

Develop artificial offshore reefs, either directly, or incidentally as part of other developments in Northern temperate waters.

MANAGING ECOSYSTEM SERVICES

COASTAL & MARINE

CREATE ARTIFICAL REEFS

GOODS & SERVICES

Food

Biodiversity

Recreation & Tourism

Education



These pages represent a review of the available evidence linking management of habitats with the ecosystem services they provide. It is a review of the published peer-reviewed literature and does not include grey literature or expert opinion. There may be significant gaps in the data if no published work within the selection criteria or geographical range exists. These pages do not provide advice, only review the outcome of what has been studied.

Full data are available in electronic form from the [Evidence Spreadsheet](#).

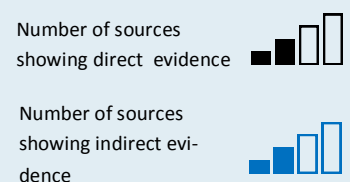
Data are correct to March 2015.

KEY

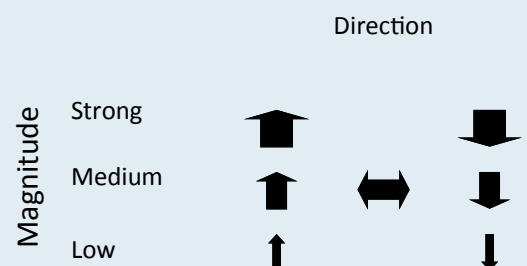
Quality of Evidence



Quantity of Evidence



Magnitude and Direction of Effect



MANAGING ECOSYSTEM SERVICES

COASTAL & MARINE

CREATE ARTIFICIAL REEFS

Provisioning Services—providing goods that people can use.

Cultural Services—contributing to health, wellbeing and happiness.

Regulating Services—maintaining a healthy, diverse and functioning environment.

PROVISIONING

Food: Moderate Evidence:- An artificial reef system was created off the Portuguese coast in 1990 consisting of a protection reef (PR) and an exploitation reef (ER)¹. A gill net was then deployed to detect the reef's importance for attracting fish. The fishing yield was 1.86 times that of the control site for the PR and 2.28 times that of the control site for the ER. Species richness and diversity were also higher at the reefs than the control sites. It is not clear if the reefs benefit fish populations and yields by improved recruitment or by attracting fish from other areas.

Weak Evidence:- A review of artificial reefs in Europe² points out that most of the reefs have been placed in the Mediterranean sea, with only a few studies on reefs in Northern Europe. The reefs in the Mediterranean have mainly been created for fish stock management, while those in other areas have been for conservation, research and recreation (diving). A study from the Eastern seaboard of the USA looked at the value of artificial reefs in the form of shellfish aquaculture gear³. It found that they offered valuable habitat for the early life history stages of a range of important commercial and recreational fish and invertebrate species and may be better than natural sea-grass vegetated habitats.

Biodiversity: *Strong Evidence*:- A study of different types of artificial reefs in Northern temperate waters found that increased structural complexity was important for occupancy by fish and invertebrates⁴. Abundance of many of the species examined was 2-3 times higher on artificial concrete reefs with voids than either solid concrete blocks or natural reefs. The species assemblages can also be influenced by whether the reef is static, such as on pilings, or mobile, such as that on floating docks or pontoons⁵. Waste materials dumped into estuaries can create 'accidental' artificial reefs⁶. This study looked at waste materials such as tyres, wood and metal and rates of colonisation compared with sandstone reefs in the same habitat. It found that waste materials were colonised at the same rate as natural material, and that schooling fish preferred the waste material. In contrast, a study looking at colonisation of a fly-ash reef off Northumberland found low diversity compared with a control area⁷. 47-66% of species were represented by only one or two individuals. Re-colonisation was primarily by opportunist species and those experiencing range expansions⁸. Artificial reefs may also act as an entry-point for non-native species, as a study found that numbers of marine non-indigenous species were 1.5-2.5 times greater on pontoons and pilings than on natural reefs⁹. ***Moderate Evidence***:- A study from the Eastern seaboard of the USA looked at the value of artificial reefs in the form of shellfish aquaculture gear³. It found that they offered valuable habitat for the early life history stages of a range of important commercial and recreational fish and invertebrate species and may be better than natural sea-grass vegetated habitats. While sub-sea pipelines and cables can produce new habitat for benthic animals, they also act as a barrier to dispersal for animals such as crabs¹⁰.

Recreation and Tourism: *Strong Evidence*:- Artificial reefs, at least in the Mediterranean, are primarily put in place to manage for fish stocks rather than recreation². In a willingness to pay study, scuba divers were interviewed regarding the differences between natural and artificial reefs¹¹. Divers value natural reefs more highly than artificial ones, however, artificial reefs may relieve pressure on natural dives sites and still contribute significantly to their economic value.

Education: *Moderate Evidence*:- A review of the reasons for placing artificial reefs in European marine ecosystems points out that some reefs are used for research purposes².

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