IMPLICATIONS OF THE NATURE AND QUALITY OF DREDGED MATERIAL FOR ITS BENEFICIAL PLACEMENT IN THE COASTAL ENVIRONMENT (AE0231).

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Introduction

Under the Food and Environment Protection Act (FEPA) Part II (Great Britain Parliament, 1985), there is a requirement for Defra to have regard to the practical availability of any alternative methods of dealing with dredged material. In recent years, this has led to a number of enlightened alternatives (i.e., "beneficial use" schemes) to the conventional sea disposal route, ranging from the construction of sea defences (primarily coarse, capital material) to the use of fine-grained sediments for the restoration of estuarine mudflats/saltmarshes for flood defence and/or habitat enhancement. However, an unfortunate consequence of this change in the focus of attention is that the sea disposal route (which, for the foreseeable future, will account for the majority of dredged material) tends to be viewed in a negative light, i.e., as an option of last resort. This need not be so: the environmental impacts of dredged material relocation may be viewed along a continuum of severity and may be managed accordingly, as the present project seeks to demonstrate.

Project aims

This project aimed to improve the decision-making process regarding the relocation of fine-grained, maintenance dredged material within the coastal environment. This was achieved through four main approaches;

- A more detailed evaluation of the characteristics of UK-licensed dredgings than hitherto
- An improved understanding of the ecological consequences of intertidal placement of fine-grained dredged material (beneficial use) for habitat creation/flood defence
- Production of an overview of the environmental effects of ongoing and new beneficial use and sea disposal schemes, through the production of a database of existing monitoring studies
- Construction of a decision-making framework for dealing with licence applications

The scientific results are presented in the final project report for AE0231, here we present the key findings, the decision-making framework and summarise the benefits to Defra of this work.

Figure 1: Intertidal recharge of fine-grained dredged material by rainbowing and direct pumping (inset)

Key findings

- There is a wide variability in the characteristics (organic content and particle size distribution) of UK-licensed dredged materials, often with a large variability within dredged areas.
- While macro- and meiofaunal recolonisation of dredged material during beneficial use schemes may occur rapidly, longer-term differences in the structure of the communities may lead to changes in the ecological functioning of beneficial use schemes relative to natural areas
- Invertebrate recolonisation processes of beneficial use schemes are sensitive to differences in organic content of dredged sediments: this parameter requires careful assessment during the decision-making process under FEPA
- Due to the large degree of variability associated with dredged material relocation in the coastal environment, the ecological consequences of ongoing or new arisings should be viewed along a continuum of severity, from adverse to beneficial. The over-arching principle of this decision-framework is that every new disposal application must be considered on a case-by-case basis (see Figure 2)
- The ecological consequences of intertidal beneficial use schemes cannot, at least in the short term (18 months), be separated from those associated with the traditional sea disposal route.

Adverse ⟷ Beneficial

Effect on ecosystem integrity in response to dredged material relocation

- Ecological effects of emplacement must be viewed along a continuum
- All relocation options (including "beneficial use") may lie anywhere along this effects continuum
- All options must ultimately be treated on a case-by-case basis *
- Management decisions must balance operational and ecological consequences.

* Effects primarily depend upon site-specific factors such as (i) the amount and (ii) frequency of disposal, (iii) the quality of dredged material, and (iv) the nature of the receiving environment

Figure 2: Decision-making framework of the ecological consequences of dredged material relocation in the coastal environment

Benefits to Defra

- Improved scientific advice regarding the predicted ecological effects of dredged material relocation in the coastal environment
- The establishment of the DECODE umbrella group acting to harmonise communication between scientists, port operators and policy regulators regarding dredged material disposal (www.cefas.co.uk/decode/default.htm)
- The establishment of CEFAS as one of UK's leaders on the assessment of the ecological recovery of beneficial use schemes
- Work conducted under this project was instrumental in the delivery of another Defra-funded research project under taken by Plymouth Marine Laboratory (AE0259)

Further work

This research project has indicated several areas of work to further our understanding of the ecological effects of dredged material emplacement and improve the advice under FEPA:

- An assessment of the long-term recovery of beneficial use schemes. This is being investigated by a further Defra-funded research project
- An understanding of the relationships between the recovery of invertebrate populations of created habitats and higher trophic level impacts (e.g., fish and bird populations)
- Progress towards developing a suitable biological indicator of dredged material disposal

Publications funded by AE0231

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