Something old & Something new

Geomorphic change at the mouth of Stony Creek

EDMUNDS BAY

The Office of the LAKE MACQUARIE & Catchment Co-ordinator

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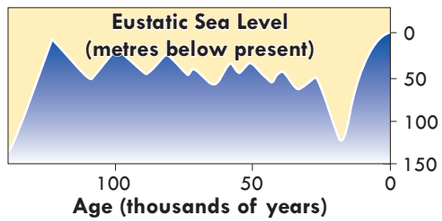
A confined catchment area

Stony Creek is one of the main tributary catchments of western Lake Macquarie. It extends west through steeply undulating country to Ryhope and much of the valley floor is flat and swampy, infilled with sediment that has accumulated over thousands of years.

An important characteristic of much of the catchment is the narrowness of the valley and this is very apparent at the mouth where the creek enters Lake Macquarie at Kooroora Bay. **Figure 1** shows how the creek valley is confined by bedrock valley sides and also by lower level alluvial sediments.

Sea level change steps in the evolution of the Stony Creek delta

The lower reaches of Stony Creek have been estuarine (that is affected by marine water as well as fresh water) for about 6000 years. This area was also estuarine for several thousand years about 120,000 years ago, when sea level was last as high (or slightly higher) than it is now.



In between times, sea level was much lower than now and streams flowed in incised valleys where Lake Macquarie is now located.

When sea level is high, Stony Creek forms a delta of sediment derived from the catchment, where flow velocities slow on entering the lake waters. The extent of these deltaic sediments can also be seen in **Figures 1 & 2**. As deltas form, they often build up slightly higher levees along the side of the channel, formed by flood deposits. Often the low lying land behind the natural levees is drained or filled to permit development, and this has been the case at Blackalls Park, where sporting fields, the Waste Water Treatment Plant (WWTP), industrial areas and the Toronto Workers Club are all located on parts of the former delta and associated freshwater wetlands.

Further sea level rise?

What will happen if sea level continues to rise over the next fifty years or more? The current best estimates are that sea level is rising slowly and will continue to rise over at least the next half century. Higher lake levels may inundate some of the deltaic sediments at the mouth of the Bay, opening opportunities for slightly more water circulation. Saltmarsh communities might creep across the backyards of properties around the shore of the bay as new areas are exposed to tidal fluctuations. But overall, the Bay will remain relatively isolated from the main body of the Lake for hundreds of years yet, with organic sediments derived from seagrass continuing to dominate the bed.

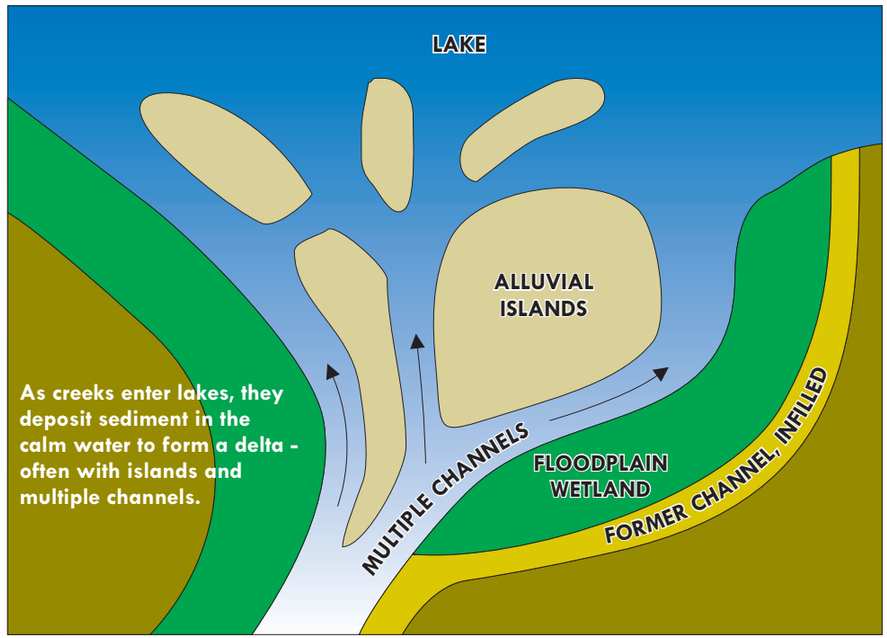
What's the trend?

So what does the future hold for Edmunds Bay? The bay is very nearly isolated from the main body of Lake Macquarie. It has very restricted water circulation and flushing. It has probably been accumulating organic sediment, with limited tidal flows, for hundreds of years and maybe even several thousand years and will continue to do so.

Before the Toronto WWTP discharged nutrient rich flows into Mud Creek (and thence to Edmunds Bay), the organic sediment was primarily derived from sea grass wrack. For forty years or so, this situation changed and the bay was dominated by billows of algae. The algae blocked light from sea grass, and contributed black oozy material to the bed.

Most recently, with the removal of effluent flows, the algal blooms have declined and seagrass meadows in the shallow waters of the bay are recovering. Recovering seagrass means habitat for juvenile fish, swans and other water birds. But it also means more wrack than most residents have previously experienced. The combination of more wrack generation and ongoing restriction of tidal and wind driven water circulation means that wrack is accumulating around the shoreline. There are no waves to lift the wrack out of the water where it can dry out and break down quickly.

A further sign of gradual changes to the sediment regime in the bay is the increase in mangroves around the shore. Residents report that fifty years ago, there were few if any mangroves in this area and that the vegetation along the shore of the Blackalls Park Reserve was dominated by Casuarina. Whether there were mangroves around the Stony Creek delta before clearing commenced in the nineteenth century is not known, but mangroves are very successful colonizers of mud flat areas (see the Mangrove information sheet in this package). Once established, they encourage further sedimentation. Mangroves are part of the future of Edmunds Bay as it continues along the long term pathway as a quiet estuarine backwater.



What also becomes apparent from studying **Figures 1 & 2** is that Stony Creek has taken more than one path through the delta over time. One channel can be seen passing through what is now the Toronto Wetland. It is probably the oldest of the Stony Creek channels and has been largely infilled since it was abandoned. Mud Creek is another former channel at the mouth of Stony Creek. On maps from the mid nineteenth century, Mud Creek is shown as a backwater called Saltwater Lagoon. Mud Creek and Edmunds Bay have also been partially infilled since this channel ceased to carry the main flow of Stony Creek.

Figure 2 shows that inset within the large delta area of Stony Creek, there is a second smaller delta. This is formed from the sediment that has accumulated at the mouth of the current channel of Stony Creek. We do not know how long this inset delta has been forming, but it predates European settlement of the area.

Edmunds Bay is therefore a lagoon confined within the arms of the old delta, and now further cut off from the open water of Lake Macquarie by the extended delta of Stony Creek.

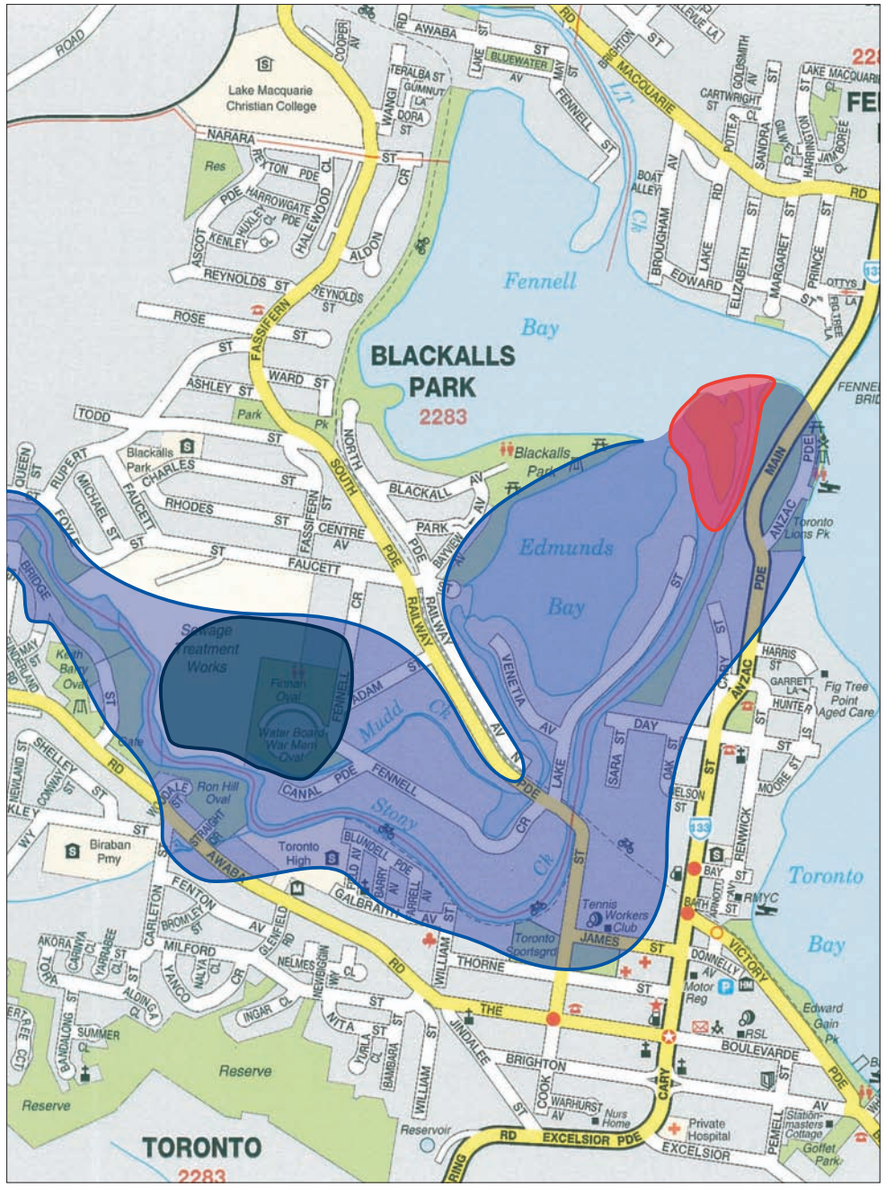


Figure 1

Most recent delta deposition associated with current channel of Stony Creek.

Estuarian floodplain & delta deposits of Stony Creek. Former dominant channels followed Mud Creek and passed through Toronto Wetlands.

Former freshwater wetlands

* The land outside these shaded areas is on Bedrock.

Figure 2

Bedrock Terrain

Approximate location of former channel through Toronto Wetland. Mud Creek is also a former dominant channel of the Stony Creek delta.

Outline of channels that are currently part of the delta.