K-12 EDUCATION NEEDS ASSESSMENT REPORT

Mission-Aransas National Estuarine Research Reserve

Report Submitted by:

Mission-Aransas National Estuarine Research Reserve

University of Texas at Austin

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Report Submitted to:

National Oceanic and Atmospheric Administration

National Estuarine Research Reserve System

Estuarine Reserves Division

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EXECUTIVE SUMMARY

The Mission-Aransas National Estuarine Research Reserve (Reserve) conducted a K-12 Education Needs Assessment to identify teacher professional development and student environmental education needs, from November 11, 2010 through May 31, 2011. Recent expansion of Reserve education programs and facilities, changes in Texas public K-12 teaching and testing requirements, and reductions in state education funding make the information collected in the Needs Assessment critical for directing future education program development at the Reserve. The findings from this Needs Assessment will help the Reserve expand coastal and estuarine K-12 education in the adjacent areas surrounding the Reserve and develop an education implementation plan that meets the goals of the National Estuarine Research Reserve System's K-12 Estuarine Education Program.

The Needs Assessment survey included required questions developed by the National Estuarine Research Reserve System and questions designed to reflect local needs identified by the Reserve's Education Advisory Committee and Education Coordinator. The questions were designed to gather information on the respondents' teaching environment, subjects taught and delivery methods, professional development preferences, student field trip needs, and knowledge of the Mission-Aransas Reserve and the national reserve system.

The Needs Assessment survey was completed by 314 total teachers. Two hundred and thirty-three teachers from within the Reserve's nine watershed counties and 81 teachers outside of the watershed counties participated in the survey. Some findings from this Needs Assessment have already been applied to expand and improve student field experiences and others will be applied to implement a *Teachers on the Estuary* training at the Reserve in the near future. Knowledge gained from this Needs Assessment is directing development of the Mission-Aransas Reserve's K-12 education program and will continue to direct future improvement.

ACKNOWLEDGEMENTS

The Mission-Aransas Reserve staff thank the members of the Reserve's Education Advisory Committee for their input in the development of the Needs Assessment survey. We also thank the K-12 science teachers who kindly provided a portion of their valuable time to fill out the survey and the school administrators who forwarded the survey to teachers in their districts. We appreciate the help of Marine Education Services staff at the University of Texas Marine Science Institute for their assistance in forwarding the survey to teachers outside of the Reserve's watershed counties. We also appreciate the helpful guidance provided by Atziri Ibanez and Bree Murphy of the National Oceanic and Atmospheric Administration's Estuarine Reserves Division and the advice of National Estuarine Research Reserve System Education Coordinators, who had completed education needs assessments for their reserves.

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INTRODUCTION

The Mission-Aransas National Estuarine Research Reserve (Reserve) conducted a K-12 Education Needs Assessment from November 11, 2010 through May 31, 2011. This report presents the findings of the Needs Assessment and the applications of these findings to Reserve K-12 education programs. The goal of the Needs Assessment was to provide guidance for future education program development at the Reserve. The primary objectives were to identify teacher professional development and student environmental education needs, and the obstacles to meeting these needs. These findings will help the Reserve expand coastal and estuarine K-12 education and develop an education implementation plan that meets the goals of the National Estuarine Research Reserve System's (NERRS) K-12 Estuarine Education Program.

Background

The Reserve encompasses approximately 185,708 acres in the southern coastal region of Texas and is administered by the University of Texas Marine Science Institute (Institute) in Port Aransas. Reserve staff currently conduct K-12 estuary education programs at several sites within the Reserve, including the Bay Education Center in Rockport, the Wetlands Education Center in Port Aransas, and Fennessey Ranch in Refugio County. K-12 estuary education offerings currently include inquiry-based field experiences, guided wetlands tours, *Science on a Sphere*© programs, and professional development trainings for teachers.

This Needs Assessment comes at a critical time when the Reserve's education program is experiencing numerous internal and external changes. Recent expansion of Reserve education programs and facilities, changes in Texas public K-12 teaching and testing requirements, and reductions in state education funding make the information collected in the Needs Assessment critical for directing future education program development at the Reserve.

Expansion of Reserve Education Programs and Facilities

The Reserve was designated in 2006. At the time of designation, the Institute's educational outreach program, Marine Education Services (MES), had offered K-12, adult, and community education programs for 32 years. The designation of the Reserve has enabled MES and Reserve staff to expand upon these existing programs and offer additional opportunities. Since 2006, the Reserve has worked with MES to develop and offer programs at Reserve sites such as the Wetlands and Bay Education Centers and at partner sites within the Reserve, including Fennessey Ranch. Future plans include the expansion of the existing visitor center at the Institute to include an Estuarium. The Estuarium will allow the general public and K-12 students to explore the economic and ecological importance of estuaries and learn how estuarine organisms adapt and change as they transition from the ocean to the river. This Needs Assessment will help guide the design of the Estuarium and direct the development of K-12 education programs as they continue to evolve and expand.

Changes in Texas Teaching and Testing Requirements

Beginning in spring 2012, the State of Texas will implement new standardized science tests for grades 5 and 8, and new end-of-course assessments for high school science courses. The new testing program is more rigorous than the previous program and will assess skills at a higher cognitive level. The new science tests will include more open-ended questions than the previous tests. They are designed to assess student readiness for successive K-12 and college science courses, and careers for graduating, non-college bound students. The new standardized tests are designed to measure the revised Texas Essential Knowledge and Skills teaching standards, which were implemented in the 2010 - 2011 school year. The new science teaching standards recommend that "classroom and outdoor investigations" comprise at least 80% of instructional time for kindergarten and 1st grade, at least 60% of time for grades 2 and 3, and at least 50% of time for grades 4 and 5. The teaching standards require that middle and high school science students conduct "laboratory and field investigations" for at least 40% of instructional time. These changes in teaching and testing affect participation in the Reserve's education program. Although participation in Reserve education programs could help students meet the lab and field investigation requirements, teachers must justify to school administrators how these programs can enhance their student's standardized test scores, before they are granted permission to participate. Information gathered in the Needs Assessment will provide guidance for Reserve staff as they work to align K-12 programs to the revised teaching and testing requirements.

Reduced State Education Funding

The Texas Legislature reduced funding for public school districts by $5.3 billion for the 2012-13 biennium, according to the Texas Association of School Administrators (2012). These budget cuts have resulted in extensive teacher layoffs, severe cuts in education programs and services, and larger class sizes. In a study conducted by the Texas American Federation of Teachers (2011), teacher professional development and student field trips ranked among the top targets for reduced funding by school districts. Teachers and school administrators must perceive Reserve K-12 education programs as relevant and important before scarce funds are released for teacher professional development and student field trips. The data collected in this Needs Assessment will direct the development of Reserve education programs that teachers and school administrators perceive as relevant and worth funding.

METHODS

This Needs Assessment targets two populations, K-12 science teachers at schools within the nine counties that make up the watershed of the Reserve and K-12 science teachers who teach outside of the Reserve watershed counties throughout Texas. These two different groups were chosen because Reserve staff wanted to know why local teachers and students made up such a small percentage of MES program participants. Prior to Reserve designation, the MES K-12 education program primarily consisted of annual teacher workshops and marine biology field experiences aboard the Research Vessel KATY. Historically, there was a lower percentage of participation by local teachers and students in these programs than from those located 75 to 250 miles inland of the Reserve. This trend has not been observed in K-12 student programs offered at the Bay Education Center, where most of the participants come from schools within the Reserve's nine watershed counties. Reserve staff were interested in comparing the Needs Assessment responses of teachers within and outside of the nine watershed counties to better understand these differences in participation.

The same Needs Assessment survey instrument was used for both populations of science teachers, to allow direct comparison of the results. The survey was developed by the Reserve Education Coordinator in consultation with the Reserve Education Advisory Committee. The survey included required questions developed by the National Estuarine Research Reserve System and questions designed to reflect local needs that were identified by the Reserve Education Advisory Committee. The questions were designed to gather information on the respondents' teaching environment, subjects taught, delivery methods, professional development preferences, student field trip needs, and knowledge of the Mission-Aransas Reserve and the national reserve system. Incentives to encourage teacher participation in the survey included informing teachers that they would receive a copy of the final Needs Assessment report and that their names would be added to a drawing for either a free field experience aboard the R/V KATY or free field experiences at the Wetlands and Bay Education Centers for their students, depending on the grade level/s they taught. The survey was published via the web-based survey tool, *SurveyMonkey©* and made available to teachers from November 11, 2010 through May 31, 2011.

Near the end of the Needs Assessment posting period, a follow-up questionnaire was developed to gather teacher responses about an assortment of topics, including the race / ethnicity of their students, the need for Continuing Education Units at teacher workshops, and their interest in programs that focus on outdoor education, cultural history, and climate change. The questionnaire link was sent to all of the Needs Assessment survey participants, both within and outside of the Reserve's watershed counties, who provided email addresses. This questionnaire was posted on *SurveyMonkey©* from May 5, 2011 through June 15, 2011.

All data collected in the Needs Assessment survey were downloaded from *SurveyMonkey©* to a Microsoft Excel spreadsheet, sorted by the county in which the respondents taught, and separated into two spreadsheets, based on whether the respondents taught within or outside

of the Reserve's watershed counties. Percentages and other numerical results were calculated for both datasets using Microsoft Excel functions. Data from the follow-up questionnaire were not separated by county because there were few differences found between the two groups in the Needs Assessment. Numerical results from the follow-up questionnaire were calculated within Microsoft Excel spreadsheets or directly by *SurveyMonkey©*. The Needs Assessment survey and follow-up questionnaire are provided in the Appendix.

Teachers within the Reserve's Watershed Counties

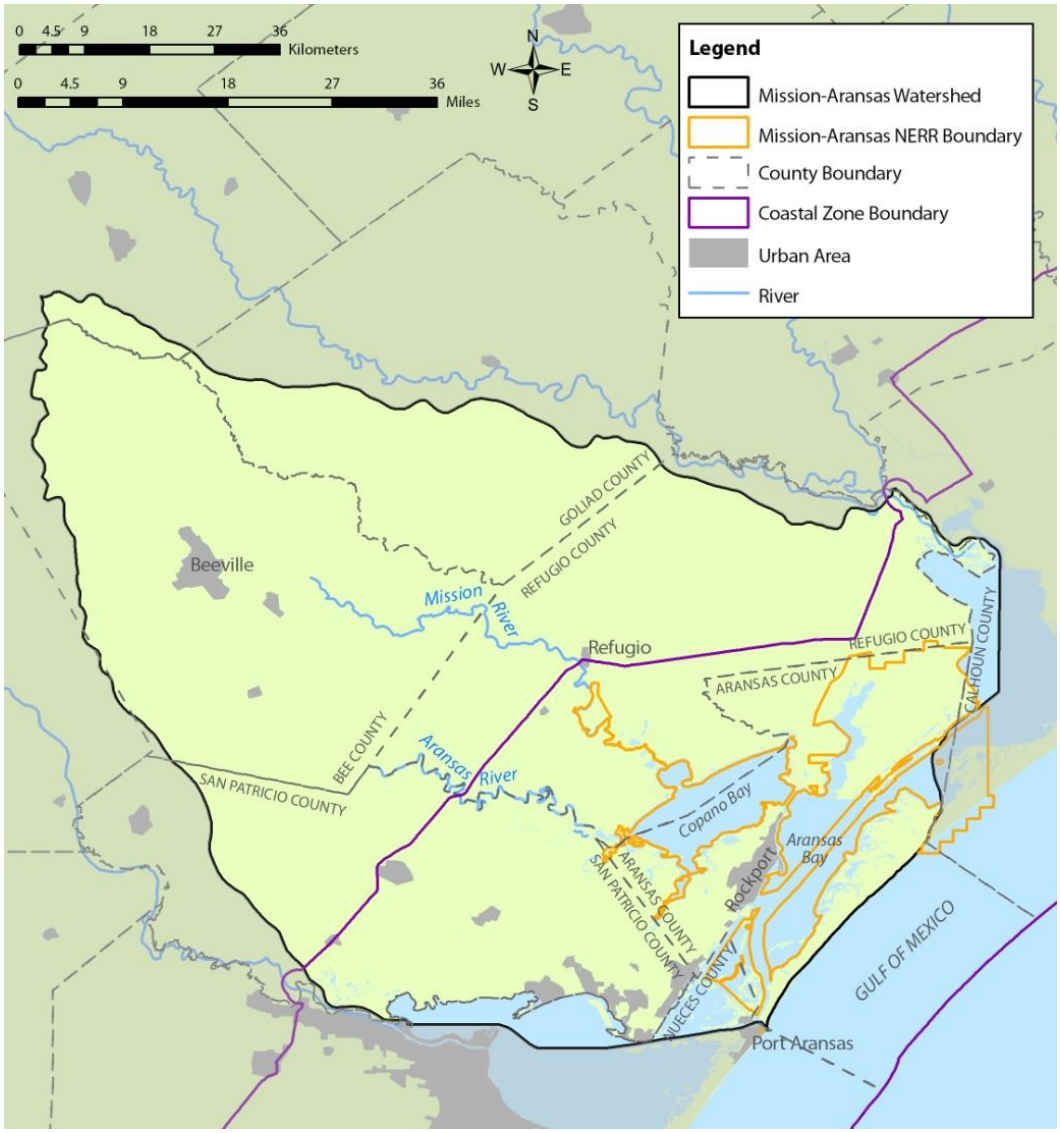
The Reserve has a strong interest in targeting local teachers and students for participation in education programs. It is important that local teachers and students understand the ecological and economic importance of estuaries and coastal resources because local students are likely to become the next generation of local decision makers. Local teachers are in a position to help these students understand the importance of coastal resources. Schools within the Reserve's watershed counties are located within a reasonable distance for teachers to travel for a professional development workshop and for students to travel for a field trip. The nine counties within the Reserve watershed are Aransas, Bee, Calhoun, Goliad, Karnes, Live Oak, Nueces, Refugio, and San Patricio (Figure 1). The teachers and students in these watershed counties live in areas that drain into the Mission-Aransas Estuary, so it is important that they appreciate how their actions impact the Estuary.

Most of the 146 schools within the Reserve's watershed counties are located in small, rural communities, with the notable exception of the urban schools in the Corpus Christi Independent School District, in Nueces County. Ninety-five percent of the schools currently fall under the Title 1 School-wide category, meaning that at least 40% of the student population lives below the poverty level and federally allocated Title 1 funds may be used to serve all students in the school. Student enrollment data collected during the 2010-2011 school year identified 70.1% of the students in the Reserve's watershed counties as Hispanic, 24.0% as white, 3.1% as black or African American, 1.3% as Asian, 1.2% as biracial, 0.3% as American Indian or Alaskan Native, and 0.1% as Native Hawaiian or Pacific Islander.

School districts within the Reserve's watershed counties were identified through the Texas Education Agency's (TEA) online School District Locator and the Texas Association of Private and Parochial Schools (TAPPS) online directory. The TEA School District Locator and the TAPPS online directory provided links to school district and private school websites and contact information for school personnel. Because many Texas school districts block direct email access to teachers, school administrators were contacted to invite teacher participation in the Needs Assessment, in most cases. When possible, Reserve staff worked with science curriculum administrators to invite teacher participation. Smaller school districts and private schools often lack specialized curriculum administrators, so superintendents, assistant superintendents, or principals were contacted in those cases. Invitations were emailed directly to teachers in some very small districts or private schools that did not block email access. School administrators or teachers from each school district and all private schools listed in the TAPPS online directory

that lie within the Reserve's watershed counties were invited to participate in this Needs Assessment.

Figure 1. **Map showing the Mission-Aransas Reserve's Watershed**



Teachers outside of the Reserve's Watershed Counties

Teachers outside of the Reserve's watershed counties were invited to participate in the Needs Assessment, while in attendance at the November 2011, Texas Conference for the Advancement of Science Teaching (Conference) in Houston, or through direct email invitation. Thousands of K-12 science teachers attend the Conference each year, so it provided an

opportunity for the Reserve Education Coordinator to interact personally with teachers and encourage them to participate in the Needs Assessment. The Reserve hosted an exhibit hall booth at the Conference that displayed interpretive panels on the Mission-Aransas Reserve and national reserve system. A poster announcing the opportunity to participate in the Needs Assessment and the potential prizes that teachers could win were also displayed at the booth. Three laptop computers were present at the booth and connected to the online Needs Assessment survey on SurveyMonkey©. The Reserve Education Coordinator invited Conference attendees who passed the booth to fill out the online survey. Attendees who accepted the invitation filled out the Needs Assessment survey and submitted their responses to SurveyMonkey© before leaving the booth.

Other teachers outside of the Reserve's watershed counties were invited to participate in the Needs Assessment directly, via email. Most of the teachers and students who participate in MES K-12 programs (primarily field experiences aboard the R/V KATY) come from schools located 75 to 250 miles inland of the Reserve. MES staff keep email addresses for these teachers, so they were emailed directly and invited to participate in the Needs Assessment.

RESULTS

Needs Assessment Survey Results

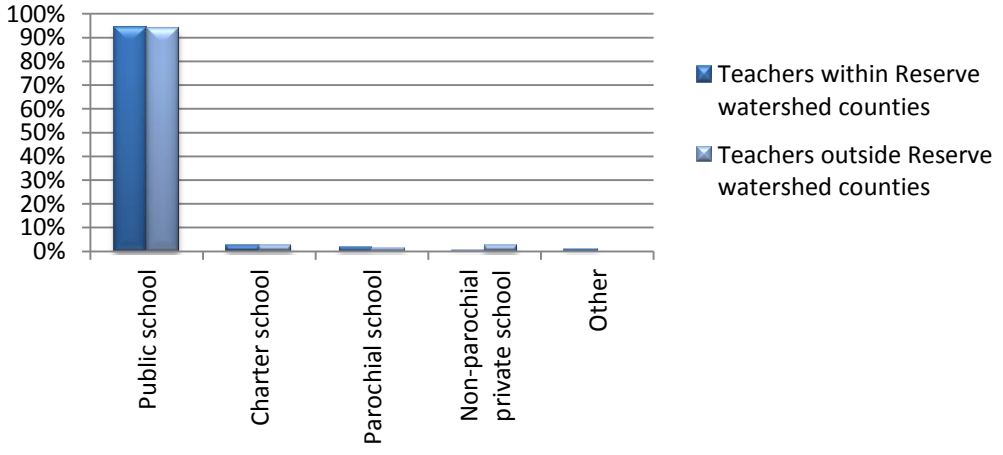
The online Needs Assessment survey was completed by 314 total teachers. Two hundred and thirty-three teachers within and 81 teachers outside of the Reserve's watershed counties participated in the survey. The results presented in the following subsections include comparisons between teachers who taught within and outside of the Reserve's watershed counties, open-ended responses in the "other" category that could not be summarized graphically, and graphical summaries of numerical results.

Numerical results are presented as percentages of respondents who selected a particular category. The percentages do not sum to 100 in cases where respondents were asked to select all answers that applied to their teaching situation. For example, one survey question asked teachers to select each grade level that they taught. These results are presented in Figure 4, below. Each entry in Figure 4 represents the percentage of teachers who taught that grade, but the percentages do not sum to 100, because many teachers taught multiple grades. In cases where only one selection was requested from respondents the percentages do sum to 100.

Educational Settings of Teachers

Respondents within and outside of the Reserve's watershed counties taught in very similar settings (Figure 2). Over 93% of the respondents from both groups identified themselves as public school teachers. Less than 5% of the teachers in each group taught at charter, parochial, or non-parochial private schools. Two teachers from within the Reserve's watershed responded in the open-ended category. One of these respondents indicated that they taught in a disciplinary alternative school and the other taught in a home school setting.

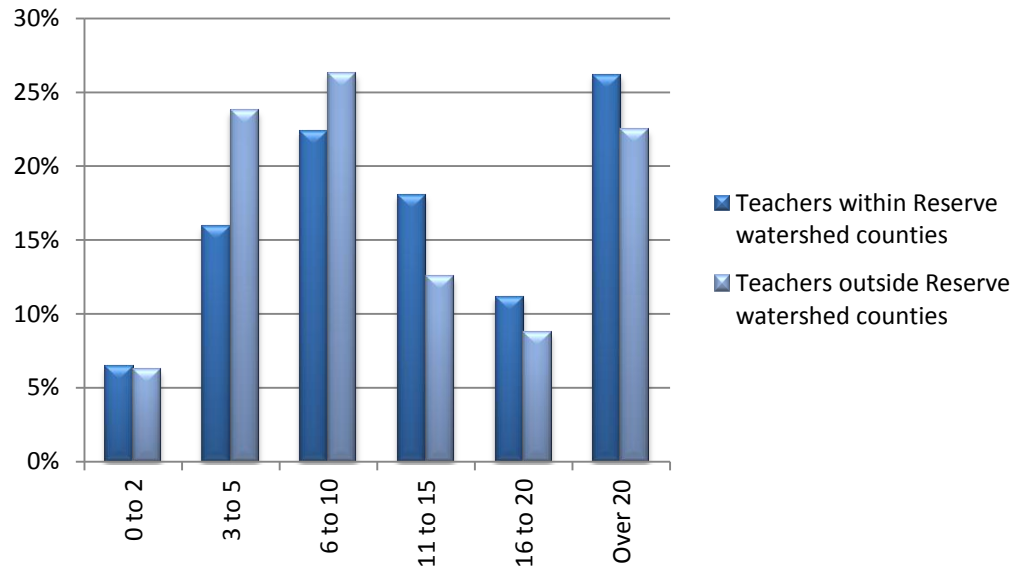
Figure 2. **Educational Settings of Teachers**



Teaching Experience

Respondents from within the Reserve watershed counties had more years of teaching experience than those from outside the watershed counties (Figure 3). Most respondents from both within and outside of the watershed counties indicated that they had over three years of teaching experience. However, the highest percentage of teachers within the watershed counties responded that they had taught over 20 years and 55% had at least 11 years of teaching experience. The highest percentage of teachers outside the watershed counties indicated that they had taught 6 to 10 years and only 44% indicated that they had taught at least 11 years.

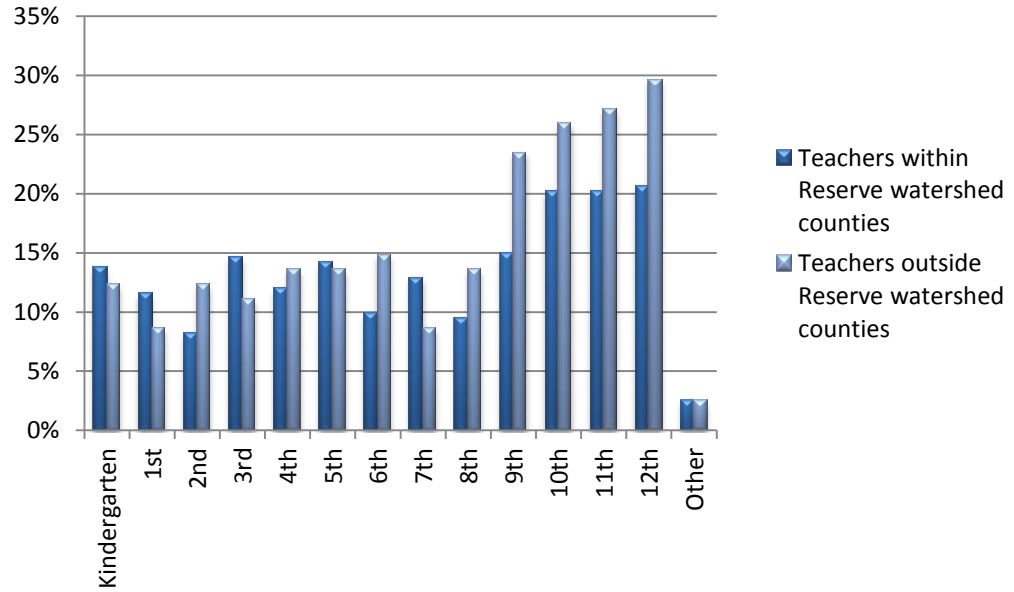
Figure 3. **Years of Teaching Experience**



Grade Levels Taught

The grades levels taught by respondents both inside and outside of the Reserve's watershed counties show generally similar trends (Figure 4). The highest percentages of respondents in both groups taught 9th or higher grade levels. However, the percentages of respondents who taught high school were greater for teachers outside of the watershed counties than for those within. Two teachers from within the watershed counties indicated that they taught "undergraduates" and "college pre-service teachers," in addition to their K-12 responsibilities, and one teacher in this group was a "K-4th Curriculum Coordinator." Teachers outside of the watershed counties who responded in the open-ended category include one "K-5 Instructional Specialist" and one "Science Coordinator."

Figure 4. **Grade Levels Taught**

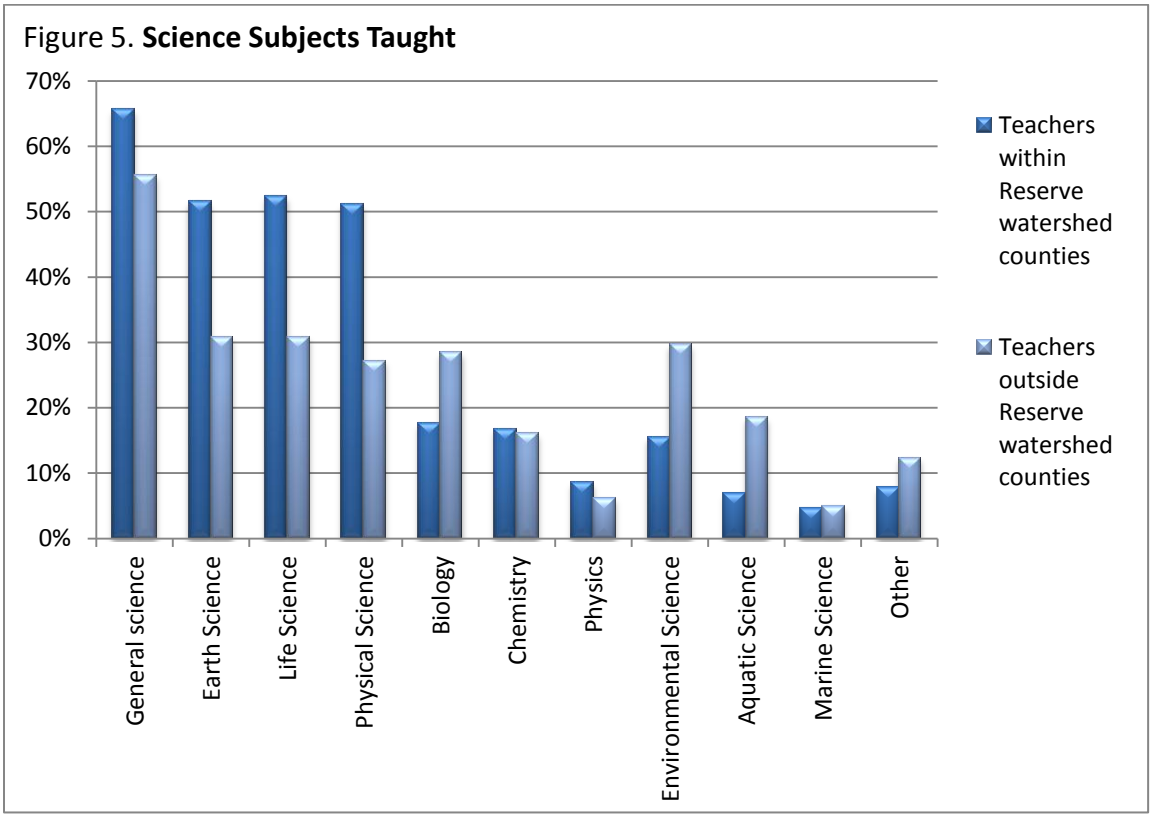


Science Subjects Taught

A considerably higher percentage of teachers from within the watershed counties identified themselves as Life, Earth, and Physical Science teachers than those from outside (Figure 5). Historically, Life, Earth, and Physical Science courses were taught at the 7th, 8th, and 9th grade levels, respectively, in Texas public schools. The names of some of these courses have changed, but science curricula still focus on life, earth, and physical sciences in grades 7, 8, and 9. Higher percentages of respondents from outside the watershed counties identified themselves as Biology, Environmental Science, Aquatic Science, and Marine Science teachers than those from inside. This result is interesting because these are the subjects most often targeted in Reserve education programs. The highest percentages of respondents in both groups taught general science, reflecting science teaching at the K-6th grade level.

Open-ended responses relative to other subjects taught within the watershed counties included the following subject names and numbers of entries: Anatomy and Physiology (4), Geography (1), Astronomy (1), Principles of Technology (1). Teachers outside of the watershed counties entered Earth-Space Science (1), Anatomy and Physiology (2), Astronomy (2), and Integrated Physics and Chemistry (1), in the open-ended category.

Figure 5. **Science Subjects Taught**

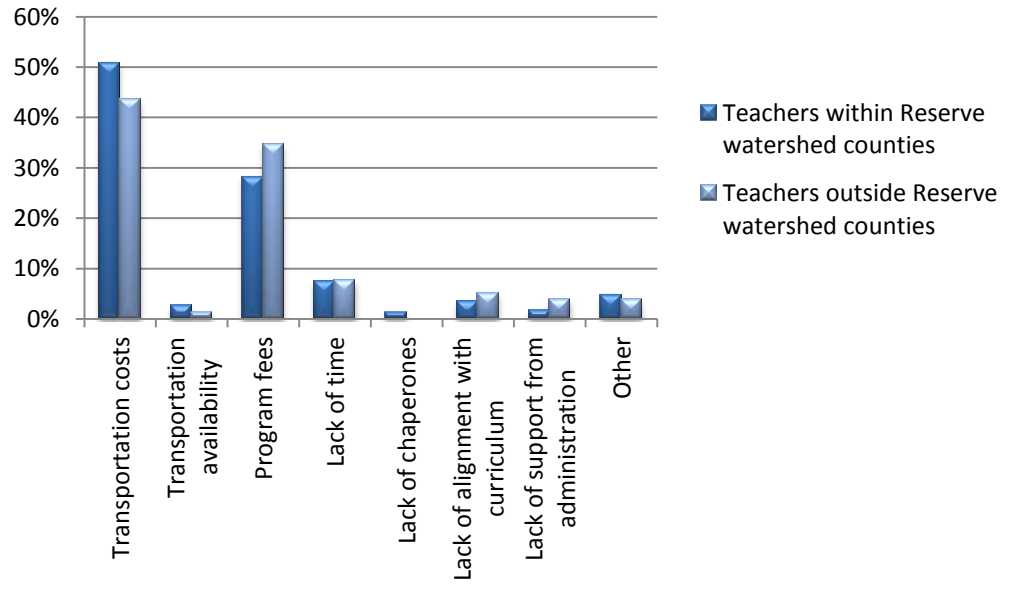


Student Field Trips

When asked whether or not they took their students on field trips, 64% of teachers within and 69% of teachers outside the Reserve watershed counties responded that they did; 36% and 31%, respectively, indicated that they did not take their students on field trips (Figure 6). Respondents both within and outside of the Reserve watershed counties identified the same three top barriers to taking their students on field trips. Transportation costs were the greatest obstacle, followed by program fees, and the third greatest barrier was lack of time. One teacher from within the Reserve's watershed counties indicated that there was limited time for field trips due to the time spent preparing students for standardized tests. Teachers from outside the watershed counties did not identify any barriers other than the choices provided, but other responses relative to field trip obstacles from teachers within the watershed counties included:

- "seat belt/car seat regulations"
- "many science field trips do not include kindergarten level activities"
- "lack of field trip opportunity to support student load"
- "size of whole 6th grade is too big for most trips"
- "geographic proximity"
- "only 1 field trip a year"
- "lack of good educational options"
- "problems getting sub [substitute teachers]"
- "lack of approved places to go"
- "young ages make it difficult to travel far (RR [restroom] breaks needed, charter bus sanitary conditions are questionable)"

Figure 6. **Greatest Obstacles to Field Trips**



Seventy or more percent of respondents, from both within and outside of the Reserve watershed counties, identified *interdependence between organisms and environments* and *human impact on the environment* as field trip topics of greatest interest (Figure 7). Given that the latter topic was of great interest, it is somewhat curious that teachers within the watershed counties identified *climate change* as their field trip topic of least interest and teachers outside of the watershed counties identified this topic as second to last in terms of interest. This topic was addressed again in the follow-up questionnaire and the findings are reported in the following questionnaire section. Open-ended responses relative to field trip topics are listed below.

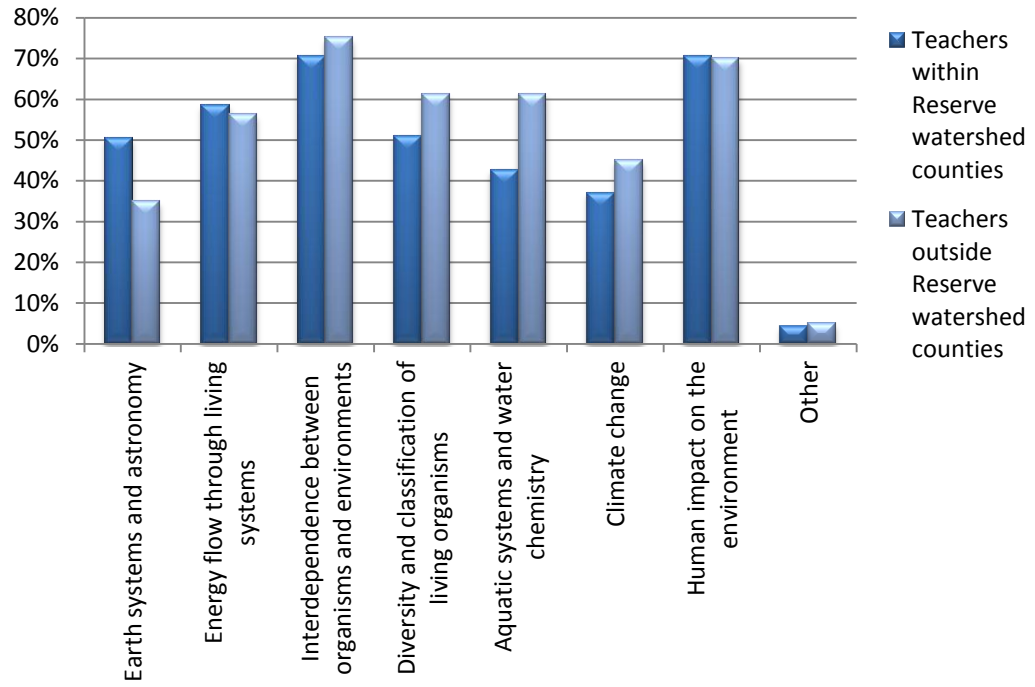
Open-ended responses from teachers within the watershed counties:

- “physical forces at work in nature”
- “agriculture and horticulture”
- “the physics of hydraulics and propulsion”
- “natural resources”
- “systems engineering and design”
- “I focus our field trips on Earth Science since it is the lowest performing objective on the science TAKS at 5th grade and the hardest for most students to grasp, given the "time" it takes change to occur and the lack of physical examples locally i.e. aquifers, layers of rock and time”
- “watersheds”
- “physics trip to Fiesta Texas”

Open-ended responses from teachers outside of the watershed counties:

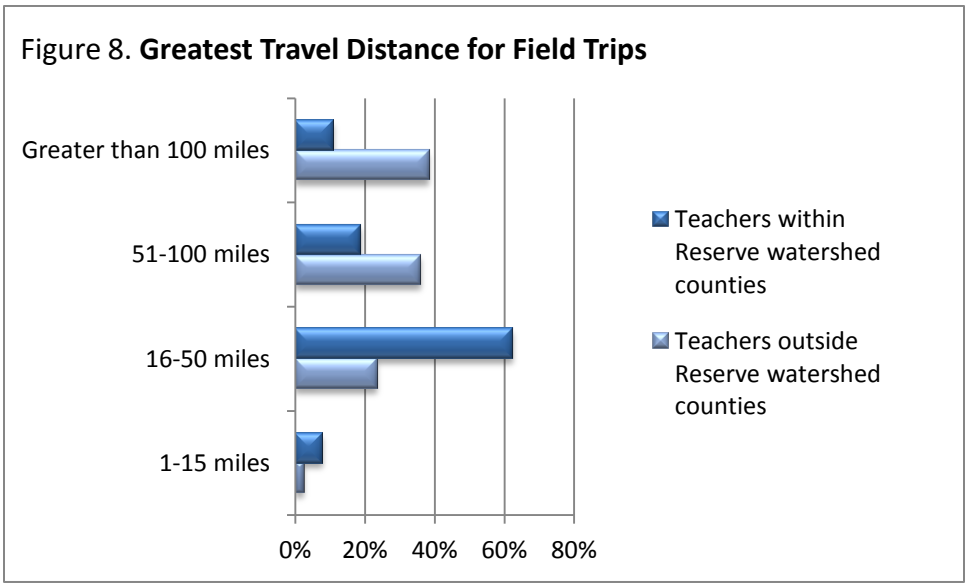
- “chemistry in the environment”
- “environmental pollutions”
- “wetlands”

Figure 7. **Field Trip Topics of Greatest Interest to Teachers**



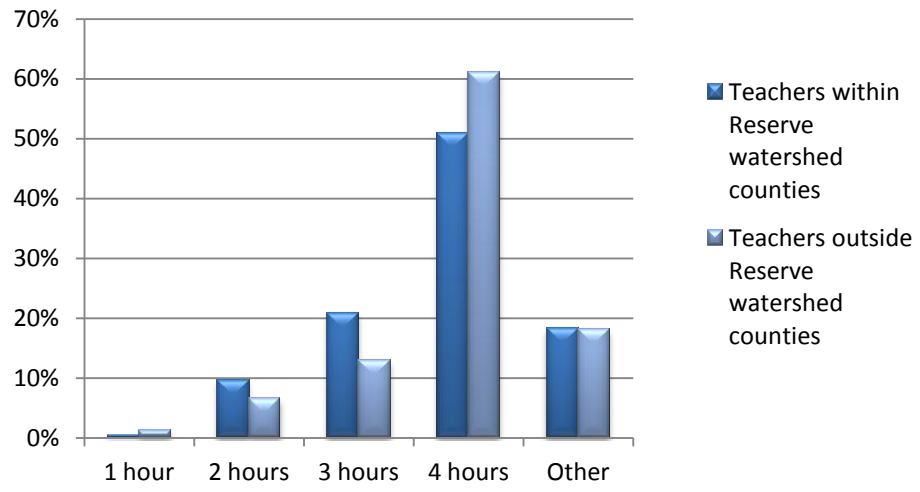
Respondents outside of the Reserve watershed counties were willing to travel greater distances to participate in field trips. 74% of these teachers were willing to travel over 50 miles for a field trip, compared to only 30% of teachers from within the watershed counties (Figure 8).

Figure 8. **Greatest Travel Distance for Field Trips**



Most teachers, both within and outside of the watershed counties, were willing to allot up to 4 hours for a field trip, excluding travel time (Figure 9). In the open-ended category, several respondents from both groups indicated that the amount of time they could spend on a field trip depended on the distance travelled, because school buses must return by mid-afternoon in order to take students home. Often these respondents used the phrase “all day” or “all class day” to describe the time they could allot to a field trip. One respondent from within the watershed counties indicated that more time for field trips was possible after the standardized testing that occurs in mid-April. None of the teachers from within the watershed counties indicated that they could take their students on an overnight field trip, but four teachers from outside the watershed counties indicated that they could do so.

Figure 9. **Greatest Time Allotment for Field Trips**

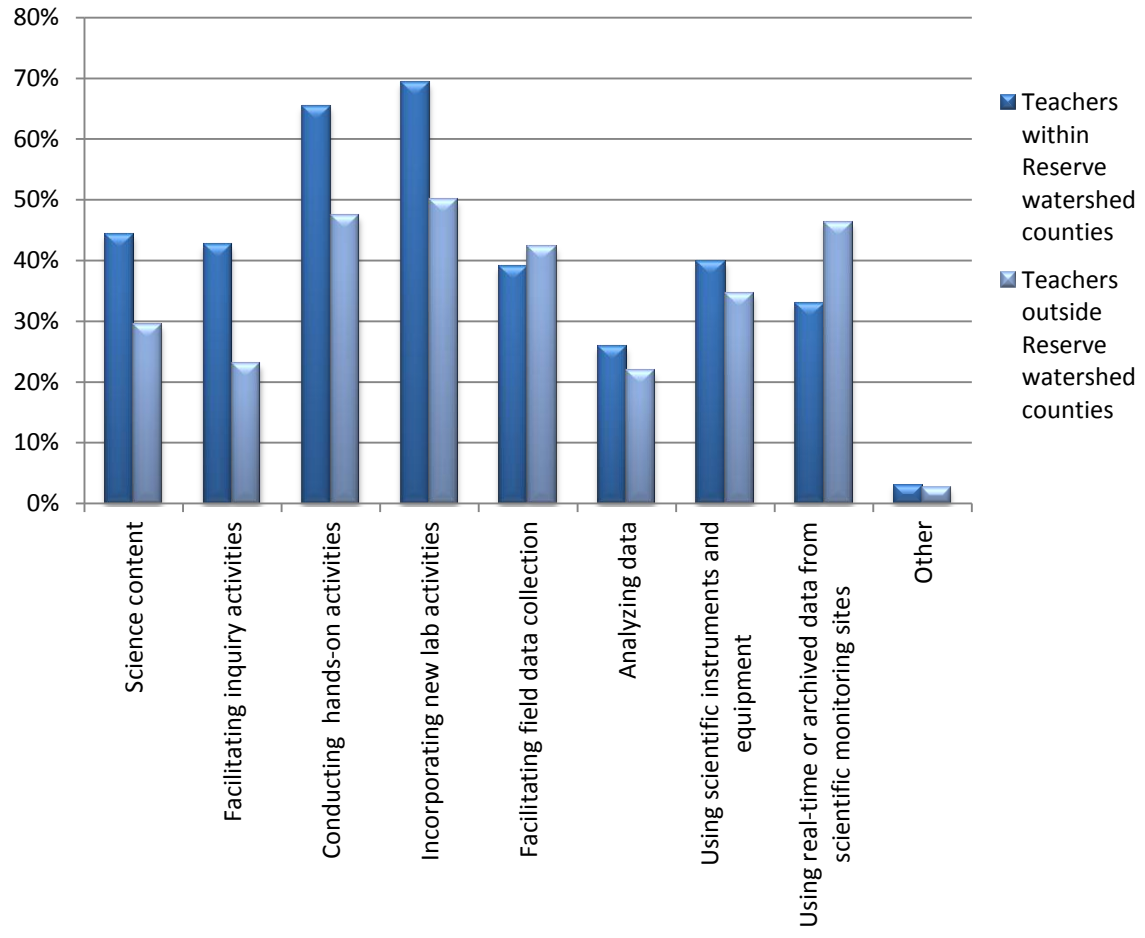


Professional Development

Respondents both within and outside of the watershed counties selected *incorporating new lab activities* and *conducting hands-on activities* as their first and second greatest needs for professional development training, respectively (Figure 10). Teachers outside of the watershed counties identified *using real-time or archived data from scientific monitoring sites,* as a close third. This latter need was identified as second to the last of the eight choices, by respondents within the watershed counties.

Open-ended responses relative to professional development needs from teachers within the watershed counties included, “questioning strategies,“ “benchmark test bank questions, how-to and assessment,” “lesson plan development,” and “practical tips for interdisciplinary classroom.” The sole respondent in the open-ended category from outside the watershed counties wrote, “I'm always looking to learn new things I can take back to my classroom.”

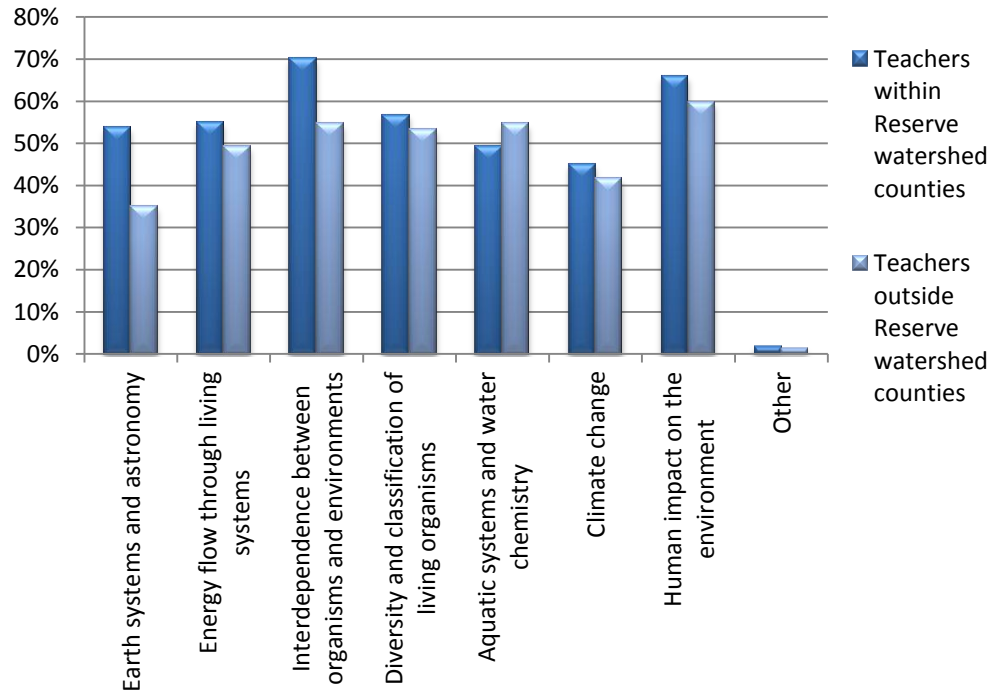
Figure 10. **Teacher Professional Development Training Needed**



The results for content of interest for professional development trainings are similar to those seen for topics of interest for field trips. *Interdependence between organisms and environments* and *human impact on the environment* were selected by respondents within the watershed counties as content of first and second greatest interest, respectively (Figure 11). Respondents from outside the watershed counties identified *human impact on the environment* as their content of greatest interest and *interdependence between organisms and environments* tied with *aquatic systems and water chemistry* for their second greatest interest. Respondents within the watershed counties identified *climate change* as their professional development topic of least interest and teachers outside of the watershed counties identified this topic as second to last in terms of interest.

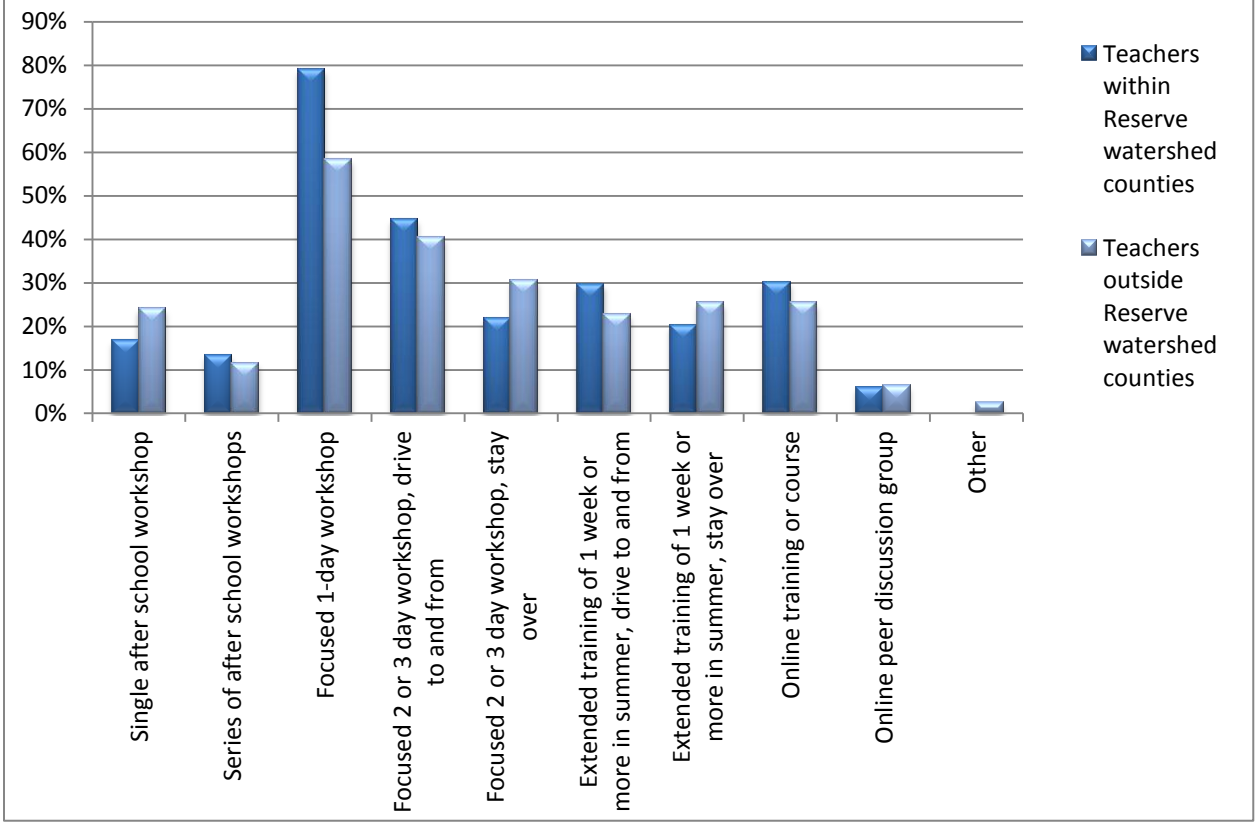
Open-ended responses relative to professional development content from teachers within the watershed counties included, "chemistry and physics," and "systems engineering and design." "Alternative energy" was the only open-ended response in this category from respondents outside of the watershed counties.

Figure 11. **Content of Interest for Professional Development Trainings**



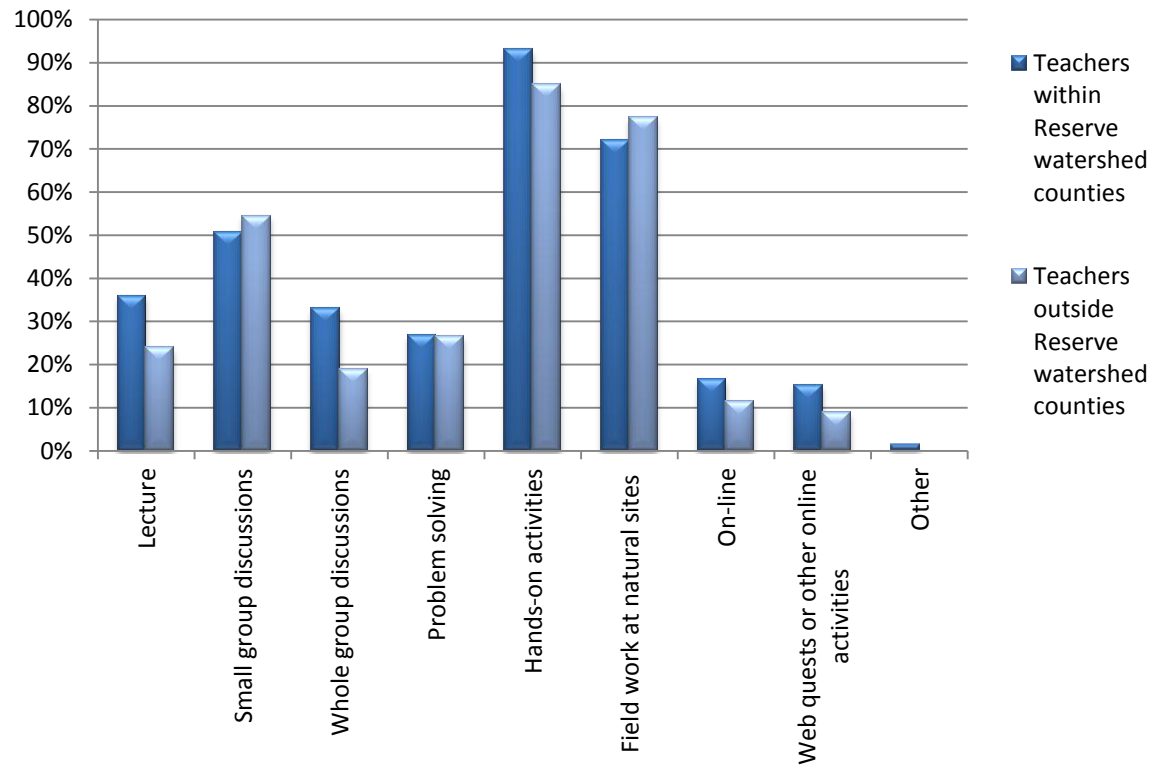
Respondents both within and outside of the watershed counties selected *focused 1-day workshops* and *focused 2 or 3 day workshops* that they would drive to and from, as their first and second preferred formats for professional development, respectively (Figure 12). The least desired formats for both groups of respondents were *online peer discussion groups* and a *series of afterschool workshops*. The only open-ended entries came from respondents outside of the watershed counties and they included, "can do any as long as they are in the summer" and "Saturday."

Figure 12. **Preferred Professional Development Formats**



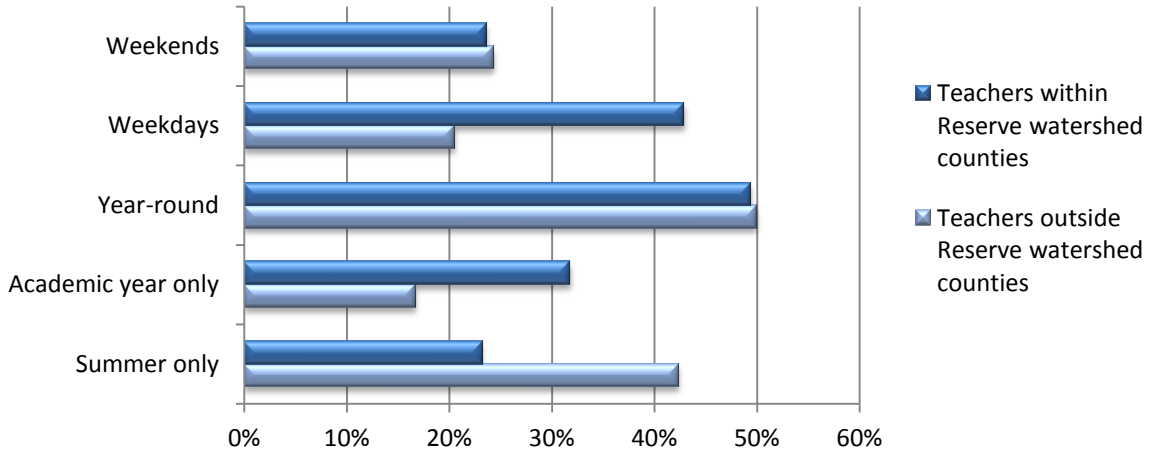
Respondents both within and outside of the watershed counties selected *hands-on activities* and *field work at natural sites*, as their first and second preferred delivery methods for professional development, respectively (Figure 13). A larger percentage of respondents from both groups prefer *small group discussions* over *whole group discussions.* The least preferred delivery methods for both groups are online trainings. The only open-ended entries came from respondents inside of the watershed counties. These teachers wrote, “opportunities where you can see how the content is being taught” and “scaffolded delivery--teach us, help us, have us try it with help, etc.”

Figure 13. **Preferred Professional Development Delivery Methods**



Although over 49% of teachers in both groups indicated that they preferred *year-round* professional development opportunities, almost twice as many teachers from outside the watershed counties preferred *summer only* opportunities (Figure 14). Almost twice as many teachers from within the watershed counties preferred *weekday* and *academic year only* opportunities, when compared to their outside the watershed counterparts.

Figure 14. **Preferred Time for Professional Development**



High registration fees stood out as the most important factor affecting professional development attendance for respondents within and outside of the watershed counties (Figure 15). *Travel and / or transportation constraints* were identified as the second most important factor for both groups. The least important factor for both groups was *lack of support from administration.* Open-ended responses relative to professional development attendance are listed below.

Open-ended responses from teachers within the watershed counties:

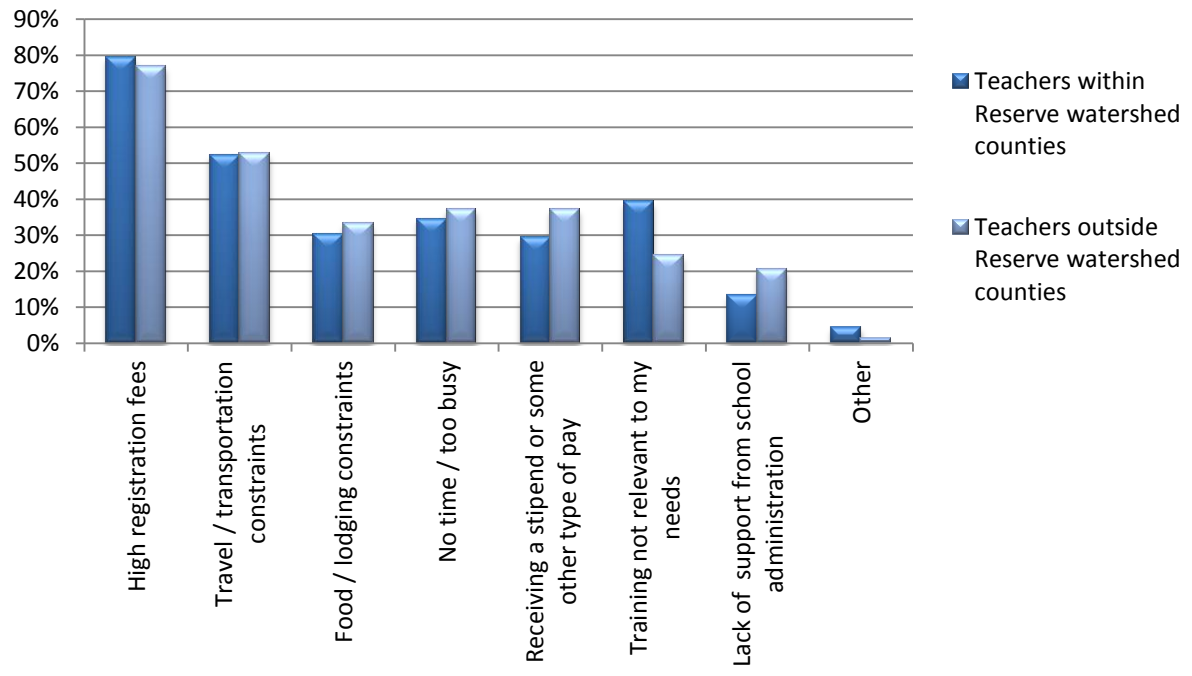
- "we have no funds to pay substitutes"
- "health concerns due to long absence from home/special diet"
- "conflict with kids / spouse schedule"
- "I am a single mother so time away from home is a problem"
- "monies for substitutes"
- "time the info is presented: if I am going to learn something that will benefit my classroom teaching I do not prefer to learn it in the middle of the year - I prefer at the very beginning or at the very end when I can implement it"
- "getting substitutes"
- "district budget constraints"

- "this year, we had to be out for a lot of curriculum days, which means I cannot be out any more days than absolutely necessary"

Open-ended responses from teachers outside of the watershed counties:

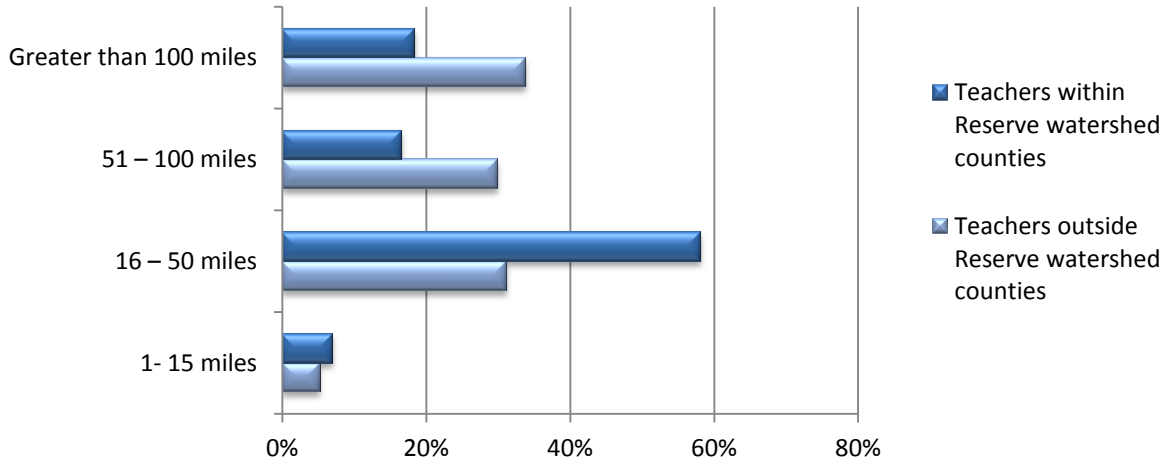
- "no budget for substitute teachers"

Figure 15. **Factors Affecting Professional Development Attendance**



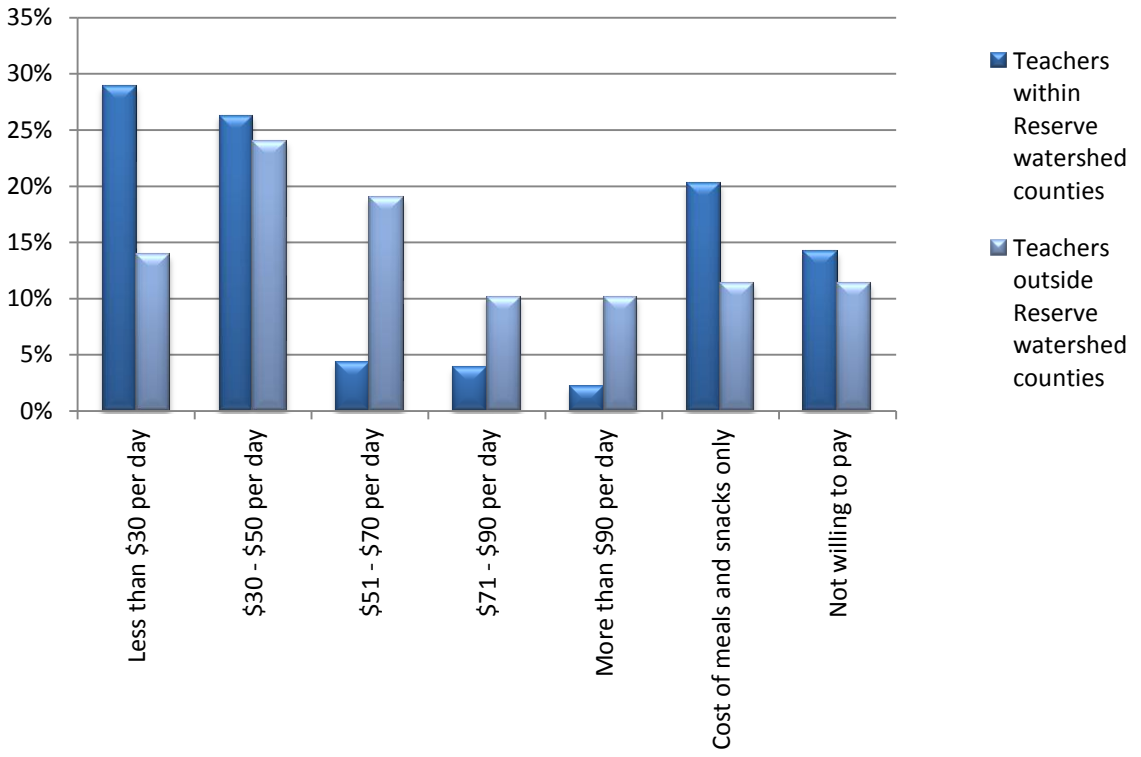
The results for the greatest distance that respondents were willing to travel for professional development trainings parallel those seen for field trip travel distance (Figure 16). Respondents outside of the Reserve watershed counties were willing to travel greater distances to participate in professional development. Sixty-four percent of these teachers were willing to travel over 50 miles for professional development training, compared to only 35% of teachers from within the watershed counties.

Figure 16. **Greatest Travel Distance for ProfessionaL Development**



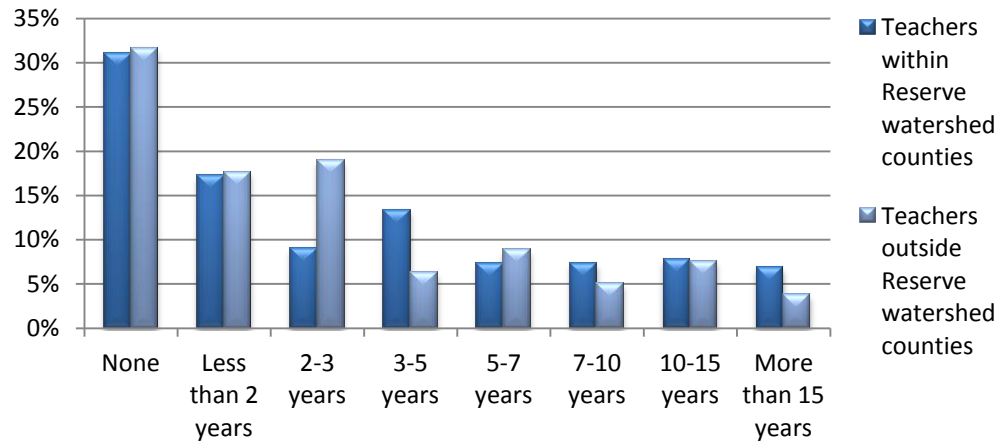
Respondents from outside of the watershed counties were willing to pay more for professional development (Figure 17). Sixty-three percent of respondents outside of the Reserve watershed counties were willing to pay $30 or more for a professional development workshop, compared to only 37% of teachers from within the watershed counties.

Figure 17. **Amount Teachers Would Pay for Professional Development**



When asked to select the number of years that they have taught about estuaries, watersheds, and coastal topics, most respondents from within and outside the watershed counties selected *none* (Figure 18). However, 69% of teachers within and 68% outside of the watershed counties have taught these topics for at least some amount of time. Most respondents within the watershed counties, who had taught these topics, selected *less than two years* and most respondents outside the watershed counties selected *2-3 years* of teaching them.

Figure 18. **Years of Teaching about Estuaries, Watersheds, and Coastal Topics**



More respondents from both within and outside of the watershed counties had participated in *Project WILD Aquatic* and *Project WET* than any other estuary, watershed, or coastal related professional development training (Figure 19). Less than five percent of respondents from either group had participated in a *NOAA/NERRS Teachers on the Estuary* training.

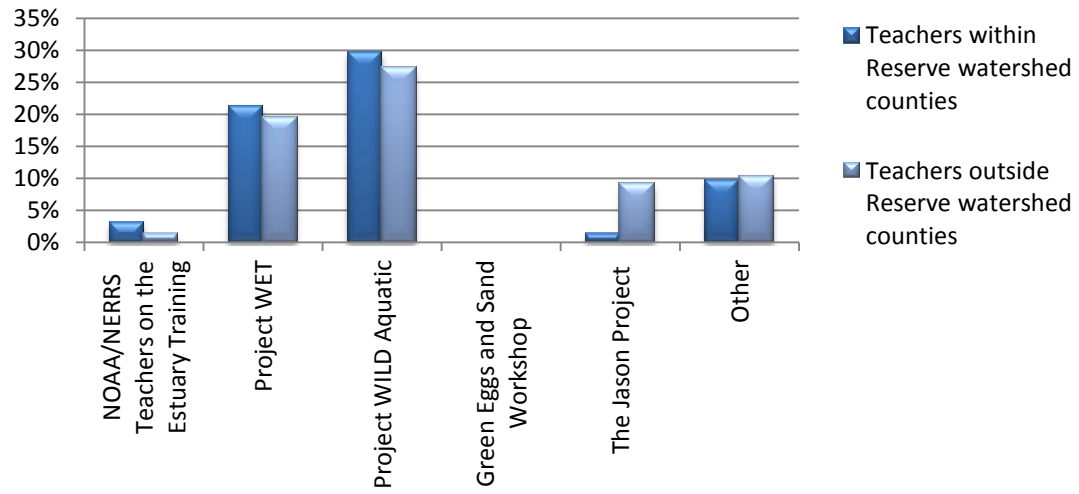
Open-ended entries from teachers within the watershed counties included the following professional development trainings and the number of times they were listed, if they were listed more than once:

- "Coastal Bend Bays and Estuaries Program" [listed 7 times]
- "Teaching Environmental Science I & II (TAMU-CC)"
- "Artist Boat"
- "NOAA GPS, TAMU-CS Water Quality, Texas Stream Team Water Quality Monitoring"
- "there was also another Project Wild I took ... can't recall it"
- "Teaching Environmental Science II, Conservation Across Boundaries"
- "Adopt-A-Wetlands"
- "Project Learning Tree"
- "Science Collaborative Trainings, GLOBE program"
- "various Texas State Aquarium workshops"

Open-ended entries from teachers outside of the watershed counties included the following professional development trainings:

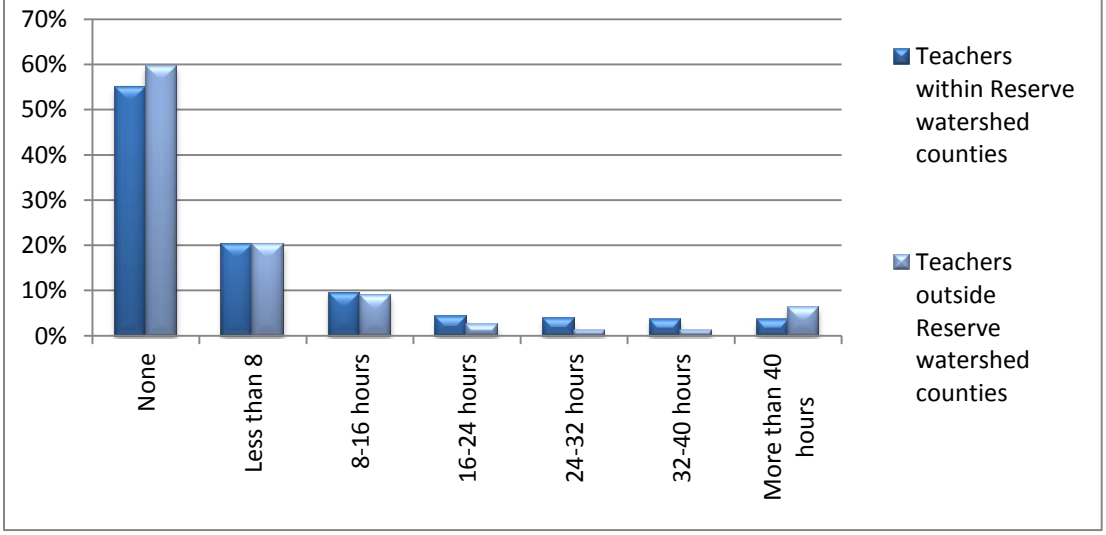
- "Exploring the Biodiversity of the Coral Reef, Project Wild (in Maryland - Chesapeake Bay: focus)"
- "Wet In the City"
- "Artist Boat"
- "Texas A&M of Corpus Christi University Estuary Program"
- "NSF GK-12 Program"
- "Texas Marine Educators Association"

Figure 19. **Professional Development Trainings Taken by Teachers**



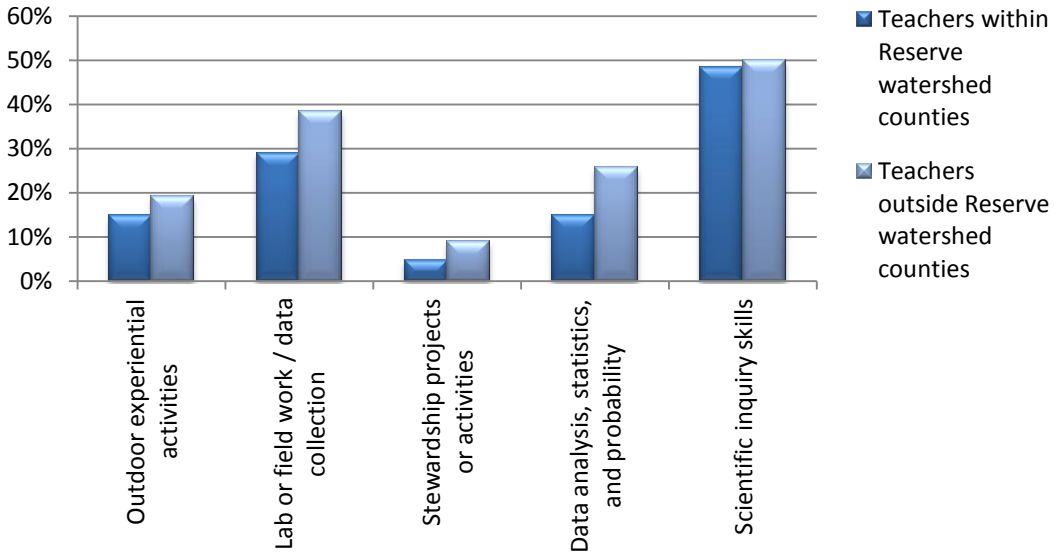
Over 55% of teachers from within and outside of the watershed counties indicated that they had received no continuing education hours in estuarine science within the last three years (Figure 20). Twenty percent of teachers from both groups responded that they had received *less than 8* hours, leaving a very small percentage in each group who had received eight or more hours of continuing education in estuarine science over the last few years.

Figure 20. **Continuing Education Hours Received by Teachers in Estuarine Science within Last Three Years**



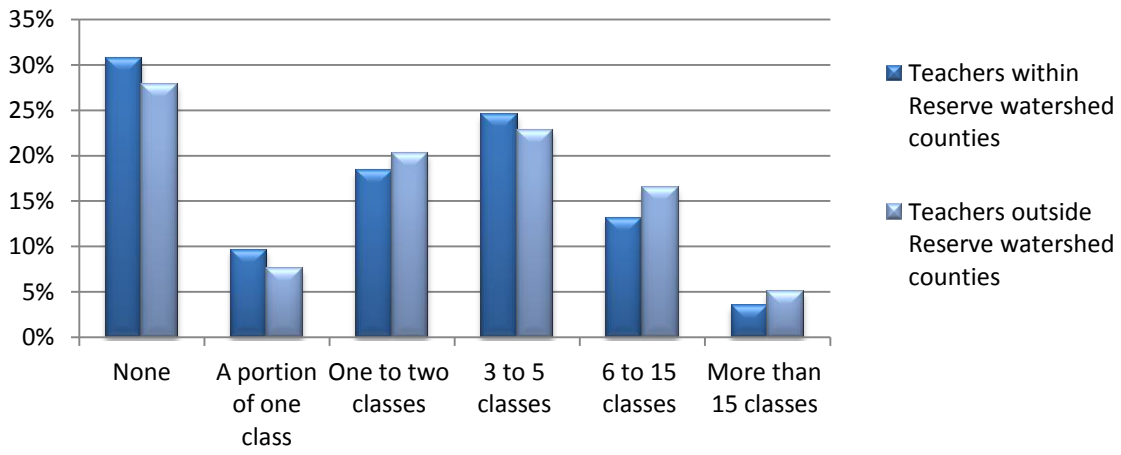
Most teachers from within and outside the watershed counties selected *scientific inquiry skills* when asked which methods and skills they emphasize most in their teaching (Figure 21). *Stewardship projects or activities* were emphasized least by both groups.

Figure 21. **Teaching Methods and Skills Most Emphasized by Teachers**



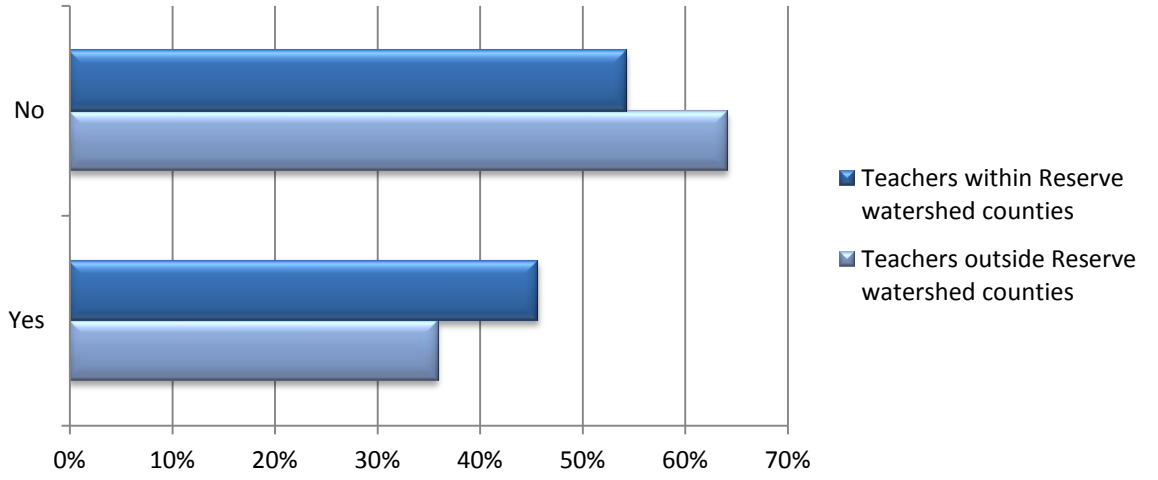
Most respondents from within and outside the watershed counties selected *none* when asked to select the number of class periods devoted to estuary, watershed, and coastal topics (Figure 22). However, 69% of teachers within and 72% of teachers outside of the watershed counties indicated that they have devoted at least a portion of one class period to these topics. The majority of respondents in both groups, who taught these topics, devoted 3 to 5 class periods to them.

Figure 22. **Number of Class Periods per Year Devoted to Estuary, Watershed, and Coastal Topics**



When asked if they were aware of the presence of the Mission-Aransas National Estuarine Research Reserve, 54% of respondents within and 64% of respondents outside of the watershed counties indicated that they were not aware of its presence (Figure 23).

Figure 23. **Awareness of Mission-Aransas Reserve Presence among Teachers**



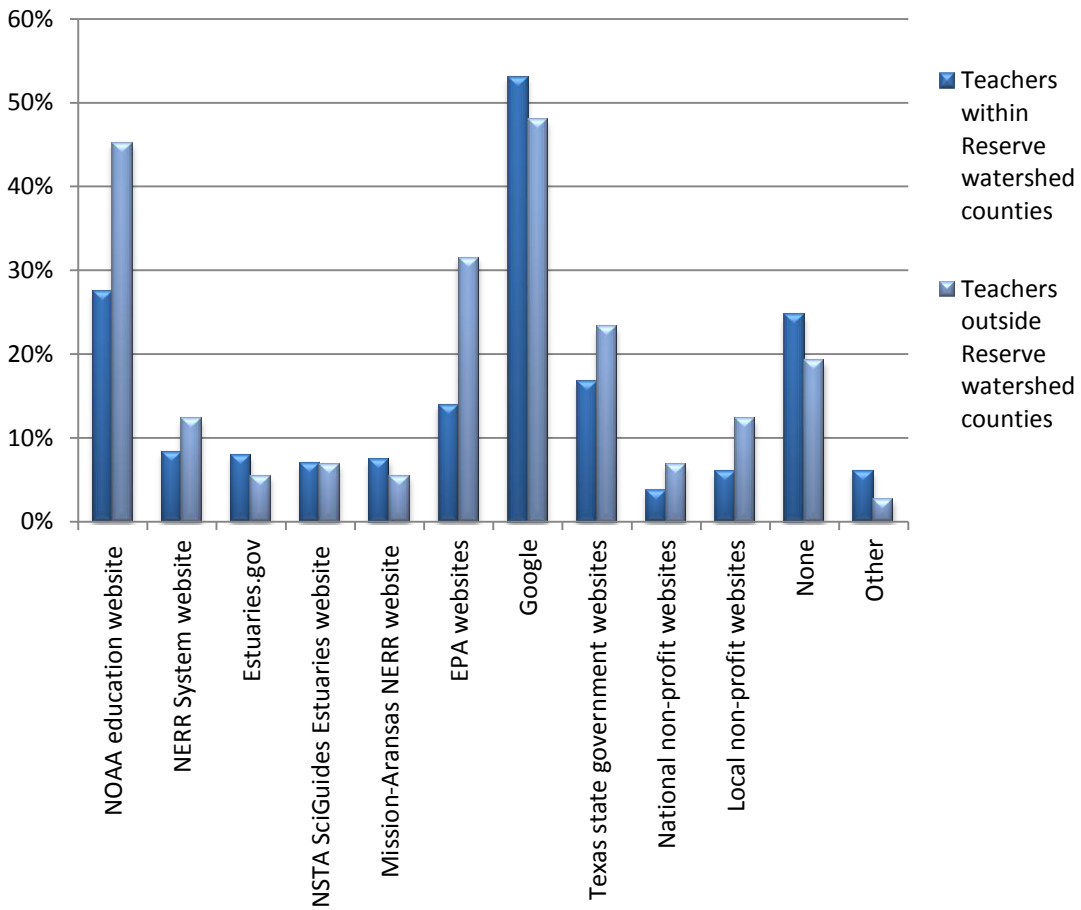
Teachers from within and outside of the watershed counties selected *Google* and the *NOAA education website* as the first and second most used web resources for estuary, watershed, and coastal information, respectively (Figure 24).

Open-ended entries from teachers within the watershed counties included the following websites and the number of times they were listed, if they were listed more than once:

- "Mission-Aransas National Estuarine Research Reserve"
- "GBRA" [Note: this unknown acronym may refer to the Guadalupe-Blanco River Authority]
- "welderwildlife.org"
- "Coastal Bend Bays and Estuaries Program" [listed 6 times]
- "Gulf of Mexico Foundation"
- "Marine Advanced Technology Education"
- "Coastal Bend Bays Foundation"
- "The Center for Innovation in Engineering and Science Education"

One respondent from outside of the watershed counties listed the "Edwards Aquifer Authority" as the only web resource entered in the open-ended category.

Figure 24. **Web Resources Used by Teachers for Estuary, Watershed, and Coastal Information**



When asked how often respondents used real-time or near real-time data streams in their teaching most teachers from within and outside of the watershed counties selected *never* (Table 1). Real- or near real-time *air temperature* and *water temperature* data were most often used by both groups of teachers. Respondents from outside the watershed counties indicated that they used *water quality* and *nutrient* data more often than other data streams, but not as frequently as air and water temperature.

Table 1. **Use of Real-Time or Near Real-Time Data Streams by Teachers**

	Within Reserve Watershed Counties				Outside Reserve Watershed Counties			
Data Streams	**Never (%)**	**Seldom (%)**	**Occasionally (%)**	**Often (%)**	**Never (%)**	**Seldom (%)**	**Occasionally (%)**	**Often (%)**
Algal blooms	84	6	5	1	77	7	15	1
Bathymetry/ topography	81	8	5	1	66	19	10	4
Currents	67	13	16	1	57	16	22	4
Directional wave spectra	84	6	3	1	78	10	8	1
Dissolved oxygen (DO)	78	8	8	1	64	18	10	7
Fish species & abundance	62	13	18	1	53	16	27	4
Ice concentration	77	13	5	0	64	16	18	1
Nutrients	67	15	12	2	47	20	22	10
Ocean color	75	11	9	1	65	19	14	1
Optical properties	84	5	5	1	81	11	7	0
pH	73	10	10	2	61	18	10	12
River discharge	73	14	9	1	58	16	18	5
Salinity	64	17	12	2	58	12	20	10
Sea level	67	19	9	1	51	23	16	7
Seafood contaminants	73	13	9	2	64	19	15	1
Air temperature	35	24	32	7	35	12	35	18
Water temperature	43	23	26	5	35	15	32	16
Turbidity	72	10	9	4	54	22	12	8
Vector currents	84	6	4	1	76	14	8	0
Water depth	72	12	9	2	51	26	16	4
Water contaminants	58	22	14	4	51	18	20	7
Water quality	58	21	14	4	42	20	20	11
Waves	60	17	16	3	50	15	20	8
Wind vector	77	8	8	1	64	14	15	3
Zooplankton species	76	7	10	1	62	19	8	5

Follow-up Questionnaire Results

The follow-up questionnaire was developed to collect specific "required data" that must be included in the Needs Assessment final report to the Estuarine Research Division. These data include information on outdoor education, student race / ethnicity and language needs, interest in student field experiences that integrate history and culture, need for Continuing Education Units in professional development, desire for professional development in computer visualizations of scientific data, and interest in including the effects of climate change on coastal areas in curricula. The questionnaire was emailed to the 181 Needs Assessment respondents who supplied their email addresses. Fifty-nine teachers completed the questionnaire, yielding a response return rate of 33%. Eighty-one percent of the respondents were from within the Reserve watershed counties.

Outdoor Education

Respondents were asked about the inclusion of outdoor education in their current curricula and their desire to incorporate more outdoor education activities. Eighty-one percent responded that they had included outdoor education in their teaching within the past two years and 93% indicated that they would like to add more outdoor education activities. When asked what help they needed in order to do so, the most frequent response was extra funding. Respondents identified field trip transportation, substitute teacher salaries, and other field trip related expenses as their primary funding needs. Other outdoor education related needs, listed in order of descending response frequency included: supplies and equipment; appropriate activities and lessons, especially those aligned to state teaching standards; time for planning and conducting field trips; assistance with directing activities and monitoring students; and curriculum resources and training.

Student Race / Ethnicity and Language Needs

When respondents characterized their students by racial /ethnic group, the results were similar to the percentages given in the student enrollment data collected during the 2010-2011 school year for students in the Reserve's watershed counties. This similarity is reasonable because 81% of the respondents to the questionnaire taught within the watershed counties. Averages calculated from the questionnaire data, identify 65% of the respondent's students as Hispanic, 31% as white, 5% as black or African American, 3% as Asian, 2% as American Indian or Alaskan Native, and 1% as Native Hawaiian or Pacific Islander. The respondent's percentages did not sum to 100, so these average percentages reflect that as well.

When asked if the teachers perceived a need for outreach educators to provide educational materials in languages other than English, 69% answered *no* and 31% answered *yes*. Spanish was the alternate language listed by all respondents who answered *yes* and who supplied an alternate language.

History and Culture Focused Field Experiences

When asked if respondents would be interested in participating in field experiences that integrate history and culture, 68% responded *yes* and 32% responded *no*.

Acquiring Continuing Education Units as part of Professional Development

Most respondents (62%) indicated that acquiring Continuing Education Units was important, but not required for their participation in professional development opportunities. Fourteen percent responded that Continuing Education Units were required and 24% responded that they were not important when determining their participation in professional development opportunities.

Professional Development Focused on Computer Visualizations of Scientific Data

When asked if respondents would be interested in participating in professional development trainings that focus on using computer visualizations of scientific data, 73% responded *yes* and 27% responded *no*.

Incorporating the Effects of Climate Change on Coastal Areas into Curricula

Results from the Needs Assessment revealed that, relative to other topics, few teachers within or outside of the Reserve's watershed counties were interested in climate change as a topic for student field experiences or professional development opportunities. However, when asked whether or not the teachers were interested in including more discussion about the effects of climate change on coastal areas in their curricula, 58% of the questionnaire respondents responded *yes* and 42% responded *no.*

Respondents who answered *yes* were asked what type of help they would need to incorporate climate change into their curricula. Their open-ended responses are as follows:

- "real data"
- "more staff training"
- "pictures, power point presentation, videos, posters, and / or other visuals"
- "a way to tie them into 6th grade TEKS, which do not cover the effects of climate change"
- "hands on activities"
- "special speaker - weather man"
- "real-time data showing the effects of climate change"
- "how it relates to math"
- "engaging and hands-on activities"
- "examples in the area"
- "global warming the real story"
- "NOTE: climate has been taken out of 6th grade TEKS"

- “resources!”
- “the history of climate change for this area”
- “more resources on that specific content and lesson ideas/activities”
- “easy access to local climate data and reasons to explain data, not too sure”
- “hands on activities”
- “I need more hands on experience so that I can feel comfortable in the discussions”
- “Student-friendly lessons & data that incorporate data from our region”
- “direct effects in our area, projections of what can happen in how long, etc.”
- “current data and data that is relevant to our area”
- “lesson plans and content information”
- “historical data vs. current conditions”

CONCLUSIONS AND APPLICATIONS

Knowledge gained from this Needs Assessment is directing development of the Mission-Aransas Reserve's K-12 education program and will continue to direct future improvement. Student field experiences and teacher professional development are currently the two main components of the program. Some findings from this Needs Assessment have already been applied to expand and improve student field experiences. These applications and discussions of future applications of Needs Assessment findings to all Reserve K-12 education programs are presented here.

Comparison of Respondents from within and outside of the Reserve's Watershed Counties

One objective of this Needs Assessment was to compare responses from teachers within the Reserve's nine watershed counties to those from teachers outside of the watershed counties. This objective arose from a desire to understand why, historically, there had been lower participation by local teachers and students in teacher professional development trainings and R/V KATY field experiences, when compared to teachers and students outside of the Reserve watershed counties.

Overall, the Needs Assessment responses from teachers within and outside of the Reserve's watershed counties were very similar. In cases where teachers were asked to select among several response choices, the most and least preferred choices of both groups were usually the same and the overall results revealed similar trends. However, there were a few differences between the groups that may help explain lower participation by local teachers and students in the specified programs.

Higher percentages of respondents from outside the watershed counties identified themselves as Biology, Environmental Science, Aquatic Science, and Marine Science teachers than those from inside. These subjects have been specifically targeted in past teacher trainings and R/V KATY programs, so teachers and students from outside the watershed might have been more interested in these programs than local teachers. Higher percentages of teachers from within the watershed counties identified themselves as Life, Earth, and Physical Science teachers than those from outside. This might explain why lower local participation has not been observed in new K-12 student programs offered at the Bay Education Center, many of which incorporate life, earth, and physical science concepts. The Reserve has a strong interest in serving local teachers and students. Expanding teacher trainings and student field experiences that target state teaching standards in life, earth, and physical science courses might increase local participation in Reserve K-12 programs.

Almost twice as many teachers from within the watershed counties indicated that they preferred weekday professional development opportunities, when compared to their outside the watershed counterparts. Most of the past teacher training programs were offered on weekends, which may have lowered participation by local teachers. Respondents from within the watershed counties were also not willing to pay as much for professional development as

those from without. Offering some teacher trainings on weekdays and limiting their cost are strategies that might increase local participation in Reserve professional development programs.

Application of Findings to Reserve Student Field Experiences

Results from this Needs Assessment indicated that *interdependence between organisms and environments* and *human impact on the environment* were field trip topics of greatest interest to respondents. These findings have already directed the development of new Reserve K-12 education programs and will be applied to future program development as well. Examples of new programs that target these topics include field experiences that reveal the relationship between habitat and wildlife diversity, how estuaries function as nurseries for juvenile aquatic animals, and how human actions impact estuarine habitats. These topics will be explored in future K-12 programs that will be conducted at Reserve partner sites, such as the Fennessey Ranch.

Although Needs Assessment results showed that, relative to other topics, few teachers were interested in climate change as a topic for field trips or professional development, over half of the respondents in the follow-up questionnaire indicated that they were interested in including the effects of climate change on coastal areas in their curricula. The presence of *Science on a Sphere*© (SOS) at the Reserve's Bay Education Center provides a powerful tool for teaching the effects of climate change on ocean and coastal environments. SOS is a visualization system, designed by the National Oceanic and Atmospheric Administration, to help students better understand Earth's oceans, atmosphere, land, and planetary systems. Several SOS visualizations (datasets) model the effects of climate change on ocean and coastal environments. These models directly address many of the needs listed by teachers who would like to address climate change in their curricula, including the need for "real data," "visuals," "projections of what can happen," and "historical data vs. current conditions." SOS datasets will be used to develop climate focused K-12 programs, aligned to the state teaching standards, for teachers and students who visit the Bay Education Center.

Over half of the Needs Assessment respondents were not aware of the existence of the Mission-Aransas Reserve. After reviewing these findings, the Reserve education staff produced a Teacher Resource Guide to inform teachers about SOS programs and field experiences at the Bay Education Center and K-12 offerings at Reserve partner sites. Electronic copies of the Teacher Resource Guide were emailed to Needs Assessment respondents who supplied their email addresses and a copy was posted on the Reserve's website (*missionaransas.org*). Several Reserve partners have also posted the Teacher Resource Guide on their websites and all teachers who request information about K-12 education programs are emailed copies of the Teacher Resource Guide. The Reserve Education Coordinator met with the principals of all schools within Aransas County, the county where the Bay Education Center is located, to introduce the Reserve's K-12 offerings and the Teacher Resource Guide. More effort will be made to disseminate this information to the other schools within the Reserve's watershed counties in the future.

Another reason for the creation of the Teacher Resource Guide was to help teachers plan meaningful field trips for very large groups of students. Several Needs Assessment respondents indicated that many environmental education sites could not accommodate the large numbers of students that they needed to bring on field trips. This created an obstacle to field trips because the teachers needed to bring all or none of their students. After reviewing these Needs Assessment findings, Reserve staff collaborated with partner site staff to discuss methods of breaking students up into smaller groups and rotating them through several sites during one field day. The suggested methods for rotating students and contact information for partner site educators were included in the Teacher Resource Guide. As a result of this collaboration, the Bay Education Center has shared many students with other Rockport sites, such as the Aquarium at Rockport Harbor and the Texas Maritime Museum.

Over 90% of respondents to the follow-up questionnaire indicated that they would like to add more outdoor education activities to their curricula. Teachers could overcome most of the obstacles to adding outdoor activities that were listed in the questionnaire, by participating in Reserve K-12 outdoor education programs. The Reserve has outdoor sites, educational supplies and equipment, outdoor activities that are aligned to the state teaching standards, and environmental educators to direct students. However, at this point, the Reserve cannot eliminate the greatest obstacle, i.e., the lack of funding for bus transportation and substitute teachers. After reviewing these findings and the obstacles to field trips reported in the Needs Assessment, Reserve staff submitted a grant proposal to a state agency requesting funding for busses, substitute teacher salaries, and program fees. The proposal was highly rated by the state agency, but was not funded. Reserve staff will revise the proposal and continue to seek funding, from this state partner and other sources, to help teachers and students participate in Reserve outdoor education programs.

Almost 70% of teachers who responded to the follow-up questionnaire indicated that they were interested in field experiences that integrate history and culture. The Reserve area has a rich cultural history. Prehistoric human occupation of the area is well documented for the last 7,500 years, Spanish explorers visited the area as early as 1528, and Spanish missions and settlements were established in the Reserve area during the 1700's. These early Spanish and later Anglo settlers were attracted to the rich resources provided by the Mission-Aransas Estuary. Field experiences that incorporate the use of estuarine resources by past and present cultures will provide opportunities to integrate science, history, and culture and to help students understand how humans benefit from and impact the estuarine environment. More emphasis will be placed on integrating these topics in future K-12 program development.

Reserve K-12 field experiences have been and are presently targeted primarily at higher grade level students. Several kindergarten and early grade level teachers who responded to the Needs Assessment indicated that there were few environmental education sites that offer field experiences for very young students. Reserve staff are currently developing education programs that target early grade level students to help ameliorate this problem. These

programs will offer hands-on education activities, some of which will be supplemented with puppet shows, using estuary animal puppets to act out stories of life in the estuarine environment.

Application of Findings to Reserve Teacher Professional Development Trainings

Teacher professional development has received much less attention from Reserve staff than K-12 student field experiences and community education, over the past few years. However, implementation of Teachers on the Estuary (TOTE) trainings is an important goal of the Reserve's education sector and a key component of the NERRS K-12 Estuarine Education Program. Completion of this Needs Assessment is one of the criteria required in the development of TOTE trainings and the findings herein will direct their planning and implementation.

The following strategies described for future TOTE trainings at the Reserve, were derived from the Needs Assessment findings and from criteria outlined in the NERRS Teachers on the Estuary Description Document. Reserve TOTE trainings will consist of focused three-day workshops that include hands-on, field-based learning experiences. TOTE activities will highlight the topics of most interest to Needs Assessment respondents, i.e., interdependence between organisms and environments, human impact on the environment, aquatic systems, and water chemistry. All of these topics will be presented around an estuary theme - based on estuarine habitats, resources, and research – and computer visualizations of scientific data will be a central component of TOTE trainings.

Focused two to three day workshops were the second most preferred professional development format for Needs Assessment respondents. Although more teachers indicated that they preferred focused one day workshops, research reported by the National Staff Development Council (Darling-Hammond et al., 2009, p.46) indicated that teachers need "close to 50 hours" of focused professional development to increase their knowledge and their students' learning. The proposed three day TOTE trainings represent a compromise between the one day format preferred by Needs Assessment respondents and that recommended by researchers. TOTE trainings will be offered during weekdays rather than weekends, because the former were preferred by teachers within the Reserve's watershed counties. Although few Needs Assessment respondents indicated that Continuing Education Units were required, most respondents indicated that they were important when determining their participation in professional development, so they will be offered as part of TOTE trainings.

An important part of TOTE trainings will be learning how to acquire real-time data and apply it to scientific problem solving. Few Needs Assessment respondents currently use real-time data in their classrooms. However, 73% percent of the respondents to the follow-up questionnaire indicated that they were interested in learning to use computer visualizations of scientific data. The current lack of real-time data use by respondents may stem from limited knowledge of how to access online data resources. Activities from the NERRS *Estuaries 101* curriculum that utilize

real-time data from the System Wide Monitoring Program will be combined with hands-on field investigations as a core component of TOTE trainings. Needs Assessment respondents indicated that they preferred to learn how to teach lab and field activities by actually doing the activities themselves during professional development trainings. Field investigations of seagrass, oyster reef, salt marsh, and other critical habitats will be conducted by teachers at Reserve and partner sites, as part of TOTE trainings. Teachers will learn how to access real-time data and apply these data in field investigations involving scientific problem solving. An example of an *Estuaries 101* activity that would lend itself well to this type of integrated training is "The Great Oyster Mystery" from the middle school curriculum. Other middle and high school *Estuaries 101* activities that facilitate the integration of real-time data and hands-on field investigations will be adapted for instruction during TOTE trainings.

When asked what resources they would need to incorporate more discussion of climate change in their curricula, the need for examples of the effect of climate change on the local environment was listed most often by follow-up questionnaire respondents. Two of the *Estuaries 101* middle school activities provide examples of predicted or actual effects of climate change on local Reserve habitats, "The Great Oyster Mystery" and "Migrating Mangroves and Marshes." These and other activities that may be adapted to integrate real-time data, field investigation, and climate change extensions will form the basis of future teacher professional development trainings at the Reserve.

REFERENCES CITED

Darling-Hammond, L., R. Chung Wei, A. Andree, N. Richardson, and S. Orphanos. 2009. State of the profession: study measures status of professional development. *National Staff Development Council*, Vol. 30, No. 2: 42-50.

Texas American Federation of Teachers. "Survey of Budget Cut Impacts on Texas Schools." Accessed February 9, 2012. http://docs.texasaft.org/publications/TexasAFT_BudgetCutsSurvey12012011.pdf.

Texas Association of School Administrators. "School Budgets in the News." Accessed February 10, 2012. http://www.tasanet.org/index.php?option=com_content&task=view&id=21132&Itemid=1056

APPENDIX

Needs Assessment Survey and Follow-up Questionnaire

Mission-Aransas Education Needs Assessment Survey

1. Default Section

Dear Texas Teacher,
The purpose of this Needs Assessment Survey is to gather information useful to the design and implementation of professional development opportunities for Texas teachers and K-12 field experiences for students.
The survey should take about 10-15 minutes to complete.
Your input is extremely important and very much appreciated!

1. In what county and school district do you teach?

2. In what educational setting do you teach? Please check all that apply.

- [ ] Public school
- [ ] Charter school
- [ ] Parochial school
- [ ] Non-parochial private school
- [ ] After school program

Other (please specify)

3. How many years have you been teaching?

- [ ] 0-2
- [ ] 3-5
- [ ] 6-10
- [ ] 11-15
- [ ] 16-20
- [ ] >20

Mission-Aransas Education Needs Assessment Survey

4. What grades do you teach? Please check all that apply.

- [ ] Kindergarten
- [ ] 1
- [ ] 2
- [ ] 3
- [ ] 4
- [ ] 5
- [ ] 6
- [ ] 7
- [ ] 8
- [ ] 9
- [ ] 10
- [ ] 11
- [ ] 12

Other (please specify)

5. Which of the following science subjects do you teach? Please check all that apply.

- [ ] General science
- [ ] Earth Science
- [ ] Life Science
- [ ] Physical Science
- [ ] Biology
- [ ] Chemistry
- [ ] Physics
- [ ] Environmental Science
- [ ] Aquatic Science
- [ ] Marine Science

Other (please specify)

Mission-Aransas Education Needs Assessment Survey

6. Do you take your students on field trips as part of your science curriculum activities?

- [ ] Yes
- [ ] No

7. Please rank the following barriers to taking your students on field trips, with #1 being the greatest obstacle.

Transportation costs	
Transportation availability	
Program fees	
Lack of time	
Lack of chaperones	
Lack of alignment with curriculum	
Lack of support from administration	
Other	

8. Which of the following concepts would interest you as the focus of a class field trip? Please check all that apply.

- [ ] Earth systems and astronomy
- [ ] Energy flow through living systems
- [ ] Interdependence between organisms and environments
- [ ] Diversity and classification of living organisms
- [ ] Aquatic systems and water chemistry
- [ ] Climate change
- [ ] Human impact on the environment

Other (please specify)

9. How far would you be willing and permitted to travel (one-way) for a class field trip?

- [ ] 1-15 miles
- [ ] 16-50 miles
- [ ] 51-100 miles
- [ ] Greater than 100 miles

10. How much time would you be able to devote to a class field trip (excluding travel time)?

- [ ] 1 hour
- [ ] 2 hours
- [ ] 3 hours
- [ ] 4 hours

Other (please specify)

11. What type of professional development training do you need? Please check all that apply.

- [ ] Science content
- [ ] Facilitating inquiry activities
- [ ] Conducting hands-on activities
- [ ] Incorporating new lab activities
- [ ] Facilitating field data collection
- [ ] Analyzing data
- [ ] Using scientific instruments and equipment
- [ ] Using real-time or archived data from scientific monitoring sites

Other (please specify)

12. What science content would interest you as part of a professional development training workshop? Please check all that apply.

- [ ] Earth systems and astronomy
- [ ] Energy flow through living systems
- [ ] Interdependence between organisms and environments
- [ ] Diversity and classification of living organisms
- [ ] Aquatic systems and water chemistry
- [ ] Climate change
- [ ] Human impact on the environment

Other (please specify)

13. What are your preferred professional development delivery formats? Please check all that apply.

- [ ] Single after school workshop
- [ ] Series of after school workshops
- [ ] Focused 1-day workshop
- [ ] Focused 2 or 3 day workshop, drive to
- [ ] Focused 2 or 3 day workshop, stay over
- [ ] Extended training of 1 week or more (during the summer), drive to
- [ ] Extended training of 1 week or more (during the summer), stay over
- [ ] Online training or course
- [ ] Online peer discussion group

Other (please specify)

14. What are your preferred delivery methods for professional development? Please check all that apply.

- [ ] Lecture
- [ ] Small group discussions
- [ ] Whole group discussions
- [ ] Problem solving
- [ ] Hands-on activities
- [ ] Field work at natural sites (observing, gathering specimens, collecting data)
- [ ] On-line
- [ ] Web quests or other online activities

Other (please specify)

15. What is your preferred time for attending professional development program? Please check all that apply.

- [ ] Summer only
- [ ] Academic year only
- [ ] Year-round
- [ ] Week days
- [ ] Week ends

16. What factors affect your decision to attend professional development programs? Please check all that apply.

- [ ] High registration fees
- [ ] Travel/ transportation constraints
- [ ] Food/lodging constraints
- [ ] No time/too busy
- [ ] Receiving a stipend or some other type of pay
- [ ] Training not relevant to my needs
- [ ] Lack of support from school administration

Other (please specify)

17. How far would you be willing to travel to attend a day-long professional development program?

- [ ] 1- 15 miles
- [ ] 16 – 50 miles
- [ ] 51 – 100 miles
- [ ] Greater than 100 miles

18. How much would you be willing to pay for a professional development workshop?

- [ ] < than $30 per day/workshop
- [ ] $30 - $50 per day/workshop
- [ ] $51 - $70 per day/workshop
- [ ] $71 - $90 per day/workshop
- [ ] > $90 per day/workshop
- [ ] Cost of meals and snacks only
- [ ] I would not be willing to pay for a professional development workshop

19. How many years have you been teaching about estuaries, watersheds and coastal topics? Please do not include "oceans or marine related topics" in your response.

- [ ] None
- [ ] Less than 2 years
- [ ] 2-3 years
- [ ] 3-5 years
- [ ] 5-7 years
- [ ] 7-10 years
- [ ] 10-15 years
- [ ] More than 15 years

20. Which trainings have you taken to supplement your estuary/coastal/watershed education? Please check all that apply.

- [ ] NOAA/NERRS Teachers on the Estuary Training
- [ ] Project WET
- [ ] Project Wild Aquatic
- [ ] Green Eggs and Sand Workshop
- [ ] The Jason Project Professional Development
- [ ] None of the above

Other (please specify)

21. How many hours of continuing education have you obtained in the discipline of estuarine science within the last 3 years?

- [ ] None
- [ ] Less than 8
- [ ] 8-16 hours
- [ ] 16-24 hours
- [ ] 24-32 hours
- [ ] 32-40 hours
- [ ] More than 40 hours

22. Think about your plans for your class for the entire year. How much emphasis did you or will you give each of the following?

	Little or no emphasis	Moderate emphasis	Heavy emphasis
Outdoor experiential activities	◯	◯	◯
Lab or field work / data collection	◯	◯	◯
Stewardship projects or activities	◯	◯	◯
Data analysis, statistics, and probability	◯	◯	◯
Scientific inquiry skills	◯	◯	◯

23. How many class or activity periods of estuary, watershed, and/or coastal instruction do your students receive in a typical school year?

- [ ] None
- [ ] A portion of one class
- [ ] One to two classes per year
- [ ] 3 to 5 classes per year
- [ ] 6-15 classes per year
- [ ] More than 15 classes per year

24. There is a National Estuarine Research Reserve located in Port Aransas, Texas that is one of 28 Reserves around the country protected for the purposes of education, research, water-quality monitoring and coastal stewardship. Were you aware that your state has a National Estuarine Research Reserve?

- [ ] Yes
- [ ] No

If you answered "yes," have you ever used any of their educational services or products? If so, which services or products? If not, why not?

25. From which web resources do you currently obtain estuary, watershed, and coastal information for use in your classroom? Please check all that apply.

- [ ] NOAA's Education Website - http://www.education.noaa.gov/
- [ ] National Estuarine Research Reserve System's Website - http://nerrs.noaa.gov/
- [ ] Estuaries.Gov
- [ ] NSTA Estuaries Sci Guide - http://sciguides.nsta.org/default.aspx
- [ ] The Mission-Aransas National Estuarine Research Reserve's Website – www.utmsi.utexas.edu/nerr
- [ ] EPA Websites
- [ ] Google
- [ ] Texas State government
- [ ] National non-profit
- [ ] Local non-profit
- [ ] I do not use web resources

If you use a national or local non-profit web resource, please specify which one. If you use any other source, please specify:

26. Please indcate how often you have used these real-time/near-real-time data streams in your teaching. Please check all that apply.

	Not at all	Seldom	Occasionally	Often
algal blooms	◯	◯	◯	◯
bathymetry/topography	◯	◯	◯	◯
currents	◯	◯	◯	◯
directional wave spectra	◯	◯	◯	◯
dissolved oxygen (DO)	◯	◯	◯	◯
fish species & abundance	◯	◯	◯	◯
ice concentration	◯	◯	◯	◯
nutrients	◯	◯	◯	◯
ocean color	◯	◯	◯	◯
optical properties	◯	◯	◯	◯
pH	◯	◯	◯	◯
river discharge	◯	◯	◯	◯
salinity	◯	◯	◯	◯
sea level	◯	◯	◯	◯
seafood contaminants	◯	◯	◯	◯
temperature: air	◯	◯	◯	◯
temperature: water	◯	◯	◯	◯
turbidity (clarity/cloudiness)	◯	◯	◯	◯
vector currents	◯	◯	◯	◯
water depth	◯	◯	◯	◯
water contaminants	◯	◯	◯	◯
water quality	◯	◯	◯	◯
waves	◯	◯	◯	◯
wind vector	◯	◯	◯	◯
zooplankton species	◯	◯	◯	◯

27. If you would you like to be notified of the results of this teacher needs assessment and the results of the R/V Katy field trip raffle, please supply your email address:

Teacher Needs Assessment Follow-up Questions

1. Teacher Needs Assessment Follow-up Questions

Thank you so much for helping with these follow-up questions.
The teacher needs assessment survey will close at the end of May, 2011, and we will send the results out as soon as they are analyzed.

1. Please name the Texas county in which you teach:

2. Have you included outdoor education activities in your curriculum within the past two years?

- [ ] Yes
- [ ] No

3. Would you like to include more outdoor education opportunities in your curriculum?

- [ ] Yes
- [ ] No

If you answered "yes" above, what help do you need in order to include outdoor education opportunities in your curriculum?

4. Do you see a need for outreach educators to provide educational materials in languages other than English, for school groups attending field-trips at their sites?

- [ ] Yes
- [ ] No

If you answered "yes" above, which languages are needed?

Teacher Needs Assessment Follow-up Questions

5. Approximately what percentage of students in your school or program identify with the following racial/ethnic groups?

Black or African American	
Native American or American Indian	
Hispanic or Latino	
White or Caucasian	
Asian	
Hawaiian Native or Pacific Islander	
Other (please specify)	

6. Would you be interested in more programs that focus on history and culture at outreach education sites that offer school field-trips?

- [ ] Yes
- [ ] No

7. Are Continuing Education Units important (or required) when determining which professional development opportunities you will participate in?

- [ ] They are important, but not required for my participation
- [ ] They are required for my participation
- [ ] They are not important
- [ ] Other (please specify)

8. Would you be interested in attending professional development training that focuses on using computer visualizations of scientific data?

- [ ] Yes
- [ ] No

Teacher Needs Assessment Follow-up Questions

9. Are you interested in including more discussion about the effects of climate change on coastal areas in your curriculum?

- [ ] Yes
- [ ] No

If you answered "yes" above, what help do you need in order to include more discussion about the effects of climate change on coastal areas in your curriculum?

Thank you for your input!
Please click "DONE" below to exit this survey.