer activity for many of the fishermen. Prawning had also become a popular past-time for holiday makers around the lakes and there are a number of references to prawning at locations such as Canton Beach and Long Jetty.

In the 1950s a number of scientific papers were published which described research on prawn ecology undertaken in the Tuggerah Lakes by Professor Dakin of Sydney University and by Dr Racek for the State Fisheries.

Most documents written prior to 1960 refer to an abundance of fish in the Tuggerah Lakes. A few describe a shortage, generally in relation to the winter months when many fish have headed out to sea.

Apart from fish and prawns, there are also a few references to other marine organisms such as oysters and blubber (jellyfish).

Fish in abundance were provided by aboriginals - 1834
We were now approaching Mr Bean's residence at Tuggerah Beach: his dwelling overlooks the largest of the Lakes, and is pleasantly situated on a rising ground; here we dismounted, and leaving me, Mr Bean accompanied Felton in search of a camping place; they fixed on a very beautiful spot about half a mile farther on, commanding a fine sea-view, the entrance of the Lakes, a fine sea beach, and a delightfully cool situation; here under the shade of some unusually large Banksia trees, our tent was pitched, and after dining with Mr Bean, we all adjourned thither: the evening was most lovely, and untroubled with mosquitoes, we really enjoyed the calm cool twilight, while the beautiful moon silvered every wave, and formed a bright glittering track across the blue sea, there could not be a more quiet lovely scene: there were several fires of the natives on the heights around, but at some distance, and we had visits from several of them, who brought us fish in abundance. (Journal of Sarah Mathew – wife of surveyor Felton Mathew, Jan 1834. from Stinson, vol 4, 1983)

Aboriginals spearing fish - 1834
Monday 27th. This day we made arrangements for crossing the first Lake, as our destination lay some miles up Wyong Creek, which enters it on the opposite side, a distance of five or six miles : the boat was to be brought round with the tide early Tuesday morning; we had our friends Mr Bean and Mr Edwards to breakfast with us, and afterwards went down to the beach to see the natives spear fish in the water, they wait till the water is shallow, and then several enter, together swimming and wading, and pursue the fish with astonishing swiftness and dexterity: the spear

usually made of the stem of the grass-tree, has three strong points, and is sometimes thrown from the hand alone, and sometimes from a sort of sling of a peculiar construction which gives it amazing force, this they call the "Wamerah", the fish-spear is called "Moontim": they seem to enjoy the sport excessively, laughing and shouting all the time, in which the rest of them on shore seemed to participate, it was really a very animated scene, and would have formed a sketch for a painter. The weather was fine, and a delightful sea-breeze setting in about eight or nine o'clock rendered the temperature all day cool and pleasant. (Journal of Sarah Mathew – wife of surveyor Felton Mathew, Jan 1834. from Stinson, vol 4, 1983)

Aboriginals hunting fish

The blacks, says Mrs Hargraves, were wonderful fishermen, with their long spears, or moutangs, pointed with a cluster of fine hardwood spikes, secured to the ends with vines and a gum named tuggerah, obtained from the grass tree. (extract from article in local newspaper in 1931 and reproduced by Stinson, vol 1, 1979;)

Abundance of fish at corroboree in 1842

The site of the camp was prettily situated on the bank of Wyong Creek, which hereabouts joined the lake. A bark canoe, paddled by a very old grey-bearded man, now silently approached, and drew up close to our camp; the canoe was so deeply laden with fish of all sorts as to be a few inches only above the water. The old man, by name "Jew Fish", at once commenced to throw the fish onto the shore. There was no rush or scramble for them; in fact no-one seemed to pay attention to this. (Observations of John Mann who attended an aboriginal corroboree at the mouth of the Wyong River in 1842; reprinted by Stinson, vol 1, 1979)

Billy Falkiner caught fish and fowl from the lakes

An occasional visitor, also (to the Blue Gum Flat School), *was Billy Falkiner, the last of the once powerful tribe that "sat down alonga" coast country from the Hawkesbury River to Lake Macquarie. Billy's lifelong home and haunt was Tuggerah Lakes, from whose waters he won his food supply of fish and fowl. He cruised Tuggerah in a crude bark boat. Like the pitcher proverbial, the boat at last went to pieces and the "Last of the Tribe" solved the infinite question in that lake from whose shores he had been separated only by occasional rum peregrinations to the township of Gosford.* (from an article describing the school at Blue Gum Flat (now Ourimbah) published in the Gosford Times, dated July 8, 1937. And reprinted by Stinson, vol 3, 1981)

Fishing trade in the 1870s

Brisbane Water – from a correspondent; ….The fishing trade at Tuggerah Beach Creek Lake affords employment to a good many, and the steamer Kate takes a full cargo to Sydney four times a week. Some few years ago the oyster trade afforded lucrative employment to a great many people, but the trade has become stagnant through the action of the lessee of the oyster beds, who will only permit the fish to be taken when it suits his purpose, and delivered to himself at such a price as he may determine. Several persons are desirous of obtaining beds for the cultivating of oysters; but according to existing arrangements with the present lessee, the Government have no power to grant such leases. …(Australian Town and Country Journal, 10/8/1878)

Lots of fish - 1885

Fish fairly swarm in the Ourimbah Creek, which, after running through the promontory, finds an outlet in the lake. Mullet, schnapper and bream are to be found of great size, and jewfish have been caught up to 3 ½ feet in length and nearly 45 lb. weight. (Sydney Mail, 21/3/1885, reprinted by Jones and Eyers (1988)

Catching schnapper at Wallarah Point - 1887
The Lakes were opened to net fishing on 25/4/87 and all the fishermen returned to Canton. The steamer came to Cabbage Tree Bay again for two months. Prior to the opening of the lake to nets, on 2/4/87, 19 schnapper and 3 bream were caught at Wallarah Point one day. (summary of Elizabeth Hargraves diary by Gambrill and Gambrill 1991)

Canton Beach fishing in the 19th century
In the 1860s Chinese settled at Canton Beach. Here they did a considerable trade in dried fish which they exported to their homeland. Late last century professional white fishermen came from the Dapto area on the South Coast of NSW and settled at Canton Beach and used their sailing boats to make big hauls from the lakes which teemed with prawns, and edible fish of several varieties. (Stinson, vol 3, 1981)

Creeks were crammed with mullet – late 19th century
Mr George Williams, 75, for 60 years a resident at Tuggerah, died on March 3 1933. Mr Williams left on record that even in those days they would go away for a day or two, fishing and shooting, more for a change of surroundings than anything else. All the creeks were crammed with mullet, and the lagoons and creeks with black ducks and black swans. There was an idea that mullet would not take a baited hook, so they speared them. The friend had a small forge and used to make spears of No. 6 gauge fencing wire by flattening the ends, filing a barb and then welding three pieces together. They drove an end into a bullrush, five or six feet long, on to which they fastened a strong fishing line for the purpose of hauling the spear back. They threw the spear with a womerah just as the aborigines did.

Mullet were plentiful and were easily speared. Occasionally they camped at The Entrance for a night or two. At that time The Entrance was a place where nothing could be heard but the sound of the black swans and the moaning of the wind through the swamp oaks. (Swancott 1963)

Fish scarce in winter of 1897
Wyong: - from our correspondent. Fish are very scarce at Tuggerah Lakes just now and the fishermen are complaining of the circumstances, particularly as the winter months are generally regarded as their harvest season. (The Gosford Times, Aug 6, 1897)

Early years of fishing
In the 1850's Chinamen on Canton Beach, Tuggerah Lakes, and at Lake Macquarie cured and smoked fish, which they exported to Queensland and the Islands, and by land to the gold diggings, where it brought high prices. They made fortunes in a few years and returned to China. At first they contracted with the local fishermen to take all their catch at a flat rate of five shillings a bushel basket all round. including mullet, blackfish, bream or schnapper. As the usual daily catch was forty baskets giving a return of £10 a day the fishermen were quite satisfied. Before very long the Chinamen learned the technique of fishing, acquired their own boats, nets and gear, and dispensed with the local fishermen.

Two horse teams carted dried and smoked fish from Tuggerah Lakes to Terrigal for shipment to China.

Some years after the Chinese had left, a party of young fellows from Wamberal tried their hand at fishing, and followed along the lines set by the Chinese. Their camp was also at Picnic Point, where Bateman's vegetable garden was located. The venture was not successful, and these men soon returned to their timber getting.

Except for a few spasmodic attempts to smoke fish in later years, no further attempt has been made to cure fish like the Chinese had done, and almost the whole of the vast catches since have been sold fresh.

Early in 1886 a crew of about ten men with two large boats and heavy nets set up camp at Picnic Point. The management was divided between two men, who had been sailors, Andrew Johnson and Charlie Augustus. They got their catches to market by bullock team to Gosford and thence by boat to Sydney. Only first class fish - mainly schnapper, whiting, bream, flathead, tarwhine and jewfish - were marketed. Hundreds of baskets of common fish were tipped back into the waters

Bullocks were soon found to be too slow and later on these men shifted camp to Saltwater Creek and horses were used for carting the fish.

Saltwater Creek lies just north of the junction of the roads from Gosford and Wyong and is spanned by a narrow bridge.

Later, McLachlan Brothers came with a fine turnout of fishing gear. Their largest boat was named "Thistle". They also set up camp at Saltwater Creek and used horses for transport.

When the northern railway was opened all fish were railed to Sydney from Wyong. In 1894, fishermen from the Tuggerah Lakes - Tuggerah, Budgewoi and Munmorah - (some 25 boats and 70 men employed) - sent 14,358 baskets of fish averaging 80 lb to Sydney markets. ….

A small steamer made a daily trip each day from Wyong to the channel entrance to pick up the catches from the fishermen. This saved them the arduous trip up the Wyong River to the Wyong wharf and the trouble of railing the fish.

An independent fishing boat would come to Wyong wharf loaded to the gunwale with perhaps 40 baskets of blackfish. The crew would hastily clean and pack the catch in baskets and rush them on the little springless cart to the railway station to catch the 11 o'clock p.m. train to Redfern.

The nett return might only be 2/- to 3/- a basket but they considered that a fair return for a day's work.

Most of the fish from Wyong went to Redfern market while the catches sent by steamer went to Woolloomooloo.

The fishermen on Tuggerah Lakes were incensed at the regulations which limited their nets to 300 fathoms. As the waters of the lakes were shallow they were compelled to go at least half a mile from shore and so considered that nets of 600 fathoms were necessary. As official inspections were irregular they took the risk of a fine and generally used the longer nets. (Swancott 1963)

Fish, ducks and oysters at the Entrance early this century

"Fish and wild ducks were there for the taking, and oysters were readily available in the channel and along the lake between the channel and what is now Long Jetty." (memoirs of Raymond Taylor, a pioneer of the Entrance, born in 1892; reported in Stinson, vol 1, 1979)

Fishing Inspector at The Entrance - early 1900s

Fishing was a big industry in the lakes but it was never based on The Entrance, although the fisheries inspector lived here. He used an outrigger canoe and a sailing boat. This part of the lakes was closed waters and fishermen were not allowed to fish near here as their nets would frighten the fish from coming into the lakes. He had to see that the waters here were protected from netting, and to see that the fishermen used only legal-sized nets and caught only fish of legal size. (memoirs of Raymond Taylor, a pioneer of the Entrance, born in 1892; reported in Stinson, vol 1, 1979)

Lakes are celebrated for their fish - 1906

….The lake, or rather, series of lakes, for there are three of them, are broad expanses of water, forming an excellent fishing ground, some 30 boats, fully equipped with gear, operating from the mouth of the river where Messrs Bogan and Cremen's steam launch meets them, taking charge of the fish, and forwarding it, packed in ice, to all parts of the State. The lakes are celebrated for their fish, but to appreciate them at their best one has to visit the district to eat them. (The Town and Country Journal, May 23, 1906, reprinted in Stinson, vol 1, 1979)

Lakes abound in fish of almost every kind – 1907

A number of men are now engaged in the fishing industry, large quantities being despatched to Sydney and Newcastle daily.

The lakes consist of three distinct bodies of water (more correctly described as immense lagoons), known by the native names of Tuggerah, Munmorah, and Budgewah, and the three are connected with each other, and finally with the Pacific Ocean, by narrow channels. They abound in fish of almost every kind to be found along the Australian coast, …(from 'The Hawkesbury and North Coast Lake District', a 1907 Tourist Bureau pamphlet)

Heading north in the off season

Harry Herbert Denniss, the oldest living professional fisherman at The Entrance, was born in 1885 and came on the first train to cross the newly built Hawkesbury railway bridge to settle with his family in the Wyong district.

As a boy he worked as a billy-boy, mail boy and general messenger on the formation work at Norah Head in preparation for the building of the lighthouse there. At the time the only families in the Toukley district were the Cliffords, Duncans and Johnstons. Harry went fishing with George Johnston, the grandfather of Mr Percy Duncan in a 16 foot boat. Steamers then came to Cabbage Tree Wharf, Noraville, to take the fishermen's catches to the Sydney market.

In later years Harry used a 19 foot boat built by Tom Gascoigne from white beech hauled from Martinsville. If fishing was quiet at The Entrance and the wind was in the right quarter Harry and his mate would put up sail and head for Port Stephens.

Again in the off season, they would move over to Frank Charlson's camp at Toowoon Bay and use his boat for schnapper fishing. Frank always expected them and left his boat in the water for them.
(Charles Swancott 1963)

Walter Denniss, 1869-1939; a line fisherman unsurpassed

I can remember many people calling quite often to "have a yarn to Walter" over an engine problem or dredging a channel or some aspect of fishing or something of that nature. I can remember the many things that I was taught about boats, lines, bait, the habits of fish etc and I know from the general talk of the times that he was a successful fisherman although I cannot remember ever having seen him using a net. He was a line fisherman unsurpassed. He and my father used to fish at the entrance to the lakes all night and in the morning there would be jewfish up to 80+ lbs to be cleaned and sown into bags to send to the Sydney Markets where they would bring a pound. One job I had was to help untangle the lines and another was to catch the "going" bait – blackfish, longtom and whatever – he knew what the fish were feeding on and served it up to them. Some catches stand out in my mind among the many – a 17¼ lb flathead on a light line and small hook, catching blackfish at night when others could see them and couldn't make them bite – Pop could; and catching a jewfish over 100 lb – evidently the scales only went up to 100 lb. (recollections by Walter Clifford's grandson, in the Wyong and Lakes District Pioneer Register, 2nd edition. Wyong Family History group 1996)

Where they're biting - 1933

Fishing Notes - …The channel has been giving good sport, bream and whiting being the best. The Lake has been providing fishermen with good sport. Bream, red fish, flounder and whiting were on the bite, and 50 fish per party was a frequent tally. …(The Guardian, 18/3/1933)

Prawning at Toukley in the 1930s

My father and brothers would go prawning at night using a prawning net, hand held, 2 men at each end, and they carried kerosene hurricane lamps and large kerosene tins were filled with prawns most nights. These were cooked on a campfire on the beach. We always hired a boat from Press's boatshed at Toukley Point where the fish restaurant is today. We all took turns at rowing and caught plenty of delicious fish.. (May Stenner (nee Blade) recalling life in Toukley, presented by Gambrill and Gambrill 1991)

Prawning at Toukley

During the prawning season it was very colourful at night to walk down on to the beach and see all the twinkling lights from the lamps and torches, and there were plenty of prawns to catch and cook on the beach. The prawners used to cook their prawns in shallow tanks and they would box them ready to be taken to the market by the trucks. (memories of Stan and Daphne Hopkins who started up the Canton Beach Store after World War Two; Gambrill and Gambrill 1991)

Toukley in the late 1940s – good prawning and fishing

It was in November 1947 that Ron and I and our two sons moved to Toukley to take over the rundown Post office Cash Store. …..A good catch was always to be had when one went fishing, there was an abundance of prawns in the season … (Recollections of Raff Alt, reproduced in Gambrill and Gambrill 1991)

Greasy back prawn investigations by Professor Dakin and his assistants

"After Professor Dakin had first obtained our so-called <u>Metapenaeus monoceros</u> from Lake Illawarra, efforts were made over the years to procure further specimens of this species. We were successful in obtaining only a few specimens in the summer months of 1938-39 from Cook's River, Sydney. These were all sent to (Mr) Burkenroad, who stated they were also the "same as my 'Dana' <u>Metapenaeus</u> sp. n.". On the outbreak of war in 1939, this work was discontinued, but in February 1945, we discovered that these same prawns were forming the bulk of the commercial catch sent to the markets, and inquiry indicated that they were being caught in Tuggerah Lakes (three closely-connected lakes, Tuggerah, Budgewoi and Munmorah), 70 miles north of Sydney. Cooked prawns in which the gonads were fully mature were obtained from the Sydney Fish Markets. The prawns themselves were comparatively small, only 3 ½ to 4 inches in length.

It is characteristic of the shallow coastal lakes along the New South Wales coast to become silted up at the entrance and, especially in dry periods, to remain closed sometimes for as long as two years. It had been hoped to make a series of observations on the various Penaeid species under these conditions, particularly in view of the known habit of the group, in other parts of the world, of migrating to open ocean waters to breed.

At this time (early 1945) it was learned that Tuggerah Lakes had been closed for a period of approximately two years, and that the 'King' and 'School' prawns, by the end of the second year (the summer season of 1944-45) were scarce but very large. None however, was observed with any gonads. But the 'Greasy Backs' which, in that particular season, were very numerous, forming the bulk of the catch, all had mature gonads. This information seemed to fit in very well

with our theories regarding the three species concerned. By the time all these details were known, it was too late in the season to carry out any field work to obtain larval stages, but plans were made for an intensive effort for the next summer season (the months of November, December 1945 and January-March 1946).

Unfortunately heavy rains caused flooding in the lake backwaters during the autumn, and in May 1945, the entrance to Tuggerah Lakes was cut through and the lakes have not been completely land-locked since that date. This entirely altered the physical conditions within the lakes, but the work was carried out as planned.

Fishermen who tested the prawning grounds in the lakes stated that small prawns first began to appear in October, but these were well under regulation size (3 ½ inches). By November 1945, however, intensive fishing was being carried on with three species of prawns appearing in the catches – P. plebejus, Metapenaeus macleayi, and the so-called "Greasy Back". The two former were taken together, mainly in the largest lake, Tuggerah itself, and always at night. The "Greasy Backs" were generally caught alone in both Tuggerah and Budgewoi Lakes, and had a habit of shoaling during the day.

Many bulk catches were examined from different parts of the lakes and though a very careful search was made throughout the whole period of the investigation (1945-47) we were never successful in finding either P. plebejus or M. macleayi in the lakes with any signs of developing gonads.

From November to March, however, the "Greasy Back" females were very conspicuous in all catches because the gonads showed up as a dark green band along the dorsal surface of the abdomen. ….
(Morris and Bennett 1951)

Jellyfish hinder Professor Dakin's Research – 1940s
Another difficulty, accentuated by the opening of the lakes to the sea, was the seasonal influx of Coelenterates. Finally two types of cones which had the same diameter as the net and which fitted over the mouth of the net were used. One was made of flat galvanised sheeting with small holes punched all over it, and the other of small gauge wire netting. The guy ropes of the net threaded through a hole in the peak of the cone, the base of which was firmly laced to the ring of the net. The current set up by these cones as the nets were pulled through the water served, to a certain extent, to force the jelly fish out of the course of the net, and the holes and wire mesh permitted the net to catch smaller organisms. The method was quite successful when dealing with the large medusa, Catostylus mosaicus, but when the Ctenophores came into the lakes, all our efforts were practically useless. The surface waters were almost solid Ctenophora, which were so soft that the cones merely broke them and the nets became coated with a thick gelatinous slime…..(Morris and Bennett 1951; a scientific paper reporting on prawn research in Tuggerah Lakes in the 1940s by Professor Dakin of Sydney University.)

Prawn catches in NSW in the early 1950s
*The fall of production in 1951-52 (*for NSW*) appears to be due to an extremely dry summer and autumn period, a fact which shows its consequences even a season later in the absence of young prawns in estuarine waters. The following sharp rise of catches in ocean waters, however, is not only caused by favourable climatic conditions alone, but is also due to the exploration of additional offshore grounds and an increased number of operating trawlers.* (Racek 1957)

Prawn minimum legal size in 1957

In New South Wales the minimum legal size for green (uncooked) prawns is 3 ½ in. The minimum legal size of mesh for all types of nets in New South Wales is 1 ¼ in. (Racek 1957)

Daylight closure of prawning in 1950s

A diurnal closure in the Tuggerah Lakes, banning the commercial capture of prawns during daylight hours became imposed following cases of food poisoning caused by improper handling of the catch during peak production in the mid-forties. (Racek 1957)

Types of prawns

The estuarine (inside) area in New South Wales is usually inhabited in summer months by maturing to mature greasy back prawns (or greentails), together with immature king prawns (Penaeus plebejus) and school prawns (Metapenaeus macleayi). The greentail (Metapenaeus mastersii), an inside breeding species, is usually present throughout the year, although its appearance is somewhat irregular. King prawns and school prawns are temporarily present in this area from postlarval stages in the late autumn to adolescent stages of an average body length of 3 ½ inches in mid summer of the following season, when they leave the inside area on their spawning run to ocean waters. The school prawn, an early spawner, usually leaves the estuaries first, followed by the king prawn. Their spawning migrations take place usually during the outgoing tide at nights with decreasing moon phases. (Racek 1957)

Problems of the fishery – vulnerability of greasyback stocks.

It is a peculiarity of the Australian prawn fisheries that, in spite of the constant growth of the offshore fishery, the commercial exploitation of inside (estuarine) stocks remains intensive. Fishing intensity is particularly high in the larger coastal lakes of New South Wales, where numerous professional fishermen are operating throughout the prawn season. Precautions will have to be taken therefore in order to ensure the continuity of the stock of inshore greasy-backs on estuarine grounds. This species is essentially an inside breeder, and usually completes its whole life cycle in the same estuarine habitat. Since the replenishment of its inside stocks by larvae bred in ocean waters is negligible, and in view of the accessibility of the shallow estuaries it is evident that excessive and unrestricted fishing activities can have disastrous effect on the survival of this particular species.

There is statistical evidence that the production of greasy-back prawns has rapidly declined in the Tuggerah Lakes, Lake Macquarie, and Lake Illawarra since the first available information in 1937. During the recent investigations, the abundance of greasy-back prawns in Tuggerah Lakes was found to be very low, and this species was present in appreciable numbers only in the upper two lakes (Budgewoi and Munmorah). Their appearance in Lake Illawarra in recent years has been extremely irregular, and a very similar condition was found to prevail in Lake Macquarie.

Considering the excellent edible quality of freshly cooked greasy-back prawns it would be a regrettable fact if these formerly abundant stocks should disappear from the estuaries mentioned because of unrestricted exploitation. Since the greasy-back is an early spawner, a closed season for this species between October 1st and December 15th should be effective in safeguarding the mating and spawning activities of the majority of its present population. Such a protective measure would not only counteract a further reduction in the supply of this species, but it also would enable the greasy-backs to compete successfully with the present inside stocks of offshore spawners. (Racek 1959)

Fishing in the early 1960s

Professional fishing is carried on in the main by descendants of the people who pioneered the area back at the turn of the century Prior to recent legislation, 300 licensed fishermen were operating within the area. Fish and prawns taken from the lakes are handled by the co-operative society with premises situated at Tacoma on the banks of the Wyong River. Local sales are made from this depot and the balance is forwarded to Newcastle or Sydney or further afield as the market warrants. Tuggerah Lakes is one of the best prawning spots on the coast and annually record catches are made. (Swancott 1963)

Fishing at Canton Beach - 1962

Bream, flathead and whiting are usually plentiful off the foreshores and it is not uncommon for bagfulls of fish to be caught here. Canton Beach is famous for prawning and it was here in the early days that Chinese 'chowed' or dried prawns for export to China – hence the name Canton Beach. About 300 yards from Canton Beach is a spot known as "The Step". Here flathead, whiting and bream in good size and quantity are taken most of the year. (Swancott 1963)

Fishing at Toukley - 1962

Throughout the lakes there are many fishing spots but one of the most popular is at Toukley Bridge, either from a boat or the bridge, or rocky foreshore. Here all classes of estuary fish are taken in large quantities. Black bream, tailor, flathead, mulloway, whiting, luderick and flounder are caught. (Swancott 1963)

Fishing and prawning at Long Jetty - 1962

Best prawning in the district is to be had at Long Jetty, due to its wide expanse of sandy bottom. There are three jetties there, and cars can be driven right to the water's edge. Here tourists may use a 20 foot maximum length drag-net for prawning without fear of infringements of fisheries regulations, provided the net is 1½ inch mesh and you have paid your 7/6 registration fee at the Fisheries Inspector's residence at 7 Gosford Road , The Entrance, a few doors from Pinehurst Guest House, which is located approximately 200 yards from the bridge at The Entrance.

Long Jetty is also one of our best whiting spots and, just off the end of the jetties in the deepwater channels, bream, flathead and flounder can be caught. If you have a launch, cruise well out into the centre of the lake and you'll pick up good flathead on the drift. It is not such a long row out to a channel peg with a yellow 44 gallon drum seated on it, and by kellicking on the edge of the weeds there and fishing into what is known as "The Flats", some good bream can be picked up, also big whiting.

Remember, also, the harder a southerly wind blows, Long Jetty, is the only place where you'll get prawns in great quantities with your dragnet.

The lake fronting the grounds is shallow with a sandy bottom and is ideal for children. (Swancott 1963)

Disappearance of jellyfish in the early 1970s

The jellyfish C<u>atostylus mosaicus</u>, which was once so abundant as to block cooling water screens (Pulley 1971) has virtually disappeared from the lakes since 1974 (J Bell, pers. comm.). (Extract from page 6 of Batley <u>et al</u> 1993, Report by CSIRO entitled "The ecology of the Tuggerah Lakes System – Stage one.")

Fish kills at Munmorah Power Station – 1970s

A number of fish kills in Budgewoi and Munmorah Lake in the 1970s have been attributed to the operation of the Munmorah Power Station. The NSW State Fisheries departmental files (73/3881) record that dead bream and silver biddy were found around the outlet canal area of Budgewoi Lake in mid November 1972 and that there was a strong smell of chlorine in the neighbourhood at that time. The Sydney Daily Mirror newspaper of the 13th November 1972 reported that "two truckloads of dead fish have been taken from Budgewoi Lake in the past few days." The cause of the fish kill was not ascertained but it seems likely that the kill was a result of an excessive amount of chlorine in the discharge waters.

In more recent years the Munmorah Power Station has only been using chlorine on an intermittent basis and there has been no evidence that this chlorination programme has been harmful to prawns or fishes. …..

In mid December 1975 the outlet water temperature frequently exceeded 34 C and rose to a high of 36 C, according to the station's temperature records, and on the 15th December dead and dying bream were seen on the water's surface in the outlet canal. At that time "cool water" was being pumped from the inlet canal to the outlet canal to try to lower the water temperature in the outlet canal and thereby reduce fish mortality. In view of the observations cited above and Clark's experimental studies (referred to earlier in the report) it seems likely that this fish kill was a result of the high water temperature in the outlet canal.

It is remarkable that almost exactly a year later (14th December 1976) approximately 10 tailor of about 4 kg average weight were sighted floating in the outlet canal. Very little is known about the thermal tolerance of tailor hence it cannot be concluded that this fish kill was due to heat stress but the possibility cannot be ignored.

It should be noted that dead prawns sink (and presumably are quickly consumed by fishes and other predators) and consequently any mass mortality of prawns in the outlet canal, should it occur, would normally go unnoticed. (from Ruello, 1978, "Report on studies on the impact of the Munmorah Power Station on the Tuggerah Lakes Prawns and Fishes, prepared on behalf of NSW State Fisheries.)

Amateur Prawn Catch – 1970s

Amateur prawning activities are carried out in The Entrance, Long Jetty, Canton Beach, Budgewoi beach and Elizabeth Beach. The methods employed by amateur prawners include a dip or scoop net and a licensed 3 metre hauling net. Individual catches exceeding 30 kg per night are not uncommon, and up to 3,000 prawners have been observed fishing in Tuggerah Lakes on a single night. Clearly the total catch and the economic value of the Tuggerah Lakes amateur prawn fishery is considerable. (Inter-Departmental Committee Report, 1979)

5 Fisheries Records – Annual Reports

Catch statistics summarising the commercial fisheries of New South Wales are available in annual reports published by NSW Fisheries from 1883 onwards. Records prior to this date were destroyed in a fire in 1882 (Henry and Virgona 1980). For the Tuggerah Lakes, the early reports (prior to 1940-41) provide information on the total quantity of fish and prawns caught as well as additional information on the types of nets used, the number of licensed fishermen and boats, and on occasions they describe the conditions of the lakes, in particular whether the entrance channel was open or not. From 1940-41 the format of the reports changed and they started to provide catch statistics for each species.

5.1 Limitations to the catch data.

The annual fish catch data contained in the annual Fisheries reports have a number of limitations which restrict the amount of analysis and interpretation that can be undertaken. The main limitations are described below;

1) Most data prior to 1941 was collected from the agents at fish markets in Sydney and Newcastle, although the fishing inspector also obtained monthly returns from the local railway stations (Tuggerah, Wyong, Wyee). On occasions, the fishing inspector also included an allowance for fish sold locally. Sometimes there are small discrepancies between the data from the markets and the data collected by the inspector. From 1941 onwards, the data was collected from the monthly returns submitted by each licensed fisherman. Unfortunately this data tended to be unreliable as many fishermen would deliberately understate their catch and others would not submit a return at all. (see addendum to the 1955-56 annual report). In some years there has also been a significant trade of fish on the black market (ie not through the Co-ops and Fish Markets) and this fish would not be reported by the fishermen.

2) During the period 1940-41 to 1954-55 the inshore ocean catch was not reported separately from the estuarine catch. For the Tuggerah Lakes this is not a major problem since there was only a small amount of ocean fishing occurring in this district. However, there are some oceanic species, such as tailor and snapper that might include a significant proportion of outside catch in their data for these years, and care should be taken when interpreting this data.

3) It is difficult to determine from the data if fluctuations in fish production are due to changes in fish stocks or fishing effort. A sudden drop in the catch of mullet, for instance, might be caused by either a decrease in abundance or a drop in market price (and hence less fishermen targeting the species). Other species, such as silver biddy, might not have been targeted in previous years, and the increase in the quantity caught simply reflects the change in market demand.

4) Fishing practices and gear have changed. For instance, the boats are now faster, the nets are lighter and require less maintenance. In early days, crews of 4 to 6 fishermen were needed to haul the nets in by hand and they would also need a couple of days per week for net maintenance. Today many fishermen work by themselves, have motorised winches, and can work 7 days a week if they wish.

5) Changing regulations can greatly influence the type and quantity of fish that can be caught. The restrictions on minimum fish sizes, mesh sizes, net lengths and the types of nets, have all changed from time to time. For instance, the minimum legal prawn size was increased from 3 inches to 4 inches at the end of 1951 and this greatly reduced the catch for that season. The areas within the Tuggerah Lakes that are closed to commercial fishing have also changed periodically and this too can affect the fish catch.

6) There is a significant fraction of the total fish and prawn catch taken by recreational fishermen and little data is available regarding this. There is also no information about how it might have changed over the years.

Despite these limitations, the annual catch data can still provide some valuable information. A summary of some trends for the Tuggerah Lakes are provided below.

5.2 Total finfish catch

The total finfish catch for the period 1886 to 1996-97 is presented in Figure 2. There is a steady increase over the period 1886 to about 1915, which possibly reflects an increase in the number of fishermen and boats working on the lakes (Figure 3) and the introduction of improved fishing techniques (such as the introduction of motorised boats). The catch fluctuates through the 1920s and 30s, and then suffers a sharp decline in the 1940s (unfortunately the data for the years 1942-43 and 1943-44 are not available). The total catch dropped to its lowest point in 1951-52 (which coincided with changes to the minimum legal sizes for a number of species, including mullet) and then rose steadily until the mid 1960s. Through the 1970s and 80s it fluctuated considerably, and then reached a peak in the late 1980s followed by a decline in the 1990s. A similar trend has been observed for estuarine production on a coastwide basis from 1954-55 to 1991-92 (See Figure 32 of Pease and Grinberg, 1995).

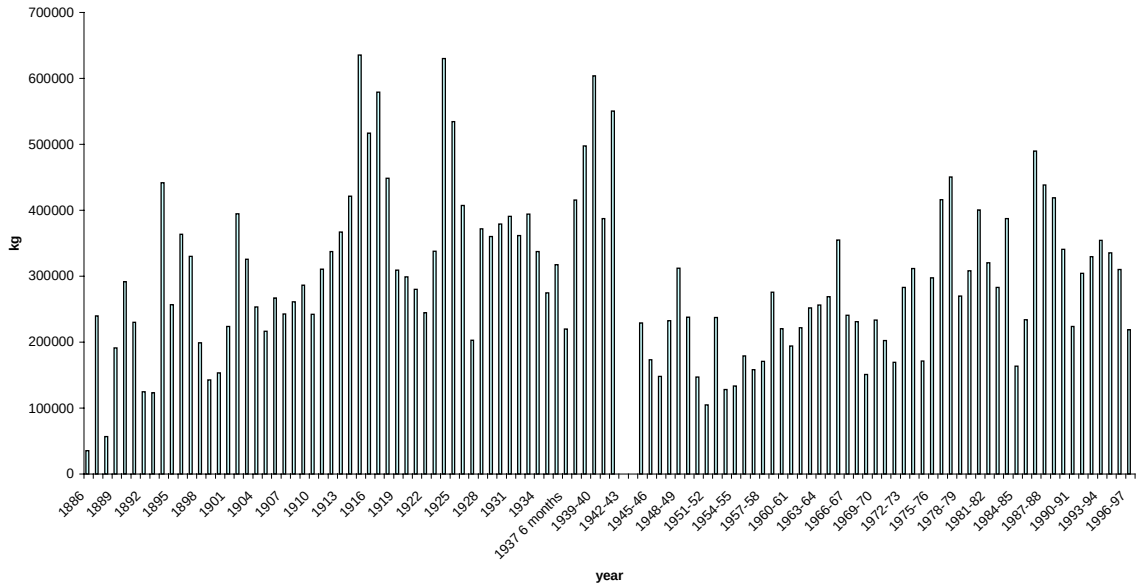


Figure 2. Tuggerah Lakes finfish catch 1886 to 1996-97

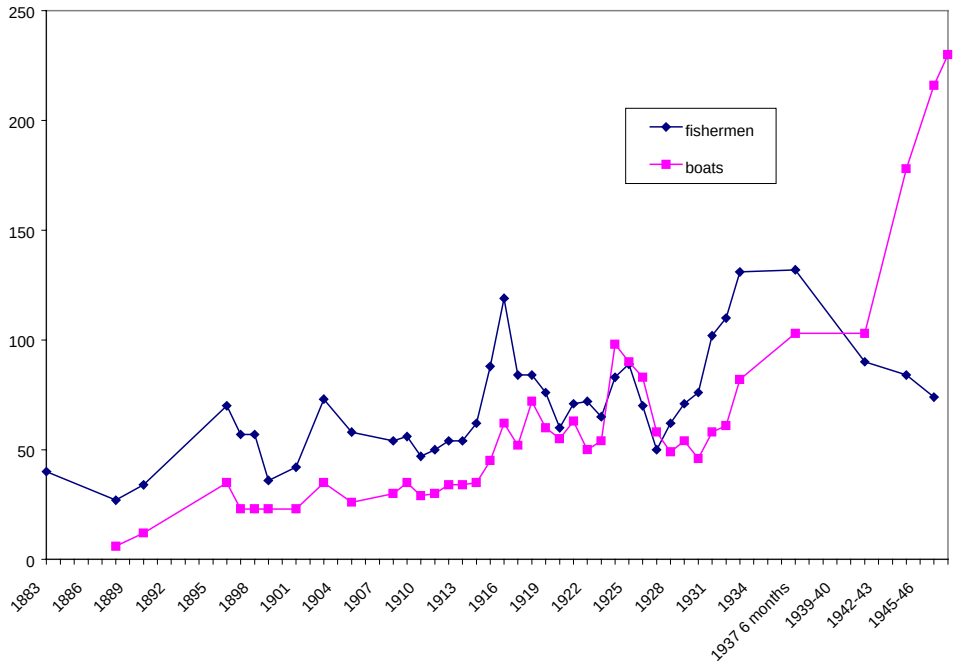


Figure 3. Number of licensed fishermen and boats on the Tuggerah Lakes between 1883 and 1946-47.

5.3 Trends for the major finfish species caught

The types of fish caught in the Tuggerah Lakes changes from year to year depending on conditions within the lake, in particular the amount of weed (seagrass and algae) and the size of the entrance channel. However, on a long term basis, there has been little change. The same species made up the bulk of the catch one hundred years ago as they do today, as shown in Table 2. The major species continue to be mullet, blackfish and bream. One species that does appear to have declined in importance is the garfish. In the 1890s and 1900s this fish was generally ranked between 3rd and 4th in quantity caught. In 1890 it was estimated to make up 15% of the total catch. In the 1990s however, garfish was only 0.3 to 1.6% of the catch, which ranked it between 5th and 9th most plentiful species caught.

Table 2. Common fish species caught in Tuggerah Lakes

Ranking	1890	1901	1903	1905	1908
1	Mullet (30%)	Mullet	Bream	Mullet	Mullet
2	Blackfish (20%)	Bream	Mullet	Blackfish	Blackfish
3	Bream (15%)	Blackfish	Blackfish	Bream	Bream
4	Garfish (15%)	River garfish	Garfish	Garfish	Garfish
5	Jewfish (10%)	Flathead	Whiting	Whiting	Whiting
6	Whiting (5%)	Whiting	Flathead	Flathead	Flathead
7	Flathead (5%)			Schnapper	Schnapper
8				Jewfish	Sole
9					
10					

Table 2 continued

Ranking	1940-41	1947-48	1957-58	1965-66	1979-80
1	Mullet (67%)	Mullet (44%)	Mullet (34%)	Blackfish (40%)	Mullet (73%)
2	Bream (18%)	Bream (14%)	Blackfish (28%)	Mullet (33%)	Bream (8%)
3	Blackfish (4%)	Whiting (11%)	Bream (12%)	Bream (9%)	Flathead (5%)
4	Leatherjacket (2%)	Snapper (6%)	Garfish (9%)	Leatherjacket (6%)	Whiting (3%)
5	Flathead (2%)	Leatherjacket (6%)	Flathead (8%)	Flathead (5%)	Blackfish (3%)
6	Whiting (2%)	Flathead (4%)	Leatherjacket (4%)	Garfish (4%)	Silver Biddy (3%)
7	Garfish (1%)	Tailor (4%)	Whiting (1%)	Whiting (1%)	Garfish (2%)
8	Tailor (1%)	Blackfish (3%)		Tailor (1%)	Tailor (1%)
9	Snapper (1%)	Garfish (3%)			
10					

Ranking	1992-93	1996-97
1	Mullet (44%)	Mullet (46%)
2	Bream (22%)	Bream (15%)
3	Blackfish (13%)	Flathead (14%)
4	Flathead (9%)	Whiting (8%)
5	Whiting (3%)	Blackfish (7%)
6	Silver Biddy (3%)	Silver Biddy (4%)
7	Tailor (1%)	Garfish (2%)
8		Tailor (1%)
9		
10		

(Note: % of total catch is shown in brackets when this data is available)

Figures 4 to 12 show the catch data for some of the more important fish species from Tuggerah Lakes. Bream (Figure 4) and flathead (Figure 5) show considerable variation throughout the period, with peak catches reported in the 1990s. The garfish catch (Figure 6) shows a peak in the late 1960s and 70s followed by a decline, particularly in the 1990s. The blackfish catch was very low in the 1940s and 50s and increased dramatically in the 1960s and 70s, presumably when there was an increase in abundance of plant growth in the lakes (the principal food of blackfish is seagrasses and algae). Another increase in catch occurred in the late 1980s and early 90s when there was a large amount of algae present. Mullet (Figure 8) shows a significant increase in catch from the late 1970s onwards. Sand whiting (Figure 11) shows a sudden increase in catch in the late 1970s and early 80s and another peak in the 1990s. The abundance of this species tends to increase when the entrance channel becomes larger. The trumpeter whiting catch (Figure 12) is generally very low, but sudden peaks occur from time to time, such as the late 1950s and once again in the 1990s.

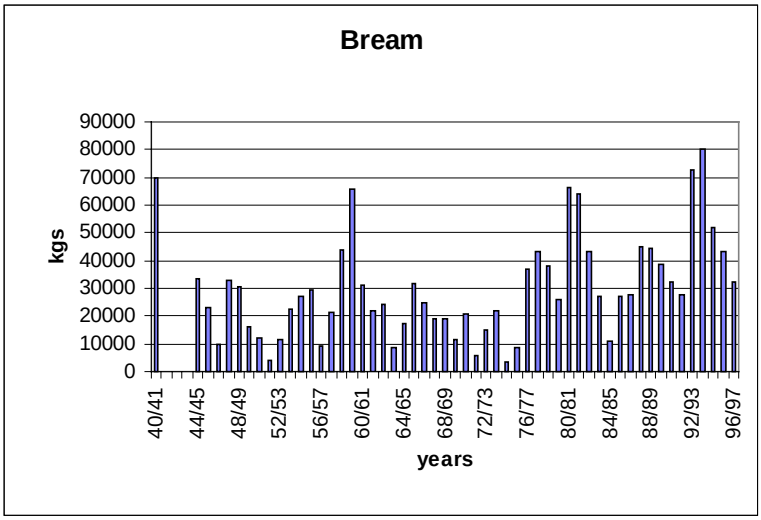


Figure 4. Catch data for bream, 1940/41 to 1996/97

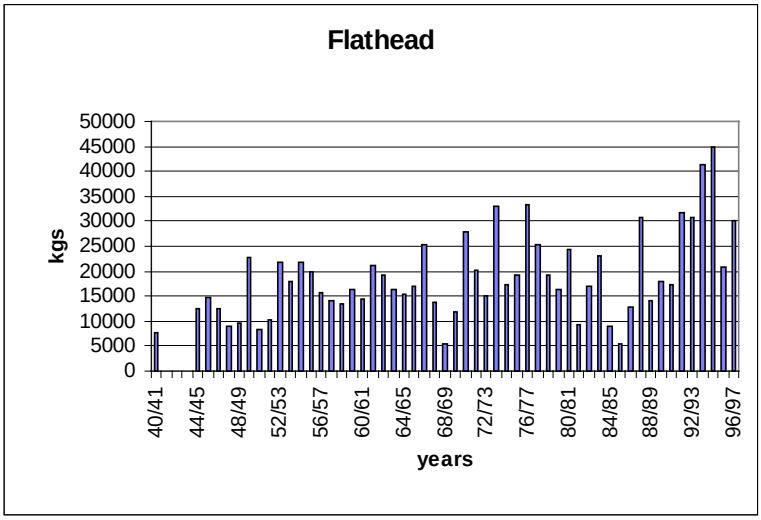


Figure 5. Catch data for flathead, 1940/41 to 1996/97

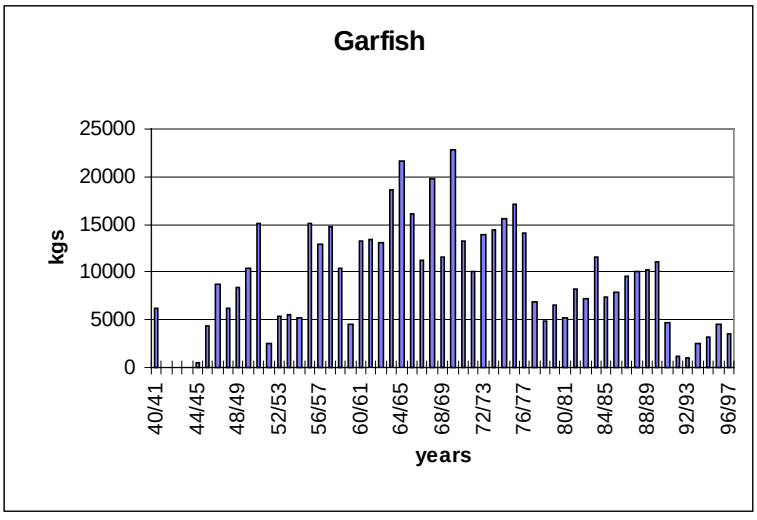


Figure 6. Catch data for garfish, 1940/41 to 1996/97

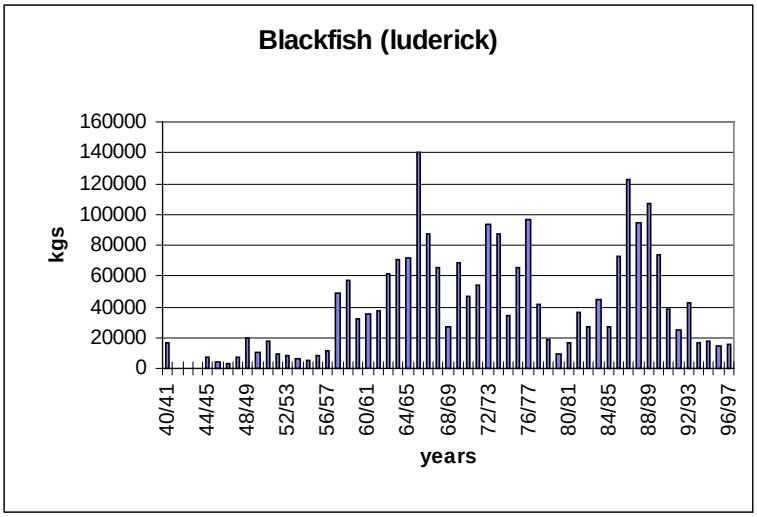


Figure 7. Catch data for blackfish, 1940/41 to 1996/97

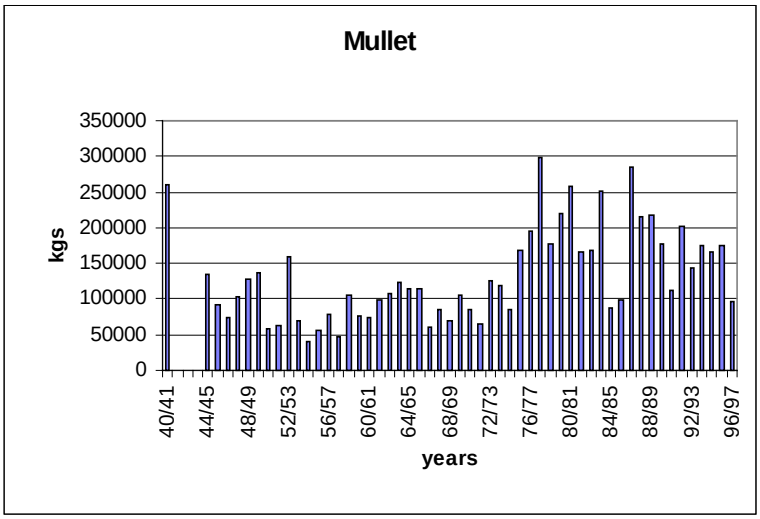


Figure 8. Catch data for mullet, 1940/41 to 1996/97

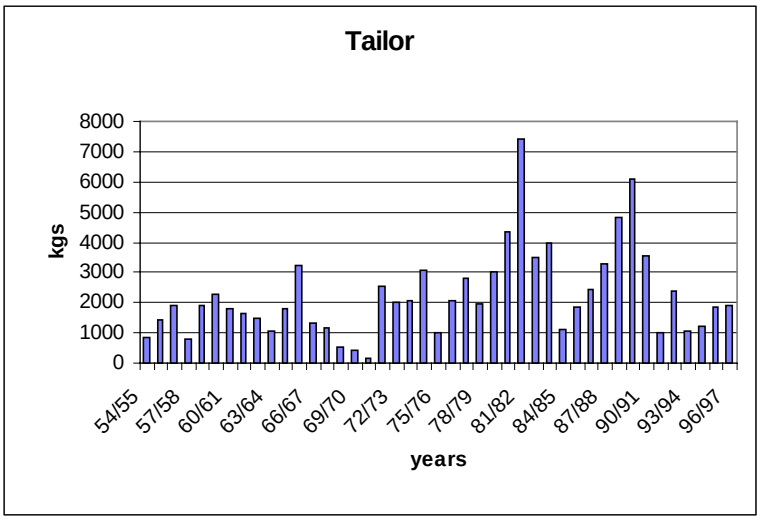


Figure 9. Catch data for tailor, 1954/55 to 1996/97

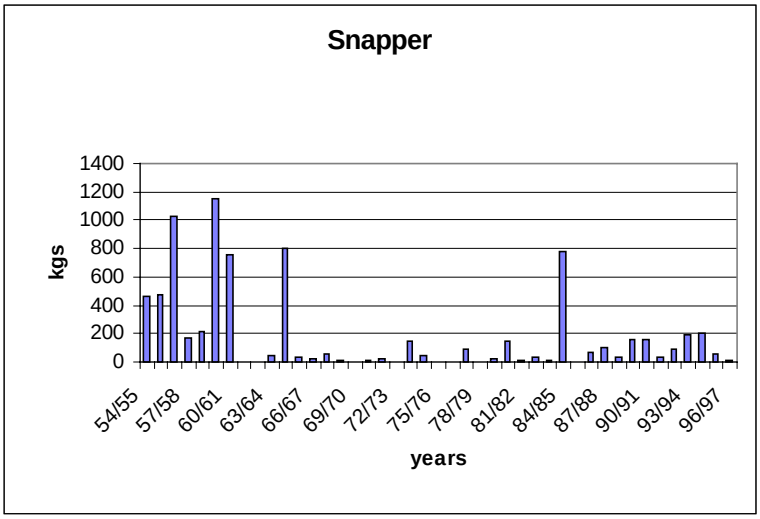


Figure 10. Catch data for snapper, 1954/55 to 1996/97

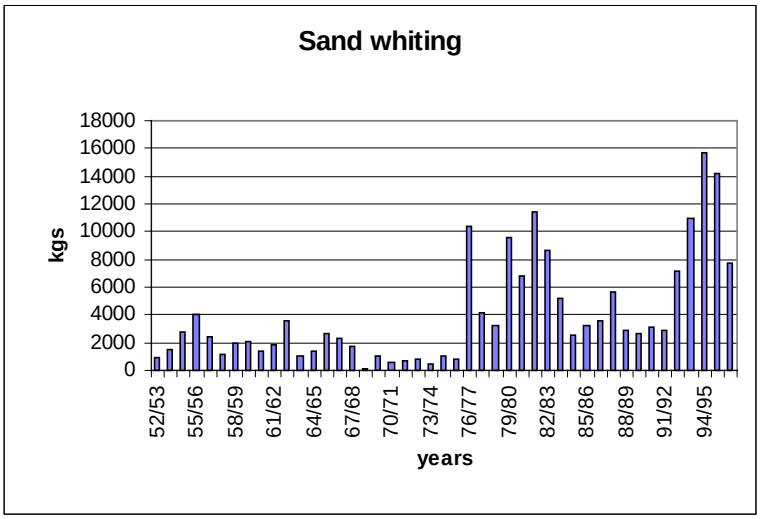


Figure 11. Catch data for sand whiting, 1952/53 to 1996/97

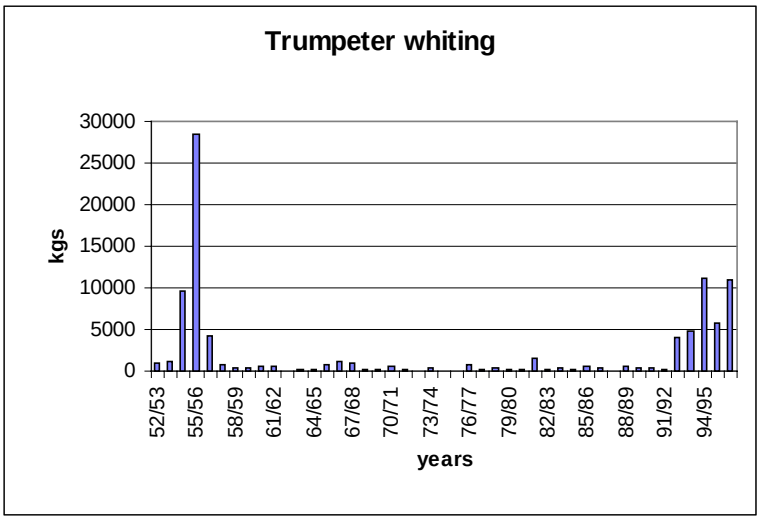


Figure 12. Catch data for trumpeter whiting, 1952/53 to 1996/97

5.4 Total prawn catch

The total prawn catch is shown in Figure 13. Prawns were caught and dried by Chinese fishermen in the mid to late 19th century, but there are no records of the quantities. The first records in the Fisheries Annual reports are in the early 1900s when fishermen started to send fresh prawns to the Sydney and Newcastle markets. Prawning increased in popularity through the 1920s and 30s and the official catch reached a peak in the 1940s. There was a sharp decline in the prawn catch in the early 1950s which coincides with a general decline along the NSW coast and the introduction of stricter regulations. Apart from a couple of exceptional years, from the 1950s onwards the official prawn catch has not been able to reach the peaks of the 1940s.

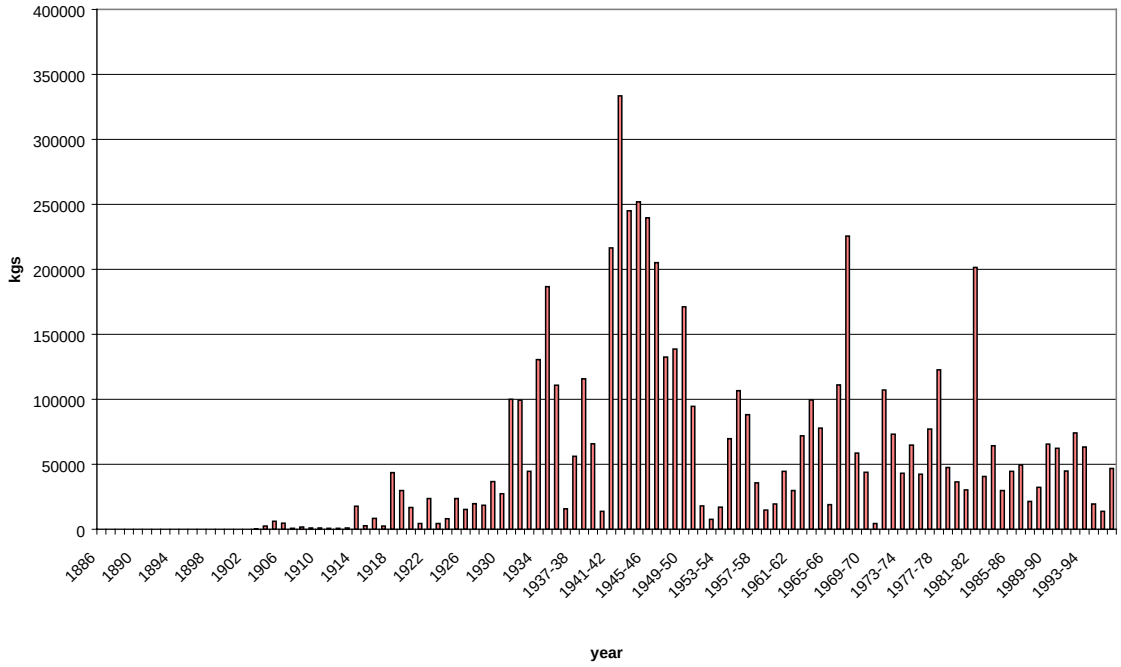


Figure 13. Annual prawn catch for Tuggerah Lakes – from NSW Fisheries data

Note; In the annual Fisheries reports, different units of weight have been used throughout the years. Initially 'baskets' were used. A basket of fish was approximately 70 lbs (but could range between 60 and 90lbs) and a basket of prawns was 60lbs. Later, the imperial units 'pounds' (lbs) were used, and finally the metric units of 'kilograms' (kgs) were introduced.

5.5 Other information in Fisheries Annual Reports

The Fisheries annual reports from the late 19th century and early 20th century also contain some other interesting notes about the Tuggerah Lakes. These include:

- The blocking of the entrance channel by sandbars for up to 18 months at a time and the subsequent opening either by floods or by dredging;
- The presence of large schools of fish either in the lakes or offshore;
- The silting at the mouth of the Wyong Creek;

- A few references in the 1880s and 90s to weed or 'slime' in the lake, generally in relation to the interference with nets;

- Occasional comments about large quantities of blubber in the lake (for example, see reports from 1892 and 1905);

- The state of an oyster lease at the North Entrance;

- Problems with large numbers of shags (cormorants) eating the small fish in the lake, and the subsequent shooting of them.

5.6 Extracts from Fisheries Annual Reports

1883 Annual Report

Appendix I

The Secretary of the Fisheries Commission to Mr E.J. Hargraves

Fisheries Office, Sydney, 27 October, 1883

Sir,

Referring to your letter dated 22nd instant, I am desired by the President of the Fisheries Commission to say that, from a piscicultural standpoint, he regards the Tuggerah Beach Lakes as of the greatest possible interest and importance; and holding this view, he will be extremely obliged if you will favour him as far as you conveniently can with replies to the following queries: -

1. *For what period had the lakes been closed from the sea?*
2. *Prior to their being opened, had the water become very fresh?*
3. *By letting out the water, how many feet have the lakes fallen?*
4. *Are the lakes now fully subject to tidal influence?*
5. *Can you suggest any means of permanently preventing the outlet from being again blocked?*
6. *Before the water was let out did you notice any young fish of those species which you know are common to the sea – such as mullet, black bream, flathead &c., in the lakes?*
7. *Have you any idea if schnapper were enclosed in the lakes, and if they lived till the water was let out?*
8. *As far as you observed, were the fish at all diseased through having been so long pent up?*
9. *Have you noticed if fish are now entering the lakes from the sea?*

It is desired to ascertain by this accidental experiment if our ordinary sea-fish will live and breed in artificial waters and be commercially profitable; and if you can supply information on the points raised in the forgoing queries you will confer a great favour on the Commissioners.

I have, &c.,

Lindsay Thompson,

Secretary

Mr EJ Hargraves to The Secretary of the Fisheries Commissioners

Noraville, 11 November, 1883

Sir,

Referring to your letter of the 27th ultimo, inviting information on the following queries, I can say in answer to No.;

1. *That the lake has been closed for a period of eighteen months.*
2. *The water about the foreshores and flats was brackish, but the water in the lakes, as a whole, salt. This is my opinion, and I am supported in it by the men now fishing here.*
3. *About 3 feet.*
4. *Yes*

5. *There are a few rocks visible at low water in the channel of the entrance, and if these were blown up with dynamite I think it would not be so likely to silt up again.*
6. *I noticed more young mullet, whiting, and bream in the lake last January and February than I had at any time for the last twenty-two years, in fact for miles along the shores just at dark the water was alive with them, and it was no trouble to shoot as many as six to eight mullet at one shot about one foot long.*
7. *I know for a fact schnapper were enclosed in the lake, as just after it was closed I caught many very large ones, and the fishermen have caught at times for the last five months as many as three to five baskets during the night in their nets; and only a fortnight since I knew of fifteen fine ones caught with a line, and attended to them myself.*
8. *I found no sign of disease, but remarked how thick their tails were, and thought at the time they were more like the outside sea schnapper, or improved lake schnapper, I cannot say; but the quality splendid and thoroughly healthy.*
9. *I have not noticed, but have been informed that large quantities of mullet were seen coming into the entrance about ten days since; but as this is not the season for mullet to travel the fishermen think these are mullet returning that went out with the fresh.*

Since the entrance has opened the men have caught a quantity of Long Toms, but for the previous five months did not take a single one; and from this fact, I have no doubt that fish are entering the lake; besides, the fish are as plentiful to catch now as the day the men commenced to fish, viz., the 6th June last.

I have not to present time been able to make convenient to see the people who let the entrance out and get their signatures to the vouchers you sent me, but will try and do so this week.

I have &c.,

E.J. Hargraves

1884 Annual Report

Tuggerah Beach Lakes. – These lakes are situated about 2 miles inland from Bungaree Norah where a small steamer calls for consignments of fish, the fish are carted overland to the steamer and arrive at the markets early in the morning; as a rule the fish are in good condition; at times however, the weather prevents the steamer from calling, and great loss is occasioned by the fishermen.

These lakes abound with fish of all description, including squire or young schnapper. Fish have a peculiar smoky flavour from these waters; I attribute this to the feed, which on account of the stillness of the water, having little if any rise and fall of tide, the entrance being very narrow, cannot get away to make room for younger growth.

Oysters are not found in these waters. These fisheries are not under the supervision of a local Inspector. I paid a visit during the latter part of the year.

James Quinan, Inspector, Home Division of Fisheries

1886 Annual Report

Appendix E

Return showing quantity, in baskets, of Fish brought to the Fish Market, Woolloomooloo, January to December, 1886 (only Tuggerah Lakes figures have been included).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Tuggerah Lake	28	-	-	-	-	8	426	365	294	-	-	-	1,121

1887 Annual Report

Tuggerah Beach Lakes:

….During the last year they were not netted, except in certain months, but in those months they maintained their celebrity for fish supply. Regarding the importance these waters possess as breeding grounds and nurseries, we have bestowed much attention upon them.

We think that the temporary prevention of netting has been beneficial; but if the tributaries and entrances to the lakes can be protected against the use of fishing nets, we think it probable that the main water may be kept available for fish capture unimpeded by further restrictions.

Appendix E
Return showing quantity, in baskets, of Fish brought to the Fish Market, Woolloomooloo, January to December, 1887 (only Tuggerah Lakes figures have been included)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Tuggerah Lake	-	-	-	194	1,435	836	820	879	824	946	759	841	7,534

1888 Annual Report

Report on Tuggerah Lakes Fisheries, 1888

Tuggerah Lakes, 31 December, 1888

Fishing operations have been very extensive. The fish were principally netted in Tuggerah Lake and Budgewoi. There was not sufficient water to allow the boats to go into Manmora (sic.) Lake. It has supported from twenty-six to twenty-eight men and six boats, and produced a total for the year of 1,780 baskets, consisting principally of small schnapper, mullet, gar-fish, bream, tarwhine, whiting, and other varieties.

Large quantities of schnapper have been caught off the entrance to Tuggerah Lakes.

The lakes themselves are in a very dirty state owing to a slimy weed which is very destructive to the nets. I do not expect improvement until a flood occurs.

All creeks abound with fish, and every precaution has been taken to prevent the destruction of immature fish.

W.N. Cain,
Assistant Inspector

1889 Annual Report

Tuggerah Lakes and Brisbane Water Fisheries:
The condition and prospects of the fisheries (fish and oysters) under my supervision are – plentiful in Tuggarah (sic.) Lakes and Brisbane Water.

The principal fish entering Tuggarah Lakes are, namely:- The mullet, garfish, tailor and bream, and other varieties which are only suitable for preserving purposes. ….

Tuggarah Lakes and Brisbane Water are not suitable for trawling. I wish to draw attention to the Italians working their sunken nets, which are very destructive to small fish.

The quantity of fish from Tuggarah Lakes and Brisbane Water for the ending of the year 1889:-

From Tuggarah Lakes	*5,467 baskets*
From Brisbane Water	*1,049 baskets*
Forwarded to Ryde and from Tuggarah lake	*279 baskets*
The quantity of smoked fish and cured	*9 tons 12 cwt*
Oysters for the year 1889	*121 bags*

W.N. Cain
Assistant Inspector of Fisheries

Extract of report from the Chief Inspector of Fisheries during a visit to Wyong in 1889

"…At Wyong Railway Station, I took occasion to note the means provided by the Railway for the transit of the fish, and think they might be improved upon. At present the fish are conveyed in the break van, no less than 84 baskets being so conveyed the night I left Wyong …."

Appendix I

Return showing the quantity of Fish (in baskets) brought to the Fish Market, Woolloomooloo, January to December, 1889.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Tuggerah	145	135	245	201	412	445	628	1,007	832	672	742	543	6,007

Memo by The Chief Inspector of Fisheries – Report, Tuggerah Lakes Heads

On my return from Lake Macquarie, I visited Tuggerah Lakes Heads, and on reaching them found a fishing net, consisting of a garfish bunt, on the shore, attached to a stake. It had evidently been used, and was so fixed that it could be used again at any time. I instructed Inspector Gordon to take the net to Wyong, and to return it to the men with a warning, but up to the present time no one has claimed it, although it is alleged to belong to one Etherington…….. On premises at the lake entrance some three or four nets were hung out to dry, and, doubtless, are being used in closed waters. There is, however, no proof of this, and it is next to impossible, except, perhaps by a system of continual watching to detect offenders. In another report I have recommended further supervision for this water, and if the Commissioners adopt the recommendation the oversight of the closed waters at the heads should be specially looked to. The boat allotted to Inspector Gordon for oversight of the lakes is absolutely useless for this purpose.

Lindsay Thompson
Chief Inspector of Fisheries

Extracts from minutes of evidence taken before the select committee, July 1889

(The person being interviewed is W N Cain, Assistant Inspector of Fisheries.)

How is the fish sent to Sydney? It is carried from Wyong to the railway station, and from there to Sydney.

Did it previously come by water? Yes

Does much fish come from there? The last account I think was over 1,000 baskets. On an average there are thirty-four men working there. They require six baskets each per week to make it pay, so that would give 204 baskets a week …..

Do you know anything about the habits of the fish? The small fish in Tuggerah Lakes want a great deal of looking after. It is a great place for young fish. The Commissioners did one good thing in closing all the rivers. Whenever there is a flood they come down with a rush. They go right up to the fresh water in the creeks, which are great nurseries for them.

Do you know anything of the migratory fish, such as the sea-mullet? Yes

At what time of year do they go into the lakes? Generally about March. There have been very few this year, because the lakes have not been opened. Now, all kinds of fish are coming in; fish that were never seen in the lakes before.

[Mr Stephen] Is there a portion of the lake closed against fishing? Yes

Is there a closed season at any particular time of the year? I do not see why they want to close the Tuggerah Lakes at all. In any of the creeks they cannot use a hauling net; they must use a meshing net from one side of the creek to the other. I do not see that it would require to be closed at all.

Then you believe it is unnecessary to close any portion of the Tuggerah Lakes? Yes; while the entrance is half a mile wide the fish can come and go in and out as they like.

Is the entrance closed during some portion of the year? It has not been closed since we had a gale of wind lately. Sometimes it is closed.

Can the spring tides flow in at any time? Yes; if a boat comes close to the entrance there is such a strong tide that they cannot fish there.

If the small fish are hauled up on shore does it not do them a great deal of damage even if they are put back into the water? Yes; if they are hauled on shore not one half of them will live if they are put back in the water.

What is your reason for believing that nets 450 or 500 yards in length should be used on Tuggerah Lakes? The men would not then have to make so many hauls as they have to make at present. They might just as well be allowed to make one haul as to make three or four hauls. With nets only 300 yards long they require to have very long lines.

Do you believe that the same length of net should be allowed on all fishing grounds as you recommend for the Tuggerah Lakes? No. I think that 300 yards is rather too long for Brisbane Water.

Why do you think that 300 yards is long enough for Brisbane Water? The tide is very strong there and the fishermen have not got such long places to haul as they have at the Tuggerah Lakes.

Can you suggest any remedy for the stealing of fish while in transit to the market? I am afraid that the remedy I would suggest would not pay. I think that every fisherman should have his fish-baskets locked; then when they arrive at the market they could be unlocked by the agents.

(The exact origin of this extract is not known. This copy was obtained from Wyong Historical Society, file No. A227)

1890 Annual Report

Tuggerah Beach Lake Fisheries

30 December 1890

……The present prolific supply from the Lakes is due entirely to the closures which have hitherto been maintained; those restrictions being now removed, and fishermen being at liberty to fish where they please, and (owing to insufficient oversight) with whatever lengths of nets they please, it is beyond reason to expect that these waters will continue for very long to yield their present large and varied supply. …..

I am, however, much impressed with the importance of Lake Budgewoi as a breeding ground and nursery; it contains extensive flats, on which food exists in abundance. These flats are so

mercilessly hauled by fishermen that future fish supply will assuredly suffer, as also it will suffer from the ravages of water birds, which collect on them in immense flocks.

Some part at least of these flats ought to be closed against the use of fishing nets, and an effort should be made to destroy or drive away the birds. It would be scarcely consistent to close the flats against netters, and yet allow these voracious pests to remain unmolested. …."

Memo from Mr Travelling-Inspector Smithers to the Secretary, Fisheries Department,

1st December 1890

On Friday last, when at the entrance of Tuggerah Lake, I noticed fishermen hauling garfish nets there, and two lots of fish staked up, the fish caught being whiting (in roe), garfish (in roe), mullet 4 oz. fish, and bream. If fishing is allowed to be carried on there it must help to cause destruction to the lake fisheries by the use of the destructive garfish net, further the fish have little chance of getting into the lake in consequence of fishermen being always stationed at entrance to shoot round fish attempting to come in.

I would urgently recommend the closing of the entrance up as far as the lake, then 1 mile each side of the channel, and 1 mile distant out into the lake. In this closure the valuable flats will be included and giving protection to the fish as well as saving the place from being over fished as at present.

Fredk. W. Smithers, Travelling Inspector.

Tuggerah Beach Fisheries

6 January 1891

I have the honor to submit my report on the Tuggerah Beach Lake Fisheries. Since I have been appointed to the charge of these lakes there has been a plentiful supply of fish, but I believe this is only owing to the very lengthy nets which the fishermen are using, which, if they are allowed to use for a much longer time, there will be very few fish to be caught here.

I recommend the entrance of all three lakes here, as also the mouths of all the principal creeks, and the large flat on the southern side of the middle lake, to be closed against netting. On all these places mentioned are to be seen large shoals of very young fish.

The average number of boats has been sixteen, and forty-eight men. The total catch since 11th August has been 4,793 baskets.

Charles Gordon
Assistant Inspector of Fisheries

Mr Inspector Gordon to the Chief Inspector of Fisheries

Wyong, 15 January 1891

Sir,

As regards the numerical proportion of the different kinds of fish caught in Tuggerah Lakes, I beg to submit the following, which, I think, is as correct as possible;-

Mullet	*30*	*Jewfish*	*10, 1/3 of the mullet*
Blackfish	*20, 2/3 of the mullet*	*Whiting*	*5, 1/6 " "*
Bream	*15, ½ " "*	*Flathead*	*5, 1/6 " "*
Garfish	*15 ½ " "*		

I have, &c,
Charles Gordon

Memo. By The Chief Inspector of Fisheries

Return showing quantity in baskets of fish brought to Fish Market, Woolloomooloo, from Tuggerah Lakes, January to December 1889 and 1890

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1889	145	135	245	201	412	445	628	1,007	832	672	742	543	6,007
1890	441	580	706	677	1,022	583	904	1,034	944	813	847	621	9,172

And this does not represent the total take, for a considerable proportion of the fish from these lakes goes into consumption through channels other than the Fish Market.

Mr Inspector Gordon to the Chief Inspector of Fisheries

Wyong, 20 February, 1891

Sir,
I beg to inform you that, in my opinion, the natural supply of fish is being exhausted through net-fishing, and I would recommend that portions of the lakes be closed.

The lakes on all the flats and all the creeks are swarming with young fish of all sorts at present, and if portions are closed they will not be disturbed, as would be the case if all the lakes were open to net-fishing.

I have, &c.
Charles Gordon

1891 Annual Report

Return showing quantity (in baskets) of Fish brought to the Fish Market, Woolloomooloo, January to December 1891

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Tuggerah Lakes	619	622	652	471	677	459	715	973	498	832	374	335	7,228

Return showing quantity (in dozens), of Schnapper brought to the Fish Market, Woolloomooloo, January to December 1891.

Tuggerah Beach Lake Fisheries

Wharf Road, Concord, 2 February, 1892

I have the honor to forward my report on the Tuggerah Beach Lakes Fisheries for 1891. From 1st January to 4th July there were 4,744 baskets caught. About 150 baskets have been used locally, being cured and smoked, and are got up very nicely.

There has been great quantities of blubber in the Lakes, and this I consider to be an advantage to the fisheries, as it prevents the fishermen from using very long lengths of net.

The principal fish caught were mullet, black-fish, gar-fish, bream, and flat-head.

The entrance from the sea, the entrances to the two upper lakes, the large flat on the east side of Lake Budgewoi, and the principal creeks with their entrances have again been closed against net-fishing. On 4th July I left Tuggerah Lakes for the Parramatta River, since which time I have been with Inspector Smithers.

Charles Gordon
Assistant Inspector

---

30 January 1892

I have the honor to submit the following report of the fisheries of Tuggerah Lakes during my supervision. The fish supply being very good, there being no less than 3,586 baskets taken from the Lake during eighteen weeks. The closed waters were all well stocked, with fish especially.

The sea entrance, Ourimbah Creek, Wyong Creek, and the big flat on the eastern side of Budgewoi Lake, which were swarming with young fish, especially mullet, in fact young fish were very plentiful all round the shores of the Lake, where the nets could not disturb them owing to the shallow water and the weeds. Some very good perch were caught by anglers about a mile above Wyong Bridge.

I consider the lake is in a prosperous state, and every prospect of a good supply of fish for the ensuing year.

John F. Hespe
Assistant Inspector of Fisheries

1892 Annual Report

The Fishing Industry (summary on pages 2 and 3 of report)
We quote 50,473 baskets received at the Eastern Fish Market as against a total of 60,689 baskets in 1891. …. The order of supply of fish in baskets from the various waters is as follows:- Lake Macquarie takes as usual premier position with 15,494 baskets; Botany 5,000 baskets; the Harbour 4,804 baskets; Lake Illawarra 4,450 baskets; Tuggerah Lakes 3,918 baskets; Broken Bay 3,087 baskets; Hawkesbury River 3,076 baskets; Port Stephens 2,844 baskets and Shoalhaven 2,405 baskets.

Tuggerah Lakes Fisheries

31 December 1892

The first half of the year is notable for the fish supply which was good, especially in May, when the largest catch through the year during any one month was made, there was also plenty of rain this month, and the lakes and creeks being very high, fish could be seen in numbers everywhere; mullet and garfish being very think (sic.) in the middle of Tuggerah Lake. In June, blubber became very thick at all parts of the lakes, and, as this pest showed no signs of a decrease, fishermen began to leave, no less than five boats with some of the best fishermen going to Lake Macquarie. With the exception of Munmorah Lake, where fish were very scarce, blubber has been plentiful in the lakes throughout the year.

During the year three fishermen were fined for fishing in the closed waters of the lakes, and one fishing net for which no owner could be found was seized, having been discovered set in closed waters.

The total number of baskets of fish caught during the year for market was 6,759, and about 260 baskets smoked locally.

F Aldrich, Assistant Inspector of Fisheries.

1892 - Return showing the quantity, in dozens, of different varieties from Tuggerah Lakes (extracted from table showing returns for all estuaries)

Schnapper	*5*	*Prawns*	*0*
Kingfish	*40*	*Crabs*	*0*
Jew-Fish	*499*	*Rock Cod*	*13*
Teraglin	*39½*	*Eels*	*55*
Nannegai	*9½*	*Garfish*	*331*
Salmon	*31½*	*Flathead*	*253*
Mullet	*2,149*	*Whiting*	*1,124*
Soles and Flounders	*18*		

1893 Annual Report

Return showing the quantity of Fish in baskets, brought to the Eastern Fish Market, Woolloomooloo, January to December, 1893.

Locality	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Tot*
Tuggerah Lake	*408*	*257*	*278*	*187*	*464*	*689*	*82*	*84*	*223*	*459*	*386*	*357*	*3,874*

Tuggerah Lakes; total schnapper caught for the year = 30 ½ dozen.

1893 - Return showing the quantity, in dozens, of different varieties from Tuggerah Lakes (extracted from table showing returns for all estuaries)

Schnapper	*30½*	*Prawns*	*-*
Kingfish	*8*	*Crabs*	*10½*
Jew-Fish	*639*	*Sweeps*	*46*
Teraglin	*8*	*Eels*	*50½*
Nannegai	*11*	*Garfish*	*156*
Salmon	*-*	*Flathead*	*147*
Mullet	*1,059*	*Whiting*	*294*
Soles and Flounders	*25½*	*Rock Cod*	*1½*
		Crayfish	*28*

1894 Annual Report

Tuggerah Beach Lakes: Tuggerah Beach Lakes leads with the quantity of fish caught during the year, taking no less than 13,888 baskets, or 2,314 in excess of Lake Macquarie. We attribute the increased supply to the waters which had been previously closed being thrown open to the fishermen, and they appear to have made the best of it. From this lake large quantities of fish are sent direct to country towns, and the balance to the markets. ….. This lake is largely used by line fishers, and with splendid results, the pleasure parties taking away large quantities of bream, flathead and whiting, and we regret to say that by this means many small and immature fish are caught.

1895 Annual report

Tuggerah Lakes: Tuggerah Beach Lakes have produced considerably less fish this year than last. In 1894, 13,888 baskets of fish were caught, and this year 8,071 baskets, showing a decrease of 5,817 baskets.

We deemed it advisable to remove Inspector Gordon from Sydney to take permanent control of these waters, and stop any illegal fishing that might occur in the closed waters at the entrance.

The line fishermen have made many good catches during the past twelve months in and about the channel entrance.

1896 Annual report

Tuggerah Lakes: Tuggerah Beach Lakes still continue to keep up with Lake Macquarie in the quantity of fish caught, taking no less than 11,422 baskets, as against 8,071 the previous year.

Sir,
I have the honor to submit my annual report of the fisheries of Tuggerah Beach Lakes for the year 1896.

The fish supply of these lakes for the year just ended has been quite equal to former years, although at the beginning of the year the entrance became silted up, thus to a certain extent stopping the fish from getting either in or out; then when rain came the waters in the lakes rose and covered all the landing, so that the fishermen could not land their nets…..

I may mention one peculiar instance of fish travelling which I saw. On February 27th there was a heavy sea on, and at high water, when the sea was washing over the bank, the fish (bream) would come over and would lay stranded till the next sea came and washed them further into the lake. At that time three fishermen caught twenty-three baskets of those fish as they lay stranded waiting for the next sea to carry them into the lake. On that occasion there must have been hundreds of baskets came into the lakes.

The average number of men working has been about seventy and thirty five boats, but the men shift about very much. The total catch sent by rail for the year has been 1,142 (sic.) baskets. This is exclusive of the quantity which are smoked, which would fully make up to 1,000 baskets per month as the catch of the fishermen.

C Gordon

(Note the typographical error, 1,142 baskets should have been 11,422 baskets)

1897 Annual Report

The following list will show the number of baskets of fish sent to the markets during the year: -

Lake Macquarie	*12,676*	*Shoalhaven River*	*1,040*
Tuggerah Lakes	*10,372*	*Hastings River*	*729*
Lake Illawarra	*9,063*	*Bateman's Bay*	*1,821*
Hawkesbury River	*8,843*	*Bermagui*	*720*
Clarence River	*5,848*	*Richmond River*	*655*
Brisbane River	*3,058*	*Macleay River*	*345*
Ulladulla	*2,638*	*Wagonga*	*171*
Cape Hawke	*2,463*	*Eden*	*80*
Manning River	*1,151*		

This list does not include those caught at George's River and Port Jackson, which are taken direct to the market by the fishermen.

Tuggerah Lakes:
This is a very valuable fishing-ground, and comes next to Lake Macquarie as regards the quantity sent to market.

The entrance to the lake was open from April, and remained so during the year.

Several large shoals of mullet, bream, and black-fish came in from the sea, and through the closure at the channel entrance were enabled to have undisturbed access to the lake waters.

Wyong 11 January, 1898

Sir,
In reply to your memo of 4th January, I have the honor to submit the following: -

1. *The schnapper, bream, tarwhine and whiting are full-roed in from November to January; blackfish and flathead, January to March; mullet, March and April; river-garfish, in August; sea-garfish, in July; long-tom, February and March. I have seen all those fish full-roed at other times of the year; but those times mentioned are about the main time.*

2. *In my opinion the fish spawn while travelling in the mouths of estuaries and rivers and in sheltered bays.*

3. *The young fry are first seen in shallow water on the flats of rivers or lakes and bays. I have seen large shoals of small fish, from ½ to 1 inch, in drains and round the edges of the lake behind the weeds, and the water has been so hot that I could scarcely bare to wade in it. Still the young fish seemed to enjoy it.*

4. *As to habits, all kinds of fish are caught at times on the same ground; but as a rule, the schnapper and bream like a rocky bottom; whiting a sandy; mullet and flathead, a sandy or muddy bottom.*

5. *On 14th, 22nd and 23rd April, large shoals of mullet went out; on 23rd April, a shoal of blackfish came in; on 5th and 6th July, large shoals of mullet were on the entrance flats, and on 7th very large shoals of some small fish were on the beach outside the entrance, but I was unable to see what sort they were, as they were a long way out.*

6. *The output of fish for 1897 was 10,372 baskets.*

7. *The fish are brought to the mouth of Wyong Creek, where they are basketed up. They are then put on board the steamer and taken to Wyong and carted up to the railway station, where they await arrival of the fish train, which arrives there about 11pm.*

8. *At present the waters are in fair condition, there not being so much slime and weeds on the bottom; but the weather is very much against getting good hauls. …..*

9. *Hauling, garfish, meshing, and divers nets are used. The garfish-net is the most injurious net if not properly used; but in this lake there are few hauls where the fishermen land. I have not seen many young fish killed in this lake, as the nets are generally hauled to a back net out on the flats, clear of the weeds, and the small fish are mostly all in-shore.*

10. *There is not much line fishing done here.*

11. *The entrance, and 1 mile on either side, and 1 mile out into the lake is the main closure here, and this gives the fish a chance to go out or in without being disturbed. There is also a large flat in the Middle Lake closed, which is a regular breeding-ground for small fish. Ourimbah, Wyong, and Wallarah Creeks are also closed. The effect on the entrance closure is that the fish can travel either way without being molested.*

12. *The average number of men has been fifty-seven, with twenty-three boats.*

13. *The condition of the only oyster-bed under lease is good, and is suitable for oyster culture, there being many whelks all over the bed. The lessee has put a lot of ti-tree stakes on his lease, but up to present nothing has adhered to them except barnacles…..*

14. *The oysters are in good condition, and there is no disease.*

15. *The first notice of any young oysters appearing on the whelks or shells was in October.*

16. *The oysters here are marketable in about two years*

The supply of fish up to the end of June 1897, increased by 1,012 baskets. This is attributable to the closures opening to net-fishing in February, but the take for the whole year has decreased by 1,050 baskets.

The take for 1896 was 11,422 baskets; for 1897, 10,372 baskets; decrease, 1,050 baskets.

I think that the weight the fishermen are allowed to catch the fish at is too small. Not one fish enumerated in the schedule has got the sign of a roe in it at the weight opposite their name, with perhaps the garfish only. The consequence is that all kinds of fish must decease.

When I was here some seven years before, the fishermen would not put any small fish in their baskets, although they were over the weight they were allowed to catch them at. They said they would spoil the sale of the other fish. Now they are glad to send them the bare weight, and they do not get the catches they got formerly.

Charles Gordon
Assistant Inspector, Tuggerah Lakes

1898 Annual Report

Tuggerah Lakes; The quantity of fish taken from this water last year was only about two-thirds of the number caught during 1897, and it is probable that the scarcity is the result of a practice that has existed for some time of the fishermen using hauling ropes of over a mile in length, and in dragging the bottom of large areas and disturbing the feeding grounds to such an extent that the fish have not found the same attraction as formerly.

The entrance from the ocean to the lake has been open the whole year, and schools of fish have been observed travelling in and out at various times…..

Wyong, 17 January 1899

Sir,
I have the honor to submit my annual report to you for the year 1898 of Tuggerah Lakes.

The year just ended has been the worst year for fish that has been known, all kinds being alike scarce. The reason for the scarcity is, I think, the light weight that all varieties of fish are allowed to be sent to market; also the diver nets used here do much harm in continually disturbing the bottom. These nets are sunk, and with the long hauling lines which are used, sometimes over a mile long, on either end, come along the bottom, thereby stirring the food of the fish up and killing it.

About the month of August there was some sort of disease among the eels here, large quantities being seen all over the lake dead. I noticed that those which were sick could not stay long under the water, but would come to the surface, and twist about till death overtook them.

On April the 20th I noticed the entrance full of very small fish. I caught some, and forwarded them to the Department – to Dr Cox – and they proved to be the spawn of the mullet, and only a day or two old, so by this I conclude that mullet, at all events, spawn in the entrance. …..

I have observed several shoals of fish travelling both in and out during the year. So late as 25th July a very large shoal of mullet came in, and on 19th August I saw a large shoal of bream and blackfish lying at entrance, bailed up by tailers and jewfish. ..

The catch for the whole year was only 6259 baskets, as compared with 10372 for 1897, and 11,422 for 1896. This shows a decrease yearly, but this last year has the greatest decrease of any previous years.

There is only one oyster lease here, and the lessee has not sent any oysters to market off it yet. He has sold two and a half bags in small lots to various pleasure parties.

The acre which was resumed for inspector's residence has been fenced, and shelter trees planted round it. The house, which is my own, is in a very leaky condition, and leaks every time it rains. A new house is very much wanted.

The average number of men working during the year has been fifty-seven, and twenty-three boats.
Charles Gordon, Inspector of Fisheries

1899 Annual Report.

For the last ten years the catch in the waters adjacent to Sydney has been as follows:-

Waters	*1890*	*1891*	*1892*	*1893*	*1894*	*1895*	*1896*	*1897*	*1898*	*1899*
Lake Illawarra	4312	4966	4450	2214	7189	9252	8386	9063	5936	9804
Botany	8991	8453	5000	3930	10000	9000	12000	5689*	14235	9224
Port Jackson	5035	5069	4804	3293	6686*	10500	1289*	792*	5016	4623
Hawkesbury R.	4721	5900	6163	4965	5740	4160	6890	8843	9377	7375
Brisbane Water	451	129	130	405	Nil	2592	172*	3058	1866	Nil
Tuggerah Lakes	9172	7228	3918	3874	13888	8071	11422	10372	6259	4200
Lake Macquarie	14521	14124	15494	7293	11574	13850	12673	12676	12470	7792
Port Stephens	5227	3039	2844	2097	6593	7800	3053*	2618*	2831	3018
Totals	**52,530**	**48,908**	**42,803**	**28,071**	**61,670**	**65,225**	**55,885**	**53,111**	**57,990**	**46,036**

On Lake Macquarie, Tuggerah, the Hawkesbury, and Port Stephens the extent of fishable water is enormous and quite out of the power of a single Inspector to supervise effectually.

<u>Tuggerah Lakes:</u> These waters were very prolific in former years for the various kinds of fish, and were considered as amongst the very best grounds, but during the last two years the supply of fish has been steadily decreasing. This is no doubt due in a great measure to the heavy and continuous netting that is carried on. The output for the year did not exceed 4,494 baskets, a marked contrast to the 10,372 baskets in 1897….

Wyong, 7 February 1900

Sir,
I have the honor to submit to you my annual report for 1899.

There has been a great decrease in the take of fish this year compared with the last and previous years. The take for this year has been 4,494 baskets, for 1898 it was 6,259 baskets, and for 1897 it was 10,372 baskets, thus showing a large decrease every year.

I can only account for the decrease by the use of the diver nets which are shot with a great length of line at either end of net, which, coming along the bottom, disturbs the feed and kills it. I also consider the weight at which the men are allowed to catch the fish at is too small, as they are not near in a spawning condition…..

I have observed large quantities of bream, whiting and flathead in the lake entrance from December to March, and a large percentage of those varieties were in roe. ….The average number of men has been thirty-six with twenty-three boats. Some of the men having left here for the Richmond River, others for Lake Illawarra.

Charles Gordon, Inspector of Fisheries.

1900 Annual Report

…The tributaries of Lake Illawarra, Lake Macquarie and the Tuggerah Lakes, after a closure of three years, were opened to net fishing on the 14th October. These waters benefited very considerably from the protection that was given, as reports were received that they were well stocked with bream, mullet, flathead, and blackfish…..

1901 Annual Report

The Secretary, Department of Fisheries.

Wyong, 13 January, 1902

Sir,
I have honor to submit to you my annual report for the year 1901. The fishermen have had a very good catch for the year just ended, the number of baskets caught being 9,045, as against 6,965 for the previous year. The average number of men at work was forty-two and the number of boats twenty-three. The principal fish caught here are mullet, bream, blackfish, river garfish, flathead, and whiting. They are most plentiful in the order named above. On 16th January I saw a large shoal of fish on the middle of Tuggerah Beach, but they were too far out to distinguish what kind they were, but I believe they were tailor….Since last mullet season there has been a good-sized shoal of them travelling up and down the channel all the time till the end of the year. They travel up and down with the tide. ..... The methods adopted by the men to secure their catch are by netting them with either a hauling, garfish, meshing or diver net. There is only one man smoking fish here, and he does not do very much in that line, as it pays him better to send his fish direct to Sydney fresh. There are no canning establishments. There are no men employed catching either crayfish or prawns. Although there are large quantities of prawns here, still no one catches them, not even for bait, and for that there would be a good sale here, as there are hundreds of line fishermen who come here during the summer, and a good many during the winter months. ….

Charles Gordon.

1902 Annual Report

The following return shows the quantity received from each river….;

Tuggerah Lakes 12,402

….It is at all times difficult to gauge the exact weight and value of fish, owing to the variation in the weights of the contents of each basket, and also to the irregular prices obtained. A basket contains from 60 to 90 lb of fish, some forms being heavier than others, and it is therefore estimated that 70 lb would be an average weight per basket.

1903 Annual Report

Tuggerah Lakes, 8 January, 1904

Sir,
I have the honor to submit my report for the year 1903. The output of fish for the year just ended was 10,914 baskets or boxes, 63 jewfish, and 5 strings of jewfish. The average number of men at work were 73, with 35 boats. The principal kinds of fish caught were bream, mullet, blackfish, garfish, whiting, flathead; and they were most plentiful in the order abovenamed.…..

The methods which the fishermen adopt to catch the fish are by net, of which there are four varieties, viz., hauling, garfish, meshing, diver. There are no prawn nets used, although during the summer months there are plenty of prawns here. There is no canning or fish smoking here.

There are no crayfish going away from here at present, although formerly there were some boats crayfishing at Bungaree. …

I have, &c., Charles Gordon

1904 Annual Report

Tuggerah Lakes, 11 January, 1905

Sir,
I have the honor to submit my annual report for 1904. The average number of fishermen working during the year was fifty-one, and boats twenty-nine. The species of fish caught were mullet, blackfish, bream, river garfish, whiting, and flathead. They have been most plentiful in the order above named.....All the fish caught are either sent direct to Sydney or up country along the northern line. There was no canning or smoking done here.
.... The output of prawns was eighty-three baskets, and the average number of men has been eight in four boats. The prawns were found most plentiful in the Top Lake from September to November. They have been going to sea since the middle of December. There are a good many in the entrance channel just now. They will be plentiful in the Top Lake again in June, at all events they were so last June. Prawn catching is practically new here, this being the first year this industry has commenced. The method adopted is by a net of 15 fathoms long of 1 inch mesh, and one man at each end walks along in the shallow water for some distance and then rounds in to shore and lands...

The fishermen are put to a great disadvantage here by the Railway Commissioners refusing to take their fish from Tuggerah or Wyee Platform, only by the regular fish train. This practically closes the top lake in the summer months, as the fish would go bad before being taken to Wyong by the steamer. One man laid out a deal of money in purchasing a horse and cart to run his fish to Wyee, which he could do in one hour from a point in the middle lake, but now they are useless....

I have, &c., Charles Gordon, Inspector Of Fisheries,

1905 Annual Report

Tuggerah Lakes, 12 January, 1906

Sir,

I have the honor to submit to you my report for the year ended 31st December, 1905. The total output of fish for the year 1905 was 6,895 baskets or boxes, and the number of men at work was fifty-eight using twenty-six boats. The species of fish caught and marketed were mullet, blackfish, bream, garfish, whiting, flathead, schnapper and jewfish. The kinds most prolific were in the order named above. All the fish which leave the lake seem to travel northwards.....

I have been informed of several shoals of mullet being seen on Bird Island beach, at Bungaree, on Tuggerah Beach, and in Chinaman's Bay, at different times during the year. I have seen them myself on Tuggerah beach at the entrance, and in Chinaman's Bay on several occasions during the year. The bream, whiting and flathead generally come in to the entrance in November or December, but they were late this season, and the roes are not so far advanced as in former seasons. …

The methods adopted by the fishermen to secure their catches are by net and line. The kinds of nets used are hauling, meshing (in season garfish), diver, and prawn. The diver-net is the same as the hauling only that it is sunk below the surface so as to avoid so much blubber getting into the net, which makes the net heavy to haul in, and it also kills the fish, especially the small ones. …

The output of crayfish was ninety-one boxes. I cannot say how many men and boats were employed as only flying visits are paid to Bungaree and I only know they are there when I get the monthly return from the station-master at Wyong.

The output of prawns was 617 baskets, and the average number of men were six in three boats. The season commences in November and lasts till May, although some are being caught all the year. The prawns generally commence to go out to sea in November, but this season they have been late.....

The past season has not been a very good one. It has decreased about 2,000 baskets each year for the last three years.

Prawns are being more largely caught now than formerly, and sometimes realise a high price.

The blubber has been very plentiful this last year, and destroys a great many small fish when hauled in amongst them.

I have, &c.,

Charles Gordon, Inspector Of Fisheries,

1906 Annual Report

Tuggerah Lakes, 11 January, 1907

Sir,

I have the honor to submit to you for the year ended 31st December, 1906. The total fish output of fish sent to Sydney was 7,447 baskets, 469 were sent north and about 500 sold locally, making a total of 8,446 baskets. This includes 47 baskets caught in Chinaman's Bay which were either sent from Gosford or run up to Sydney by boat. The species caught and marketed were mullet, blackfish, bream, garfish, whiting, flathead, schnapper, and sole. They were most prolific in order named above.

All fish going to sea from the lake travel north. During the year I have been informed of several shoals of mullet and bream seen on different parts of the beaches and during all the winter months

there were large shoals of mullet in the entrance channel. They work up and down with the tides - sometimes go out and lie on the rocks to the south or on the beach to the north of entrance. ....

The output of prawns was 173 baskets. This is very much below the number caught last year. The prawn season commences here about the beginning of November, and lasts till May. During the summer months the line fishers catch great quantities (when the nights are dark) with hoop nets and a lantern. They use them for bait.

There are practically no oysters here now, the disease and pleasure parties having denuded all the grounds. There is nothing here for the spat to adhere to, only some whelks.

The past season has been much better than that of 1905, there being over 1,500 baskets of fish caught above last year, although the prawns have decreased.

The boarding-houses have been full since November, there being never less than sixty visitors distributed amongst the various houses. There is a great deal of correspondence amongst so many people coming and going yet we have no post office here, and one is greatly needed.

I have &c.,

Charles Gordon

1907 Annual Report

Tuggerah Lakes, 13 January, 1908

Sir,

I have the honor to submit my annual report for the year ended 31st December 1907. The output from these lakes was 7,629 boxes fish, viz.: - 6,231 boxes to Sydney, 898 sent north, 500 local consumption, and 274 from Boat Harbour were sent to Sydney from Gosford. The average number of men employed was fifty-two with twenty-six boats. The species caught and marketed were, mullet, blackfish, bream, garfish, whiting, flathead, schnapper, and sole. They were most prolific in the above order.

The mullet generally work down on the entrance flats about December, ready for going out any time from January to April. They all travel north…..

The output of prawns was 25 ½ baskets, all of which were sold locally to the line fishers for bait. One bag of dried prawns was sent to Sydney. The prawn season commences here in November and lasts till May. When the nights are dark the line fishers catch a great many with a hoop net and a lantern…..

The past season has not been so good as the former, there being a decrease of 770 boxes. During the months of June and July (which are the best two months) there was a decrease of over 1,000 boxes. I think the want of rain has a lot to do with the decrease. During July, August and September only 116 points of rain were registered. ….

Charles Gordon

1908 Annual Report

Tuggerah Lakes, 20th January, 1909

Sir,

I have the honor to submit my annual report for the year 1908. The output of fish sent by rail was 7,700. This comprises the fish sent from Tuggerah, Wyong, and Wyee railway stations. Besides these, there are two fishermen, who each go around the district twice weekly, and dispose of their catch. I estimate the quantity otherwise disposed of at 500 boxes. This would bring the total up

to 8,200 boxes. The average number of men employed was 54 in 30 boats. The different species marketed were mullet, blackfish, bream, garfish, whiting, flathead, and schnapper. The mullet generally drop down on the entrance flats towards the end of summer, ready for travelling any time till the end of April.

I have observed some large shoals of fish wide out, but am unable to say what they were. .....

The output of crayfish was 14 baskets. These were sent from Wyee when the Italians could not run them to Sydney. There were 19 baskets of prawns sent to Sydney also from Wyee. The catch of prawns sold to the line fishermen would be about 40 baskets, making the total output 59 baskets; this excludes any what are caught by visitors themselves, who sometimes on dark nights get a good many.

There are not many oysters here now.

The past season has exceeded the former by 571 boxes of fish. …..

There are four boarding houses at the entrance, and one at Chinaman's Bay. They are all full during the summer months, and besides line fishing, there is bathing, both in the surf and in the channel. There are no sharks in these lakes, and visitors can bathe with safety. Oil launches ply several times daily between the entrance and Tuggerah Jetty.

I have, &c.,
Charles Gordon

1909 Annual Report

Wyong, 19 January 1910

Sir,
I have the honor to submit my report for 1909 on the fisheries of Tuggerah Lakes. The output of fish by rail was 8,700 boxes. These were sent from Wyee, Wyong, and Tuggerah Lakes stations.

During the winter months there were three people hawking fish through the district. I cannot obtain the correct quantity vended in this way, but estimate it at 300 baskets, which would bring the total catch to 9,000 boxes. This is a good advance on last year's catch. Great quantities are also caught by visitors at the different boarding establishments. The average number of fishermen employed was 56, using 35 boats. The principal species marketed were mullet, blackfish, bream, garfish, whiting, flathead and schnapper.....

There is one smoking establishment which turned out about 60 boxes of smoked fish, but since the fishermen have been receiving better prices for their fish they are all sent to market - either to Sydney or to different townships along the Northern line.

Only one box of crayfish was sent to Wyee. The Italians, who catch them at Bungaree, generally send them to market by their own launch, and I have no record of them, or of the schnapper which are caught outside.

The output of prawns was 37 boxes 5 bags, and 6 bags of dried prawns. There are two boats used to catch prawns for the purpose of supplying the visitors at the boarding-houses. The visitors themselves catch a good many on dark nights; sometimes one man will get 8 quarts in a night when they are plentiful.....

Launches ply daily between Wyong and the entrance, and the boarding houses have been well patronised this season.

I have, &c.
Charles Gordon, Inspector

1910 Annual Report

Tuggerah Lakes: The average number of fishermen employed at Tuggerah was 47, with 29 boats, and the output of fish per rail from Tuggerah Lakes, Wyong, and Wyee stations totalled 7,260 boxes - 1,740 boxes below last year's figures. Inspector Gordon reported that the new municipal market in Sydney had affected the local trade. The marketed fish included mullet, blackfish, bream, garfish, whiting, flathead, jewfish, and snapper.

Prawns; Thirty baskets were taken during the year for bait purposes.

1911, 1912, 1913 Annual Reports

Fisheries, 1911;
Inspector Gordon reported that on average fifty men, using thirty boats, were employed during the year. The output was 9,655 baskets of fish, nine dozen crayfish, and fifty-two baskets of prawns, a considerable quantity of fish, not estimated, sold locally, and twenty baskets of prawns. The season was a good one, consignments to Sydney, he stated, exceeded those of the previous year by about 2,000 cases. Fish were plentiful, and the prices realised were exceptionally good. …. An immense number of people visited the Lakes (the accommodation available being insufficient), who indulged in line fishing with considerable success.

Fisheries, 1912;
The same Inspector reported that fifty-four men, using thirty-four boats, were employed during the year; 10,506 baskets of fish and eight baskets of prawns were consigned to Sydney, and 106 baskets of fish and a considerable quantity of prawns were disposed locally. Fish were plentiful, bream more so than for some years…..

Fisheries 1913;(first 6 months)
The Inspector reports that during the half year sixty-five men and thirty-four boats were employed. 5,945½ baskets of fish, twenty-eight dozen crayfish and thirty-seven baskets of prawns were consigned to Sydney, and fifty-four baskets were sold locally. Fish were plentiful, and large bodies of bream were observed on the beach near the entrance waiting to enter, many of which were washed into the lake by heavy seas. Although, when the entrance opened in April, considerable numbers of fish left for the ocean, others entered, and the effects of the freshets, which were numerous, were more beneficial than detrimental, as quantities of fish were brought out of the creeks into the Lake, which were before inaccessible…..

Tuggerah Lakes – Fisheries (1913, 2nd 6 months and full year)
Fifty-four men and 34 boats were employed during the half-year for for an output of 5,470 baskets of fish, 312 dozen of crayfish, and 2 baskets of prawns, consigned to Sydney, and 59 baskets of fish sold locally, making a total for the year of 11,528 baskets of fish, 340 dozen of crayfish, and 39 baskets of prawns, an increase of about 1,000 baskets of fish on the output of the previous year. Fish were generally plentiful, and the men's earnings were more than satisfactory. Good sport was obtained by a very large number of visitors to the entrance with line fishing, quantities of prawns being caught by them for bait.

Further notes from 1913 Annual Report
…..Prawns (especially king prawns) very frequently become stranded about the entrances to coastal lakes, and in this connection it is of interest to note that during February a great many were being washed upon Tuggerah Beach every night, near the lake's entrance. In one morning alone four kerosene-tinsful, one kerosene-caseful, and a number of smaller lots were picked up (living) by one party.

.... it has often become apparent to me, and has been stated, that the coastal lakes and estuaries are capable of a much greater output than is the case at present; and the evidence laid before the recent Royal Commission on Food Supply, while inquiring into the supply and distribution of fish, will be seen to amply bear me out. In many cases men fish for only two or three days per week, who if the facilities for transport of the product were there, could fish for every day in the week. Difficulties connected with transport are, in fact, the main factors in restricting the output from the coastal waters. The following typical items, taken from official reports during the last year, are here of value, and will need no explanation from me;-

1) *A fisherman at Tuggerah Lakes got a big haul of blackfish in the middle of the lake, but, not having sufficient ice, had to let them go. ...*

1914 Annual Report

Tuggerah Lakes District

Inspector C Gordon

An average number of 62 men and 35 launches and boats, of an approximate value, with gear, of £1,119, were employed during the year for an output of 13,084¼ baskets of fish, 102 dozen crayfish, 652½ baskets of prawns, and 5 dozen crabs. Fish were generally more plentiful than during the previous year. …

1915 Annual Report

Tuggerah Lakes District (embracing Tuggerah Lakes and Norah Head)

Inspector C Gordon

Fisheries: Eighty-eight men and 45 launches and boats, valued at £1,580, were employed, on an average, for the year for an output of 19,970 baskets of fish, 167 dozen crayfish, 107 dozen crabs, and 99 baskets of prawns - as compared with 13,084¼ baskets of fish, 582 dozen crayfish, 5 dozen crabs, and 652½ baskets of prawns for 1915 (sic.).

Though no exceptional catches were made, fish generally; and particular black bream, were more numerous than during the preceding year, and the men's earnings were good.

The ice supply required was obtained from the Wyong Butter Factory, and was delivered at a reasonable rate at Wyong wharf.

The whole of the fish caught are consigned by rail.…..

The Inspector suggests more rapid transit by rail, and in this the Supervising Inspector fully concurs; the fish invariably carried on the "pick-up" train which, when running to time - this is rare - takes six hours to travel 63 miles.

1916 Annual Report

Tuggerah Lakes District

Inspector S.H. Foster

One hundred and nineteen men, with 12 launches and 50 boats, valued at £2,950, were employed on an average during the year for an output of 16,200 baskets of fish, 47 dozen crayfish and 259 baskets of prawns, to Sydney markets, and about 50 baskets of prawns sold locally.

1917 Annual Report

Tuggerah Lakes District

Inspector S.H. Foster

Eighty-four men, working 17 launches and 34 boats, valued, with gear, at £2,015, were employed on an average during the year for an output of 18,134 baskets of fish, 180 dozen crayfish, 456 baskets of crabs, and 68 baskets of prawns, and 63 baskets of fish and 20 baskets of prawns sold locally, as compared with 16,200 baskets of fish, 47 dozen crayfish, and 259 baskets of prawns for 1916. …

1918 Annual Report

Tuggerah Lakes District

Inspector S.H. Foster

Ninety men (of whom six work ocean waters), working 26 launches and 46 boats, valued with gear at £4,387, were employed on an average during the year for an output of 14,105 baskets of fish (of which 359 baskets were sold locally), 450 dozen crayfish and 1,591 boxes of prawns (of which 126 boxes were sold locally), as compared with an output of 18,197 baskets of fish, 180 dozen crayfish, 456 baskets of crabs and 88 baskets of prawns for the year 1917. …

1919 Annual Report

Tuggerah Lakes District

Inspector HW Atkins

Seventy-eight men (of whom two work ocean waters), working 26 launches, 33 boats, and 1 punt, valued in all at £4,055, were employed on an average during the year for an output of 9,720 baskets of fish, 10 dozen crayfish, and 1,091 baskets of prawns, of which 297 baskets of fish, 10 dozen crayfish, and 193 baskets of prawns were sold locally…..

Whiting were scarcer than during the previous year, but bream were much more plentiful. On the whole fish were scarcer. Two hundred and twenty boxes of blackfish were obtained in one haul during the first part of March, and 150 boxes in the latter end of the month. ..

Amateur fishermen obtained fairly good line fishing during the months of July, September, October, and November.

1920 Annual Report

Fish generally were more scarce than the previous year. Some fine hauls of blackfish were made during the year. One hundred and thirty boxes were netted in one haul in May, and three hauls in September killed 108, 180 and 112 boxes respectively…

Young prawns were very numerous during the early part of December in all three lakes.

1929 Annual Report

….In the same month (January 1929) enormous numbers of whiting entered the channel at Tuggerah Lakes, but as these waters were closed to net fishermen no catches were made except by linesmen who had a magnificent sport.

1933 Annual Report

On the 6th October, the regulations as regards the lawful length of prawns was amended by increasing the size from 2½ inches to 3½ inches.

1935 Annual Report

The principal catches of prawns were obtained from Lake Illawarra (469,320 lb.), Tuggerah Lakes (410,940 lb.), Port Jackson (313,620 lb.) and Port Stephens (241,980 lb.).

1949-50 Annual Report

NSW Prawn production – The output for the year increased by 485,897 lb. This increase was to a great extent due to the exploitation of the offshore prawn fishery, which has developed since prawns were first located in the Stockton Bight (Newcastle) during the summer of 1947-48. …..…

1951-52 Report

NSW Prawn fishery – The output for the year declined by 2,428,005 lb., representing a decrease inshore of 452,676 lb. and offshore 1,975,329 lb. An average number of 369 fishermen operated, being fourteen less than the previous year. The catch per man fell from approximately 11,000 to about 5,000 lb.

The decline in production must be regarded as a warning of the danger of unrestricted cropping both in the estuaries and in ocean waters during each season. A biologist of the Department during the year commenced a scientific investigation of the prawn fishery and the work completed to date confirms that the prawns caught in the estuarine waters are immature and that the majority taken in ocean waters have not had an opportunity to spawn before being killed. …

Addendum to 1955-56 Annual Report;

An investigation into the pronounced differences between the production figures as collated on returns furnished by fishermen and the disposed figures was undertaken. It was found to be caused by a general reluctance of fishermen to submit returns, and the extensive practice of understating any returns submitted.

1957-58 Annual Report

Note about the data in this report; In the 1957-58 Annual Report there is a table providing the quantity of fish passing through each co-operative in the state. For the Tuggerah Lakes the total sales of fish was 655,540 lbs, of which 608,234 lbs went to the Sydney Fish Market and 47,306 lbs was sold locally. This compares with the fishermen's returns of only 376,480 lbs. The figures for the prawn catch appear more consistent with the co-op reporting a total catch of 78,540 lbs and the fishermen reporting 78,422 lbs.

1958-59 Annual Report

Prawns; summary for NSW; The outlook for the prawn fishery did not show much promise in the later months of 1958, but good catches were made in both the estuarine and ocean waters, during the months of February, march and April 1959. All estuarine waters however, did not recover from the effects of the prolonged dry conditions which contributed to the previous year's poor catch. The Tuggerah Lakes production amounted to only 33,000 lb, the lowest ever recorded for that water, whilst the catch for the Myall River and Lakes, totalled only 19,000 lb which is again well below its normal production..

1959-60 Annual Report

As a result of the scientific investigation of the Eastern Australian prawn fisheries carried out by Dr A A Racek, the minimum legal length of prawns was abolished from 1st January 1959. The relaxation of this law no doubt contributed to some extent to the increased production of prawns during the balance of the financial year.

It was found that a large number of fishermen, following the removal of the minimum legal length size, flooded the Markets with very small "rubbish" type prawns which seriously affected the market and the retail trade. ….

6 Floods and the opening of the entrance channel

The only connection between the Tuggerah Lakes and the ocean is a small channel at The Entrance. This results in a restricted interchange of water, and very little tidal effect. The channel is in a continuous state of change due to the deposition and subsequent erosion of various sandbars and spits.

Under natural conditions the channel would slowly block up and could remain closed for up to a year or more. Eventually a large flood would burst over the sandbars and scour out the channel. This was often expedited by local residents who lived in low lying areas around the lake shores (eg Tacoma) and whose houses were being flooded. The sudden release of water during these floods would wash all of the sand out of the channel and for a while the entrance channel would be much wider and deeper than usual.

The channel is now kept permanently open by continuous dredging of the sand bars that slowly build up across it.

The channel, so shallow as to be fordable at low water - 1834

…we continued along the coast, (though shut out from view of the sea by high banks,) till gradually ascending we reached the summit of Wyrabalong, one of the highest among the headlands of this coast, and from which there is an extensive and beautiful view; the heads of Port Stephens to the northward, the Maitland Sugar Loaves three remarkable conical hills, with many other points on the coast, while nearer lay the Tuggerah Beach Lakes, separated from the sea by a chain of sand hills, and their communication with it being, merely a narrow channel, so shallow as to be fordable at low water; ….

Tuesday 28th. After getting the boat round with great difficultly, on account of the sands and shallows which obstruct the mouth of the Lake, we had all our things packed and put into it, but found her so deep in the water when loaded, that it was quite impossible to get her through the channel; after three hours unsuccessful efforts, we were obliged to give it up, and landing our things, pitch the tents again, resolving to embark the following morning on the other side of the Point, where the Lake has water enough at all times; and to send our things down in the cart… (Journal of Sarah Mathew – wife of surveyor Felton Mathew, Jan 1834. Reprinted in Stinson, vol 4, 1983. Original manuscript is in the National Library)

Walking horses across channel – 19th century

The Hargraves family from Noraville commonly rode past our place on their way to Gosford. They would leave their home and follow a track through the red gum forest. down to Soldiers Beach, then along the beach to North Entrance. If the channel was shallow enough they would walk their horses through it; but if it was too deep for that they would row across and lead their horses which swam behind the boat. (Memoirs of Raymond Taylor, Stinson, vol 1, 1979)

Opening the channel – Letters from the 1883 Fisheries Annual Report

Tuggerah Beach Lakes: We have given considerable attention to the fisheries in these lakes, but do not feel ourselves so far in a position to offer a decided opinion upon the economy of their fish production.

It was represented to us in January last that the entrance to the sea had been sanded up, and that as the spawning time of several varieties of fish is approaching, the occurrence of a freshet would result in the destruction of innumerable small fry and many tons of fish.

In this contingency we communicated with Mr E.H. Hargraves, J.P., an old resident on the lake, who kindly offered his assistance and advice, the result being an application to the Minister for Public Works, who caused a survey to be made and plan prepared, showing the work necessary to be done to open a passage to the sea. About this time our colleague, Mr G.F. Want, visited the lakes at our request, and reported against the project, principally on the ground that it would prove a most costly undertaking, owing to the water being very low in the lakes.

The matter was thereupon allowed to rest until October last, when, on representation by Mr E.J. Hargraves that the water had risen to such a height that the judicious outlay of £20 would effect the desired entrance to the sea, we invited him to be good enough to undertake the supervision of the work; he very kindly did so, the result proving a complete success. We desire to record our obligations for the valuable aid he rendered.

As some of the correspondence on the subject may be deemed of interest, it will be found appended.

Appendix H – Tuggerah Beach Lakes.
Letter from the Secretary to the President of the Fisheries Commission

Mr Hargraves informed me this morning that the officer of the Works Department who had been sent to examine the entrance to the lakes had returned, and that his report might shortly be expected.

He explained, in reference to the lakes generally, that the effect of the closure from the sea was to cause a sickness amongst the fish; that the mullet showed black spots through their flesh and that they were full of worms, and that when dead they remained flaccid and never attained rigidity.

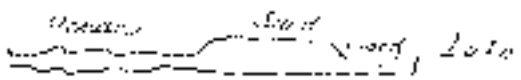
He also said that when the restrictions of the 17th section Fisheries Act are removed, the lake will be despoiled by Chinamen, unless means are provided for the daily transit of fish thence to Sydney market.

That the supply from the lakes will be enormous, and that it might be in the province of the Commissioners to provide a means of communication, at any rate in the first instance, in order to open the way for subsequent private enterprise.

12/4/83
L.G.T.

Mr Commissioner Want to the President of the Fisheries Commission

Sir,
I have the honor to inform you that, by direction of the Fisheries Commissioners, I visited Tuggerah Beach Lakes, on the 9th inst., in the steam launch "Florrie," chartered for the occasion. Arrived off the entrance to the lakes about 3 o'clock p.m., and found that the same was closed from the ocean by a neck of island about (150) one hundred and fifty yards from water to water and sanded up in the natural channel say for 30 or 40 feet, about from 4 feet high, the remaining distance being some (7) seven or (8) eight feet high thus:-



I made inquiries from Mr Hargraves, a resident there of some years standing, and ascertained from him that it would be a most costly undertaking at present and not absolutely necessary for the preservation of the fish in the lake for several reasons to open the same, which I found

afterwards borne out by a visit to the upper end of the first or southern lake, where most of the fishermen live. When at work there, I may state, in the first place, it is only for a limited number of months (in the winter) that these men can carry on fishing operations with a successful issue, as the fish will not keep in summer to reach the market; in the second place, the lake is almost divided into three lakes by narrow necks of water, and in each of these the rocks are conspicuous along the shore, preventing any hauling in fully half the same; thirdly, the difficulty of getting fish to market.

At Mr Hargraves' place, which is situated at Bungaree Norah Head, the small steamers embark their freights of fish, which can only be done in fine weather at this point. The lake is about two (2) miles by land from the ocean at this point, and the fish are carted over in bullock drays, at a charge of one shilling a basket, by Mr Hargraves.

I examined several fishermen, and they were of opinion that the lakes were full of fish, and little, if any, object would be gained by opening the mouth of the entrance to the lakes. I was preceded by The Central Inspector, Mr Quinan, and boatman Hellings, who went by sailing-vessel to Terrigal the previous day, and who had ridden over by the entrance, with a view of inspecting the nets and boats.

We examined the boats, nets, &c, having walked across the two miles and back, returning by steamer, on the 18th inst.

The fishermen are divided in the lakes, some fishing the northern lake and sending their fish overland to Newcastle, and then to Sydney by steamer. From what I could learn, there must be some forty fishermen at work in the vicinity.

I may add, in conclusion, I found the water on the coast from Terrigal to Bungaree Norah plentifully supplied with fish. The schnapper kind can be caught as fast as the lines could be put down, and if properly worked could more than supply the wants of the market at present from line fishing alone. The night before I arrived at Bungaree Norah, 180 baskets of fish were carted across to the steamers, irrespective of the catch in the upper lakes, which I learned was nearly as great.

I have, &c.,
G.F. Want

Extract from Mr E.J. Hargraves' letter to the Secretary to the Commissioners of Fisheries.

Noraville, 22 October, 1883

Sir
I have the honor to acknowledge the receipt of you communication of the 15th instant, with reference to the opening out of Tuggerah Beach Lakes to the sea. On the 6th instant some of the settlers commenced the work, and on the following day had let the water out.

I have, &c.,
E.J. Hargraves

Entrance blocked and lake level high - 1884

On the Great Northern Line- Gosford to Newcastle; …Tuggerah Beach Lake is an estuary or inlet of the sea, and at the time of our artist's visit the entrance to it on the sea coast was blocked with sand, and the road from Ourimbah Creek to Tumbi Umbi was completely under water. (Town and Country Journal, 2nd Feb 1884)

1889 flood

On May 27th 1889 heavy rain caused the lake to flood. The lake was over the flat (now Budgewoi Rd near the Sea N Sun Motel) *and the lake crossing at Budgewoi where the sulky and wagons crossed it was 7 to 8 feet deep. The horses had to swim for 60 yards.* (summary of Elizabeth Hargraves diary by Gambrill and Gambrill 1991)

Flood in 1893

The first punt on the Wyong River was destroyed by a large flood in 1893. (Stinson, vol 5, 1984)

1893 flood

This is a letter written by a pupil at Wyong Primary School on March 14th 1893 which describes a huge flood and the destruction of the original punt across the Wyong River. *"Dear Fred, The last flood was the highest flood ever known in Wyong. It destroyed lots of crops. The flood made the lake rise very high. The current was so strong that it carried the old punt from Mr Woods place to the other punt; when it struck against the new punt they both went to the bridge. The old punt broke its railing and got under the bridge, it is now in the lakes. If this old punt gets out to sea it might wreck ships. I have nothing more to say about the floods. I remain yours affectionately F Chapman.* (reprinted in Stinson vol 5, 1984)

Entrance blocked in 1896

<u>Tuggerah Lakes:</u> …….We have experienced a large amount of trouble in keeping the entrance clear, and eventually it was found absolutely necessary to employ labour to cut a channel through the sand bank which unfortunately made right across the channel, thus stopping the inflow of the sea, and was found to be acting most detrimentally upon fishing…..

Sir,

I have the honor to submit my annual report of the fisheries of Tuggerah Beach Lakes for the year 1896. The fish supply of these lakes for the year just ended has been quite equal to former years, although at the beginning of the year the entrance became silted up, thus to a certain extent stopping the fish from getting either in or out; then when rain came the waters in the lakes rose and covered all the landing, so that the fishermen could not land their nets.

The fishermen made three attempts to open the lake but failed. It was then taken by contract by P Flanagan for the sum of £10, and he succeeded in opening the lake on the 1st August, thus lowering the water in the lake, and enabling the fishermen to work again.

I am sorry to say that through the absence of any heavy rainfall the entrance is silting up again. I think that some steps might be taken to try and keep the entrance to these lakes open, seeing that they contribute so largely to the general supply of fish.

C Gordon. (1896 Fisheries Annual Report)

Entrance channel open for most of 1897

The entrance opened on 24th April through the heavy sea breaking over, and there was a very large entrance up till the end of the year; but it has since closed up considerably, and is likely to close altogether if rain does not soon come. (1897 Fisheries Annual report)

Entrance channel remains open - 1898

The entrance still keeps open, having about 4 feet on bar at high water, so that travelling fish can enter, and fish outward bound can get out. (1898 Fisheries Annual Report)

Heavy rain and floods in 1903

The present season is regarded as the wettest on record in this district. Hardly a fine day has been seen this summer. All bush work is completely stopped, likewise the mills. On Friday night last the rainfall in some parts of the district was extraordinary, totalling five to seven inches in some places. At Tuggerah all the low-lying lands were inundated, and from Wyong to the Tuggerah Hotel was simply a sea of water. (Gosford Times; November 15, 1903, :reprinted in Stinson, vol 3, 1981)

1903 flood

From 5-7 inches of rain on a November night in 1903 caused serious flooding. From Wyong to the Tuggerah Lakes was a sea of water. (Swancott 1963)

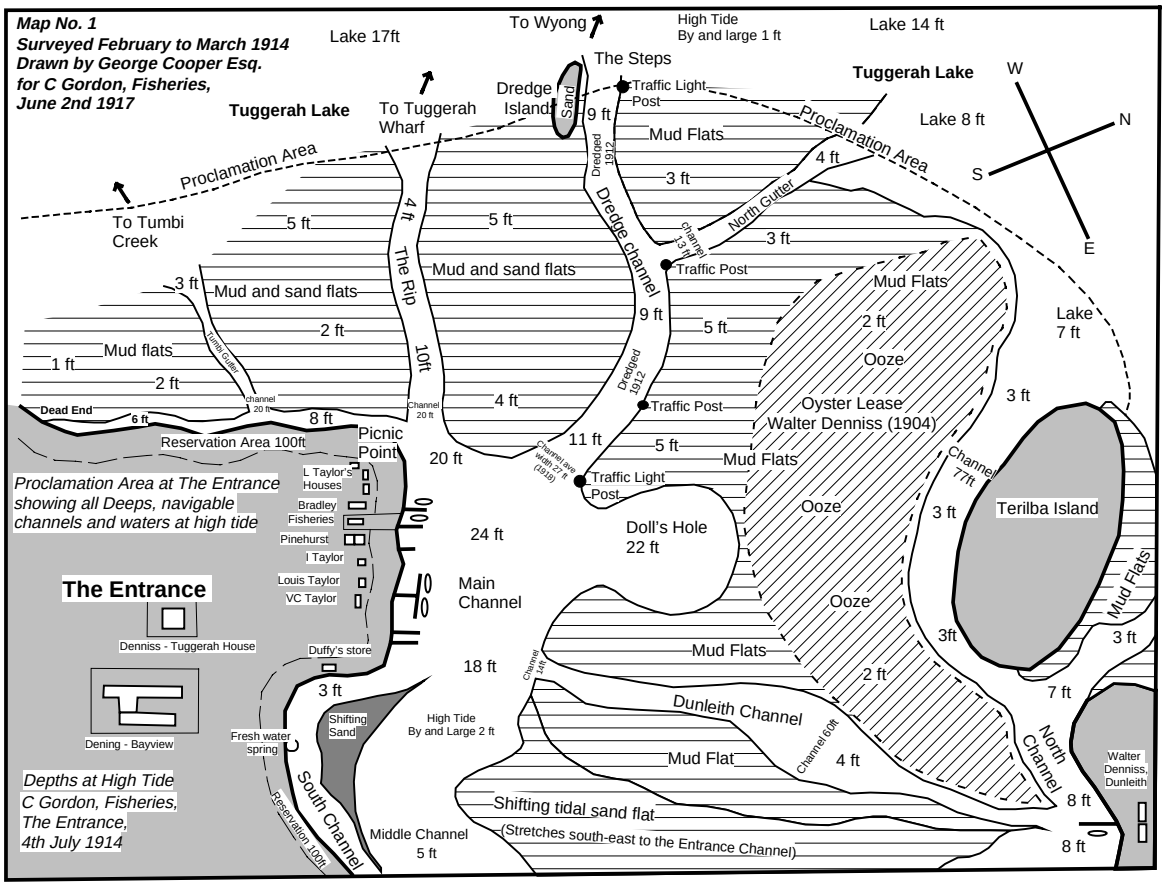
Lake rose 4 feet – 1905 flood

In April, 1905, as a result of three days very heavy rain, the waters of Tuggerah Lake rose 4 feet in height, and flooded all the low-lying lands (1905 Fisheries Annual Report)

1905 Flood

Tremendous rain in December 1905, over 8 inches at Wyong Creek and Jilliby, and much more at Yarramalong. This caused Ourimbah Creek to rise 20 feet above the ordinary summer level within 12 hours. Farms and orchards were destroyed. (Swancott 1963)

Inspector Gordon's sketch map of the channels and sand bars at The Entrance in 1914



(redrawn by A Scott)

Channel opened up in 1914

The entrance from Tuggerah Lake to the ocean was closed up in the beginning of January by the formation of a sand bar; and after a few months' closure, a large body of water, the result of heavy rain, accumulated and caused great inconvenience to the farming population settled on the banks of Wyong Creek. In view of the damage to property bordering on the lake and creeks by inundation from the backed up waters, the Public Works Department was authorised in July to open a channel to allow the accumulated waters to escape to the ocean. (1914 Fisheries Annual Report)

Channel opened to reduce water level - 1915

The entrance was closed for about eight months during 1915, and the lake rose so high that the Shire Council was compelled to open it, since when it has remained open, though it is now rapidly closing again. (Letter from C Gordon, the Fisheries Inspector, in the 1915 Fisheries Annual Report)

Cutting a channel in 1916

….In June a sand-bar formed across the mouth of Tuggerah Lake and the entrance remained closed to the ocean waters for several weeks, and in August the residents endeavoured to cut an opening through the sand-bar, but failed to set the waters running. Another attempt which was made in October by a number of local fishermen was successful in cutting a channel which very quickly increased to a width of 50 yards. (1916 Fisheries Annual Report)

Channel remains open due to heavy rain - 1919

The lake was open to the sea throughout the year, and the heavy rainfall, 40.95 points assisted in keeping the entrance open. (1919 Fisheries Annual Report)

Dredging the channel

Late in 1919 the channel from The Entrance to Pelican Island became silted up and was unnavigable for the ferry boats plying from Wyong. Erina Shire, of which Wyong was then part appealed to the State Government for a dredge to clean out the channels. The Government said there were no funds available for the project. And there the matter stood.

The problem was overcome by the ingenuity of the late Mr E.D. Bateman of Pinehurst Guest House, the father of Mr Royce Bateman. He submitted a plan for a manually operated machine to Erina Shire Council, which approved it. Built by the Council, the machine did an excellent job of work in clearing the channel. It was manipulated by five men and consisted of a rotating arm on a pole supported by braces. At each end was suspended a pulley through which ran a rope supporting two hinged scoops with handles. …. A Government dredge was transported to The Entrance in 1921 by the then Harbours and Rivers Department. (McClure, 1978)

Channel closed for much of 1920

The entrance to the lake closed to the sea on 18th March and again opened on 12th December. Fish were very little affected by the closure. (1920 Fisheries Annual Report)

Killarney Vale used to flood

My father told me once that back in last century, perhaps a hundred years ago, and certainly before my time, the entrance to the ocean was blocked (and this has happened many times) and big floods in the Yarramalong and Dooralong and Ourimbah creek valleys had raised the waters of the lakes to unheard-of heights. The waters poured into the lake and there was nowhere for

them to go but to spill over into low lying grounds along the foreshores. All that land where the (Killarney Vale) *shopping centre is now and right out to the hills to the south was submerged in big swamps which were there for many months and swans made their nests there.* (Memoirs of Raymond Taylor, a pioneer of the Entrance, born in 1892. Stinson, vol 1, 1979)

The greatest flood - 1927

The greatest flood ever recorded in Wyong occurred on Easter Saturday, April 16, 1927. It reached its peak here about 2 o'clock in the afternoon. The waters poured over the railway line between Wyong and Tuggerah (see photo in Stinson, p77, vol 2, 1980 and series of photos in Stinson, vol 6, 1988). *Some houses on the western side of Tuggerah Straight were half submerged in that flood, and had to be vacated by the occupants.* (Stinson, vol 6, 1988)

1927 flood

18 April; The biggest flood that Wyong has ever had. Three people drowned, houses and fences washed away. Cattle and pigs, fowls and all their produce lost. It is 8 pm. (from Elizabeth Hargraves diary, reprinted by Gambrill and Gambrill 1991)

February 1929 flood

14th Feb – Jack Conley did not take the mail to Wyong this morning. Wyong creek is flooded, the launch could not pass the bridge and there were logs, trees and rubbish coming down with the tide that it was not safe for the launch. Dudley came home too wet to work on the road. Albert said the water was level with the bridge at Budgewoi; he thought he would never get through the water.

15th Feb – A fine day. Jack Conley went to Wyong with his launch today. The lake is up – the water is over the jetty at Toukley. (from Elizabeth Hargraves diary, reprinted by Gambrill and Gambrill 1991)

June 1930 flood

18th June – Chris Chicory started for Newcastle but could not get past the sand (south of Budgewoi, end of Toukley Golf Course). *It is the highest flood that the fishermen have seen in the lake. The train could not pass Tuggerah station this morning, the water was up to the railway bridge. Nora rang up, she said the floodwater is up to Edie's verandah posts and up to Ada's cottage. Dick Clifford had two cows drowned last night and Renie had 12 fowls drowned. Three of the boats got smashed at Toukley last night; the water is up to some of the door steps.* (from Elizabeth Hargraves diary, reprinted by Gambrill and Gambrill 1991)

Digging out the channel - 1937

12th July - 40 men digging a channel to the lake to let the water out at the Entrance.

13th July - The men are still working at the Entrance digging the channel. The lake is very high. All Tea Tree Point (now Toukley Golf Course) *is under water. Up to the logging at Budgewoi. Nora says all the little islands are covered with water.*

15th July - Small flow out of the lake.

19th July - Edie rang up, she said the Entrance is running strongly and the lake has gone down 3 feet. (from Elizabeth Hargraves diary, reprinted by Gambrill and Gambrill 1991)

Comparing the 1937 flood with that of 1889

In 1937 when the entrance channel was cut the water was only three feet higher than usual, but Mr Smith recalls that in 1889 a storm which came up in the morning and lasted all night caused the lake level to rise to six feet above normal. (Swancott 1963)

1939 Flood – opening up the channel

During April 1939 Tuggerah lakes were closed to the sea and heavy rains caused flooding around the waterfront. Horse scoops and manual labour were used to open up the channel. (Swancott 1963)

Opening up the Entrance channel - 1939*;*

The Entrance had been blocked for nearly two years, and as a consequence the lakes had risen and were flooding properties adjacent the foreshores. In some instances the rise in the lakes had encroached on dwellings at Tuggerah and Chittaway, while a large area of Berkeley Vale had also been flooded. The old Erina Shire decided that quick action be taken and supplied men with scoops and two horse teams to scoop out a channel. ….. Fish which had been enclosed in the lakes were eager to get to the sea, and crowds worked in relays day and night to secure their share of the big fish drive. The picture was taken on April 25, 1939. (see page 98 of The Entrance Long Ago, by A McClure, 1978).

1946 flood

The 1946 flood was 6ft or more above normal. Tacoma was completely cut off. Some homes had up to 2 feet of water in them. When the channel burst, the fish went to sea and the fishermen had to go to other places to earn a living. (Swancott 1963)

Convening a conference on the flooding of foreshores

1st October, 1947
JG: HS 63/4.

Under Secretary
Department of Harbours and Rivers,
Sydney

Dear Sir,

<u>Flooding of the foreshores of Tuggerah Lakes</u>
A deputation, representing numerous public organisations throughout the Wyong Shire, was recently received by the above mentioned Council in connection with this matter and, as a result of the views expressed by the deputation and, in light of the knowledge of the serious position which arises from time to time, the Council decided to convene a conference of all interested parties to consider measures to prevent the periodical flooding of the areas around the shores of the Tuggerah Lakes and the silting up of the channels therein.

It has been decided to hold a conference at The Entrance on Monday the 3rd November, 1947 at 10.30 a.m. and to invite representatives of the undermentioned departments to attend, in addition to representatives of the various local organisations concerned and the two Members of Parliament representing this District, namely –

Department of Lands
Department of Main Roads
Department of Public Works
Chief Secretary's Department
Soil Conservation Service
Forestry Commission
Tuggerah Fishermen's League
Wyong Chamber of Commerce
Local Branches of the Agricultural Bureau of New South Wales
Local Branches of the Primary Producers Union
Various Progress Associations in the District
Minister for Tourist Activities & Immigration
Federal Member for the District

In view of the importance of this conference, I trust you will endeavour to assist the Council by making the necessary arrangements for an officer of your department to attend. Your early reply will be appreciated.

Yours faithfully
Shire Clerk.

Permanent entrance too expensive - 1948

Department of Public Works NSW
Bridge and Phillip Streets
Sydney
H.&R.48/359

The Shire Clerk,
Wyong Shire Council,
Wyong

Flooding of Tuggerah Lakes

Dear Sir,
Referring to your communication dated 27/1/48, No. JG:JT.63/4, Mr AR Ford's report confirmed the opinions previously expressed by this department, i.e. that the cost of constructing entrance works to give a permanent opening would not appear to justify the costs involved. Under existing conditions of settlement and of land-use, reasonable protection against serious damage from flooding, could be obtained by cutting a channel through the sand bar when the flood waters reach a critical height.

The above practice is adopted by other Councils along the coast of NSW and in some cases a wide shallow dry channel is maintained from the lake to the limit of wave action in order to permit the opening to be made without delay.

Yours faithfully
D Ford
Under Secretary

(letter received by Council on 11th February 1948)

1949 flood
Another large flood occurred in June 1949 and the approaches to the old Toukley bridge were submerged. (see photo on page 77 of, Stinson, vol 2, 1980)

Silting not new
The silting of the Entrance estuary is not a new thing…. As far back as memory and pictorial records go, silting of the channel has been a major problem. Clearance of the channel tends to lessen conditions considerably, at least for a time, but then the sand returns. (McClure, 1978)

Rainfall records

The flooding of Tuggerah Lakes depends on two main factors, 1) high rainfall, and 2) blocking of the entrance channel which prevents the release of water. Table 3 presents a summary of major rainfall events that have been recorded for Wyong during the period May 1885 to May 1998.

Table 3. Major rainfall events for Wyong; 1885 to 1998

Date	***Rainfall (mm)***
June 1885	274 mm in 3 days
May 1889	**440 mm in 4 days**
March 1894	215 mm in 6 days
January 1895	246 mm in 4 days
August 1899	251 mm in 4 days
June 1900	212 mm in 4 days
April 1905	**389 mm in 2 days**
March 1907	261 mm in 4 days
December 1920	341 mm in 8 days (242 mm in 4 days)
Dec 1921 – Jan 1922	**410 mm in 14 days**
January 1924	268 mm in 4 days
May 1925	311 mm in 10 days
December 1926	298 mm in 3 days
April 1927	**390 mm in 5 days**
February 1929	264 mm in 5 days
October 1929	290 mm in 7 days
March 1930	267 mm in 8 days
June 1930	284 mm in 3 days
March 1942	**461 mm in 8 days**
May 1943	**376 mm in 13 days (246 mm in 4 days)**
June 1945	304 mm in 7 days
April 1946	**658 mm in 5 days**
January 1948	206 mm in 5 days
January 1949	293 mm in 2 days
June 1949	321 mm in 6 days
June 1950	270mm in 5 days
July 1952	284 mm in 4 days
May 1953	**473 mm in 8 days (248 mm in 3 days)**
February 1956	215 mm in 3 days
March 1958	201 mm in 4 days
May 1962	276 mm in 5 days
April 1963	250 mm in 4 days
June 1964	**432 mm in 8 days**
January 1972	218 mm in 5 days
March 1977	261 mm in 3 days
March 1978	247 mm in 8 days
May 1978	207 mm in 5 days
May/June 1978	217 mm in 3 days
February 1981	218 mm in 2 days
November 1984	203 mm in 4 days
July 1988	204 mm in 2 days
December 1989	292 mm in 3 days (266 mm in 1 day)
February 1990	**405 mm in 2 days**
April 1990	202 mm in 6 days
February 1992	214 mm in 3 days
May 1998	237 mm in 5 days

Notes: Rainfall events of 200 mm or more are listed. Those which exceed 350 mm are in bold

This data was obtained from Bureau of Meteorology. Unfortunately the data set is not complete. Missing data includes most of 1903 and 1904, some of 1917, all of 1931, some of 1966, much of 1967 and some of 1968.

7 Bird life

There are a considerable number of historical documents which comment on the abundant birdlife of the Tuggerah Lakes, in particular waterbirds such as swans, ducks, pelicans and cormorants. This abundance of birdlife was an attraction for hunters, and a number of the documents refer to this activity. Fishermen on the other hand, saw the fish-eating waterbirds as pests and in the early 1900s the local fishing inspector was attempting to reduce the cormorant population by shooting them.

There are few historical records that refer to the breeding of waterbirds on the Tuggerah Lakes, although there is one document from 1842 that refers to the nesting of swans in the shallows near the mouth of the Wyong Creek.

Black swans and pelicans - 1834

On the shoal near the mouth of Tuggerah Beach Creek were hundreds of Pelicans, who took no notice of the boat, though we passed very near, they gazed at us apparently unconcerned, as if aware that we were too much engaged with the dangers of our own situation, to think of hurting them: they are most extraordinary looking birds, and I was very anxious to get one; we had seen several before in different parts of the Lake, and had made many efforts to shoot one, though always unsuccessful as they are very shy; in crossing we also roused an immense flight of Black Swans. I should scarcely have recognised these birds, for the under part of the wing being white or grey, gives them quite a different appearance when flying : the young birds too are nearly white, and assume their mourning habits by degrees, the old birds only being quite black.
(Journal of Sarah Mathew – wife of surveyor Felton Mathew, Jan 1834. Reprinted in Stinson, vol 4, 1983. Original manuscript is in the National Library)

Swans nesting - 1842

Description by John Mann in 1842 when he attended an aboriginal corroboree at the junction of Wyong Creek with Tuggerah Lake. *The lake abounded with fish of all sorts, but what attracted my attention in the first instance were the black swans; their nests built in the water of sticks were dotted over the whole of the shallow beaches of the lake. Every nest contained several eggs, and we each colleted as many as we could conveniently carry. The several points of land which extended into the lake were black with ducks, and waterfowl; they were in thousands, and covered acres of ground. The outlines of the sand flats were indicated by a countless number of pelicans.*
(First published in the Daily Telegraph probably late in the last century, and later reprinted in the Gosford Times on May 20th and May 27th 1904. Also in Swancott 1963 and Stinson, vol 1 1994)

Birds of Tuggerah Beach Lakes - 1867

<u>Brisbane Water - from our correspondent:</u> *The waterbirds which are most numerous at the Tuggarah Beach Lakes are the black swans, black ducks, teal, shoveller ducks, sea curlew or sea snipe, pelicans, and cormorants. There are also jabirus, native companions, spoonbills, nankeen cranes, and various kinds of herons. In the Wyong creek swamps there are plenty of common snipe, and about the creek numerous redbills and a few landrail; there are also some wood ducks, widgeon and musk ducks.* (Beginning of next sentence is obliterated) *is a plain rather more than a mile wide and three miles long, where there are a great many spurwing, plover, and other birds.*

There are very few settlers at Tuggarah, for the land is inferior in the immediate neighbourhood of the lakes, so that the birds are not more disturbed now than they were before the white man landed in Australia.

I will give a short account of those birds I am acquainted with, and of others I can get an accurate description of. The black swans are very numerous at Tuggarah; you may sometimes count as many as a hundred within range of your eye at one time. The colour is deep black and the pinion

feathers white, which are generally only seen when in flight. They breed in August; the young birds are light mottled grey. They are excellent eating when young. The proper time to shoot them is the end of Autumn. The black duck is so well known that I need not describe it; it is the best eating of all our game birds except perhaps the Wonga Wonga pigeon. The teal are the most numerous at Tuggarah of all the duck tribe next to the black duck. The drake is a beautiful little bird, chestnut and black-mottled, and with a green neck. I do not think there is more than one variety of teal at Tuggarah, but there are several varieties in Australia, and I have seen two or three very beautiful specimens in Queensland, almost as handsome as mandarin drake.

The shoveller is a large duck, dull in plumage; the bill is more than three inches in length, and very broad at the extremity. It is plentiful at Tuggarah, and appears to mix freely with the black duck. They are not good flyers; it is good eating.

The wood duck is a very rare bird with us, as I expected it to be. I can only find one person who has seen any specimens at Tuggarah. It is a very beautiful duck, the plumage light grey mottled with black, the breast nearly black, and the head and neck chestnut; I have found it to be rather a shy bird, and not particularly good eating; I believe naturalists place it among the geese, the head and beak resemble those of barnacle geese; you generally see them in flocks by the side of a water-hole, more frequently than in the water, and they are evidently grazers; it generally makes its nest in the hole of a tree by the side of the creek; I do not know the widgeon here by sight; I believe it is called the pochard by shooters; it is described as being like the English widgeon in plumage; it is generally found in the creek, and is tolerably plentiful.

The musk duck is a very ugly clumsy bird of a dark grey colour, and the drake has a strong smell of musk. It is a rare bird and very shy. Its wings are small and it is a capital diver, indeed I think it comes nearer to the diver class than to the ducks. It is not worth shooting as far as eating is concerned.

The sea curlew or sea snipe, as they are called here, I believe to be similar to the curlew which are found upon the coasts in England; quite a different bird from what we are accustomed to call the curlew here (with its long melancholy cry), which is called at home the Norfolk plover or stone curlew. The sea curlew is a shy bird, and in winter assembles in considerable flocks. I am informed that there are two varieties, but I cannot vouch for the fact. It is good eating.

There are very few people who have made voyages along this coast that are not acquainted with the pelican. It is useless, as far as sport is concerned, but is picturesque and gives interest to the scene. It is larger than the black swan, the body white and the wings black, the beak long, with a large pouch on the under side of it. These birds are chiefly found in the immediate neighbourhood of the coast, but I once shot one near the head of the Burnett River, upwards of sixty miles from the coast in a straight line, and many hundred miles by the course of the river, which it must have followed up from the sea.

The cormorants, or shags, as they are commonly called, are numerous in all the salt water lakes in this district. There are several varieties: one a large black bird, not very much less than the swan, with the breast very dark-grey streaked with black; there are two smaller kinds, black and white. They are not fit to eat. These birds are not confined to the coast.

The jabirus are not uncommon at Tuggarah. I am informed that it is seldom a sportsman goes out for a days shooting without seeing some. About two months ago a settler living in the neighbourhood of the lake, shot a black swan when in flight, and it fell dead into the nest and across the neck of a young jabiru, and pinned it to the ground until the man ran up and caught it. There were two other young ones in the nest which escaped. The man took the bird to Sydney, and sold it to the market, I am told, for fifteen shillings. I did not see the bird.

A gentleman who keeps a boat in the Wyong Creek, about three miles from the lake, and occasionally can spare a day for shooting, informs me that last season he found the nest of a jabiru in a small teatree scrub in the swamp, in which were two young birds; he could not take them then, but returned in two or three days for that purpose, when he found that the native dogs

had destroyed them. Evidently the same pair of jabirus soon after built another nest, this time high up in a dead swamp mahogany tree. The second clutch of birds also came to grief, for when large enough to take, some men cut the tree down to obtain the young birds, and they were killed, by the falling of the tree. I could not learn how many birds there were in the second nest. Some of these birds are described to me as being five and a half feet heigh (sic.). This is taller than I have generally seen accounts of but three of my informants agree as to the heigh.

The jabiru is a very handsome, elegant bird, the predominant colours being green and white, the white much shown while in flight. The beak is very long and powerful. A gentleman says that he has seen at Tuggarah another species of gigantic crane still larger than the jabiru.

In the swamps an occasional native companion is seen, but, they are a rare bird with us. It is a very shy bird. It is more like the English crane than most birds which we call cranes here, but larger than the European bird. The general colour is light slate blue, with a red cere and a bare head; they are nearly as tall as the jabiru; they are fit to eat. It is easily tamed. I remember a good many years ago two being kept in the small garden in front of the old "Red Cow", in Parramatta. …(Sydney Morning Herald, 12/4/1867)

The lakes swarm with swans and ducks - 1878

…. The Wyong and the Ourumbah – called creeks, but in reality small fresh water streams, or rivers – with other (much less important) rivulets, discharge themselves into Tuggerah Beach Lake, which swarms with wild swan, wild duck, &c., and it is full of fish. (Australian Town and Country Journal, 10 Aug, 1878)

Lake covered with swans and other fowls - 1884

On the Great Northern Line- Gosford to Newcastle; Tuggerah Beach Lake is an estuary or inlet of the sea, and at the time of our artist's visit the entrance to it on the sea coast blocked with sand, and the road from Ourimbah Creek to Tumbi Umbi was completely under water. The lake is literally covered with black swans and other fowls. (Town and Country Journal 2nd February, 1884)

Home to many birds - 1885

….Pelicans, swans, ducks, teal, snipe, curlews, and pigeons, too, find a home either on the placid surface of the lake or thick, grassy, and thinly-timbered fringe through which we travelled. (From an 1885 newspaper article describing a ride on horseback past the southern shore of Tuggerah Lakes, reprinted by Jones and Eyers 1988)

Plenty of swan and duck shooting near Tumbi Umbi Ck - 1885

…Overlooking and indeed stretching down to the lake is a farm of 120 acres, about one third of which is cleared, belonging to Mr B.O. Holterman, M.L.A., and in charge of Mr Taylor. With fertile land on the flat, through which runs the Tumbi-Umbi Creek, and in every way conveniently situated for sport, this neat little property should make an excellent site of a shooting box. On the lakes, besides good fishing, plenty of swan and duck shooting is to be obtained, to say nothing of kangaroos, wallabies, and even the more exciting sport of hunting dingoes. The country around here, therefore, should be in great request as soon as the railway to Waratah, which runs within a few miles of the lakes is completed. (Sydney Mail, 14 March, 1885)

Hunting ducks in the late 19th century

I have often been with my father when quite a lad duck shooting on Tuggerah Lakes. I can assure you it was a wild place then, not a resident within miles. I might tell you I have on those occasions been terrified at night by the howling of dingoes and the screeching of the wild fowl which was very numerous at that time. (Part of an address made by Mr W.J. Waters in 1917 at a

pioneers dinner. Mr Waters was born in 1855 and his family moved to Yarramalong when he was aged two. Stinson, vol 1, 1979)

The ravages of waterbirds on small fish - 1890
I am, however, much impressed with the importance of Lake Budgewoi as a breeding ground and nursery; it contains extensive flats, on which food exists in abundance. These flats are so mercilessly hauled by fishermen that future fish supply will assuredly suffer, as also it will suffer from the ravages of water birds, which collect on them in immense flocks.

Some part at least of these flats ought to be closed against the use of fishing nets, and an effort should be made to destroy or drive away the birds. It would be scarcely consistent to close the flats against netters, and yet allow these voracious pests to remain unmolested. …. (1890 Fisheries Annual Report)

Very numerous swan, pelican, duck coot and various other sea birds - 1898
But ere I lay my pen to rest I feel in duty bound to make some slight reference to our beautiful pleasure resort – the charming Tuggerah Lakes – where hundreds of people during the summer months avail themselves of every possible opportunity of visiting; and is there any wonder, situated as it is bordered with the swamp-oak, green mossy banks and sparklings and banks, while floating serenely upon its silvery crest can always be discerned the ever numerous swan, pelican, duck coot and various other sea birds, with abundance of fish always available, being constantly fed by means of a beautiful entrance to the sea. In fact I think we might justly agitate its inclusion as one of the most lovely pleasure resorts of New South Wales. (Last paragraph of newspaper article written by AT Hawkins entitled "Ourimbah and its surroundings" in the Gosford Times, 9th September 1898. Reprinted by Jones and Eyers 1988)

"In my young days there were millions of birds" – early 20th century
From the junction of the Wyong and Gosford roads running south (towards Gosford) from there about a mile, and for several hundreds of yards on either side of the road in the vicinity of what is now the high school and beyond, was a favourite grazing area for the cattle, and we used to call it "the big plain". Last century a picnic horse race meeting was held there.

To the west of "the big plain" is a low-lying area which includes the new Killarney Vale shopping centre. My father told me once that back in the last century, perhaps a hundred years ago, and certainly before my time, the entrance to the ocean was blocked (and this has happened many times) and big floods in the Yarramalong and Dooralong and Ourimbah Creek valleys had raised the waters of the lakes to unheard-of heights. The waters poured into the lake and there was nowhere for them to go but to spill over into the low-lying grounds along the foreshores. All that land where the shopping centre is now and right out to the hills to the south was submerged in big swamps which were there for many months and swans made their nests there.

In my young days there were millions of birds - swans, pelicans, cormorants and ducks - on the lake which in places was black with them. I have seen swans massed there for as far as the eye could see. I have heard that on the middle lake there was once great numbers of redbills. I can remember when there was four pence a head bounty on cormorants, or shags as some people call them. They were eating so many fish, they were treated as pests. People went in with guns and shot great numbers of the birds or frightened them away. Very few remain now. (Memoirs of Raymond Taylor of The Entrance, born 1892. From Stinson, vol 1, 1979)

A visit to the Tuggerah Lakes (NSW) - 1904
As an extension to the fourth Congress of the Australian Ornithologists Union, held in Sydney during November and December (of 1904), *a party of the visiting members made an excursion to the Tuggerah Lakes, situated about 60 miles north of Sydney. …. The party caught the early Newcastle train which proceeds via Hawkesbury, where some charming water and landscape*

scenery is to be observed as the train wends its way along narrow, low embankments, with water on either side – ideal spots for waterfowl and waders. Our destination was reached at noon. We made our headquarters at Mr Legge's house of accommodation – a very suitable position, with thick bush country near, and moderately timbered land with settlers' clearings here and there, and only a few miles from some of the sub-tropical virgin scrub, intermixed with palms, various fruit-bearing trees and berry-bearing bushes. ….Mr Legge's three younger sons, who are thoroughly observant, and inclined towards natural history, rendered valuable assistance in locating the various birds, and so saved us much valuable time. They are also expert boatmen, and so, immediately after refreshing the "inner man", two of the party sailed with Mr H W Legge in his small boat in a flying trip across the big lake, which is comparatively shallow and salt, being a large inlet, land-locked, with a narrow and shallow entrance from the sea. Waterfowl were plentiful, especially the Black Swan (Chenopis atrata), which were congregated in thousands on the weedy shallows, where an abundance of food is procurable. Several species of Cormorants were seen, including the Black (Phalacrocorax carbo), Pied (P. hypoleucus), and the Little Cormorant (P. melanoleucus). The Silver Gull (Larus novae-hollandiae) graced the scene with its silvery plumage, while Black Duck (Anas superciliosa) and the Grey Teal (Nettion gibberifrons) were fairly plentiful. Up a sluggish and brackish river that empties itself into the lake the Darter (Plotus novae-hollandiae) was seen; while here and there along the banks Blue Kingfishers (Alycone azurea) would dart along like flashes of light in the rays of the sun, or the more stately Sacred Kingfisher (Halycon sanctus) could be seen perched on a dry tree near the water. …. Far aloft the wedge-tailed eagle (Aquila audax) soared in circles out of harms way, and further on a pair of White-bellied Sea-eagles (Haliaetus leucogaster) was seen.

A morning spent near the lake's edge gave opportunity of seeing a few shore birds, and several Sharp-tailed Stints (Heteropygia acuminata) were secured. The Curlew (Numenius cyanopus) could be seen wading in the shallows, while a White-fronted Heron (Notophoyx novae-hollandiae) was perched on a neighbouring dry tree. A few Spur-winged Plovers (Lobivanellus lobatus) gave their warning cry, which every sportsman well knows, often to his cost. Some Silver Gulls (Larus novae-hollandiae) were floating on the wing just above the salt water. Over the open flats between the lake and timbered country a Spotted Harrier (Circus assimilis) soared in search of prey, and the innocent little Nankeen Kestrel (Tinnunculus cenchroides) hovered in the air over a mouse or other titbit ere it descended to carry it off. Here too the Swallow (Hirundo neoxena) swept the surface of the pools and chased the gnats, that were plentiful. …(The Emu, Official Journal of the Australian Ornithologists Union, Vol 5, pages 1-6, July 1905.)

Great quantities of wild duck - 1905

District News – Tuggerah … Great quantities of wild duck have been seen on Tuggerah Lakes during the last few months which is rather unusual for this time of year. Messrs Legge have been getting great numbers for market use. Excellent fishing is also obtainable on the lake at present and the boarding house keepers are benefiting to no little extent through the sport obtainable. …(The Gosford Times, 17/3/1905)

Celebrated shooting and fishing grounds - 1907

The lakes have long been celebrated as shooting and fishing grounds. Gill birds, wild duck, quail, sand snipe, red bill, parrots, and pigeons are obtained, and wallabies are met with. **(**Description of Tuggerah Lakes from 1907 Tourist Bureau pamphlet)

Shooting the cormorants - 1908

Being supplied with 100 cartridges for the destruction of shags, I have killed 53, using 41 cartridges. The birds were not so plentiful this year. (letter from Inspector C Gordon, in the 1908 Fisheries Annual Report)

Shooting the cormorants - 1909

Being supplied with cartridges for the destruction of cormorants, I shot seventy-six birds, using fifty-six cartridges. I also issued vouchers for 177 heads, making 253 in all. Launches ply daily between Wyong and the entrance, and the boarding houses have been well patronised this season. (letter from Inspector C Gordon, 1909 Fisheries Annual Report)

Cormorants numerous in 1915

Cormorants were exceedingly numerous and destructive to young fish. (1915 Fisheries Annual Report)

Fish and ducks plentiful

Fish and wild ducks were there for the taking, and oysters were readily available in the channel and along the lake between the channel and what is now Long Jetty. (Memoirs of Raymond Taylor, a pioneer of the Entrance, born in 1892, reprinted in Stinson, vol 1, 1979)

Birds sent to market

"Harry Herbert Denniss, the oldest living professional fisherman at The Entrance, was born in 1885 and came on the first train to cross the newly built Hawkesbury railway bridge to settle with his family in the Wyong district…. Harry mixed fishing with the shooting of gillbirds, duck and pigeons. These would be placed on top of the partly filled fish baskets and would sell readily on the Woolloomooloo wharf. (Swancott 1963)

McPherson's Brush – breeding in the swamps

The heavily timbered area to the west of Tuggerah Straight was known as McPherson's Brush. This brush was largely swampy and a breeding ground for a great number of waterbirds - wild ducks, redbills, swans, egrets and the like. (Stinson, vol 5, 1984)

8 Miscellaneous topics

In this section some miscellaneous articles about the Tuggerah Lakes are presented. They include;

- a discussion about the possibility of a second entrance many years ago,
- details of Budgewoi Creek, and
- information about the dredging of the lakes and the mouth of the Wyong River.

A second entrance

Some old pioneers with whom I was in contact when young spoke of stories handed down by aborigines that in their dreamtime, perhaps hundreds of years ago, and certainly long before the coming of the white man, there was an entrance from the ocean to the lake at a spot at Budgewoi a short distance to the south where there is a narrow low-lying neck of land where even in recent times the road has been blocked by heavy seas pouring through there and leaving deep deposits of sand over the road, making it impassible until cleared away - so it seems to me very credible that the story told by the natives was a true one. (Stinson, vol 5, 1984)

Budgewoi channel

In those days (1828) this channel was shallow and easily fordable at its southern end, and for centuries it had been a traditional crossing place of the Aborigines; and in due course it became the crossing place of the white men too. (Stinson vol 4, 1983 and also Stinson, vol 5, 1984)

Silting of the Wyong River mouth - 1895

We regret to note that the bar at the mouth of Wyong Creek is causing great trouble, it being with the greatest difficulty that the fishermen can get over it without damaging their boats. The only remedy to this would be by having a small channel cut to admit of boats passing in and out – indeed we would like to see the channel made deep enough to allow the small steamer which at present carries the fish from the mouth of the creek to Wyong, going about the lake to pick up the fish from different points. This would be a great boon to the fishermen, as it would save them unnecessary travelling and would also be appreciated by excursionists. (1895 Fisheries Annual Report)

Dredging the Wyong River mouth - 1903

At a visit of the Board to Tuggerah Lakes, it was found that the channel leading from Wyong creek to the lake was so shallow and narrow that fishing boats could not proceed with freights of fish to the steamer from the lake into the creek. The attention of the Minister for Works was accordingly drawn to the necessity for cutting a proper channel, and a sum of £40 was granted, which enabled the fishermen to provide a channel suitable for all boats and steam launches to proceed through. (1903 Annual Fisheries Report)

Silting of the Wyong River mouth

Before passenger and goods services could commence down Wyong River the river had to be dredged and cleared of snags and it took some time to do this after the railway came. Towards the end (ie the 1930s) the river was silting up again and the junior passengers were sometimes called on to transfer weight and rock the boat to assist it off a mud bank. (Wyong Shire Historical Society and Brisbane Water Historical Society, 1969).

Dredging the lakes - 1950

27th June 1950
JG/JS. 63/4

D'arcy Rose, Esq., M.L.A.
Parliament House
Sydney

Dear Sir,
I have been directed by the abovenamed Council to request you to make urgent representations to the newly elected Government to install a sand pump permanently in the Tuggerah Lakes to pump out the silt in the channels and river mouths.

Representations were made by the Council itself in the past to the Department of Public Works but without avail. The last information received in November 1949 was to the effect that the Department was giving consideration to the construction of a dredge suitable for use in Tuggerah Lakes and other similar localities but no indication could be given as to when construction would be undertaken or as to where the dredge would be used on completion.

Quite recently the Tuggerah District Fishermen's Co-operative Limited sought the Council's urgent attention to this matter because of the serious effect on the fishing industry but enquiries disclosed that it was not even possible to hire plant for the purpose.

Trusting your endeavours on the Council's behalf will prove successful,

I am,
Yours faithfully,
Shire Clerk.

Dredging - 1962

Council recently started dredging the channels of Tuggerah Lakes with its own dredge. Sometimes the channel silts up and spoils the fishing in certain areas and hampers the activities of boats. The dredging is designed to overcome this possibility and at present the dredge is working at the mouth of the Wyong River. (Swancott 1963)

Dredging Budgewoi Creek - 1964

Electricity Commission
Box 5257, GPO,
Sydney
10 Nov 1964

The Shire Clerk,
Wyong Shire Council
Box 74, WYONG, NSW

Dear Sir,

<u>Munmorah Power Station - Dredging in Lake Budgewoi</u>

The power station being built at Munmorah will circulate some 4,000 cu.ft/second of lake water for cooling purposes when it is fully developed. It is proposed that this water be drawn from Lake Munmorah, passed through the power station, and discharged into Lake Budgewoi from where it will return to Munmorah from the natural channel known as Budgewoi Creek. Dredging of the creek proper has already been commenced and it is proposed to extend the current contract to include the approach channel as delineated in orange on the attached sketch No. 591.4/PR/1384.

We are advised by the Department of Lands that the approval of your Council and also the Superintendent of Fisheries is necessary before dredging in the lake is undertaken.

Should further information be required, I should be glad to assist in any way I can.

As the Commission is anxious to proceed with this work as soon as possible, it would be appreciated if an early reply could be given on this matter.

Yours faithfully
K.C. Fraser
Manager and secretary

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