

# Ocean Guardian – Parents’ Values and Opinions of an Ocean Conservation and Stewardship Educational Program



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Ocean Guardian Logo





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## Abstract

The Ocean Guardian School (OGS) program is a federally funded grant program coordinated out of NOAA's Office of National Marine Sanctuaries and supported by the National Marine Sanctuary Foundation. The program was designed to further the educational goals of the National Marine Sanctuaries by supporting hands-on, ocean stewardship projects in schools. Schools are awarded small grants (up to \$4,000) to carry out their own school or community-based conservation project that makes a difference in the health and protection of their local watersheds and/or the world's ocean. Up until this point, little has been known about the benefits parents and children receive from the OGS program. This study uses a survey to estimate the value that parents place on their child's participation in this program.

## Key Words

Ocean Guardian School, Contingent Choice, Value, Education, Parents, Behavioral Changes





## Key Findings

### School Participation

- There are no statistically significant differences for age, household income and gender for the populations in areas for schools that did and did not participate in the survey.
- There are statistically significant differences for race, ethnicity and education levels of the populations in areas for schools that did and did not participate in the survey.

### Survey Response Rates

- 51.7% (15 of 29) of schools that ONMS staff contacted for the survey participated.
- 19.7% of parents (270 of 1,371) participated in the survey.
- Participation rates of parents varied significantly by mode of survey: 18.4% using the electronic survey versus 29.3% using paper copies of the survey.

### Response Rates – Demographic Questions (% non-response)

- Age – Students: 15.2% , Parents: 15.6%
- Race – Students: 27.8%, Parents: 28.2%
- Ethnicity – Students: 17.8%, Parents: 18.2%
- Gender – Students: 14.8%, Parents: 18.5%

### Parental Support for OGS Program

- 88.5% of parents support their child’s participation in the program. Only 0.4% did not support the program.

### Program Benefits

- Of the 10 program benefits received by students participating in OGS, 86.1% of parents noted their child received at least one of the benefits.
- 12.2% of parents responded that their child received all 10 benefits. While 2.2% reported no benefits.
- Top Four Benefits (as rated by parents)
- 72.2% of parents selected “increased responsibility towards the environment”.
- 66.7% of parents selected “increased understanding of how people interact with the environment”.
- 66.3% of parents selected “positive environment change”.
- 63.3% of parents selected “increased commitment to environmental protection”.



## **Behavioral Changes**

Behavioral changes were assessed on five topic areas pre and post program participation by students, while four topic areas were assessed for parents.

- For students, the greatest change was for “talking to others about ways to improve the environment”: 35.6% were doing it before the program and 65.9% after participating in the program.
- For parents, the lowest before program rate of doing the activity was for “encouraging others to make eco-friendly decisions” with 75.9%. After the program, 18.5% did more of this.

## **Perceptions of watersheds, ocean ecosystems and the natural world (% positively influenced by OGS using 7-point scale with 1=strongly disagree to 7=strongly agree)**

- Students: 80.9% scored 5 to 7 (somewhat to strongly agree)
- Parents: 64.8% scored 5 to 7 (somewhat to strongly agree)

## **Parent’s Perception of the environmental impact of the child’s program project (7-point scale 1=very negative to 7=very positive)**

- 82.2% scored 5 to 7 (somewhat to strongly positive).

## **Preferences – Important things parents want their children to learn (four items rated)**

- Importance of protecting wildlife and ocean habitat: 77.8%
- Humans can impact the natural world to the point that it is difficult to restore: 73.7%.
- The importance of protecting endangered species: 71.9%
- The importance of protecting rare plants and species to maintain genetic diversity: 68.9%.

## **School Subject Support**

Parents were asked to rate their support for seven different school subjects on a 7-point scale 1=do not support to 7=highly support.

- Environmental Education ranked number 3 behind sciences (#1) and mathematics (#2).

## **Economic Value of the OGS Program and Program Components (Annual Willingness to Pay per Child)**

- For all program components, parents were willing to pay \$262.73 per child per year.



- The most valuable program component was habitat at \$58.52 per child per year. Habitat includes learning about ocean-friendly gardens and habitats and participating in projects to create/ improve school gardens and yards with eco-friendly practices and methods such as planting native species, reducing run-off, installing rain barrels.
- The lowest valued program component was recycling at \$21.41 per child per year. Recycling includes learning how to reduce waste and implement programs to reduce their waste within the school.

### **Benefits versus Costs**

- Generally, the benefits of OGS exceed the costs. In only one example, one school representing the maximum cost of \$333.33 (\$4,000 spread over 12 students), did the costs exceed the benefits.
- The average cost per student ranged from \$21.11 to \$52.91 per child per year. If schools picked the “habitat” module, the benefits of OGS exceed the costs.
- Combination of two to three OGS program components (modules) will generally result in benefits exceeding the costs.



# 1. Introduction

## Ocean Guardian School Program


The Ocean Guardian School (OGS) program is a federally funded grant program coordinated out of NOAA's Office of National Marine Sanctuaries (ONMS) and supported by the National Marine Sanctuary Foundation. The program was designed to further the educational goals of ONMS by supporting hands-on, ocean stewardship and conservation projects in K-12 schools. Schools are awarded small grants (\$1,000 to \$4,000) to carry out their own school or community-based conservation projects that make a difference in the health and protection of their local watersheds and/or the world's ocean.

By supporting K-12 schools in their focused watershed/ocean stewardship hands-on projects, the Ocean Guardian School program strives to:

- **Raise awareness** among the participating K-12 school about the goals of the national marine sanctuary system, the land-ocean connection as well as the environmental issues affecting the health of these special ocean areas and other marine habitats,
- **Inspire** changes in environmental stewardship behavior in school communities and beyond,
- **Encourage** projects that will become sustainable within a school community,
- **Educate** students about Ocean Literacy Principles and Climate Literacy Principles and how these principles relate to the students' ocean stewardship efforts.

Schools are required to connect their funded projects to one of the established five Ocean Guardian "project pathways": 1) Refuse/Reduce/Reuse/Recycle/Rot, 2) Marine Debris, 3) Watershed Restoration, 4) Schoolyard Habitat/Garden, and 5) Energy & Ocean Health. Each project pathway provides a general focus and framework for the schools' ocean stewardship project. For example:

- **Refuse/Reduce/Reuse/Recycle/Rot:** Students learn how to reduce waste within the school and/or community. Projects may include: Implementing/improving of school-wide recycling/composting programs, school-based wastewater system, school-wide green purchasing programs, zero waste lunch programs.
- **Marine Debris:** Students focus on how single-use plastics (such as plastic water bottles, bags, straws, flatware, etc.) make their way into our waterways and impact the health of marine environments. Projects may include: installing of water hydration stations on campus and replacing of single-use bottles with reusable bottles, "no plastic straw" campaigns focused on local eateries, promoting of reusable bags at home and out in the community.


- 
- **Watershed Restoration:** Students focus on the watershed-ocean connection and how restoring the watershed helps to protect the ocean. Projects may include: Removing of invasive species, propagating/growing /planting native plants, improving fish habitats, stabilizing banks/shorelines.
  - **Schoolyard Habitat/Garden:** Students design/install/maintain ocean-friendly gardens and/or habitats with an emphasis on native/low-water plants, chemical-free gardening techniques, rain catchment systems, low-water irrigation systems, etc.
  - **Energy Use and Ocean Health:** Students learn about how fossil fuel-based energy use impacts the health of the world’s ocean. Projects may include: Auditing school energy use/carbon footprint with the goal to implement energy saving plans (i.e., “power down” campaign, “no idling” campaign, bike to school days, light bulb/computer energy savings plans, etc.), designing/implementing clean energy alternatives such as wind/solar projects, implementing water savings plans, tree planting projects.

### **History and Accomplishments of Ocean Guardian School Program**

The Ocean Guardian School Program awarded its first grants in the fall of 2009 to schools in 13 California counties. Since then, the program has grown to support primary schools in 16 California counties as well as in designated areas in Washington, Oregon, Hawaii, New York, Maryland, Colorado and most recently Texas. From 2010-2016, over 40,000 students in more than 80 schools have directly contributed to the protection of our watersheds and our world’s ocean. (Measurable Data Table 1.1) In addition to collecting measurable data from their hands-on projects, students also participate in a variety of outreach activities that in turn, provide opportunities for them to talk about their ocean stewardship projects and project-related environmental issues to a variety of school and community audiences. These activities include but are not limited to: presenting their projects to students at other schools, publishing of articles in local newspapers, presenting at local and national conferences, presenting to local government agencies and non-profit organizations, and creating large scale art work on their campuses and communities.

**Table 1.1 Measurable Data for the Ocean Guardian School Program**

<i>Ocean Guardian School Measurable Data</i>	<i>2010-2016</i>
Awarded Grants	\$682,372
Number of participating schools	84
Number of students directly participated in projects *Includes schools that completed projects + schools that did not complete projects + schools extending projects from prior year	41,278
Pounds of trash removed from school and/or community sites	123,189
Number of recycling bins installed	776
Number of compost bins installed	362
Pounds of compost created from school food waste	1,387
Pounds of reused clam and oyster shells	6,000
Pounds of e-waste recycled	5,131
Number of reusable bags distributed or purchased to replace single use bottles	7,870
Number of reusable bottles distributed or purchased to replace single-use bottles	10,187
Number of single use plastic bottles not used due to reusable hydration stations	108,857
Square feet of non-natives removed from school or community sites	171,108
Square feet of turf removed from school or community sites	29,616
Linear feet of bank stabilization	2,070
Number of native or fruit trees planted at school or community sites	3,228
Number of native perennials planted at school or community sites	28,137
Square feet of native plants planted	117,152
Number of rain barrels installed at school	43
Gallons of water reclaimed on school grounds from use of water catchment system	5,423
Number of storm drains stenciled	63
Number of wildlife structures installed	115
Number of nurdles removed	9,767
Energy Reduction kwh	186,368
Energy smart power strips installed	30
Number of official bike to school days	12



## The Purpose of this Study

Although the costs are known and there are some measurable impacts of the Ocean Guardian School Program, little is known about parent preferences and their values towards these types of ocean conservation education programs. This research seeks to fill the informational gaps that currently exist. There have been studies conducted on the value of early childhood education and long-term education exposure to certain topics (Heckman et al., 2010 & Belfied & Schwartz, 2006). A comprehensive literature review reveals that to date, only one study has sought to ask how people value natural resource education programs.

In June 2016, Haefele et al., released a paper on the Total Economic Value of the National Park Service and Lands Programs and found respondent's value of NPS educational programs to be \$16.7 per 100,000 students. The NPS study is different from the OGS study because only parents of OGS students are asked about their WTP (willingness to pay) for a specific program. Consequently, this study is unique in that through survey questions, researchers are able to isolate parents' monetary value of specific OGS curriculum pathways. Further, this study also compares the costs (grant amounts) of the program to the monetary benefits to determine if OGS creates net positive benefits.

There are four primary research questions:

1. What are the preferences parents have for environmental education programs?
2. Are students changing their behavior to be more environmentally conscious?
3. What is the willingness to pay of parents for ocean conservation and stewardship programs?
  - a. Are there specific characteristics of these programs that parents are willing to pay more for, relative to the other characteristics?
4. Do the benefits (measured in terms of WTP) exceed the costs (grants awarded) of OGS?

Throughout this report, the findings of these research questions will be presented and discussed. Chapter 2 describes the landscape of current Ocean Guardian Schools. Chapter 3 explains the survey development and implementation. Chapter 4 presents the results of the survey, including the answers to the first two research questions listed above. Chapter 5 explains the methodology and findings of the parents' willingness to pay for ocean conservation and stewardship programs. Chapter 6 presents a cost benefit analysis and the conclusions and future research suggestions. A detailed discussion of the survey and econometric methods use to complete this analysis can be found in the Technical Appendix to this report (Schwarzmann et al., 2017).



## 2. Ocean Guardian Schools

### **Ocean Guardian School Application Data**

Twenty-nine schools participated in the Ocean Guardian School (OGS) program for the 2015-2016 school year. The OGS program serves a variety of school types including; public (including charter) and private schools. Of all the schools in the program, 44.8% are Title 1. To be classified as Title 1, schools must have high numbers or percentages of children from low-income families and receive additional funding to ensure their students meet educational goals and standards.

This survey was conducted during a two-month period during the end of the school year when most of the schools had completed their stewardship project. The projects are determined by the schools and may be school-wide or specific to a grade, classroom, or extracurricular activity. Each project is run by either a teacher, a parent volunteer or a community partner organization. There are five ocean conservation topics that schools may choose from including; refuse/reduce/reuse/recycle/rot (composting), marine debris, watershed restoration, schoolyard habitat/garden, or energy use and ocean health. Additionally, some schools may have OGS students interact with students and teachers outside of their grade or community members outside their school. Table 2.1 shows data from the 2015-2016 applications as it pertains to the above categories. The table also shows the percentage of schools that are first-year schools versus returning schools.



**Table 2.1 Application Data for OG Schools during the 2015-2016 School Year**

<b>Application Data Category</b>	<b>Percentage of Applications</b>
<b>Type of School</b>	
Public	65.5%
Private	20.7%
Charter	10.3%
<b>Title 1 Schools</b>	44.8%
<b>School-wide vs. Specific Grade/Class</b>	
School-wide	31.0%
By Grade/Class or Extracurricular	69.0%
<b>Run By:</b>	
Teacher	82.8%
Parent	6.9%
Not Specified	10.3%
<b>First Year School vs. Returning</b>	
First Year	41.4%
Returning	58.6%

### **Census Data**

This section presents the census data for OGS based upon the school's zip code. The 2014 American Community Survey was the source of the data for this analysis. This report looks at six aspects of the demographics including; age, education, race, ethnicity, income, and gender. Fifteen of the twenty-nine OGS that were contacted participated in the survey. Both the schools that did and did not participate have their zip codes demographics data presented below to present a complete picture of the zip codes OGS serves. In this section, when the word community is used, it is synonymous with zip code).

If schools did not participate, the refusal occurred at the teacher level and the parents never received an invitation to complete the survey. Of the schools that participated, 26.7% were Title 1.

**Age.** The average median age of Ocean Guardian School zip codes served during the 2015-2016 school year was 40, with the average age for those schools participating in the survey being 42 and those who did not, 38. The total age breakdown is shown in Figure 2.1. There is no statistically significant difference between the populations of the areas for schools that did or did not participate in the survey (Schwarzmann et al., 2017).

There is no statistically significant difference between the populations of the areas for schools that did or did not participate in the survey

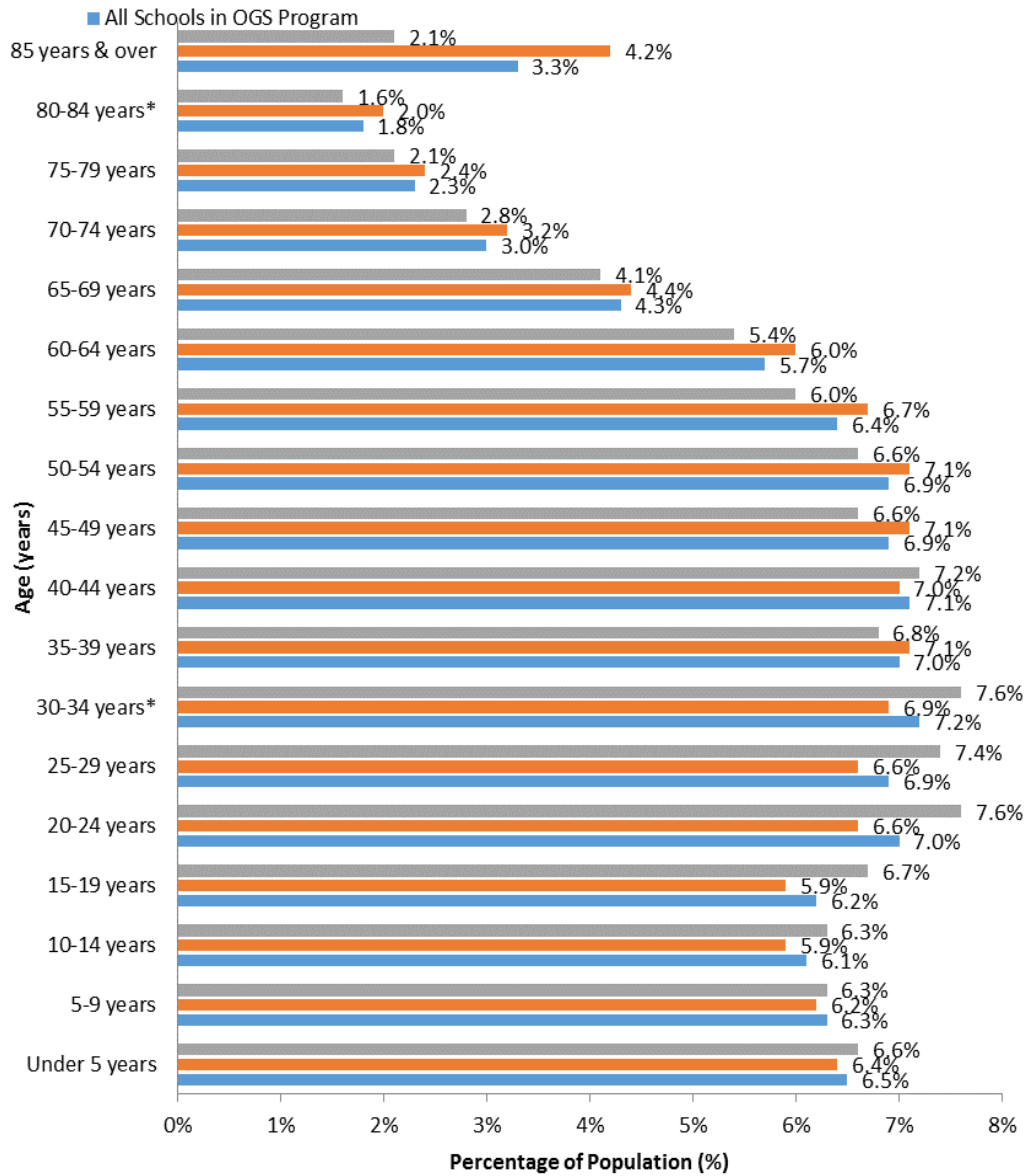
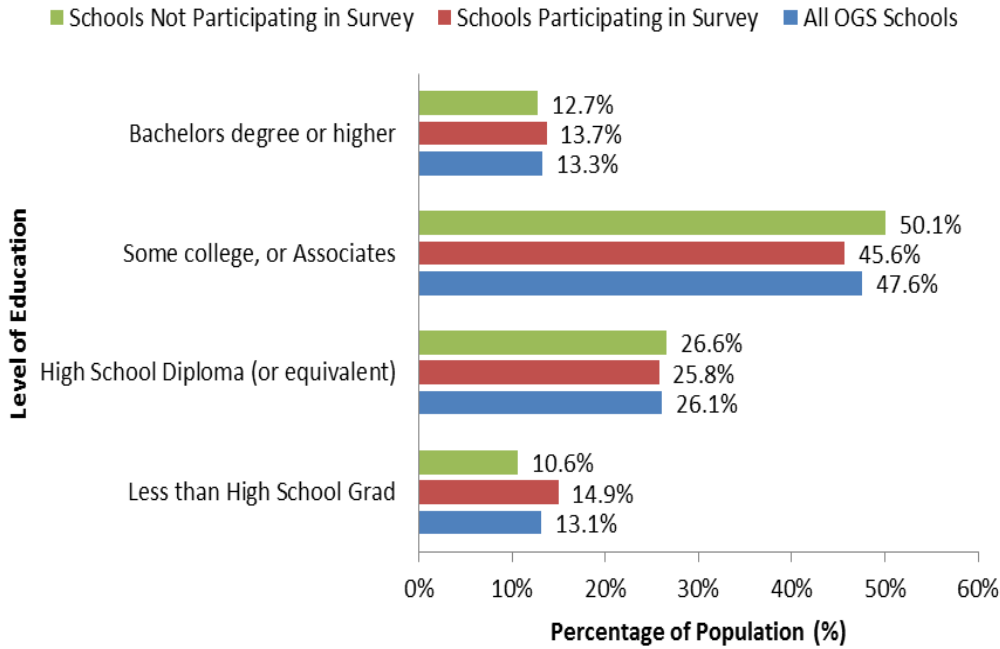


Figure 2.1 Age Demographics of OG School Population

**Education Levels:** For the population of 18-24 year olds, education levels were categorized into four different categories, “Less than High School (no diploma)”, “High School or GED”, “Associates or Some College”, and “Bachelor’s Degree or higher”. The category with the highest percentage of the population was “Associate’s Degree or Some

College” at 45.6% with the lowest category being “Bachelor’s degree or higher at 13.7% for the schools participating in the survey.

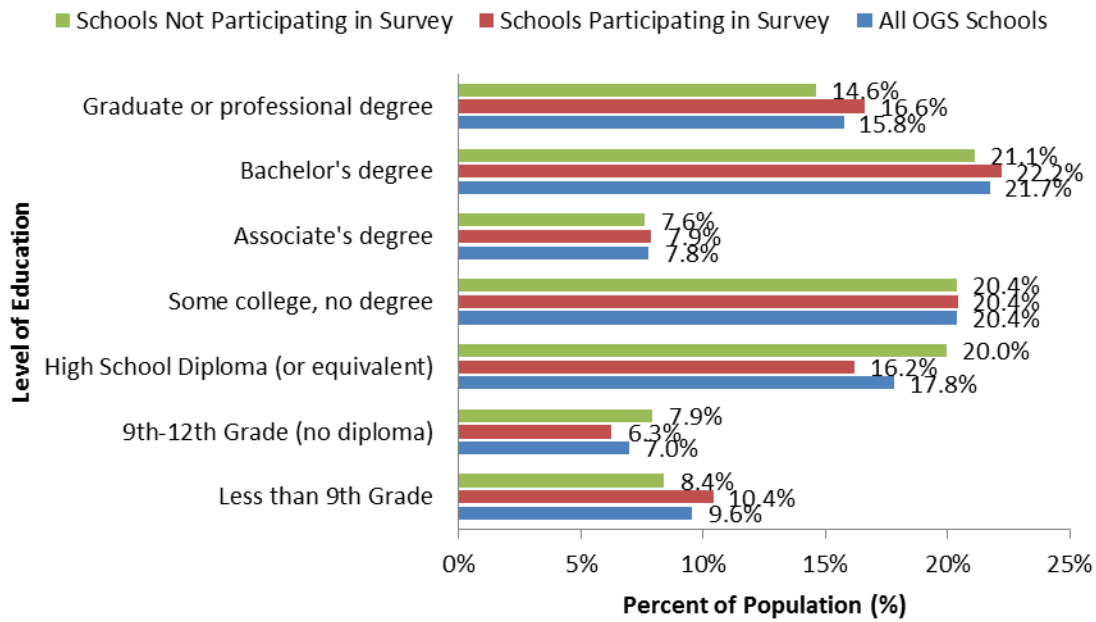
Across all OGS, the largest percentage of people have some college or an associate’s degree. The second highest category is a Bachelor’s degree or higher. There is a statistically significant difference between the populations of the areas for schools that did and did not participate in the survey



**Figure 2.2 Education Levels in OGS Population (Ages 18-24)**

There were six different levels of education for those aged 25 and above. They were: “Less than 9<sup>th</sup> Grade”, “9-12<sup>th</sup> grade (no diploma)”, “High School Grad (or equivalent)”, “Some College, No Degree”, “Associate’s Degree”, “Bachelor’s Degree”, and “Graduate or Professional Degree”. The education level with the highest percentage of the population was persons with a “Bachelor’s Degree” at 22.7%, and the category with the lowest average percentage was “9<sup>th</sup>-12<sup>th</sup> Grade (No Degree)” at 6.3% for the schools that participated in the survey. There is a statistically significant difference between the populations of the areas for schools that did and did not participate in the survey (Schwarzmann et al., 2017).

Across all OGS, the largest percentage of the population has a Bachelor's degree or higher. Roughly, two-thirds, 67.1% have some college or a college degree. There is a statistically significant difference between the populations of the areas for schools that did and did not participate in the survey.

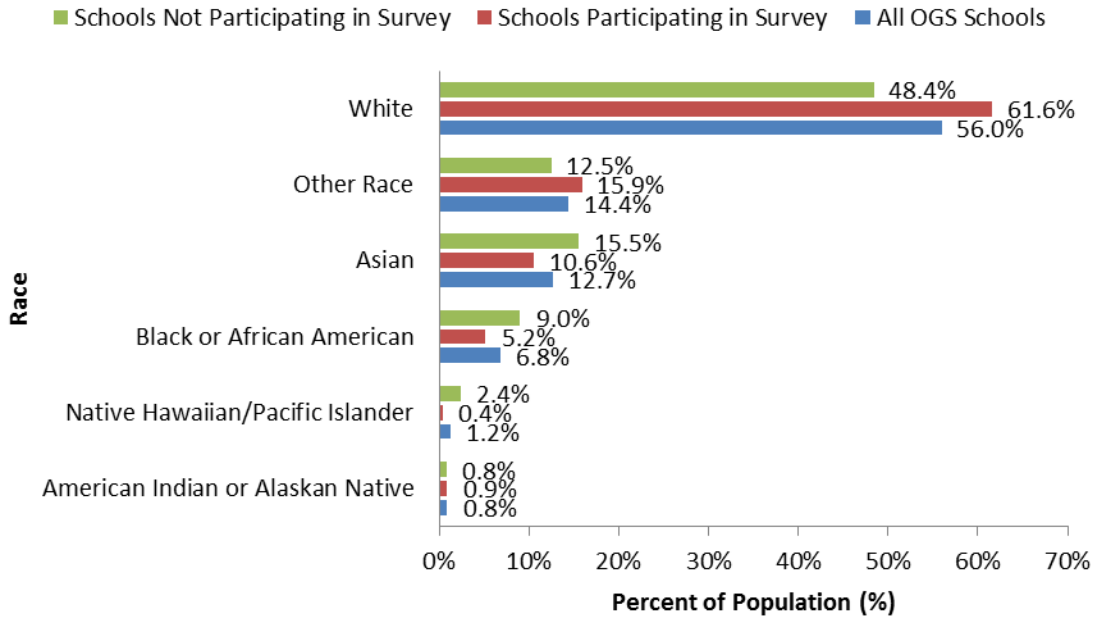


**Figure 2.3 Education Levels for OGS Population (Ages 25+)**

**Race:** The majority of the communities of schools participating in the OGS program are predominately white, with twenty-five of the twenty-nine schools having the highest percentage of people in their zip code identifying to that race. Two of the school communities were predominantly Black or African American and two other school communities were predominantly Asian. Nearly two-thirds, 61.6% of the populations in the OGS program's school zip codes are white and 5.2% of the populations identified as Black or African American. Figure 2.4 presents the data. There is a statistically significant difference in the populations for the areas for schools that did and did not participate in the survey (Schwarzmann et al., 2017).

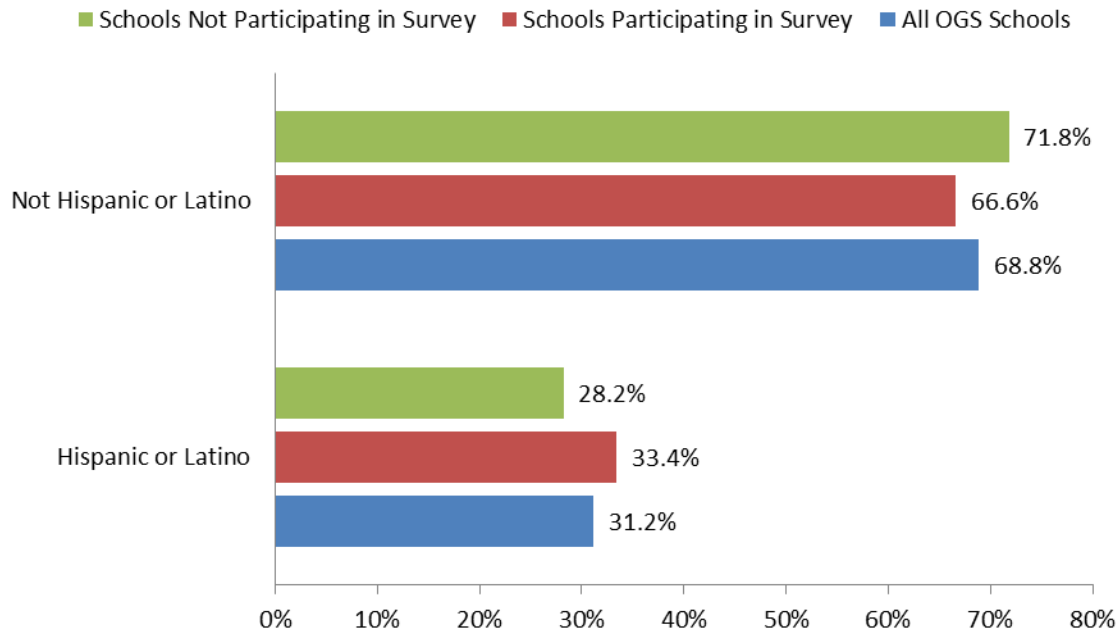
**Ethnicity:** For ethnicity, the data for whether or not the population identifies as Hispanic or Latino is displayed in Figure 2.5. For Ocean Guardian School Populations, 33.4% were Hispanic or Latino and 66.6% were not. There is a statistically significant difference in the populations for the areas for schools that did and did not participate in the survey (Schwarzmann et al., 2017).

Across all OGS zip codes, 56% of the population is white, 14.4% identify as other and 12.7% of the population is Asian. There is a statistically significant difference in the populations for the areas for schools that did and did not participate in the survey.



**Figure 2.4 Race Demographics in OGS Population**

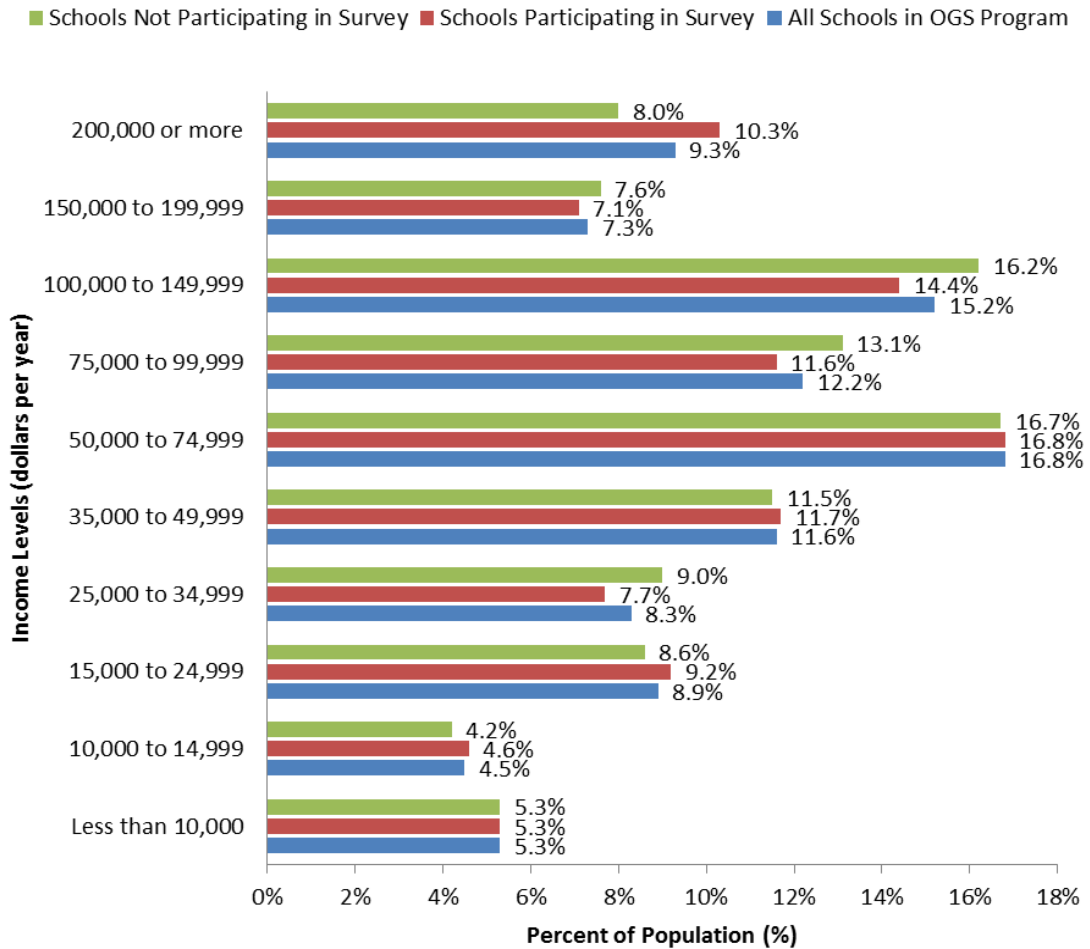
Across all OGS communities, 68.8% of the population is not Hispanic or Latino and 31.2% is Hispanic or Latino. There is a statistically significant difference in the populations for the areas for schools that did and did not participate in the survey.



**Figure 2.5 Hispanic/Latino Demographics in OGS Population**

**Income:** The average of the median household incomes for schools enrolled in the OGS Program was \$77,080.82 with 58.6% of schools being below that amount and 41.4% of schools were above. The average percentage of the population who lives below the poverty line is 11.9%. Nearly half of the school communities have populations falling below that percentage and 51.7% being above. Percentages of people below the poverty line in the school’s zip code ranged from 3% to 19.2%. One of OGS program’s goals is to bring environmental education to all students regardless of their family’s income. Many of the schools that participate in the OGS program are Title 1 schools (44.8%) which have high percentages of students that come from low-income families. By gathering income data for the schools served in the OGS program, there can be a better understanding of the types of communities that the OGS program serves. There is no statistically significant difference between the populations of the areas for schools that did or did not participate in the survey (Schwarzmann et al., 2017).

Across all OGS, the largest percentage of the population (16.8%) earns \$50,000-\$74,999. Over half, 55.4% earn \$50,000 or more. There is no statistically significant difference between the populations of the areas for schools that did or did not participate in the survey.



**Figure 2.6 Household Income Levels in OGS Population**

**Gender:** For participating school district communities, 50.6% were female and 49.4% were male. Figures 2.7 shows how the gender data varies for the communities in the OGS program. There is no statistically significant difference between the populations of the areas for schools that did or did not participate in the survey (Schwarzmann et al., 2017).

Across all OGS communities, females compose 50.7% of the population and males compose 49.3%. There is no statistically significant difference between the populations of the areas for schools that did or did not participate in the survey.

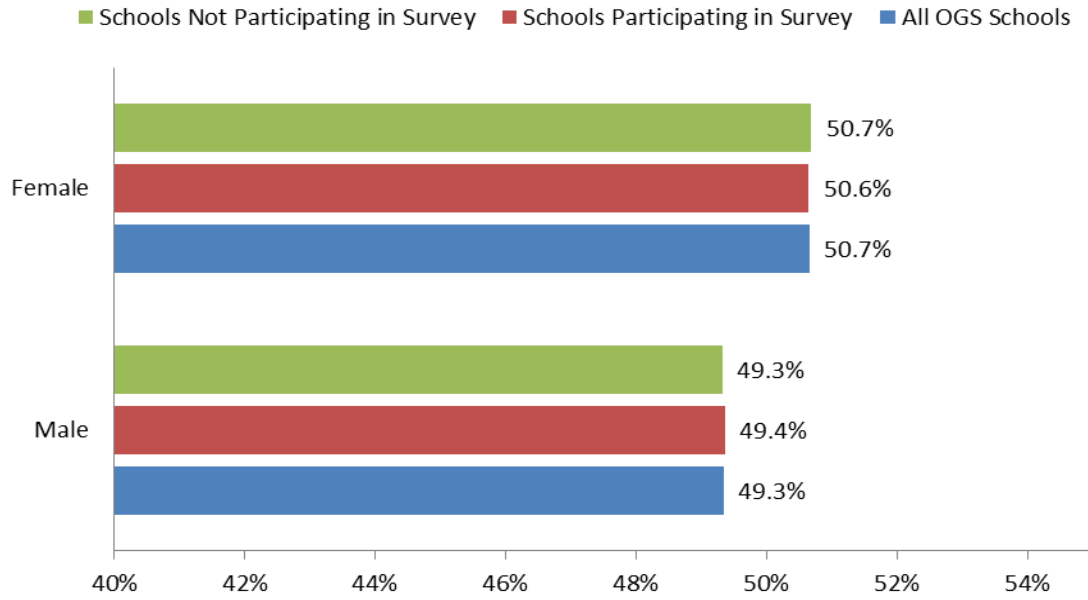


Figure 2.7 Gender Demographics in OGS Population





## 3. Questionnaire Design and Implementation

### Questionnaire Design

Designing the questionnaire began in the fall of 2015. Several discussions with Ocean Guardian Program faculty and Office of National Marine Sanctuary leadership determined the goals of the survey. To reiterate from Chapter 1 the goals were;

1. What are the preferences parents have for environmental education programs?
2. Are students changing their behavior to be more environmentally conscious?
3. What is the willingness to pay of parents for ocean conservation and stewardship programs?
  - a. Are there specific characteristics of these programs that parents are willing to pay more for, relative to the other characteristics?
4. Do the benefits (measured in terms of WTP) exceed the costs (grants awarded) of OGS?

In addition to demographic data, three distinct groups of questions were developed. From the parent's perspective, a series of questions were developed to understand if students became more environmentally conscious in their behaviors towards the environment. In addition, parents were asked a similar set of questions to determine if the OGS program had an impact on others. A different set of questions asked parents about their attitudes and preferences towards their students being taught specific concepts and topics relative to ocean literacy and conservation. Lastly, the contingent choice method was used to estimate the value of the Ocean Guardian Program.

The survey went through the Office of Management and Budget (OMB) review to assure respondent burden was minimized and the questions were asked in a way that could produce results that could be extrapolated to the OGS population. The initial 60-day notice was posted to the Federal Register on November 6, 2015. The second notice was posted February 12, 2016 and approval was granted March 30, 2016. For the survey questionnaires and other support materials see (Schwarzmann et al., 2017).

### Survey Implementation

The survey was implemented from May to June 2016 via Survey Monkey and print versions that were sent home with students. Each Ocean Guardian School received communication from Office of National Marine Sanctuary Staff (ONMS) in regards to their grant and an annual review they complete as part of the grant process.

Utilizing existing relationships between ONMS and Ocean Guardian School staff, on April 1, 2016 ONMS staff e-mailed the OGS contact at each school to inform them about the upcoming webinar and survey. Each teacher was asked to send three letters home to the parents, an initial contact e-mail informing parents about the impending survey, an e-mail with links to the survey and a reminder survey. Teachers could also opt for paper versions. ONMS provided paper versions of each letter and reminder letter. Additionally, teachers could request Spanish versions based upon the school's student population. All versions of the letters are provided in the Technical Appendix (Schwarzmann et al., 2017).

### **School Participation**

There were 29 OGS that ONMS staff contacted to participate in the survey. Six schools opted out of the survey in April. Reasons varied from the teachers being in the middle of testing and not having time to take on this additional responsibility or not having time to get approval from their respective Boards of Education. Of the 23 remaining schools, 5 schools never participated in the webinar and did not respond to our requests. Three additional schools participated in the webinar but did not implement the survey due to testing or the teacher's time constraints. In total, 15 schools participated. The response rate of schools invited to complete the webinar and survey was 51.7% (15 of the 29 schools).

### **Implementation of the Survey**


The survey was implemented in late spring and early summer. School staff that were helping to implement the survey received three e-mails. On May 10, 2016 staff was asked to send home an initial survey letter, informing parents that a survey would soon be sent home for them to complete.

**Table 3.1 Schedule of Survey implementation**

<i>Action Item</i>	<i>Date</i>
Survey Design	Fall 2015-Spring 2016
Teacher Webinars	April 26, April 29 & May 9, 2016
Initial Contact Letter to Parents	May 10, 2016
Initial Survey Letter to Parents	May 13, 2016
Reminder Survey Letter to Parents with Survey	May 24, 2016

### **Response Rates**

In total, 270 parents participated in the OGS program survey out of a sample of 1,371 for a response rate of 19.7%. When considering parent participation at each school, participation rates ranged from 5.0% to 80.0%. The average response rate across each



school was 21.3%. The average response rate for electronic communications was 18.4%. Four schools requested paper copies, and their average response rate was 29.3%.

**Table 3.2 Response Rate by Mode**

<i>Mode</i>	<i>Frequency</i>	<i>Percentage</i>
English	244	90.4
Spanish	26	9.6
Paper Version	108	40.0
Electronic (Online) Version	162	60.0
English Paper Version	162	60.0
Spanish Paper Version	26	9.6
English Electronic Version	82	30.4
Spanish Electronic Version	0	0.0

## 4. Results of the Survey

The next section presents the information collected by the survey. In total, 270 surveys were collected and analyzed. The data is presented on respondent answers. Data was collected from a parent for their child, as well as information regarding the parent. Demographics data was collected for both the child and the parent. Discussions include:

- behavioral changes as a result of child participation in the OGS program,
- benefits that may be acquired through the program,
- OGS program’s influence on parent and child environmental perceptions,
- parent’s attitudes towards ocean conservation programs,
- level of parent support for these types of programs,
- and the economic value of the OGS program.

### Demographics Data

**Child’s Age:** For the child, the age with the highest frequency was age 13, with the least frequent being age 15. The average age for a child represented in the Ocean Guardian School was 11.1, with the median age being 12. A total of 15.2% participants opted out of the question. Figure 4.1 shows the frequencies of each age of children represented in the survey.

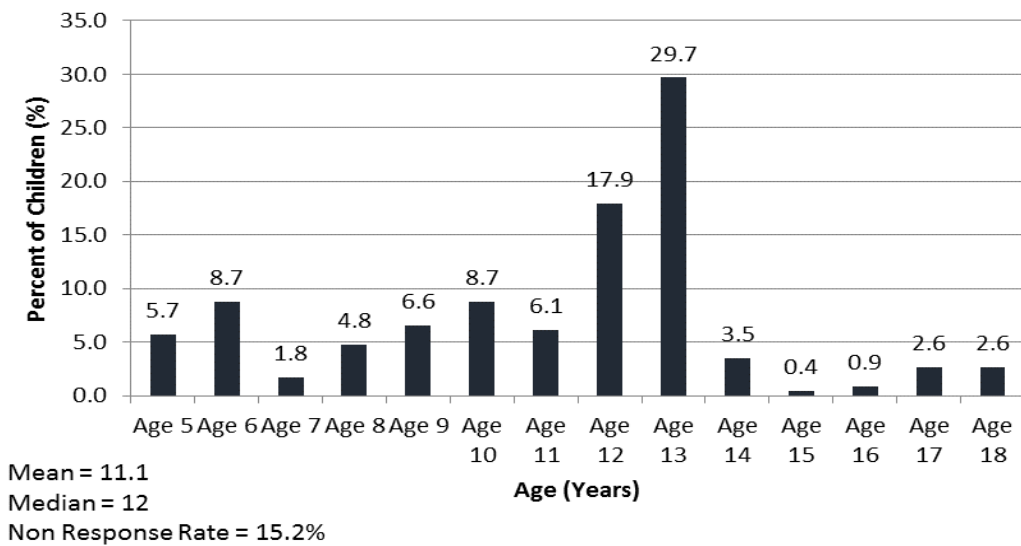
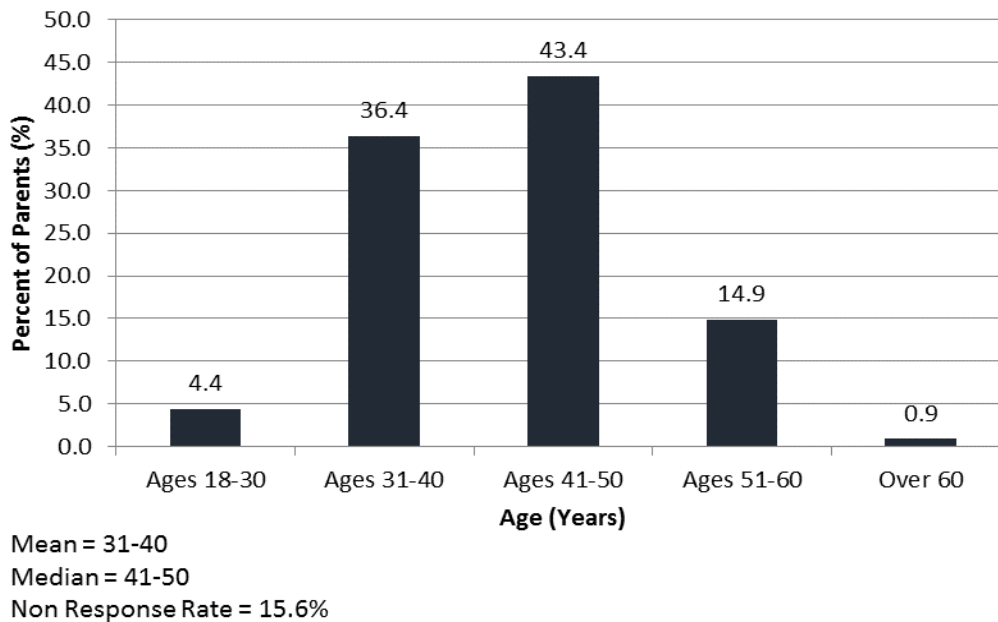


Figure 4.1 Child Age Data from “Willingness to Pay” Survey

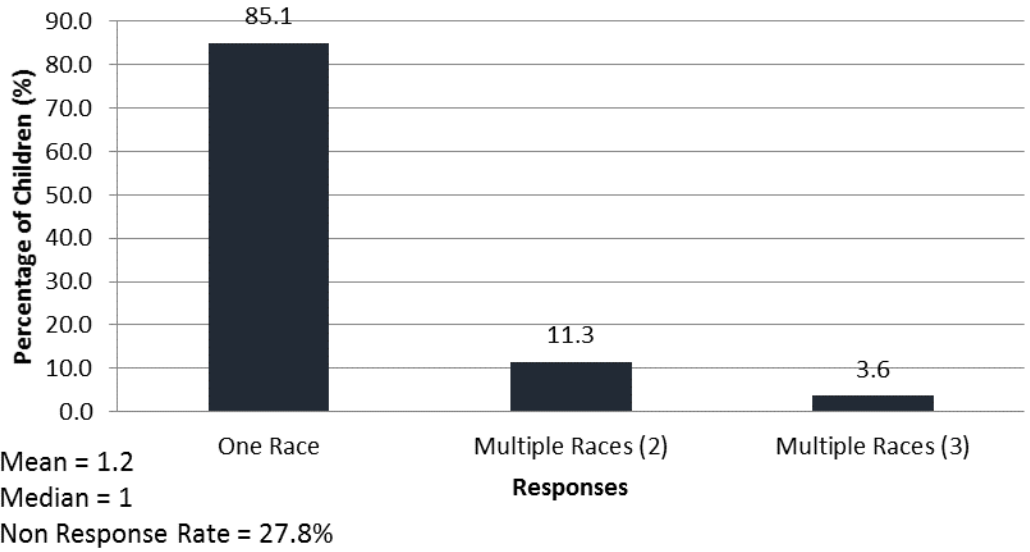
**Parent’s Age:** For the parent’s data, 43.4% of participants fell into the “Ages 41-50” category with the second highest frequency being “Ages 31-40”. The age data lines up with the median age of persons in the Ocean Guardian School program’s school districts,

which was 40-50. Less than one percent of participants recorded being in the “Over 60” age bracket. A total of 15.6% of participants opted out of this question. The complete distribution of parent ages can be found in Figure 4.2.

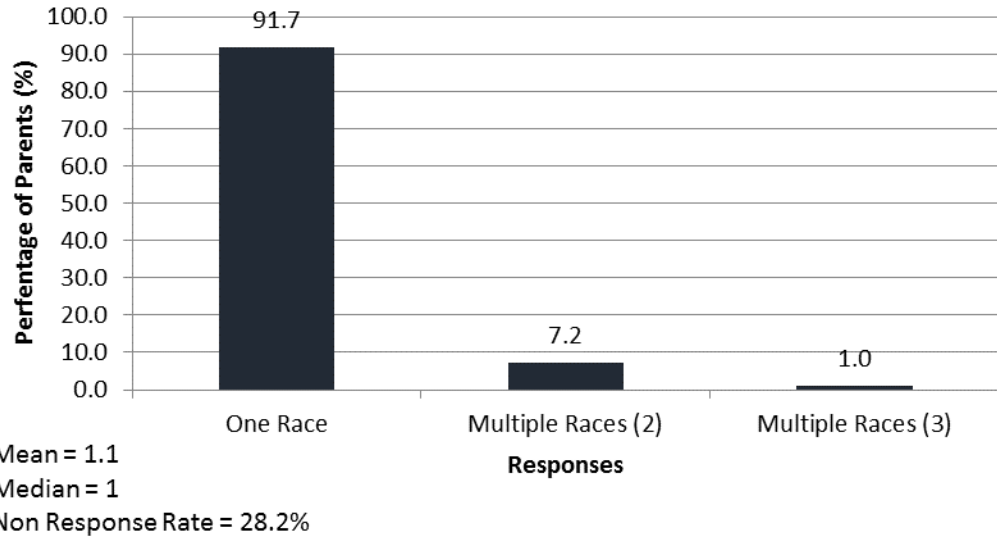


**Figure 4.2 Parent Age Data from “Willingness to Pay” Survey**

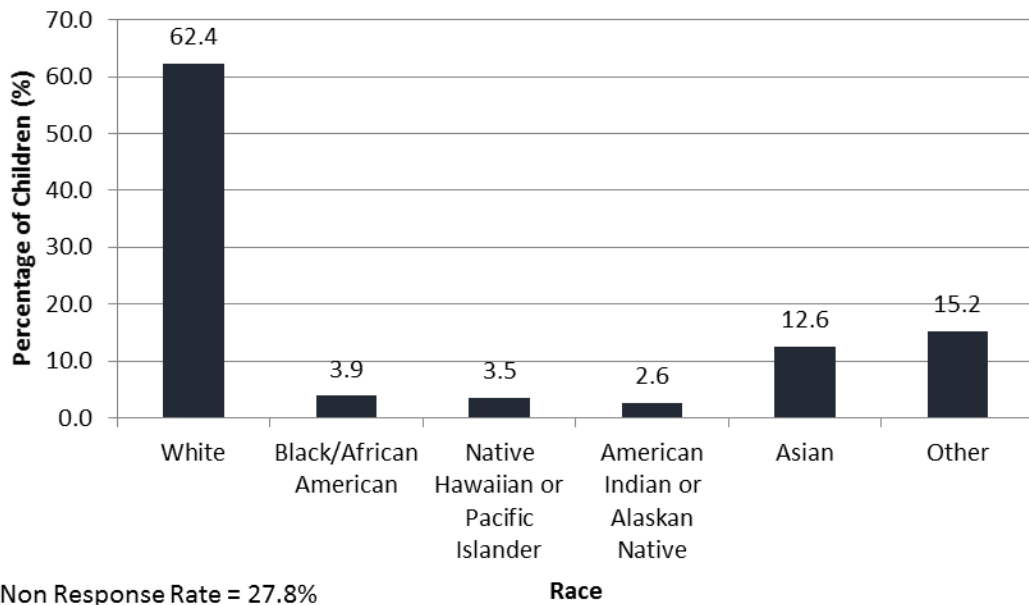
**Race:** This question had the highest non-response rate. The results are presented for parents who answered this question. For the category of race, participants were asked their race and ethnicity for both themselves (the parents) and their child. Nearly two-thirds (62.4%) of respondents’ children were “White”, 12.6% were “Asian”, and 3.9% were “Black or African American”. The “other” category was chosen by 15.2% of respondents, either noting a race that was not listed as a category or their child was multi-racial. As for the parents’ race data, 67.0% of parents were “White”, 13.6% were “Asian”, and 2.4% were “Black or African American”. For this data, 14.1% of parents chose “other” category. Figure 4.3 shows the percentage of children who identified as one race, two races or three races. Figure 4.4 shows the same data for the parents. The complete breakdown of race can be found in Figure 4.5 and Figure 4.6.



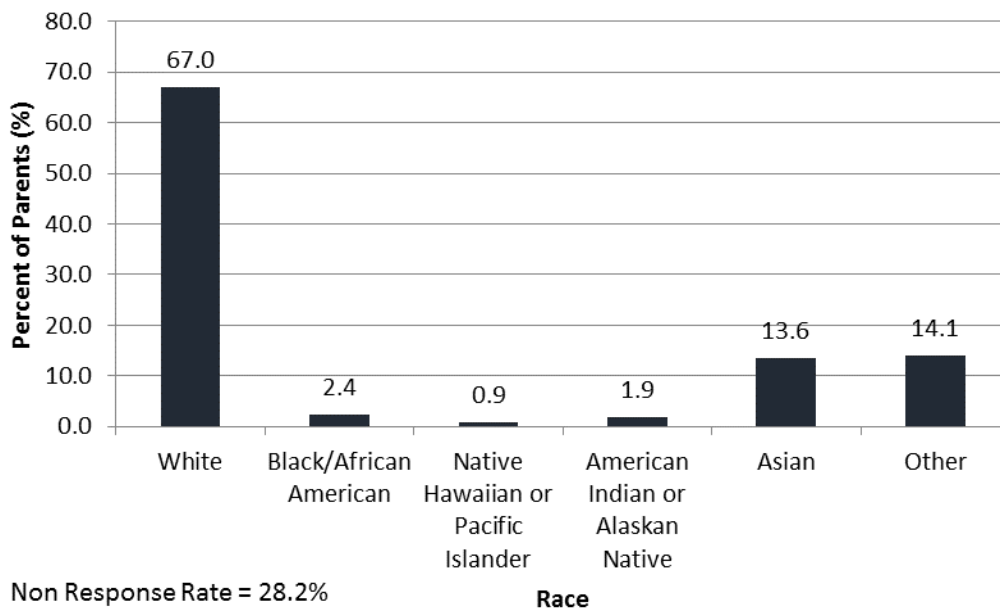
**Figure 4.3 Response Rates for Child Race Data Questions**



**Figure 4.4 Response Rates for Parent Race Data Questions**

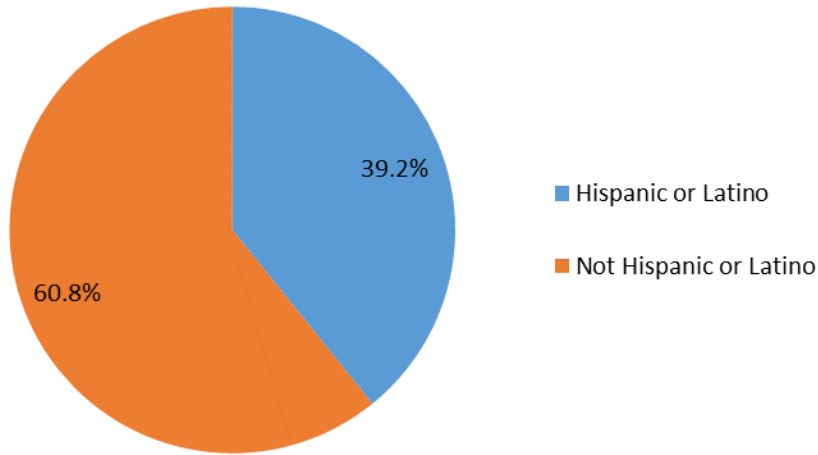


**Figure 4.5 Child Race Data from Survey**



**Figure 4.6 Parent Race Data from Survey**

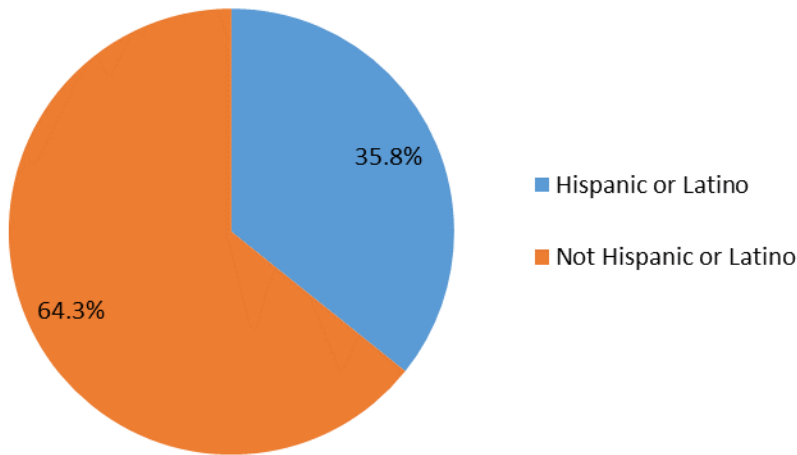
**Child’s Ethnicity:** For ethnicity, parents were asked whether or not their child was Hispanic or Latino. Thirty-nine percent of parents who answered this question indicated that their child was Hispanic or Latino while 60.8% noted that their children was not, with 17.8% of parents choosing not to respond to this question. Figure 4.7 shows the ethnicity data for the child.



Non Response Rate = 17.8%

**Figure 4.7 Child Ethnicity Data from Survey**

**Parent’s Ethnicity:** Of the parents who answered this question, roughly 35.8% of parents identified themselves as Hispanic or Latino while 64.3% did not. 17.8% chose not to respond to this question. Figure 4.8 shows the ethnicity data for the parent.

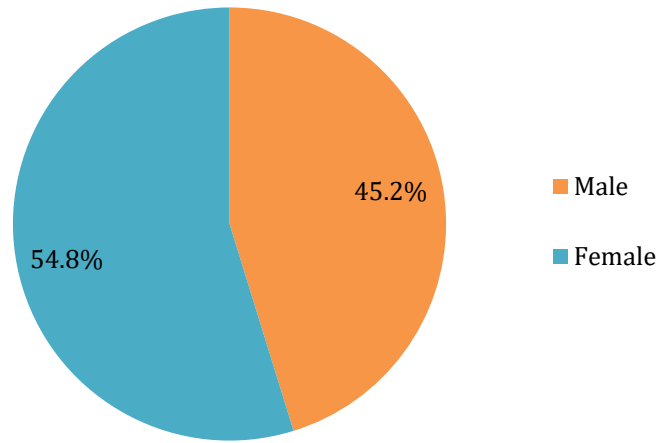


Non Response Rate = 18.2%

**Figure 4.8 Parent Ethnicity Data from Survey**

**Child’s Gender:** For the child’s data, 45.2% of parents who answer this question responded their child was male, while 54.8% responded that their child was female. 14.8% percent of parents opted out of this question. Figure 4.9 shows the gender data for the child.

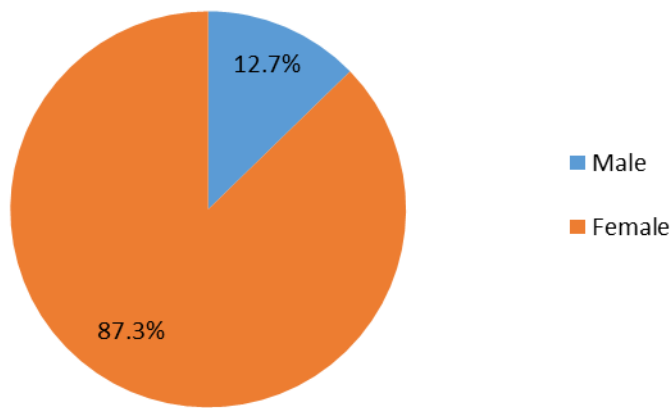




Non Response Rate = 14.8%

**Figure 4.9 Child Gender Data from “Willingness to Pay” Survey**

**Parent’s Gender:** For the parents that answered the gender question, 87.3% of parents who took the survey were female, while 12.7% were male. This question was not answered by 18.5% of parents. Figure 4.10 shows the gender data for the parent.



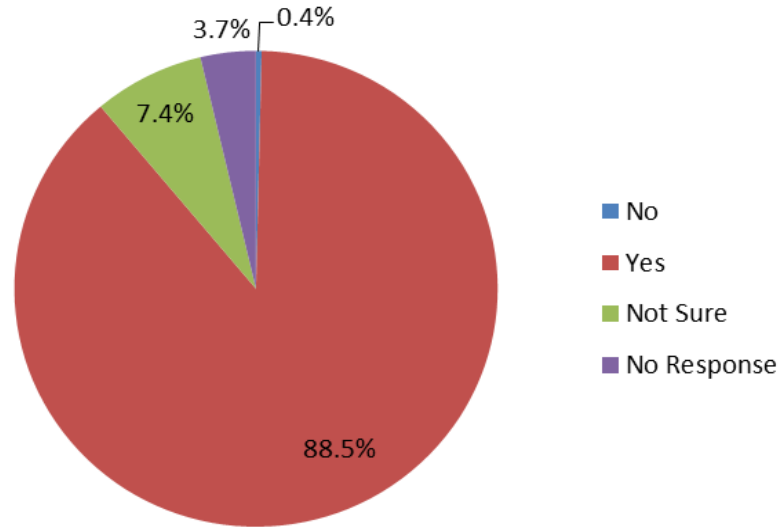
Non Response Rate = 18.5%

**Figure 4.10 Parent Gender Data from “Willingness to Pay” Survey**

### **Parental Support**

At the beginning of each survey, parents were asked if they support their child’s participation in the OGS Program. Overall 88.5% of parents support their child’s participation in the program. Another 7.4% of parents were unsure if they supported their

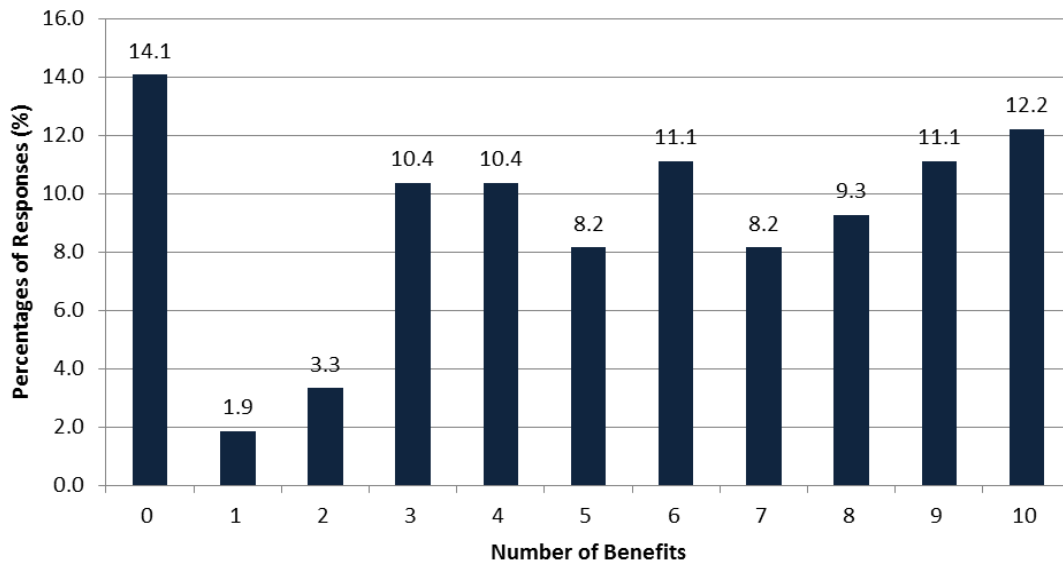
child's involvement and 0.4% did not support their child in the program. Figure 4.11 shows the frequencies of each response.



**Figure 4.11 Parents' Support of the OGS Program**

### **Program Benefits**

At the start of each survey, participants were asked to select from a list of ten choices describing potential benefits children may receive through participating in the Ocean Guardian School Program. Participants were permitted to select all that applied from the list, including an option for not sure or no benefits. Both the number of benefits and the type of benefit selected was recorded in the analysis of the survey. The median number of benefits and skills selected by parents was six. Of all participants, 86.1% noted that their child received at least one benefit from the OGS program, and 12.2% of participants selected every benefit from the list. Roughly two percent reported that their child received no benefits from the program and 11.9% selected not sure. The three most frequently chosen benefits and/or skills acquired by the OGS program were “Increased responsibility towards the environment” (72.2%), “Increased understanding of how people interact with the environment” (66.7%) and “Positive environmental change” (66.3%). Seven out of the ten benefits/skills had 50% or higher percentages of parents noting that the statement applied to their child's experience. Figure 4.12 shows frequencies of number of benefits and skills selected and Table 4.1 shows the frequency of each potential benefit selected.



**Figure 4.12 Number of Benefits and Skills Acquired By Child through OCS Program**

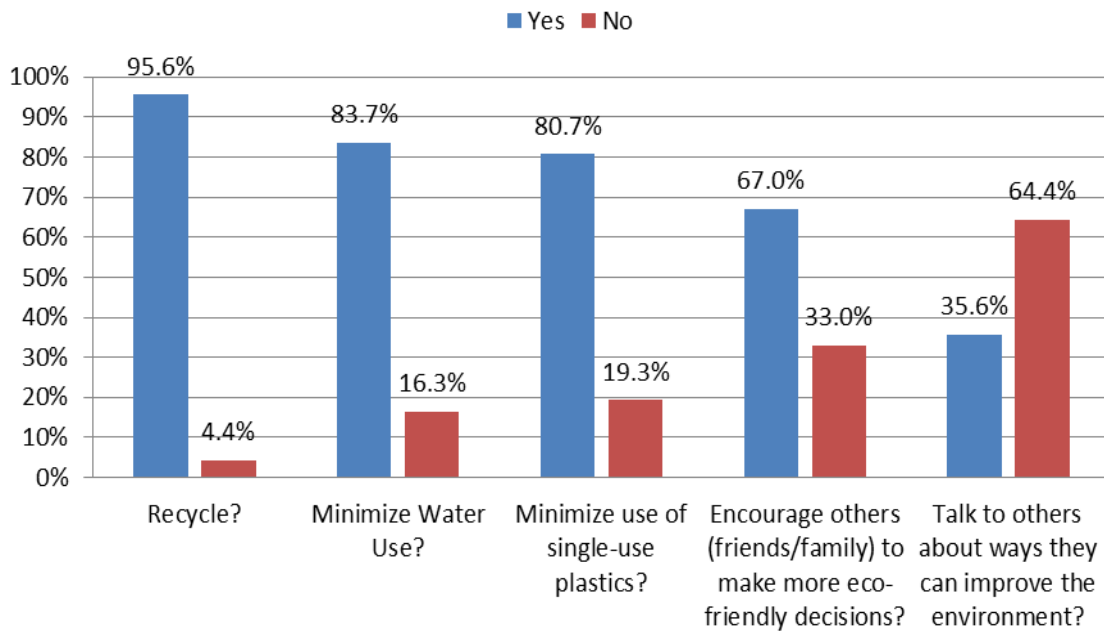
**Table 4.1 Frequencies of Types of Benefits and Skills Acquired By Child through OGS Program**

<b>Benefits Child Acquired From the Ocean Guardian School Program</b>	<b>Percentage of Participants Who Selected Each Benefit</b>
Increased sense of community	59.3%
Work Experience (resume, future applications for scholarships, high school, etc.)	23.3%
Development of self-esteem & self-confidence	37.4%
Experience working with peers as a part of a team	55.9%
Sense of Accomplishment (seeing a project through start to finish)	47.4%
Appreciation for volunteering/increased likelihood to volunteer in the future	50.0%
Positive Environmental Change	66.3%
Increased understanding of how people interact with the environment	66.7%
Increased responsibility towards the environment	72.2%
Increased commitment to environmental protection	63.3%
None of the above	2.2%
Not Sure	11.9%

### **Behavioral Changes**

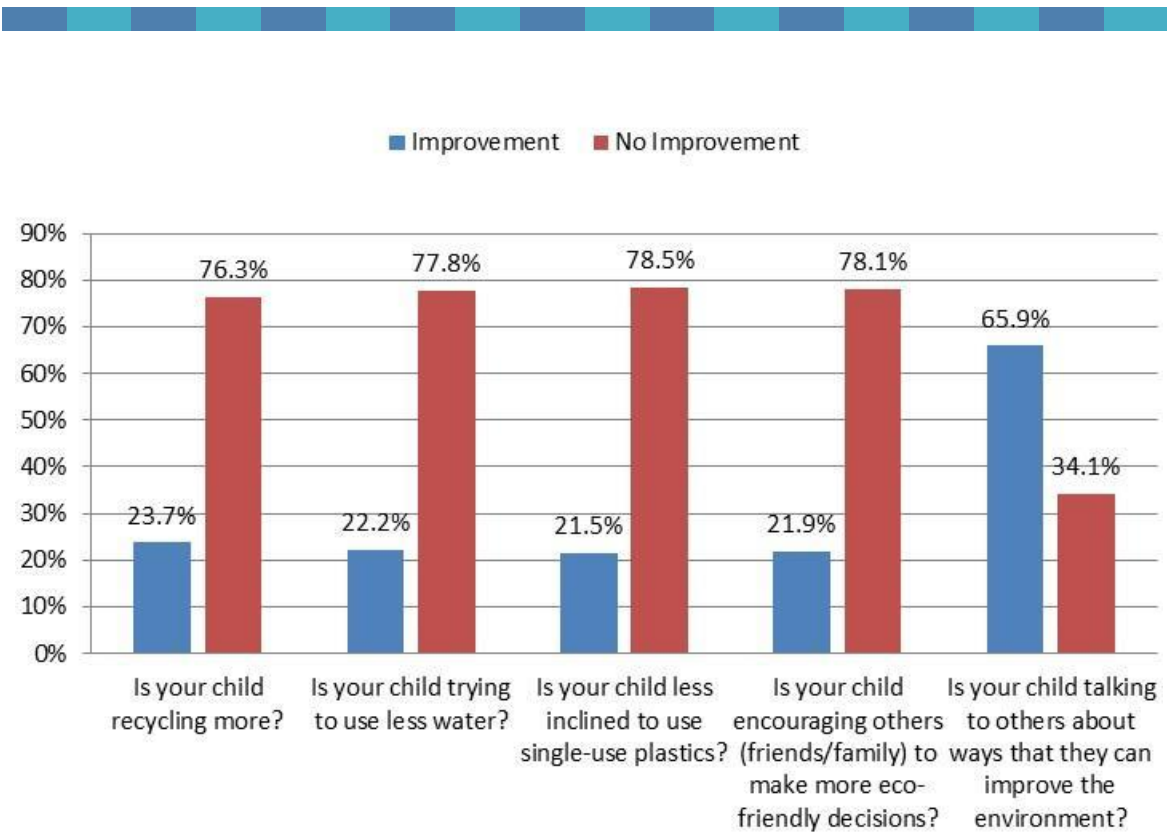
One of the goals of OGS program is to promote ocean conservation and stewardship. Parents were asked several questions about behavioral changes on topics about recycling, minimizing water usage or using less water, minimizing single-use plastics, encouraging others to make eco-friendly decisions and talking to others about ways to improve the

environment. As seen in Figure 4.13, 95.6% of children were recycling before participating in the program, 83.7% were minimizing their water usage, 80.7% were minimizing their use of single-use plastics, 67.0% were encouraging others to make eco-friendly decisions and 35.6% were talking to others about ways to improve the environment.



**Figure 4.13 Child’s Behaviors before Participating in OGS Program**

When asked about their child’s behaviors after participating in the OGS program, the results show that most behaviors saw a 20-24% improvement. This number may be small because the majority of students were already engaged in all the behaviors. The number of students recycling, minimizing water use and minimizing single use plastics were near the ceiling of 100% prior to receiving the OGS education. The largest improvement was that children are now “talking to others about ways they can improve the environment”. Figure 4.14 shows behavior changes in the child because of participating in the program.

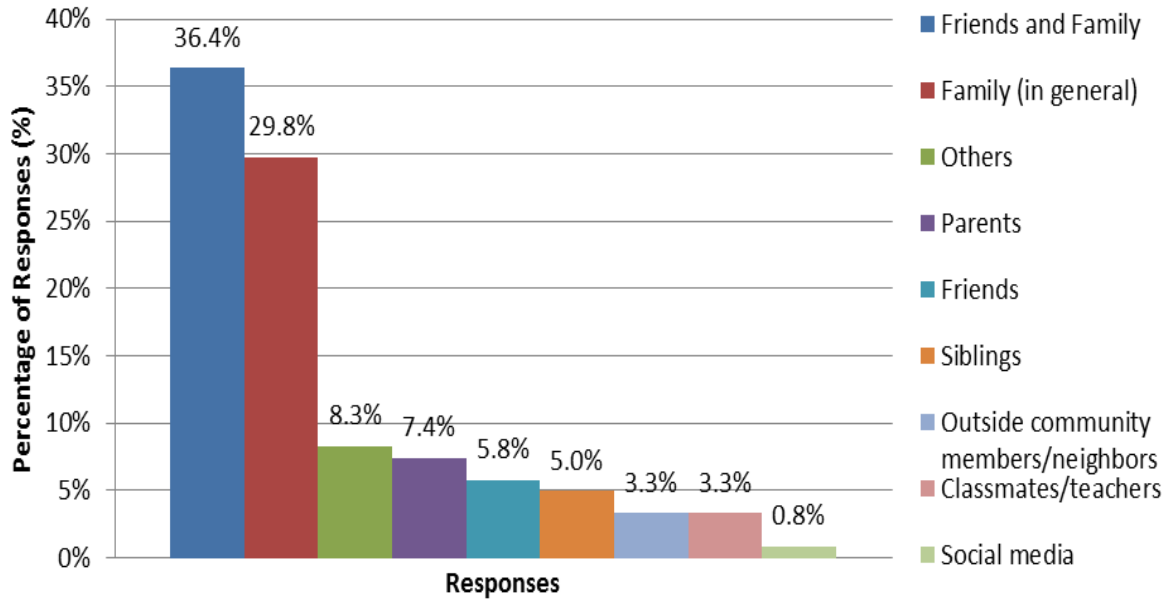


**Figure 4.14 Child’s Behaviors After Participating in OGS Program**

The most notable changes in behavior were in the form of students talking to others about ways they can improve the environment. Prior to the school year, two-thirds of students (174 students) were not talking to others about how they can improve the environment. However, after the program, more than half of the students (96) that were not talking to others prior to the program were now talking to others. Further, 82 of the students who were talking to others, increased their efforts after receiving the OGS program.

The table below shows whom children are now talking to or talking to more about their OGS experiences and learnings. The frequencies are also displayed in the figure below about the relationships of whom their child is speaking to about the environment. This question was meant to see if the program is expanding beyond just educating the student. Out of the 121 responses that the survey received for “Identifying the relationship of the student to the person(s) they are talking to [about environmental stewardship]” 36.4% said that their student is communicating with both friends and family about what they have learned through the OGS Program. Nearly thirty percent responded that their student was educating both immediate and extended family members, while 7.4% spoke primarily to his/her parents. 8.3% reported responses that did not indicate a specific person or person to whom the child has communicated, but did note that they have seen a

noticeable impact on their child’s perceptions of environmental issues. Notable comments from parents are also recorded below Figure 4.15.



**Figure 4.15 Persons Being Educated by the Student (Relationships)**

*“He talks frequently about the impact of what we do around the house on the ocean. We live near a creek and he and I have gone down three times and cleaned up trash (the creek is near a bus stop and people throw tons of trash in the creek bed).”*

*–Ocean Guardian School Parent*

*“My daughter wants to go back to her preschool to teach younger kids about ocean pollution”*

*–Ocean Guardian School Parent*

*“Everyone! She is very concerned about trash ending up in the ocean and stops us in our activities to pick up trash when we are out.”*

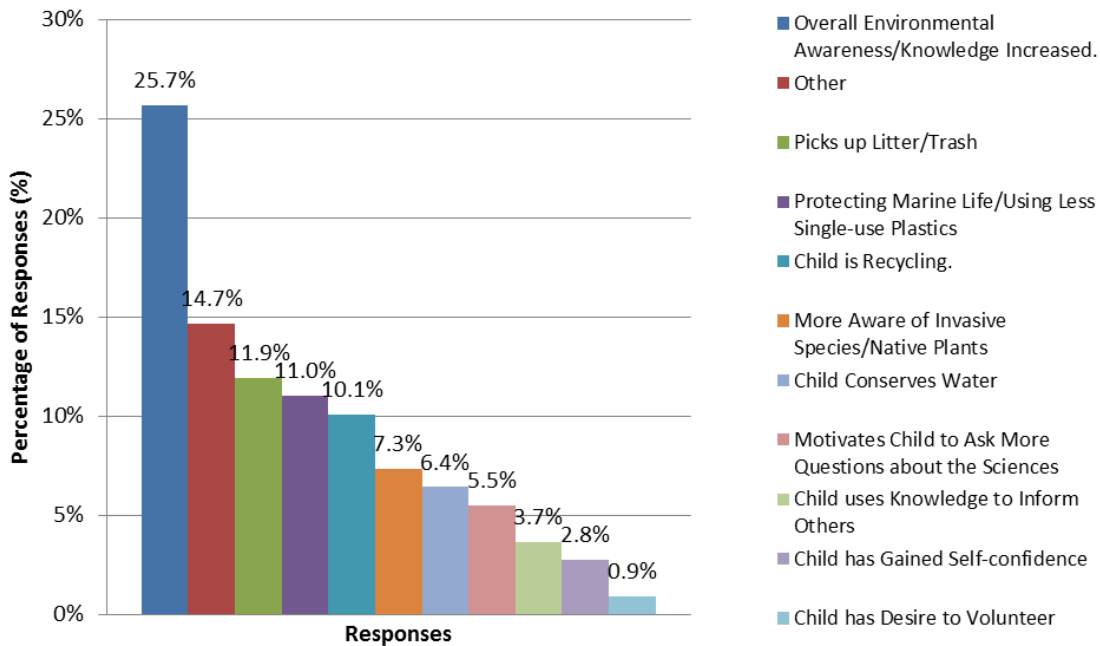
*–Ocean Guardian School Parent*

*“Everyone who comes over she tells them not to waste water. My dad came to visit and she called him out on leaving the water in while brushing his teeth!! She also is very concerned with not hurting plants.”*

*–Ocean Guardian School Parent*

In addition to the five specific questions above, parents were able to write-in behavioral changes. As seen in Figure 4.16, out of the 109 responses for the question of “Have you perceived any other noticeable shifts in your child’s behavior/attitude resulting from the

program?” the most frequent response, with 25.7%, is that their child’s “overall environmental awareness and/or knowledge increased”. Additionally, 11.9% of parents noted that their child “picks up litter and trash”, 11.0% said that their child is trying to “eliminate marine debris by not using single-use plastics”, and 10.1% their child is now “actively recycling” because of taking part in an OGS program. Further, 14.7% of participants wrote in a response that either did not fit a specific category, or did not answer the question properly.



**Figure 4.16 Shifts in Behaviors/Attitudes Results from OGS Program**

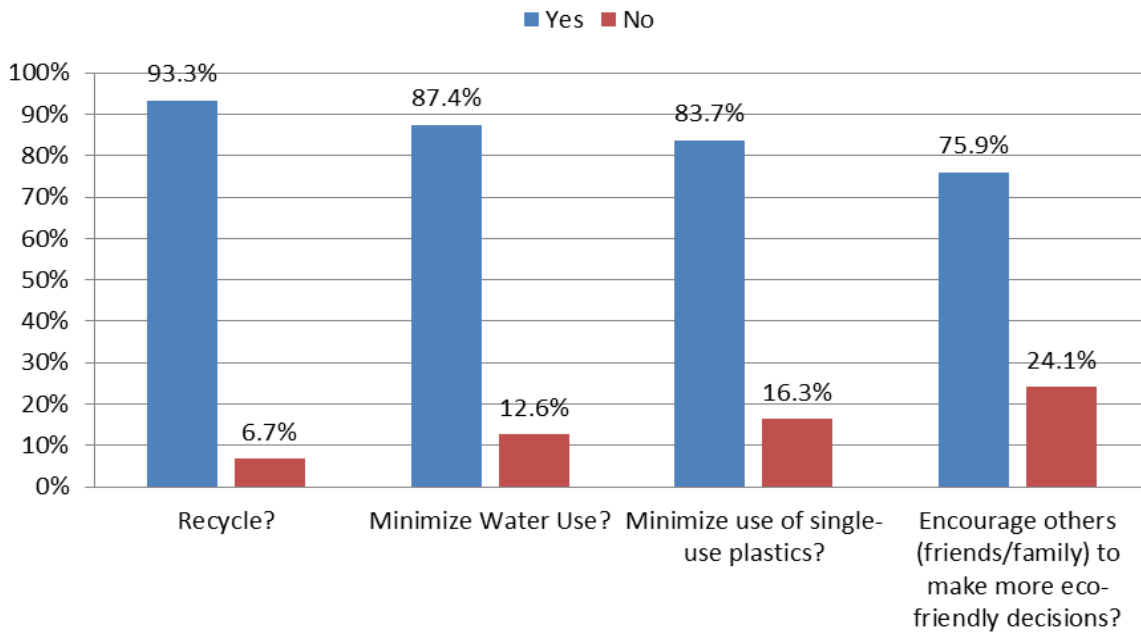
*“She is more expert on environmental matters. She will stop us and we will have a conversation about her learning. It’s also showing in her creative writing.”*  
*–Ocean Guardian School Parent*

*“Sharing ideas on conservation more freely through social media. Interest in colleges that are “green”.”*  
*–Ocean Guardian School Parent*

*“My son is very interested in supporting beach cleanup me, reusable plastics and bags, as well as noticing Native plants in our neighborhood. He is also very good at explaining to others the impact their class has had on restoration.”*  
*–Ocean Guardian School Parent*

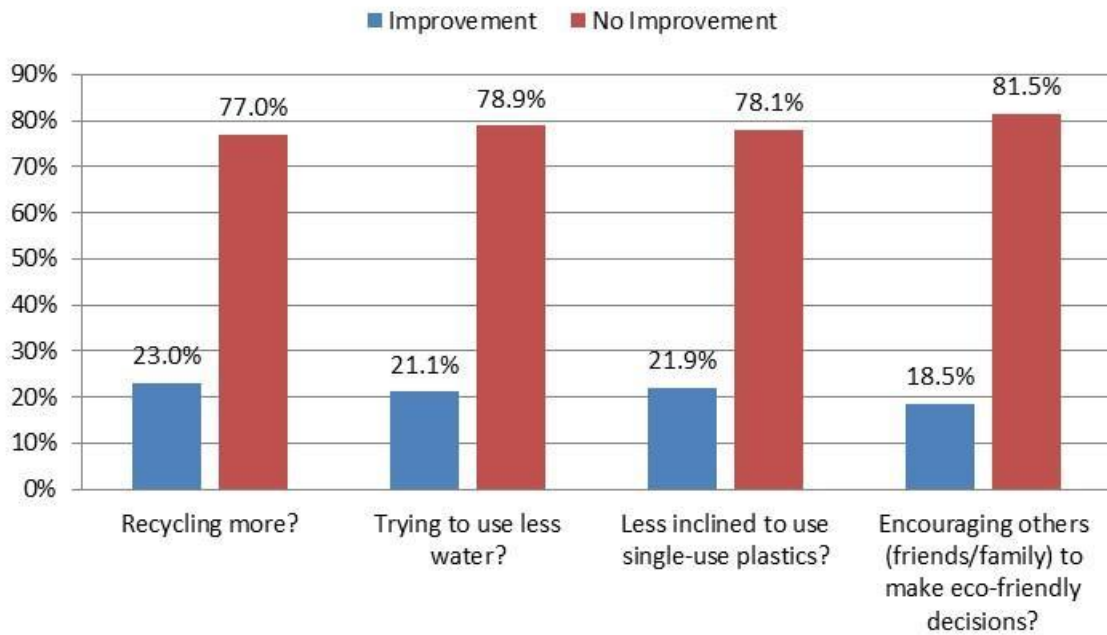
*“My daughter has become passionate about reducing environmental impact and has become much more outgoing and willing to speak in public about this. She is a shy kid. This has been a huge deal!”*  
*–Ocean Guardian School Parent*

Parent’s behavioral changes were also important to this study, as they show that students may be influencing their parents’ and others’ behaviors as a result of what they are learning from the OGS program. Figure 4.17 shows parents’ behaviors before their child had participated in the OGS program, and Figure 4.18 shows the improvement in behavior after program participation. Again, like the students, the majority of parents were already practicing eco-friendly behaviors before their child’s participation in the Ocean Guardian School Program, and approximately 20% of parents noted that after their child’s participation, their positive behaviors increased.



**Figure 4.17 Parents’ Behaviors Before Childs’ Participation in the OGS Program**

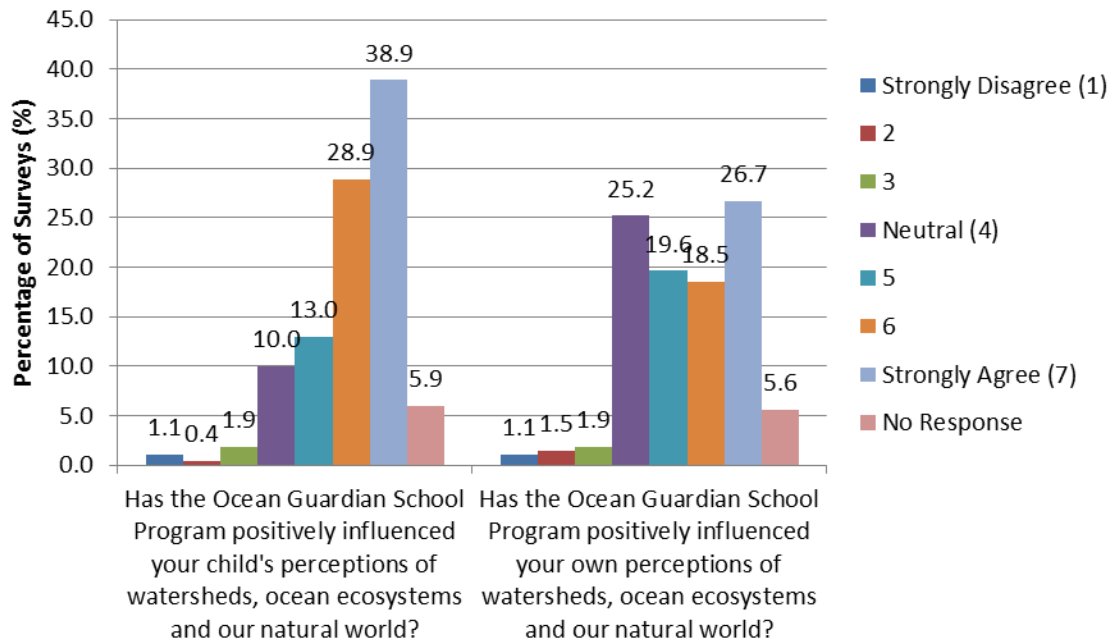




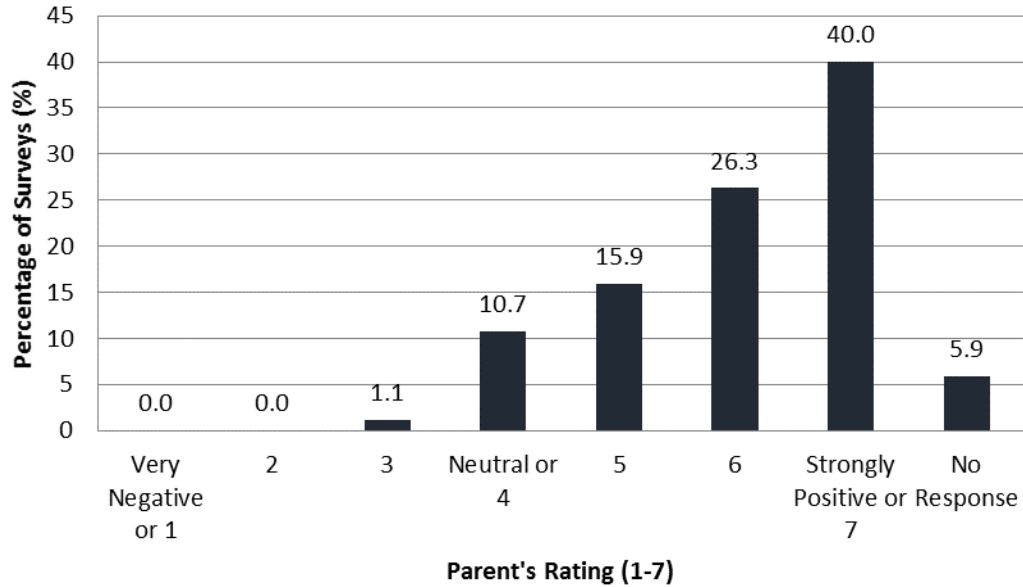
**Figure 4.18 Parents' Behaviors After Children's Participation in the OGS Program**

### Parent Perceptions

One of the goals of the OGS program is to positively influence the perceptions that children have of watersheds, ocean ecosystems and the natural world. Parents were asked to rate their perceptions on a scale of 1 to 7, with 1 being “strongly disagree”, 4 being “neutral” and 7 being “strongly agree”. Overall, parents strongly agree that the OGS program has positively influenced their perceptions and their child’s perceptions on watersheds, ocean ecosystems and the natural world. Parents were also asked to rate the environmental impact of their child’s OGS project. The same scale was used as the perception questions, except a rating of 1 meant that parents believed their school’s project had a “very negative” impact, and a rating of 7 meant that they believed it had a “very positive impact”. Almost, forty percent of parents strongly agree that their child’s OGS project had a positive impact on the environment. The results on the perception survey questions can be found in Figure 4.19 and Figure 4.20.



**Figure 4.19 Ocean Guardian School’s Influence on Parent and Child’s Perceptions of Watershed, Ecosystems, and the Natural World**



**Figure 4.20 Environmental Impact of Ocean Guardian School Projects**

## Preference Statements

In order to get a sense of environmental attitudes, each participant was asked to read four different statements and select each one that they believe is important for their child to learn. The four statements were:

- The importance of protecting wildlife and ocean habitat
- The importance on protecting endangered species
- Humans can impact the natural world to the point where it is difficult to restore
- The importance of protecting rare plants and species to maintain genetic diversity

This question also may indirectly reveal whether or not parents are supporting the lessons students are learning through OGS program. Figure 4.21 shows the responses for each statement. Statements that were checked as being important were marked as a “yes” and those that were not, a “no”.

From the data, it was apparent that more parents valued “the importance of protecting wildlife and ocean habitat” than the other three categories. “The importance of protecting rare plants and species to maintain genetic diversity” had the least amount of support (68.9% agreement).

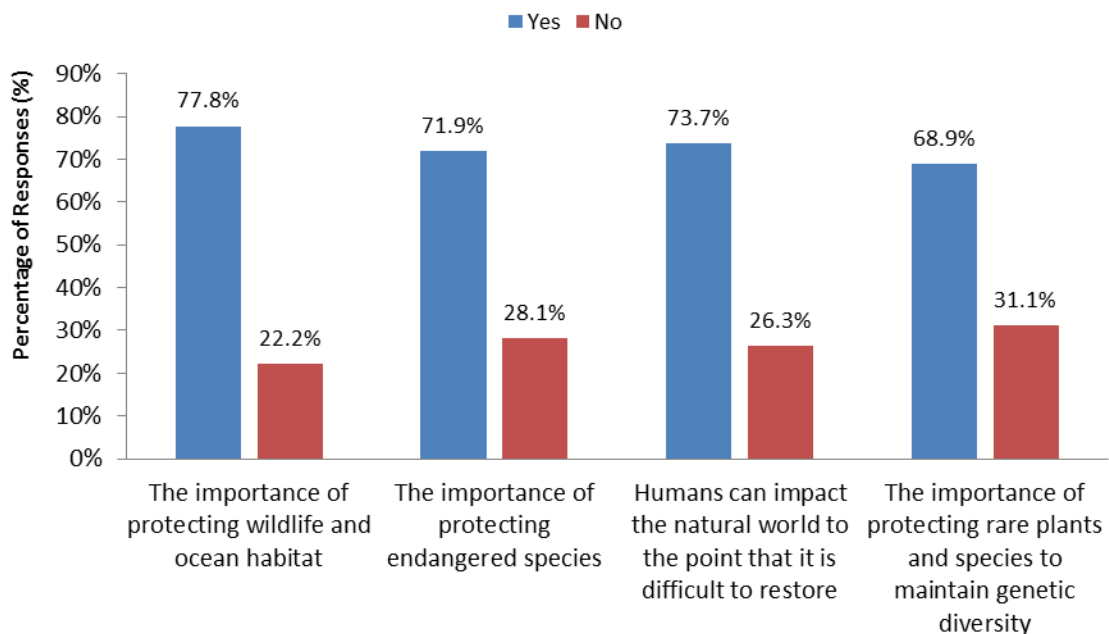


Figure 4.21 Parents’ Attitudes to Different Environmental Topics

## School Subject Support

Another objective of the survey was to determine how environmental education varies in level of importance among parents compared to other subjects and educational topics. Parents were asked to rate seven subjects taught in school, environmental education, outdoor education, art, music, mathematics, sciences, and natural resource conservation on a scale from one to seven; one being “do not support” and seven being “highly support”. Table 4.2 shows the average level of support amongst respondents for each educational subject. In general, parents are supportive of various types of education within school.

**Table 4.2 Average Level of Parent Support for School Subjects/Educational Topics**

<i>Topic</i>	<i>Mean</i>	<i>Standard Error</i>	<i>Minimum</i>	<i>Maximum</i>	<i>N</i>
Environmental Education	6.32	0.06	3	7	222
Outdoor Education	6.18	0.07	2	7	230
Art	6.29	0.07	2	7	225
Music Education	6.28	0.07	3	7	228
Mathematics	6.64	0.05	4	7	228
Sciences	6.67	0.04	4	7	227
Natural Resource Conservation	6.18	0.07	2	7	230

As shown in Figure 4.22, science had the highest percentage of parents who “highly support” the inclusion of that subject in schools (63.7%). Mathematics came in second with 63.0% of parents highly supporting the subject. The subjects with the least amount of parent support were outdoor education and natural resources conservation, with 47.0% of parents highly supporting the inclusion of these topics in school. Environmental education ranked fifth highest, with science, mathematics, music, and art education having a higher percentage of support from parents.

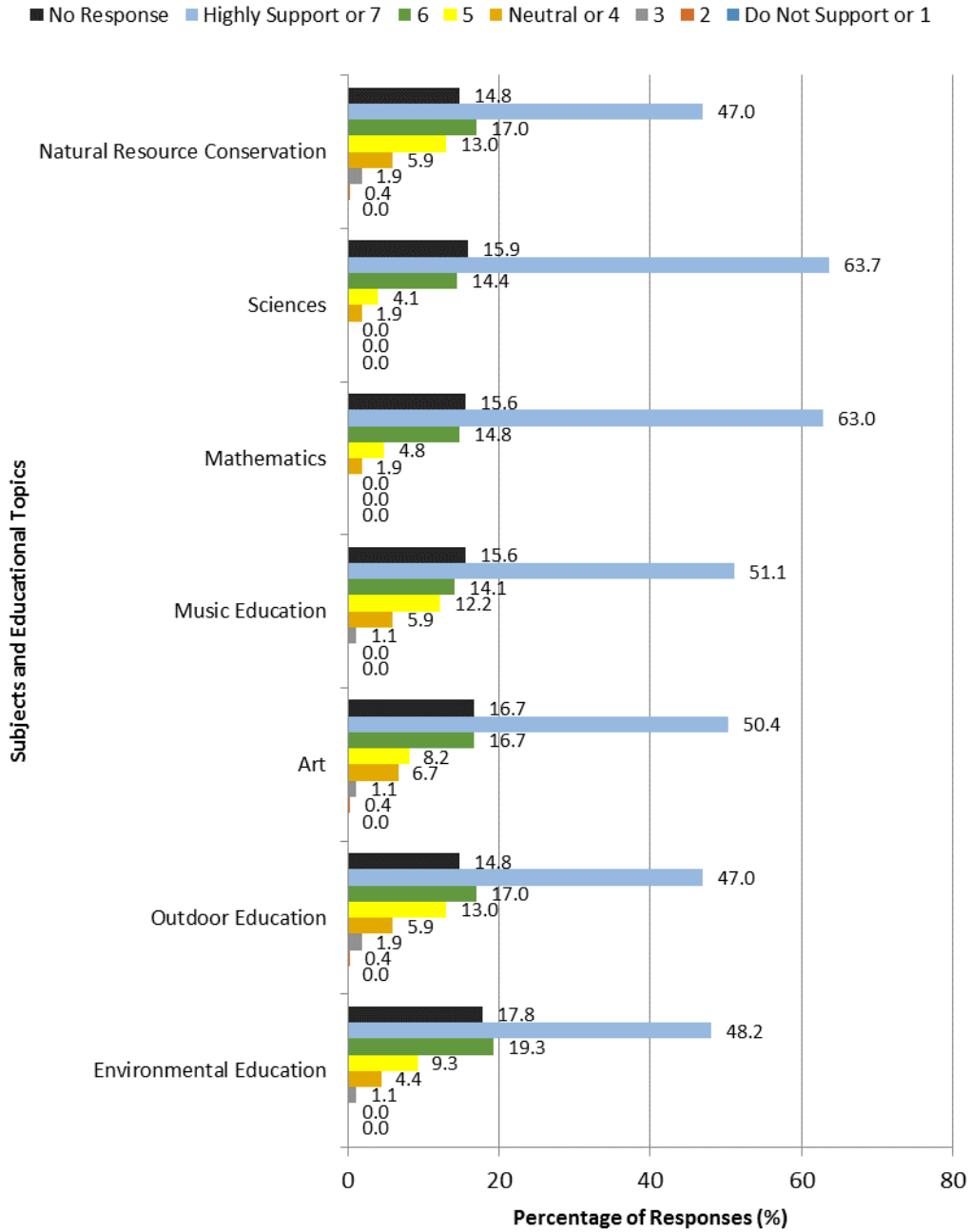


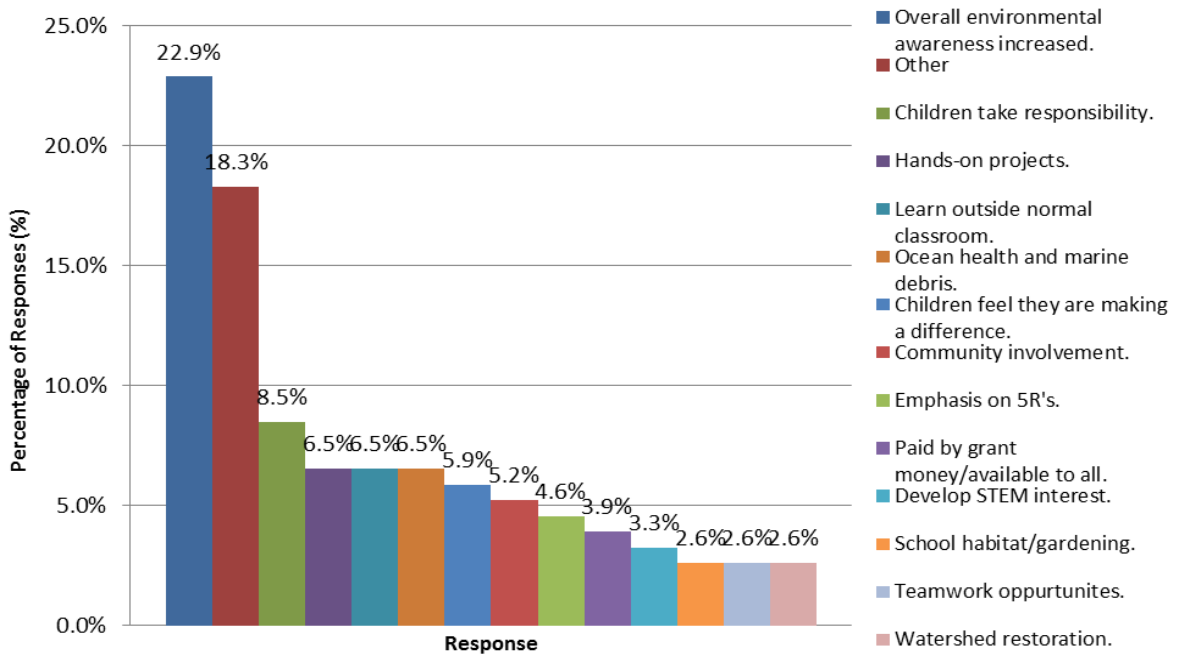
Figure 4.22 Parent Support for School Subjects/Educational Topics

### Open Ended Responses

Participants were given the opportunity to answer some key questions that may help the National Marine Sanctuary staff analyze the program and determine the most successful

aspects of the program and what needs improvement. Parents were also asked to identify what they deemed to be the most successful aspects of the OGS program on their child.

Out of 153 responses to the question of what they liked most, 22.9% of parents responded they liked that their child’s “Overall sense of awareness and stewardship to the ocean and environment increased”, while 8.5% noted that their child has an “increased sense of responsibility both for the environment and other aspects of their lives”. Tied at 6.5% were “having hands-on projects”, “the ability to learn outside the normal classroom setting” and “Emphasizing the Ocean Health and Marine Debris categories”. Overall parents felt that the Ocean Guardian School program is having a positive influence in their child’s lives when it comes to environmental stewardship, protecting the oceans and the marine life, and developing environmentally–friendly daily habits. 18.3% provided varying responses that did not fit into a specific category. Their responses to these open-ended questions are displayed in Figure 4.23.



**Figure 4.23 Most Successful Aspects of the Ocean Guardian School Program**

Some of the “other” comments included responses that were either too unique to fit into one specific category or were too vague to assign a category. Some of the more notable responses (whether categorized or placed in “other”) are recorded below:

*“I like the sense of ownership that my son had of the restoration site. I also like that he had to put in some hard physical labor to make an impact. I also like that it affected his daily life, like when he wanted to repeatedly clean up trash in the creek behind our house.”*  
*–Ocean Guardian School Parent*

“Our school is located on a creek in a roughly 7 mile long watershed between the mountains and the ocean. It's a perfect for us. I like the duration because it allowed us to create a restoration project in multiple phases and actually see it work.”

–Ocean Guardian School Parent

“It was a surprise! Knew nothing about it [the OGS program] until it happened. It was refreshing that something happened without having to push for it. (We have a relatively poor school district and have to constantly battle the finances)”

–Ocean Guardian School Parent

Out of the 109 responses received for suggestions on what the OGS Program could improve, 39.4% responded with “Nothing at this time”. Coming in as the second highest rate of suggestion was the “cost of the program” at 11.9%. The OGS program is currently free to parents, so there may have been some type of misunderstanding about potential costs proposed in the choice questions respondents answered. Roughly ten percent were “unsure of what they would change about the program” and 8.3% of parents would like to see the program “available to more students, schools, and teachers”, with several noting that federal funding (how the program is funded currently) is important because it provides lower income families with the opportunity to participate.

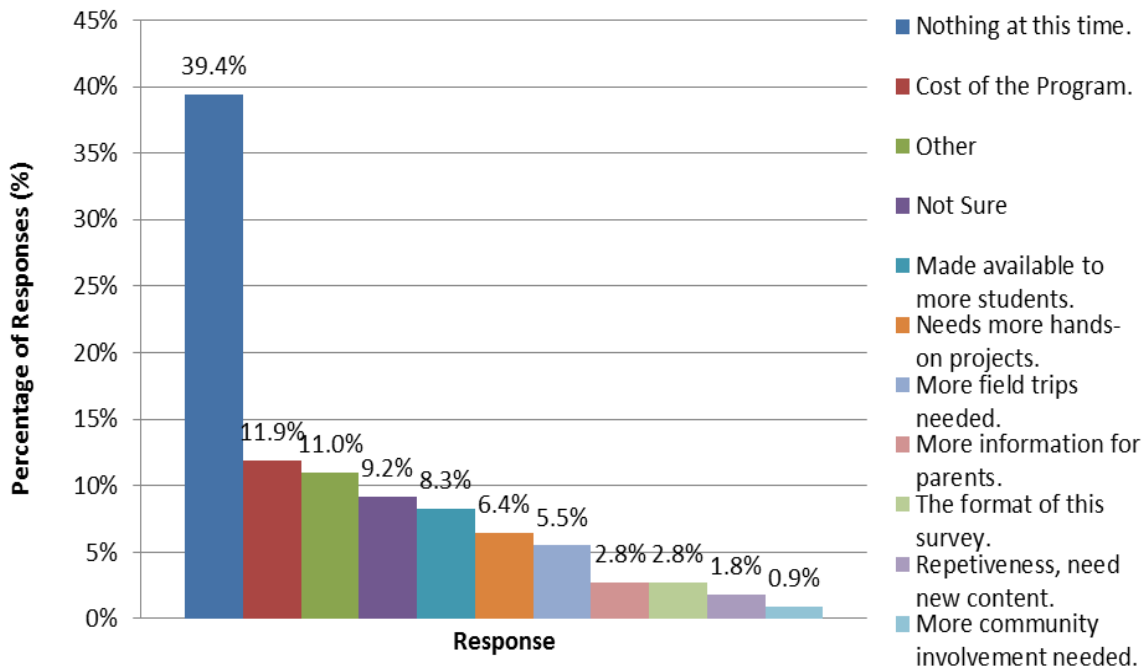


Figure 4.24 Suggested Changes for OGS Program



## 5. Economic Modeling & Results

### Introduction


There have been few studies completed on the economic value of education. In regards to the economic value of environmental education, no studies were found during a thorough literature review. (Although since work began on this project one paper by Haefele et al., 2016 has been published online that estimates a value of all the National Park Service educational programs provided to school children). There was an abundance of blueprints and guidance documents to develop environmental educational curriculum and activities, but none of these discussed the economic values apart from anecdotal evidence. One of the goals of this research was to fill this informational gap and to provide the monetary value for a comprehensive ocean literacy program and for specific attributes or characteristics of ocean literacy and conservation programs.

There have been studies completed that look at the economic value of specific types of education. For example, a cost-benefit analysis of preschool programs found that for every dollar invested in the Perry Preschool program, benefits totaled \$7 to \$10 (Heckman et al., 2010). The same study also found that Perry saved \$3 to \$8 dollars in crime costs for each dollar spent on the preschool. Other studies have found that every dollar spent at the Chicago Child-Parent Centers generates almost \$11 (Belfied & Schwartz, 2006). A report produced by the Whitehouse looking at the value of increased future earnings from those who received early childhood programs suggests that increased earning over the student's lifetime results in benefits ranging from \$1.60 to \$5.90 for every dollar spent (White House, 2015). These studies only focus on early childhood education and do not discuss the benefits of environmental education or the economic value parents have for such programs.

Additionally, several studies have begun to look at the economic value of higher education. One report produced by the Department of the Treasury and Department of Education found that in 2011 the median weekly earnings of a full-time employee with a bachelor's degree were 64% higher than those with a high school degree. Higher education also increases a person's economic mobility and expands a person's job opportunities. It is clear there are economic benefits from exposure to early childhood education and higher education, what remains unknown are the benefits derived from exposing students to environmental and ocean education in small doses.

This study uses contingent choice experiments to determine the value of OGS. This method creates scenarios similar to a market where people are forced to make trade-offs between the characteristics of a good, including its price. For example, when a person purchases a car trade-offs are made between color, speed, fuel efficiency, price, etc. The application here asks parents to make trade-offs between various hands-on ocean





conservation experiences and price. A detailed description of the methodology is presented in the Technical Appendix to this report (Schwarzmann et al., 2017).

### **Variables Used**

This part of the survey was designed to determine what parents would be willing to pay for a year of an OGS project if federal funding was not available. Participants were informed that the programs would be paid through increased school supply and field trip costs.

In five separate questions, parents were given three different packages of education to choose and asked to select one option for each question. Option A or “status quo” represents an option where there is no OGS program at the child’s school. Options B and C include a combination of hands-on programs (5 R’s, Marine Debris, Watershed Restoration, Schoolyard Habitat/Garden, and Energy Use and Ocean Health), levels of involvement with other grades and community members, and costs (\$20, \$40, \$70, \$110, or \$175) associated with that choice. In each question parents were asked to choose which of the three scenarios (A, B, or C) they prefer, the reasoning for their choice, and their level of confidence in the choice that they have chosen.

#### *Description of Variables*

**Table 5.1 Description of Variables**


<b>Ocean Guardian Program (possible values)</b>	<b>Status Quo Definition</b>	<b>Improvement Definition</b>
Chosen2	Dependent variable – respondent choose status quo	Dependent variable – respondent choose an improvement to the status quo
Asc	Alternative specific constant	Alternative specific constant
restoration	Learning about local watersheds and participating in projects to improve the local watershed; such as removing invasive species, planting native species or improving fish habitat	Learning about local watersheds and participating in projects to improve the local watershed; such as removing invasive species, planting native species or improving fish habitat
habitat	Learning about ocean-friendly gardens and habitats and participating in projects to create/ improve school gardens and yards with eco-friendly practices and methods such as planting native species, reducing run-off, installing rain barrels	Learning about ocean-friendly gardens and habitats and participating in projects to create/ improve school gardens and yards with eco-friendly practices and methods such as planting native species, reducing run-off, installing rain barrels
energy	Learning about how fossil fuel-based energy use impacts the ocean; participating in projects to reduce energy use and/or implementing renewable energy projects such as wind or solar	Learning about how fossil fuel-based energy use impacts the ocean; participating in projects to reduce energy use and/or implementing renewable energy projects such as wind or solar
recycle	Learning how to reduce waste and implement programs to reduce their waste within the school	Learning how to reduce waste and implement programs to reduce their waste within the school
debris	Learning how to reduce one-time use plastics (such as plastic water bottles) and participating in projects to reduce trash entering the ocean	Learning how to reduce one-time use plastics (such as plastic water bottles) and participating in projects to reduce trash entering the ocean

Ocean Guardian Program (possible values)	Status Quo Definition	Improvement Definition
involve_med	<p>Your child would interact with students and teachers in their grade, as they normally do <i>or</i></p> <p>In addition to interacting with students and teachers in their grade and other grades, your student would also interact with <u>local community members</u>, such as small businesses, non-profits or local government officials</p>	<p>In addition to interacting with students and teachers in their grade, your student would also interact with <u>students and teachers in other grades</u></p>
involve_high	<p>Your child would interact with students and teachers in their grade, as they normally do <i>or</i></p> <p>In addition to interacting with students and teachers in their grade, your student would also interact with <u>students and teachers in other grades</u></p>	<p>In addition to interacting with students and teachers in their grade and other grades, your student would also interact with <u>local community members</u>, such as small businesses, non-profits or local government officials</p>
Cost (\$20, \$40, \$70, \$110 or \$175)	Free -- \$0	<p>\$20, \$40, \$70, \$110 or \$175</p> <p>This amount would be paid by you through additional school supply and field trip costs next school year</p>

### Protest Bids

The survey included a series of questions that were asked to identify potential protestors. In this research, a protestor is a person who has value for the OGS but does not reveal their value because they disagree with the method of payment, who is responsible for the payment or the scenarios. So they choose the status quo as a protest to the payment method or question. Question 1, after the Choice Questions on the survey (Appendix C) used a Likert scale to ask respondents how much they agreed or disagreed with a series of statements. The four statements used to identify protestors are;

- a. I should not have to pay for my child's education
- b. Costs should not be a factor in a child's education
- c. I do not believe these scenarios accurately reflect the education my child should receive

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- d. I should not have to pay any additional monies for my child to participate in this program.

If a respondent rated their level agreement as a '5' or higher and they chose the status quo for all the questions they answered, then they were considered to be a protester and removed from the analysis. Protesters are removed from the data set because they do not have a true 'zero' value for the program; instead, they are protesting the method of payment or a question's validity. Including these protesters would artificially deflate the value of the program. If a respondent answered zero but did not indicate an objection to the method of payment or question, then their zero values were included in the analysis. In total, 21 respondents were removed from the data set for being protesters.

### **Economic Modeling**

The econometric models used to estimate parents' willingness to pay for each characteristic of OGS are described briefly here. For a detailed approach, please see the Technical Appendix to this report (Schwarzmann et al., 2017). A multinomial logit, nested logit and random parameters models were estimated using the survey data. The final results presented in this report are the average of the three models used. Averaging the three models was done to account for strengths and weaknesses of each of the three model specifications.

The cost variable and each attribute of the choice questions were statistically significant. In each case, as a student was exposed to energy, debris, restoration and habitat education parents were willing to pay for these programs. In all models except the RPM the recycling variable was significant at the 95% level. Further, parents were also willing to pay more to increase their child's interactions with those outside the school. (However, in the MNL & NMNL the significance was at the 90% confidence level instead of the 95% confidence level).

### **Monetary Benefits**

In each model specification, the attribute of ocean guardian that had the highest willingness to pay was habitat - learning about ocean-friendly gardens and habitats and participating in projects to create/ improve school gardens and yards with eco-friendly practices and methods such as planting native species, reducing run-off and installing rain barrels. The average WTP across all models is \$58.52 per student for hands-on habitat experience. The attribute with the second highest WTP was restoration - learning about local watersheds and participating in projects to improve the local watershed; such as removing invasive species, planting native species or improving fish habitat, with an average of \$44.79. In regards to the remaining three attributes, energy, marine debris and recycling had the third, fourth and fifth highest marginal WTP per attribute in all three models, respectively. When the three models are averaged the marginal willingness to

pay for energy is \$34.24, marine debris is \$25.50 and the average marginal WTP is \$21.41 for recycling.

**Table 5.2 Average Willingness to Pay Across Selected MLM, NMLM, RMP Specifications**

	Status Quo to Receive Education with High Interaction
asc	\$52.78
restoration	\$44.79
habitat	\$58.52
energy	\$34.26
recycle	\$21.41
debris	\$25.50
involve_high	\$25.48
TWTP	\$262.73

### Cost Benefit Analysis


There are three grant amounts that schools could potentially receive. For years one to three, schools receive \$4,000. Schools receive \$2,500 for the fourth year and \$1,000 for the fifth year. The average cost was calculated for the three different funding levels and the number of students that each school reported as being part of the OGS program. The cost per student is derived by taking the dollar amount that the school receives divided by the number of students that participate in the program at the school.

**Table 5.3 Costs per Student**

	Annual School Cost	Minimum Cost Per Student	Maximum Cost Per Student	Average Cost Per Student	Standard Error	N
All Schools	\$4,000	\$5.30	\$333.33	\$52.91	\$12.54	33
	\$2,500	\$3.31	\$208.33	\$33.07	\$7.84	33
	\$1,000	\$1.32	\$83.33	\$13.23	\$3.13	33
Participating Schools	\$4,000	\$5.30	\$200.00	\$48.44	\$13.08	15
	\$2,500	\$3.31	\$125.00	\$30.27	\$8.17	15
	\$1,000	\$1.32	\$50.00	\$12.11	\$3.27	15

### Cost Benefit Analysis

When analyzing the minimum cost per student, \$1.32, (Table 5.9), it is clear that as long as students receive any one single attribute of OGS program, the benefits will exceed per student costs. It becomes less clear when considering the maximum cost per



student. The largest amount, \$333.33 per student, occurs at a school that involves 12 students in the OGS program and does not result in benefits being greater than costs. However, at all other annual cost amounts, it is possible to still have a net gain based on the design and mix of attributes offered by the OGS program.

When considering the average cost per student the range is \$12.11 to \$52.91. In all cases, there are a few mixes of attributes and benefits that result in benefits exceeding costs. Comparing Table 5.2 to 5.3, if a student receives habitat restoration only or either restoration or energy in combination with a high level of involvement from outside their grade level than benefits exceed costs. There are several other combinations in which the monetary value of OGS exceeds the maximum potential cost of the program per student.

### **Other Benefits Not Analyzed**

It is important to note that the OGS program has direct influences on other measurable data that were not considered in this analysis. These benefits include; the value-added of the school projects to schools or local communities, the long-term impacts that changed behavior of students and parents may have on the environment, and the costs savings from students completing restoration projects or cleaning up marine debris relative to the school or community hiring someone.

More specifically, analysis may be considered for data resulting from a variety of hands-on projects and educational experiences that take place both on campus and out in the community. Examples include:

1. Restoration of campus/community areas/habitats with addition of native plants, berms, etc. that contribute to measurable impacts on runoff/erosion, water use/retention, native species, soil fertility, etc.
2. Projects that focus on the decrease use of single use plastics on campus that in turn, significantly affect school/district resources and budgets by increasing the use of reusable bottles, flatware, sandwich/snack bags, etc. These activities may also include the instillation of water hydration stations on campus that directly impact the number of single use bottles NOT used on campus and thus reducing the response to marine debris
3. Projects aiming to reduce the use of fossil fuels by implementing renewable energy sources that in turn, affect the school/district energy use/costs while influencing students and their families to make similar changes at home.



## 6. Conclusions and Future Research

The research sought to fill several existing research gaps about the value of ocean stewardship education programs and specific characteristics of that education for which people are willing to pay. It is clear that with proper planning and program design benefits can exceed costs. This is without considering other economic benefits not included in this analysis. These other benefits were discussed at the end of Chapter 5.

This economic survey has inspired ideas for future research with aim to improve the existing survey as well as to give us greater insights and deeper understanding into other benefits of the OGS program. There are a couple of different approaches to future research. First, the survey could be revised to address noted weaknesses and repetitions. Some of the feedback the researchers received included; the survey took too long, not enough time was given to schools to get the proper approval from the principals or board of education and onerous questions. Although, this survey was vetted and went through rigorous internal review, no focus groups were held prior to implementation. If this study is replicated, contact with the responsible teacher and principal would be made earlier in the year.

Further, due to the ceiling effect, several behavioral changes were smaller than expected. It is possible, that the researchers were not asking the appropriate questions about behavioral changes. One possible change could be to increase understanding of how students talk to other people and if those conversations have an impact on other people. Alternatively, conversations with teachers about the behavioral changes they are seeing in the students could help to inform the behavior questions.

The other option for future research is to revise and implement the survey nationally. It could be interesting and informative to understand if and how various geographies or communities value ocean conservation and literacy. Sanctuaries are national treasures, so it is important to understand how all geographies and regions of America value education related to the conservation of these resources.



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