



U.S. Environmental Protection Agency



U.S. Maritime Administration

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National Guidance: Best Management Practices for Preparing Vessels Intended to Create Artificial Reefs

Siting of Artificial Reefs

May 2006

SITING OF ARTIFICIAL REEFS

Artificial reefs can enhance marine resources and in turn benefit the marine environment; however, creating a successful reef entails more than randomly placing miscellaneous materials in ocean, estuarine, or other aquatic environments. Planning (including siting), long-term monitoring, and evaluation are necessary components of each project to help ensure that the anticipated benefits of artificial reefs are attained. Improperly planned, constructed, or managed reefs may be ineffective, may cause conflict among competing user groups of the reef site, may increase the potential to over harvest targeted species, or may damage natural habitats. In such cases, the anticipated benefits of an artificial reef project may be negated.

Because the purpose of creating an artificial reef is to benefit the environment by enhancing aquatic habitat and marine resources, as well as providing an additional option for conserving, managing, and/or developing fisheries resources, artificial reefs should not cause harm to existing living marine resources and habitats. Properly prepared and strategically sited artificial reefs can enhance fish habitat, provide more access to quality fishing grounds, and provide managers with another option for conserving, managing and/or developing fishery resources.

Placement of a vessel to create an artificial reef should:

- enhance and conserve targeted fishery resources to the maximum extent practicable;
- minimize conflicts among competing uses of water and water resources;
- minimize the potential for environmental risks related to site location;
- be consistent with international law and national fishing law and not create an obstruction to navigation;
- be based on scientific information; and
- conform to any federal, State, or local requirements or policies for artificial reefs.

Additional considerations that may be relevant to the placement of a vessel for the creation of an artificial reef include:

- facilitating access and use by recreational and/or commercial fishermen; and
- facilitating access and use by recreational divers.

Artificial reef project planners should identify the habitat type and/or species targeted for enhancement and determine which biological, physical, and chemical site conditions will be most conducive to meeting the reef objectives. Once these siting conditions, including community settlement and recruitment dynamics, are determined, they should be used in identifying potential construction sites. Existing communities (e.g., infaunal, epifaunal, benthic, demersal, mid-water, surface-oriented) in the area where the artificial reef is to be placed should

be considered prior to placement -- this should include monitoring to establish baselines for the fishing resources.

Caution should be exercised when developing artificial reefs in nearshore areas due to the increased potential for resource competition as well as competition for niche space. Improperly sited reefs might enhance a recreational fish resource at the expense of other species or habitat; it may also alter the ecological balance of the area. For example, sandy estuarine habitat often provides critical nursery grounds for the juveniles of many species of bottom fish. During this life stage, the primary predator protection for these juvenile fish is the absence of large fish -- which are favored by recreational anglers. Oftentimes, sandy estuarine locations tend to be popular choices for siting artificial reefs to attract large fish for recreational fishing, thereby altering existing predatory/prey interactions and creating resource competition. Strategic project planning can minimize these conflicts.

Artificial reefs should not be constructed such that they are placed on or threaten the integrity of natural habitats such as:

- existing coral reefs;
- significant beds of aquatic grasses or macroalgae;
- oyster reefs;
- scallop, mussel, or clam beds;
- existing live bottom (i.e., marine areas supporting growth of sponges, sea fans, corals, and other sessile invertebrates generally associated with rock outcrops); or
- habitats of Endangered Species Act listed species and species of State and local concern.

The goals and priorities of an artificial reef project should direct overall site selection. Within the identified target area, existing natural and artificial reefs and known bottom obstructions should be identified. Exclusion areas for potential artificial reef projects should include, but are not limited to:

- shipping lanes;
- restricted military areas;
- areas of poor water quality (e.g., low dissolved oxygen, dredged material disposal sites);
- traditional trawling grounds;
- unstable bottoms;
- areas with extreme currents, or high wave energy;

- existing right-of-ways (e.g., oil and gas pipelines and telecommunication cables);
- sites for purposes that are incompatible with artificial reef development; and
- areas designated as habitat areas of particular concern or special aquatic sites.

The bottom composition and configuration at an artificial reef site affects reef stability and longevity and should be carefully evaluated in the site selection process. In most cases, soft sediments such as clays, silts, and loosely packed sands should be avoided. Over time, artificial reef materials may sink into these sediments or become partially covered.

Project planners should evaluate vessel-to-reef projects and potential sites with regard to chemical and biological conditions as well as long-term durability and stability, as these will affect future habitat value.

Coastal physical processes can greatly influence a potential artificial reef site. Artificial reef planners should be aware that bottom sediments shift and may change significantly during storms, hurricanes, and geologic events. Materials that present large amounts of surface area may scour deeply into almost any bottom type, depending upon storm events, currents, or wave action.

The principal hydrographic factors to be considered in selecting sites for artificial reef placement include water depth, potential wave height, currents, and tides. Water depth is a significant siting criterion. Artificial reefs should be placed in water at sufficient depths to avoid creating a hazard to navigation – minimum clearance above the reef should accommodate the draft of the largest vessels expected to operate in the vicinity with an adequate safety margin. Water depth at the site may critically affect artificial reef material stability and long-term structural integrity. In large, open bodies of water, average wave energy as a function of water depth is the major concern.