Runswick Bay Ecological Enhancement & Coastal Defence Scheme
Runswick Bay, North Yorkshire
Scarborough Borough Council

BIG Biodiversity Challenge Award Category: *Project of the Year (up to 5 Ha)*

Project overview

The scheme included the placement of 9,500 tonnes of granite rock armour to protect 250 m of frontage & 113 properties. Collaboration between ecologists, engineers and coastal managers created 70 artificial rock pools in the granite armour stone and a further 20 natural pools were created through informed positioning of boulders.

What were the biodiversity conditions on site, prior to the enhancement?

The area has a number of environmental designations and accreditations such as SSSI, Special Protection Area (SPA) and Marine Conservation Zone (MCZ). Runswick Bay became a (MCZ) in January 2016 and was designated an MCZ for its low energy, moderate energy and high energy intertidal rock.

Prior to construction an intertidal biotope survey was conducted in April 2017 by JBA consulting. An EIA screening was completed in 2015. Planning permission was granted in November 2017. A Marine Licence, issued under the Marine and Coastal Access Act 2009, was also submitted to cover the proposed scheme.

What were the reasons behind this project ?

The enhancements were conducted over and above the requirements of planning, they were developed during the outline of the business case phase of the project. The ecological enhancement aspect of the project was conducted due to the sensitive nature of the site and to provide a betterment to the foreshore. An additional benefit was that the proposed habitat creation helped to gain project consent /assent from Natural England, The Marine Management Organisation and the North York Moors National Park.

Runswick Bay CDS. The green boulders are the existing boulders which were used to "seed" the new defence

a)

b)

a) Saw cut artificial rock pool b) natural rock pool made through informed positing

What were the biodiversity measures taken?

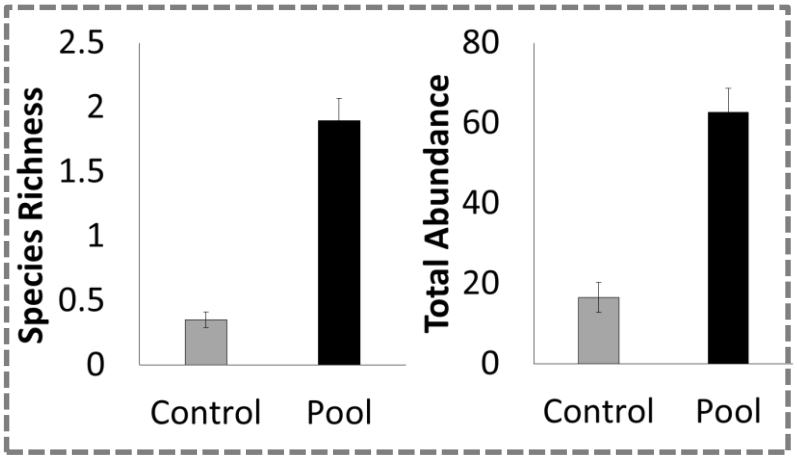
70 artificial rock pools were cut into the top of granite boulders using a circular saw and breaker by the contractors. The pools were approximately 300mm diameter and 150mm deep. Where possible the remaining boulders were orientated to retain water naturally. Grooves were also cut into the granite boulders to increase habitat heterogeneity- a technique which has been proven to work by Hall *et al* 2018. The new defence was "seeded" with existing boulders which were already colonised at the site- these boulders had been kept aside during the construction period and reused. The combination of techniques has created suitable intertidal habitat including rock pools which would otherwise be absent from the defence structure.

After 3 months, 13 species were recorded in the artificial rock pools and only 3 species were recorded on the adjacent control granite rock faces. These species included the intertidal fish Shanny (*Lipophrys pholis*), two intertidal crabs (*Carcinus maenas, Necora puber*) and two intertidal snail species (*Littorina littorea, Littorina obtusata*). These rock pools provide valuable functions for spawning, nursery and feeding for coastal species.

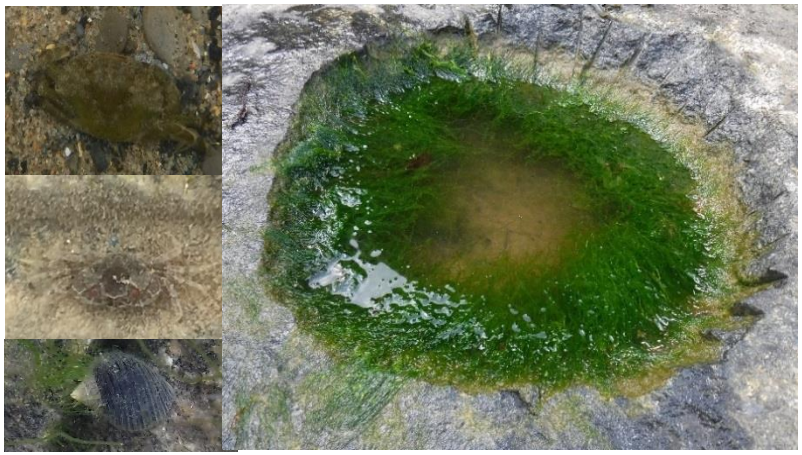
The project achieved successful collaboration between engineers and ecologists, a good working relationship with Natural England and the Marine Management Organisation and the local community including school children. Long term monitoring will be conducted over the next 3 years by Dr Alice Hall, Bournemouth University and Dr Susan Hull, University of Hull.

This project was the largest creation of artificial rock pools in granite rock armour in the country to date. The technique can easily be replicated on future defence schemes.

Hall A, Herbert R, Britton J. and Hull S. (2018) Ecological enhancement techniques to improve habitat heterogeneity on coastal defence structures. Estuarine, Coastal and Shelf Science 210 (2018) 68–78



Mean species richness and total abundance of flora and fauna found on the control granite boulders and rock pools after 3 months (+/- SE, N=70).



Selection of fauna found inside the artificial pools- Green shore crab (adult & juvenile), Edible periwinkle and green seaweed.

Further information

Installation –The circular saw was used to make two sets of parallel cuts which were perpendicular to each other to form a cross shape. A breaker was then used to break up the cuts and form pools of approximately 300 mm diameter and 150 mm depth

Monitoring-The abundance of fauna and flora were recorded in-situ inside the rock pools and compared to the adjacent rock face to determine if the artificial rock pools had a positive effect on increasing biodiversity on the rock armour. Water parameters, including temperature, pH and salinity were recorded inside the rock pools and compared to a sample of seawater. In addition, measurements of rock pool width and depth were also obtained to determine physical rock pool characteristics. After 3 months there had been an increase in biodiversity. Monitoring will be continued until 2021.

Lessons learnt – It is essential that collaboration between ecologist and engineers begins at the design phase of a project to allow exchange of ideas.

Project Team

Client: Scarborough Borough Council, Consultant; Project Manager & Site Supervisor: Royal HaskoningDHV, Design Consultant; JBA Consulting, Build Contractor; ESH Construction. Ecologists: Dr Alice Hall, Bournemouth University & Dr Susan Hull, University of Hull

What was the motivation for carrying out the enhancement?

Scarborough Council and Dr Alice Hall wanted to improve the habitat provided by the coastal defence scheme by creating simple cost effective ways to incorporate suitable habitat into artificial structures. Engineers should consider creating multifunctional structures which are suitable for coastal protection and provide habitat for marine life.

Monitoring protocol- artificial rock pool and quadrat on the control rock face.:

Natural existing boulders placed at the toe of the new structure to aid colonisation of granite boulders.