D'ENTRECASTEAUX & HUON COLLABORATION

REPORT CARD

2015

ourwaterway.com.au
facebook.com/ourwaterway

THE D'ENTRECASTEAUX & HUON COLLABORATION

FAST FACTS: THE CHANNEL-HUON WATERWAY

The picturesque D'Entrecasteaux Channel and lower Huon Estuary waterway provides:

- A home for marine life –fish, marine mammals, seagrass, invertebrates and seaweeds; and coastal flora and fauna – eucalypt woodlands, saltmarsh and wetlands, migratory and resident birdlife, marsupials and terrestrial invertebrates
- A place people love to be – rich in Aboriginal cultural heritage and valued for fishing, birdwatching and boating
- The key to economic prosperity of the region – tourism, aquaculture and development.

The coastline is sparsely populated, but its natural beauty, broad variety of local industries and proximity to Hobart have encouraged population growth:

- 6% population increase over the past 5 years
- 51 000 residents in Kingborough and Huon Valley

The land to 1 km inland of the waterway is dominated by natural environments (52%), residential land (17%) and pasture (16%). Smaller areas (<2% each) are dedicated to horticulture, forestry and other uses, although forestry is more important in the broader catchments that flow into the waterway.

The waterway itself is vast, with some areas designated for marine farming (shellfish and finfish) and for conservation (primarily conservation areas and nature reserves).

- 44,600 ha total area of waterway
- 6,000 ha of reserves within the marine environment of the waterway
- 2,952 ha of marine farming zones (finfish and shellfish), containing 1,392 ha of aquaculture leases

Tourism and aquaculture are important and growing industries for the region.

- Annual tourist numbers have increased to more than three times the resident population size, with a 9% increase in visitor numbers (2014-15; compared to the previous 12 months).
- Finfish farming leases in the Channel and Huon study area covered 983 ha in 2015, reflecting a 6% increase since 2012.

The waterway is valued for its recreational benefits:

- It is Tasmania's most popular area for recreational boating.
- A designated recreational fishing area extends throughout the D'Entrecasteaux Channel. Fishing is very popular, particularly for species such as flathead, Australian salmon, Atlantic salmon, sea-run trout, barracouta, bream, mullet, squid, pike and flounder.
- There are numerous sandy beaches, bushwalks and picnic areas.

DID YOU KNOW?

The coastline of the D'Entrecasteaux Channel and Huon Estuary waterway is dotted with more than 300 marine structures, including 4 yacht clubs, 4 marinas, 20 public jetties, and 24 public boat ramps, 10 slipways plus at least 10 other small private slips, and numerous additional private jetties and boatsheds.

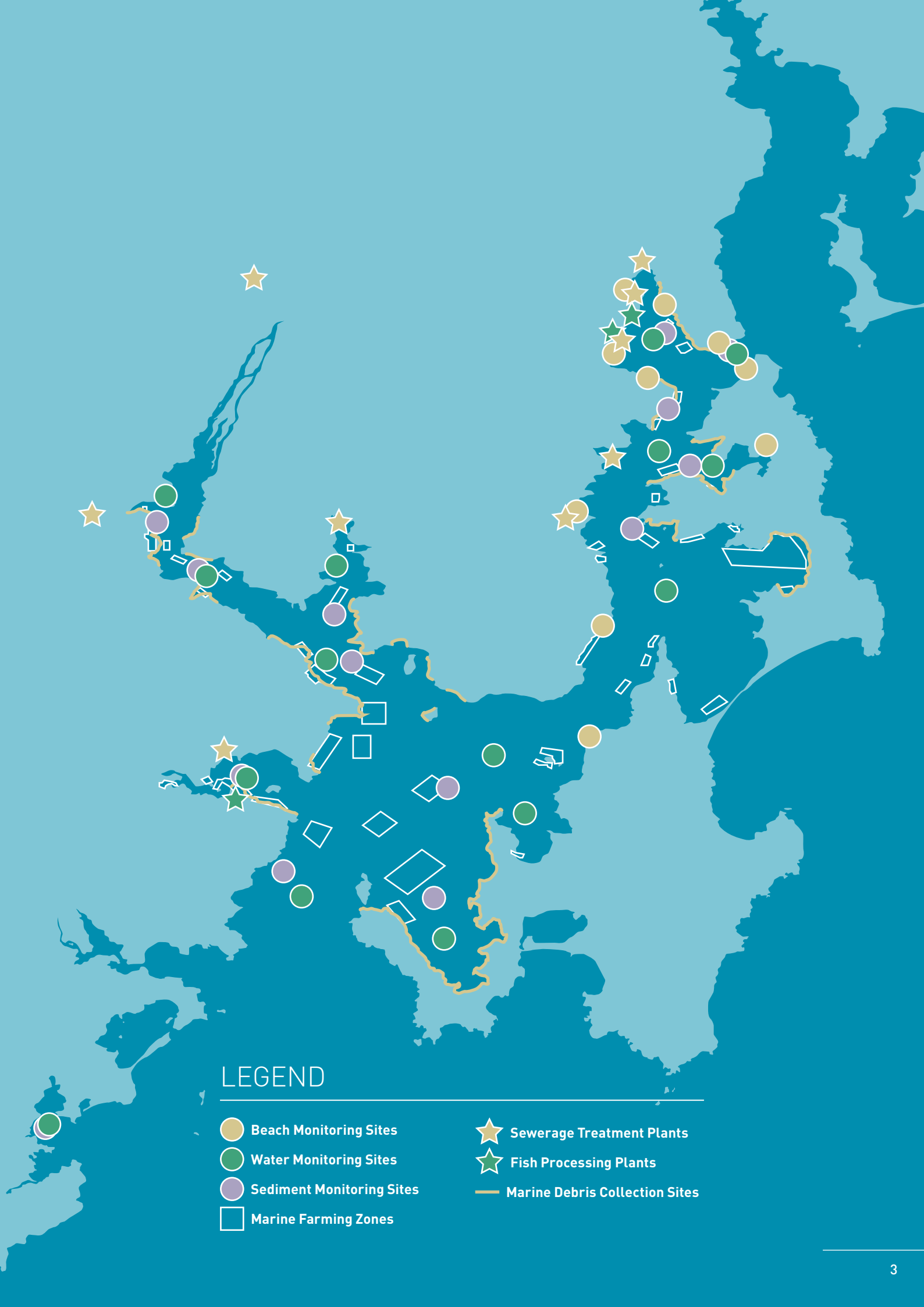
VALUING WATERWAY CONDITION

Good water quality in the D'Entrecasteaux Channel and Huon Estuary waterway is essential for ecosystem health, recreation and economic prosperity.

Launched in 2013, the D'Entrecasteaux and Huon Collaboration is a partnership supported by the Derwent Estuary Program, Huon Aquaculture, Huon Valley and Kingborough Councils, NRM South, Tassal and TasWater in the interest of maintaining the diversity and improving the condition of our natural values with cooperative and coordinated natural resource management.

Each organisation has technical expertise, knowledge, information and networks that can assist each other and achieve greater outcomes by working together.

The Collaboration aims to review data and report on the condition of the waterway, and develop practical projects that improve condition and health and encourage participation in the active management of the waterway. For more information, see the Collaboration website at: **www.ourwaterway.com.au**


LEGEND
Beach Monitoring Sites
Water Monitoring Sites
Sediment Monitoring Sites
Marine Farming Zones
Sewerage Treatment Plants
Fish Processing Plants
Marine Debris Collection Sites

WATERWAY DATA AND REPORTS

A 'state of the waterway' report was prepared for the D'Entrecasteaux Channel and lower Huon Estuary in 2012. It provided a comprehensive review providing the baseline data for the period from 1999 to 2011-2012, and a baseline for future comparison (see **www.ourwaterway.com.au**). The report acknowledged significant advances in our understanding of the water and sediment dynamics of the region through a number of system-wide studies, and identified key data gaps to guide future monitoring and research. It identified a wide range of environmental issues, including:

- inputs of dissolved nitrogen and other nutrients;
- localised oxygen depletion in Huon Estuary bottom waters;
- toxic algal blooms and seafood safety;
- foreshore modification, weeds and marine pests; and
- declines in native species and habitats.

This Report Card builds on the 'state of the waterway' report by compiling updated data (to 2014, where available). System-wide water and sediment quality sampling occurs through the Broadscale Environmental Monitoring Program (BEMP). Additional monitoring programs and studies have also contributed to our understanding and management of the waterway environment.

An extensive body of research supports the basis for selecting the water and sediment quality parameters that are currently monitored in the waterway – including the Aquafin Cooperative Research Centre initiative, which was a partnership between industry, government, the Institute for Marine and Antarctic Studies (IMAS) and the Commonwealth Scientific and Industrial Research Organisation (CSIRO). It expanded on the earlier work of the Huon Estuary Study to conduct a series of system-wide projects for the combined Huon-Channel waterway, and ultimately led to the implementation of the BEMP, which has been conducted as a regulatory requirement for finfish farming since 2009.

Water quality indicators such as; temperature, salinity, dissolved oxygen, nutrients, chlorophyll a and phytoplankton, are monitored through the BEMP at 15 sites across the D'Entrecasteaux Channel and Huon Estuary (see map). Water quality sampling is conducted monthly during May-January and fortnightly during February-April.

Sediment health is also monitored at 15 sites (see map), with physical, chemical and ecological features of the sediments sampled annually in March. The BEMP sites are positioned to provide an indication of system-wide health rather than localised impacts. Additional local-scale monitoring is undertaken at all fish farms. The BEMP dataset is helping to build a detailed knowledge of background conditions, and contributing to the development of environmental guideline values for the region, which take into account naturally high winter oceanic nutrient inputs.

Detailed modelling of the Huon Estuary and D'Entrecasteaux Channel has improved our understanding of nutrient cycling in the waterway, and also provides a tool for predicting the effects of nutrient inputs on water quality and phytoplankton growth. Recent expansion of the model has shown that inputs to the waterway influence the water quality of the neighbouring Derwent Estuary. Additional work is underway to further extend the model to the area south of the Channel; this will improve its accuracy and value as a coastal management tool.

A simplified modelling tool, which can help fish farmers to better assess nutrient input dispersion and improve local farm management strategies is being developed.

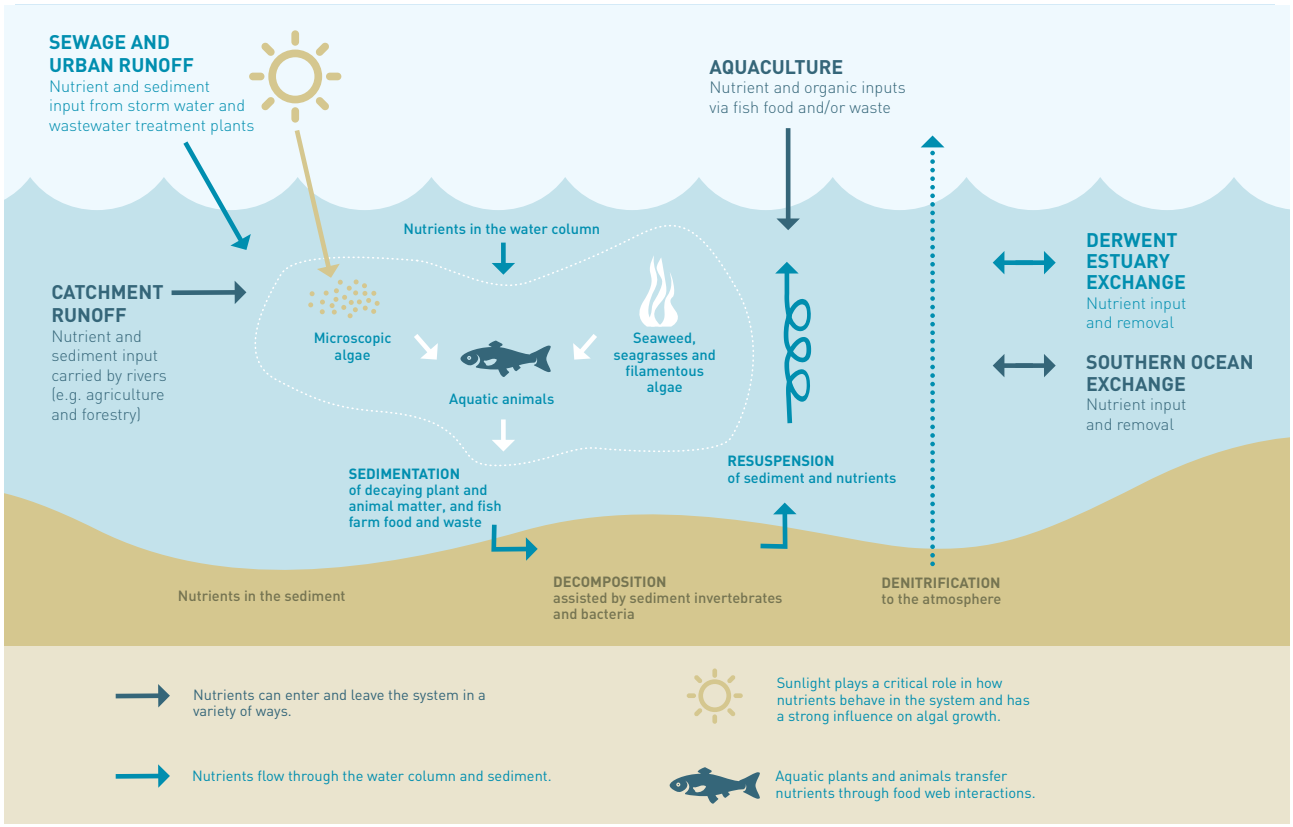
CASE STUDY

SURVEYS IDENTIFY COMMUNITY VALUES

The Institute for Marine and Antarctic Studies (IMAS) released the findings of the 'Your marine values' study in 2013, which identified the marine values that matter most to local communities, aquaculture industries and government agencies in the D'Entrecasteaux Channel and Huon Estuary. The combined results of a series of workshops and a survey revealed 17 key marine values, including regional environmental values as well as values that affect or are affected by aquaculture (see **www.imas.utas.edu.au**, or the 'Your marine values' facebook site). The values identified have been related to measurable indicators, and are assisting with the development of risk assessment tools to support sustainable management of the waterway.

An added outcome is that many interested participants are now members of a Community Reference Group which is informing a new IMAS/CSIRO research project investigating the changes in interactions between finfish farms and the environment over time. Community surveys and workshops have also been undertaken by Kingborough Council to identify community understanding and concerns regarding sea level rise and coastal hazards. A case study approach was applied at Snug, with outputs to contribute to planning for coastal hazard management and increasing adaptive capacity within the community.

Nutrient Cycling



CASE STUDY

MARINE DEBRIS CLEAN-UP – A COLLABORATIVE EFFORT

As the population and industries expand, marine debris is a growing environmental issue for the waterway. Sources are many and varied, with marine-based debris coming from pleasure craft, commercial vessels and fish farming activities, and land-based sources including coastal litter and runoff from urban stormwater drains and the broader catchment. Industry and community groups have been working together to identify and tackle marine debris hotspots, and reduce inputs through community awareness and improved waste management. Finfish and shellfish farmers monitor and remove marine debris from nominated shorelines through an 'Adopt a Shoreline' initiative, while the Kingborough Alliance project and ongoing activities of Sustainable Living in Kingborough (SLiK) has engaged the broader community through marine and coastal clean-ups, and public and school events. Monitoring activities of the Kingborough Alliance identified around 50 categories of marine debris in the waterway, dominated numerically by plastic food packaging and cigarette butts. In 2013, 32 cubic metres of marine debris were collected by the finfish farming industry from their adopted shorelines, with the same areas yielding 25 cubic metres during 2014. The volume of debris sourced from salmon farms declined by 8% in 2014, but remained the primary source of material by volume (80%). The D'Entrecasteaux and Huon Collaboration recently commissioned a Marine Debris Strategy which outlines coordination, communication, clean-up and prevention strategies and actions that will further contribute to a consolidated and cohesive approach to marine debris reduction.

Image supplied by Marina Debria Collaboration

LOCAL CLIMATE PROFILE

The climate has an important influence on the environment of the waterway; for example, increased rainfall, or sudden rainfall events, results in greater river and stormwater flows, runoff of catchment sediments, and hence potentially higher inputs of nutrients, faecal bacteria, litter and other pollutants. Reduced rainfall can result in lower and less frequent flows in rivers and streams, leading to impacts on habitats and species that are intolerant of periodically dry conditions. With lower river flows, the surface freshwater tannin layer on the Huon Estuary, which provides a unique environment for many seaweed species, fish and invertebrates, can be significantly reduced.

Assessment of long-term data indicate rising average temperatures since the 1950s (up to 0.1 °C per decade), and declining average rainfall and a lack of very wet years since the mid-1970s, with this decline strongest in autumn. During 2010-2014, average annual rainfall at Dover (a representative weather station for the region) was 3% lower than the long term average, while mean minimum and maximum temperatures were on average 2% higher than the longer term average. Over the past five years, 2014 was the hottest and driest year, with 16% less rainfall than the long term average for Dover.

Key changes

- Climate change is impacting on marine ecosystems and fisheries through modified ocean currents, temperatures and ocean acidification. Changing conditions can influence aquatic disease and phytoplankton blooms, fish/shellfish development, tourism and coastal protection.
- Ocean temperatures have warmed, and this has been exacerbated by a strengthening of the East Australian Current, which is extending further southward. Marine biodiversity in the Channel and Huon areas is changing as a result, with southward range extensions of marine species along the Tasmanian coastline a clear indicator of ocean warming.
- Shorelines have been impacted due to issues such as rising sea level and coastal flooding, and storm surges causing erosion and recession; sheltered beaches in the Channel are estimated to have receded between 1-20 metres since the 1940s.

Coastal hazard identification

Climate change is predicted to increasingly impact on the infrastructure, natural ecosystems, heritage values and industries of the waterway and adjoining coast. Initial assessments have identified 17 coastal hazard 'hotspots' within the Channel/lower Huon Estuary, representing areas at most risk of coastal erosion or flooding. The capacity of the region to adapt is being evaluated through climate change adaptation and coastal vulnerability planning for Kingborough and several coastal case studies at Margate, Snug, Coningham and Garden Island Sands. Coastal environments such as saltmarshes, as well as Aboriginal cultural heritage sites and infrastructure on low lying and erodible sites, are at risk as coastlines recede.

Shoreline monitoring has been established at six sites in the region as part of the TASMARC program to assess changes in the shape and position of beaches.

CASE STUDY

HUON HOTSPOTS PROJECT

A Coastal Hotspots program in the Huon was initiated following a damaging storm-surge event in 2011, and has focussed on high value natural assets at particular risk of erosion and/or inundation. The Huon Valley Council and NRM South developed a joint plan in 2014 to collate natural values and hazards information for key coastal sites, and to fill knowledge gaps by completing a series of studies. Highlights to date have included establishing TASMARC shoreline monitoring sites at Eggs and Bacon Bay and Randalls Bay, conducting vegetation condition assessments at 11 key coastal sites (focussing on saltmarsh and soft sediment shorelines), a summer shorebird monitoring program at 30 sites, and an evaluation of coastal hazard hotspots across the Huon Valley. The program has helped to inform coastal rehabilitation priorities and contributed to the development of new coastal management projects, such as the Shipwrights Point rehabilitation project and 'Dogs on Beaches' project.

Image supplied by Paul Gray

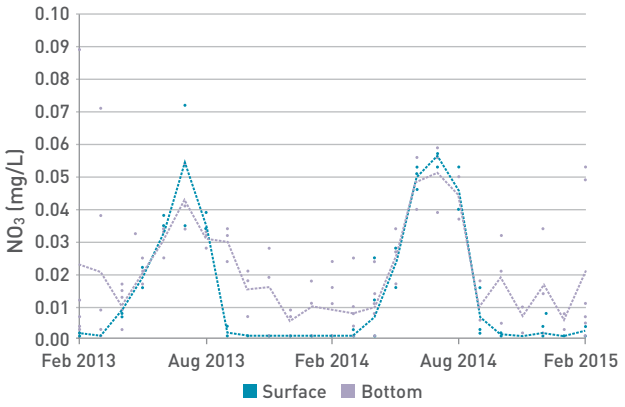
WATERWAY CONDITION

Water quality and sediment health

The Southern Ocean has a strong influence on dissolved inorganic nitrogen levels in the waterway, with levels rising naturally during winter months. This is illustrated by winter 'peaks' in nitrate concentrations (see graph below). These seasonal nutrient inputs trigger subsequent phytoplankton growth, with peak blooms in spring and late summer/autumn. Due to the regional circulation patterns, the greatest nutrient accumulation occurs in the Huon and the northern Channel, although phytoplankton biomass is typically highest in the Huon Estuary. An increase in nutrients and a decrease in bottom-water oxygen were recorded in the Huon Estuary in 2009-12 compared with earlier data. This is likely to be due to a combination of natural hydrodynamic variation and organic inputs at fish farms.

Data analysed to 2012 suggested no broad-scale deterioration in sediment health. Variation in sediment health primarily reflects exposure, current flow and position in the estuary/system.

Water quality: nitrate (NO3) concentrations (dashed lines represent average concentrations across three geographically representative sites).



Pollution types and sources

Pollution enters the waterway from 'point sources' such as sewage treatment plants, finfish farms, and fish processing plants, and also from 'diffuse sources' such as urban and industrial stormwater runoff, and broader catchment inputs from activities such as agriculture and forestry.

Pollution typical of waterways in mixed residential and production areas includes nutrients, pathogens (bacteria, viruses and other microorganisms that can present a hazard to human health), organic matter, silt, litter, hydrocarbons and a range of other pollutants. Inputs of nutrients, and particularly nitrogen, are considered to be of greatest environmental significance for the region. The addition of excess nutrients (from natural or artificial sources) can lead to negative environmental effects including algal blooms and hypoxia (the depletion of oxygen in the water). Nitrogen, in particular, can influence the growth of algae (phytoplankton and macroalgae); it is therefore important to recognise that nitrogen inputs can be divided into 'labile' (i.e. dissolved inorganic nitrogen, which is 'bioavailable' to algae) and 'refractory' (i.e. 'non-bioavailable') components.

Comparative inputs across the major human-related and natural (oceanic) sources of nitrogen reveal that the ocean contributes just over 50% of both labile and refractory inputs. The human-related sources are primarily by fish farms for the labile component, and by catchment inputs via riverine flows for the refractory component. The majority of the oceanic loading occurs during winter, while human-related sources of nutrients dominate the system during summer months. Excluding natural oceanic inputs, the total load across other major sources in 2014 is estimated to be 1,650 tonnes of labile nitrogen and 889 tonnes of refractory nitrogen.

Point sources of pollution

Nutrient loads from finfish farms are predominantly dissolved nitrogen.

Finfish farms are regulated on the basis of the total amount of dissolved nitrogen they are permitted to discharge into the system. The nitrogen allocation is spread over two marine farming development plan areas (the Huon River and Port Esperance, and the D'Entrecasteaux Channel) and totals 2,225 tonnes. This total permissible dissolved nitrogen output (TPDNO) has been in place and unvaried since 2002.

Data to 2013 indicated;

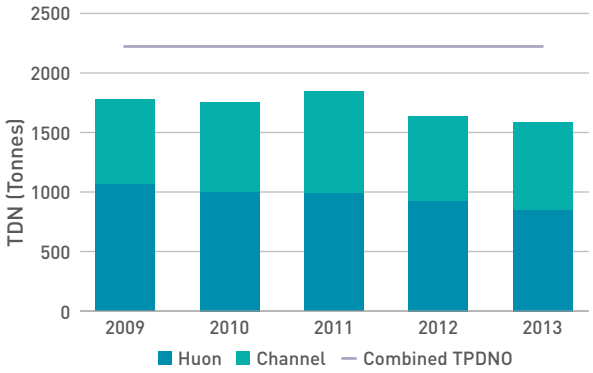
- A 10% decline in TDNO since 2009 from 1,778 tonnes to 1,594 tonnes in 2013
- In 2013, the load represented 72% of the TPDNO (the regulatory limit for the combined Channel and Huon areas)

Reduced nitrogen inputs since 2011 can be attributed to changes to feed formulations, which have resulted in reduced nitrogen levels per volume of feed, as well as modified approaches to feed management. These factors have effectively improved the Feed Conversion Ratio (FCR), leading to a reduction in nitrogen inputs relative to production level, as well as a reduction overall during 2012-2013. Note that the total leased area for shellfish farming increased by 11% from 367 to 409 ha between 2012 and 2015, however there are no direct nutrient inputs from these farms.

In the months leading up to December 2015, Huon Aquaculture Company Pty Ltd reported to the Department of Primary Industries, Parks, Water and Environment (DPIPWE) that it exceeded its forecast dissolved nitrogen input in the area covered by the Huon River and Port Esperance Marine Farming Development Plan by approximately 277 tonnes or 42%. As a consequence, the regulator has required that a comprehensive assessment be undertaken by the Institute of Marine and Antarctic Studies (IMAS) to examine the timing, nature and location of the exceedance; nutrient release and any associated benthic enrichment; and any ecological responses. IMAS will submit its final report to DPIPWE as the industry regulator. Future Report Cards from the Collaboration will report on management responses made as a result of this study.

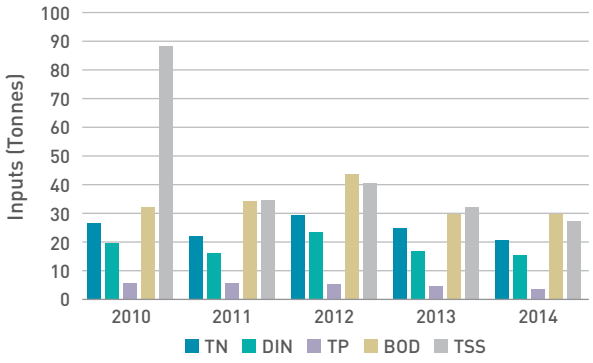
Use of antibiotics at finfish farms has been reduced through improvements to fish husbandry techniques and preventative approaches for disease management such as vaccines. Despite increased production of salmon, total input levels of antibiotics have been reduced to <100 kg per year, compared with 3,000 kg five years ago. Further information on finfish farming-specific inputs and topics such as antibiotic use can be found on sustainability dashboards for each of the finfish aquaculture companies (see **www.tassal.com.au/sustainability/asc-dashboard** and **dashboard.huonaqua.com.au**)

Finfish farm loads: Total Dissolved Nitrogen (TDN)

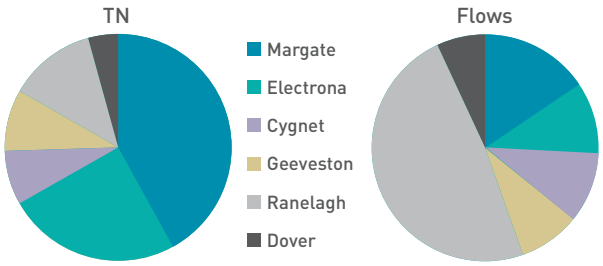


Note: 2014 data are not provided due to commercial senstivity associated with information on the most recent year of production.

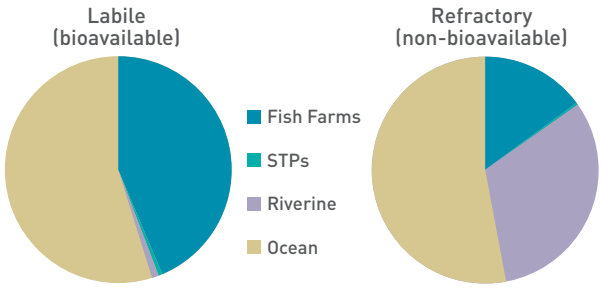
Sewage Treatment Plant (STP) loads: total nitrogen (TN), dissolved inorganic nitrogen (DIN), total phosphorus (TP), total suspended solids (TSS), biochemical oxygen demand (BOD)



Sewage Treatment Plant (STP) inputs: total nitrogen (TN) and flows, relative contributions of individual STPs (2014)



Comparative nitrogen inputs (2014*)



* Based on 2014 data for STPs and riverine inputs, and most recent data available for fish farms (2013) and oceanic inputs (2003 modelled data).

Fish processing plants consisting of two factories at Margate and one at Dover also discharge nutrients directly to the waterway. Inputs, represent approximately 30% of the nutrient inputs from Sewage Treatment Plants (STPs), and are likely to decline following the completion of a new treatment facility at Dover during 2014.

There are currently eight STPs discharging directly to the D'Entrecasteaux Channel and Huon Estuary waterway. Analyses of nutrient inputs focus on six of these, due to the small or infrequent discharges at Kettering and Woodbridge. Effluent from an additional STP at Howden is re-used at the local golf course, and therefore is not discharged to the estuary. Other large plants that have input to the waterway include the STPs at Ranelagh, on the Huon River, and at Blackmans Bay, on the edge of the Channel and Derwent Estuary. Although it is possible that nutrients can move into the Channel from the Blackmans Bay STP, it is located outside the study area and is considered in detail through the Derwent Estuary Program monitoring and reporting.

Monitoring of STP inputs during 2010-2014 recorded the highest pollutant loads during 2012, with the exception of a large spike in suspended solids sourced at the Ranelagh plant in 2010. Inputs in 2014 were generally lower than in the previous four years. The total annual input of nitrogen was 21-30 tonnes, 75% of which was in labile form, while 4-6 tonnes of phosphorus were discharged each year. The volume of effluent flow was greatest at Ranelagh, however the highest nitrogen discharges were at Margate and Electrona, reflecting poorer effluent quality at these plants. Both of these are soon to be de-commissioned.

DID YOU KNOW?

The Environment Protection Authority (EPA) of Tasmania released a Sewage Management Directive in 2013 outlining new rules relating to discharge of waste from recreational vessels in State waters. Under the directive, sewage that has not been disinfected cannot be discharged in waters <5 m deep, or within 120 m of any land adjacent to the waters of the D'Entrecasteaux Channel and Huon Estuary. For further information, see **epa.tas.gov.au/epa/boat-sewage-management-directive.**

CASE STUDY

ADVANCES IN WASTEWATER & STORMWATER MANAGEMENT

TasWater's Kingborough Sewerage Upgrade Project represents a significant improvement in wastewater management for the region, with treatment plants at Electrona, Margate and Howden to be closed, and waste instead to be piped to a significantly upgraded Blackmans Bay treatment plant. This will remove the major sources of sewage inputs to the upper Channel waterway, and the quality of effluent discharged to the Derwent Estuary at Blackmans Bay will be improved through updated infrastructure. A draft proposal for the Blackmans Bay upgrade was submitted in July 2015, and construction is expected to occur between 2016 and 2018. A new wastewater treatment plant commissioned during 2014 at Tassal's Dover fish processing factory will help to further reduce pollutant inputs to the waterway. Stormwater issues have also come under the spotlight, with the Kingborough Council currently preparing a Stormwater Management Strategy for the municipality, and completing a stormwater improvement project at Conningham to construct a new reticulation system and outfall. The project was completed in 2015 and incorporates a bio-retention basin to slow the rate of water movement, and is expected to improve water quality by removing excess nutrients, reduce coastal erosion and enhance habitat values.

Image supplied courtesy of Kingborough Council

Diffuse sources of pollution

Nutrient loads from agriculture, forestry and other land use activities in the Huon and D'Entrecasteaux Channel catchments enter the system via river flows. Catchment loads are also strongly dominated by nitrogen, with inputs of 642-959 tonnes per year during 2010-2014, compared with 16-24 tonnes of phosphorus. During this period, nutrient loads were greatest during the years experiencing the highest rainfall (2011 and 2013). The majority of the nitrogen input is refractory, with a small labile portion (6%). Inputs are seasonal, peaking during heavier winter rainfalls. The Huon contributes 90% of flows and total nitrogen inputs each year, dwarfing the next largest contributor, the Esperance River at 5%.

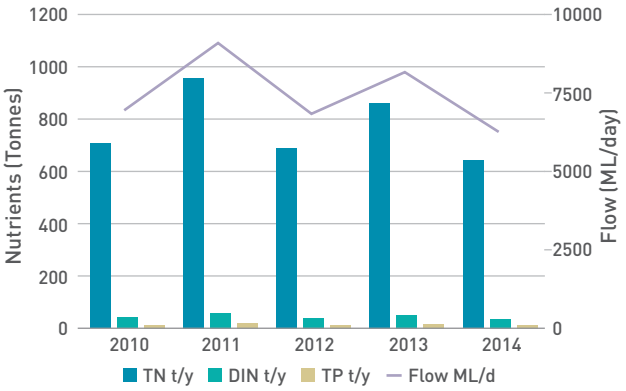
Stormwater contributes a range of contaminants to the waterway, as well as faecal bacteria, sediment and litter. Stormwater outlets are concentrated around townships such as Margate, Snug, Kettering, Woodbridge, Cygnet, Dover, Geeveston and Huonville; for example, at least 16 outlets occur in the vicinity of small towns in North West Bay alone. The water quality of stormwater discharges is currently not monitored, however recent management and on-ground activities reflect increasing recognition of the influence of stormwater on waterway health.

Other activities

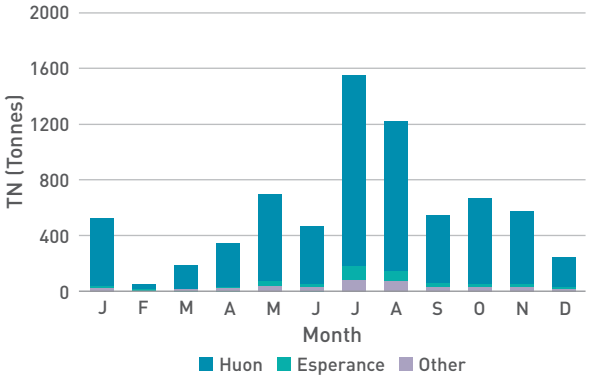
Many of the recreational and commercial activities on and around the waterway are greatly valued for contributing to the lifestyle and prosperity of the region. At the same time, they exert pressures on the environment and require careful management to avoid degradation of the natural values upon which they rely.

Recreational boating and fishing participation rates in the D'Entrecasteaux Channel and Huon Estuary exceed those of any other Tasmanian waterway. Boating activities may result in inputs such as sewage, hull fouling waste, oil and litter, and also potentially cause habitat disturbance. More than 4,500 boat licences are held by residents of the region, representing 8% of licences statewide, however 15% of all registered Tasmanian boat owners utilise the waterway. The number of boat moorings in the Channel/ Huon in 2015 is 1,538, reflecting a 15% increase since 2012.

Riverine inputs: total nitrogen (TN), dissolved inorganic nitrogen (DIN), total phosphorus (TP) and flows



Riverine loads 2014: total nitrogen by month and river



Swimming in the waterway

Recreational water quality is currently monitored during summer at 10 D'Entrecasteaux Channel beaches within the Kingborough municipal area – across the D'Entrecasteaux Channel (see see 'Beach monitoring sites' on map). Monitoring occurs monthly during December to March, however Bruny Island sites are monitored twice during this period. Monitoring frequency is less than in the adjacent Derwent Estuary, which prevents the use of a system to describe 'risk level' to swimmers. However, all of the monitoring sites in the Channel have good water quality for the majority of the time; occasionally bacterial counts become elevated following events such as high rainfall. As a precaution, swimming is not recommended in the vicinity of towns and other settlements for several days after heavy rain, and never in the vicinity of stormwater drains or urban streams.

CASE STUDY

REDMAP - CITIZEN SCIENCE HELPING TO IDENTIFY SOUTHWARD MIGRATING SPECIES

Tasmania's east coast has been described as a global 'hotspot' for ocean warming, with the increasing southerly penetration of the East Australian Current causing warming at almost four times the global average, and bringing with it a range of marine species not previously recorded this far south. The microalga *Noctiluca scintillans*, the source of recent bioluminescent blooms in southern Tasmania, now appears to be a permanent member of the phytoplankton community of the D'Entrecasteaux Channel and lower Huon Estuary. The long-spined sea urchin *Centrostephanus rodgersii* has also been recorded from occasional sightings, but has not yet formed the destructive barrens observed further north on Tasmania's east coast. Fishers, scuba divers and other members of the community can report sightings of marine species uncommon to their local waterways via the 'Redmap' (Range Extension Database and Mapping project) citizen science program at **www.redmap.org.au**. Reports are verified by scientists and contribute to research on species extending their ranges in response to changes in the marine environment, such as ocean warming. The Redmap project has identified over 50 species that are likely to be observed in southern Tasmania, with the 10 most likely to occur in the Channel including the above sea urchin, eastern rock lobster, gloomy octopus and seven fish species.

Image supplied by Scott Ling

Seafood safety

The D'Entrecasteaux Channel and Huon Estuary periodically experience blooms of the toxic dinoflagellate *Gymnodinium catenatum*, a species producing potent biotoxins which accumulate in shellfish and can result in Paralytic Shellfish Poisoning (PSP) in human consumers. The shellfish growing areas of the D'Entrecasteaux Channel and lower Huon Estuary are monitored as part of the Tasmanian Shellfish Quality Assurance Program (TSQAP), a collaboration between State Government and the shellfish industry. Harvesting shellfish ceases when there are elevated risks associated with biotoxins or catchment pathogens. Since 2013, improvements have been made to the program to better safeguard human health, primarily through increased sampling of shellfish meat for biotoxins.

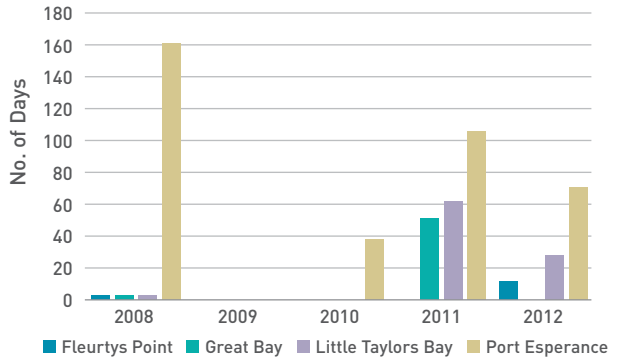
Within the waterway, the Huon Estuary is the area most affected by toxic *G. catenatum* blooms, and shellfish are no longer farmed there other than at two restricted sites in Port Cygnet. Biotoxins are also a major concern in Port Esperance, where the most recent five years of available data up to 2012 indicate farm closures for an average of 75 days per year, compared with average closures of just 3-19 days per year in the Channel growing areas (see graph opposite). Public alerts are also issued during periods of biotoxin risk to warn against the consumption of wild shellfish in affected areas. Alerts issued since 2012 indicate that there have continued to be periodic and sometimes prolonged *G. catenatum* blooms in the Huon Estuary and Port Esperance during 2013-2015. Pathogens associated with sewage inputs are also monitored by TSQAP, and while precautionary shellfish farm closures may occur in response to rainfall and river flow triggers, it is notable that there have been no closures in the region in recent years due to sewage spills.

A permanent health advisory issued by the State Department of Health and Human Services (DHHS) recommends that recreationally harvested wild bivalve shellfish not be eaten, since poor water quality in unmonitored areas could cause contamination of shellfish, particularly during heavy rainfall or algal blooms. **It is safe to eat bivalve shellfish from approved retail outlets because of the TSQAP monitoring.** Further information on periodic and permanent public health shellfish alerts can be obtained at: **www.dhhs.tas.gov.au/publichealth/alerts**

Finfish are not filter feeders like oysters and mussels, and so they do not accumulate biotoxins. Food safety of farmed salmon is ensured through regular sampling and quality testing as part of the Food Safety, Australia and New Zealand (FSANZ) Australian and New Zealand Food Standards Code which is regulated under Commonwealth Law.

Unlike the nearby Derwent Estuary, heavy metals are considered a minor risk to seafood in the D'Entrecasteaux Channel and lower Huon Estuary, and monitoring has revealed concentrations that are consistently below maximum permitted levels (MLs).

Shellfish growing areas: days of closure due to biotoxin risk



CASE STUDY

PHASING OUT OF COPPER-BASED ANTI-FOULANTS ON FISH FARMS NOW COMPLETE

Copper-based antifoulant has been used extensively within the finfish industry of the D'Entrecasteaux Channel and Huon Estuary over the last 20 years, however elevated levels of copper in the sediments of farmed areas increasingly led to concerns of ecological impacts and toxicity. A study completed in 2014 by IMAS and CSIRO in collaboration with the finfish farming industry found no evidence of acute short term toxicity effects, or significant changes in benthic communities or sediment function; however, potential was recognised for chronic long-term toxic effects where copper concentrations were elevated.

The study found that copper concentrations at fallowed (rested) sites did not return to background levels in the short term (12 months), however evaluation of >5 year farm datasets and sediment cores suggest that there is potential for recovery over the longer term. Recognising the risks of cumulative impacts, industry has gradually been reducing dependence on the use of copper anti-foulants, and during 2014 phased out their use altogether. A system for regular and efficient in-situ net cleaning has now replaced the previous practise of administering anti-foulants.

FLORA AND FAUNA

Coastal habitats and condition

The coast is a focal point for development in the region, and has been modified by a range of residential, agricultural, recreational, tourism, and industrial uses. Coastal habitats have been impacted by human activities, leading to declines in populations of some native animals and plants.

Coastal vegetation is dominated by dry eucalypt forest and woodland (54%) and agricultural, urban and exotic vegetation (34%), with smaller areas of saltmarsh and wetland (2.8%), and other vegetation (<5%). Throughout the D'Entrecasteaux Channel and Huon Estuary, only 18% of coastal vegetation is classified as 'intact', while the majority is described as altered with >10% weed cover.

Coastal vegetation provides breeding and foraging habitat for a number of threatened species, including the endangered swift parrot, Tasmanian devil and forty-spotted pardalote, as well as more than fifty other listed fauna and fauna species.

Vegetation Condition Assessments (VCAs) during 2011-2014 at 11 key coastal sites of the Huon found that they were in low-medium condition, with the exception of several healthier saltmarsh communities.

Temperate coastal saltmarshes are found throughout the D'Entrecasteaux Channel and Huon Estuary, and are a critical component of the system, supporting the ecology and biodiversity values of the waterways and coast. In recent years, it has been recognised that coastal saltmarsh is increasingly under threat due to factors such as sea level rise and erosion, land management (reclamation, conversion to pasture or recreation areas, draining, livestock), invasion of weeds, and pollution (stormwater). As such, coastal saltmarshes became a listed threatened community under the *Environment Protection and Biodiversity Conservation Act 1999* in 2013. A significant amount of work was undertaken in 2013 to map current extent of saltmarsh and future footprint (reports available via **www.nrmsouth.org.au**). New awareness and saltmarsh condition monitoring programs for the area are currently in development.

Weeds found on the foreshore of the waterway include 27 declared species, 8 of which are Weeds of National Significance (WoNS). The Huon Valley Weed Management Strategy 2013-2018 has recently been developed to supplement other strategies in the region. In 2014, Kingborough Council initiated a major review and update of municipal weed strategies. The three existing weed strategies have been combined to produce a single strategy for the municipal area – this will be released in early 2016. On-ground action by community groups and Councils has contributed significantly to weed control efforts, with bridal creeper, boneseed, canary broom, gorse and at least six other species prioritised in recent control and eradication programs.

Image supplied by Emma Flukes

Marine habitats and species

Seabed habitats in subtidal (submerged) areas of the waterway consist primarily of un-vegetated soft sediments (96%), with low cover of rocky reef (3%) and seagrass beds (1%). Surveys conducted as recently as 2012 support earlier evidence of a long-term decline in the seagrass cover of North West Bay. Rocky substrates comprise 70% of the upper shore and 57% of the lower shore in the intertidal zone, with sandy beaches and mudflats contributing 21-26% of cover.

Animals reliant on the marine environment of the D'Entrecasteaux Channel and Huon Estuary include a range of resident and migratory species adapted to either estuarine or fully marine conditions. At least 150 fish species occur in the waterway, while over 200 species of algae (seaweed) occur at the entrance to the Huon Estuary alone.

Reef species are monitored at the Tinderbox and Ninepin Point Marine Reserves, with total abundance and species diversity of large fishes as well as abundance of lobsters increasing at the Tinderbox site relative to fished areas. Protection-related effects have been less evident at Ninepin Point, but may be enhanced over time following reserve expansion in 2009. The algal community at Ninepin Point is unique, containing more rare species (9) than recorded at any other Tasmanian location.

Marine mammals and birds are also important in waterway ecosystems. Opportunistic sightings reported during the five years 2010-2014 included 17 and 12 sightings respectively for southern right and humpback whales. Common and bottlenose dolphins, as well as a rare sperm whale sighting, were also reported. Seals and birds are attracted to the fish concentrations at finfish farms and occasionally die following entanglement. Available data for 2012-2014 indicate small numbers of deaths, with the majority of animals able to be released. Increased use of farms as feeding sites by gulls following closures of tips has been a challenge, with annual

gull counts in south-east Tasmania recording 70% of Pacific and silver gulls at finfish farms. Industry has developed seabird rescue strategies to enhance the welfare outcomes of entrapped birds. The roll-out of new predator-proof pens, anticipated to be largely complete by the end of 2015, is aimed at significantly reducing interactions with seals and birds.

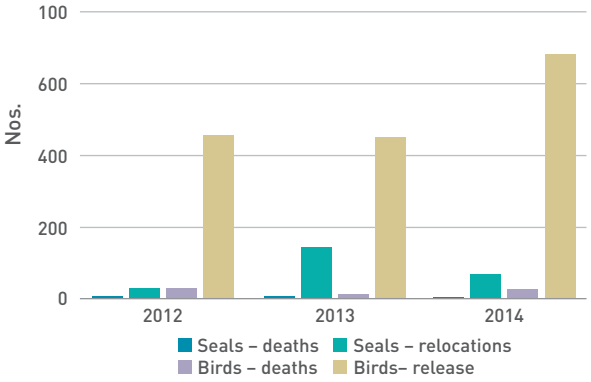
Summer surveys of little penguins during 2011-2015 found small colonies on the eastern coast of the Tinderbox Peninsula and at Huon Island, but none between Verona Sands and North West Bay. The disappearance of some colonies has been attributed to predation, habitat degradation, and incidental drowning in recreational gillnets. Surveying at Bruny Island Neck indicated a good breeding year in 2014/2015.

There are 49 known introduced marine species in the waterway, including three with National Control Plans – northern Pacific seastar, Japanese seaweed and European clam – and also the feral Pacific oyster, toxic *Gymnodinium* dinoflagellate and dead man's fingers seaweed. The New Zealand screw shell also dominates some seabed habitats. There has been considerable community effort to control and maintain feral Pacific oyster-free areas of the coastline, with eight sites targeted on the basis of significant coastal values.

Recreational fishing is dominated by line-fished flathead, however the flathead catch in 2012-2013 reflected a 26% decline since 2007/2008. Consistent with this, a recent stock assessment suggested depletion of legal-sized flathead in the waterway. The recreational catch of abalone in 2012-2013 had increased nearly three-fold compared with two years earlier, whilst annual lobster catches remained steady. The recreational scallop fishery has remained closed since 2012 due to overfishing and poor recruitment.

Commercial fishing is limited to a small amount of abalone, with annual catches declining by 85% since 2010. This is due to much of the region being closed to commercial fishing as a result of biotoxin monitoring requirements, and consequent preference by divers to fish elsewhere.

Seals and birds: deaths and releases at finfish farms*



*Tassal data

Image supplied by Emma Flukes

DID YOU KNOW?

Whales, seals and marine birds are highly vulnerable to entanglement in fishing gear and marine debris, as demonstrated by a sighting of a humpback whale at Tinderbox in 2014 entangled in a rock lobster pot/line that it had dragged from the east coast of Bruny Island. This highlights the importance of preventing loss of fishing gear and rubbish whilst out on the water. Observations in recent years of Endangered southern right whale cows with small calves in the area are an encouraging sign for this recovering species, however they are particularly vulnerable to disturbance from vessel traffic. It is important to observe the guidelines for interacting with whales and dolphins (see **http://dpipwe.tas.gov.au/wildlife-management/caring-for-wildlife/whale-dolphin-viewing-guidelines**), and members of the public are encouraged to report whale and dolphin sightings or strandings, and injured or entangled marine mammals at the 24hr/7 day Marine Mammal Hotline (0427 WHALES).

ACKNOWLEDGMENTS

Many people have contributed towards the development of this Report Card – the efforts of individuals involved in the collation of data and information are specifically acknowledged – particularly Karen Parsons of Ecomarine Consulting and the members of the D'Entrecasteaux and Huon Collaboration Steering Committee and Scientific and Technical Working Group. Photographs provided by Nepelle Crane, except where acknowledged.

THE D'ENTRECASTEAUX & HUON COLLABORATION

Key stakeholders of the D'Entrecasteaux Channel and Huon Estuary are also acknowledged for their input into the Report Card.

The following information sources compiled by members of the Collaboration and other stakeholders are summarised in the Report Card:

- BEMP water and sediment quality sampling;
- recreational water quality testing during summer months;
- sanitary surveys of shellfish growing areas;
- river flow and nutrient monitoring;
- wastewater effluent monitoring;
- finfish farming and processing nutrient input data;
- waterway nutrient modelling research;
- marine debris surveys;
- habitat and biological surveys (e.g. coastal vegetation, little penguins, seagrass);
- marine pest surveys;
- coastal hazards assessments and shoreline monitoring programs;
- recreational boater and fisher surveys;
- fisheries research and stock assessments;
- the Tasmanian visitor survey;
- community reporting and citizen science initiatives; and
- environmental management actions (e.g. weeds, stormwater, feral oyster control).

For further information

Contact the D'Entrecasteaux and Huon Collaboration

NRM South

PO Box 425, South Hobart, TAS, 7004

Office location: 313 Macquarie St, Hobart

(03) 6221 6111

www.ourwaterway.com.au

ourwaterway.com.au
facebook.com/ourwaterway

THE D'ENTRECASTEAUX & HUON COLLABORATION