# Can Artificial Reefs Reduce or Alter User Pressure on Adjacent Natural Reefs?

## AN ASSESSMENT OF THE SINKING OF THE SPIEGEL GROVE

## FACTSHEET

Florida Keys National Marine Sanctuary Socioeconomic Monitoring Program

In June 2002, the retired navy ship *USS Spiegel Grove* was sunk in the waters off of Key Largo in Southern Florida. At 510 feet the *Spiegel Grove* was at that time the largest vessel ever intentionally sunk for the purpose of creating an artificial reef. This study aims to assess the economic and ecological impacts of the establishment of a new artificial reef by sinking a decommissioned ship. An understanding of the effects of sinking the *Spiegel Grove* is important as it will inform future decisions made by the Florida Keys National Marine Sanctuary (FKNMS) as to whether to permit similar artificial reefs.

The Key Largo Chamber of Commerce organized the sinking of the *Spiegel Grove* with a view to increasing local scuba diving charter business and thus increasing net tourism revenues in the local economy. In addition to these expected economic benefits, it was hypothesized that this new artificial reef would yield ecological benefits as well by attracting users from the surrounding natural reefs and thus reducing pressure from recreation on those reefs.

Dive charter operations provided their logbook data for both before and after the sinking of the *Spiegel Grove*. This logbook information was supplemented with on-site data collection, and estimates of total recreational reef use, dive charter business, and the associated economic impacts were derived. By comparing these estimates from the pre- and post-deployment periods, it is possible to gauge the impact of sinking this ship.

***Ecological Benefits.***
In order to assess ecological impacts, this study examines the change in total recreational reef use following the deployment of the *Spiegel Grove*. A decrease in use of the natural reefs is interpreted as an ecological benefit. We find a decrease in the number of users for scuba divers, snorkelers and others, which includes fishing. On net there was a 13.7% decline in total use on the surrounding natural reefs (See table on right). Furthermore, we see a decrease in the share of use occurring on natural reefs (86.8% to 68.5%) and an associated increase in the share of recreational use occurring on artificial reefs (13.2% to 31.5%).

Absolute and Percent Change in Total Recreational Reef Use Following the Deployment of the Spiegel Grove

**Absolute Change (All Use)**

| Reef Type | Divers | Snorkelers | All Others* | Total |
|---|---|---|---|---|
| *Natural Reefs* | -17,834 | -26,072 | 6,370 | -37,537 |
| *Artificial Reefs* | 34,110 | 18,786 | 14,162 | 67,059 |
| *Total* | 16,276 | -7,286 | 20,532 | 29,522 |

**Percent Change (All Use)**

| Reef Type | Divers | Snorkelers | All Others* | Total |
|---|---|---|---|---|
| *Natural Reefs* | -12.7% | -25.7% | 19.3% | -13.7% |
| *Artificial Reefs* | 118.1% | 245.1% | 271.2% | 160.5% |
| *Total* | 9.6% | -6.7% | 53.8% | 9.3% |

* This includes those who went out on charter or other boats but who did not participate in any further activity, as well as those who participated in fishing.

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***Dive Industry Benefits.*** When considering the potential benefits to the dive charter industry, the absolute numbers of dives done by scuba divers and snorkelers and the number of other paying passengers onboard during those dives (those onboard but not snorkeling or diving) are the figures of interest. From the pre-deployment to the post-deployment period, our results show an increase of 9,701 dives by scuba divers, or a 6.5% increase in scuba diving business; a decline of 3,094 dives by snorkelers, or a 10.7% decrease in snorkeling business; and an increase of 169 other paying passengers, or an 8.9% increase in business from these customers (See table on right). On net there was an increase of 6,776 in the number of dives with paying customers, or a 3.7% increase in business. This demonstrates that the sinking of the *Spiegel Grove* did yield benefits for local dive charter operations, as was expected.

Absolute and Percent Change in Dive Charter Operation Reef Use Following the Deployment of the Spiegel Grove

**Absolute Change (Dive Charters)**

| Reef Type | Divers | Snorkelers | Others | Total |
|---|---|---|---|---|
| *Natural Reefs* | -18,170 | -6,780 | -125 | -25,075 |
| *Artificial Reefs* | 27,872 | 3,686 | 294 | 31,852 |
| *Total* | 9,701 | -3,094 | 169 | 6,776 |

**Percent Change (Dive Charters)**

| Reef Type | Divers | Snorkelers | Others | Total |
|---|---|---|---|---|
| *Natural Reefs* | -14.6% | -27.7% | -8.2% | -16.7% |
| *Artificial Reefs* | 108.3% | 81.8% | 75.4% | 104.0% |
| *Total* | 6.5% | -10.7% | 8.9% | 3.7% |

***Local Economic Benefits.*** The net changes in total recreational expenditures from the pre- to the post-deployment period, along with the associated sales/output effects, income effects and employment effects, are shown in the table at right as measures of the economic impact of the sinking of the *Spiegel Grove*. These results differentiate between residents and visitors. Overall, local income increases by $961.8 thousand, and local employment increases by 68 jobs following the sinking of the *Spiegel Grove*. We also see associated increases of over $2 million in total recreational expenditures and in sales. As we would expect, visitors account for a much larger share of this growth than residents. These results confirm our expectations that the *Spiegel Grove* would result in net benefits for the local economy.

Net Change in Local Economic Impact of Recreational Reef Use Following the Deployment of the *Spiegel Grove*

| | Visitors | Residents | Total |
|---|---|---|---|
| **Expenditures** | $2,152,318 | $458,094 | $2,610,412 |
| **Sales/Output** | $2,410,596 | $320,666 | $2,731,262 |
| **Income** | $874,435 | $87,349 | $961,784 |
| **Employment** | 62 | 6 | 68 |

***Conclusions.*** This study concludes that the sinking of the *Spiegel Grove* did indeed result in a win-win situation for local ecology, the dive charter industry, and the local economy. However, these results do not take into account the ecological effects of habitat creation and are applicable only to this specific case.

Photo by Stephen Frink

The full report *Can Artificial Reef Reduce or Alter User Pressure on Adjacent Natural Reefs?* is available on the web at the following link: http://marineeconomics.noaa.gov

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