

Use of Vessels as Artificial Reef Material in Florida

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Introduction

Vessels have historically played a major role in artificial reef construction off Florida's coasts. According to records in the Florida Fish and Wildlife Conservation Commission (FWCC) artificial reef database, a total of 268 miscellaneous boats and ships and 167 barges (435 vessels total), have been intentionally sunk in state and federal waters off 28 Florida coastal counties, since 1959. These vessels have ranged in size from 36' to 610' in length. An additional 27 vessels lost through acts of war, accident, or storm events are also used by the public as fishing and diving sites off Florida. The total number of 462 vessels represents 26.4% of the 1,753 artificial reefs in the FWCC artificial reef database as of September 19, 2001.

A number of federal agencies are considering the cleaning and sinking of surplus ships as a preferred alternative for disposal of large numbers of excess vessels. Because of the cumulative number of vessels involved, these decisions could have major ramifications for Florida. With inter-agency coordination, proper planning and management based on science, Florida has the opportunity to take a proactive approach to maximize the benefits of these proposed activities while minimizing the risks for the benefit of Florida's public and natural resources.

Recent activities

The Florida Coastal Management Program, State Clearinghouse recently coordinated the review of a US Coast Guard (USCG) draft Environmental Assessment (EA) that proposes to dispose of 15 excess 180' Cutters and the Cutter "Fir", possibly as artificial reefs. The EA describes artificial reef deployment a good way for the USCG "to cost effectively rid itself of obsolete and inefficient vessels." This proposal would set precedent for the following activities as a programmatic link between disposal of surplus ships and artificial reef construction on a greater scale than previously observed.

Over the next 20 years, the US Maritime Administration (MARAD) needs to dispose of 358 large ships (>300' in length) (Gregg and Murphey 1994, Hess et al. 2001). A report prepared for the US Navy recommends disposal via "reefing" (sinking ships on artificial reef sites) off of US coasts as a viable, cost effective alternative to shore-based recycling (Hess et al. 2001). It is uncertain how many of these vessels might be proposed for deployment off of Florida.

The USCG and the US Customs, Drug Enforcement Administration have asked the FWCC, Artificial Reef Program to accept and pay for dockage, cleaning and towing of approximately 20 seized derelict ships and boats in the Miami River, for use as artificial reefs. Private funding was secured recently, for three of these vessels to be prepared and sunk on a South Florida artificial reef site.

The US Navy is also considering "reefing" as an alternative to get rid of its excess vessels and has discussed this with FWCC, Artificial Reef Program staff. The number of vessels and the timeframes involved are unknown at this time.

The Florida Department of Environmental Protection (DEP) has a major interest in these activities because of statutory responsibilities regarding artificial reef permitting, environmental protection, water quality protection and proprietary responsibilities regarding management of submerged lands. Water quality and environmental impacts would be of concern for vessels disposed in federal waters and would be subject to the federal consistency process for any proposed vessel disposal program.

Outlined below is a number of management and environmental issues associated with the use of vessels as artificial reefs:

Advantages of using vessels as artificial reefs:

- Vessels are popular artificial reef material with the public, divers (both recreational and technical, deep diving, mixed-gas users) and fishermen (GSMFC 1997).
- High publicity reef deployments may increase support for local artificial reef programs (GSMFC 1997).
- Artificial reefs, including sites with vessels, can generate significant economic contributions to coastal counties. These contributions can be as high as 0.6-1.5 billion dollars per year in areas such as Miami-Dade and Broward counties in southeast Florida (Hazen and Sawyer 2001)
- Artificial reefs provide an avenue for reuse of vessels that may be more economical than recycling the metals (Hess et al. 2001)
- The high profile (off the seafloor) of vessels attracts baitfish, which in turn, attracts species important to recreational and commercial fishermen and increases catch rates (Lindquist and Pietrafesa 1989, Gregg 1996, GSMFC 1997).
- Under some circumstances, vessels appear to attract greater abundance and higher biomass of fish species, than nearby natural reefs, (Spieler 2001, Palm Beach County DERM 2001).
- Vessels provide extensive vertical and horizontal surface area for epibenthic colonization.
- Vessels are considered durable artificial reef material, with notable exceptions such as in areas prone to hurricanes, when too much structural damage occurs during salvage or cleaning and when excessive use of explosives damages the structure of the vessel (Bell and Hall 1994, Blair et al. 1994, Gregg and Murphey 1994, GSMFC 1997)

Disadvantages of using vessels as artificial reefs:

- Stability during hurricanes is variable due to the typical high profile of the vessel versus water depth. Vessels placed in shallow depths, such as for SCUBA divers, are most likely to move during storm events (Bell and Hall 1994, Blair et al. 1994, GSMFC 1997). Movement of vessels from 0 to 700m has been documented during storms (Bell and Hall 1994, Blair et al. 1994, GSMFC 1997). Damage to other artificial reef materials and natural reefs by ships sunk as artificial reefs have also been documented (Blair et al. 1994, GSMFC 1997).
- Durability can be compromised by salvage operations during the cleaning process and by the explosives typically used to sink these vessels (Myatt and Myatt 1992, Gregg and Murphey 1994, GSMFC 1997).

- Damage to the structural integrity of vessels is common from hurricanes, which may increase hazards to divers on artificial reefs (Blair et al. 1994, Bell and Hall 1994).
- Vessels in general, and ex-military ships in particular, are often contaminated with high levels of pollutants, including: Polychlorinated Biphenols (PCBs), oils, cosmoline, lead, mercury, zinc and asbestos (GSMFC 1997). These pollutants are difficult and expensive to remove from ships (Gregg and Murphey 1994, Gregg 1995, GSMFC 1997).

In the mid 1990s, the US EPA made a determination that sinking a ship with PCBs constituted a violation of the Clean Water Act (Gregg and Murphey 1994). South Carolina, Division of Marine Resources staff conducted a study of PCBs and heavy metals in tissues from demersal fish and epibenthic shellfish on South Carolina artificial reefs and natural reefs (Maratore et al. 1997). This study found no increase of PCBs or heavy metals in tissues from animals taken on ships than was observed in animals sampled from natural habitats (Maratore et al. 1997). The concentrations were an order of magnitude below the US EPA action level of 2ppm (Maratore et al. 1997). Since these findings, the US EPA determination has been refined to allow sinking a vessel as an artificial reef if no part of the vessel exposed to the environment exceeds 50ppm concentration of PCBs. (Stuart Perry and Craig Brown, US EPA, Pers. Comm. to Jon Dodrill). PCB sampling and subsequent cleaning of ships prior to sinking is a requirement in order to comply with the US EPA guidelines for disposal under the Toxic Substances Control Act.

- Hazards to workers cleaning vessels include exposure to friable asbestos and toxins such as PCBs and heavy metals (GSMFC 1997). Marine contractors who clean these vessels often do not follow proper hazardous materials handling and disposal protocols.
- Potential liability and responsibility issues listed in the artificial reef planning documents include: damage to private and public property during towing and cleaning; vessels sinking outside of the designated site creating hazards to navigation and ships damaging natural habitats due to improper deployment. Additional liability includes danger to divers if hatches and doors are not removed during cleaning and chemical exposure of workers cleaning the vessels (Myatt and Myatt 1992, GSMFC 1997, 1998).
- Increased fishing pressure may remove more biomass than is produced by the artificial habitat, thereby adversely affecting certain species and overall fish stocks (Bohnsack 1989, Polovina and Sakai 1989, Bohnsack et al. 1991, Low and Waltz 1991).
- Vessels typically provide low habitat value to fisheries resources for these reasons: the surface is not an ideal substrate for colonization by epibenthos. Sloughing of steel due to corrosion results in loss of epibenthic animals (Gregg 1995); only the lowest 3 meters of the outside of the hull is used by demersal fish species (Grove and Sonu 1985). Unless the hull is extensively modified, most of the interior of the vessels is not accessible to marine life (Myatt and Myatt 1992, GSMFC 1997).
- Use of vessels for artificial reefs can result in conflicts between divers and fishermen (Myatt and Myatt 1992).

The potential exists for Florida's resource users and public to benefit from well-planned, properly sited and monitored artificial reef construction. While most artificial reef programs publicize their successes, little discussion has been given to the negative impacts that some

artificial reef projects have had on natural resources. This paper is an attempt to increase discussions of all aspects of artificial reef permitting, siting, construction, and management relating to the use of vessels as artificial reefs, with the intended outcome to be more informed resource management decisions and support for those informed decisions from the resource user groups. Assuring the benefits of responsible artificial reef development accrue while minimizing the negative impacts of this development can be accomplished with coordinated planning, adequate oversight and proactive management (Gordon 1994, GSMFC 1998). Responsibility for achieving this goal rests squarely with artificial reef managers at local, county, state, regional and national levels and the resource user groups served by these agencies. Success of these artificial reef activities depends on good communication, planning and coordination between stakeholders, as well as basing management decisions on the best information that is available.

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