State of the D'Entrecasteaux Channel and the lower Huon Estuary 2012

Report for the D'Entrecasteaux Channel Project






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ecomarine Consulting

The D'Entrecasteaux Channel Project is a collaboration between local and state government agencies, non-government organisations, research institutes and industry to sustainably manage the waterway. This report was funded by Kingborough Council, the Derwent Estuary Program, NRM South, Huon Valley Council and Tassal.

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Cover photographs by (clockwise from top left): Tassal salmon farms (R. Jupe); Kettering marina (D. Hardie); Feather on local beach (J. Doole); Boathouses at Conningham Beach (D. Hardie); Native pigface at Conningham Beach (D. Hardie)

EXECUTIVE SUMMARY

The D'Entrecasteaux Channel Project has recently been initiated by the Kingborough Council in response to interest being generated within council and the broader community to collaboratively managing the D'Entrecasteaux Channel in a sustainable manner. This project has been developed in partnership with other local government, state government, industry and natural resource management organisations. The first major step for the D'Entrecasteaux Channel Project has been the commissioning of the current review of the State of the D'Entrecasteaux Channel and the lower Huon Estuary to update information previously compiled in 1999. The aim of the review is to develop an understanding of the current environmental status of the region and compile information needed to underpin decisions for sustainable management. Based on data compiled, the report describes the overall status of the environment in the D'Entrecasteaux Channel and lower Huon Estuary and identifies key management issues, data gaps and potential future investigations. The information compiled is intended as a basis for ongoing planning and prioritisation of activities of the D'Entrecasteaux Channel Project.

The D'Entrecasteaux Channel and lower Huon Estuary are located in south-east Tasmania and provide a large area of waterway (446 km^2) that is protected from oceanic swells. While this region has experienced lower levels of urban development than the adjacent Derwent Estuary, its sheltered waters and natural values have encouraged population growth in surrounding areas and increasing pressures from both commercial and recreational activities. The D'Entrecasteaux Channel and lower Huon Estuary receive freshwater inputs from the Derwent Estuary-Bruny and Huon catchments, and fall within the Kingborough and Huon Valley municipalities. The study area for the report included the waterways and coastal zone to 1 km inland of high water mark, incorporating a total coastline of 405 km. The Huon Estuary is a highly stratified salt-wedge estuary, characterised by a freshwater layer overlying a saline wedge, while the D'Entrecasteaux Channel is predominantly marine. The majority of the waterway is >10 m depth, reaching a maximum depth of ~55 m, and experiences a small tidal range averaging 0.5 m. The estimated flushing time for the combined D'Entrecasteaux Channel/Huon Estuary waterway is 26 days, although more rapid individual flushing times have been recorded for the Huon Estuary (2-4-5.6 days) and D'Entrecasteaux Channel (7.5-8.8 days).

The region has experienced a relatively high level of population growth, with primary urban centres concentrated along the coast, while the foreshore includes a very large number of facilities and structures that service recreational and commercial marine activities. Levels of recreational boating and fishing are the highest in Tasmania, and there has been significant growth in finfish and shellfish farm production in the waterways over the past ten years. Secondary industries including a pulp mill and silicone/former carbide plant ceased operations in the early 1990s, however three seafood processing plants and a growing number of tourism operations rely on the waterway.

Anthropogenic (human) inputs

Contaminants enter the D'Entrecasteaux Channel and lower Huon Estuary from a variety of sources. Point sources include 9 wastewater treatment plants (WWTPs), 3 fish processing plants and 20 operational finfish farming leases. Non-point or diffuse sources include stormwater drains, septic and other urban runoff, tips and contaminated sites, quarries, catchment inputs carried by rivers (e.g. forestry and agricultural runoff), marinas and other boating wastes. Available data indicate that catchment inputs via river waters and fish farms are the largest anthropogenic sources of nutrients to the waterways. Smaller inputs occur via sewage and industrial WWTPs, while inputs from stormwater outlets cannot currently be quantified, and septic system leakages in several areas are likely to be contributing locally to pollutant loads. Residual contamination has been recorded at a historic pulp mill site at Port Huon, although a number of potential sources may have contributed to elevated pollutants in the area. There is also evidence of environmental legacy issues at a former carbide works site at Electrona, although measures have been implemented to

mitigate potential effects on the waterways. Organic inputs from fish farms have increased since 1999, while a lack of wastewater flow data prior to 2009/2010 prevents temporal comparisons of sewage inputs.

There have been some reductions in pollutant inputs as a result of management initiatives, while additional measures are planned to help further reduce or restrict future inputs. Reticulation and 100% re-use of sewage at Howden has prevented sewage wastes from this location entering North West Bay, while plans to divert effluent from Electrona and Margate may further reduce direct inputs to this bay. Levels of antibiotic use at fish farms have declined to very low levels in recent years, and a phasing-out of the use of copper-based antifoulants on fish cage nets is planned at depositional sites by 2015. Caps have been placed on levels of nutrient inputs from fish farms, and cleanup programs have been instigated by salmon and shellfish growers and community groups to address concerns about marine debris.

Water quality

Water quality has been assessed from recreational water quality surveys performed by local councils during 2000-2011 and system-wide monitoring studies of the ambient environment conducted during 1996-2005. More recent data (2009 to present) have been collected as part of the Broadscale Environmental Monitoring Program (BEMP) and are currently being evaluated, but were not available at the time of preparing this report. Available data suggest that, as of 2005, the water quality of the region remained relatively healthy, with both the D'Entrecasteaux Channel and lower Huon Estuary benefiting from having small regional populations and a lack of heavy processing industries on their shores. Nutrient concentrations frequently exceed national guidelines; however, the primary nutrient source is the neighbouring ocean, highlighting the lack of applicability of national nutrient guidelines to this region. Water quality conditions are generally suitable for primary recreational activities, with occasional periods of localised and short term bacterial contamination associated with high rainfall. Heavy metal concentrations have been investigated in the Huon Estuary and are low in most areas, but have not been extensively surveyed in the D'Entrecasteaux Channel. There is some evidence of environmental degradation determined on the basis of applicable national guidelines (e.g. dissolved oxygen) or comparative assessments, including: localised oxygen depletion and nutrient enrichment in bottom waters of the Huon Estuary, a long-term increase in phytoplankton (microalgal) biomass across the region, and periodic blooms of the introduced and toxic microalga *Gymnodinium catenatum*.

Sediment quality

Marine and estuarine sediments include a mix of sand and fine, silty particles, depending on depth, currents, wind and wave exposure. Areas characterised by fine sediments are particularly vulnerable to accumulation of organic matter and contaminants. The majority of sediments in the region are healthy, as reflected by low organic content and heavy metals, high levels of oxygenation, and relatively diverse communities of benthic infauna. However, localised anoxia (i.e. oxygen depletion) and elevated organic content reflect degradation of some areas, particularly in parts of the lower Huon Estuary and North West Bay. High organic loadings at fish farms are in nearly all cases confined to within farm leases, while sewage is generally a small contributor to organic content except in the immediate vicinity of some urban centres and wastewater discharges. Experiments involving sediments from the Huon Estuary demonstrated that organic loading can potentially trigger the release of nutrients from sediments and increase the risks of eutrophication. This highlights the importance of maintaining healthy sediments and monitoring organic inputs. Examples of contamination issues include residual high pollutant concentrations in the vicinity of a former pulp mill site, elevated metals associated with sewage wastewater and use of copper-based antifoulant paints at fish farms, and localised tributyltin contamination in some marina environments.

Seafood safety

Filter feeding invertebrates such as oysters and mussels tend to accumulate pathogens, toxins and other contaminants at a higher rate than other species and hence are the primary concern for seafood safety. Sanitary surveys performed in the region monitor risks of shellfish contamination and instigate closure of oyster and mussel farms in accordance with specified triggers. During 2000-2011, both biotoxins from toxic microalgae and faecal bacteria indicators were significant causes of shellfish closures. Sites in the lower Huon Estuary, including Port Esperance, are at a particularly high risk from biotoxins associated with the toxic dinoflagellate *G. catenatum*. There are no clear temporal trends in risks to shellfish safety; however, it is clear that risks associated with biotoxins are an ongoing concern, with 2011 recording the highest and most widespread biotoxin-triggered farm closures for the 2000-2011 period. Levels of metals and pesticides in shellfish flesh have been within prescribed guidelines for seafood safety, while a long-term monitoring site has recorded mercury concentrations consistently below the maximum permitted level in flathead.

Nutrient sources and modelled impacts

A coupled model incorporating biogeochemical, hydrodynamic and sediment components has been used to simulate local processes controlling the cycling of nutrients, and predict the interactive effects of anthropogenic and natural inputs of nutrients on water and sediment quality and phytoplankton blooms. Modelling conducted in 2002 indicated that 60% of nitrogen was sourced from marine waters, 23% from the Huon River and 17% from fish farms. Almost all of the fish farm-derived nitrogen was categorised as biologically available to phytoplankton and other organisms, while most of the river-derived nitrogen was found to be biologically unavailable. Additional modelling based on maximum projected farming inputs by 2009 was conducted to determine potential impacts on environmental attributes of the waterway, and to help define fish farming management limits. A separate project is currently reviewing actual changes in nutrient inputs from fish farms and other sources, and performing a concurrent assessment of any changes in water quality.

Foreshore environment

The foreshore of the waterways has considerable scenic and recreational value, and also services marine farming, tourism, commercial fishing vessels, processing and other industries. A large percentage of the foreshore within the region is moderately to highly modified from its natural state. On the basis of mapping for 1.0 ha coastal cells, 34% of the foreshore was categorised as having been completely cleared of native vegetation and 90% was categorised as being under continued pressure from human disturbance. There are no major sites of reclamation; however, the presence of more than 300 foreshore structures reflects a strong focus on marine industries and the popularity of the waterways for recreational fishing, motor boating and yachting. Population growth is also concentrated along the coast, highlighting the need to carefully manage foreshore use to minimise impacts on natural and heritage values.

Values, habitats and species

Many areas of high natural, heritage and geoconservation value occur in the D'Entrecasteaux Channel and lower Huon Estuary, and 45 state reserves have been declared in the waterways and along the coast. Aquatic habitats are dominated by unvegetated soft sediments but also include highly productive seagrass and kelp beds and saltmarshes. The region supports a wide range of fauna due to its diverse marine, estuarine and foreshore habitats, including 150 species of fish and 130 species of birds. Threatened species include 23 fauna and 45 plants, while 7 threatened vegetation communities occur on the foreshore. Threatened fauna species include eight birds, two terrestrial invertebrates, three marine invertebrates, three fish, three terrestrial mammals and four marine mammals. Many threatened and other high conservation value species are endemic (i.e. unique) to Tasmania, south-east Tasmania or even to the Channel and Huon Estuary, including the spotted handfish, seastar species and highly restricted algae (or 'seaweeds'). Research on seagrass beds indicates reductions in their areal extent over the past 60 years,

while giant kelp beds have not declined to the same extent observed in more northern parts of Tasmania. Declines in other marine species and overall diversity have occurred in association with historic scallop dredging, siltation of habitats, nutrient inputs and spread of introduced species, while little penguins and other nesting shorebirds have been impacted by habitat degradation and disturbance.

The majority of the foreshore is rated as moderate to high geoconservation value and contains a total of 24 listed sites, including several classified nationally as geological monuments. At least 600 Aboriginal heritage sites have been identified, and are concentrated along the immediate coast. Some have been degraded by erosion, diverted runoff, walking tracks and trampling. Approximately 65 state-listed and numerous additional locally-listed European heritage sites also occur on the coast and at the sites of historic shipwrecks.

Introduced species

There are currently 49 known introduced and cryptogenic (= potentially introduced) marine species in the D'Entrecasteaux Channel and lower Huon Estuary, including six 'target' introduced pest species. This represents a significant increase in the number of identified introduced marine species since 1999, but may largely reflect improved data availability. The toxic microalga *G. catenatum*, New Zealand screwshell *Maoricolpus roseus*, and the northern Pacific seastar *Asterias amurensis* have become dominant members of the community. There is evidence of increasing densities of certain benthic introduced species, with their proportional abundance increasing by 2-3% per annum during 1998-2003 relative to the total benthic community. Foreshore mapping to 100 m from the high water mark has revealed 31 dominant weed species, with weeds present in nearly 60% of foreshore areas surveyed. This mapping, and additional records extending to 1 km inland of the coast, indicate the presence of 27 declared weed species, as listed under the *Tasmanian Weed Management Act 1999*, including 8 Weeds of National Significance.

Climate change

Regional risks associated with climate change include shoreline erosion, flooding and landward recession due to sea level rise, with geomorphological mapping indicating that many areas of the study area are highly vulnerable, particularly around Margate, Snug, Great Bay, Bruny Island Neck and mid-Channel tertiary shores. The frequency and severity of storm surge events relative to current sea level and coastal infrastructure locations are predicted to increase, while saltmarshes and other coastal habitats are at risk where there are no suitable environments for their retreat. Additional impacts are associated with changes to water temperatures and chemical properties that influence the composition of marine and estuarine biological communities. Changes already evident include range expansions of species such as the long-spined sea urchin *Centrostephanus rodgersii* and microalga *Noctiluca scintillans*, while threats to kelp beds and fisheries species have also been identified.

Key management issues and data gaps

There has been a very large improvement in the availability of environmental data for the D'Entrecasteaux Channel and lower Huon Estuary since 1999. In particular, several system-wide studies have contributed greatly to our understanding of the water and sediment dynamics of the waterways. These studies indicate that anthropogenic inputs of organic matter and nutrients are currently the most significant threat to the ecological functioning of the waterway. Catchment runoff and fish farms are the primary sources, but are supplemented by inputs from sewage treatment plants, boat wastes, seafood processing plants, stormwater and leaking septic systems. Additional and, in some cases, related key management issues include recurrent toxic algal blooms, degradation of sediments, foreshore modification, declines in native marine and coastal species, increasing densities of marine pests, and vulnerability to sea level rise and ocean warming. Some of the management issues identified by the report are already being addressed by various government, industry and community initiatives.

The most significant data gap is the absence of a 'catchment to waterway' monitoring strategy that effectively measures the major sources of human inputs to the waterways, and provides for long-term monitoring of environmental status using consistent sites and techniques. Examples of other key gaps include a general paucity of data for the broader D'Entrecasteaux Channel compared to the Huon Estuary and North West Bay, incomplete spatial coverage of sediment contaminant surveys, absence of water quality classifications for recreational sites, and lack of data on stormwater outlet locations and discharges. A more detailed assessment of management issues and data gaps, including identification of potential future investigations, is provided to facilitate planning within the D'Entrecasteaux Channel Project.