Estuarine Habitat Mapping in the Derwent – Integrating Science and Management

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Summary

The Derwent Estuary is a large drowned river valley situated in south-east Tasmania that extends for a distance of 52 kilometres and covers an area of around 198 km^2 between Iron Pot and New Norfolk. The physical structure of the estuary varies substantially along its length, with the upper reaches highly stratified due to consistent freshwater input from the Derwent River and the lower reaches generally well mixed. The freshwater tends to flow on the surface along the eastern shore with saline water travelling upstream on the bottom. While several studies have examined the physical setting of the estuary, there is little information on the distribution and structure of benthic habitats.

In 1988, the Derwent Estuary Program (DEP) was initiated to prepare an environmental management strategy for the Derwent Estuary, together with an associated long-term monitoring program and agreements for implementation of specific environmental improvement programs. Management of estuarine habitats, particularly seagrasses, macroalgae and tidal wetlands have been identified as a priority within this project. It is clear that such management will be most effective if the current distribution of estuarine habitats is known at the appropriate spatial scale.

The distribution of sub-tidal habitats between Iron Pot and New Norfolk were identified through a combination of field mapping using echo-sounders, grab sampling and video assessment, and digitising habitat boundaries from geo-rectified aerial photographs. Habitats were classified as either seagrass, aquatic macrophytes, rocky reef, sand, silt/sand or silt. In addition, one hundred and four sites were sampled for sediments to obtain a qualitative assessment of sediment type (sand, silt/sand and silt) in order to delineate sediment boundaries and to collect samples for analysis of sediment particle size, heavy metals and redox. A number of video transects were also conducted on rocky reef habitats in order to describe the dominant macroalgae.

The estuary was classified into lower, middle and upper reaches due to differences in the physical aspects of shoreline morphology, bathymetry and salinity. Rocky reef habitats occurred primarily in the lower reaches of the Derwent Estuary, although some narrow margins of reef were also present in the middle reaches. The two regions had a combined reef area of approximately 1.97 km^2, which represents around 1% of the overall habitats in the estuary. The structure of the macroalgae assemblages that occurred on these reefs varied substantially between eastern and western shorelines, position along the estuary and depth. In general, the habitat was dominated in the shallow depths by *Lessonia corrugata* and *Ecklonia radiata* while *Carpoglossum confluens*, *E. radiata*, *Caulerpa* sp., and unidentified

red algae dominated the deeper section. Parts of the reef along the western shoreline also had a canopy *Macrocystis pyrifera*. The diversity and abundance of macroalgae decreased in the northern part of the lower reaches, with only small amounts of red and brown algae present on the rocky substrates within the middle reaches.

Seagrass habitats were restricted to small beds within the lower (Halfmoon Bay and Opossum Bay and middle parts (Cornelian Bay, Wilkinsons Point, Dogshear Point, Woodville Bay and Old Beach) of the Derwent Estuary that had a combined area of around 0.22 km^2. The beds consist primarily of *Heterozostera tasmanica*, although small amounts of *Zostera muelleri* were present on the inner margin of beds in the middle reaches. No beds of seagrass were found in either the northern or southern end of Ralphs Bay. As the surveys were conducted during late winter, the area estimate represents distribution during the period of low biomass and cover.

Aquatic macrophytes occurred in large beds in the northern part of the middle section and southern part of the upper section of the Derwent Estuary. In the middle section, extensive beds occurred in the mouth of the Jordan River, southern side of the channel at Granton and northern side of the channel adjacent to Woods Point, usually from the shoreline to around 3 m deep. These beds had a combined area of around 3.04 km^2, with *Ruppia* sp. being by far the dominant species. The density of *Ruppia* spp. was high and evenly distributed across the beds in all areas, with often a large biomass of filamentous algae also present in the beds.

Unvegetated habitats were the most dominant habitat type within the Derwent Estuary representing around 96% of all subtidal habitats, although large differences occurred in the distribution of sediment type between the lower, middle and upper reaches. The lower reaches were represented by sand all depth zones in the mouth, the northern and southern parts of Ralphs Bay and in shallow depths on both eastern and western shores. Sand/silt occurred in the deeper section from around Halfmoon Bay to Gellibrand Point and the northern end of Ralphs Bay and in middle depths on the western shore from Cartwright Point to Sullivans Cove. On the eastern shore north of Droughty Point, sand/silt occurred adjacent to the sand beach habitats up to Kangaroo Bluff. The silt habitat occurred in the deeper parts of the lower reaches north of Gellibrand Point.

The middle reaches of the estuary was dominated by silt habitat, although areas of sand occurred in shallow depths on the western shore up to Cornelian Bay and the eastern shore almost continuously up to Woodville Bay. A large area was also present between Dogshear Point and the eastern shoreline. Sand/silt was restricted to several small areas including Elwick Bay and east of Dogshear Point. The channel region of the upper reaches was found to contain mostly sand/silt, although silt most likely dominated the deeper sections. Results of the distribution of sediment particle size, heavy metals and redox will be published in a subsequent report of the Derwent Estuary Program.

Additional information is presented on the distribution of intertidal habitats and wetlands. The spatial distribution of wetlands presented reflects that identified in the mapping layers from the TASVEG 2000 project (Tasmanian Parks and Wildlife Service), defined as habitat codes Sw (tall-wet scrubs), Mg (graminoid saltmarsh) and Ws (sedge/rush wetland). The Tasmanian coastline and tidal zone data layer information was supplied by the Land

Information Services Tasmania, Department of Primary Industry Water and Environment which categorised habitat into rock, sand, unvegetated mudflat and vegetated mudflat.

The techniques and problems associated with the design of monitoring programs for macroalgae, seagrass and aquatic macrophytes are discussed. It is clear that it will be difficult to define a cost-effective monitoring regime that examines both the processes that determine the spatial and temporal patterns in these habitats and quantifies the amount of change that results from human induced impacts. In order to detect both large and small scale change, a combination of aerial photograph assessment, ground truthing and fixed sampling may be most appropriate. Recommendations are made on the appropriate number and location of monitoring sites for macroalgae, seagrass and aquatic macrophytes.