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Written Testimony on HR 3644, the “Bay-Watershed Education and Training (B-WET) Regional Program and National Environmental Literacy Grant Program Act”

**For the
COMMITTEE ON NATURAL RESOURCES
SUBCOMMITTEE ON INSULAR AFFAIRS, OCEANS, AND WILDLIFE
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Madame Chairwoman, Members of the Subcommittee, I greatly appreciate the opportunity to testify before you today about two programs that mean a great deal to me, to my organization the Campaign for Environmental Literacy (CEL), and to many members of the education community with whom I work. You have all of our deepest gratitude for bringing the “Bay-Watershed Education and Training (B-WET) Regional Program and National Environmental Literacy Grant Program Act” forward, and our particular thanks to Congresswoman Capps for introducing this bill and yourself, Madame Chairwoman, for co-sponsoring it. We especially appreciate the efforts that your Subcommittee staff, Dave Jansen and Katherine Romans, have taken to listen carefully to members of the stakeholder community and to craft a bill that reflects the best ideas for authorizing these two programs. As a result, I would like to refer you to the attached letter from 30 national organizations and 40 state and local groups who have endorsed HR 3644 in just the past two weeks as evidence of the support their careful work has generated for this important bill.

With the help of Kevin Coyle, Anthony Cortese, and a number of others, I founded the Campaign for Environmental Literacy (CEL) in 2005 to catalyze an effective voice in Washington for environmental education's numerous stakeholders. Our original hypothesis was that environmental education can attract widespread and bi-partisan support both within Congress and the public, and our success to date has confirmed this. We founded CEL because, unlike almost all other sectors within either education or the environment, environmental education at that point had no national organization dedicated to advocating for its interests. At least partially as a result, I roughly estimate federal spending on environmental education to be currently less than 48 cents a year per capita, of which a mere 30 cents goes to the field itself in the form of competitive grants¹.

To accomplish this, CEL: 1) provides leadership and coordination to catalyze advocacy initiatives within the different sectors of environmental education, 2) develops new legislative and policy campaigns by organizing large coalitions of “grass-tops” stakeholder groups, 3) provides policy recommendations for these campaigns as well as for federal agencies, and 4) lobbies Congress to insure continued and expanded appropriations funding for federal environmental education programs.

So, after eighteen years of building and running an international field school for undergraduate environmental studies, my professional life is now devoted to helping advance federal policy and legislation related to what I summarize as "education for a green economy". President Obama has declared the transition to a clean, green economy to be his top priority, a transition which acknowledges and supports the vital connections between climate change, economic stimulus, energy security and job training. The missing link in this interconnected system is the critical role that education must play in helping to make the green economy a reality. Clearly we do not yet have a society or workforce prepared to execute this transition. Successfully navigating the transition to a green economy will require a broad base of environmentally literate citizens to make well-informed decisions as consumers, workers, business owners, investors and voters. Architects, engineers, planners, scientists, business managers, financial experts, lawyers, entrepreneurs, political leaders, resource managers and many others as well as a green manufacturing workforce will all be needed to help make this transition – not to mention environmentally literate consumers to drive the green economy. In short, our education system sends over 3 million graduates out into the workforce each year, armed with the attitudes, skills, and knowledge to advance either a green economy - or business as usual. And the impact, good or bad, of each of these 3 million individuals lasts a lifetime.

NOAA's Director of Education, Louisa Koch, has provided you with a thorough overview of the B-WET and Environmental Literacy Grants (ELG) programs and the impact they are having. I would like to offer you some context for the bill and these programs, how these programs fit into the bigger picture and why they are important to the nation and to environmental education. I will use the broad term "environmental education" (and also the term for the intended outcome of environmental education which is "environmental literacy") as shorthand for the kind of education that these two programs promote. However, that is not completely accurate.

Environmental education is a wide field of study. It cuts across many disciplines and subjects, from biology, ecology, chemistry, and geography to economics, civics, and political science, to name just a few. And it comes in many forms: ocean and marine education, conservation education, sustainability education, energy education, earth science education, climate education, environmental science education, and so on - each with its own perspective on what aspects of environmental education (and related fields) are important to learn and how it relates to the others.

The ELG program is primarily concerned with environmental education, although it is environmental education with NOAA's own take on the field. NOAA as you well know is a science mission agency largely concerned with ocean and atmospheric aspects (and increasingly climate, which integrates the ocean and atmospheric aspects). Its perspective on environmental education and ELG grant-making has thus tended to appropriately focus on these two aspects of environmental education.

The BWET program focus is on "bay-watershed education" which, as the bill explains, means "environmental education focused on watersheds, with an emphasis on stewardship of critical coastal and marine resources, including an understanding of how climate change is impacting those resources."

B-WET grantmaking and program activity has thus focused on the watershed aspect of environmental education.

Since those distinctions are time consuming to keep making in this testimony, I will stick to using "environmental education" despite the fact that it is sometimes only an approximation of what is being discussed.

The Importance of Environmental literacy in Coastal and Watershed Communities

With one of the longest coastlines in the world, the health and well-being of our coastal populations (more than 60% of all Americans) are inextricably linked with the quality of the coastal marine environment. As you are well aware, healthy oceans and watersheds are essential to human health and wellbeing. We derive critical food, minerals, and numerous "ecosystem services" from the oceans and associated watersheds. Even as we rely on these ecosystems for their resources, ocean environments around the world are collapsing as ocean ecosystems, food webs and habitats are being systematically destroyed, primarily by over-fishing, pollution, and coastal over-buildingⁱⁱ.

The world's oceans provide us with an estimated \$21 trillion of services each year, generating 70% of the oxygen we breathe and 20% of all food we eat (supplying 1/6th of the planet's population with their primary source of protein), regulating our climate, cleaning the water we drink and the air we breathe, offering us a pharmacopoeia of potential medicines, generating employment to 200 million small-scale and commercial fishers worldwide. In return, we too often treat these life-bearing and life-supporting ecosystems as garbage dumps, while raiding fish stocks with giant vacuum cleaners, disrupting critical habitat, and destroying the fundamental reproductive capacity of life in the oceans:

- More than 80 percent of pollution to the marine environment comes from land-based sourcesⁱⁱⁱ. For example, more oil pollutes the oceans each year as a result of leaking automobiles and other non-point sources than the oil spilled in Prince William Sound by the Exxon Valdez^{iv}.
- Humanity gets 20 percent of its animal protein from marine sources. Yet 75 percent of fish populations monitored by the United Nation are fully exploited, overexploited, or depleted^v.
- And at the same time, commercial US fisheries discard up to 20 billion pounds of non-target fish each year- twice the catch of desired commercial and recreational fishing combined.

These are not environmental problems per se; they are all problems of human behavior. And too often, such behavior is simply a result of widespread ignorance - ignorance of the vital role of ecosystems in providing our basic life support, ignorance of how individual behaviors combine to have massive impacts. And while ignorance can be overcome by regulation, the usual federal tool of choice, education is far more effective over the long term.

Mitigating environmental problems is also costly. For example, in the Everglades alone, the effort to *partially* restore wetland functions such as flood control, water filtration and recreational fishing will

take decades and is now estimated to cost \$600 billion^{vi}. Thus we have a prime example of Derek Bok's famous phrase: "If you think education is expensive, try ignorance."

In short, it is far more cost effective to educate people to understand the right thing to do in the first place. Consider Hurricane Katrina: NOAA can deliver the best forecast, communicate it broadly, and, if the recipients do not understand the implications of the forecast, these accomplishments are wasted.

The bottom line: we just are not educating the nucleus of talent needed for the U.S. to remain competitive, conserve scarce resources and funds, and meet the conditions being imposed on us by a rapidly changing environment – whether those changes are pollution, diminishing natural resources, climate change, or energy security.

When I was a member of the National Environmental Education Advisory Council, we drafted a Report to Congress that put it another way: "Our nation's future relies on a well-educated public to be wise stewards of the very environment that sustains us, our families and communities, and future generations. It is environmental education which can best help us as individuals make the complex, conceptual connections between economic prosperity, benefits to society, environmental health, and our own well being. Ultimately, the collective wisdom of our citizens, gained through education, will be the most compelling and most successful strategy for environmental management."^{vii}

The Nation's Environmental Literacy

How environmentally literate are graduating students in this country? While a number of prior studies have partially answered this question, the sad truth is that we really don't know the full answer. Most indications are that we fail as a nation to grasp those essential insights necessary to function on a daily level as proper stewards of our children's future. While our *awareness* of environmental issues appears to be growing, our *understanding* of those issues is not. This gap seems to be increasing at the very moment in history when it needs to be rapidly shrinking.

The best data we may have comes from a recent study by the Organization for Economic Co-operation and Development^{viii} which provided the "first comprehensive and internationally comparative database of students' knowledge about the environment and environment-related issues, including information on the sources of students' awareness of environmental science, their attitudes towards the environment and how these attitudes interrelate with their performance in environmental science." The bottom line? The average U.S. student scores only just above basic proficiency. The USA ranked 34th out of the 57 countries surveyed in both environmental science and geoscience, and is consistently below the OECD averages in almost all categories. True, we beat out Uruguay and Thailand. But we fell below Estonia, Croatia, and the Slovak and Czech Republics as well as Canada, Japan, Australia, Russia, and the UK.

While the amount of environmental education taking place in the U.S. is clearly much greater than thirty five years ago when environmental education experienced a significant boost from the first Earth Day, it does not yet result in widespread literacy. One major reason is that students rarely experience a coherent and integrated education about the environment throughout their learning years.

No research studies to my knowledge have been conducted on what makes up the typical American student's environmental learning process over their school years, but a typical student likely gets a hodgepodge of unconnected learning: several field trips at any early age to local nature centers or outdoors, several Earth Day projects, a rainforest project in fourth grade, a unit on ecology in high school biology class, perhaps some environmental chemistry, a community service activity cleaning up a pond, beach, or trail, some exposure through zoos, aquaria, museums, parks, and TV documentaries, and perhaps a college course related to the environment.

These are of course all valuable and important learning experiences, but what does this all really add up to? Missing for almost all students is an intentional "scope and sequence" to the learning that they receive over the course of their educational career. Without such a framework for delivering a coherent and intellectually rigorous learning process, our children are getting a patchwork of exposure that falls significantly short of what is needed to become environmentally literate. Thus it may come as no surprise that children today reportedly can identify over 1,000 corporate logos but fewer than 10 plants and animals native to their region^{ix}.

The General Status of Environmental Education as a K-12 Subject

To get a sense for the status of environmental education as a K-12 subject, consider an inexact taxonomy of high school subjects. In high school, "first tier" subjects are math, English/language arts and some sciences (usually "lab sciences" such as biology and chemistry). Virtually every student takes at least two, usually three, and sometimes four of each during their high school career. Second tier subjects are mostly social studies subjects like history, government, phys ed/health, sometimes economics and occasionally civics. Most but not all students take at least one of each of them. Third tier subjects are almost always electives: art, music, foreign languages, computer/technology, geography. Most students on "honors" or "AP" tracks will graduate having taken only a couple of courses in all of these subjects combined.

Environmental education is third tier subject. For example, 73,000 students took the AP exam in environmental science in 2009, significantly less than the number who took Spanish Lit, Spanish Language, European history, or statistics^x. Our k-12 schools for the most part simply are not delivering a comprehensive environmental education^{xi}.

Environmental Education and Science, Technology, Engineering and Math (STEM) education

My colleague, Kevin Coyle, has covered many of the benefits of environmental education this morning. I would like to single out the benefits of environmental education for STEM education.

When integrated into STEM curricula, environmental education demonstrably improves student engagement and student achievement in science^{xii}. Such improvement is likely due to the fact that environmental education connects classroom learning to the real world. When given a choice, students naturally (no pun intended) gravitate towards environmental topics. For example, science fair administrators note that 40 percent of all science fair projects relate directly to the environment (and the Corporation for National and Community Service reports that more than 50 percent of the service-learning programs they fund are focused on the environment).

The National Science Board of the National Science Foundation confirmed the importance of environmental education to student learning in their 2000 report, *Environmental Science and Engineering for the 21st Century*: "The twin goals of learning are to acquire knowledge and gain skills such as problem solving, consensus building, information management, communication, and critical and creative thinking. Environmental issues offer excellent vehicles for developing and exercising many of these skills using a systems approach...changes should be made in the formal educational system to help all students, educators, and educational administrators learn about the environment, the economy, and social equity as they relate to all academic disciplines and their daily lives."

The relative lack of environmental education in the U.S is one leading cause for why our students' performance in science compared to other countries does not meet our expectations. Unfortunately, the results of the "Trends in International Mathematics and Science Study" (TIMSS) issued every four years, our primary source for international comparative information on mathematics and science education in the primary and middle grades, are often embarrassing for the U.S.. We barely make the top 25% of participating nations in some scores and barely even the top 50% in other cases.

Why does the US fare so poorly in science in comparison to other countries? A 2006 study, compared the scores of our students compared to their peers in other countries as documented by the 2003 Trends in International Mathematics and Science Study (TIMSS) with their scores on the National Assessment for Educational Progress (NAEP) to find some answers. (NAEP is the United States' source for nationally representative and continuing information on what American students know and can do, and is commonly known as the Nation's Report Card.) This study found that the relative lack of environmental science education in the U.S. compared to other countries participating in TIMSS is a significant factor in the disappointing performance of U.S. students in the TIMSS scores, noting that: "As only TIMSS includes environmental science as a separate content area, there are more items in TIMSS than in NAEP that were classified in this area of the TIMSS framework, particularly at the eighth grade

^{xiii} .

Current Federal Government

Environmentally-related education (such as conservation education, ocean education, earth education, energy education, and environmental education) is supported and undertaken by at least fourteen different federal agencies, though the vast majority are very modest programs. The Departments of Agriculture, Commerce, Energy, Interior, and Transportation as well as NASA, EPA and

NSF all have legislative authority for activities that relate, if only peripherally in some cases, to environmental literacy. These agencies are prolific producers of environmental information and educational materials designed to inform the public about a wide range of environmental problems, issues and solutions. Most of these programs are oriented towards outreach and communications rather than education.

It appears that the majority of federal money invested in environmental education is spent on the following activities in descending order of investment:

- development and delivery of agency **materials, curricula, and in-house training programs**
- underwriting agency environmental **scholarships, fellowships, and internships**, which helps to address the issue of federal environmental/science workforce needs but is of lesser value in advancing environmental literacy on a broad public scale.
- For agencies other than NOAA, NSF, and the Corporation for National and Community Service, the smallest percentage of money often goes into **competitive grants for the field**

Each agency employs its own approach to advancing environmentally-related education, and each has its own mission-related reasons for supporting it. Many of us feel that environmental education should not be consigned to only one federal agency or department. The field is too wide, encompassing energy, resource management, pollution, climate change, earth science, etc., to be housed solely in one agency. Each agency/department brings its own strengths, perspectives, resources and information to the challenge of building an environmentally literate nation. NOAA for example has over 700 staff who have education included in their job responsibilities and who represent a powerful influence on the environmental literacy of NOAA constituencies.

Only two agencies - EPA and NOAA - have grant-making programs explicitly for environmental education. Three additional agencies/departments - NSF, the Department of Education, and the Corporation for National and Community Service - also have grant-making programs that have been successfully accessed by the environmental education community. (However, since the latter three and other agencies do not specify these funds for environmental education but instead include it as an eligible activity for funding, this makes it impossible to compile precise federal funding figures for environmental education).

I have been asked how the NOAA and EPA environmental education programs differ. I view the NOAA and EPA programs as representing two complementary federal approaches to achieving differing aspects of the goal of an environmentally literate nation. Both support informal and formal education, with a grant-making focus largely on k-12 audiences but also on higher education.

However, NOAA's focus, as noted earlier, is on those aspects of environmental education most relevant to its mission: watershed, atmospheric and now climate education. NOAA also brings immense and current informational resources about weather, climate, oceans, fisheries and coastal issues to their education programs.

The EPA program tends to fund traditional environmental education. This nineteen year old program has distributed about \$2 million/year for the past decade or so to one large, national educator training program and about \$3 million in mostly small (under \$25,000) grants to 150 or so grantee organizations across the country. The remaining funds appropriated each year (about \$4 million) support undergraduate and graduate internships and fellowships at EPA, the National Environmental Education Foundation, and EPA expenses. EPA also brings the benefit of an agency on the cutting edge of environmental science to its education programs, but of course the science is different.

In the final analysis, I believe that a better question is: is the federal government as a whole taking its pivotal role in creating an environmentally literate nation? All indications are that the answer to this question is no. Thus even if there is a degree of overlap, the bigger picture is that they both still are needed.

How B-WET and ELG Promote an Environmentally Literate and Engaged Citizenry

NOAA's two programs have accomplished a tremendous amount in their relatively short tenure. In BWET's eight year history, over \$40 million has been granted to 530 projects in six regions of the country. In FY08 alone, NOAA's data show that the B-WET program reached over 125,000 students and 6,000 teachers through 130 projects.^{xiv} In ELG's four year history, 59 competitive awards totaling \$25.8M have been granted. And demand for this funding is high: NOAA reports that they have only been able to fund 9% of the ELG applications received and only 7% of the requested funds since 2005.

Ms. Koch has described the accomplishments of these programs in much better detail than I ever could. I would simply like to stress one point that she made: the value of having complimentary national and regional programs. The national ELG program enables NOAA to fund projects that are national in scope and that advance ocean and watershed education as fields of study. An example is The Ocean Project's comprehensive public opinion research project, which provided findings that will help those addressing ocean conservation and climate change connect more strategically with the public for conservation education and action. Or the project to create a national model earth science lab course. Such projects can have big impacts on improving the field's practice as well as education policy, for example, but they obviously would not qualify for support from the regional BWET programs.

On the other hand, the regional programs help build local grassroots efforts with funding, coordinating, networking, training, and materials support. The regional directors develop a working knowledge of the local players, resources and needs, which can be invaluable in both grant-making and in helping new programs get established, improve, or expand. The impact of regional programs can more easily be measured in number of students and teachers reached. Local projects are also usually too small, inexperienced, or shorthanded to apply for national grants.

While these two programs are complimentary, I do not want to imply that they are identical except for their geographic differences: HR 3644 clearly describes how their purpose, focus, grant-making priorities, and structures differ.

Can this bill be Improved?

The bill largely reflects the current state of NOAA's thinking about these two programs as I understand it, so I feel the bill is fundamentally sound. The biggest change in the current programs being proposed by the bill is the creation of five new B-WET programs. I have been in touch with growing alliances of organizations in both the Alaska and Great Lakes regions and seen the letters of support for creating new programs in these regions they have sent to their Congressional delegations, so I know firsthand that there is a need and demand for at least these two new programs.

The one change that I would personally like to see is an increased attention in the bill's grant-making criteria to funding programs that focus on the relationship between the environment and the economy, or the intersection of environmental science and economics. For decades, polls have shown broad public concern for environmental issues – but they consistently show the public has a bigger concern for their pocketbooks. The public clearly views environmental progress and protection above all else as a tradeoff with economic development.

This view is perpetuated by the myth that we have to choose between "jobs and spotted owls", when the inescapable truth is that they are mutually dependent: without a healthy economy, the environment will continue to degrade over time; without a healthy environment, the economy will degrade over time. This view is perpetuated by the lack of understanding that restoring our environment and becoming a regenerative society, creating a "clean energy, green economy" as our President calls it, holds immense economic opportunity and value. I believe this great myth has held back environmental progress more than any other single misunderstanding, and will significantly hinder our transition to a clean energy, green economy.

Business leaders on the other hand increasingly recognize that an environmentally literate workforce is critical to their long term success and profitability, with better sustainability practices and improved efficiencies impacting positively on the bottom line while helping to better position and prepare their companies for the future. Charles O. Holliday, Jr., Chairman and CEO of DuPont, speaks for a growing number of his peers in declaring that: "an environmentally sustainable business is just good business, given the growing concern for environmental problems across America. A key component of an environmentally sustainable business is a highly educated work force, particularly involving environmental principles."^{xv} And the Association for Career and Technical Education reports that "the need for human capital is proving to be a barrier to the continued growth and expansion in energy efficiency and sustainability... there must be a greater focus by policymakers and business and industry leaders on providing the training and retraining necessary to help shape this new workforce and ensure the continued pipeline of skilled workers."^{xvi}

Closing:

In closing, I'd like to simply point out that, as far as I can tell, we are the first generation to leave the planet *as a whole* in worse shape that we got it. As Paul Hawken noted in a recent graduation speech, "Class of 2009: you are going to have to figure out what it means to be a human being on earth

at a time when every living system is declining, and the rate of decline is accelerating. Kind of a mind-boggling situation... but not one peer-reviewed paper published in the last thirty years can refute that statement. Basically, civilization needs a new operating system, you are the programmers, and we need it within a few decades."^{xvii} So for me, and I can only speak for myself on this, I feel a deep and abiding commitment to do all I can to at least give my children's generation the best possible tools - the knowledge and skills - to try to do a better job than we have at creating this "new operating system".

This bill takes one more step in that direction. A smart and important step. And that, at the end of the day, is why I support it.

Thank you for the wonderful opportunity to speak with you today.

ⁱ My estimates are rough because the biggest federal investment in environmental education probably comes from the National Science Foundation, and they do not report environmental education expenditures.

ⁱⁱ Multiple sources listed in the Report of the Pew Oceans Commission, 2003.

ⁱⁱⁱ NOAA Fact Sheet: <http://www.yoto98.noaa.gov/facts/pollut.htm>

^{iv} www.savethesea.org/STS%20ocean_facts.htm

^v dels.nas.edu/dels/rpt_briefs/marine_ecosystems_final.pdf

^{vi} U.S. Army Corps of Engineers

^{vii} National Environmental Education Advisory Council, Report to Congress, September 2000

^{viii} "Green at Fifteen?, How 15-year-olds perform in environmental science and geoscience in PISA 2006" (http://www.oecd.org/document/22/0,3343,en_32252351_32236191_42466966_1_1_1_1,00.html)

^{ix} American Educator, 2001

^x <http://professionals.collegeboard.com/profdownload/exam-volume-change-09.pdf>

^{xi} Interestingly, charter and magnet schools seem to be an exception: I estimate that upwards of 10% of all charter and magnet schools have a focus on environmental education.

^{xii} "Pieces of the Puzzle: An Overview of the Status of Environmental Education in the United States", Gerald Lieberman, Science Wizards, 1995. www.seer.org/pages/research/Pieces.pdf

^{xiii} "Comparing Science Content in the National Assessment of Educational Progress 2000 and Trends in International Mathematics and Science Study 2003 Assessments", U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. 2006. Executive Summary, Pages iv - vi

^{xiv} <http://www.oesd.noaa.gov/BWET/index.html>

^{xv} Holliday, personal correspondence, 2006

^{xvi} ACTE Issue Brief, October 2008

^{xvii} http://www.paulhawken.com/multimedia/UofP_Commencement_05.03.09.pdf