

Key Resources for the Artificial Reef Project

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Please note that Alyona and Jennifer are recent additions.

Tourism Manager – Lidia Gorzelany

Pompano Beach Tourism Investment Opportunity

This is your opportunity to be a part of the most significant endeavor and tourism revenue generator in Pompano Beach. This exciting venture is the sinking of a 300 foot cargo ship in 150 feet of water just a half mile off of Pompano Beach in a flat area that has already been government permitted for such ecological purposes. The ship will include specific themes, exciting underwater events, artwork and rotating art exhibits to create a unique dive experience for local and international tourists. Public and private funding now is being sought.

The project is being spearheaded by the City of Pompano Beach Tourism Committee. The project would be the largest addition to Florida's artificial reef system along the Atlantic coast. The sunken ship will add greatly to the eco system of Florida's reefs. It is modeled after other artificial reef projects that have all realized far greater than expected returns on investment helping to further create a year-round tourist destination.

The project in Pompano Beach is anticipated to be even more successful for a variety of reasons. Average costs for a project like this would normally be five to six million dollars to purchase a suitable vessel, have it cleaned to meet environmental standards, relocate it to Pompano Beach and sink it in the appropriate location. This particular vessel allows us the opportunity to relocate, prepare and sink at a cost less than \$750-thousand, including all of the art and fixtures.

This vessel is a large cargo ship that is up for sale at a greatly reduced price. Because it is a newer ship, it requires far less environmental cleanup prior to sinking, which is typically the largest part of the expenditure in these artificial reef projects. For example, there is no asbestos to remove as older ships have, and all of the ship's wiring is in conduits for easy removal. The cargo ship is already in South Florida's Miami River, so relocation costs will be extremely low.

The other shipwrecks in Florida are located many miles offshore, requiring lengthy boat rides to get to the site. Pompano Beach's dive ship location is more attractive because it will be located in a flat, deep area less than one mile offshore. The unique geography allows for the perfect depth of water with quick, easy access. Additionally, Pompano Beach's dive ship location is easier for international travelers to get to by air.

A highly experienced team with a proven track record of sinking ships for artificial reefs has been working with the Tourism Committee to help accomplish this project. The attached document describes the huge economic impact of earlier ship sinkings in other artificial reef projects around Florida. One of many examples is the USS Orinksy that was deployed 25 miles offshore in Escambia County. It generates \$1-million per month in tourism commerce. The county's \$1-million investment was returned just three days after the sinking. County bed taxes are up by 17-percent.

It's easy to understand why funding this eco-friendly sunken ship project is a win-win investment opportunity for economic development, increase in tourism and tax dollars to make the City of Pompano Beach a world class tourist destination. For more information on partnership opportunities call 954-214-0460.

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Dr. Leeworthy is currently the Chief Economist for the Office of National Marine Sanctuaries within the National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS) located in Silver Spring, Maryland. Dr. Leeworthy came to NOAA in 1985 as a National Sea Grant Fellow from Florida State University and was Leader of NOS's Coastal and Ocean Resource Economics Program from 1986 to 2007. Dr. Leeworthy designed and has been overseeing implementation the Socioeconomic Research and Monitoring Program for the Florida Keys National Marine Sanctuary since 1998 and is currently working on expanding the social science capacity of the National Marine Sanctuary System.

<http://sanctuaries.noaa.gov/science/socioeconomic/>

Socioeconomic Research & Monitoring: Recreation - Tourism



USS *Vandenberg* in its operational days as a missile tracking ship.

Photo: Artificial Reefs of the Keys



Photo: Don Kincaid

Schooling fish on the USS *Vandenberg*

Public Financing and Return on Investment from the USS *Vandenberg* as an Artificial Reef

Introduction

In May 2009, the USS *Vandenberg* a 520-foot decommissioned U.S. Air Force missile tracking ship and World War II-era U.S. Army troop transport ship was sunk as an artificial reef off Key West, Florida, in Florida Keys National Marine Sanctuary

The state of Florida and Monroe County governments invested in the sinking of the *Vandenberg* to boost economic development and tourism. The result was an increase in both local dive charter business and the local economy.

The following summary examines state and local tax revenues generated by the USS *Vandenberg* and as well as the return on investment to state and local governments.

Costs of the USS *Vandenberg*

The total costs of cleaning, towing, sinking and conducting monitoring of the USS *Vandenberg* were \$8.6 million. The state of Florida invested \$2.8 million, while Monroe County invested \$4.3 million, for a total state and local government investment of \$7.1 million. The U.S. Maritime Administration invested \$1.25 million, with the remaining \$0.25 million contributed by private sources.

Additional Tax Revenues Generated by the USS *Vandenberg*

The USS *Vandenberg* generated an annual increase in state and local tax revenues of approximately \$618,000 — about \$379,000 in state sales tax revenue and almost \$240,000 in local sales and lodging tax revenues (Table 1).

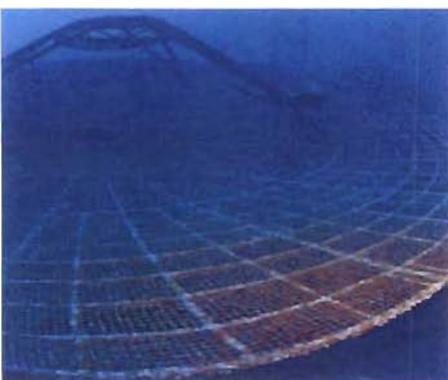


Photo: Don Kincaid

Satellite dish on the USS *Vandenberg*

Net Present Value of Tax Revenues and Return in Investment

Using lower-bound conservative assumptions that the annual additional state and local tax revenues from the *Vandenberg* will remain constant (net of inflation); that the life of the *Vandenberg* will range from 20 to 40 years; and the real interest rate (net of inflation) used to discount future tax revenues to their net present values ranges from three to five percent, we can calculate the net present value of the future flow of the tax revenues and compare these to the net costs to the state and local governments that invested in the *Vandenberg* to support economic development and tourism.

Based on the above assumptions, the net present value of tax revenues to state and local governments ranged from a low of \$7.71 million (assuming the *Vandenberg* has a useful life of only 20 years and the discount rate is five percent) to a high of \$14.29 million (assuming a useful life of 40 years and a discount rate of three percent). With a total state and local government investment of \$7.1 million, there is a net return to state and local government even under the lower-end estimate.

Table 1. Additional Annual State and Local Sales and Lodging Tax Revenues from the USS *Vandenberg*

State Sales Tax Revenue (5.5%)	\$378,920
Local Sales Tax Revenue (2.0%)	\$142,892
Local Lodging Tax Revenue (5%)	\$96,756
sub-total Local Tax Revenues	\$239,649
Total State & Local Revenue	\$618,569

1. State sales tax is 6%, but 0.5% is returned to local governments.
2. Local sales tax is 1.5%, but 0.5% of state sales tax is returned to local governments.
3. Local lodging tax is 5%, the 7.5% of sales tax on lodging is counted in the state and local sales taxes.

State government would receive a return on its investment under all assumptions, while local government would receive a return on its investment only under two of the six assumptions (useful lives of 30 and 40 years and an interest rate of three percent). However, if the state and local government pooled their investments and paid the full cost of the *Vandenberg* (\$8.6 million), they would have received a return on their investment under all but one of the assumptions (20-year useful life and five percent interest rate).

Given what we know about other large ships deployed as artificial reefs, a 40-year lifespan seems a reasonable assumption for the *Vandenberg*. Under this scenario, state and local governments could have paid the entire cost of the *Vandenberg* and earned a net return on their investment.

Conclusions

This case study demonstrates that sinking a decommissioned ship as an artificial reef can be both a benefit to the dive businesses and the local economy, while also providing a return on investment to state and local governments.

To access the main report, technical appendix and other facts sheets go to:

http://sanctuaries.noaa.gov/science/socioeconomic/floridakeys/recreation/new_reefs.html

Table 2. Net Present Value of Additional State and Local Tax Revenue from the USS *Vandenberg*

Tax	3% Interest Rate (Millions \$) ¹			5% Interest Rate (Millions \$) ¹		
	20 years	30 years	40 years	20 years	30 years	40 years
State Sales Tax Revenue	\$5.64	\$7.43	\$8.75	\$4.72	\$5.82	\$6.50
Local Sales Tax Revenue	\$2.12	\$2.80	\$3.30	\$1.78	\$2.20	\$2.45
Local Lodging Tax Revenue	\$1.44	\$1.90	\$2.24	\$1.21	\$1.49	\$1.66
sub-total Local Tax Revenue	\$3.56	\$4.70	\$5.54	\$2.99	\$3.69	\$4.11
Total State & Local Tax Revenue	\$9.20	\$12.13	\$14.29	\$7.71	\$9.51	\$10.61

1. Interest rates are net of inflation, since tax revenues are also net of inflation. Assumption is that additional tax revenue is constant over time.



Photo: Don Kirkland



Photo: Don Kirkland



Socioeconomic Research & Monitoring: Recreation - Tourism



Photo: Artificial Reef of the Keys

USS *Vandenberg* in its operational days as a missile tracking ship



Photo: Don Kirkland

USS *Vandenberg* being sunk off Key West



Photo: Don Kirkland

USS *Vandenberg* with schooling fish

Economic Impact of the USS *Vandenberg* on the Monroe County Economy

Introduction

On May 27, 2009, the USS *Vandenberg*, a decommissioned U.S. Air Force missile tracking and World War II-era U.S. Army troop transport ship, was sunk in the waters off Key West within Florida Keys National Marine Sanctuary. At 520 feet long, the *Vandenberg* is the largest vessel sunk as an artificial reef in the sanctuary. Prior to permitting the sinking of the ship as an artificial reef, NOAA commissioned a study to measure the economic and ecological impacts of the new artificial reef. Understanding the effects of sinking the *Vandenberg* is important as it will inform future management decisions related to artificial reefs.

Artificial Reefs of the Keys, Inc. organized the sinking of the *Vandenberg* as an artificial reef in hopes of increasing local scuba diving charter business and tourism revenues in the local economy. In addition to these proposed economic benefits, it was hypothesized this new artificial reef would yield ecological

benefits by redirecting users from the surrounding natural reefs to the artificial reef, thus reducing pressure on those natural reefs.

In order to study changes in reef use, dive charter business and economic impacts from the *Vandenberg*, Key West dive operators provided logbook records for both before and after the sinking. This logbook information was supplemented with on-site data collection. Estimates were made for total recreational reef use, dive charter business, and the associated economic impacts. By comparing estimates from the pre- and post-deployment periods, it is possible to gauge the impact of this artificial reef.

Environmental Impacts

In order to assess environmental impacts, this study examines the change in total recreational use of the natural reefs prior to and after sinking of the *Vandenberg*. A decrease in the use of the natural reefs is interpreted as an ecological benefit. However, an increase in use cannot be interpreted as a negative ecological impact since this would require an assessment of the ecological carrying capacity of the reefs.

In the time since the *Vandenberg's* sinking, there was a 40.1% increase in the total number of users (scuba divers, snorkelers, and others) on the surrounding natural reefs (Table 1). A 23.5% increase in recreational scuba diving use was observed on the natural reefs (5,214 dives), in contrast to a 442% increase (34,394 dives) on artificial reefs. However, the share of total use on natural reefs did decline from 67% to 46.5% since the *Vandenberg's* deployment.

Continued...

Table 1. Net changes in total reef use following the deployment of the *Vandenberg*.

Reef Type	Absolute and Percent Changes							
	Dives SCUBA	%	Dives Snorkelers	%	All Others*	%	Total	%
Natural Reefs	+5,214	+23.5	+748	+22.0	+18,270	+52.3	+24,232	+40.0
Artificial Reefs	+34,394	+442.0	+493	+252.9	+32,806	+150.5	+67,693	+227.3
Total	+39,608	+132.3	+1,241	+34.5	+51,076	+90.1	+91,925	+101.9

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

Table 2. Net changes in dive charter operation business following deployment of the Vandenberg

Reef Type	Absolute and Percent Changes							
	Dives SCUBA	%	Dives Snorkelers	%	All Others*	%	Total	%
Natural Reefs	+9,007	+64.4	+748	+22.0	+567	+94.7	+10,322	+57.4
Artificial Reefs	+28,959	+501.3	+483	+247.7	-1,214	-59.9	+38,751	+484.4
Total	+37,966	+92.1	+1,231	+34.2	-446	-17.0	+49,073	+188.9

* This includes those that went out on the charter, but who did not participate in any further activity.

Environmental Impacts (cont.)

Despite the decline in the overall percentage of divers visiting natural reefs, rising demand for recreational diving caused an increase in total use across the board. Thus, the hypothesis that introduction of the Vandenberg as an artificial reef would reduce use (pressure) on the surrounding natural reefs was not supported.

Local Dive Charter Business

When considering the potential benefits to the dive charter industry, the study compared the number of dives made by scuba divers, snorkelers and the other non-diving passengers onboard (those onboard but not snorkeling or diving) pre- and post-Vandenberg sinking. From the pre-deployment to the post-deployment period, the results show an increase of 92.1% or 37,966 dives by scuba divers; an increase of 34.2% or 1,231

dives by snorkelers; and a decrease of 446 other non-diving passengers, or a 17% decrease in business from these customers (Table 2). In total, there was an increase of 49,073 in the number of dives with paying customers, or a 188.9% increase in business.

Local Economy

The net changes in total recreational expenditures from the pre- to post-deployment period indicate that total

recreational expenditures increased by \$6.5 million, which generated a total impact on sales/output of \$7.29 million, about \$3.2 million in income, and the creation of 105 new jobs (Table 4). As expected, visitors accounted for a much larger share of this growth than residents (86.4% vs. 13.6% respectively).

Conclusions

It was hypothesized that introducing an artificial reef to Key West would benefit the local environment, the local dive charter industry, and the larger local economy. Results from this case study are not consistent with the first hypothesis about the benefit to the local environment, but the latter two hypotheses are supported with large increases in local dive charter business and the greater local economy grew in terms of sales/output, income and employment.

Table 3. Net economic impacts of the deployment of the Vandenberg

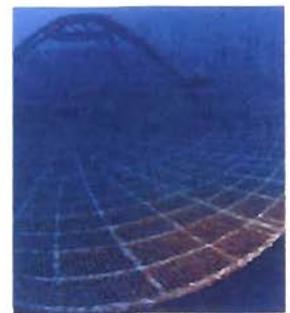
	Visitors	Residents*	Total
Expenditures	\$5,624,686	\$884,578	\$6,509,264
Sales/Output	\$6,299,652	\$990,726	\$7,290,378
Income	\$2,830,525	\$357,382	\$3,187,907
Employment	93	12	105

* Only export sector of resident spending included and all spending includes multiplier impacts.

The full report *The Economic Impact of the USS Vandenberg on the Monroe County Economy* and the technical appendix with explanations of the methods and more detailed results is available on the web at http://www.sanctuaries.noaa.gov/science/socioeconomic/floridakeys/recreation/new_reefs.html

For further information, please contact:

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Photos: Don Kinkaid



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.





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



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FACTSHEET

Florida Keys National Marine Sanctuary Socioeconomic Monitoring Program

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	204	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 Total 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:

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