

Executive summary

This report, prepared as an initial project of RiverWorks Tasmania, is a compilation and synthesis of existing information about the Tamar Estuary and was prepared to help identify significant pollution sources and evaluate proposed remediation works. The report provides a brief overview of the Tamar's physical setting and uses, identifies and quantifies major pollutant inputs, and reviews and synthesises environmental quality data on water, sediments and biota.

The Tamar is a narrow, highly tidal estuary, with large freshwater inputs at its head, and is generally considered to be well-flushed. Broad tidal flats and wetlands border a relatively deep central channel, and become more extensive in the estuary's upper reaches. The Tamar's large tidal range (3 m) and strong tidal currents have resulted in an active sediment transport regime marked by rapid sedimentation in the upper reaches and a long history of dredging. The Tamar's catchment is very large (10,000 km²) and land cover types are predominantly forests (52%) and agricultural lands (37%). River flows from the South Esk Basin are influenced by hydropower developments at Poatina and Trevallyn.

The estuary is an important recreational and scenic resource, particularly for the City of Launceston (population 66,000) situated at its head, as well as for numerous smaller communities along the eastern and western shores. The Tamar is Tasmania's second largest port and supports a large industrial area at Bell Bay and Long Reach (metal- and wood-processing industries). Several large conservation areas are associated with the estuary, including the Tamar River Wildlife Sanctuary and the Tamar River Mouth Nature Reserve.

A variety of point and non-point sources discharge contaminants to the estuary. Point sources include 10 sewage treatment plants and 4 major industrial plants (Comalco, TEMCO, North Forest Products and Boral Timber Tasmania), while diffuse sources include urban run-off (sometimes combined with sewer overflows in Launceston), atmospheric and ground-water pollution, and agricultural and mining run-off from the catchment. Until the late 1980s/early 1990s, the majority of urban, industrial and mining emissions had little treatment. Contaminants associated with these sources include pathogens, nutrients, organic matter and suspended solids (mostly derived from sewage, urban run-off and agricultural inputs from the catchment), as well as metals, fluoride and cyanide (associated with mining and metal processing industries). There have been significant decreases in most end-of-pipe emissions over the past 5 to 10 years - particularly due to sewage treatment plant upgrades and improved wastewater treatment at TEMCO and Comalco. The remaining significant inputs are probably now derived from diffuse sources, such as urban run-off (particularly combined sewer overflows), ground- and surface-water emissions from tips and contaminated sites, mining and agricultural wastes from the South Esk catchment and atmospheric emissions from industry and urban activities. Some pollutants may also be derived from contaminated sediments within or adjacent to the estuary.

The Tamar Estuary shows indications of environmental degradation in several areas. These conclusions, however, are supported by very limited information, as most monitoring programs and studies relating to the Tamar's environmental quality are over 10 years old, were typically of short-duration, covered limited areas and rarely included the full range of contaminants. Furthermore, our understanding of the processes which control environmental

quality in the Tamar is poor, particularly with respect to estuarine circulation and sedimentation. It is strongly recommended that surveys of water quality, sediment contamination and biota be carried out and that the on-going monitoring program be revised accordingly. It is possible that the major issues and areas of concern identified in this report could be revised significantly, once additional information becomes available. On the basis of the existing data, however, the following environmental issues appear to be of most concern in the Tamar Estuary.

Sedimentation in the Tamar's upper reaches has been an issue of long-standing concern, both for reasons of amenity and environmental quality. The estuary receives inputs of sediments from the catchments of the South and North Esk Rivers, which, through the action of tidal currents tend to accumulate as fine-grained silt deposits in the upper reaches of system. Rapid siltation in the Home Reach section of the Tamar causes difficulties with navigation and may increase the probability of flooding along the South Esk and North Esk Rivers. These sediments are considered unsightly by many people, and also serve as an effective trap for heavy metals and other contaminants. The upper estuary has been extensively dredged over the past 50 to 100 years and large areas of dredge spoils have been deposited along the banks of the upper Tamar. Few additional disposal sites are available, and it is estimated that the remaining sites have only a few more years' capacity. Some of the dredge spoil piles adjacent to the Tamar appear to be contaminated with heavy metals, particularly cadmium, zinc and chromium. Environmental impacts of dredging activities and dredge spoil disposal have never been adequately investigated.

Water contamination by **pathogens** (as indicated by faecal bacteria) derived from sewage and abattoir wastes has historically been a problem in the upper estuary, with levels frequently exceeding guidelines for secondary contact recreation. Since 1994, however, when the Hoblers Bridge wastewater treatment plant was upgraded and began treating abattoir wastes, there has been a significant improvement. Still, several sites in North Esk River and upper Tamar (above Freshwater Point) exceed guidelines for primary contact recreation. Sources of faecal contamination in this area are unknown and unquantified, but presumably reflect some combination of urban run-off, sewage, agricultural run-off and wildlife.

Heavy metals, particularly zinc, cadmium and lead, appear to be elevated in several areas of the Tamar - notably the upper estuary around Launceston, Deceitful Cove and (possibly) Middle Arm. Heavy metal concentrations in water, sediment and shellfish collected from the estuary have been in excess of recommended Australian and international guidelines, and as recently as 1993, it was recommended that oysters collected from the Tamar should not be consumed due to heavy metal contamination. Historical sources of heavy metals have included industries at Bell Bay and Launceston, and mining wastes from the South Esk catchment (Aberfoyle/Storeys Creek mines) and Beaconsfield. Diffuse sources of heavy metals may include ground-and surface-water emissions from tips and contaminated sites, urban run-off, and contaminated sediments/dredge spoils in or adjacent to the estuary.

The Tamar is not known to experience nuisance algal blooms, and little data are available on **nutrients** or chlorophyll *a* in the Tamar, beyond some indications of elevated phosphates in the upper reaches. However, nutrient inputs from sewage treatment plants and agricultural activities in the South Esk catchment are relatively high

Organic compounds have not been widely monitored in the Tamar. Hydrocarbons in oysters were recently surveyed in the lower estuary, in response to the *Iron Baron* oil spill of 1995, and were found to be relatively low. Elevated concentrations of polycyclic aromatic hydrocarbons (PAHs) and phenols have been measured in Deceitful Cove. Few data are available for organochlorine pesticides and no data are available for polychlorinated biphenyls (PCBs).

Introduced species have been identified as an issue of concern, particularly rice grass and the Pacific oyster, which have colonised large areas of mudflats throughout the estuary. Concerns have been raised that other potentially destructive species (e.g. toxic dinoflagellates, Northern Pacific seastar) could also be introduced to the Tamar via ships' ballast water. Little information is available on the environmental status of seagrass beds and wetlands, which are vital components of the estuarine system.

On the basis of the available data, it appears that the Tamar is environmentally degraded in several areas, particularly in the vicinity of Launceston and near major industrial and mining areas. There have been a number of significant reductions in industrial and sewage pollution over the past 10 years, which have resulted in some observable improvements in water quality - particularly with respect to faecal indicator bacteria and dissolved oxygen levels in the upper estuary. As major point sources around the estuary are progressively upgraded, it is anticipated that diffuse sources will become the major contributors of contaminants. These diffuse sources - urban, agricultural and mining run-off, atmospheric inputs, ground-water contamination, contaminated sediments - tend to be difficult and expensive to remediate and will require strategic 'whole-of-estuary' planning to address effectively.

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