

Inshore Dredging Disposal Monitoring Factsheet - Benthic Ecology



Epibenthic Dredge Contents

Background

Port Otago Limited has disposed historically less than 450,000m³ per year of dredged material (sand, rock and silt) to the inshore disposal grounds. This material being derived from dredging the harbour channel and berth areas to maintain the required depths, as well as minor capital dredging works.

A variety of monitoring is undertaken on a regular basis to monitor the environmental effects of the disposal activity.

What are benthic ecosystems?

The invertebrates, algae and fishes living in and on the sea floor, from between the tides to abyssal depths, collectively are called benthos or benthic organisms.

Even sandy and muddy shores and sea floors have abundant and diverse (up to 40-50 different species) benthic ecosystems.

Most benthic organisms are small (< 5 mm long), but some, such as surf clams and other shellfish, can be quite large (10 cm long).

Not only are they usually very numerous (up to 20,000 individuals/m² or 75-80 in a cup of sediment in Blueskin Bay), but they also grow and reproduce quickly (3-4 generations per year are common) to replace the large numbers eaten by predators, like fishes and seabirds.

This means that their total production (weight of live organisms produced) over a year is very substantial.

What types of organisms form the benthos?

Muddy and sandy (or soft) bottoms are dominated by worms and crustaceans.

Crustaceans, especially amphipods, are most diverse and abundant in shallow sandy habitats on exposed coastlines.

Molluscs, typically bivalves (e.g., tuatua) and sometimes snails, also live in these habitats, at times in very dense populations.

Epibenthic Dredge - NIWA



Fan worm



Red Swimming Crab



Nemertean worm



Nudibranch mollusc



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Aramoana Spit

Benthic crustaceans



It's just mud - why should we care about muddy bottom ecosystems?

Marine plants, notably phytoplankton and larger algae, use light and nutrients via photosynthesis to grow, providing the energy base that drives the marine food chain.

Benthic ecosystems break down the dead plant and animal tissue, faeces and other detritus to release nutrients in a natural, healthy way, so that they can be re-used in photosynthesis.

In this natural decay process, millions of benthic invertebrates feed on the organic matter,

growing, reproducing and themselves becoming food for larger organisms, directly or indirectly supporting fishes and seabirds.

These invertebrates behave like worms in compost. Different species do slightly different things, but, collectively, they till or garden the muddy sea floor as they move and feed, breaking down clumps of organic matter, releasing nutrients and keeping the sediment aerated in the process.

Burrowing amphipod



Although the individuals are small, collectively they keep our coastal waters and oceans healthy and productive.

Like all biodiversity, these invertebrates also have their own intrinsic biodiversity values. For example, one species (*Otagia zelandicus*) represents an endemic genus named for the Otago region. It appears restricted to the southern east coast of New Zealand, so is special for that reason alone.

Surf Zone Isopod



What happens when the benthos is affected, such as by dredged sediment deposition?

When benthic ecosystems are disrupted, for example, when too much organic detritus accumulates, natural decay processes can use all of the available oxygen, killing many of the benthic invertebrates and creating smelly dead zones that can take many years to restore.

Dredge material deposition can lead to changes in benthic ecosystems, but recovery commences almost immediately and can be surprisingly rapid. Recent monitoring undertaken by NIWA shows that dredged

sediment deposited at the Heyward Point and Aramoana grounds reduce densities and diversities of the benthos within the disposal grounds.

In the wider context of the Blueskin Bay and sandy shelf area, similar habitats and benthos exist, and the disposal sites are a very small portion of this wider area.

Some key species survive burial by several centimetres of sediment, others quickly re-colonise and together these maintain the

decay processes in a healthy, largely aerobic state. NIWA did find occasional slightly anaerobic sediments.

Increasing the Heyward Point ground's size will allow longer intervals between deposition events, on average, allowing greater recovery of both the benthos and normal ecosystem functioning.