THE NATIONAL MARINE EDUCATORS ASSOCIATION brings together those interested in the study and enjoyment of the world of water. Affiliated with the National Science Teachers Association, NMEA includes professionals with backgrounds in education, science, business, government, museums, aquariums, and marine research, among others. Members receive Current: The Journal of Marine Education, NMEA News, and discounts at annual conferences. Membership information is available from: NMEA, P.O. Box 1470, Ocean Springs, Mississippi 39566-1470; Phone: (228) 818-8893; Fax: (228) 818-8894; email: johnette.bosarge@usm.edu, or visit our website online at www.marine-ed.org.

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Susan Haynes
Steve Krous
Charina Cain Layman
Leslie Orzetti
Hank Pennington

Zoe Randall
Christopher Snyder
Juan R. Tricoche

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This Special Edition, the National Ocean Sciences Bowl (NOSB®) Special Report #2, is being provided to the National Marine Educators Association (NMEA) membership with the approval of its Board. This report summarizes and contextualizes the results of a two-year research study, which examined the broader impacts of the NOSB. The guiding research questions for the study were: (1) does participation in the National Ocean Sciences Bowl influence the manner in which secondary student participants view careers in the ocean sciences community, and does participation provide an environment conducive to career decision-making; and (2) does participation in the National Ocean Sciences Bowl impact secondary students in affective, academic, developmental, and social ways which are durable and important in later college, career, and/or life settings?

The research study described in this report was developed and implemented collaboratively by the Center for Educational Development and Research (CEDAR) at Ashland University’s College of Education, Ashland, Ohio, and researchers at The College of Exploration (TCOE) in Potomac Falls, Virginia. CEDAR supports and enhances teaching and learning within the classroom, and faculty research and collaboration within the broader educational community. TCOE is an international not-for-profit, education and research institution with expertise in a variety of educational programming, distance-delivery technologies, and research and assessment methods. This study was funded by the National Oceanic and Atmospheric Administration (NOAA) through the Consortium for Oceanographic Research and Education (CORE).

Howard D. Walters, Ed.D., Issue Editor

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This Special Edition of the National Ocean Sciences Bowl (NOSB®) Special Report #2 is sponsored by the National Oceanic and Atmospheric Administration (NOAA).
THE NATIONAL OCEAN SCIENCES BOWL: ESSENTIAL FOR FOSTERING STEWARDSHIP FOR OUR OCEANS

BY DICK WEST

We are very excited about the growth of the National Ocean Sciences Bowl (NOSB®) over the past nine years. The Consortium for Oceanographic Research and Education (CORE) is the host, an avid supporter, and a sponsor of this unique national ocean science academic competition. NOSB provides team competition at the high school level, stimulates the study of the ocean sciences, fosters the next generation of ocean scientists, and expands ocean literacy at a younger age, which is most important for the future of our largest and most important natural resource.

A few years ago, a multi-tiered, independent evaluation titled, Assessing the Impact of the National Ocean Sciences Bowl (NOSB®): A Systems Approach was conducted to determine the value and effectiveness of the program. The report emphasized what the ocean research and education communities surmised: “the NOSB does possess a strong academic and content focus which broadens students’ and teachers’ awareness of the latest scientific research on oceans.”

For almost three years, a panel of 16 distinguished Americans studied the state of our oceans, coasts, and Great Lakes and issued a report that disclosed to the President and Congress that our oceans are in trouble! Their report was titled, An Ocean Blueprint for the 21st Century. It also emphasized the need to enhance our understanding of our oceans through education. It states, “strengthening the nation’s awareness of the importance of the oceans requires a heightened focus on the marine environment through both formal and informal education efforts. Curricula for kindergarten through 12th grade should expose students to ocean issues throughout their formal education with the next generation of ocean scientists, managers, educators, and leaders being prepared through diverse higher education opportunities…”

Each year, the NOSB engages over 2000 high school students and 400 schools in regional and national competitions, dealing with topics related to ocean biology, chemistry, geology, physics, navigation, geography, related history, literature, and more. These activities are designed to expand interest in and knowledge of the oceans and help bring the nation closer to obtaining an “ocean literate” society. In keeping with CORE’s goal to increase this nation’s level of knowledge and concern for our oceans, I’d like to issue a call to action—let us all work together to ‘promote lifelong ocean education’ through programs like NOSB. The US Commission on Ocean Policy and the Pew Commission have determined that lifelong ocean education is an essential element for preserving and protecting the oceans.

As a ‘not-for-profit’ consortium representing leading public and private ocean research and education institutions, aquaria, and industry, CORE is working with ocean science educators, federal agencies, and Congress to sustain and expand the NOSB program. This high school science competition is fun and a ‘win-win’ investment for this nation.

Dick West is the President and CEO of the Consortium for Oceanographic Research and Education (CORE).
Assessing the Impact of the National Ocean Sciences Bowl (NOSB®): A Systems Approach

By Howard Walters, Ed.D., Kristina Bishop, Ed.D., and Rachel Wlodarsky, Ph.D.

Assessing the Impact of the National Ocean Sciences Bowl (NOSB®): A Systems Approach was an ambitious, two-year (2002-2004), multi-tiered research study of a national, ocean science education program implemented annually in 24 regions throughout the nation, and culminating in a national finals competition each spring. The research questions in the study were formulated after a thorough review of past educational research on secondary school level competitions and student career decision-making. In particular, research-based information in two areas (Factors Influencing Career Selection and Characteristics of Effective Competitions) was analyzed and used as the starting point for generating the initial questions, developing the research instruments, and guiding the data sorting and analyses.

The guiding research questions were: (1) does participation in the National Ocean Sciences Bowl influence the manner in which secondary student participants view careers in the ocean sciences community, and does participation provide an environment conducive to career decision-making; and (2) does participation in the National Ocean Sciences Bowl impact secondary students in affective, academic, developmental, and social ways which are durable and important in later college, career, and/or life settings? Underlying these formal research questions was a foundational question: is the NOSB “just a competition” or is it something more enduring and complex than simply a weekend program?

BACKGROUND INFORMATION ON THE NOSB

The Consortium for Oceanographic Research and Education (CORE) has sponsored the NOSB for nine years. In 1998, sixteen regional competitions were hosted across the United States and these regionals each sent a team of four students and one alternate to participate in the national competition in Washington D.C. By 2004, the number of regional competitions had increased to 24. The NOSB program is conducted as a partnership among CORE, its member institutions, the Sea Grant College Program, and the National Marine Educators Association (NMEA) with funding and/or sponsorship provided by nine agencies of the National Ocean Partnership Program (NOPP): Minerals Management Service, National Aeronautics and Space Administration, National Oceanic and Atmospheric Administration, National Science Foundation, Office of Naval Research, Oceanographer of the Navy, U.S. Department of Energy, U.S. Environmental Protection Agency, and U.S. Geologic Survey, as well as other public and private entities.

The study’s findings supported the effectiveness of the program, and also revealed potential approaches for growth and development of the NOSB both programatically, and through further contribution to teaching and learning and the educational research field more broadly. (These findings follow at the end of this paper.)

A key event highlighting the need for this research was the development of a five-year strategic plan for NOSB. In 2001, a planning team [including the first author of this current report] established goals for the expansion of the program, fiscal enhancement, and the leveraging of technological resources for communications and participant recruitment over the period 2002-2006. In addition, the plan laid the groundwork for the current study by calling for a strengthening of the NOSB infrastructure to support teaching and learning, and an ongoing assessment process which focused on career development of the student participants.

LITERATURE REVIEW

The researchers reviewed literature in two primary areas. First, the literature related to secondary student career-selection was pertinent because this is the primary audience for NOSB and part of the overall program mission is to have influence on this process.

The researchers also analyzed the literature of academic competitions, because the academic competition is the centerpiece of the NOSB. The figures provided delineate the common factors associated with students’
selection of career paths (Figure 1) and effective competitions (Figure 2).

**Career Selection**

There are many factors involved in students’ selection of a career. Students’ own aspirations appear to be the most important; however, students do seem to consider parental expectations and the expectations of their teachers and mentors. Mentoring by significant adults and personal, hands-on experience through internships and other programs that provide specific, career-task understandings seem to be very effective influences. Educational preparedness also plays an important role and challenging curricula and meaningful extracurricular activities help students make decisions about what to do after high school.

The research suggests that as high school students begin to consider their options before and after graduation, more than half will choose to attend college. Among those choosing college, a small number will declare a major upon matriculation. As for the rest, ambiguous goals and indecision contribute to numerous changes in majors over the first two years of higher education. The careers considered are “all over the map and wildly unrealistic” (Grant, 2000; Kerr and Erb, 1991; Olson, 1996; and Pearson and Dellman-Jenkins, 1997).

Career selection is influenced by a person’s background, personal qualities, motivation, and environment (Shoffner and Vacc, 1999). Parental involvement in schools is also documented as a positive influence on student’s achievement, attendance, attitudes, behavior, and graduation rates regardless of cultural background, ethnicity, and/or socioeconomic status (Kaplan, et al., 2001; Olson, 1996; Scherer, 2000; and Shymansky, 2000). School counselors, teachers, adult role models, and peers also play a critical role in providing appropriate career education and guidance for secondary students. Additionally, through challenging curricula, specific career information, informal contact and social relationships, job “shadowing,” and after-school internship experiences—students gradually acquire a sense of purpose, academic and vocational goals (Shoffner and Vacc, 1999; Grant, 2000; Subotnik and Steiner, 1993; Scherer, 2000; Mariani, 1998; Cavallo, 1999; and Pearson and Dellman-Jenkins, 1997).

Further, there are many different types of competitions which challenge and engage students. These, along with summer programs, magnet schools, community colleges, and university sponsored programs, provide opportunities for growth beyond the traditional classroom. Many of these extracurricular activities have successfully influenced students’ career decisions (Adenika-Morrow, 1996; Cavallo, 1999; Quimbita, 1991; and Viadero, 1997).

With all of these influential factors, students may choose or reject a career based on their own perceptions of the career, and personally identified or “felt” aspirations (Grant, 2000; Olson, 1996; Subotnik and Steiner, 1993; and Wang and Staver, 2001).
A student’s aspirations usually include two components: ambition and inspiration (Quaglia and Perry, 1995). Ambition refers to students’ sense of educational and vocational goals for the future. Inspiration refers to students’ involvement in an activity for its intrinsic value and enjoyment. It is important that educators be attentive to the need to both teach and inspire students (Scherer, 2000).

**Academic Competition**

Academic contests are not a new phenomenon. Across a spectrum of academic competitions: math, science, writing, foreign languages, history, geography, civics and government, economics, and the arts (Diegmueller, 1996; Nifong, 1996; and Tallent-Runnells and Candler-Lotven, 1996), academic competitions provide an opportunity for students to compete and excel on a mental level much the way they do on a physical one in sports (Parker, 1998). They “give a kid a pat on the back” (Walters, 1997). They are “about promoting learning and lifting the profile of the student” (Harp, 1995).

The research literature on student competitions encompasses a variety of different types of competitions with goals designed to fit the specific situation. Thus, science fairs complement school curricula by encouraging individual students to use and understand the scientific method in designing and performing experiments (Abernathy, 2001). A few contests such as *We the People…The Citizen and the Constitution*, require entire classroom participation (Diegmueller, 1996; and Cairns and Putz, 1990). Many structured competitions like NOSB are team-based contests that are seen as a vehicle for stimulating intellectual and personal growth. Thus Walters (1997) states that “Many students are scholars who want to match minds with other serious students across the country….The chance to compete with kids with similar interests is a wonderful motive.” Nifong’s (1996) study also asserts that such contests can be a means for bringing out excellence, “for encouraging students to do things they didn’t know they could do….the very act of being engaged with other competitors, the very synergy of that…summons up the best in everybody.”

Several authors have explicitly focused on the nuances of student motivation and the role of competition versus cooperation in stimulating excellence. Some educators believe that extrinsic rewards can be important and often lead students to become more interested in the subject area, even if they were initially intrinsically motivated to succeed (Gay and Rueth, 1993; and Kohn, 1991) while others feel that students’ actions (and involvement in competitions) should be based solely on learning for learning’s sake. At one end of this philosophical spectrum are those that question whether or not competition has a place in academics at all, or whether all learning should be cooperative.

A centrist view is that competitions can serve as worthwhile tools to help motivate students. Thus, Ediger (1996) states that “a rational balance between cooperative learning and competitive learning” should be viewed as “sensible since life in school and in society consists of both.” Also, since children frame their experiences to a large degree on how their parents and teachers react (Diegmueller, 1996), if parents and teachers frame competition positively, contests can prompt students to strive for excellence (Nifong, 1996).

Other research studies have focused on identifying specific benefits and concrete skills that students acquire via participation in competitions. Thus, competitive events that make students aware of skills required in their future occupations were found to be important to academic accomplishment (Daily, 1996). Programs with a focus on experiential learning help students think more critically about solutions to problems (Mentors, 2001). Examples of competitions which demonstrate these principles include: *A Pledge and a Promise Environmental Awards*, which focuses on environmental science (Karnes and Riley, 1999); *The Future City Competition* allows students to study community structure in a fun and interesting way through the SimCity program. Here, engineer mentors …show potential engineering applications” (Mentors, 2001); *Math Counts* and *Quiz Bowl* teach students sportsmanship, discipline, social skills, and how to handle stress (Parker, 1998); and *Science Fairs and Science Olympiads* enhance problem solving, the scientific method, and rigorous procedures and data management.

These competitions and many more encourage students to participate and to invest in their schools and their academic selves. These competitions seem to have serious and enduring effects on shaping career patterns and life choices (Anderman and Maehr, 1994).
METHODS

A research team was assembled from the University of Southern Mississippi, Ashland University, and the College of Exploration, with funding for the study provided by NOAA through CORE. To collect data to answer the questions stated earlier, the researchers used four survey instruments, two interview protocols, site visits and observations at 10 locations, a participant observer, and a limited, on-line discussion forum. The specific sources of data are delineated in Figure 3. The researchers collected a significant quantity of data from over 500 research subjects, including regional coordinators, coaches (teachers), competition officials/volunteers, parents, current participants (students), and past participants. The data collected were analyzed separately, i.e. by survey and audience, to identify major thematic issues and clusters, and then re-analyzed cross-wise for consistency of view—both internally and in view of the literature review.

FINDINGS

CAREER PATH RELATED FINDINGS

Sufficient data exist, with high internal consistency across the audiences of the study, to demonstrate the effectiveness of the NOSB program for creating social networks that can influence the career path decisions of the participating students. These networks include: relationships among teammates, with teams from other schools, and emerging mentor relationships with coaches, college professors, researchers, and undergraduate and graduate students. In-depth discussions with coaches and past participants have indicated that these relationships are durable and may contribute to career selection.

At the level of specific career information required for decision-making among high ability secondary students, the study found that CORE does provide significant links for students to career information. The evidence of such linkage is both generalized (i.e., derived from researchers’ observations of career-related social interactions), and specific such as data on the presence of career-focused questions during the competition. The level of exposure to such information was found to vary significantly across the different regions. Given CORE’s and the program’s goal of influencing the career pipeline—this study suggests that regional communication of career information could be more consistently shared across the country.

LEADERSHIP DEVELOPMENT FINDINGS

A second major finding from across the data sets is related to the value of academic and leadership skills as a basis for future career decision-making. While the literature suggests that a student’s view-of-self is a key factor in career path decisions, the data collected on the NOSB program suggest that the situation is more complex. Coaches, parents, volunteers, and past participants were in strong agreement that NOSB preparation and participation forced students to master a set of academic-related skills that transfer to success in college and in the career setting. Further, a separate set of skills—Leadership Skills—which includes the ability to express confidence, to plan and sequence complex tasks and studies, to create working relationships with colleagues, and to formulate a system of ethics and values associated with performance, and winning or losing—were
present across all of the data sets. Clearly, whether the students won or lost at NOSB competition, they learned the skills necessary to lead and succeed in school and work settings.

**Competition Effectiveness Findings**

The researchers found convincing evidence that the NOSB program demonstrates many of the important characteristics of an effective competition identified by Tallent-Runnels and Chandler-Lotven (1996). The program has a clear purpose and strong performance focus. NOSB also clearly enhances student motivation, develops transfer skills, and provides valuable resources for student preparation. The data suggest greater visibility of academic feedback to students be provided through increased communication with the key audiences, particularly parents and school administrators.

The literature highlights a philosophical tension between the role of competitive approaches in pedagogical practice (competition in academic settings vs. cooperative learning) and suggests that these approaches are typically viewed as exclusive from each other. In contrast, the data in this study show that the NOSB program—possibly because it is implemented as a team competition and not an individual student competition—avoids the negative characteristics of both of these methodologies and succeeds in providing a balanced outcome. Students are motivated by the “winning or losing” dynamic, and this results in the development of performance strategies, ranking of performance, and an orientation toward “being the best.” At the same time, the data are clear that the students also learn group and team-building skills, are encouraged to value the contributions of peers, and gain a better understanding of the concept of task specialization. Triangulation of the data indicated internally consistent conclusions on this point: NOSB models authentic competition and cooperation and social sensitivity simultaneously. From these data, the researchers suggest competition and cooperation can function within the same programmatic context such that students benefit from both aspects of the program.

**System-Level Findings**

The fourth area of findings addresses the systems view of the NOSB program. The data are consistent in their description of the NOSB as a functional community, comprising multiple audiences with a variety of interrelated rationales for participation. Further, the audiences expressed these different participation rationales in highly consistent ways as evidenced in the single-set data summaries. The data support a perspective that the NOSB has evolved from a one-dimensional educational program, into a broad-reaching learning community.

The NOSB has had a significant impact on the development of a community linking scientists and educators in a cooperative venture. Since the early 1980s, calls for greater involvement of scientists in education have emphasized the necessity of “bridging the gap” between the nation’s classrooms and the latest scientific research (Walker et al., 1992). Currently, several large-scale policy and funding initiatives are seeking creative models to link scientists with educators in a way which directly and measurably impacts students at all levels. In several ways, the NOSB program provides a model for this type of linkage.

The CORE/NOSB staff utilize the expertise of marine scientists and educators in developing the competition questions, and all of the competitions recruit scientists and graduate students as official judges and volunteers. Many regional competitions provide opportunities for students to visit laboratories and research centers to interact with scientists. Other regions feature guest speakers to provide students with informative and interesting examples of not only science as it is practiced, but the people who practice science and their education and career paths. Such a model provides students with mentors and a network of contacts to assist and support their own career and college decisions, while providing opportunities for the scientists and researchers to present, explain, and showcase their own research in an informal, educational program setting.

**CORE and NOSB Mission and Goal-Related Findings**

The last area of findings concerns evidence from the data that the NOSB program is operating in a manner consistent with the overarching mission statement, goals and approaches of CORE, and is consistent with its own stated purposes. While at first glance, this statement may seem superficial—in fact it suggests a structural and foundational element important for the sustainability and development of this program in the future. The degree to which the program is internally consistent with institutional mission, goals, and approaches will influence the overall staffing stability and support for the program internally at CORE, as
At the mission level, CORE desires to “promote, encourage, develop, and support efforts to advance knowledge and learning in the science of oceanography and to disseminate such knowledge to the scientific community and the public...[and to] promote the exchange of information and knowledge to create, foster, and support cooperative efforts among members of CORE and other U.S. scientists, and federal, state, and local agencies.” (Note: Mission Statement 2004).

The data collected for this study are consistent in that the activities delineated in the mission statement are sustained in the operation of the NOSB program at the regional and national competitions. The regional sites have deep community support from the public and private sectors and from science and community service agencies alike. A clear academic focus and emphasis on student development supersedes the “win or lose” mentality of other competition-based programs reviewed in the literature. Communication structures have developed and are sustained throughout the year which seem far more sophisticated and durable than would be expected for what, at face value, is a series of two-day, weekend programs.

With respect to the specific goals of the NOSB program, as excerpted from the CORE web page, the data consistently support a conclusion that the NOSB does possess a strong academic and content focus which “broadens students’ and teachers’ awareness of the latest scientific research on oceans.” Certainly, the NOSB provides a vehicle for networking and connectivity within the regional oceanographic research communities where the program is located, and the program has intentionally reached out to under-represented populations of students to enhance the inclusivity of the ocean community.

One area where progress has not been uniform across the country is in meeting the goal of helping teachers “use the oceans as an interdisciplinary vehicle for teaching.” Although this goal is recognized as important in many regions, and many coaches indicate they have infused ocean science content into their general instruction, this seems to have occurred as an ancillary or side-benefit—and not as a result of a program of consistent professional development for the teachers across the regional locations.

RECOMMENDATIONS

While this research study was designed primarily as an assessment of the broader accomplishments and impacts of the NOSB and is thus more than a program evaluation per se, the data and analyses are substantial enough to identify areas where efforts are particularly effective and funding should be continued and expanded. The data also suggest several areas wherein the program could be strengthened—given the overall goals and objectives for this program and for education at CORE. The reader should carefully note that CORE personnel, using NOAA enhancement funding, have already begun work on a number of these recommendations, and an update on current NOSB activity by CORE personnel is included in this Special Report.

1. Leadership. The data collected from the various audiences provide strong support for the widely held perspective that one of the most valuable impacts of the NOSB for the participants is the opportunity to develop and practice leadership skills. Program elements that promote student leadership at select regional sites could be studied in the context of the strategic development of the NOSB program, and it is suggested that marketing of the NOSB be refined to communicate the strong leadership development component of this program as a whole.

2. Communication with Parents. The data collected are consistent that communications with parents should be evaluated for comparability across the regions. Information concerning NOSB was evidently not reaching the majority of the parents during the competition period considered in the study.

3. Marketing to the Scientific Community. Data from the interviews and volunteer surveys, associated with the supporting science institutions and agencies, suggest that the NOSB could be marketed more widely to the science community as an opportunity for their involvement in educational programming. A mechanism to build on the NOSB’s solid base of accomplishment would be to consider hosting a “partner’s conference” as a strand or sub-conference at one of the major national or international ocean sciences conferences. This effort could create additional momentum and sponsorship for NOSB, as well as highlight this significant accomplishment of CORE across a part of its constituency that tends to be less involved in pre-college education.

4. Database. At the time this research study was designed and implemented, there was a significant need to formalize and improve usability of the NOSB
databases to better manage competition questions, alumni records, and communications. Robust, well-functioning systems for managing this information are essential to the future of the program.

5. Professional Development. As also reported in the pilot study in 2000, the coaches who participate in the NOSB program represent a pool of approximately 400–500 teachers who obtain most of their content knowledge training secondarily, from coaching their team. There is a need to formalize the training in terms of knowledge depth and instructional activities with this pool of teachers. It should be noted that CORE has taken steps, using NOAA enhancement funding, to address this recommendation.

6. University Student Connections. Both the literature and the data collected highlight the important relationships that can occur between secondary students and undergraduate and graduate students in career path decision-making. It is therefore recommended that formalization and expansion of the role of undergraduate and graduate students—and particularly past participants in NOSB—be undertaken by CORE and the regional coordinators.

CONCLUSION

The National Ocean Sciences Bowl is a significant, regional and national ocean sciences education program that provides a context to inspire and motivate students toward leadership and involvement in ocean sciences and toward a greater sensitivity for environmental stewardship. It possesses characteristics which can influence these students’ career path decision-making, by engaging them in a social network that provides specific, contextualized information about careers and entry pathways to those careers. It contributes to the generalized development of these students by facilitating leadership and academic-focused skills that are highly transferable to other academic and vocational settings. It meets a widely perceived need for high ability students to compete, engage, and share experientially with other students of similar ability levels. All of the audiences reporting for this impact study conclude that the act of competition is singularly important as a motivational strategy to engage these students’ “best performance” skills in both academic and interpersonal domains.

The National Ocean Sciences Bowl is also a dynamic social system. It is composed of numerous sub-populations who satisfy and sustain some dimension of their own personal, professional, or institutional identity through the NOSB program. Students develop mentor connections, and address their social identities and their need to prepare for college. Teachers address their need for professional learning and engagement with their peers, as well as curricular and science content enhancement. College and university personnel address their recruitment needs. Scientists and researchers address their needs to engage with educational programs and to recruit high-ability and interested students to their fields. Numerous agencies, institutions, and businesses meet their needs for community involvement, support of youth programming and education, and public relations.

In final analysis, the researchers conclude that the NOSB is significantly more complex and substantive than “just a competition.” This complexity is difficult to ascertain and describe “in the trenches”—particularly during the incredibly fast-paced and dense, weekend schedule that is a part of most regional and the national events. This view is an important contribution of this impact assessment, and the researchers believe this view will and should support continued refinement and programmatic development within the NOSB—and through the NOSB, within CORE.

This report is condensed from a much lengthier manuscript, including substantial summaries of the data collected during the study. That report has been published for the reader electronically at www.nosb.org.

References and Bibliography: The references for this paper have been published separately on the web page version of the report.

Howard Walters, Ed.D., is an Assistant Professor in the College of Education at Ashland University. His primary teaching and research interests are in Research Methods, Statistical Inquiry Methods, Adult and Continuing Professional Education, and the foundations of educational practice.

Kristina Bishop, Ed.D., is the Academic Director of The College of Exploration in Potomac Falls, Virginia. Her research interests include online teacher education and professional development, science learning for K-12 students and the general public, and Research/Evaluation/Assessment methods and procedures.

Rachel Wlodarsky, Ph.D., is an Assistant Professor in the College of Education at Ashland University. Her primary teaching and research interests are in Educational Psychology, Adult Education, and Human Cognition, as well as in the foundations of educational thought and inquiry.
The NOSB® is not just a high school competition. The regional and national competitions are run by oceanographers throughout the country. These volunteers have taken the time to meet, talk, and share with students what oceanography is all about. Oceanography has been brought out of the textbooks and has become real for the students on the teams. A simple pat on the back or a “you can do this” from an oceanographer at these competitions or on one of the field trips, opens the eyes of the students, touches their minds, and gets oceanography into their hearts. I have seen the joy in the eyes of my team as they hugged each other while standing by the grave of Charles Darwin in Westminster Abbey. I saw the awe on the face of one of my team members standing two meters away from the Kilauea lava flow. He is now a marine geology major at Boston University. I have seen one of my team members snorkel around stalactites in Bermuda. She is now studying geology at MIT. I have seen one of my team members give a presentation at the National Ocean Summit in the White House. He presented the idea of elevating the ocean to a cabinet level position in the government because the ocean is so important to the future of this planet. NOSB opens up career paths and creates memories of a lifetime.

— Doug Grant
NOSB Coach
Through their participation in the NOSB® my students have gained a strong foundation of knowledge in ocean science and a respect for the vital roles that our ocean plays in their daily lives. But of equal importance, my students have been given the rare opportunity to meet and interact with scientists at the forefront of oceanographic research, and to see these scientists as real people pursuing a worthwhile career, establishing lasting friendships with colleagues, and genuinely having fun making a living doing a job they love. The value of that kind of experience to my students far exceeds anything I could hope to accomplish with them in a classroom setting.

— Steve Krous
NOSB Coach
Early one morning, in the fall of my senior year at Mount Holyoke College, I sat in Thermodynamics class wondering where I would be after graduation. As a Biochemistry major I had my fair share of options. Why shouldn't I have my fair share of options? I was raised in Lexington, Massachusetts and was able to benefit from some of the finest public education in the country. I was where I was because of hard work, true. But I was also where I was as a result of the privilege that growing up in a wealthy suburb afforded me. It did not occur to me until college that if I had received the best education because of where I was able to live, that there were also children receiving a poor education because of where they lived. This made me furious, but I did not know how I would change anything until that one morning in Thermodynamics class.

As the professor worked through what seemed to be a never-ending problem on the board, the answer to my problem entered the room. A campus recruiter interrupted our class to share with us the mission of an organization called Teach for America: “One day, all children in this nation will have the opportunity to attain an excellent education.” She told us that Teach for America recruits the top college graduates in the country to serve for two years as public school teachers in underserved communities. I knew that morning this was something I must do. I went full force ahead into the long and competitive application process. By April of my senior year I was accepted into the 2004 corps and assigned to teach chemistry in Atlanta, Georgia.

There were many challenges facing a young, college graduate directly entering the classroom. However, one of the biggest benefits was that high school was so recent in my memory. As I prepared for the challenges ahead in Atlanta, I reflected on what made my high school experience so good for me. I won’t lie; high school is not a walk in the park for anybody. I did not breeze through it, enjoying every moment, every teacher. What I realized as I reflected was that my high school was not great because we had the best equipment, technology, and resources. What made my education so unique, rewarding, and challenging was my chosen extracurricular path of the Science Team. I joined the Lexington High School Science Team my sophomore year under the encouragement of my Advanced Placement Biology teacher and mentor, Mr. Carpenter. High school was never the same afterward.

I participated in many different competitions while on the science team, but the event that had the biggest impact on me was the National Ocean Sciences Bowl (NOSB®). This event combined my love of the ocean with a competitive need for speed that all the team members enjoyed. I spent long hours at school studying and practicing for NOSB. All the team members would write practice questions and read them while the rest of us competed against each other to buzz in first and answer correctly. Our team was so competitive that during competition we were rarely concerned about answering before the other team. I competed in NOSB from 1998, the year it began, through 2000. In 1998 and 1999, I captained the regional third place team, while my school’s other team continued on to Nationals to win both years in a row. In 2000, I was on the team that represented Lexington to win the Nationals for the third year in a row.

~ This event combined my love of the ocean with a competitive need for speed that all the team members enjoyed. ~
Participating in NOSB was a great experience for many reasons. It improved my study skills, as team members were individually responsible for studying the material. It helped me to realize many hands-on applications for all the different areas of science. It built my self-esteem to be an important part of an academically competitive team. It also afforded me the opportunity to travel, both for competition and award trips.

Because of NOSB, I was able to do an internship with the Navy at Stennis Space Center, travel to Catalina Island and Monterey Bay Aquarium, and visit the Baltimore Aquarium before a competition. I was also motivated to attend the Acadia Institute of Oceanography in Maine and complete their tropical oceanography study in Jamaica. I continued this interest in college and completed an internship at the New England Aquarium in 2001.

Realizing what NOSB did for me in high school, there was no question in my mind as I entered my classroom in Atlanta: I had to start a science team. This did not happen right away, as I was overwhelmed in the first few months with paperwork, classroom management, and lesson plans. It was a student that reminded me of what I wanted to do. One of my homeroom students, Fatoumatta, approached me after school one day to sponsor her for a science competition. I was honored that she wanted me to be her mentor and I eagerly proposed to her the idea of starting a team for such competitions. Within two weeks we had six new members on our team. I bought a buzzer system and had the team start studying oceanography. Unfortunately, we were too late to register for the regional Southern Stingray Bowl in South Carolina, but we were able to go to the competition and watch. I was also able to take my team to the Hofstra University Marine Lab in Jamaica for one week to complete the same program in tropical oceanography that I had done through the Acadia Institute of Oceanography. The team raised over $8,000 to go on this trip and learned to swim in two months.

~ Participating in NOSB® improved my study skills and built my self-esteem. ~

This year I have 25 students signed up on my team. The five returning members are already practicing and fundraising. I will be choosing the five most competitive members to compete in the Southern Stingray Bowl in February 2006. The team is traveling to the Tennessee Aquarium in September, introducing new members to the exciting world of oceanography, and providing return members with an opportunity to gain even more experience. I look forward to watching my team compete. I know my students’ science background is not as strong as mine because of the schools they attended, but I know they have enough heart and determination to make up for it. These are some of the brightest children I have ever met and I have high expectations that they will be extremely competitive. I want my students to make it to Nationals and do well. I would love to beat my old coaches, but I know that regardless of the results of the competition, whether or not my team wins Nationals, their lives are changed. And so has mine, again.

**Elizabeth Goodridge** is a Chemistry Teacher at D. M. Therrell High School in Atlanta, Georgia. She is a former student participant in the National Ocean Sciences Bowl.
| NOSB®—An Inland Perspective |

By Genevieve Healy

My experience with the National Ocean Sciences Bowl (NOSB®) competition began in its inaugural year in 1998 at the University of Miami. I assisted on the coordinating team recruiting volunteers to be judges for the Manatee Bowl in Florida. Little did I know that I would eventually be coordinating the only land-locked site in the country.

In January 2003, I moved to Boulder, Colorado, to join a team of science educators for the Cooperative Institute for Research in Environmental Sciences (CIRES) at the University of Colorado. Because of my ocean science background, my job description included coordinating the Colorado Regional Ocean Sciences Bowl. Although I was very enthusiastic about organizing such an important and worthwhile event, our education team frantically had to pull together and train 70 volunteers, find prizes and freebies for the teachers and students, and attempt to learn all of the rules so we wouldn’t be caught off guard… all in less than two months! Thanks to the volunteers, one of whom was an NOSB alumni from the winning regional team the previous year, the competition went off “without a hitch.” Sixteen teams participated from 13 different schools throughout Colorado—one team even participated from Wyoming.

With the first year under our belt, our CIRES Outreach group decided that more schools needed to become involved with NOSB to improve the diversity of the competition and broaden the awareness of ocean sciences among teachers and students from the inland states. To accomplish this, we decided to recruit teams for the 2004 competition from Colorado, Utah, Wyoming, and Kansas. Not only did the diversity continue to increase each year, but the level of competition also continued to improve. Twenty teams competed in 2004 from 16 different schools. Two schools were from Kansas, and one was from Salt Lake City, Utah. In 2005, we again recruited from the same four states and had a record 36 teams from 26 schools register for the competition. Due to money restrictions and volunteer capacity, we could only accept 25 teams. However, teams that could not participate in the full competition were encouraged to attend and participate in an afternoon consolation round. In 2004, we added the afternoon consolation round to increase the number of games a team would play if they didn’t make it to the afternoon double elimination. We allowed teams registered for 2005, not accepted into the official competition, to participate in this way. We received overwhelmingly positive feedback from the coaches and students for initiating this addition to the daily events.

In 2005, we also added an art and logo contest to come up with a catchy name for our regional competition, as well as to allow participants from any school to contribute their artistic talents. The winning logo, Mountain Mariner Challenge, is now the new name for our regional competition. The logo design was used on the program, banners, and t-shirts worn by the students during the event.

~ The greatest highlights for me are to see the smiling faces on the students as they compete and interact with their fellow students and learning that students go on to ocean science related degrees and careers—this is when you feel you have really made a difference. ~
The past three years coordinating the Colorado Regional NOSB were both personally and professionally rewarding. Some highlights include: the 3rd place national finish by the Poudre High School team from Fort Collins, Colorado in 2004; the opportunity to experience several coastal sites at the national competition; and the chance to meet some of the most interesting, dedicated, and passionate people involved in coaching, volunteering, and coordinating this wonderful event across the country. But the greatest highlights for me are to see the smiling faces on the students as they compete and interact with their fellow students; to receive emails from NOSB alums asking to help volunteer for the event; and learning that students go on to ocean science related degrees and careers— this is when you feel you have really made a difference.

My overall goal as a coordinator of the Ocean Sciences Bowl competition in Colorado is to raise the awareness and interest in learning and understanding the importance of the ocean among inland teachers and students. Marine science and oceanography classes are growing in the southwest region of the U.S. as teachers and science curriculum specialists realize the multidisciplinary importance of ocean science content and the real effects the ocean has on the global and local climate. Not to mention, Colorado has the highest number of certified scuba divers per capita than any other state in the U.S. This is an untapped volunteer resource in our region that I am very excited about pursuing to further ocean interest and awareness among our youth, as well as to recruit these folks as speakers and volunteers at the next regional NOSB competition on February 25, 2006. Perhaps I’ll see you there!

Genevieve Healy is a Research Associate at the Cooperative Institute for Research in Environmental Sciences, University of Colorado. She serves as the NOSB Regional Coordinator at that institution.

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**NOSB® in Alaska**

**By Phyllis Shoemaker**

The National Ocean Sciences Bowl (NOSB®) is a wonderful way to get the public interested in learning about the oceans and to acquaint students with career possibilities in marine science fields. I have been involved in the National Ocean Sciences Bowl program in a variety of capacities since it was established in 1998 to help celebrate the International Year of the Ocean. That first year I was recruited to be a moderator at the Alaska regional competition. Even though I have an undergraduate degree in Oceanography, I was impressed by the difficulty level of the questions and amazed by the depth of knowledge among the high school students who attended. It was great fun and I was hooked.

Because of the distances involved, many of the high school teams participating in the Alaska regional National Ocean Sciences Bowl need an entire day to travel from their homes to Seward where the competition is held. After the first year it was decided to make the Alaskan competition a three-day event. To broaden the educational benefit of the competition, Alaskan organizers introduced a research project component in 1999 that counts as half of a team’s total competition score, with the quiz bowl making up the other half. Teams begin in the fall to prepare a 20-page research paper and a 20-minute oral presentation based on an important aspect of ocean sciences in Alaska. The topic is announced before the start of the school year.

The Tsunami Bowl website describes some of the benefits gained by students who complete the research project:

This year’s topic was to determine the most important problems or hazards facing an Alaskan coastal community as a result of climate change; and to propose policy changes or actions that can be taken now to deal with the specific problems or hazards identified. The team from Cordova came to the conclusion that climate change will have a major economic impact on Cordova because of effects on salmon populations in the area. The best way to mitigate those effects is to educate the public and policy makers. Their coach, Kate Alexander of the Prince William Sound Science Center, encouraged the students to identify an audience they want to reach and come up with a plan to do that. One student created a handout on facts of climate change. Another organized a viewing of “The Day After Tomorrow” movie and a discussion with high school students about the realities of climate change. Two of the students created a letter template for others in Alaska to sign and mail to encourage Alaska’s senators to take climate change seriously by signing the Climate Stewardship Act. All of this was done after the NOSB competition when the students returned to their communities. In addition to learning basic facts about marine science, these students gain valuable experience in community involvement and work toward a solution to a common problem.
Last year’s topic was to determine the most important contaminant problem facing an Alaskan coastal community and to develop a local risk assessment study to determine what measures should be taken to reduce the contaminant source or to reduce the health risks. A team from Soldotna did their research project on tributyltin (TBT), an anti-fouling compound often found in ship paint. This compound was identified in waste material generated at an Alaskan shipyard. As concerned citizens searched for information on the substance, they came across the research paper written by the students from Soldotna High School, which was posted on the Tsunami Bowl website. In an email message to Bruce Rife, the coach of the Soldotna team, one person stated: “For most of us this was the first time we had heard of TBT, the paper has proven to be a great crash course so folks know what we are talking about.” Bruce was involved in the National Ocean Sciences Bowl for several years and pointed out what a great learning experience this was for his students. They realize how doing research and sharing that research with the public can have an impact on local environmental concerns.

The project topic in 2001 was to develop a 50-year environmental protection plan for an Alaskan aquatic or marine ecosystem. A team from Juneau decided to focus on the waste generated and disposed of by cruise ships visiting their area each summer. An Alaska state representative learned of the research and asked them to present their findings before a legislative committee. She told other people what to do (that must be the mother in me but comes in handy when organizing volunteers, students, and coaches for three days of events). As I said to one of my children recently, “I can’t believe I actually get paid to do this!”

Phyllis Shoemaker is the Alaska Coordinator for the National Ocean Sciences Bowl. She works for the University of Alaska Fairbanks at the Seward Marine Center, in the School of Fisheries and Ocean Sciences.
Why I Never Miss the National Ocean Sciences Bowl…or, How the Pink Team Made My February

By Allegra Hosford Scheier

The “pink team” walked into the non-descript classroom, shuffling their flip-flopped feet in the early-morning hour. With hooded eyes, the four girls tested their buzzers, announcing their names at the same time they pushed the red button, so that the low-frequency tone drowned out “Megan” and “Emily” and the other popular names of the mid 1990s. No stranger to fashion myself, I wondered if the stylish foursome had really come to play, or if they merely warmed their chairs in anticipation of some more interesting—or socially acceptable—pursuit…a trip to the aquarium perhaps? A kayak tour masquerading as a water-fight-flirt with boats of teenage boys? Or, I got it, a stop at the Gilroy outlet mall on the way home. That must be it. And then, I was surprised. The pink team, named for the four girls in matching pink shirts, knew their oceanography and won that early-round match, low-rider jeans, flip-flops, pink shirts, and all. I guess I knew then that future leaders of my field, oceanography, could be sitting before me. Sure, the smart guys from the elite high school across the bay would go on to win the regional tournament, and eventually, to place among the top teams at Nationals, but I wasn’t convinced that those Caltech and MIT bound students would study anything but physics, mathematics, and engineering, leaving behind the hoard of facts they had memorized about oceanography. No, it was the quiet self-possession of the members of the pink team that assured me that participating in the National Ocean Sciences Bowl (NOSB®) had made them life-long learners, and lovers, of the oceans.

I happened upon the NOSB by accident. Near-to-drowning with my Ph.D. thesis defense looming, I had an entire chapter to write and no time to leave my dungeon—my office and blueberry iBook. The request for Lobster Bowl volunteers beckoned from my email inbox. Perhaps the much-needed break from “thesis hell” lured me from my lonely office at Woods Hole Oceanographic Institution onto the diesel-permeated coach for the hour trip to snowy Boston. Perhaps I longed for civilization, preferring to leave for a while deserted Cape Cod in exchange for the thriving metropolis. I think, instead, that answering the call to arms bespoke of a longing for a connection between my specialized doctoral work on the creation of oceanic crust at spreading centers and the inquisitive high school student that I’d been 10 years before. I was a science judge and substitute moderator that first year at the Lobster Bowl, the Massachusetts regional NOSB competition. And though the crowd grumbled about the dominant team using up the clock while they won every round, I didn’t care… I loved it all: the intensity of the students and their coaches, the books piled high on the conference table in the judging room, and the anticipation of a tie-breaking answer late in a round.

~ Whereas I didn’t know that I loved the oceans until my senior year of college, NOSB enables students to discover that years earlier—and then it fosters that knowledge with internship and scholarship programs. ~

So when I moved to the San Francisco Bay area, I knew I had to be a part of that region’s NOSB—Monterey’s Otter Bowl—in whatever capacity they needed. Much to the organizer’s delight, I dragged my oceanographer husband to the practice session, providing two brand-new volunteers to the annual hunt for help. This session was near-to-the-real thing: teams and coaches made the trek to the marine lab for a chance to put into practice what they’d been working toward for months. During the practice rounds, we quizzed the teams while we rotated through all the volunteer positions, from timekeeper to score keeper, to science judge to rules judge, to moderator. And I found my niche: inspired perhaps by too many episodes of “Survivor,” as moderator I admonished the teams in my best Jeff Probst voice to “wait for my go” before turning over their team challenge questions.
By the time the Otter Bowl came around a few weeks later, I knew the responsibilities of the moderator by heart. There was some sort of karma that February at the competition: three of the five volunteers in my room had Ph.D.’s from Woods Hole Oceanographic Institution, many of the players and coaches whom I’d met several weeks earlier at the practice session nodded in recognition, and some team of girls admired my olive-green, pink satin-lined jacket. Above all that, though, the lure of the Otter Bowl lay in its fundamentals: we were all there to share our knowledge about the magic, watery wonder that covers most of this planet.

That’s what keeps me coming back. Whereas I didn’t know that I loved the oceans until my senior year of college, NOSB enables students to discover that years earlier—and then it fosters that knowledge with internship and scholarship programs. No matter where my science career takes me around the country, if it’s February, you’ll find me at the National Ocean Sciences Bowl. My husband will be there, too. He’s hooked.

Allegra Hosford Scheirer is a Research Geophysicist for the U.S. Geological Survey in Menlo Park, California. She has participated in the National Ocean Sciences Bowl at the regional level as a moderator and volunteer.

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**May 13-15**  
**Asilomar Conference Grounds**  
**Pacific Grove, California**

Hosted by  
**The Consortium for Oceanographic Research and Education (CORE) and**  
**The Marine Advanced Technology Education (MATE) Center at Monterey Peninsula College**

The 2007 NOSB will be at Stony Brook University in Stony Brook, New York

For more information, call 202-332-0063 or email nosb@coreocean.org
Over the next few decades we will depend on champions like those participating in the National Ocean Sciences Bowl to further our understanding of our ocean and ensure that we are good stewards of this important natural resource.

— Vice Admiral Conrad Lautenbacher, Jr.  
Under Secretary of Commerce for Oceans and Atmosphere, and NOAA Administrator

The NOSB® competition has become a flagship effort that raises the bar in science literacy within our coastal and Great Lakes states and for many heartland states as well.

— Sharon H. Walker, Ph.D.  
Administrator, Scott Aquarium and Professor, Department of Coastal Sciences, University of Southern Mississippi

National Ocean Sciences Bowl
NOSB has really shown me what I want to do with my life. It has evoked my true love of science in a way that no high school course ever could. By becoming so immersed in ocean science I began to fall in love not only with the material, but also with the whole idea of the scientific process....As a result, I have decided to pursue a career in scientific research.

– Former NOSB Participant
Tufts University

There really hasn’t been one course in my entire undergraduate career (or the first few weeks of my graduate career) that hasn’t made me thankful for all the studying we did for NOSB. I feel that I’ve had quite the head-start in all of my ocean science classes compared to other students.

– Former NOSB Participant
University of Rhode Island
**National Ocean Sciences Bowl: More than a Competition**

By Susan Haynes and Susan Cook, Ph.D.

As the academic year progresses, talented high school students from across the country are enthusiastically gearing up for the ninth annual National Ocean Sciences Bowl (NOSB®) competition. At the same time, education staff in the NOSB national office at the Consortium for Oceanographic Research and Education (CORE), an oceanographic organization dedicated to advancing ocean science research and education, are reviewing the program’s many successes and working hard to build on these strengths for the future.

From its inauguration in 1998, the NOSB has provided an educational forum for students to excel in math and science and to receive national recognition for their talents. With a current framework of 25 dedicated regional competition sites and over 12,000 student participants since inception, NOSB has a proven track record for generating student interest and excitement about science and the oceans and offers young people an exceptional opportunity to explore marine science, both as an in-depth area of study and as a possible career path. The NOSB fosters collegiality and teamwork, competition, critical thinking, and factual recollection. It connects students to ocean experts as role models and mentors in a wide variety of settings and excites and inspires our nation’s teachers, providing them with new tools to capture the imagination of their students. In the broadest sense, the program’s mission is to help produce the next generation of well-informed ocean leaders and environmental stewards.

This Special Report published by the National Marine Educators Association (NMEA) features the 2002-2004 NOSB research study and highlights the impact NOSB has had among students, coaches, regional coordinators, and volunteers. The study concludes that NOSB has had a measurable impact on both students and teachers and that it is an effective mechanism for bringing together marine science professionals, educators, and students in an environment that promotes long-term collegial relationships (Walters, H., K. Bishop, NOSB Impact Evaluation, 2004). Within the Walters and Bishop report, several suggestions were made to help CORE/NOSB continue to elevate the value of the program. Many of these suggestions have been or are currently being addressed while others remain under review at the national office. These suggestions focus on professional development opportunities for coaches, improving communications in a number of arenas within the NOSB community, and data collection and management. Recent enhancements and general program management improvements have addressed some of these suggestions and CORE/NOSB staff continue to evaluate and refine our direction as we look toward further development of the program.

**Recent Enhancements**

Over the past few years, CORE has expanded NOSB’s impact well beyond that of a seasonal competition by implementing initiatives that expand the program’s horizons and foster further intellectual and personal growth for students, coaches, and regional coordinators. These efforts include a diversity initiative by which NOSB staff reach out to new audiences; internship and scholarship opportunities for all competition participants; and professional development opportunities for team teachers/coaches and regional coordinators. Each of these elements has become an integral part of the “complex learning community that is NOSB.” (Walters, 2004).

**Underrepresented Populations**

It has been a goal at the national office to make NOSB more accessible to populations that typically are under-represented in the marine sciences. CORE is proud to have recently developed and implemented a strong diversity initiative.
Currently, four regional sites are actively engaged in incorporating teachers and students into their competitions from schools that have a high enrollment of traditionally underrepresented students. These sites are building long-term relationships with schools, teachers, and students and providing experiences in the marine sciences that might otherwise never have been available.

Although total numbers are still modest, the overall percentage of non-Caucasian students participating in regional bowls has increased over the past five years from just under 20 percent to 30 percent in 2005 (Table I). Over time, these data show noticeable increases for African American students (three percent increase) and Asian American students (five percent increase). Hispanic participation has increased by one percent with Native Americans remaining steady at one percent. Students who are categorized as ‘other’ increased by about two percent. Additionally, there is a relatively equitable gender ratio averaging 53 percent male and 47 percent female over the past two years.

**Internships and Scholarships**

The Coastal and Ocean Science Training Internship (COAST), implemented in 2003 via a partnership with the Student Conservation Association (SCA), provides an opportunity for students to gain significant, hands-on experience in a marine environment in an extended residential setting. Interns spend four weeks living and breathing marine science in an area of the country selected for its unique and pristine habitats and ability to challenge students with extensive work in the field. The six successful finalists for 2005 spent the summer working with SCA crew leaders and onsite researchers on projects in Olympic Peninsula National Park in Washington state. This group included students from Colorado, Georgia, Florida, New York, Ohio, and Alaska. Their work exposed them to a variety of data collection techniques and the use of scientific field equipment. The students learned about coastal environments, the geologic makeup of a beach, coastal flora and fauna, as well as native cultural relationships within the region. In addition to the scientific research, they were visited by a college professor who discussed their academic and career options. This element of the NOSB program provides students with opportunities to work hand in hand with research scientists, experience the rigor of marine science field work, and learn valuable group living skills.

Of equal importance is the NOSB National Ocean Scholar program. Most college scholarship programs designed to interest students in specific careers focus on providing support for the junior or senior years. NOSB takes a different approach by identifying talented students at the high school level and providing them with the funds to continue to explore their marine science interests during the first two years of college.

<table>
<thead>
<tr>
<th>Year &amp; Source</th>
<th>African American</th>
<th>Asian American</th>
<th>Caucasian</th>
<th>Hispanic</th>
<th>Native American</th>
<th>Other</th>
<th>Total non-Caucasian</th>
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<tr>
<td>2000 (Walker &amp; Walters)</td>
<td>2%</td>
<td>9%</td>
<td>81%</td>
<td>6%</td>
<td>1%</td>
<td>1%</td>
<td>19%</td>
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<tr>
<td>2001-2002 (CORE)</td>
<td>2%</td>
<td>7%</td>
<td>81%</td>
<td>6%</td>
<td>1%</td>
<td>3%</td>
<td>19%</td>
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<tr>
<td>2004 (CORE)</td>
<td>3%</td>
<td>11%</td>
<td>75%</td>
<td>7%</td>
<td>2%</td>
<td>2%</td>
<td>25%</td>
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<tr>
<td>2005 (CORE)</td>
<td>5%</td>
<td>14%</td>
<td>70%</td>
<td>7%</td>
<td>1%</td>
<td>3%</td>
<td>30%</td>
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Table I. Race/ethnicity of student participants in NOSB regional competitions nationwide (n = total number of students for which data was provided by coaches).
Implemented in 2002, the Ocean Scholar program provides $6,000 in scholarship funds ($3,000 per year) to NOSB alumni who are talented academically and show interest in an ocean or marine science career. Any NOSB student, regardless of their team’s result in the competition, may apply to become an Ocean Scholar during his/her senior year. Awareness of this program component has increased exponentially and in 2005 four students were selected from 29 applicants by a panel comprised of scientists and educators. Recent recipients are currently attending college at North Carolina State University, the University of Florida, Harvard University, the University of San Diego, Duke University, Brown University, Scripps College, and California Technical Institute. NOSB hopes to fund a greater number of these scholarships in the near future.

Professional Development for Teachers/Coaches and Regional Coordinators

As mentioned in the Walters and Bishop report, NOSB should provide avenues to enhance teacher/coach learning in marine science. Recently, CORE/NOSB staff have been considering how best to address this need through our program and, with current resources, are slowly implementing professional development activities for both coaches and regional coordinators. Funding sources are being sought to strengthen this element of the program.

Coaches:

After careful review of various options, NOSB staff joined forces with the NSF-funded ARMADA program for teachers at the University of Rhode Island. The ARMADA program is a well-established, successful effort to provide teachers at-sea, laboratory, and field experiences with researchers around the world. This initial collaborative effort in 2005 will likely expand to include partnerships with other similar programs, further enhancing NOSB coach’s experiences in ocean sciences.

~ Through NOSB, teachers and marine educators gain valuable experience in marine science, furthering their ability to encourage and excite the students they work with every day. ~

In 2005, two NOSB coach applicants were selected by ARMADA/CORE staff. Of these two candidates, one accepted the offer and one did not complete the application process. The successful candidate, from New Caney High School in Texas, spent several weeks participating in a study conducted by the Gulf of Maine Research Program for the Census of Marine Life. The goal of this project was to establish a baseline record of the use of an offshore habitat by pelagic seabirds, mammals, and large fishes. This teacher is taking her experience into the classroom this fall and will also share how she incorporates what she has learned into her curriculum with colleagues and others at the NSTA conference in 2006.

Regional Coordinators:

Last year, also for the first time, NOSB was able to provide professional development opportunities for the 25 hardworking regional coordinators around the country. NOSB provided two travel assistance awards for coordinators to participate in the July 2005 NMEA conference. These individuals attended concurrent sessions and assisted with CORE/NOSB booth staffing and promotion. Likely unable to attend the conference without NOSB support, this opportunity provided these regional coordinators direct access to current marine science and education information and the chance to make quality connections with peers around the globe.

In addition, four regional coordinators were selected to accompany the top four winning teams from the national competition on their summer award trips. These coordinators assisted with overall program
management and helped to ensure a high quality experience for all participants. They also gained new experiences and knowledge in a variety of marine habitats and at several research facilities.

Providing such experiences for both the team coaches and regional coordinators is an important goal for NOSB. Through these avenues, teachers and informal marine educators gain valuable experience in marine science, furthering their ability to encourage and excite the students they work with every day.

COMMUNICATION

A prominent thread evident throughout the NOSB 2002-2004 research study is an emphasis on improving communication avenues on all levels via the national office and regional sites. In the last year, NOSB has developed a new exhibit and brochure in cooperation with the central coordinating office for the Centers for Ocean Science Education Excellence (COSEE) (housed at CORE), completely redesigned the NOSB website, and made substantial improvements to the databases for competition question management and alumni record keeping. These efforts will help us to expand our reach in sharing the work of NOSB at scientific and education meetings, better communicate with our constituents, better process internal information, and develop tools to track participant career paths over time.

LOOKING AHEAD

Over the past year significant effort has been given to budget review and analysis, including financial and growth projections for the next five years. To assist in future development of the program, CORE/NOSB will soon establish a formal NOSB advisory board and also step into the second phase of strategic planning for 2007–2011.

Additionally, attention is being given to the need to document former participants academic and career avenues. The NOSB community is now beginning to see former NOSB participants appear in the workforce, in graduate programs, and in prestigious fellowship programs such as the Sea Grant Knauss Fellowship Program. Several have returned to NOSB as volunteers. In the next year, CORE/NOSB will begin longitudinal tracking of select participants over time to develop a substantive understanding of the program’s impact on career development and selection.

From NOSB’s inception, it has been a thriving program at CORE. As the program approaches its 10th anniversary, it will continue to expose our nation’s students to the wonders of our oceans and prepare them to be leaders of the future through exceptional academic and life experiences.

For more information about the National Ocean Sciences Bowl and the 2006 competition in Pacific Grove, California, the COAST internship program, the National Ocean Scholar Program, or CORE, visit www.nosb.org.

ACKNOWLEDGEMENTS

The National Ocean Sciences Bowl is supported by nine U.S. government agencies through the National Oceanographic Partnership Program (NOPP): Minerals Management Service, National Aeronautics and Space Administration, National Oceanic and Atmospheric Administration, National Science Foundation, Office of Naval Research, Oceanographer of the Navy, U.S. Department of Energy, U.S. Environmental Protection Agency, and U.S. Geologic Survey; and by the following foundations, corporations, and organizations: Dolphin Quest, Hilton-Waikoloa Village, IEEE/Oceanic Engineering Society, Sea Education Association, Bermuda Biological Station for Research, University of Southern California’s Wrigley Institute for Environmental Studies, Great Lakes Environmental Research Lab, the Marine Technology Society, the National Marine Educators Association, and others. (per April 2005)

CORE is grateful for the continued support of these sponsors without which this program would not be possible.

Susan Haynes is the Director of the National Ocean Sciences Bowl at CORE. Formerly a marine education specialist with Virginia Sea Grant at the Virginia Institute of Marine Science, Ms. Haynes has been working with NOSB since its inception in 1998.

Susan Cook, Ph.D., is the Director of Education at CORE. Dr. Cook has prior experience working with NOSB at Harbor Branch Oceanographic Institution and served as Associate Program Officer for Ocean Education at NSF from 2001–2004.