

# **National Oceanic and Atmospheric Administration's Bay Watershed Education and Training Program**

## **Evaluation System 5-Year Plan**

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## Introduction

This document presents the 5-year plan for developing and implementing a National Evaluation System for the National Oceanic and Atmospheric Administration's (NOAA's) Bay Watershed Education and Training (B-WET) program. In 2010, Anita Kraemer and Joe Heimlich at the Institute for Learning Innovation, in partnership with Michaela Zint at the University of Michigan, were contracted to create this evaluation plan. In mid-2012, the relationship with ILI was terminated, and the project was completed by Anita Kraemer, now with eeEvaluations, and Michaela Zint. For simplicity, the research team is referred to as ILI-UM throughout this document.

The evaluation system plan consists of several components:

- A detailed description of the B-WET program, including a cross-regional logic model
- Evaluation questions to be answered by the data collected with this system
- A data collection design, submitted to OMB for 3-year PRA clearance, including instruments and a metrics matrix organized by evaluation question, constructs, and instrument items
- A 5-year timeline including resubmission to OMB in Year 3 for extended PRA clearance

A prototype web portal for entering data and a database for storing those data are under construction. It is assumed that B-WET will update the evaluation system periodically, ideally with the guidance of an internal or external evaluation specialist.

## B-WET Program Description

The National Oceanic and Atmospheric Administration (NOAA) is an agency in the Department of Commerce with the mission: "To understand and predict changes in climate, weather, oceans, and coasts, to share that knowledge and information with others, and to conserve and manage coastal and marine ecosystems and resources" (NOAA website). The NOAA Office of Education, "in conjunction with the NOAA Education Council, coordinates education activities across NOAA and develops NOAA's Education Strategic Plan and policy. These efforts help to ensure that NOAA's education programs and activities are based on NOAA science and support the agency's cross-cutting priority of promoting environmental literacy" (NOAA Office of Education website).

One of the Office of Education's education programs is the NOAA Bay Watershed Education and Training (B-WET) program. B-WET seeks to contribute to NOAA's mission by supporting education efforts to create an environmentally literate citizenry that contributes to protecting and restoring watersheds and related ocean, coastal, and Great Lakes ecosystems. B-WET proposes that by immersing participants in a Meaningful Watershed Education Experience (MWEE), which includes learning about watersheds in an outdoor setting, participants will develop the knowledge, attitudes, and skills needed to act in ways that protect watersheds and related ocean, coastal, and Great Lakes ecosystems.

B-WET, first implemented in the Chesapeake region in 2002, is a national program that currently focuses on seven regions across the country (i.e., California, Chesapeake Bay, Great Lakes, Gulf of Mexico, Hawaii, New England, and Pacific Northwest). B-WET is managed by seven regional coordinators who are housed in different NOAA line and program offices and have responsibilities beyond managing their region's B-WET programs (see organizational chart in Appendix A). The B-WET national coordinator sits in the Office of Education and serves as a liaison between the B-WET regions and the central education office administration.

As expected of a national program, the seven regions have much in common. They have the same overarching mission, agree on outcome objectives, and on methods for achieving these outcomes (see logic model in Appendix B). More specifically, the regions' activities center on a grant program supporting MWEE-based professional development for K-12 teachers and instruction for students. These grants support projects that are aligned to state standards and directly serve K-12 teachers and students. To further support the adoption of MWEEs and/or outdoor environmental education (OEE), the regions also work with education officials as well as policy makers and/or natural resource managers. Education officials are encouraged to incorporate MWEEs and/or OEE into school, school district, state, regional, and national education policies. And policy makers and/or natural resource managers at various levels within and outside NOAA are engaged to demonstrate how MWEEs and/or OEE can help meet conservation/resource management goals. Although all of the seven regions engage, or seek to engage, in these activities, there are some differences in the extent to which that they do. These differences appear to be due to where the regions are in their respective life histories, their host office, and the amount of resources they have available (see regional descriptions in Appendix A).

As suggested earlier, B-WET's mission is "To promote environmental literacy in society: citizens exhibit behaviors that protect and restore watersheds and related ocean, coastal and Great Lakes ecosystems." The cross-regional logic model (Appendix B) visually represents B-WET's focus on six major goals towards this mission:

1. To fund projects that provide MWEEs for students and enable teachers to implement MWEEs with their students;
2. To influence institutional change and capacity building within NOAA: B-WET is recognized as an integral part of NOAA's education portfolio, a tool to meet the goals outlined in the Education Strategic Plan and the NOAA Next Generation Strategic Plan, and to meet agency mission goals;
3. To influence institutional change and capacity building within education community: EE is an essential part of instruction for both teachers and students;
4. To play a role in driving national, regional, and/or state education policies;
5. To play a role in driving national and regional environmental policies; and,
6. Establish a sustainable evaluation system.

### **B-WET Evaluation History**

NOAA B-WET has conducted project-level evaluations for several years. In 2004, B-WET California enlisted the ongoing support of an evaluation consultant to assist grantees in creating project-specific evaluations. The consultant periodically synthesizes the results from those evaluations to provide a snapshot of California B-WET program-wide impacts.

NOAA B-WET has also conducted a region-level evaluation. In 2005, B-WET Chesapeake commissioned a one-time, external evaluation of their grant-funded program (completed in 2007; <http://chesapeakebay.noaa.gov/bay-watershed-education-and-training-b-wet/evaluation>).

Presently, NOAA B-WET is focused on creating an across-region evaluation system. The B-WET Advisory Group (BWAG), composed of the national coordinator and the 7 regional coordinators, enlisted the California evaluator to facilitate a January 2010 retreat to brainstorm on evaluation needs and potential questions. The majority of the B-WET staff-generated evaluation questions pertained to the grant program (Appendix C). However, there were also a few questions about education system, education policy, and environmental policy impacts.

## NOAA B-WET Evaluation System Plan

In 2010, B-WET contracted the Institute for Learning Innovation (ILI) and the University of Michigan (UM) to develop an across-region evaluation system to be able to “serve as a long term tracking and monitoring system that may ultimately be used beyond the initial period of this contract and independent of an external evaluator” (NOAA B-WET National Evaluation System Scope of Work 2010).

The ILI-UM team began by working with the BWAG to further clarify B-WET’s theory of change underlying its program and to continue to attempt to focus the evaluation system’s questions. Clarifying B-WET’s theory of change was essential to familiarizing the evaluators with the program and its underlying assumptions and thus, to begin to offer advice with regard to what audiences and evaluation questions to focus on. To accomplish this goal, the ILI-UM team conducted 1) a content analysis of regional logic models; 2) completed interviews with all regional B-WET coordinators; 3) developed a draft B-WET cross-regional theory of change model; 4) conducted a two-day B-WET retreat to improve upon the draft cross-regional logic model and to discuss the advantages and disadvantages of focusing on different evaluation questions; and 5) engaged in ongoing dialogue with NOAA B-WET administrators.

In addition, the ILI-UM team conducted an extensive literature review of watershed-education and related research to inform the development of instruments for B-WET’s evaluation system and to help ascertain the extent to which the assumptions underlying B-WET’s MWEs may hold (see Appendix D).

A series of additional conversations and activities also focused on assessing what is known about how B-WET’s grantees may be implementing their projects. These conversations/activities were necessary because, from an evaluation perspective, it is critical to be able to link program characteristics to program outcomes.

### **Evaluation System Purpose and Users**

An evaluation’s purpose should determine the design of the evaluation, to ensure that it will meet the information and decision needs of stakeholders. B-WET’s primary purpose for creating the evaluation system is to monitor program implementation and assess outcomes so that the B-WET program can be most efficient and effective in achieving its goals. The intent of the evaluation system is therefore primarily to meet these *program improvement* goals, by providing B-WET with data to inform its grant funding strategies. Given that B-WET is a federally-funded program, however, there is also a need for B-WET to provide evidence of the benefits of its projects. A secondary evaluation purpose is therefore to provide B-WET with information to help meet *program accountability* needs.

As suggested by the above, the primary stakeholders and users of the proposed evaluation system are B-WET staff members who administer the B-WET grant program. The NOAA Office of Education also has also been identified as having a strong interest in the evaluation results and is therefore a secondary user. Grant recipients and project participants are secondary and tertiary users because the evaluation results are likely to affect their practices and experiences. There are a number of other audiences who have an interest in the evaluation results. These audiences include NOAA offices beyond the Education Office, the Office of Management and Budget (OMB), Congress, school administrators, and others.

It is also important to note that B-WET’s goal is to have in place an evaluation system that can be operated with only occasional assistance from an outside contractor.

## Evaluation System Guiding Questions

During the B-WET staff retreat in January 2010, staff agreed that they desired a “national evaluation [to] focus on aspects of the B-WET program common to all regions, particularly the B-WET Meaningful Watershed Educational Experience, or MWEE,” (NOAA B-WET National Evaluation System Scope of Work 2010) and identified a series of evaluation questions that they hoped the evaluation system could address. The majority of these questions centered on student and teacher outcomes in response to grant supported MWEEs. There were, however, also some evaluation questions that related to raising NOAA visibility and changing environmental policy as well as education systems.

Because not all of the regions are equally engaged in the latter, because evaluating the latter would require a fundamentally different approach,<sup>1</sup> and because of the desire for an evaluation system that can be operated with minimal assistance from an outside contractor, the proposed evaluation system will focus on questions about the regions’ grant programs directly serving teachers and students. The proposed evaluation system will, however, also collect preliminary data to inform future evaluation work to address B-WET staff’s remaining evaluation questions (i.e., “exploratory questions”).

The proposed evaluation system is designed primarily to answer the following four overarching questions about B-WET’s grant program:

### **MWEE Implementation Questions**

1. To what extent do regional B-WET programs support grantees in implementing Meaningful Watershed Educational Experiences (MWEEs)?
2. How are MWEEs implemented by grantees and teachers?

### **MWEE Outcome Questions**

3. To what extent do B-WET funded projects increase teachers’ knowledge of watershed science concepts, their confidence in their ability to integrate MWEEs into their teaching practices, and the likelihood that they will implement high quality MWEEs?
4. To what extent do B-WET funded projects increase students’ knowledge of watershed concepts, attitudes toward watersheds, inquiry and stewardship skills, and aspirations towards protecting watersheds?

By answering these four overarching questions, the majority of the original evaluation questions generated by B-WET staff and identified in the original Statement of Work (SOW) (Appendix C) will be addressed.

## Constructs

To answer the evaluation questions, the constructs identified in Table 1 will be measured along with background information about target audiences for descriptive and comparison purposes. The evaluation system metrics matrix has a detailed list of all constructs and the questionnaire items through which those data will be collected (Appendix E).

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<sup>1</sup> Answering questions related to changes in evaluation policy and education systems would require substantial initial qualitative work including in-depth case study research.

## NOAA B-WET Evaluation System Plan

Once baseline data are available, B-WET staff will be able to use these data to develop informed targets to serve as indicators of its program’s success.

The evaluation system can be used to collect data for NOAA Strategic Execution and Evaluation (SEE) performance measures, as well as measures currently being developed as part of the NOAA Education Monitoring and Evaluation Framework implementation effort. These draft measures include:

- Number of educators participating in professional development programs that enhance the use and understanding of NOAA science and foster stewardship.
- Number of PreK-12 students that participated in formal education programs that enhance understanding and use of climate, weather, ocean, Great Lakes, and coastal environmental information to promote stewardship and increase informed decision making.
- Number of institutions with a NOAA-funded interpretive/educational center, exhibit or program that extend the capabilities of NOAA Education to reach the public.

The final measures can be incorporated into the evaluation system instruments by the contractor hired in 2014-15 to review and update the evaluation system for resubmission to OMB for extended PRA clearance.

**Table 1. Evaluation system questions, constructs, and instruments**

Evaluation Questions	Constructs	Evaluation Instrument
To what extent do regional B-WET programs support grantees in implementing Meaningful Watershed Educational Experiences (MWEEs)	<ul style="list-style-type: none"> <li>• Grantee satisfaction and needs</li> </ul>	<ul style="list-style-type: none"> <li>• Grantee questionnaire</li> </ul>
How are MWEEs implemented by grantees and teachers?	<ul style="list-style-type: none"> <li>• Project characteristics: audience numbers, length, location, goals, etc.</li> <li>• Watershed content addressed</li> <li>• Instructional practices used by teacher/grantee during MWEEs and MWEE PD, including use of NOAA resources, environmental actions exposed to, etc.</li> <li>• Participant satisfaction</li> <li>• Grantees’ evaluation practices</li> </ul>	<ul style="list-style-type: none"> <li>• Grantee questionnaire</li> <li>• Teacher post-MWEE questionnaire</li> </ul>
To what extent do B-WET funded projects increase teachers’ knowledge of watershed concepts, their confidence in their ability to integrate MWEEs into their teaching practices, and the likelihood that they will implement high quality MWEEs?	Teachers’ self-reports: <ul style="list-style-type: none"> <li>• Knowledge of watershed concepts</li> <li>• Confidence toward MWEE instruction</li> <li>• Reported changes in MWEE practices</li> </ul>	<ul style="list-style-type: none"> <li>• Grantee questionnaire (those who conducted professional development)</li> <li>• Teacher post-professional development questionnaire</li> </ul>
To what extent do B-WET funded projects increase students’ knowledge of watershed concepts, attitudes toward watersheds, inquiry and stewardship skills, and	Grantees’ and teachers’ perceptions of students’: <ul style="list-style-type: none"> <li>• Attitudes towards watershed resources</li> <li>• Knowledge of watershed</li> </ul>	<ul style="list-style-type: none"> <li>• Grantee questionnaire (those who conducted MWEEs with students)</li> <li>• Teacher post-MWEE questionnaire</li> </ul>

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aspirations towards protecting watersheds?	concepts (physical and biological components, human influences) <ul style="list-style-type: none"> <li>• Engagement in science learning</li> <li>• Changes in stewardship behavior intentions</li> </ul>	
Exploratory: What are MWEEs' broader impacts?	Grantees' perceptions of: <ul style="list-style-type: none"> <li>• B-WET impact on regional education system and/or policy, EE practice, environment, and environmental policy</li> </ul>	<ul style="list-style-type: none"> <li>• Grantee questionnaire</li> </ul>

## Methods

### Instruments & Design

Although there are several data collection methods that would be appropriate for answering the proposed evaluation questions, the national scale of the program and the desire to conduct on-going evaluations with limited resources dictate a quantitative, questionnaire-based approach and one that is as automated as possible (i.e., collecting data through an Internet portal).

The proposed evaluation system will therefore collect data through:

- (1) a grantee questionnaire to be completed at the end of each grant period,
- (2) a teacher questionnaire to be completed at the close of teachers' professional development, and
- (3) a teacher questionnaire to be completed by professional development teachers, after they have completed a MWEE with their students (surveyed before the end of the school year or the grant period, whichever comes first).

In addition, there will be an item bank of questions designed for inclusion in questionnaires prepared and administered by grantees, to be completed by students before and after they have experienced a MWEE.

The grantee questionnaire will be "distributed" by B-WET, in that B-WET staff will prompt grantees to complete the instrument on-line. Similarly, grantees will prompt teachers to complete two questionnaires on-line. The first at the close of their MWEE professional development and the second one after teachers have completed their MWEEs – before the end of the school year and/or before the end of the grant period (whichever comes first).

As suggested by the above, teachers will be asked to complete post-test, not pre- and post-test, questionnaires. A post-test only design was selected for teachers for two primary reasons: (1) Teachers' data collection burden must be minimized to maximize response rates and thus, the ability to draw conclusions that can be generalized, and (2) Data collected from teachers will consist of self-reports, for which a retrospective pre-test approach (included in the post-test questionnaire) yields more accurate self-assessments of change (Pratt, McGuigan, and Katzev 2000; Lam and Bengo 2003; Hill and Betz 2005).

The ILI-UM team also considered collecting data directly from students. It became clear, however, that there are currently too many barriers to do so. Given that B-WET grantees and/or the teachers for whom they provide professional development reach about 45,000 students per school year, a



sophisticated sampling approach would need to be created and implemented. Creating and implementing such a sophisticated sampling approach is beyond the current evaluation system capacity due to financial and B-WET staff time constraints. Instead, the ILI-UM team developed a bank of questionnaire items (Appendix F), to be submitted for OMB PRA clearance, which can be used by grantees and teachers to collect data from their 4<sup>th</sup> through 12<sup>th</sup> grade students. One of the benefits of this approach is that grantees and teachers can create questionnaires that collect data only on those outcomes suitable for their particular MWEEs.

In addition to this item bank, the evaluation system will also provide guidance for how grant recipients can collect data from their student audiences with the help of teachers and, ideally, an independent evaluator so that these data can help answer B-WET questions related to student outcomes. This guidance will consist of the following:

- distribute the pre-test questionnaire prior to the start of the MWEE and the post-questionnaire immediately following,
- assign a unique ID to each students so that pre- and post-data can be matched,
- obtain parental permission to include students in the study,
- obtain school and/or school district permission for the study (i.e., meet school-specific requirements),
- identify a comparison group for a quasi-experimental design (preferred), and
- analyze the data and report results.

B-WET can request that grantees share subsequent evaluation reports. Results obtained through these reports can then be used as examples of how B-WET funded projects are benefitting students. Syntheses of results from individual B-WET projects will be facilitated by the fact that data on outcomes will be collected in a consistent manner (which is currently not the case).

The above described design of the proposed evaluation system was decided upon as part of a meeting in February 2012 with the BWAG, in response to a proposal by the UM-ILI team. The latter was informed by extensive consultations with University of Michigan statisticians in the Center for Statistical Consultation and Research, Institute for Social Research, and the School of Education.

### Item Development

The evaluation systems' questions, based on B-WET's logic model and MWEE characteristics, drove the selection of the constructs that the proposed evaluation system will measure. The items for measuring these constructs were, in turn, adopted or adapted from past studies, as well as newly created when suitable existing measures could not be identified (Table 2). Existing measures were adopted or adapted whenever possible to enhance the validity and reliability of the items used by the evaluation system.

Existing measures were identified through a literature review of watershed education, environmental education, science education, and professional development research (Appendix D). The review drew primarily on studies published in peer reviewed journals. Relevant evaluations such as of Chesapeake B-WET (Kraemer et al. 2007), praised for its rigorous design by the National Research Council (2010) as part of its review of NOAA's education programs, were also included.

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Initial drafts of the self-report items were reviewed to establish face and content validity by three B-WET grantees, three professional evaluators with knowledge of B-WET and/or NOAA education programs, and the nine members of the B-WET advisory group. In addition, two watershed scientists, one working for NOAA and one for UM, assessed the content validity of the initial items developed to assess students' watershed literacy.

Insights from the University of Michigan exploratory study of the benefits of MWEEs (Zint in process), which included extensive qualitative and quantitative testing of MWEE questionnaire items (including exploratory factor analysis), also informed the final choice of measures included in the B-WET questionnaires and item bank. Based on exploratory factor analyses conducted with SPSS and M+ by Zint (In process), the scales that will be used by the proposed evaluation system are expected to have good to excellent reliability (i.e., Cronbach Alpha range: .70 to .90) (Carmines & Zeller 1979; Nunally & Bernstein 1994). Similarly, because the respective factors explained a substantial amount of variance (i.e., range: 40% to 90%) in the Zint (In process) study, there exists additional support for the validity of the measures to be used by the proposed evaluation system.

**Table 2. Source of Items for Questionnaires**

	<b>Program Implementation</b>	<b>Outcomes</b>
Professional Development	<ul style="list-style-type: none"> <li>▪ Newly created from NOAA B-WET cross-regional logic model and MWEE description</li> <li>▪ From UM MWEE study which also used items modified from literature and reports on best PD practices: Penuel et al. 2007, Phillips et al. 2007, Kraemer et al. 2007, etc.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Newly created from NOAA B-WET cross-regional logic model and MWEE description</li> <li>▪ From UM MWEE study which also used items modified from literature on EE teacher outcomes: Kraemer et al. 2007, etc.</li> </ul>
Student MWEEs	<ul style="list-style-type: none"> <li>▪ Newly created from NOAA B-WET cross-regional logic model and MWEE description</li> <li>▪ From UM MWEE study which also used items modified from literature and reports on best EE practices: Kraemer et al. 2007, etc.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Newly created from NOAA B-WET cross-regional logic model and MWEE description</li> <li>▪ From UM MWEE study which also used items modified from literature and reports on EE student outcomes: Kraemer et al. 2007, etc.</li> </ul>

### Database

Data for the proposed evaluation system will be collected from grantees and teachers through the on-line questionnaires described earlier. Data collected through this Internet portal will be stored in a database which will generate a descriptive synthesis of results (for the national program overall as well as each of the regions) that B-WET staff can access. It is important to note that although B-WET award numbers will be used by the system (e.g., to link grantee and teacher data), this information will not be available to B-WET staff. That is, B-WET staff will have access to aggregate results but not to the results of specific B-WET projects. This is critical to protecting the identity of individual respondents, helping to ensure that the information they provide will be accurate. Lastly, it will also be possible for external researchers/evaluators to download data from the site for more sophisticated analyses.

A prototype of the database is currently under development by a subcontractor working with the ILI-UM team. This prototype is being designed as closely as possible to a final production site. The consultant developing the prototype is, for example, striving to meet Federal Information Security Management Act (FISMA) requirements.

It is also important to note that data collected and stored by the respective B-WET regions for internal monitoring purposes will not be used as part of the proposed evaluation system. This was decided through discussions between BWAG and the ILI-UM team in light of the fact that the fields and response options were not sufficiently consistent between regions and because of the difficulty of drawing data from multiple databases built on various platforms.

## Sampling

As part of the evaluation system, data will be collected from all current-year grantees (about 120) and their professional development participants (about 4,000 teachers). That is, a census will be conducted of each of these populations. This strategy is appropriate in light of the populations' relatively small size and the costs that would be associated with incorporating a sampling approach, including as part of the automated database.

## B-WET Grantees

NOAA B-WET will prompt grantees to complete the web-based questionnaire once per year (toward the end of the grant period) to answer questions about grantees' satisfaction, project implementation, and perceived participant outcomes. One representative from each grantee organization will complete the online questionnaire, directly entering their responses into the database's web portal. The portal will automatically generate up to two reminders.

## Teacher Participants

B-WET needs to encourage grantees to collect data from the teachers participating in their MWEE professional development. More specifically, grantees should be advised to prompt their teachers (through the on-line database) to complete the post-professional development questionnaire at the close of their professional development experience or by the end of the grant year, whichever comes first. Moreover, they will need to prompt (again through the on-line database) these same teachers to complete the post-MWEE questionnaire after they have completed MWEEs with their students or by the end of the school or grant year, whichever comes first.

B-WET will supply each grantee with the email text and survey link to distribute to their teacher-participants. The survey link will have the B-WET award number embedded in it so that the teachers' data can be linked to the grantee's data.

## Response Rates

For the evaluation system results to be representative of the grantee and teacher populations, a sufficient number of invited respondents must complete the questionnaires. The Office of Management and Budget, which reviews and approves NOAA evaluation studies, seeks response rates of about 60-70% (Brabson 2012) and requires that if fewer than 80% of invited respondents respond, the data collectors must conduct a nonresponse analysis (OMB 2006). Non-response analyses are time consuming and add additional cost to projects. Therefore it is best to avoid the need for such a study. The evaluation system design and questionnaires have been developed with this in mind. However, it will be important that the B-WET national coordinator, regional coordinators, and grantees do what they can to ensure that the above response rates are met. For one, we believe it will be essential that B-WET require grantees to participate to the extent possible and that B-WET encourages grantees to include a similar requirement for its teachers.

Lastly, incentives, such as financial compensation, are known to increase response rates. B-WET grantees will be encouraged to include an incentive for teachers to complete questionnaires. For example, if they offer stipends to their professional development teachers, they can include a request that teachers complete the questionnaire to receive the payment. Alternately, when the grantees distribute the questionnaires to the teachers, they could provide small incentives valued at \$5 or less, such as a t-shirt or gift card, to encourage teachers to complete the questionnaire.

Should the proposed evaluation system not result in the desired response rates, an evaluation consultant should be hired to explore alternative designs and means for addressing this challenge.

### Data Analysis and Reporting

The evaluation system will generate descriptive statistics based on data collected from grantees and teachers. Both national and regional descriptive statistics will be available to all B-WET staff. The evaluation system will also generate a list of qualitative responses. In addition, data will be available for export so that professionals with expertise in quantitative and qualitative analysis can conduct more sophisticated analyses. The latter may be needed to answer B-WET’s more challenging evaluation questions.

Periodically, an external contractor (evaluator or researcher) should be hired to (1) verify the validity and reliability of the data collected and (2) conduct an in-depth qualitative study (e.g., using interviews or focus groups) to add interpretation and context to the data collected using the online questionnaires and to uncover any undocumented program outcomes. The specifications for the contractor’s scope of work should be informed by the evaluation system.

### Evaluation System Maintenance

NOAA technical staff will likely be needed to assist with issues that may arise in maintaining and improving the on-line database.

### 5 Year Timeline

Once the evaluation system has been approved by OMB, the execution of the system is proposed to consist of an iterative process (Table 3). Data will need to be collected by B-WET funded grantees and teachers. B-WET will need to institute processes to prompt grantees to participate and to encourage grantees to support their teachers’ participation. It will also be important for B-WET to monitor the growing database and to consider hiring an external contractor (evaluator or researcher) to conduct an “audit” every other year, at least, to assess the current-year relevance of the data collected, make any needed modifications to the system, and provide additional data analyses to answer more sophisticated questions B-WET may have about MWEE implementation and outcomes. Finally, since OMB PRA clearance can only be obtained for 3 years, NOAA will need to submit a request for renewal in 2015-2016.

**Table 3. Timeline for 5-year evaluation system plan**

<b>2012-13</b>	<b>2013-14</b>	<b>2014-15</b>	<b>2015-16</b>	<b>2016-17</b>
Submit evaluation system plan with instruments to OMB in 2012; 3-year	B-WET use of evaluation system	Hire contractor to conduct sophisticated analyses of data, produce an initial	Submit modifications to OMB for 3-year renewal	Final evaluation system in place

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approval expected by spring 2013	report, review evaluation system, and recommend adjustments to improve use
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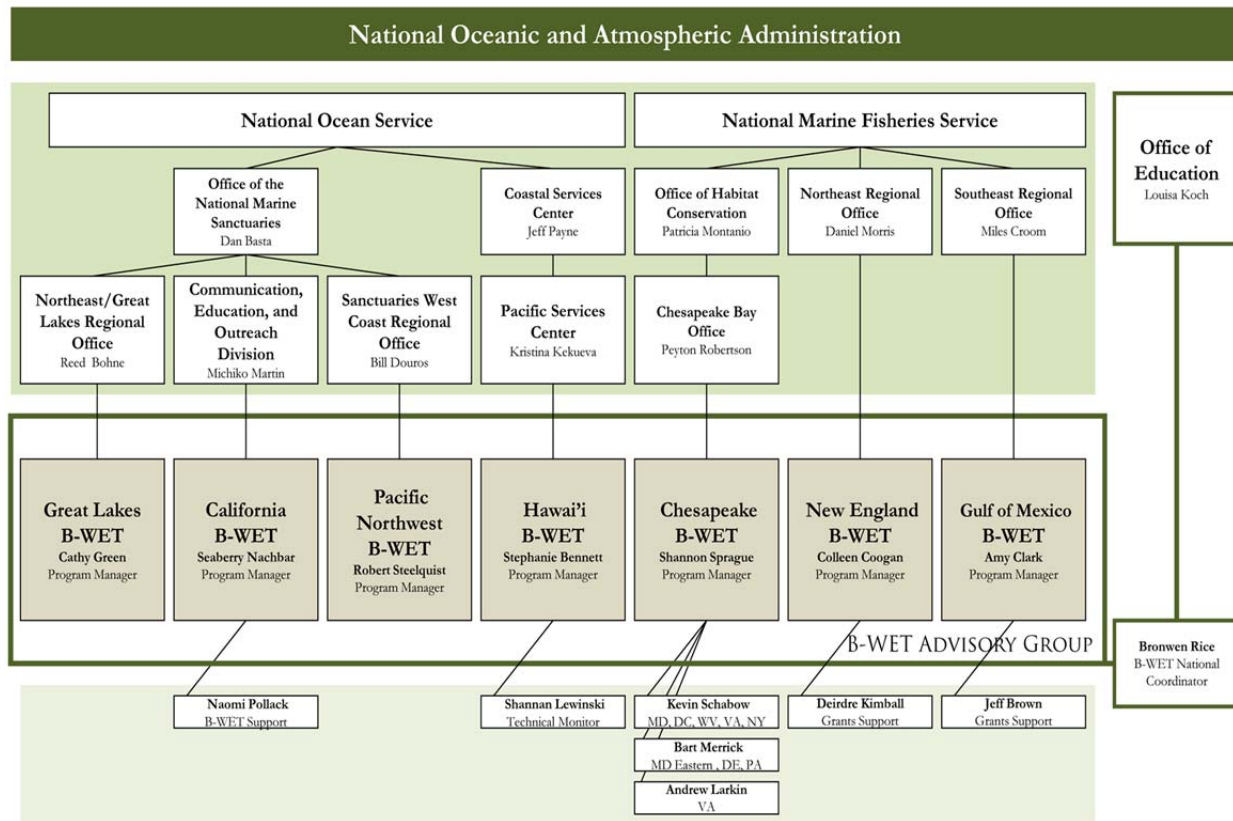
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## Appendix A: NOAA B-WET Multi-Regional Structure

### NOAA BAY WATERSHED EDUCATION AND TRAINING PROGRAM ORGANIZATION CHART



Each of the seven regional programs has been designed to maximize the impact of existing NOAA resources and align with NOAA priorities in the region. Therefore, differences between them are due to the characteristics and environmental priorities of the regions they represent and the goals of the respective line and program offices in which they are housed:

The *California* region is managed by NOAA's Office of National Marine Sanctuaries and requires that grantees' MWEs incorporate visiting and learning about the region's sanctuary, has encouraged grantees to focus on multicultural and underserved audiences, and has a grant program for adult audiences (e.g., business executives, policy makers) so they may learn about local watershed and water quality issues through MWEs. Grantees are encouraged to focus not only on local watersheds but also emerging ocean issues, for example ocean acidification, climate change, and marine debris. The region has also provided its grantees with extensive evaluation support, to build capacity among grant recipients. B-WET California supports the West Coast Governor's Agreement on Ocean Health and the state mandated CA Environmental Education Initiative.

The *Chesapeake* region requires that grantees provide integrated MWEs (i.e., ones that combine teacher professional development and student instruction) that focus on local watersheds. However, the Chesapeake region also supports grants to strengthen the capacity of organizations to advance MWEs/OEE at the state/regional level as well as grants that strive to systemically integrate MWEs/OEE within schools. B-WET Chesapeake also supports related policy coordination work. For

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example, since 2003 NOAA has led the Chesapeake Bay Education Workgroup, which brings together federal, state, university, and nonprofit partners to plan for and coordinate the implementation of MWEEs. In 2010, NOAA was designated as the federal lead to develop an Elementary and Secondary Environmental Literacy Strategy in the Chesapeake in support of the Chesapeake Bay Executive Order (Executive Order 13508). This policy work has been made possible in large part because of the financial investment that B-WET has afforded the agency and has been important to coordinating the efforts in the Chesapeake Bay at both the federal and state levels.

The *Great Lakes* region is managed by NOAA's Office of National Marine Sanctuaries, and is the newest B-WET program, offering its first round of competitive grants for projects in 2012. Initial funding for this region comes from the Environmental Protection Agency, through the Great Lakes Restoration Initiative (GLRI). The Great Lakes region requires that through MWEEs taking place in the Great Lakes watershed, grantees support the goals, strategies, and principles of the GLRI Action Plan, as well as align with the Great Lakes Literacy Principles.

In the *Gulf of Mexico* region, the NOAA Fisheries Service Southeast Regional Office manages the B-WET Program, focused on the needs of the area defined by the Gulf of Mexico Alliance, the NOAA Gulf of Mexico Regional Collaboration Team, and by natural and man-made events such as hurricanes and the recent oil spill.

The *Hawaii* region is administered by the NOAA Pacific Services Center. In addition to focusing on the local watershed (as culturally defined), grantees are encouraged to contribute to both ocean and climate literacy principles that support efforts to increase environmental awareness and community resilience in the region. The NOAA Pacific Services Center environmental literacy program has also supported the development of a marine science education curriculum aligned to national and state standards to ensure that teachers have access to such a resource that complements regional B-WET projects.

In the *New England* region, the NOAA Fisheries Service Northeast Regional Office manages the B-WET Program, integrating ocean literacy principles with NOAA Fisheries regional priorities. This B-WET program highlights the importance of watersheds from upstream through to the estuarine and oceanic ecosystems, supporting the marine fisheries that are economically and culturally important to this region.

The *Pacific Northwest* region, managed by NOAA's Office of National Marine Sanctuaries, encourages the use of these special places and their staff to promote ocean literacy and foster the development of Science, Technology, Engineering, and Mathematics (STEM) education in communities in Oregon and Washington. The program funds mostly smaller organizations, partly to build their capacity to deliver MWEE/OEE instruction. The program also supports organizations serving mostly smaller communities to help ensure that K-12 teachers and students in these settings also have access to MWEE/OEE experiences (compared to those in larger communities). Pacific Northwest B-WET is supporting the West Coast Governor's Agreement on Ocean Health.

**Appendix B: Cross-Regional NOAA B-WET Logic Model: Key Characteristics Common across Regions**  
***INCLUDING EVALUATION QUESTIONS IDENTIFIED BY B-WET STAFF IN 2010***

**NOAA B-WET Mission:** To promote environmental literacy in society: citizens exhibit behaviors that protect and restore watersheds and related ocean, coastal and Great Lakes ecosystems.

**Cross-Regional B-WET Program Logic Model**

NOAA B-WET Goals	Inputs/Resources (What B-WET invests)	Activities/Outputs (What B-WET does)	Audience/ Participation (Who B-WET reaches)	Short-term Outcomes (Changes in Knowledge, Attitudes, Skills, Aspirations)	Mid-term Outcomes (Changes in Behaviors)	Long-term Outcomes (Changes in Conditions)
<b>B-WET-funded projects provide MWEEs for students and enable teachers to implement MWEEs with their students</b>	<p>B-WET funding</p> <p>Regional and national B-WET staff</p> <p>NOAA resources (i.e., data, products, places, tools, and personnel)</p> <p>Regional partners</p>	<p>B-WET staff:</p> <ul style="list-style-type: none"> <li>• Create and distribute targeted FFOs,</li> <li>• lead expert panel to review proposals,</li> <li>• fund increased number of improved proposals,</li> <li>• monitor awards for alignment with proposed deliverables, and</li> <li>• use this and other information from grantees for program improvements</li> </ul> <p>Assist regional EE providers with developing high quality B-WET proposals (e.g., hold grant training and other workshops, review proposals, inform grantees about relevant NOAA and other partners' resources)</p> <p>Create networks/foster partnerships among grantees (e.g., grantees share what they learned with others)</p> <p>Disseminate information about B-WET and MWEEs</p>	<p>Regional EE providers with the knowledge/skills to implement MWEEs and/or to offer MWEE professional development</p> <p>Regional grantees (EE providers who receive B-WET grants)  <b><i>Q1: Satisfied, Needs?</i></b></p>	<p>EE providers are aware of the B-WET funding opportunity and proposal requirements</p> <p>EE providers have the knowledge/skills to develop high quality B-WET proposals</p> <p>EE providers are aware of relevant NOAA resources to enhance their educational activities</p>	<p>EE providers apply for and receive B-WET funding</p> <p>EE providers have the knowledge/skills to use NOAA resources to enhance educational activities</p>	<p>Grantees implement MWEEs and use NOAA resources as part of their educational activities, increasing the number of teachers and students experiencing improved MWEEs</p> <p><b><i>Q2: Implementation challenges/needs?</i></b></p> <p><b><i>Q10: Using NOAA science/resources?</i></b></p> <p><b>(see Grantee logic model below)</b></p>



NOAA B-WET Evaluation System Plan

NOAA B-WET Goals	Inputs/Resources (What B-WET invests)	Activities/Outputs (What B-WET does)	Audience/ Participation (Who B-WET reaches)	Short-term Outcomes (Changes in Knowledge, Attitudes, Skills, Aspirations)	Mid-term Outcomes (Changes in Behaviors)	Long-term Outcomes (Changes in Conditions)
<p><b>To influence institutional change and capacity building internal to NOAA: B-WET is recognized as an integral part of NOAA's education portfolio, a tool to meet the goals outlined in the Education Strategic Plan and the NOAA Next Generation Strategic Plan and agency mission goals"</b></p>	<p>B-WET staff  NOAA Education Strategic Plan  NOAA Next Generation Strategic Plan  Evaluation results</p>	<p>B-WET participates in the NOAA budget process  Provide presentations to NOAA leadership, councils  Participate actively in NOAA Education Council  Incorporate agency strategic plan education priorities into FFOs</p>	<p>NOAA leadership including Office of Education, Education Council, and related groups</p>	<p>NOAA leadership is knowledgeable about how B-WET contributes to meeting NOAA objectives</p>	<p>NOAA leadership considers B-WET to be an integral part of the NOAA education portfolio (e.g., B-WET is effectively incorporated into the NOAA budget process)</p>	<p>NOAA values education as a means to achieve its mission goals.</p>
<p><b>To influence institutional change and capacity building in the education community: environmental education is an essential part of instruction for both teachers and students.</b></p>	<p>B-WET staff  Existing regional education policy  Evaluation results</p>	<p>Meet with state agency and regional education representatives and administrators to encourage them to support environmental education  Disseminate results of B-WET evaluations</p>	<p>B-WET regions':  School district administrators  State agency education representatives</p>	<p>B-WET regions' school district administrators and state agency education representatives have:</p> <ul style="list-style-type: none"> <li>• increased, consistent understanding of MWEES</li> <li>• Increased understanding of MWEES' and environmental education's role in supporting learning and academic achievement</li> </ul>	<p>State and/or school district standards are revised to support environmental education  Growing number of school systems and environmental education providers use environmental education to meet educational objectives</p>	<p>Environmental education is a systemic part of students' curriculum <i>Q14: MWEES institutionalized in schools/systems</i></p>

NOAA B-WET Evaluation System Plan

NOAA B-WET Goals	Inputs/Resources (What B-WET invests)	Activities/Outputs (What B-WET does)	Audience/ Participation (Who B-WET reaches)	Short-term Outcomes (Changes in Knowledge, Attitudes, Skills, Aspirations)	Mid-term Outcomes (Changes in Behaviors)	Long-term Outcomes (Changes in Conditions)
<p><b>To play a role in building capacity for driving national, regional, and/or state education policies</b>  <i>Q12: B-WET advancing EE efforts in region?</i></p>	<p>B-WET staff  Evaluation results</p>	<p>Participate in regional education policy development (e.g., education workgroups, state environmental literacy plan development, regional support of No Child Left Inside initiative)</p>	<p>National, regional, and state education representatives</p>	<p>National, regional, and state education representatives are aware of success/outcomes of MWEES</p>	<p>B-WET and environmental education are identified as a means to meet regional and state education policy objectives</p>	<p>National, regional, and/or state education policy supports environmental education (e.g., states have environmental literacy plans)</p>
<p><b>To play a role in building capacity for driving national and regional environmental policies</b>  <i>Q12: B-WET advancing environmental policy in region?</i></p>	<p>B-WET staff  Evaluation results  NOAA regional teams</p>	<p>Participate in regional environmental policy development (e.g., Presidential executive orders, regional agreements)  Engage regional resource managers in B-WET activities</p>	<p>National, regional, and state policymakers and natural resource managers</p>	<p>Policy makers and resource managers are aware of success/outcomes of B-WET and MWEES</p>	<p>B-WET and environmental education are identified as a means to meet environmental policy objectives</p>	<p>Education plays a role in the achievement of outcomes in environmental stewardship and management</p>
<p><b>Establish a sustainable evaluation system</b></p>	<p>B-WET staff  External evaluators  Evaluation plan  <i>Q3: Internal grant tracking appropriate?</i></p>	<p>Participate in the development of the B-WET evaluation system and engage in actions necessary to implement it (e.g., encourage and support participation by grantees)</p>	<p>B-WET staff  Grantees</p>	<p>B-WET staff support evaluation system (e.g., encourage grantees to use it)  B-WET staff have the knowledge and skills to use the evaluation system and support their grantee's participation  Grantees have the knowledge and skills to evaluate their programs, in ways consistent with the evaluation system</p>	<p>B-WET staff and grantees use evaluation systems (e.g., its measures, input data)  B-WET staff use evaluation results to meet accountability and program improvement needs (e.g., programs are adjusted based on insights into "best practices")  B-WET staff maintain/improve evaluation system</p>	<p>Evaluation system is sustained and continues to meet program improvement and accountability needs</p>

NOAA B-WET Evaluation System Plan

**Cross-Regional Grantee Logic Model**

Grantee Goals	Inputs/Resources	Activities/Outputs	Audience/ Participation	Short-term Outcomes (Changes in Knowledge, Attitudes, Skills, Aspirations)	Mid-term Outcomes (Changes in Behaviors)	Long-term Outcomes (Changes in Conditions)
<p><b>Teachers are more environmentally literate and teach students to be environmentally literate</b></p>	<p>B-WET Funding</p> <p>EE providers and their resources</p> <p>NOAA resources (i.e., data, products, places, tools, and personnel)</p>	<p>Grantees provide MWEE professional development that is based on current NOAA scientific information and use NOAA resources</p> <p><i>Q2: Implementation challenges/needs?</i></p> <p><i>Q10: Using NOAA science/resources?</i></p>	<p>K-12 teachers</p> <p><i>Q8: Satisfaction</i></p>	<p>K-12 teachers:</p> <ul style="list-style-type: none"> <li>- have the pedagogical methods and content knowledge to implement MWEEs</li> </ul> <p><i>Q5: “ watershed as system” knowledge</i></p> <ul style="list-style-type: none"> <li>- Know why MWEEs are beneficial and effective at achieving education and environmental literacy outcomes (e.g. how they can be used as means to meet education standards)</li> <li>- have positive attitudes towards MWEEs (e.g., confidence to teach outdoors)</li> </ul> <p><i>Q6: Confidence to implement MWEES?</i></p> <ul style="list-style-type: none"> <li>- are aware of relevant NOAA resources to enhance MWEE experiences</li> </ul> <p><i>Q11: Raise knowledge about NOAA, visibility?</i></p> <ul style="list-style-type: none"> <li>- intend to implement MWEEs</li> </ul>	<p>K-12 teachers implement MWEEs, use NOAA resources and continue to do so after no longer receiving support from B-WET grantees</p> <p><i>Q7: Implement full MWEES – which most frequently?</i></p> <p><i>Q13: B-WET, MWEE result in behaviors that protect watersheds?</i></p>	<p>K-12 teachers are environmentally literate citizens who provide MWEE instruction to students and engage in behaviors that protect and restore ocean, coastal, and/or Great Lakes watersheds</p>

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Grantee Goals	Inputs/Resources	Activities/Outputs	Audience/ Participation	Short-term Outcomes (Changes in Knowledge, Attitudes, Skills, Aspirations)	Mid-term Outcomes (Changes in Behaviors)	Long-term Outcomes (Changes in Conditions)
<p><b>Students are more environmentally literate</b></p>	<p>B-WET Funding</p> <p>Grantees and/or K-12 teachers who implement MWEEs and their resources</p> <p>NOAA resources (i.e., data, products, places, tools, and personnel)</p>	<p>Grantees and/or K-12 teachers implement MWEEs and use current NOAA resources</p> <p><i>Q2: Implementation challenges/needs?</i></p> <p><i>Q10: Using NOAA science/resources?</i></p>	<p>K-12 students</p> <p><i>Q8: Satisfaction</i></p>	<p>K-12 Students:</p> <ul style="list-style-type: none"> <li>- have the knowledge and skills to protect and restore ocean, coastal, and/or Great Lakes watersheds</li> <li><i>Q4: Earth/Systems/STEM knowledge, standardized tests?</i></li> <li><i>Q5: watershed as system knowledge?</i></li> <li><i>Q6: inquiry skills?</i></li> <li>-have the attitudes, beliefs, values, and motivations to protect and restore ocean, coastal, and/or Great Lakes watersheds</li> <li><i>Q9: Attitudes toward watershed?</i></li> <li>- intend to act in ways that protect and restore these resources</li> </ul>	<p>Students make decisions and engage in behaviors that protect and restore ocean, coastal and/or Great Lakes watersheds</p> <p><i>Q9, Q13: B-WET, MWEE result in behaviors that protect watersheds?</i></p>	<p>Students develop into environmentally literate adults who engage in behaviors that protect and restore ocean, coastal and/or Great Lakes watersheds</p>

**NOTES:**

Audience and environmental education definitions are below.

Audience satisfaction with NOAA activities is assumed to be a part of the Audience/Participation column.

## NOAA B-WET Audiences

**B-WET staff:** National coordinator; Regional coordinators and associated staff and colleagues (see B-WET organizational chart)

**Grantees:** Organizations that receive B-WET funds

**NOAA leadership:** Under Secretary of Commerce for Oceans & Atmosphere and Administrator, line office directors, program managers, administrators, undersecretary's office, regional collaboration team lead (across line offices, e.g., NART), regional office directors, fishery science center directors and their deputies

**NOAA Office of Education:** Director, deputy director, assistant director, senior program managers, B-WET national coordinator

**National, regional, and state education representatives:** Representatives from professional organizations advocating for policy changes (such as National Science Teachers Association, Campaign for Environmental Literacy, NAAEE, *Mid-Atlantic Marine Education Association*, *Maryland Association for Environmental and Outdoor Education*, etc.)

**Regional EE providers** (especially underserved): NOAA National Marine Sanctuaries, NOAA National Estuarine Research Reserve System, NOAA SeaGrant, B-WET grant recipients, other national organizations' state representatives, regional scale nonprofits, aquariums, science centers, etc.

**Regional policymakers and resource managers:** Set agenda for regional natural resources, external and internal to NOAA (e.g., Inter-tribal organizations, federal sanctuaries managers, regional alliances such as Chesapeake Bay Program)

**School district administrator:** Superintendent, assistant superintendent, curriculum coordinators (note: Hawaii B-WET works directly with school principals)

**State agency education representative:** State department of education employees such as state science curriculum coordinator or environmental education coordinator; Education representatives in other state agencies (e.g., natural resources, environment, etc.)

**Teachers:** K-12 school teachers

## Definitions

**Environmental education** is the study of the relationships and interactions between dynamic natural and human systems. Environmental Education promotes environmental literacy: a fundamental understanding of the systems of the natural world, the relationships and interactions between the living and non-living environment, and the ability to understand and utilize scientific evidence to make informed decisions regarding environmental problems.

Environmental education:

- Includes learning in the field as well as the classroom
- Incorporates the teaching methods of:
  - **Outdoor education**
  - **Experiential learning** (Experiential education programs engage learners in constructing meaning by immersing them in direct and meaningful hands-on experiences. This experiential approach incorporates learning using real-world problems and interaction with natural phenomena.)
  - **Place-based education** (Immerses the learner in local heritage, culture, landscapes, opportunities, and experiences as a foundation for the study of language arts, mathematics, social studies, science, and other subjects. This method of instruction encourages participants to use the schoolyard, community, public lands, and other special places as resources, turning communities into classrooms.)
- Is inherently interdisciplinary
- Promotes school/community partnerships
- Is hands-on, student-centered, inquiry driven, engages higher level thinking skills, and relevant to students' everyday lives
- Develops awareness, increases knowledge, builds skills, and creates the capacity for stewardship and good citizenship regarding the environment upon which we depend for life support.
- Helps address the causes of “nature deficit disorder”
- Boosts student achievement in math, science, reading, writing and social studies

Sources: No Child Left Inside Coalition definition of *environmental education* (<http://www.cbf.org/Page.aspx?pid=946>), NOAA Education Strategic Plan 2009-2029 ([http://www.oesd.noaa.gov/NOAA\\_Ed\\_Plan.pdf](http://www.oesd.noaa.gov/NOAA_Ed_Plan.pdf)), Association for Experiential Education (<http://www.aee.org/>), Place-based Education Evaluation Collaborative definition ([http://www.peecworks.org/PEEC/Benefits\\_of\\_PBE-PEEC\\_2008\\_web.pdf](http://www.peecworks.org/PEEC/Benefits_of_PBE-PEEC_2008_web.pdf))

## Appendix C: Evaluation Questions from Scope of Work

### Evaluation Questions

The following provides detail on specific evaluation questions the B-WET program would like to answer. From these questions potential evaluators will get a sense of our critical questions and our priorities; however we are aware that in the ultimate evaluation design some of these may need to be rearranged, combined, or changed. Some level of flexibility remains to modify these questions based on feedback from the evaluator.

#### Evaluating Program Implementation:

In 2010, the NOAA B-WET program will continue an internal effort to characterize our grant investments and collect baseline information that can be used to report on program activities and serve as a resource of basic program information to support future evaluation efforts. This will likely take the form of an internal grant tracking database. The design, population, and maintenance of this system will be conducted outside the scope of this contract but in consultation with the contracted evaluator. The B-WET program will seek guidance on the most appropriate information to collect to address the evaluation questions outlined in this document. Please see Appendix 2: *Internal Implementation Evaluation Effort*.

In addition to guidance on these internal efforts, B-WET seeks the assistance of an evaluator to answer the following questions related to the *Reactions* level of Bennett's framework.

#### Implementation Questions:

1. Are B-WET grantees satisfied with B-WET program tools and services (e.g., grants process, responsiveness of and communication with B-WET staff, grants on-line system, trainings, web-based information, etc.)? Are their needs being met, given current funding constraints?
2. What programmatic challenges do grant recipients face while implementing their projects? Are there other services or tools that B-WET could provide to help grant recipients meet their project implementation challenges?
3. Is the information we propose to collect in our internal grant tracking system the right data to guide and/or to measure B-WET performance and progress relative to the desired outcomes?

#### Evaluating Program Outcomes:

Beyond the level of program implementation, B-WET needs to begin collating information that will allow us to draw conclusions about higher level program outcomes. To this end, we require the assistance of an evaluator to address the following questions related to the *Reactions, KASA, Practices, and SEE levels of Bennett's framework*. Recognizing that many of these are challenging, we have prioritized them according to what we would most like to know about our program.

#### High Priority Outcome Questions:

1. Does B-WET increase students' understanding of general earth system science concepts and/or improve standardized test scores or other measurable performance standards related to Science, Technology, Engineering, and Math (STEM) disciplines?
2. Does B-WET programming improve understanding in students and teachers of the watershed as a system?

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3. Does B-WET programming improve students' inquiry skills, such as critical thinking? Do B-WET professional development workshops increase teachers' confidence to integrate MWEEs into their teaching practices?
4. Do B-WET trainings result in teachers implementing full MWEEs with their students? If not, which components are most often implemented?
5. Are teachers (students, community members) participating in B-WET projects satisfied?
6. Do student attitudes, behavior, and/or decision making regarding watershed resources change as a result of MWEEs?
7. Are grantees using up to date NOAA scientific information and products in the delivery of their programs?
8. Does the B-WET program increase NOAA visibility, knowledge about NOAA or improve NOAA's image in a community? Does it raise visibility of NOAA programs, products, and/or services?
9. Does B-WET advance environmental policy in a region? Is it affecting and advancing environmental education efforts in the region where it operates?

### **Evaluating Program Impacts:**

B-WET has also developed some longer term/larger scope evaluation questions that examine effects of the program beyond the immediate outcomes outlined in the Bennett model. Though these are outside the scope of the current evaluation contract, these will be helpful for potential evaluators to know in order to provide guidance on the other stages of evaluation, so that we are collecting the information we may need to approach these questions at some point in the future.

### High Priority Impact Questions:

1. Does a MWEE delivered through the B-WET program result in citizens who exhibit behaviors that protect and restore ocean, coastal, and Great Lakes watersheds?
2. To what degree does teachers exposure to the B-WET program result in MWEEs becoming institutionalized in schools/school systems?
3. How many contact hours (and over what duration) with participants (students and teachers) are necessary to have a positive impact (taking into account age, socioeconomic, and cultural differences)?
4. Are different MWEEs/components of MWEEs/methods needed to involve different cultures, socioeconomic sectors, and urban/rural/suburban communities? If so, what are they?
5. Taking into account the variety of projects that B-WET funds, which project types (e.g. boat-based, after school, schoolyards, outdoor camps) are most effective at increasing environmental stewardship, and what makes them so? Which types are more "meaningful?"
6. Which project types/teaching methods are most effective at each age/grade level?



## Appendix D: Literature Review

### A literature review of watershed education-related research to inform NOAA B-WET’s evaluation system

Completed September 2011 for NOAA B-WET by:

Dr. Michaela Zint, University of Michigan

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## Executive Summary

NOAA B-WET funds and supports Meaningful Watershed Education Experiences (MWEEs) to increase students' and teachers' knowledge, attitudes, and skills so that they will act in ways to protect watersheds and related ocean, coastal, and Great Lakes ecosystems.

This literature review of watershed education and related research was conducted primarily to inform B-WET's evaluation system. More specifically, we sought to learn how constructs of interest have been measured in reliable and valid ways. However, in light of B-WET's desire to learn what research suggests about the potential effectiveness of MWEEs, the review also addresses this question.

***Research supports that B-WET's focus on watershed education is very much warranted. There is a great need for enhancing individuals' watershed literacy and this need is unlikely to be sufficiently met through formal education and other national environmental education programs.***

- U.S. adults and children are not “watershed literate,” they lack the knowledge necessary to understand issues related to water quality, point and non-point source pollution, as well as the impact of land use practices and personal actions on watersheds. They are therefore also unlikely to recognize the need for a watershed-based management approach.
- Watershed education concepts have limited representation in K-12 national and state standards and the few instructional resources that teachers can choose from tend to be national in scope; i.e., they tend not to be place-specific, locally-relevant, or linked to relevant education standards.

***“Literacy” initiatives and watershed education research provide insight into the understanding individuals need to be considered scientifically “watershed literate.”***

- Based on our review, we propose that a watershed literate individual should be able to 1) define the term “watershed”, 2) identify their local watershed(s), 3) identify how watersheds are connected to the ocean via streams, rivers, and human-made structures, 4) identify the functions that occur in a watershed (transport, store, and cycle water), 5) recognize that both natural processes and human activities affect water flow and water quality in watersheds, 6) identify connections between human welfare and water flow and quality, 7) identify possible point and non-point sources of water pollution, 8) identify actions individuals can engage in to protect/restore water quality in watersheds, and 9) identify how humans seek to manage watersheds

***It is important to note, however, that while scientific literacy may be necessary for individuals to act to protect watersheds and related ocean, coastal, and Great Lakes ecosystems (B-WET's desired longer-term outcome), it is unlikely to be sufficient.***

- Research suggests that environmental education programs need to have the following characteristics, if they are to have behavioral outcomes:
  - explicit behavioral outcome objectives,

- driven by behavior theories/models,<sup>2</sup>
- consider participants' needs, context and background,
- incorporate experiential learning and
- be longer<sup>3</sup> in duration.

***Studies confirm that watershed education can have the types of benefits B-WET expects its funded projects to have for both students and teachers – to the extent that they incorporate certain instructional and professional practices.***

- Potential benefits consist of improved students and teachers understanding of watersheds (as defined above and consistent with national science standards) and enhanced environmental attitudes, sense of environmental stewardship, and responsible environmental behaviors.
- Instructional practices leading to these outcomes include 1) place-based authentic hands-on science inquiry with sufficient opportunities to examine and discuss data, 2) outdoor learning experiences that include preparation and reflection phases as well as the nature of the experience itself (e.g., appropriate amount of structure, opportunities to directly interact with environment, facilitating and role modeling by educators), 3) demonstrations/models that make invisible parts of watershed systems visible, 4) use of instructional technologies, and 5) service learning. To achieve behavioral outcomes, in addition to learning outcomes, programs should also have the characteristics outlined earlier. Finally, programs that are longer tend to be more effective than shorter programs.
- Professional development needs to provide teachers with the knowledge and skills they perceive as necessary to conduct outdoor field investigations with their students, including involving them in experiences similar to those they are expected to engage in with their students (e.g., collecting and analyzing watershed data). Effective subsequent implementation is likely to depend on teachers' perceptions about how well aligned the proposed activities are with their own goals and the goals they have for their students, the extent to which they had time, as part of the professional development, to plan for implementation, as well as on a number of other characteristics. Finally, 30 or more contact hours have been associated with perceived increases in teachers' knowledge and skills.

Altogether these findings support the effectiveness of the practices that B-WET advocates for through its MWEs for students, such as the inclusion of outdoor, inquiry based field work or engaging in restoration activities<sup>4</sup> as well as of preparation and reflection phases to support student learning. The above findings, however, also offer additional ways MWEs could be

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<sup>2</sup> An excellent review of relevant models is provided by Heimlich & Ardoin (2008). The majority of these models include predictors other than scientific literacy.

<sup>3</sup> Syntheses of environmental education research and evaluations suggest that programs which last only a few hours are less likely to change behaviors than ones that last 1-2 years. However, whether or not this goal is reached also very likely depends on other program characteristics.

<sup>4</sup> Under the assumption that these are part of a service learning experience.

strengthened to further contribute to student learning and result in behavioral outcomes (e.g., longer duration, building on behavior theories). With regard to teacher professional development, MWEEs encourage a minimum length of 3 days which, comes close to the 30 hours that teachers have reported as necessary for changing their own knowledge and skills. Other professional development practices, including but not limited to those suggested by B-WET, are also likely to play an important role in determining to what extent teachers will adopt the desired MWEE practices.

There is a relatively limited number of studies that can inform the B-WET evaluation system given that the system will be based primarily on quantitative data whereas most watershed education studies have relied on qualitative data. At the same time, two national studies have included multiple choice and true/false questions that can be used to test aspects of students' understanding of watersheds, as well as a few other studies which include questions that can be modified to provide quantitative response options. In terms of assessing to what extent students may change their environmentally responsible behaviors as a result of the watershed education they receive through B-WET funded programs, the B-WET Chesapeake evaluation conducted by the authors in 2007 still seems to provide some of the most relevant measures to adapt for the purpose of the national evaluation. Finally, two studies of teacher watershed education programs provide some insight into constructs to measure that may explain differences in teacher outcomes and syntheses of professional development research provide a foundation for the development of list of best professional development practices to measure.

## Introduction

As suggested by its mission and logic model, B-WET seeks to increase its funded projects' participants' knowledge, attitudes, and skills so that they will act in ways to protect watersheds and related ocean, coastal, and Great Lakes ecosystems. B-WET does so by funding and supporting its grantees to adopt Meaningful Watershed Education Experiences (MWEEs).

## Purposes of Literature Review

The purposes of this literature review were to identify research to help assess the potential effectiveness of the features of Meaningful Watershed Education Experiences (MWEEs) and, importantly, as a result of this process find measures or scales to inform the development of data collection instruments for B-WET's evaluation system.

## Methods

Given B-WET's focus on watershed education and the lack of an available synthesis of watershed education research, this review sought to identify and summarize results from watershed education studies. These studies were identified by 1) searching electronic databases, 2) reviewing related research syntheses (e.g., on ocean and climate literacy), 3) examining each of the identified publications' respective references, 4) contacting environmental education researchers with relevant expertise, and 5) drawing on our own work.

In addition to focusing on single watershed education studies, this review also drew on insights from syntheses conducted of relevant bodies of research including:

- ocean and climate literacy education (Fortner, Unknown; Payne & Zimmerman, 2010; Tran, 2009; Tran, Payne, & Whitley, 2010),
- outdoor education (Dillon et al., 2006; Rickinson et al., 2004),
- instructional practices leading to changes in environmentally responsible behavior (Zelezny, 1999; Zint, 2012)
- environmental literacy (Coyle, 2005; Marcinkowski et al., 2012; OECD, 2009)
- place based education (Smith, 2012)
- inquiry-based science instruction (Minner, Jurist, & Century, 2010)
- (science) teacher professional development (Fishman & Davis, 2006)

Syntheses from these particular bodies of research were reviewed because they:

- focus on outcomes of interest to B-WET,
- provide insight into how these outcomes have been measured, and
- address the effectiveness of instructional practices supported by B-WET through its MWEEs.

It was appropriate to draw on these syntheses rather than to identify and review single studies within these research domains because 1) these syntheses are thorough and comprehensive in scope and 2) conclusions drawn from syntheses have greater reliability than ones from single studies.

## Results

This section synthesizes the results from the literature review. It is organized mainly around questions related to watershed education. However, there are also a number of textboxes which answer related questions that cannot be addressed on the basis of findings from the watershed education literature.

More specifically, each of the following questions is addressed in the order presented below:

- Is there a need for watershed education?
- What should the objectives of watershed education be?
  - What instructional practices can foster environmentally responsible behaviors?
- What are the potential benefits of watershed education for students and teachers?
- What instructional practices have resulted in the student benefits identified above?
  - What are the benefits of place-based instruction?
  - To what extent is inquiry-based science instruction more effective in fostering students' understanding of science concepts than more passive techniques?
  - What do we know about the value of outdoor fieldwork and the factors that influence how much learning will take place as a result?
- What do we know about teachers' watershed education practices?
- What professional development practices can strengthen teachers' watershed education efforts?
  - What professional development practices support teacher learning and change?
- What studies and resources can be drawn on to inform the development of data collection instruments for B-WET's evaluation system?

When relevant and possible, implications for B-WET are addressed (these are highlighted in ***bold and italics***).

### *Is there a need for watershed education?*

There appears to be a great need for watershed education. This is supported by the results from a range of descriptive studies with adults and children, suggesting that the US public is not “watershed literate.” For example, when presented with multiple choice definitions of “a watershed” as part of a national environmental literacy survey, only 41% of adults were able to identify the true meaning of the term and 35% did not venture a guess; that is three out of five American adults did not know what

a watershed<sup>5</sup> is (NEETF, 1998). This same study also revealed that only one in five American adults (22%) knew that run-off is the most common form of pollution of streams, rivers and oceans, compared to nearly half (47%) who thought the most common source is waste dumped by factories (NEETF, 1998). Findings from another set of national studies of both adults and children were consistent with these results, suggesting that:

- 44% of adults and 74% of children indicated that they did not know what a watershed<sup>6</sup> is,
- 65% of adults and 59% of children believed that watersheds and wetlands are the same thing,
- 26% of adults and 54% of children did not know into which body of water rain in their neighborhood flows,
- 86% of adults and 85% of children admitted that they were not familiar with the term non-point source pollution,
- only 19% of adults were able to correctly identify non-point sources of pollution as the largest source of water quality problems, and
- only 35% of adults identified land use, land development, and urban sprawl as the most serious threats to watershed health (Penn, 2001a, 2001b).

Results from these studies are troubling<sup>7</sup> because they suggest that the US public lacks the necessary knowledge to understand issues related to water quality, point and non-point source pollution, and the impact of land use practices and personal actions on watersheds (Patterson & Harbor, 2005; Schueler & Holland, 2000). As a result, the US public is unlikely to recognize the need for a watershed-based management approach (Coyle, 2005; Eflin & Sheaffer, 2006; NEETF, 1999; Schueler & Holland, 2000).

In addition to these national studies, research has also been carried out to explore grades 4-12 students' understanding of watersheds in greater depth. These sets of studies identify students' ideas related to watersheds, as well as gaps in their understanding. For example, children have the common perception that watersheds are human made sheds that have water inside or on top of them (Patterson & Harbor, 2005), although this conception is more likely to be held by elementary and middle school than high school students (D. P. Shepardson, Harbor, & Wee, 2005). Considering the water cycle as a component of watersheds similarly increases by grade level (D. P. Shepardson, et al., 2005).

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<sup>5</sup> The report offers the following definition of a watershed: "an area of land that, due to its natural drainage pattern, collects precipitation and deposits it into a particular body of water. In the West these land areas are often called drainages and through the nation they are sometimes referred to as river or stream basins" (NEETF, 1998).

<sup>6</sup> Respondents answered this question after being provided with the following definitions: "A watershed (often referred to as a river basin) is an area that, due to its natural drainage pattern and geography, collects rainfall, snowmelt or irrigation that runs over land and then deposits it into a particular body of water. A watershed is often referred to as a river or stream basin. Non-point source pollution occurs when water runs over land or through the ground and picks up pollutants and deposits them into rivers, lakes, oceans, and groundwater" (Penn, 2001a, 2001b).

<sup>7</sup> It is acknowledged that these studies were conducted over a decade ago and thus, that individuals' understanding of watersheds may have changed. At the same time, however, we are not aware of any interventions that have taken place to remedy this situation.

Students' ideas about watersheds also tend to be limited to mountainous terrains, rivers and streams, even among Midwest students (D. Shepardson, Harbor, Cooper, & McDonald, 2002; D. P. Shepardson et al., 2003; D. P. Shepardson, et al., 2005). Thus, students tend to portray watersheds as areas of land with high relief and elevation where water is cycled, stored, or transported (D. P. Shepardson, Wee, Priddy, Schellenberger, & Harbor, 2007, 2009). It may be because of these ideas that students have been found not to consider runoff, groundwater, or the impacts of human activities and biological entities on watersheds (D. Shepardson, et al., 2002; D. P. Shepardson, et al., 2003; D. P. Shepardson, et al., 2005).

Moreover, students have also been found not to understand:

- the basin shape of watersheds (Dove, Everett, & Preece, 1999),
- that bodies of water are interconnected and flow into larger bodies of water (Dove, et al., 1999; D. P. Shepardson, et al., 2005),
- that watersheds occur in urban areas (Dove, et al., 1999; D. P. Shepardson, et al., 2005; D. P. Shepardson, et al., 2009),
- the connections between water and land; i.e. water flowing through landscape-scale systems (D. P. Shepardson, et al., 2005; D. P. Shepardson, et al., 2009), and
- aspects of watershed systems that are not readily visible (Covitt, Gunckel, & Anderson, 2009).

Several of these studies also explore why students may have such ideas and gaps in understanding. For the most part, results suggest that students' limited conceptions appear to be due to the diagrams and other graphics in presentations, textbooks, websites and materials about watersheds and the water cycle. For example, several studies revealed that students omit human activities and biological organisms from their illustrations of the water cycling through watersheds; both are typically also missing from instructional diagrams (Ben-zvi-Assarf & Orion, 2005; D. P. Shepardson, et al., 2007, 2009). Others have argued that students do not have the necessary systems perspectives to recognize the movement of water under the ground (Dickerson & Dawkins, 2004), the conservation of water (Ben-zvi-Assarf & Orion, 2005), and the role and effects of the biosphere and human activities (Ben-zvi-Assarf & Orion, 2005; D. P. Shepardson, et al., 2005; D. P. Shepardson, et al., 2007).

Importantly, despite adults' and children's limited knowledge as related to watersheds, there is evidence to suggest that they are interested and willing to take action to help protect watersheds, but that in order to do so, they need relevant procedural knowledge (Penn, 2001a, 2001b). These findings are consistent with the results from a national study investigating the US public's understanding of and willingness to act to protect the oceans (Project, 2009).

The need for watershed education is further supported by the fact that related concepts have limited representation in K-12 national and state frameworks and standards, although there are some movements toward mandating watershed education (Gruver & Luloff, 2008). In addition, there are few resources that teachers can choose from and these resources tend to be national in scope (e.g., Project WET, Project WILD-Aquatic, and Wonders of Wetlands). They therefore are not place-specific and may lack local relevance (Gruver & Luloff, 2008). Moreover, these national materials may also not be aligned with relevant education standards (Gruver & Luloff, 2008).



***Overall, these findings suggest that B-WET's focus on watershed education is very much warranted. There is a great need for enhancing individuals' watershed literacy and this need is unlikely to be sufficiently met through the formal education system and existing programs that have only a national scope.***

### *What should the objectives of watershed education be?*

There have been a number of initiatives to develop environmental science literacy objectives linked to the National Science Education Standards that could be drawn on to help identify objectives for watershed education and, thus, to help determine what teacher or student outcomes to potentially assess as part of B-WET's evaluation system. These initiatives include the Great Lakes Literacy Principles (<http://www.greatlakesliteracy.net/>), the Ocean Literacy Principles (<http://oceanliteracy.wp2.coexploration.org/>) and the Climate Literacy Principles (<http://www.climatescience.gov/Library/Literacy/>).

There have been two researchers, however, who developed science objectives specifically for watershed education:

(1) Shepardson et al. (2007) suggested that students should develop the following understandings:

- Watersheds are defined by elevation and relief.
- Watersheds have a structure that includes running water and still water.
- Watersheds consist of biological and physical components.
- Watersheds are changed by natural processes and human activity.
- Watersheds function to transport, store, cycle and transform water and materials.
- Watersheds are polluted by point sources, non-point sources and biological, organic and thermal pollution.

(2) Endreny (2010), building on the work by Shepardson et al. (2007), developed a similar set of objectives:

- The water cycle (precipitation, evaporation, condensation, infiltration and run-off) is responsible for the water in the watershed.
- A watershed is any body of water and the land that drains into that body of water.
- Topography defines and separates the watersheds.
- Smaller watersheds connect to each other forming larger more inclusive watersheds.
- Land use in watersheds affects water pollution. This includes run-off pollution.
- A watershed contains biological components that interact and influence the watershed.
- The watershed contains physical and biological components.
- A watershed is influenced by human and natural factors.

***These "literacy" initiatives and the two researchers' objectives provide insight into the understanding individuals may need to be considered scientifically watershed literate.***

*More specifically, we propose that a watershed literate individual should be able to 1) define the term “watershed”, 2) identify their local watershed(s), 3) identify how watersheds are connected to the ocean via streams, rivers, and human-made structures, 4) identify the functions that occur in a watershed (transport, store, and cycle water), 5) recognize that both natural processes and human activities affect water flow and water quality in watersheds, 6) identify connections between human welfare and water flow and quality, 7) identify possible point and non-point sources of water pollution, 8) identify actions individuals can engage in to protect/restore water quality in watersheds, and 9) identify how humans seek to manage watersheds. These objectives provide some guidance as to what outcomes to measure to assess students’ and possibly, teachers’ scientific watershed literacy as part of B-WET’s evaluation system.*

*It is important to note, however, these resources and studies do not provide insight into the other characteristics individuals may need to have to act to protect watersheds and related ocean, coastal, and Great Lakes ecosystems; B-WET’s desired longer-term outcome. This is important because scientific literacy may be necessary but is unlikely to be sufficient for environmentally responsible behaviors (Hines, Hungerford, & Tomera, 1986-1987; Hungerford & Volk, 1990).*

#### **What instructional practices can foster environmentally responsible behaviors?**

If instruction in science may not be sufficient for fostering environmentally responsible behaviors, what instructional practices may be? A recent review of ten published behavioral outcome evaluations of environmental education programs (Zint, 2012) helps to identify potentially successful practices. Specifically, this review suggested that EE programs cannot foster changes in behaviors if they:

- lack clearly defined behavioral outcome objectives,
- focus on general environmental knowledge or attitudes (vs. ones related to desired behaviors),
- are top down (i.e., not designed to meet audiences’ needs),
- passive (i.e., information transmission focused, lacking participant involvement), and
- are short (i.e., a few hours) in duration.

and that EE programs can foster changes in behaviors if they:

- have behavioral outcome objectives,
- are designed based on behavior theories/models [see (Heimlich & Ardoin, 2008) for a review of relevant theories/models],
- consider participants’ needs, context and background,
- incorporate experiential learning (e.g., field trips, service learning), and
- are longer (i.e., 1-2 years) in duration.

These results are quite consistent with a meta-analysis of 18 studies that also sought to identify the instructional factors to which changes in environmental responsible behavior can be attributed (Zelezny, 1999). This meta-analysis, for example, also suggested that shorter (less than 10 hours) and passive programs were less likely to result in environmentally responsible behaviors than longer ones that actively involved participants. The same author, however also concluded that programs in traditional classroom settings were more effective than ones in non-traditional classroom settings (i.e.,

ones that included field studies). Due to the limitations of the reviewed studies, however, it is unclear how the author could be confident in drawing this *particular* conclusion (Rickinson, et al., 2004)

***Although B-WET encourages its grantees to include experiential learning opportunities as part of their MWEs and to offer programs of a certain length, B-WET does not stress that grantees engage in the other practices that these reviews have identified as leading to changes in environmentally responsible behaviors. That is, B-WET does not explicitly stress that grantees target specific behaviors, draw on behavior theories/models and/or that they build on participants' needs, context or background to facilitate changes in their environmentally responsible behaviors.***

### *What are the potential benefits of watershed education for students and teachers?*

Studies identified through this literature review provide some evidence to suggest that watershed education can have a number of benefits for students including to:

- improve their understanding of watersheds in ways consistent with National Science Education Standards (Endreny, 2010),
- enhance their environmental attitudes, a sense of environmental stewardship, and responsible environmental behaviors (Bodzin, 2008),
- increase their advocacy for the environment (Stapp, 2000), and
- strengthen their civic responsibility (Eflin & Sheaffer, 2006).

In addition, there is evidence that professional development can increase teachers' understanding of watersheds, water quality, and stream monitoring (D. Shepardson, et al., 2002) ***As such, these studies suggest that watershed education can have some of the types of benefits B-WET expects its funded projects to have for both students and teachers.***

### *What instructional practices have resulted in the student benefits identified above?*

The authors of watershed education research provide evidence that the following instructional practices can lead to the types of student outcomes identified above:

- (long term) place-based hands-on science inquiry (Bodzin, 2008; Endreny, 2010; Patterson & Harbor, 2005),
- outdoor learning experiences (Bodzin, 2008),
- demonstrations/models that make invisible parts of watershed systems visible (Covitt, et al., 2009),
- instructional technologies (e.g. Web-based GIS maps and Google Earth) (Bodzin, 2008), and
- service learning (Eflin & Sheaffer, 2006).

### **What are the benefits of place-based instruction?**

Place-based instruction is a relatively new teaching and learning approach that is aimed at “fostering both community and environmental renewal” (Smith, 2012). Place-based initiatives typically involve students in investigating and reporting on issues in their local communities, drawing on individuals and resources within their home communities. Because place-based education represents a relatively new approach and has received limited funding, little research is available on its effectiveness. In his review of place-based education practices and impacts, Smith (2012) summarizes the evidence that is available on place-based education, draws on research from related domains (e.g., authentic and service learning), and offers theoretical justifications in support of this approach. Smith concludes that place based learning has the potential to increase student achievement, contribute to stewardship, civic engagement, and self-efficacy, as well as other outcomes. **Given the nature of the evidence and arguments presented by Smith (2012), there appears to be some arguments for B-WET students and teachers to be involved in investigating local watersheds from a place-based education perspective.**

Interestingly, Dr. William Stapp, the developer of an international river and watershed education program entitled the Global Rivers Environmental Education Network (GREEN), has attributed the successes of his program to a similar set of features:

- watershed analysis,
- experiential learning,
- interdisciplinary (natural and social science) approach,
- integrated problem solving,
- action-taking strategies, and
- peer and community based support networks (Stapp, 2000).

### **To what extent is inquiry-based science instruction more effective in fostering students’ understanding of science concepts than more passive techniques?**

This is the question that a review of 138 studies published between 1984-2002 sought to answer (Minner, et al., 2010). The review, however, is not only useful in terms of helping to answer this question. It is also valuable in that it presents a conceptual framework that operationalizes what is meant by inquiry-based science instruction (Table 1).

**Table 1.** Conceptual framework for inquiry science instruction (From Minner et al., 2010)

Presence of Science Content	<ul style="list-style-type: none"> <li>• Science as Inquiry</li> <li>• Life Science</li> <li>• Physical Science</li> <li>• Earth and Space Science</li> </ul>			
Type of Student Engagement	<ul style="list-style-type: none"> <li>• Students manipulate materials</li> <li>• Students watch scientific phenomena</li> <li>• Students watch a demonstration of scientific phenomena</li> <li>• Students watch a demonstration that is NOT of scientific phenomena</li> <li>• Students use secondary sources (e.g., reading material, the Internet, discussion, lecture, others' data)</li> </ul>			
<b>Elements of the Inquiry Domain</b>				
<b>Components of Instruction</b>		Instruction emphasizes <b>Student Responsibility for Learning</b> when it demonstrates the expectation that students will:	Instruction emphasizes <b>Student Active Thinking</b> when it demonstrates the expectation that students will:	Instruction emphasizes <b>Student Motivation</b> when:
	Question	Decide which questions to investigate; seek clarification of the investigation question(s).	Generate investigation question(s); use prior knowledge to inform the question(s); consider or predict possible outcomes of the question; explore the reasons question(s) are being asked to determine if they are appropriate for scientific investigation; refine questions so that they can be investigated; discuss questions based on previous study or data collected.	<b>it demonstrates the expectation that students will: display/express interest, involvement, curiosity, enthusiasm, perseverance, eagerness, focus, concentration, pride (all affective)</b>
	Design	Identify when and where they need help understanding the design; ensure that they (or the class/group/partner) grasps the design and how to implement it; decide what investigation design to use; ensure that the design addresses the research question.	Use prior knowledge to inform the design; determine if the design is an appropriate match for the question including variables and procedures; debate the merits of different investigation designs and whether it is "doable" and will result in needed data; consider where and how issues of bias may need to be addressed; generate investigation designs.	
	Data	Decide the data organization strategy; decide what data collection strategy to use and/or how to adapt it; identify if they or others need help collecting or organizing data; seek out clarification and advice when it is needed.	Alter and refine their approach to gathering, recording, or structuring the data based on information they acquire as they proceed.	
	Conclusion	Decide what strategies to use to summarize, interpret or explain the data; identify when they or others need help in summarizing, interpreting or explaining; and seek out other relevant information to assist in drawing conclusions.	Ensure that their conclusions are supported by their data; apply prior knowledge to summarize, interpret, or explain the data; construct conclusions; consider conclusions' reasonableness and credibility; identify applications of their findings to other situations and/or contexts; offer explanations for variations in the findings among the class and/or within their working groups; generate new questions that arise out of their explanations.	
	Communication	Decide how to structure their communication; seek advice and suggestions from others about how/what to communicate; provide feedback to others about their communication.	Engage in sound discussion and debate; demonstrate the logic they used to draw conclusions and interpretations; articulate the reasonableness and credibility of others' work; discuss appropriate communication mechanisms including language, visual aids, technology, etc.; articulate the merits and limitations of their work.	

In terms of answering the question about the effectiveness of inquiry-based science instruction, the authors did not find “overwhelming positive” (p. 493) evidence that inquiry-based science instruction is more effective than traditional, passive instruction in improving students’ understanding of science concepts. However, they indicate that there is “a clear and consistent trend” (p. 493) in the achievement of these outcomes when students are engaged in actively thinking about and drawing conclusions from data. **These findings suggest that even if students were not actively involved in collecting data but had the opportunities to examine and discuss NOAA data (a desired part of B-WET’s MWEs), they may increase their understanding of underlying science concepts.**

The fact that it is likely to be important to provide direct personal experiences (e.g. through outdoor activities, field investigations) with watersheds, if B-WET’s desired outcomes, are to be achieved is supported by the authors cited throughout this section as well as by education theory and research from other, related contexts:

- Dewey (1938) is probably the most notable education researcher to advocate for supporting students’ learning through direct personal experiences.

- A survey of adults in the Pacific Northwest found that individuals who had direct connections with coastal areas through personal visits or business interests were more knowledgeable about coastal and ocean resource issues than those who did not (Steel, Lovrich, Lach, & Fomenko, 2005). In this particular study, individuals who were more knowledgeable of ocean science concepts were also found to be more knowledgeable and supportive of policies and regulations to protect oceans (Steel, et al., 2005).
- An experimental study to determine the added value of a field trip during which middle school students collected (and presumably analyzed) data from a freshwater system, found that these particular students had a more advanced understanding of ecological concepts than students who did not have this opportunity (Manzanal, Barreiro, & Jimenez, 1999).

The synthesis of ocean and climate literacy research that referenced the above study by Steel et. al (2005) also stressed the importance of enhancing students' systems thinking within the context of ocean and climate change education (Tran, 2009; Tran, et al., 2010). These authors' literature review on systems thinking education suggested that within this context it is important to 1) ensure that teachers have advanced pedagogical knowledge to scaffold student thinking; 2) design activities that give students control to create and manipulate models (virtual and physical); and 3) provide opportunities for students to talk with peers to reflect on, articulate, and share their thinking. ***Given B-WET's interest in fostering systems thinking, the findings from Tran's (2009; 2010) review of this literature are relevant to the program.***

***Altogether the findings reviewed in this section support the effectiveness of many of the practices that B-WET advocates for through its MWEs, such as the inclusion of outdoor field work to enhance student learning (see following text box). Many of the practices that MWEs encourages have been linked to the types of outcomes B-WET hopes to achieve, such as increasing students' understanding of science concepts. At the same time, it must be noted that there is limited evidence that these practices lead to changes in environmentally responsible behaviors. Within a watershed education context, only one study provided some evidence of changes in environmentally responsible behaviors (Bodzin, 2008) and a review of research on outdoor fieldwork and visits (Rickinson, et al., 2004) identified only two such studies (Bogner, 2002; Mittelstaedt, Sanker, & Vanderveer, 1999).***

**What do we know about the value of outdoor fieldwork and the factors that influence how much learning will take place as a result?**

To answer this question, we drew on a synthesis of research on outdoor learning (Rickinson, et al., 2004) as well as a summary of parts of this particular synthesis (Dillon, et al., 2006). The review was based on 150 studies published between 1993 and 2003. It led the authors to conclude that there is:

*“substantial evidence to indicate that field work, properly conceived, adequately planned, well thought out and effectively followed up, offers learning opportunities to develop their [students'] knowledge and skills in ways that add value to their everyday experiences in the classroom” (Dillon et al., 2006 p. 107).*

The authors base this conclusion on their synthesis' findings that fieldwork can have positive learning, attitudinal, interpersonal and social outcomes. Moreover, field work appears to result in affective and cognitive interactions that support higher-order learning. Specific outdoor education practices associated with these outcomes were found to include:

- the length of the program (i.e., longer, sustained ones, tend to be more effective),
- the preparatory work prior to the outdoor learning experience [including preparing students for the cognitive (concepts and skills), geographic (setting), and psychological (process) aspects],
- the learning experience itself (e.g., appropriate amount of structure, opportunities to directly interact with environment, facilitating and role modeling by educators, choice among learning activities), and
- follow up work that links the outdoor with indoor/classroom-based activities.

***As such, these particular results support the emphasis B-WET places on its MWEEs inclusion of preparation and reflection phases (in addition to the focus on implementation).***

The synthesis also identified a range of external and personal factors that influence the amount and quality of field work that will be offered and how much learning will take place as a result. External factors include:

- fear and concern about health and safety
- teachers lack of confidence in teaching outdoors
- school curriculum requirements
- shortage of time, resources, and support
- trends in education and other policies

Personal factors include learners':

- age (i.e., younger students tend to be more enthusiastic than older students)
- prior knowledge and experience
- fears and phobias
- learning styles and preferences (e.g., preference for teacher led vs. student led activities)
- physical disabilities and special education needs
- ethnic and cultural identity, and
- the educational setting (i.e., there is a need to balance novelty and familiarity)

### *What do we know about teachers' watershed education practices?*

We know extremely little about teachers' watershed education practices. There has been one mail survey of Pennsylvania teachers on the topic (Gruver & Luloff, 2008). This particular study focused on identifying factors that may determine teachers' watershed education practices (i.e., measured as teaching about watersheds beyond the standards, revising existing watershed curriculum, initiating cross-department collaboration about watersheds, seeking ways to involve students in watershed learning, and development of a new watershed curriculum). Results revealed that gender, age, classroom confidence, and self-efficacy significantly influenced teachers' watershed education

behavior. ***This particular study therefore supports B-WET's assumption that funded professional development programs should strengthen teachers' confidence to teach about watersheds.***

Although the study by Gruver and Luloff (2008) did not offer additional insight into the specifics of teachers' watershed education practices, research into teachers' practices in outdoor and other environmental education contexts suggests that they will be unlikely to use outdoor settings or to conduct field investigation to teach about watersheds because they probably feel that they lack the necessary knowledge/skills and are concerned about managing their students in outdoor settings (Rickinson, et al., 2004; Simmons, 1998). ***Given that outdoor experiences and field investigations are a prominent aspect of B-WET's MWEE's, these findings support the need for professional development that provides teachers also with the knowledge and skills they perceive as necessary to conduct outdoor field investigations with their students.***

### *What professional development practices can strengthen teachers' watershed education efforts?*

Just as our knowledge of teachers' actual watershed education efforts are limited, so is our knowledge of professional development practices that may enhance their watershed education efforts. Two studies have addressed teacher professional development within the context of watershed education, but they did not focus on teachers' subsequent practices. One of these articles provides a description of a professional development program that engaged teachers in watershed science to strengthen their understanding of science inquiry (D. P. Shepardson, et al., 2003). To achieve this goal, teachers conducted site surveys of watersheds, designed and conducted their own study, used technology to assist with their investigations, and presented their results. This professional development is described to have been a success as it engaged teachers in "doing" science. The other article, presents actual empirical evidence to support that a similar professional development program increased teachers' understanding of watersheds, water quality, and stream monitoring (D. Shepardson, et al., 2002). This particular professional development included a 2 day pre-institute workshop, a 2 or 3 week summer institute and follow-up workshops during the academic year, and again, had teachers design and conduct a local watershed science research project. Table 2 identifies the changes in teachers' responses to an open-ended question to test their understanding of what a watershed is as a result of the professional development. The authors also report that teachers gained an increased awareness of the impact land use has on watersheds due to the professional development they participated in. ***As such, the results from this particular study support the value B-WET places on teachers being actively involved in collecting and using watershed data as part of the program's funded professional development activities.***



**Table 2.** Teachers’ responses to an open-ended question testing their understanding of what a watershed is before and after a professional development (D. Shepardson, et al., 2002)

Open-response item/category	Pre-assessment (% of teachers)	Post-assessment (% of teachers)
What is a watershed?		
A source of water	44	24
An area that drains water	5	38
A topographical area	0	21
An area that drains into a stream	31	66
Watershed quality		
Supports biological community	33	57
No pollutants	26	69

*Note.* Teacher responses often contained multiple ideas. Therefore, the percentage totals may exceed 100%.

Not only has there been limited research focused on professional development within the context of watershed education but there has generally been little research on professional development activities outside of formal classroom settings (Phillips, Finkelstein, & Wever-Frerichs, 2007). The exceptions include three studies that provide insight into professional development practices that may be effective in changing teachers’ science inquiry practices, including in watershed education contexts.

One of these three studies is particularly relevant as it explored the effectiveness of different professional development practices within the context of GLOBE (Penuel, Fishman, Yamaguchi, & Gallagher, 2007). GLOBE is an international, inquiry-based earth-science education program that calls for teachers to engage students in data collection (based on scientific protocols), to report data about the atmosphere, hydrology, soils and/or land cover/biology to a Web site for use by students and scientists, and to have students lead investigations using the data collected for the program. Professional development for teachers is provided by a variety of local organizations. Based on data collected from these providers, a sample of teachers, and the extent to which teachers followed through on data reporting, the authors were able to identify a number of effective professional development practices. For example, teachers’ perceptions about how coherent their professional development experiences were (i.e., “teachers’ interpretations of how well aligned the professional development activities are with their own goals for learning and their goals for students” p. 931), the incorporation of time for teachers to plan for implementation, and the provision of technical support were found to be particularly important to effective program implementation.

The second of the three studies examined the types of support US informal learning organizations provide for K-12 students and science teachers (Phillips, et al., 2007). As in B-WET's case, these institutions provided direct-to-student programs as well as teacher professional development (Table 3), among other types of support. The study found that informal learning organizations use a combination of features effective at changing science teachers' practices (Table 4) including experiential components (i.e., teachers are encouraged to participate in activities or experiences in much the same way that their students would) (Darling-Hammond, 1998). These institutions also offered an extended duration of professional development support for teachers ( $\geq 25$  hours contact hours), consistent with the 30 or more contact hours that teachers have associated with perceived increases in their knowledge and skills (Garet, Porter, Desimone, Birman, & Yoon, 2001).

**Table 3.** Examples of the types of programs offered by informal science institutions (ISIs) for K-12 students and science teachers (From Phillips, et al., 2007).

Type of programme	Number of ISIs	Percentage of ISIs <sup>a</sup>
<b><i>Direct-to-student programmes</i></b>	307	65
Structured and educationally supported field trips (providing teachers with activities that precede and/or follow up on their students' visits to the institution)	259	55
Outreach programmes ('van' programmes, travelling demonstrations, support for school science fairs, etc.)	245	52
<b><i>Teacher PD programmes</i></b>	279	59
Teacher special events (one-day workshops or special gatherings that take place on a single day)	205	44
Teacher multi-day workshops (PD events that last at least 8 h but less than 40 h; e.g., a three-day workshop on a specific topic or a series of five Saturday sessions)	117	25
Pre-service and formal teacher education connections (courses, apprenticeships, pre-service observations, and/or research opportunities for individuals enrolled in teacher education programmes)	107	23
Teacher coaching and classroom support (demonstrations, shared teaching, and/or other forms of in-school support by staff or teacher interns from your institution)	97	21
Teacher institutes (PD experiences, usually on consecutive days, that cumulatively involve 40 h or more of participation)	76	16
PD provider training (training for administrators or staff providers of teacher PD)	70	15
Teacher internships (teachers working in the museum on a full-time or part-time basis, e.g., a teacher on a special assignment or a teacher serving as a science specialist for the district)	61	13

**Table 4.** Features of professional development adopted by informal science institutions ISIs found to be effective at changing science teachers’ practices (Phillips, et al., 2007)

Programme feature	Included (%)	Not included (%)
Teachers learning science by participating in activities that they can use in their classroom	88	3
Teachers learning how to integrate your institution’s resources into their curriculum	74	11
Teachers engaging with exhibits	59	21
Web resources sponsored by or affiliated with your institution	40	45
Teachers borrowing curriculum kits from your institution	39	43
Teachers learning how to use your institution’s curriculum kits	32	48
Educators from your institution performing demonstrations in participating teachers’ classrooms	29	51
Educators from your institution providing other forms of support at participating school sites	28	42
Teachers learning science by participating in activities geared specifically to teachers or adults, so that they cannot use the activities with their students in their classrooms	25	56
Teachers visiting informal science institutions other than yours	23	56
Teachers attending lectures	22	55
Teachers examining and discussing student work with other teachers	22	56
Educators from your institution providing instructional coaching in participating teachers’ classrooms	20	67
Teachers providing instructional coaching in other teachers’ classrooms	7	66
Online discussions among participating teachers	6	72
List-serve memberships	10	73
Teachers visiting other teachers’ classrooms	3	77

The third of the three studies compared the teaching practices of novice science teachers who had the opportunity to learn about and practice teaching in an informal learning setting and ones who went through a traditional teacher education program with limited opportunities to practice constructivist and inquiry based teaching (Saxman, Gupta, & Steinberg, 2010). The authors found that science teachers in the former group outperformed the control group in constructivist and inquiry-based teaching practices.

### **What professional development practices support teacher learning and change?**

A synthesis of what we know about teacher learning from the perspective of the learning sciences, identified many of the same components that have already been described as well as several additional ones that can support teacher learning and change (Fishman & Davis, 2006). For example, the review suggests that effective professional development:

- is of extended duration
- emphasizes content, pedagogy, and pedagogical content knowledge
- is coherent with other learning activities
- requires teachers to examine their own practice
- promotes reflection
- provides opportunities for social support
- is closely coupled to what is expected to be taught in the classroom
- situates teachers' learning in representations of practice (i.e., "practice-based")
- is structured around (educative) materials and activities that teachers can employ directly in their own classroom practice.

***Note that if B-WET's funded professional development activities do in fact illustrate how teachers can meet school requirements, standards, or curriculum needs through watershed education, the likelihood that several of these effective professional development components would be in place, would be increased.***

***Overall, this review supports that teachers' professional development has to have certain characteristics to help ensure that teachers will adopt the desired changes in instructional practices. B-WET's MWEEs encourage a minimum length of 3 professional development days which, depending on the length of the day may be close to the 30 hours that teachers have reported as necessary for changing their knowledge and skills (which may not be sufficient to also change their practices). However, B-WET's MWEEs acknowledge that additional professional development features are necessary to help ensure changes in teachers' practices. The quantity and quality of these features will also play an important role in helping to determine to what extent teachers participating in B-WET funded professional development will adopt the desired practices.***

### **What studies and resources can be drawn on to inform the development of data collection instruments for B-WET's evaluation system?**

If teacher' or students' "watershed literacy" were to be assessed, it would likely be useful to draw on the national environmental and river literacy studies (NEETF, 1998; Penn, 2001a, 2001b) which included questions to assess individuals' understanding of watersheds. Using these questions could be valuable as B-WET participants' knowledge could be compared with that of the participants in these national studies. However, this would depend on our ability to obtain and use these surveys' questions. At this time, for example, we have not been able to obtain the wording of the questions used by NEETF

(1998). There is also a “Watershed IQ” instrument which may be relevant to assess teachers’ and students’ watershed knowledge (NEETF, 1999). However, this instrument does not appear to have been used as part of a study and therefore, B-WET’s results could not be compared with those from other sample populations.

If students’ knowledge of watersheds were to be assessed, the various studies of students’ ideas and gaps in understanding provide some useful information to build on as well. However, it is important to know that these studies relied on qualitative data. That is, the majority asked students to draw watersheds and explain their drawing, develop concept maps, or interviewed them. One study also provided students with a map of a river and its tributaries in a watershed and asked them to explain which towns would be affected by water pollution entered in a particular location.<sup>8</sup> These qualitative methods were appropriate for assessing students’ in-depth understanding of watersheds. Moreover, such assessments are more consistent with inquiry-based instruction than quantitative approaches. However, given the knowledge, skills, and resources such qualitative methods require, they are unlikely to be feasible for B-WET’s evaluation system at this time. Nonetheless, if quantitative student instruments were developed, the choice of questions and response options could be informed by these studies. For example, a question asking for the definition of a watershed could include a multiple choice option of a shed that contains water (as this is a popular perception youth and adults hold). Similarly, it may be possible to provide students with the drawing of a watershed and present them with multiple choice options exploring their understanding of its different elements and/or how it may be negatively or positively affected by human actions under various conditions. In terms of what watershed understandings or related outcomes to assess, 1) B-WET’s logic model, 2) the literacy initiatives, 3) the objectives developed for watershed education, and 4) especially the results from the current study of expected watershed education outcomes are expected to be helpful.<sup>9</sup>

Should it be appropriate to assess to what extent students change their environmentally responsible behaviors as a result of the watershed education they receive through B-WET funded programs, the instrument to determine whether the B-WET Chesapeake professional development and meaningful watershed educational experience programs attain their goal of a future citizenry committed to protecting the Bay (Kraemer, Zint, & Kirwin, 2007) would be appropriate to adapt for this particular purpose.

There are also other tested instruments that have been used to assess various aspects of environmental literacy that could potentially be built on. For example, there have been several studies that have assessed individuals’ ocean (and coastal) literacy (AAAS, 2004; Project, 2009; Steel, et al., 2005). In addition, there have been both national and internal studies that have assessed students’ environmental literacy (Marcinkowski, et al., 2012; OECD, 2009). And then there are several sites that

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<sup>8</sup> The majority of the students did not focus on tracing water through the river system in the watershed but focused on other cues such as the proximity of towns and/or their connections to draw their conclusions about the impact of pollution in the watershed.

<sup>9</sup> This study of watershed educators is currently being conducted under the leadership of Dr. Zint in collaboration with Anita Kraemer.

identify relevant instruments developed by environmental and conservation psychologist (see <http://www.conpsychmeasures.com/CONPSYCHMeasures/index.html> for overview) and informal science educators (search <http://www.pearweb.org/atis/tools/jump>). The [conpsychmeasures.com](http://www.conpsychmeasures.com) site, for example, includes the Children's Environmental Attitude and Knowledge Scale (CHEAKS), used by Bodzin (2008) to investigate the impacts of a watershed education program on children. This particular scale includes a number of items to assess children's knowledge as related to water (e.g., one question asks about the main sources of water pollution), as well as items to gauge their attitudes toward engaging in actions to use less water. Of course, there are also a range of other instruments that could be built on to assess a variety of other potential outcomes of B-WET supported programs. For example, if the current study of expected watershed education outcomes reveals that it may make sense to focus on assessing students' environmental science research skills (e.g., measurement techniques, sampling, interpreting data) or attitudes toward science and science careers, instruments that have been used as part of evaluations of GLOBE [see (Cincera & Maskova, 2011) for a review] could be among those to draw on.

It may also be very informative to learn solely about the perceptions students have about their outdoor field experiences as part of B-WET's evaluation system. In other words, are students indicating that they have experiences consistent with those reported by grantees and/or teachers? One instrument that could be adapted for this purpose (assuming it is possible to obtain access to the actual items) is the Science Outdoor Learning Environment Inventory (SOLEI) (Orion, Hopstein, Tamir, & Giddings, 1997). This scale was developed to measure students' perception of their outdoor learning environment under the assumption that positive learning environments predict both cognitive and affective student outcomes. This particular scale measures students' environmental interactions, integration of outdoor with indoor learning, student cohesiveness, teacher supportiveness, open-endedness, preparation, as well as organization and material environment.

With regard to assessing relevant teacher outcomes, there have only been two studies directly focused on watershed education. One of these assessed changes in teachers' understanding of watersheds, water quality, and stream monitoring and some of the study's qualitative data may help to inform the development of quantitative items for an instrument to be used as part of B-WET's evaluation system (Shepardson et al., 2002). The other study of factors that influence teachers' water education efforts provides insight into how to potentially measure teachers' behaviors related to watershed education, their confidence including self-efficacy as related to watershed education, and their watershed related knowledge (see Table 5 for an excerpt from the article describing the measures that were used) (Gruver & Luloff, 2008). This study also suggests that it may be important to measure teachers' age and gender as these variables helped to predict their watershed education behaviors (vs. years and grades taught, which did not).

**Table 5.** Measures used by Gruver and Luloff (2008) of factors predicting teachers' watershed education efforts

**Variable Measurement: The Dependent Variable of Teacher Behavior**

Prowatershed teacher behavior was operationalized using nine actions demonstrative of positive behavior toward teaching about watersheds on the basis of CBAM. Respondents were asked whether they (a) attend local watershed meetings, (b) attend watershed conferences, (c) attend watershed seminars or workshops, (d) volunteer to teach others about watersheds, (e) develop new watershed curriculum, (f) revise existing watershed curriculum, (g) initiate cross-departmental collaboration about watersheds, (h) seek ways to involve students in learning about watersheds, and (i) teach about watersheds beyond the standards. Responses ranged from 1 (*never*) to 5 (*very frequently*).

Exploratory factor analysis revealed these nine items were indicative of two behavior types: (a) curricular behavior (teaching about watersheds beyond the standards, revising existing watershed curriculum, initiating cross-departmental collaboration about watersheds, seeking ways to involve students in watershed learning, and developing new watershed curriculum) and (b) active behavior (attending local watershed meetings, attending watershed conferences, volunteering to teach others about watersheds, and attending watershed seminars or workshops). We created composite index variables for both behavior categories (Cronbach's  $\alpha = .89$  for curricular behavior,  $.84$  for active behaviors). The focus of the present study was on curricular behavior, the dependent variable.<sup>1</sup>

**Teacher Confidence**

We measured overall teacher confidence by three variables: classroom confidence (scale), self-efficacy (scale), and watershed knowledge (single item). We operationalized these variables separately but added them to the model as a block.

*Classroom confidence.* We operationalized classroom confidence in teaching about watersheds using five teaching-confidence statements in which teachers self-rated their own confidence levels. Responses ranged from 1 (*not confident*) to 5 (*very confident*). We asked respondents if they felt confident (a) teaching about watersheds, (b) that students understood watershed concepts after being taught about them, (c) relating information about watersheds to other teachers, (d)

teaching required watershed competencies, and (e) that students were gaining required competencies. Following exploratory factor analysis, we included all five statements in a composite measure of teaching confidence (Cronbach's  $\alpha = .87$ ).

*Self-efficacy (self-reported effectiveness).* We operationalized teacher self-efficacy regarding teaching about watersheds using four statements in which teachers self-rated their own teaching efficacy. We measured self-efficacy on a 7-point Likert-type scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). We asked respondents how much they agreed or disagreed with the following statements: (a) When teaching about watersheds I welcome students' questions; (b) I understand watersheds well enough to teach about them effectively; (c) I am at a loss when trying to help students understand watersheds; and (d) I don't have enough information to teach about watersheds. Following exploratory factor analysis, we included all four statements in a composite measure of self-efficacy (Cronbach's  $\alpha = .84$ ).

*Watershed knowledge.* We included a single watershed-knowledge question in the survey to assess general understanding of watershed processes. Toward the end of the survey, we asked the question "How familiar are you with the watershed you live in and how it is linked to either the Chesapeake Bay, the Delaware Bay, or the Gulf of Mexico?" We made every effort to portray the question as one of general interest to the study and not as a quiz question (i.e., it was not the first question of the survey and was among a series of questions regarding watershed curricula). We measured watershed familiarity on a 5-point Likert-type scale ranging from 1 (*not familiar*) to 5 (*extremely familiar*). We collapsed these categories to 0 (*familiar; extremely familiar, very familiar, and familiar*) and 1 (*unfamiliar, somewhat familiar, and not familiar*).

*Engaging students about watersheds.* We measured this single item on a 7-point Likert-type scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). We asked respondents how much they agreed or disagreed with the following statement: "I do not know how to excite my students about watersheds."

The three professional development studies described earlier may also provide particularly helpful guidance. For example, both providers and teachers could be asked about the features of their professional development and these results could be used to attempt to predict teachers' science inquiry practices. The instruments used in these studies provide guidance in terms of what professional development components to ask about and how, as well as how to potentially measure teachers' science inquiry instructional practices (Penuel, et al., 2007; Phillips, et al., 2007). And Saxman et al.'s (2010) study points to potential ways to assess pedagogy, science content, and lesson planning based

on Praxis II assessments and the XAMonline preparatory guides. In the latter study, improvements in teachers' inquiry and constructivist-based science instruction were also observed by rating teachers' skill at engaging student interest, making student thinking visible, and the extent to which students were allowed to construct their own understanding. While this is not feasible for B-WET's evaluation system at this time, it would be possible to ask teachers about the extent to which they feel better prepared to engage in these practices as a result of B-WET funded professional development.

**Overall, this review suggests that there are instruments that can be drawn on to inform how constructs could be measured as part of B-WET's evaluation system. Which instruments may be drawn on or which studies may be used to inform the choice of constructs and measures will depend on what specific questions the evaluation system will focus on.**

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**Evaluation System Question 1:**

**To what extent do regional B-WET programs support grantees in implementing  
Meaningful Watershed Educational Experiences (MWEEs)?**

Row	Constructs (alphabetical)	Grantee Questionnaire Items (data submitted to B-WET)
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## Appendix E: Evaluation System Metrics Matrix

1	1 Unique ID or Award Number	Please enter your NOAA B-WET award number. The award number will be used ONLY to 1) identify your B-WET region, not your organization, and 2) allow us to link information you provide with that of data that may be provided by your project's teachers.
2	Descriptives: funding NOAA	Did you operate a NOAA B-WET funded program this past grant year? -Yes -No [SKIP LOGIC OUT]
3	Descriptives: funding NOAA amount	What is the total amount of funding you received this past grant year from NOAA for your B-WET project? -\$20,000 or less -\$20,001-\$50,000 -\$50,001-\$100,000 -\$100,001-\$200,000 -\$200,001-\$300,000 -\$300,001 or greater
4	Descriptives: funding NOAA years	Including this past grant year, for how many years has your organization received funding (not including anticipated funding) from NOAA B-WET for the currently-funded project? -1 year -2 years -3 years -4 or more years
5	Descriptives: years in existence	For how many years total has this B-WET project been in existence, including years not funded by NOAA B-WET? -1 year -2 years -3 years -4 or more years
6	Descriptives: funding all sources amount	What is the total amount of funding for this project, from all sources, this past grant year? -\$20,000 or less -\$20,001-\$50,000 -\$50,001-\$100,000 -\$100,001-\$200,000 -\$200,001-\$300,000 -\$300,001 or greater

**Evaluation System Question 1:**

**To what extent do regional B-WET programs support grantees in implementing  
Meaningful Watershed Educational Experiences (MWEEs)?**

<b>Row</b>	<b>Constructs (alphabetical)</b>	<b>Grantee Questionnaire Items (data submitted to B-WET)</b>
<b>7</b>	Descriptives: organization region	In which region(s) were your organization's MWEEs offered this past grant year? (check all that apply) -California -Chesapeake Bay -Great Lakes -Gulf of Mexico -Hawaii -New England -Pacific Northwest -Other (please describe) _____
<b>8</b>	Descriptives: organization type of MWEE	Which of the following B-WET-funded programs did your organization provide? [SKIP LOGIC: 1, BUT NOT 2; 2, BUT NOT 1; BOTH 1 AND 2; NEITHER, SKIP OUT] MWEEs for students/youth who are between the ages of 4-18 (or grades PreK-12) MWEE professional development or support for teachers Other (please describe) [SKIP LOGIC OUT]
<b>9</b>	Descriptives: organization type	For what type of organization do you work? (choose one) -Academic institution (community college, college, university) -Business/Corporation -Local government -State education agency -State natural resource agency -Non-profit organization -School/school district -Other (please describe) _____
<b>10</b>	Descriptives: person completing questionnaire	To what extent were you involved in: (Not at all = 1 to To a great extent = 5) -Developing your organization's most recent funded B-WET grant proposal (on your own or through collaborating with an external grant writer) -Implementing your organization's most recent B-WET-funded grant -Evaluating your organization's most recent B-WET-funded grant (on your own or through collaborating with an external evaluation consultant)
<b>11</b>	Descriptives: zip code	In what zip code is your organization located?

**Evaluation System Question 1:**

**To what extent do regional B-WET programs support grantees in implementing  
Meaningful Watershed Educational Experiences (MWEEs)?**

<b>Row</b>	<b>Constructs (alphabetical)</b>	<b>Grantee Questionnaire Items (data submitted to B-WET)</b>
<b>12</b>	Grantee needs	<p>Overall, what grade would you give the support you received from your region's NOAA B-WET staff over the past grant year?</p> <ul style="list-style-type: none"> <li>-A</li> <li>-B</li> <li>-C</li> <li>-D</li> <li>-F</li> </ul> <p>Briefly describe why you selected this grade:</p>
<b>13</b>	Grantee needs	<p>In the future, how likely is it that you will make use of each of the following to help you implement your B-WET-funded programs?</p> <ul style="list-style-type: none"> <li>-One-on-one time with B-WET program staff (i.e., regional or national coordinators)</li> <li>-Facilitated networking with other B-WET grantees in my region</li> <li>-Facilitated networking with other B-WET grantees from other regions</li> <li>-Email listserv, web forum, Facebook page, or other tools for virtual interaction with other grantees</li> <li>-Access to local NOAA subject-matter experts</li> <li>-Information about and access to current NOAA data sets</li> <li>-NOAA materials and lesson plans relevant to watersheds</li> <li>-Suggested "best" or "preferred" practices for MWEEs</li> <li>-Assistance with evaluating MWEEs</li> <li>-Assistance with grant management</li> <li>-Opportunities to learn about watershed science</li> <li>-Opportunities to learn about local or regional environmental issues</li> <li>-Opportunities to learn about local or regional policy efforts impacting environmental education</li> <li>-Opportunities to learn about national policy efforts impacting environmental education</li> <li>-Opportunities to learn about climate change literacy principles</li> <li>-Opportunities to learn about ocean literacy principles</li> </ul>

**Evaluation System Question 2:**

**How are MWEEs (PD) implemented by grantees?**

Row	Constructs (alphabetical)	Grantee Questionnaire (data submitted to B-WET)	Teacher PD Questionnaire (data submitted to B-WET)	Teacher MWEE Questionnaire (data submitted to B-WET)
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1	1Unique ID or Award Number	(see Grantee Support tab)	(Award number)	
2	Descriptive: MWEE PD?	Which of the following B-WET-funded programs did your organization provide? MWEE professional development or support for teachers -No -Yes	Did you recently complete a professional development opportunity focused on watersheds or water quality issues (also known as a Meaningful Watershed Education Experience {MWEE} professional development)? -Yes -Not sure -No	
3	Descriptive: population		Which of these categories best describes your school’s community (during the school year)? -Rural (population of less than 10,000) -Town/Suburban (population 10,000-99,999) -Small urban (population 100,000-250,000) -Urban (population greater than 250,000)	
4	Descriptive: region	(see Grantee Support tab)	In which region(s) did you teach this past year? (check all that apply) -California -Chesapeake Bay -Great Lakes -Gulf of Mexico -Hawaii -New England -Pacific Northwest -Other (please describe) _____	

**Evaluation System Question 2:**

**How are MWEEs (PD) implemented by grantees?**

Row	Constructs (alphabetical)	Grantee Questionnaire (data submitted to B-WET)	Teacher PD Questionnaire (data submitted to B-WET)	Teacher MWEE Questionnaire (data submitted to B-WET)
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5	Descriptive: student ESOL		What percent of your students speak English as a second language (aka English Language Learners)? -Don't know -Less than 20% -21-40% -41-60% -61-80% -81-100%	
6	Descriptive: teacher ethnicity/race		Do you identify yourself as (check all that apply): -Hispanic or Latino -American Indian or Alaska Native -Asian -Black or African American -Native Hawaiian or Other Pacific Islander -White -Other _____ -I prefer not to answer	
7	Descriptive: teacher grade level	What percent of the participating teachers taught the following grade levels? (total should equal 100%) -Pre-K -Elementary -Middle -High -Other -I don't know	In which grade levels do you primarily teach? (select all that apply) -Pre-K -Elementary -Middle -High -Other -None	
8	Descriptive: teacher past MWEEs	NA	Did you conduct MWEEs with your students before participating in the MWEE professional development? -No -Yes	

**Evaluation System Question 2:**

**How are MWEEs (PD) implemented by grantees?**

Row	Constructs (alphabetical)	Grantee Questionnaire (data submitted to B-WET)	Teacher PD Questionnaire (data submitted to B-WET)	Teacher MWEE Questionnaire (data submitted to B-WET)
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9	Descriptive: teacher reason to participate	NA	What was your PRIMARY reason for participating in the MWEE professional development? (check one) -To obtain information and resources for teaching -Personal interest in the topic of the professional development -To obtain continuing education, recertification, or graduate credit -I was required to attend -I was asked to attend -Other, please describe:	
10	Descriptive: teacher setting		In what setting do you teach? -Public school -Private school -Non-formal education (e.g., environmental centers, zoos, museums, interpretive programs at local or state level parks, youth organizations) -Home-school -Other	
11	Descriptive: teacher subject	Did the majority of participating teachers teach science? -No -Yes	What subject(s) do you primarily teach? (select one) -Science -Math -Language Arts -Social studies -Fine arts -Multiple disciplines, including science -Multiple disciplines, not including science -Other	



**Evaluation System Question 2:**

**How are MWEEs (PD) implemented by grantees?**

Row	Constructs (alphabetical)	Grantee Questionnaire (data submitted to B-WET)	Teacher PD Questionnaire (data submitted to B-WET)	Teacher MWEE Questionnaire (data submitted to B-WET)
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12	Descriptive: teacher?		Are you currently a PreK-12 teacher or educator? -Yes -No	
13	Descriptive: teachers' students' ethnicity/race	NA	About what percent of your students are (percent should equal 100 ): -Hispanic or Latino -American Indian or Alaska Native -Asian -Black or African American -Native Hawaiian or Other Pacific Islander -White -Other _____	
14	Descriptive: teachers' students' socioeconomic status		Is the school where you teacher a Title 1 school? -No -Yes -N/A	
15	Descriptive: zip code?	(see Grantee Support tab)	In what zip code is your school located?	
16	Descriptives: Number of <u>teachers</u> served teachers, K-12 schools, and school districts served	For about how many teachers, schools, and school districts did your organization provide professional development or support (e.g., trained in workshops, coached at schools or in the field) this past grant year as a result of your B-WET grant? (Please provide one number, NOT a range.) About ____ teachers served About ____ K-12 schools served About ____ school districts served		

**Evaluation System Question 2:**

**How are MWEEs (PD) implemented by grantees?**

Row	Constructs (alphabetical)	Grantee Questionnaire (data submitted to B-WET)	Teacher PD Questionnaire (data submitted to B-WET)	Teacher MWEE Questionnaire (data submitted to B-WET)
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17	PD best practices: during workshop/institute PD	<p>As part of your B-WET professional development workshops or institutes this past grant year, did your organization typically include the following:</p> <ul style="list-style-type: none"> <li>-Presented information and examples illustrating how teachers have integrated MWEEs</li> <li>-Discussed how teachers may be able to integrate MWEEs into their own curriculum or classroom activities</li> <li>-Discussed alignment of MWEEs with state, regional, or national standards</li> <li>-Provided examples of how MWEEs align with standards</li> <li>-Engaged teachers in aligning MWEEs with their school or school district standards</li> <li>-Allowed teachers time to plan how they will implement MWEEs</li> <li>-Engaged teachers in the same activities/practices they can use with their students</li> <li>-Included more than one teacher from individual schools</li> <li>-Presented how NOAA data can be used to support student scientific inquiry</li> <li>-Discussed how to use NOAA data to obtain knowledge about local issues</li> <li>-Shared examples of how other teachers have used NOAA data with their students</li> <li>-Allowed teachers time to plan how they will integrate the use of NOAA data</li> </ul>	<p>Did you participate in an education/training workshop, institute, or class as part of your professional development?</p> <p>-Yes -No</p> <p>If Yes, Did the workshops, institutes, or classes you participated in include the following professional development practices? (a) Please indicate yes or no for each statement. (b) Then indicate which 3 practices were most valuable in helping you implement MWEEs.</p> <ul style="list-style-type: none"> <li>-Sharing of information and examples illustrating how other teachers have integrated MWEEs</li> <li>-Discussion of how teachers may be able to integrate MWEEs into their own curriculum or classroom activities</li> <li>-Discussion of alignment of MWEEs with state, regional, or national standards</li> <li>-Provision of examples of how MWEEs align with standards</li> <li>-Engaging you and other participating teachers in aligning MWEEs with your school or school district standards</li> <li>-Participating along with other teachers from my school, at the same time</li> <li>-Allowing you and other participating teachers time to plan how to implement MWEEs</li> <li>-Engaging you and other participating teachers in activities/practices that can be used with your students</li> <li>-Presentation of how NOAA data can be used to support student scientific inquiry</li> </ul>	
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**Evaluation System Question 2:**

**How are MWEEs (PD) implemented by grantees?**

Row	Constructs (alphabetical)	Grantee Questionnaire (data submitted to B-WET)	Teacher PD Questionnaire (data submitted to B-WET)	Teacher MWEE Questionnaire (data submitted to B-WET)
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			<ul style="list-style-type: none"> <li>-Discussion of how NOAA data can be used to obtain knowledge about local issues</li> <li>-Examples of how other teachers have used NOAA data with their students</li> <li>-Allow you and other participating teachers time to plan how to integrate the use of NOAA data with your students</li> </ul>	
18	PD best practices: support from others (e.g., mentor teachers)	What types of support did your organization typically provide to teachers participating in MWEE professional development this past grant year? <ul style="list-style-type: none"> <li>-Assisted teachers with conducting field trips or field work</li> <li>-Assisted teachers with establishing schoolyard habitats</li> <li>-Assisted teachers with establishing restoration projects</li> <li>-Co-teaching in teachers' classrooms or in field</li> <li>-Provided coaching in participating teachers' classrooms</li> <li>-Provided demonstrations in teachers' classrooms</li> <li>-Assisted with the use of equipment or technologies</li> <li>-Communicated with teachers through personal phone calls or email</li> <li>-Communicated with teachers through newsletters or web-site (e.g., an online community)</li> </ul>	What types of support did you receive from your MWEE professional development provider? (a) Please indicate yes or no for each statement. (b) Then indicate which 3 practices were most valuable in helping you implement MWEEs. <ul style="list-style-type: none"> <li>-Assistance with conducting field trips or field work</li> <li>-Assistance with establishing schoolyard habitats</li> <li>-Assistance with establishing restoration projects</li> <li>-Co-teaching in my classrooms or in field</li> <li>-Coaching in my classroom</li> <li>-Demonstrations in my classroom</li> <li>-Assistance with the use of equipment or technologies</li> <li>-Communicating with provider through personal phone calls or email</li> <li>-Communication with provider through newsletters or web-site (e.g., an online community)</li> </ul>	

**Evaluation System Question 2:**

**How are MWEEs (PD) implemented by grantees?**

Row	Constructs (alphabetical)	Grantee Questionnaire (data submitted to B-WET)	Teacher PD Questionnaire (data submitted to B-WET)	Teacher MWEE Questionnaire (data submitted to B-WET)
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19	PD best practices: support from PD provider	Which characteristics describe your organization's typical MWEE professional development this past grant year? -Helped make connections to local community organizations and resources -Facilitated interactions with NOAA scientists/staff -Facilitated interactions with natural resource professionals -Provided teacher stipends -Offered continuing education credits -Offered graduate credits -Provided equipment -Provided instructional/educational/curriculum materials -Provided information on how to obtain grants or funding for MWEEs	Which additional practices did your MWEE professional development and/or the support you received include? (a) Please indicate yes or no for each statement. (b) Then indicate which 3 practices were most valuable in helping you implement MWEEs. -Connections were made to local community organizations and resources -Interactions were facilitated with NOAA scientists/staff -Interactions were facilitated with natural resource professionals -I was provided with a stipend -I was offered continuing education credits -I was offered graduate credits -I was provided with equipment -I was provided with instructional/educational/curriculum materials -I was provided with information on how to obtain grants or funding for MWEEs	
20	PD goals: Attitudes/ towards science teaching	It is a goal of my organization's B-WET-funded MWEE professional development that teachers will: Be more enthusiastic about teaching science		
21	PD goals: Behavior/ stewardship (as model for students)	It is a goal of my organization's B-WET-funded MWEE professional development that teachers will: Be more likely to act to protect and/or restore ocean, coastal, or Great Lakes watersheds		

**Evaluation System Question 2:**

**How are MWEEs (PD) implemented by grantees?**

Row	Constructs (alphabetical)	Grantee Questionnaire (data submitted to B-WET)	Teacher PD Questionnaire (data submitted to B-WET)	Teacher MWEE Questionnaire (data submitted to B-WET)
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22	PD goals: Instruction/ MWEE component use	<p>It is a goal of my organization's B-WET-funded MWEE professional development that teachers will:</p> <ul style="list-style-type: none"> <li>Teach more about watersheds</li> <li>Be more likely to implement MWEEs</li> <li>Be more likely to implement MWEEs after they are no longer supported by our organization</li> <li>Be more likely to use NOAA resources to enhance their students' MWEE experiences</li> <li>Be more likely to guide students through taking action to protect or restore watersheds</li> <li>Be more likely to use science inquiry instruction</li> <li>Be more likely to use the outdoors for instruction</li> <li>Be more likely to use local community resources as part of instruction</li> <li>Be more likely to use interdisciplinary approaches to instruction</li> </ul>		
23	PD goals: Knowledge/ environmental impacts of human behaviors (issues)	<p>It is a goal of my organization's B-WET-funded professional development that teachers will be able to:</p> <ul style="list-style-type: none"> <li>Recognize that both natural processes and human activities affect water flow and water quality in watersheds.</li> <li>Identify connections between human welfare and water flow and quality</li> <li>Identify possible point and non-point sources of water pollution</li> </ul>		

**Evaluation System Question 2:**

**How are MWEEs (PD) implemented by grantees?**

Row	Constructs (alphabetical)	Grantee Questionnaire (data submitted to B-WET)	Teacher PD Questionnaire (data submitted to B-WET)	Teacher MWEE Questionnaire (data submitted to B-WET)
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24	PD goals: Knowledge/ stewardship behaviors	It is a goal of my organization’s B-WET- funded professional development that teachers will be able to: Identify actions individuals can engage in to protect/restore water quality in watersheds		
25	PD goals: Knowledge/ watersheds	It is a goal of my organization’s B-WET- funded professional development that teachers will be able to: Define the term “watershed” Identify their local watershed(s) Identify how watersheds are connected to the ocean via streams, rivers, and human-made structures Identify the functions that occur in a watershed (transport, store, and cycle water)		
26	PD instruction: alignment with standards	To what extent was your organization’s MWEE professional development content aligned with: (Not at all=1 to To a great extent=5) School district education standards State education standards National education standards Regional environmental/natural resources management priorities		

**Evaluation System Question 2:**

**How are MWEEs (PD) implemented by grantees?**

Row	Constructs (alphabetical)	Grantee Questionnaire (data submitted to B-WET)	Teacher PD Questionnaire (data submitted to B-WET)	Teacher MWEE Questionnaire (data submitted to B-WET)
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27	PD instruction: education methods	<p>What education methods were used during your MWEE professional development? (select No or Yes for each method) (Not sure, No, Yes)</p> <p>Outdoor field trip Field work Place-based education Scientific-inquiry-based learning Issue investigation</p> <p>Did teachers participate in any of these activities to protect and/or restore ocean, coastal and/or Great Lakes watersheds during their MWEE professional development? Monitored water quality</p>	<p>What education methods were used during your MWEE professional development? (select No or Yes for each method)</p> <p>Outdoor field trip Field work Place-based education Scientific-inquiry-based learning Issue investigation</p> <p>During your MWEE professional development, did you participate in any of these activities that protect and/or restore ocean, coastal, and/or Great Lakes watersheds? Monitored water quality</p>	
28	PD instruction: hours	<p>About how many hours of MWEE professional development and/or support did your organization typically provide for any one teacher this past grant year?</p> <p>-N/A -None -1-2 hours -3-5 hours -6-10 hours -11-20 hours -21-40 hours -41-60 hours -61-80 hours -More than 80 hours</p>	<p>About how many hours of MWEE professional development and/or support did you receive over the past 12 months?</p> <p>-1-2 hours -3-5 hours -6-10 hours -11-20 hours -21-40 hours -41-60 hours -61-80 hours -More than 80 hours</p>	

**Evaluation System Question 2:**

**How are MWEEs (PD) implemented by grantees?**

Row	Constructs (alphabetical)	Grantee Questionnaire (data submitted to B-WET)	Teacher PD Questionnaire (data submitted to B-WET)	Teacher MWEE Questionnaire (data submitted to B-WET)
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29	PD instruction: hours outdoors	<p>About how many hours did the typical teacher participate in outdoor activities as part of your organization's MWEE professional development this past grant year?</p> <p>None -1-2 hours -3-5 hours -6-10 hours -11-20 hours -21-40 hours -41-60 hours -61-80 hours -More than 80 hours</p>	<p>About how many hours of those MWEE professional development hours did you spend outdoors?</p> <p>-None -1-2 hours -3-5 hours -6-10 hours -11-20 hours -21-40 hours -41-60 hours -61-80 hours -More than 80 hours</p>	
30	PD instruction: science inquiry methods	<p>IF SELECTED Scientific-inquiry learning above: Which of the following steps did you include: Engaged teachers in:</p> <p>Formulating scientific questions they can answer using data Making predictions or hypotheses Collecting data or using existing data Analyzing and interpreting data Making conclusions and adjusting predictions/hypotheses Developing presentations of their findings</p>	<p>If responded Yes to "Scientific-inquiry-based learning" in "What education methods were used during your students' MWEEs?", then answer this question:</p> <p>As part of your MWEE professional development, were you involved in...</p> <p>Formulating scientific questions that can be answered using data Making predictions or hypotheses Collecting data or using existing data Analyzing and interpreting data Making conclusions and adjusting predictions/hypotheses Developing presentations of findings</p>	
31	PD instruction: stewardship behaviors	<p>Did teachers participate in any of these activities to protect and/or restore ocean, coastal and/or Great Lakes watersheds during their MWEE professional development?</p> <p>Created a schoolyard or backyard habitat Installed a rain barrel at school or at home</p>	<p>During your MWEE professional development, did you participate in any of these activities that protect and/or restore ocean, coastal, and/or Great Lakes watersheds?</p> <p>Created a schoolyard or backyard habitat Installed a rain barrel at school or at home</p>	



**Evaluation System Question 2:**

**How are MWEEs (PD) implemented by grantees?**

Row	Constructs (alphabetical)	Grantee Questionnaire (data submitted to B-WET)	Teacher PD Questionnaire (data submitted to B-WET)	Teacher MWEE Questionnaire (data submitted to B-WET)
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		<p>Gave presentation(s) about the local watershed (e.g., for school, other organizations)</p> <p>Participated in or organized event(s) to raise awareness about the importance of watersheds</p> <p>Participated in or helped coordinate a clean-up of a local stream, or beach</p> <p>Participated in a restoration activity (e.g., planting trees) Limited or avoided the use of household chemicals including fertilizers, herbicides and pesticides</p> <p>Told others about ways they can protect their local watershed</p>	<p>Gave presentation(s) about the local watershed (e.g., for school, other organizations)</p> <p>Participated in or organized event(s) to raise awareness about the importance of watersheds</p> <p>Participated in or helped coordinate a clean-up of a local stream or beach</p> <p>Participated in a restoration activity (i.e., planting trees)</p> <p>Limited or avoided the use of household chemicals including fertilizers, herbicides and pesticides</p> <p>Told others about ways they can protect their local watershed</p>	
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32	PD instruction: type	<p>Which of the following types of B-WET-funded MWEE professional development did you typically provide over the past grant year?</p> <p><u>Teacher Education</u></p> <p>One day workshops (usually less than 8 hours)</p> <p>Teacher institute (usually on consecutive days that cumulatively consist of 40 hours of more)</p> <p>Multi-day workshops (events that last at least 6 hours, but are less than 40 hours, e.g., a three-day workshop on a specific topic or a series of five Saturday sessions)</p> <p>A college-level course</p> <p>Professional development provider training (training for individuals who provide teacher professional development)</p> <p><u>Teacher Support</u></p> <p>Individual teacher coaching and support (e.g., curriculum planning, shared</p>	<p>Which type(s) of MWEE professional development did you participate in or receive: (please select yes or no for each type)</p> <p><b>TEACHER EDUCATION</b></p> <p>One day workshops (usually less than 8 hours)</p> <p>Teacher institute (usually on consecutive days that cumulatively consist of 40 hours of more)</p> <p>Multi-day workshops (events that last at least 6 hours, but are less than 40 hours, e.g., a three-day workshop on a specific topic or a series of five Saturday sessions)</p> <p>A college-level course</p> <p>Professional development provider training (training for individuals who provide teacher professional development)</p> <p><b>TEACHER SUPPORT</b></p> <p>Individual teacher coaching and support (e.g., curriculum planning, shared</p>	
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**Evaluation System Question 2:**

**How are MWEEs (PD) implemented by grantees?**

<b>Row</b>	<b>Constructs (alphabetical)</b>	<b>Grantee Questionnaire (data submitted to B-WET)</b>	<b>Teacher PD Questionnaire (data submitted to B-WET)</b>	<b>Teacher MWEE Questionnaire (data submitted to B-WET)</b>
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		teaching, demonstrations and/or other forms of in-school or in-field support) On-line professional development support (e.g., courses, webinars, discussion forums)	teaching, demonstrations and/or other forms of in-school or in-field support  On-line professional development support (e.g., courses, webinars, discussion forums)	
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**Evaluation System Question 2:**

**How are MWEEs (PD) implemented by grantees?**

Row	Constructs (alphabetical)	Grantee Questionnaire (data submitted to B-WET)	Teacher PD Questionnaire (data submitted to B-WET)	Teacher MWEE Questionnaire (data submitted to B-WET)
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33	PD instruction: use of NOAA resources	<p>Which NOAA resources were incorporated into your organization's typical B-WET-funded MWEE professional development? (No/Yes/Not sure)</p> <p>None</p> <p>Information from NOAA studies, reports, or websites</p> <p>Data collected by and accessible through NOAA</p> <p>IF YES: Name the NOAA data source: _____</p> <p>NOAA expert (e.g., scientist, educator, Sea Grant staff member, policy expert)</p> <p>NOAA curricula and education programs</p> <p>IF YES: Name the curricula or programs: _____</p> <p>NOAA labs or facilities</p> <p>IF YES: Name the lab or facility: _____</p> <p>NOAA National Marine Sanctuary</p> <p>NOAA National Estuarine Research Reserve</p>	<p>Which NOAA resources were used as part of your MWEE professional development?</p> <p>None</p> <p>Information from NOAA research studies, reports or websites</p> <p>Data collected by and accessible through NOAA</p> <p>IF YES: Name the NOAA data source: _____</p> <p>NOAA expert (e.g., scientist, educator, Sea Grant staff member, policy expert)</p> <p>NOAA curricula and education programs</p> <p>IF YES: Name the curricula or programs: _____</p> <p>NOAA labs or facilities</p> <p>IF YES: Name the lab or facility: _____</p> <p>NOAA National Marine Sanctuary</p> <p>NOAA National Estuarine Research Reserve</p>	
34	Teacher satisfaction		<p>What component(s) of the MWEE professional development best prepared you to teach your students about local watersheds?</p> <p>How could the MWEE professional development be improved to better prepare teachers to teach about the watershed?</p>	<p>What are some things that could possibly be done by others to help you develop and implement improved MWEEs?</p>

**Evaluation System Question 2:**

**How are MWEEs (PD) implemented by grantees?**

Row	Constructs (alphabetical)	Grantee Questionnaire (data submitted to B-WET)	Teacher PD Questionnaire (data submitted to B-WET)	Teacher MWEE Questionnaire (data submitted to B-WET)
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35	Teacher satisfaction		<p>Overall, what grade would you give your MWEE professional development experience? F, D, C, B, A</p> <p>Briefly describe why you selected this grade.</p>	
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**Evaluation System Question 2:**

**How are MWEEs (student) implemented by grantees and teachers?**

Row	Constructs (alphabetical)	Grantee Questionnaire (data submitted to B-WET)	Teacher MWEE Questionnaire (data submitted to B-WET)	On Teacher MWEE Nonresponse Survey= X	Student Questionnaire Items (data not submitted to B-WET)
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1	1Unique ID or Award Number	(see descriptives in Grantee Support tab)	TEACHER UNIQUE ID (links teacher to PD): To allow us to compare your past, current, and future responses, please create a unique 8-digit ID number using the 2 digits of your birth month, the 2 digits of your birth day, and the last 4 digits of most often used phone number. If you were born on March 9 and your home phone is 410.719.1234, your ID number would be 03091234.	X	Pre/Post matching code created by teacher
2	Descriptive: number of <u>students</u> , K-12 schools, and school districts served	How many students, schools, and school districts were served directly by your organization this past grant year as a result of your B-WET grant? (Please provide one number, NOT a range .) ABOUT ____ STUDENTS SERVED ABOUT ____ K-12 SCHOOLS SERVED ABOUT ____ SCHOOL DISTRICTS SERVED	How many of your students participated in a MWEE during the most recent school year? (Please provide your best estimate, NOT a range) ABOUT ____ STUDENTS	X	

**Evaluation System Question 2:**

**How are MWEEs (student) implemented by grantees and teachers?**

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3	Descriptive: student academic level				In science, do you usually get... -Mostly A's? -Mostly B's? -Mostly C's? -Mostly D's or below? -Our school does not give this type of grades -I prefer not to answer
4	Descriptive: student ESOL	What percent of the participating students speak English as a second language (aka English Language Learners)? Don't know Less than 20% 21-40% 41-60% 61-80% 81-100%			Do you mostly speak English at home? -No -Yes -I prefer not to answer
5	Descriptive: student ethnicity/race				Do you identify as (check all that apply): q Hispanic or Latino q American Indian or Alaska Native q Asian q Black or African American q Native Hawaiian or other Pacific Islander q White q Other

**Evaluation System Question 2:**

**How are MWEEs (student) implemented by grantees and teachers?**

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					q I prefer not to answer
6	Descriptive: student gender				Are you .... -Male -Female -I prefer not to answer
7	Descriptive: student grade level	What percent of the students/youth directly served by your organization were in each of the following grades levels? (total should equal 100%) <ul style="list-style-type: none"> <li>• Pre-K</li> <li>• Elementary</li> <li>• Middle</li> <li>• High</li> <li>• Other</li> <li>• I don't know</li> </ul>			What grade are you in? Pre-K, K, 1, 2, 3 4 5 6 7 8 9 10 11 12 Other

**Evaluation System Question 2:**

**How are MWEEs (student) implemented by grantees and teachers?**

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8	Descriptive: student socioeconomic status	What percent of the participating students' schools are Title 1? Don't know Less than 20% 21-40% 41-60% 61-80% 81-100%			
9	Descriptives: person/organization completing questionnaire		Are you currently a PreK-12 teacher or educator? -Yes -No	X	
10	Descriptives: person/organization completing questionnaire		In what setting do you teach? -Public school -Private school -Non-formal education (e.g., environmental centers, zoos, museums, interpretive programs at local or state level parks, youth organizations) -Home-school -Other	X	



**Evaluation System Question 2:**

**How are MWEEs (student) implemented by grantees and teachers?**

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11	Instruction: education methods	IF SELECTED Scientific-inquiry learning above: Which of the following steps did you include: Engage students in: Formulating scientific questions they can answer using data Making predictions or hypotheses Collecting data or using existing data Analyzing and interpreting data Making conclusions and adjusting predictions/hypotheses Developing presentations of their findings	If responded Yes to “Scientific-inquiry-based learning” in “What education methods were used during your students’ MWEEs?”, then answer this question: Which of the following steps did you engage students in... Formulating scientific questions they can answer using data Making predictions or hypotheses Collecting data or using existing data Analyzing and interpreting data Making conclusions and adjusting predictions/hypotheses Developing presentations of their findings		
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12	Instruction: education methods	What education methods were used by your organization’s staff with students during your organization’s typical B-WET- funded MWEEs? (select No or Yes for each method) Outdoor field trip Field work Place-based education Scientific-inquiry-based learning Issue investigation	What education methods were used during your students’ MWEEs? (select No or Yes for each method) Outdoor field trip Field work Place-based education Scientific-inquiry-based learning Issue investigation Service learning		
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**Evaluation System Question 2:**

**How are MWEEs (student) implemented by grantees and teachers?**

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		Service learning			
13	Instruction: MWEE action - data collection	Did students participate in any of these activities to protect and/or restore ocean, coastal and/or Great Lakes watersheds during your organization's B-WET-funded MWEEs? (please indicate no or yes for each activity) Monitored water quality	During the outdoor learning experience(s), my students: Conducted a one-time data or sample collection Conducted water quality monitoring over a period of time		E.G., While we were outside, I spent time collecting samples or taking measurements.

**Evaluation System Question 2:**

**How are MWEEs (student) implemented by grantees and teachers?**

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14	Instruction: MWEE action - stewardship behaviors	Did students participate in any of these activities to protect and/or restore ocean, coastal and/or Great Lakes watersheds during your organization's B-WET-funded MWEEs? (please indicate no or yes for each activity) Created a schoolyard or backyard habitat Conserved water at school to protect the local watershed Installed a rain barrel at school Reduced litter at the school Gave presentation(s) about the local watershed (e.g., for school, other organizations) Participated in an event to raise awareness about the importance of watersheds Helped clean up or take care of a local stream or beach Participated in a restoration activity (e.g., planting trees) Told others about ways they can protect their local watershed	Did students participate in any of the following activities to protect and/or restore ocean, coastal, and/or Great Lakes watersheds during their MWEE? (please indicate no or yes for each activity) Created a schoolyard or backyard habitat Conserved water at school to protect the local watershed Installed a rain barrel at school Reduced litter at the school Gave presentation(s) about the local watershed (e.g., for school, other organizations) Participated in an event to raise awareness about the importance of watersheds Helped clean up or take care of a local stream or beach Participated in a restoration activity (e.g., planting trees) to benefit watersheds Told others about ways they can protect their local watersheds		E.G., While we were outside, I spent time helping to protect the area.

**Evaluation System Question 2:**

**How are MWEEs (student) implemented by grantees and teachers?**

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15	Instruction: MWEE alignment with standards	To what extent were your organization's MWEEs aligned with: (Not at all=1 to To a great extent=5) School district education standards State education standards National education standards Regional environmental/natural resources management priorities	To what extent was the content of your students' MWEEs aligned with: : (Not at all=1 to To a great extent=5) school district education standards state education standards national education standards regional environmental/natural resources management priorities		
16	Instruction: MWEE hours outdoors	On average during the past grant year, a typical student spent ____ hours <u>outdoors</u> taught by your organization's staff during a B-WET-funded MWEE. -None -1-2 hours -3-5 hours -6-9 hours -10-16 hours -17-24 hours -25-40 hours -More than 40 hours	On average during the last school year, about how many hours did a typical student spend <u>outdoors</u> during MWEE activities? (check one) -None -1-2 hours -3-5 hours -6-9 hours -10-16 hours -17-24 hours -25-40 hours -more than 40 hours	X	

**Evaluation System Question 2:**

**How are MWEEs (student) implemented by grantees and teachers?**

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17	Instruction: MWEE hours total	On average during the past grant year, a typical student spent ____ hours taught by your organization’s staff during a B-WET-funded MWEE. -None -1-2 hours -3-5 hours -6-9 hours -10-16 hours -17-24 hours -25-40 hours -More than 40 hours	On average during the last school year, about how many hours did a typical student spend involved in MWEE activities? (check one) -None -1-2 hours -3-5 hours -6-9 hours -10-16 hours -17-24 hours -25-40 hours -more than 40 hours	X	
18	Instruction: MWEE integration (classroom/outdoors)	NA	Overall, what I taught my students about watersheds in the classroom was closely integrated with students' outdoor learning experience(s). (7-point agreement scale) My students' outdoor learning experiences were designed to help them understand what they had been introduced to during regular science class My students' outdoor learning experiences were designed to reinforce what students learned during regular science class		

**Evaluation System Question 2:**

**How are MWEEs (student) implemented by grantees and teachers?**

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19	Instruction: MWEE length	On average, a typical student participated in your organization's B-WET-funded MWEEs over the course of: -One day -2-6 days -One week -2-3 weeks -One month -2-3 months -4-8 months -A full school year (about 9 months) -A full calendar year -Multiple years	On average, did students participate in a MWEE over the course of: -One day -2-6 days -One week -2-3 weeks -One month -2-3 months -4-8 months -A full school year (about 9 months) -A full calendar year -Multiple years	X	
20	Instruction: MWEE location		Where did the outdoor component of your students' MWEEs occur? On school grounds Near the school (1-5 minute walk) Walkable from the school (more than 5 minutes) In a location to which the students were bussed or driven		

**Evaluation System Question 2:**

**How are MWEEs (student) implemented by grantees and teachers?**

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21	Instruction: MWEE preparation		BEFORE students participated in their outdoor learning experience: I provided them with detailed information about what they were going to do I let students know what activities they were going to do I spent a lot of time preparing students for what to expect I introduced relevant science concepts		E.G., BEFORE we went outside to learn, we talked about what we were going to do outside.
22	Instruction: MWEE reflection		AFTER students participated in the outdoor learning experience(s): They discussed results based on their observations They offered explanations for what they observed They were expected to draw on what had been learned I spent a lot of time to make sure the students had integrated what they had learned		E.G., AFTER we had gone outside, I had a chance to talk with my teacher and other students about what we did and learned.

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**How are MWEEs (student) implemented by grantees and teachers?**

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23	Instruction: MWEE subjects	<p>Were your organization's typical B-WET-funded MWEEs focused only on science concepts, or on concepts from multiple disciplines (e.g., science, math, social studies, literature, art, music)?</p> <ul style="list-style-type: none"> <li>-Only science concepts</li> <li>-Concepts from multiple disciplines, including science</li> <li>-Other</li> </ul>	<p>Were your typical MWEEs focused only on science concepts, or on concepts from multiple disciplines (e.g., science, math, social studies, literature, art, music)?</p> <ul style="list-style-type: none"> <li>-Only science concepts</li> <li>-Concepts from multiple disciplines, including science</li> <li>-Other</li> </ul>		
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24	Instruction: MWEE type	<p>Which of the following did your B-WET-funded programs provide for students during this past grant year?</p> <ul style="list-style-type: none"> <li>Off-site field programs during the school day</li> <li>Schoolyard-based programs during the school day</li> <li>Classroom-based programs during the school day, including distance learning experiences</li> <li>After-school or weekend programs (e.g., science clubs)</li> <li>Summer programs</li> <li>Events for youth with their families</li> </ul>			
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**How are MWEEs (student) implemented by grantees and teachers?**

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25	Instruction: MWEE use of NOAA resources	<p>Which NOAA resources were used as part of MWEEs for students, if any?</p> <p>None</p> <p>Information from NOAA studies, reports, or websites</p> <p>Data collected by and accessible through NOAA</p> <p>IF YES: Name the NOAA data source: _____</p> <p>NOAA expert (e.g., scientist, educator, Sea Grant staff member, policy expert)</p> <p>NOAA curricula and education programs</p> <p>IF YES: Name the curricula or programs: _____</p> <p>NOAA labs or facilities</p> <p>IF YES: Name the lab or facility: _____</p> <p>_____</p> <p>NOAA National Marine Sanctuary</p> <p>NOAA National Estuarine Research Reserve</p>	<p>Which NOAA resources were used as part of your typical student MWEE?</p> <p>None</p> <p>Information from NOAA research studies or reports</p> <p>Data collected by and accessible through NOAA</p> <p>IF YES: Name the NOAA data source: _____</p> <p>NOAA expert (e.g., scientist, educator, Sea Grant staff member, policy expert)</p> <p>NOAA curricula and education programs</p> <p>IF YES: Name the curricula or programs: _____</p> <p>NOAA labs or facilities</p> <p>IF YES: Name the lab or facility: _____</p> <p>_____</p> <p>NOAA National Marine Sanctuary</p> <p>NOAA National Estuarine Research Reserve</p>		
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**Evaluation System Question 2:**

**How are MWEEs (student) implemented by grantees and teachers?**

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26	MWEE goals: academic achievement	It is a goal of my organization's B-WET-funded MWEEs that students will: Perform better academically in science Perform better on state standardized tests Be more engaged in their science learning			
27	MWEE goals: Attitudes/Career interest	It is a goal of my organization's B-WET-funded MWEEs that students will: Be more likely to express an interest in pursuing science careers			
28	MWEE goals: Attitudes/towards watershed resources	It is a goal of my organization's B-WET-funded MWEEs that students will: Feel more connected to their local watershed Express greater caring and concern for watersheds			
29	MWEE goals: Behavior/Stewardship change	It is a goal of my organization's B-WET-funded MWEEs that students will: Be more likely to act to protect and/or restore watersheds Be better able to make informed decisions to protect or restore watersheds			

**Evaluation System Question 2:**

**How are MWEEs (student) implemented by grantees and teachers?**

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30	MWEE goals: Behavior/Stewardship self-efficacy	It is a goal of my organization's B-WET-funded MWEEs that students will: Be more confident in their ability to protect and/or restore watersheds			
31	MWEE goals: Knowledge/environmental impacts of human behaviors (issues)	It is a goal of my organization's B-WET-funded MWEEs that students will: Recognize that both natural processes and human activities affect water flow and water quality in watersheds. Identify connections between human welfare and water flow and quality Identify possible point and non-point sources of water pollution	Did your typical MWEE include any of the following learning objectives? Students will be able to: Recognize that both natural processes and human activities affect water flow and water quality in watersheds Identify connections between human welfare and water flow and quality Identify possible point and non-point sources of water pollution		
32	MWEE goals: Knowledge/Stewardship behaviors	It is a goal of my organization's B-WET-funded MWEEs that students will be able to: Identify actions individuals can engage in to protect/restore water quality in watersheds	Did your typical MWEE include any of the following learning objectives? Students will be able to: Identify actions individuals can engage in to protect/restore water quality in watersheds		

**Evaluation System Question 2:**

**How are MWEEs (student) implemented by grantees and teachers?**

Row	Constructs (alphabetical)	Grantee Questionnaire (data submitted to B-WET)	Teacher MWEE Questionnaire (data submitted to B-WET)	On Teacher MWEE Nonresp onse Survey= X	Student Questionnaire Items (data not submitted to B-WET)
33	MWEE goals: Knowledge/watersheds	It is a goal of my organization's B-WET-funded MWEEs that students will be able to: Define the term "watershed" Identify their local watershed(s) Identify how watersheds are connected to the ocean via streams, rivers, and human-made structures Identify the functions that occur in a watershed (transport, store, and cycle water)	Did your typical MWEE include any of the following learning objectives? Students will be able to: Define the term "watershed" Identify their local watershed(s) Identify how watersheds are connected to the ocean via streams, rivers, and human-made structures Identify the functions that occur in a watershed (transport, store, and cycle water)		
34	MWEE goals: Skills/Science inquiry skills, such as critical thinking	It is a goal of my organization's B-WET-funded MWEEs that students will: Be better able to conduct scientific investigations			
35	MWEE implemented?		In the past 12 months, did you implement a Meaningful Watershed Educational Experience (MWEE) with your students? -Yes -No  [IF NO] Please explain why you did not implement a MWEE. (essay box)	X	
36	Student satisfaction				Satisfaction post self-

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					report items
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**Evaluation System Question 3:**

**To what extent do B-WET funded projects increase teachers' knowledge of watershed concepts, their confidence in their ability to integrate MWEEs into their teaching practices, and the likelihood that they implement high quality MWEEs?**

Row	Constructs (alphabetical)	Teacher PD Questionnaire (data submitted to B-WET)
1	1 Unique ID or Award Number	<b>TEACHER UNIQUE ID:</b> To allow us to compare your past, current, and future responses, please create a unique 8-digit ID number using the 2 digits of your birth month, the 2 digits of your birth day, and the last 4 digits of most often used phone number. If you were born on March 9 and your home phone is 410.719.1234, your ID number would be 03091234.
2	Behavior: stewardship (as role model for students)	BEFORE the MWEE professional development, how confident were you in your ability to: AFTER the MWEE professional development, how confident are you in your ability to: In the FUTURE, I intend to ...: -Act to protect and/or restore ocean, coastal, or Great Lakes watersheds
3	Instruction: MWEE confidence	(retrospective pre/post) BEFORE the MWEE professional development, how confident were you in your ability to: AFTER the MWEE professional development, how confident are you in your ability to: Teach my students about local watersheds Incorporate MWEEs into my curriculum Implement MWEEs without support from a professional development provider Use NOAA resources to enhance my students' MWEE experiences Guide students through taking action to protect or restore watersheds Research environmental issues affecting watersheds with students Use scientific inquiry instruction Use the outdoors for instruction
4	Instruction: MWEE intention to teach	In the FUTURE, I intend to ...: Teach my students about local watersheds Incorporate MWEEs into my curriculum Implement MWEEs without support from a professional development provider Use NOAA resources to enhance my students' MWEE experiences Guide students through taking action to protect or restore watersheds Research environmental issues affecting watersheds with students Use scientific inquiry instruction Use the outdoors for instruction

**Evaluation System Question 3:**

**To what extent do B-WET funded projects increase teachers' knowledge of watershed concepts, their confidence in their ability to integrate MWEEs into their teaching practices, and the likelihood that they implement high quality MWEEs?**

Row	Constructs (alphabetical)	Teacher PD Questionnaire (data submitted to B-WET)
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5	Knowledge: environmental impacts of human behaviors	As a result of participating in the MWEE professional development, I am better able to: Recognize that both natural processes and human activities affect water flow and water quality in watersheds Identify connections between human welfare and water flow and quality Identify possible point and non-point sources of water pollution
6	Knowledge: stewardship behaviors	As a result of participating in the MWEE professional development, I am better able to: Identify actions individuals can engage in to protect/restore water quality in watersheds
7	Knowledge: watersheds	As a result of participating in the MWEE professional development, I am better able to: Define the term "watershed" Identify my local watershed(s) Identify how watersheds are connected to the ocean via streams, rivers, and human-made structures Identify the functions that occur in a watershed (transport, store, and cycle water)

**Evaluation System Question 4:**

**To what extent do B-WET funded projects increase students' knowledge of watershed concepts, attitudes toward watersheds, inquiry and stewardship skills, and aspirations towards protecting watersheds?**

Row	Constructs (alphabetical)	Teacher MWEE Questionnaire (data submitted to B-WET)	On Teacher MWEE Nonresponse Survey= X	Student Questionnaire Items (data not submitted to B-WET)
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1	1Unique ID or Award Number	(see MWEE Implementation tab for teacher descriptives)		(see MWEE Implementation tab student descriptives)
2	Academic achievement	As a result of participating in MWEEs, I believe students: Perform better in science Perform better academically Perform better on state standardized tests Are more engaged in their science learning	X	Science Engagement pre/post self-report items
3	Attitudes: career interest	As a result of participating in MWEEs, I believe students: Are more likely to express an interest in pursuing science careers	X	Science Engagement pre/post self-report items
4	Attitudes: towards watershed resources	As a result of participating in MWEEs, I believe students: Express greater caring and concern for their local watershed	X	Connection with Nature pre/post self-report items Connection to Waters pre/post self-report items
5	Behavior: stewardship change	As a result of participating in MWEEs, I believe students: Are more likely to act to protect or restore watersheds Are better able to make informed decisions to protect or restore watersheds  As a result of participating in my typical MWEEs, I believe students are more likely to _____ to protect and/or restore ocean, coastal, and/or Great Lakes watersheds. Create a schoolyard or backyard habitat Conserve water at school to protect the local watershed Install a rain barrel at school Reduce litter at the school Give presentation(s) about the local watershed (e.g., for school, other organizations) Participate in an event to raise awareness about the importance of watersheds Help clean up or take care of a local stream or beach Participate in a restoration activity (e.g., planting trees) to benefit watersheds Tell others about ways they can protect their local	X (first statement only)	Conserve Water pre/post self-report items Intentions to Act pre/post self-report items



**Evaluation System Question 4:**

**To what extent do B-WET funded projects increase students' knowledge of watershed concepts, attitudes toward watersheds, inquiry and stewardship skills, and aspirations towards protecting watersheds?**

Row	Constructs (alphabetical)	Teacher MWEE Questionnaire (data submitted to B-WET)	On Teacher MWEE Nonresponse Survey= X	Student Questionnaire Items (data not submitted to B-WET)
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		watersheds Other: text box		
6	Behavior: stewardship self-efficacy	As a result of participating in MWEEs, I believe students: Are more confident in their ability to protect and/or restore watersheds	X	Locus of Control pre/post self-report items
7	Knowledge: watersheds	As a result of participating in MWEEs, I believe students: Know more about watersheds	X	Pre/post multiple choice questions
8	Most important outcomes	What is the most important benefit of MWEEs for your students?		
9	Skills: Science inquiry skills, such as critical thinking	As a result of participating in MWEEs, I believe students: Are better able to conduct scientific investigations Are better able to understand the nature of scientific research	X	Science Inquiry Skills pre/post self-report items

## Exploratory Questions

Row	Constructs (alphabetical)	Grantee Questionnaire Items (data submitted to B-WET)	Teacher PD Questionnaire (data submitted to B-WET)
1	Education policy impact	To what extent do you (dis)agree with the following statement: NOAA B-WET has had, or will have, a positive impact on education policy in my area? (NA, Strongly disagree to Strongly agree 7-point scale) Please explain why you selected the response you did.	
2	EE impact	To what extent do you (dis)agree with the following statement: NOAA B-WET has had, or will have, a positive impact on environmental education in my area's formal education system? (NA, Strongly disagree to Strongly agree 7-point scale) Please explain why you selected the response you did.	
3	Environment impact	To what extent do you (dis)agree with the following statement: The health of our local watershed(s) has improved, or will improve, as a result of my organization's B-WET-funded professional development or MWEEs. (NA, Strongly disagree to Strongly agree 7-point scale) Please explain why you selected the response you did.	
4	Environmental policy impact	To what extent do you (dis)agree with the following statement: NOAA B-WET has had, or will have, a positive impact on environmental policy in my area? (NA, Strongly disagree to Strongly agree 7-point scale) Please explain why you selected the response you did.	
5	NOAA visibility	To what extent do you (dis)agree with the following statement: As a result of NOAA B-WET, the public is more familiar with NOAA, such as NOAA science, resources, and experts? (NA, Strongly disagree to Strongly agree 7-point scale) Please explain why you selected the response you did.	
6	NOAA visibility		Did your B-WET professional development provider indicate that it was funded (in part) with funding from the National Oceanic and Atmospheric Administration (NOAA)?

## Exploratory Questions

Row	Constructs (alphabetical)	Grantee Questionnaire Items (data submitted to B-WET)	Teacher PD Questionnaire (data submitted to B-WET)
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			- No - Yes  Did participating in the B-WET professional development increase your knowledge of ... what NOAA does? No    Yes scientific data accessible through NOAA? No    Yes educational resources available through NOAA? No    Yes
7	Organization impact	To what extent do you (dis)agree with the following statement: The B-WET grant has improved, or will improve, the overall quality of environmental education provided by my organization? (NA, Strongly disagree to Strongly agree 7-point scale) Please explain why you selected the response you did.	
8	Evaluation	Which of the following best describes the situation with regard to evaluation(s) of your organization's B-WET-funded programs? -Don't know -No evaluation has been conducted and there are no plans to complete one -No evaluation has been conducted, but there are plans to complete one -An evaluation is being conducted, but it is not yet finished -One or more evaluations has been completed -Other (please describe) _____  IF SELECTED ' One or more evaluations has/have been completed' ABOVE: What type of evaluation has been completed? Needs assessment	

## Exploratory Questions

Row	Constructs (alphabetical)	Grantee Questionnaire Items (data submitted to B-WET)	Teacher PD Questionnaire (data submitted to B-WET)
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		Process/Implementation Outcome Impact	
9	Evaluation	If outcome or impact evaluation:  Which of the following best describes who led the evaluation? -Don't know -Internal staff member (someone who is an employee of your organization) -External consultant (someone who is not an employee of your organization) If selected, please provide consultant/firm name: _____ -Other (please describe) _____	
10	Evaluation	If outcome or impact evaluation: Does the evaluation report include evidence of: (Don't know, Not measured, No, Yes) Increases in knowledge about watersheds (participants learned new information) Changes in attitudes toward watersheds (participants'; changed their beliefs, opinions, feelings, or perspectives) Increases in the skills needed to engage in behaviors to protect and/or restore ocean, coastal and/or Great Lakes watersheds (verbal, mental, or physical) Increases in intentions to act on behalf of watersheds Participants engaging in actions that protect or restore watersheds Improved water quality (positive changes in physical watershed that can be attributed to participants'; actions) Improved academic performance	

## Appendix F: Evaluation System Instruments

### GRANTEE QUESTIONNAIRE

#### NOAA B-WET Introduction

Please answer the following questions in reference to the most recently-completed grant year of your current NOAA B-WET grant. You will be asked about a range of practices and outcomes that represent the diversity of *Meaningful Watershed Educational Experiences* (MWEEs) offered by B-WET-funded programs, some of which may not apply directly to your project. It is acceptable to answer “not applicable” (N/A) in those instances.

For the purposes of this questionnaire, we assume that *Meaningful Watershed Educational Experiences* (MWEEs) are investigative, project-oriented, sustained activities that include one or more outdoor experiences, consider the watershed as a system, and are an integral part of a school instructional program. MWEEs for students are projects that provide K-12 students opportunities for these activities. MWEEs for teachers provide K-12 teachers opportunities for professional development to build their confidence and capacity to implement MWEE activities with their students. MWEEs are enhanced by NOAA products, services, or personnel; support regional environmental and natural resource management priorities; and are designed to increase students' and teachers' understanding and stewardship of watersheds and related ocean, coastal and Great Lakes ecosystems.

We realize that not all MWEEs are designed in the same way and that your organization does not necessarily only offer one type. Because we are attempting to generalize, we often ask you to consider a “typical” MWEE offered by your organization. Please consider your most frequently offered MWEE as “typical.”

For the purposes of this survey, please respond in reference to NOAA B-WET-funded MWEEs and professional development.

All responses will be kept anonymous, that is they will not be associated with you and your organization. THANK YOU in advance for your candor and thoughtfulness in answering the questions that follow.

*Note: The term “organization” is used generically to mean the B-WET funds “awardee.” The awardee may be one nonprofit organization or an academic institution completing the work, or the awardee may be an institution that is serving as the leader of a partnership of organizations that are completing the work. If you are the latter type of awardee, please respond on behalf of your collective group of partners.*

*Note: We apologize for redundancy in information you have previously provided to NOAA B-WET as part of your award. At this time, we are not able to link this national evaluation system database with NOAA B-WET's other databases.*

It will take between 30-60 minutes to complete this survey, depending on the nature of your project.

Thank you.

Bronwen Rice

NOAA B-WET National Coordinator

**Did you operate a NOAA B-WET funded program this past grant year?**

- Yes
- No [SKIP LOGIC OUT]

**To what extent were you involved in:**

	Not at all 1	2	3	4	To a great extent 5
Developing your organization's most recent funded B-WET grant proposal (on your own or through collaborating with an external grant writer)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Implementing your organization's most recent B-WET-funded grant	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Evaluating your organization's most recent B-WET-funded grant (on your own or through collaborating with an external evaluation consultant)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Please enter your NOAA B-WET award number.** The award number will be used **ONLY** to 1) identify your B-WET region, not your organization, and 2) allow us to link information you provide with that of data that may be provided by your project's teachers.

**In what zip code is your organization located?**

**In which region(s) were your organization's MWEEs offered this past grant year? (check all that apply)**

- California
- Chesapeake Bay
- Great Lakes
- Gulf of Mexico
- Hawaii
- New England
- Pacific Northwest
- Other (please describe) \_\_\_\_\_

**\*\*Which of the following B-WET-funded programs did your organization provide?**

[SKIP LOGIC: 1, BUT NOT 2; 2, BUT NOT 1; BOTH 1 AND 2; NEITHER, SKIP OUT]

	No	Yes
MWEEs for students/youth who are between the ages of 4-18 (or grades PreK-12)	<input type="radio"/>	<input type="radio"/>
MWEE professional development or support for teachers	<input type="radio"/>	<input type="radio"/>
Other (please describe) [SKIP LOGIC OUT]	<input type="radio"/>	<input type="radio"/>

**What is the total amount of funding you received this past grant year from NOAA for your B-WET project?**

- \$20,000 or less
- \$20,001-\$50,000
- \$50,001-\$100,000

- \$100,001-\$200,000
- \$200,001-\$300,000
- \$300,001 or greater

**What is the total amount of funding for this project, from all sources, this past grant year?**

- \$20,000 or less
- \$20,001-\$50,000
- \$50,001-\$100,000
- \$100,001-\$200,000
- \$200,001-\$300,000
- \$300,001 or greater

**Including this past grant year, for how many years has your organization received funding (not including anticipated funding) from NOAA B-WET for the currently-funded project?**

- 1 year
- 2 years
- 3 years
- 4 or more years

**For how many years total has this B-WET project been in existence, including years not funded by NOAA B-WET?**

- 1 year
- 2 years
- 3 years
- 4 or more years

**For what type of organization do you work? (choose one)**

- Academic institution (community college, college, university)
- Business/Corporation
- Local government
- State education agency
- State natural resource agency
- Non-profit organization
- School/school district
- Other (please describe) \_\_\_\_\_

**Overall, what grade would you give the support you received from your region's NOAA B-WET staff over the past grant year?**

- A
- B
- C
- D
- F

**Briefly describe why you selected this grade: (essay box)**

**In the future, how likely is it that you will make use of each of the following to help you implement your B-WET-funded programs?**

	Extremely unlikely 1	2	3	4	5	6	Extremely likely 7
One-on-one time with B-WET program staff (i.e., regional or national coordinators)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Facilitated networking with other B-WET grantees in my region	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Facilitated networking with other B-WET grantees from other regions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Email listserv, web forum, Facebook page, or other tools for virtual interaction with other grantees	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Access to local NOAA subject-matter experts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Information about and access to current NOAA data sets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NOAA materials and lesson plans relevant to watersheds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Suggested "best" or "preferred" practices for MWEES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assistance with evaluating MWEES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assistance with grant management	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Opportunities to learn about watershed science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Opportunities to learn about local or regional environmental issues	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Opportunities to learn about local or regional policy efforts impacting environmental education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Opportunities to learn about national policy efforts impacting environmental education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Opportunities to learn about climate change literacy principles	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Opportunities to learn about ocean literacy principles	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



**TO BE ANSWERED BY GRANTEES WHO WORK DIRECTLY WITH STUDENTS (question marked with \*\* on page 1)**

**Please answer the following questions with regard to the instruction your organization provides directly to students (not the instruction provided by teachers).**

**How many students, schools, and school districts were served directly by your organization this past grant year as a result of your B-WET grant? (Please provide one number, **NOT** a range.)**

About \_\_\_\_ students served

About \_\_\_\_ K-12 schools served

About \_\_\_\_ school districts served

**What percent of the students/youth directly served by your organization were in each of the following grade levels? (total should equal 100%)**

\_\_\_\_\_ PreK

\_\_\_\_\_ Elementary

\_\_\_\_\_ Middle

\_\_\_\_\_ High

\_\_\_\_\_ Other

\_\_\_\_\_ I don't know

**What percent of the participating students' schools are Title 1?**

Don't know

Less than 20%

21-40%

41-60%

61-80%

81-100%

**What percent of the participating students speak English as a second language (aka English Language Learners)?**

Don't know

Less than 20%

21-40%

41-60%

61-80%

81-100%

**To what extent were your organization's MWEEs aligned with:**

	N/A	Don't know	Not at all 1	2	3	4	To a great extent 5
School district education standards	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
State education standards	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
National education standards	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Regional environmental/natural resources management priorities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Which of the following did your B-WET-funded programs provide for students during this past grant year?**

	No	Yes
Off-site field programs during the school day	<input type="radio"/>	<input type="radio"/>
Schoolyard-based programs during the school day	<input type="radio"/>	<input type="radio"/>
Classroom-based programs during the school day, including distance learning experiences	<input type="radio"/>	<input type="radio"/>
After-school or weekend programs (e.g., science clubs)	<input type="radio"/>	<input type="radio"/>
Summer programs	<input type="radio"/>	<input type="radio"/>
Events for youth with their families	<input type="radio"/>	<input type="radio"/>

**On average during the past grant year, a typical student spent \_\_\_\_ hours taught by your organization’s staff during a B-WET-funded MWEE.**

- None
- 1-2 hours
- 3-5 hours
- 6-9 hours
- 10-16 hours
- 17-24 hours
- 25-40 hours
- More than 40 hours

**On average during the past grant year, a typical student spent \_\_\_\_ hours outdoors taught by your organization’s staff during a B-WET-funded MWEE.**

- None
- 1-2 hours
- 3-5 hours
- 6-9 hours
- 10-16 hours
- 17-24 hours
- 25-40 hours
- More than 40 hours

**On average, a typical student participated in your organization's B-WET-funded MWEEs over the course of:**

- One day
- 2-6 days
- One week
- 2-3 weeks
- One month
- 2-3 months

- 4-8 months
- A full school year (about 9 months)
- A full calendar year
- Multiple years

**Were your organization’s typical B-WET-funded MWEEs focused only on science concepts, or on concepts from multiple disciplines (e.g., science, math, social studies, literature, art, music)?**

- Only science concepts
- Concepts from multiple disciplines, including science
- Other

**Which NOAA resources were used as part of MWEEs for students, if any?**

	Not sure	No	Yes
None	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Information from NOAA studies, reports, or websites	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Data collected by and accessible through NOAA	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
IF YES: Name the NOAA data source: _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NOAA expert (e.g., scientist, educator, Sea Grant staff member, policy expert)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NOAA curricula and education programs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
IF YES: Name the curricula or programs: _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NOAA labs or facilities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
IF YES: Name the lab or facility: _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NOAA National Marine Sanctuary	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NOAA National Estuarine Research Reserve	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**What education methods were used by your organization’s staff with students during your organization’s typical B-WET-funded MWEs? (select No or Yes for each method)**

	Not sure	No	Yes
Outdoor field trip (i.e., excursion to learn about natural history and ecology in the outdoors, may or may not include data collection)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Field work (i.e., scientific study carried out somewhere other than in a classroom/laboratory, includes data collection)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Place-based education (i.e., an interdisciplinary instructional strategy that uses the local environment and community as the context for teaching and learning)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Scientific-inquiry-based learning (i.e., an instructional strategy that gives students the opportunity to explore an idea or question. To arrive at an answer or to better understand the concept, students often collect and analyze data)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Issue investigation (i.e., an interdisciplinary instructional strategy that engages learners in investigating complex, real-world environmental issues and problem-solving as the context for teaching and learning)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Service learning (i.e., an instructional strategy that integrates meaningful community service with instruction and reflection to enrich the learning experience, teach civic responsibility, and strengthen communities)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**IF SELECTED Scientific-inquiry learning above: Which of the following steps did you include: Engage students in:**

	No	Yes
Formulating scientific questions they can answer using data	<input type="radio"/>	<input type="radio"/>
Making predictions or hypotheses	<input type="radio"/>	<input type="radio"/>
Collecting data or using existing data	<input type="radio"/>	<input type="radio"/>
Analyzing and interpreting data	<input type="radio"/>	<input type="radio"/>
Making conclusions and adjusting predictions/hypotheses	<input type="radio"/>	<input type="radio"/>
Developing presentations of their findings	<input type="radio"/>	<input type="radio"/>

**Did students participate in any of these activities to protect and/or restore ocean, coastal and/or Great Lakes watersheds during your organization’s B-WET-funded MWEEs? (please indicate no or yes for each activity)**

	No	Yes
Created a schoolyard or backyard habitat	<input type="radio"/>	<input type="radio"/>
Conserved water at school to protect the local watershed	<input type="radio"/>	<input type="radio"/>
Installed a rain barrel at school	<input type="radio"/>	<input type="radio"/>
Reduced litter at the school	<input type="radio"/>	<input type="radio"/>
Gave presentation(s) about the local watershed (e.g., for school, other organizations)	<input type="radio"/>	<input type="radio"/>
Participated in an event to raise awareness about the importance of watersheds	<input type="radio"/>	<input type="radio"/>
Helped clean up or take care of a local stream or beach	<input type="radio"/>	<input type="radio"/>
Participated in a restoration activity (e.g., planting trees)	<input type="radio"/>	<input type="radio"/>
Told others about ways they can protect their local watershed	<input type="radio"/>	<input type="radio"/>
Monitored water quality	<input type="radio"/>	<input type="radio"/>

**It is a goal of my organization's B-WET-funded MWEEs that students will:**

	N/A	Don't know	No	Yes
Know more about the ocean	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Know more about climate change	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feel more connected to their local watershed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Express greater caring and concern for watersheds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Be more confident in their ability to protect and/or restore watersheds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Be more likely to act to protect and/or restore watersheds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Be better able to make informed decisions about how to protect or restore watersheds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Be better able to conduct scientific investigations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Be more likely to express an interest in pursuing science careers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Perform better academically in science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Perform better on state standardized tests	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Be more engaged in their science learning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**It is a goal of my organization’s B-WET-funded MWEEs that students will be able to:**

	N/A	Don't know	No	Yes
Define the term “watershed”	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Identify their local watershed(s)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Identify how watersheds are connected to the ocean via streams, rivers, and human-made structures	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Identify the functions that occur in a watershed (transport, store, and cycle water)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Recognize that both natural processes and human activities affect water flow and water quality in watersheds.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Identify connections between human welfare and water flow and quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Identify possible point and non-point sources of water pollution	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Identify actions individuals can engage in to protect/restore water quality in watersheds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



**TO BE ANSWERED BY GRANTEES WHO PROVIDE PROFESSIONAL DEVELOPMENT TO TEACHERS (see question marked with \*\* on page 1)**

**Which of the following types of B-WET-funded MWEE professional development did you typically provide over the past grant year?**

	No	Yes
<b>Teacher Education</b>		
One day workshops (usually less than 8 hours)	<input type="radio"/>	<input type="radio"/>
Teacher institute (usually on consecutive days that cumulatively consist of 40 hours of more)	<input type="radio"/>	<input type="radio"/>
Multi-day workshops (events that last at least 6 hours, but are less than 40 hours, e.g., a three-day workshop on a specific topic or a series of five Saturday sessions)	<input type="radio"/>	<input type="radio"/>
A college-level course	<input type="radio"/>	<input type="radio"/>
Professional development provider training (training for individuals who provide teacher professional development)	<input type="radio"/>	<input type="radio"/>
<b>Teacher Support</b>		
Individual teacher coaching and support (e.g., curriculum planning, shared teaching, demonstrations and/or other forms of in-school or in-field support)	<input type="radio"/>	<input type="radio"/>
On-line professional development support (e.g., courses, webinars, discussion forums)	<input type="radio"/>	<input type="radio"/>

**For about how many teachers, schools, and school districts did your organization provide professional development or support (e.g., trained in workshops, coached at schools or in the field) this past grant year as a result of your B-WET grant? (Please provide one number, NOT a range.)**

About \_\_\_\_ teachers served

About \_\_\_\_ K-12 schools served

About \_\_\_\_ school districts served

**What percent of the participating teachers taught the following grade levels? (total should equal 100%)**

\_\_\_\_\_ PreK

\_\_\_\_\_ Elementary

\_\_\_\_\_ Middle

\_\_\_\_\_ High

\_\_\_\_\_ Other

\_\_\_\_\_ I don't know

**Did the majority of participating teachers teach science?**

- No
- Yes

**About how many hours of MWEE professional development and/or support did your organization typically provide for any one teacher this past grant year?**

- N/A
- None
- 1-2 hours
- 3-5 hours
- 6-10 hours
- 11-20 hours
- 21-40 hours
- 41-60 hours
- 61-80 hours
- More than 80 hours

**About how many hours did the typical teacher participate in outdoor activities as part of your organization's MWEE professional development this past grant year?**

- None
- 1-2 hours
- 3-5 hours
- 6-10 hours
- 11-20 hours
- 21-40 hours
- 41-60 hours
- 61-80 hours
- More than 80 hours

**To what extent was your organization's MWEE professional development content aligned with:**

	N/A	Don't know	Not at all 1	2	3	4	To a great extent 5
School district education standards	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
State education standards	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
National education standards	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Regional environmental/natural resources management priorities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Which NOAA resources were incorporated into your organization's typical B-WET-funded MWEE professional development?**

	No	Yes	Not sure
None	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Information from NOAA studies, reports, or websites	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Data collected by and accessible through NOAA	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
IF YES: Name the NOAA data source: _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NOAA expert (e.g., scientist, educator, Sea Grant staff member, policy expert)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NOAA curricula and education programs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
IF YES: Name the curricula or programs: _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NOAA labs or facilities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
IF YES: Name the lab or facility: _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NOAA National Marine Sanctuary	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NOAA National Estuarine Research Reserve	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**What education methods were used during your MWEE professional development? (select No or Yes for each method)**

	Not sure	No	Yes
Outdoor field trip (i.e., excursion to learn about natural history and ecology in the outdoors, may or may not include data collection)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Field work (i.e., scientific study carried out somewhere other than in a classroom/laboratory, includes data collection)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Place-based education (i.e., an interdisciplinary instructional strategy that uses the local environment and community as the context for teaching and learning)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Scientific-inquiry-based learning (i.e., an instructional strategy based on the idea that learning may be facilitated by giving students the opportunity to explore an idea or question on their own. To arrive at an answer or to better understand the concept, students often collect and analyze data)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Issue investigation (i.e., an interdisciplinary instructional strategy that engages learners in investigating complex, real-world environmental issues and problem-solving as the context for teaching and learning)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

IF SELECTED Scientific-inquiry learning above:

**Which of the following steps did you include?**

**Engaged teachers in:**

	No	Yes
Formulating scientific questions they can answer using data	<input type="radio"/>	<input type="radio"/>
Making predictions or hypotheses	<input type="radio"/>	<input type="radio"/>
Collecting data or using existing data	<input type="radio"/>	<input type="radio"/>
Analyzing and interpreting data	<input type="radio"/>	<input type="radio"/>
Making conclusions and adjusting predictions/hypotheses	<input type="radio"/>	<input type="radio"/>
Developing presentations of their findings	<input type="radio"/>	<input type="radio"/>

**As part of your B-WET professional development workshops or institutes this past grant year, did your organization typically include the following:**

	No	Yes
Presented information and examples illustrating how teachers have integrated MWEEs	<input type="radio"/>	<input type="radio"/>
Discussed how teachers may be able to integrate MWEEs into their own curriculum or classroom activities	<input type="radio"/>	<input type="radio"/>
Discussed alignment of MWEEs with state, regional, or national standards	<input type="radio"/>	<input type="radio"/>
Provided examples of how MWEEs align with standards	<input type="radio"/>	<input type="radio"/>
Engaged teachers in aligning MWEEs with their school or school district standards	<input type="radio"/>	<input type="radio"/>
Allowed teachers time to plan how they will implement MWEEs	<input type="radio"/>	<input type="radio"/>
Engaged teachers in the same activities/practices they can use with their students	<input type="radio"/>	<input type="radio"/>
Included more than one teacher from individual schools	<input type="radio"/>	<input type="radio"/>
Presented how NOAA data can be used to support student scientific inquiry	<input type="radio"/>	<input type="radio"/>
Discussed how to use NOAA data to obtain knowledge about local issues	<input type="radio"/>	<input type="radio"/>
Shared examples of how other teachers have used NOAA data with their students	<input type="radio"/>	<input type="radio"/>
Allowed teachers time to plan how they will integrate the use of NOAA data	<input type="radio"/>	<input type="radio"/>

**What types of support did your organization typically provide to teachers participating in MWEE professional development this past grant year?**

	No	Yes
Assisted teachers with conducting field trips or field work	<input type="radio"/>	<input type="radio"/>
Assisted teachers with establishing schoolyard habitats	<input type="radio"/>	<input type="radio"/>
Assisted teachers with establishing restoration projects	<input type="radio"/>	<input type="radio"/>
Co-teaching in teachers' classrooms or in field	<input type="radio"/>	<input type="radio"/>
Provided coaching in participating teachers' classrooms	<input type="radio"/>	<input type="radio"/>
Provided demonstrations in teachers' classrooms	<input type="radio"/>	<input type="radio"/>
Assisted with the use of equipment or technologies	<input type="radio"/>	<input type="radio"/>
Communicated with teachers through personal phone calls or email	<input type="radio"/>	<input type="radio"/>
Communicated with teachers through newsletters or web-site (e.g., an online community)	<input type="radio"/>	<input type="radio"/>

**Which characteristics describe your organization's typical MWEE professional development this past grant year?**

	Not included	Included
Helped make connections to local community organizations and resources	<input type="radio"/>	<input type="radio"/>
Facilitated interactions with NOAA scientists/staff	<input type="radio"/>	<input type="radio"/>
Facilitated interactions with natural resource professionals	<input type="radio"/>	<input type="radio"/>
Provided teacher stipends	<input type="radio"/>	<input type="radio"/>
Offered continuing education credits	<input type="radio"/>	<input type="radio"/>
Offered graduate credits	<input type="radio"/>	<input type="radio"/>
Provided equipment	<input type="radio"/>	<input type="radio"/>
Provided instructional/educational/curriculum materials	<input type="radio"/>	<input type="radio"/>
Provided information on how to obtain grants or funding for MWEEs	<input type="radio"/>	<input type="radio"/>

**Did teachers participate in any of these activities to protect and/or restore ocean, coastal and/or Great Lakes watersheds during their MWEE professional development?**

	No	Yes
Created a schoolyard or backyard habitat	<input type="radio"/>	<input type="radio"/>
Installed a rain barrel at school or at home	<input type="radio"/>	<input type="radio"/>
Gave presentation(s) about the local watershed (e.g., for school, other organizations)	<input type="radio"/>	<input type="radio"/>
Participated in or organized event(s) to raise awareness about the importance of watersheds	<input type="radio"/>	<input type="radio"/>
Participated in or helped coordinate a clean-up of a local stream, or beach	<input type="radio"/>	<input type="radio"/>
Participated in a restoration activity (e.g., planting trees)	<input type="radio"/>	<input type="radio"/>
Limited or avoided the use of household chemicals including fertilizers, herbicides and pesticides	<input type="radio"/>	<input type="radio"/>
Told others about ways they can protect their local watershed	<input type="radio"/>	<input type="radio"/>
Monitored water quality	<input type="radio"/>	<input type="radio"/>



**It is a goal of my organization’s B-WET-funded professional development that teachers will be able to:**

	N/A	Don't know	No	Yes
Define the term “watershed”	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Identify their local watershed(s)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Identify how watersheds are connected to the ocean via streams, rivers, and human-made structures	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Identify the functions that occur in a watershed (transport, store, and cycle water)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Recognize that both natural processes and human activities affect water flow and water quality in watersheds.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Identify connections between human welfare and water flow and quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Identify possible point and non-point sources of water pollution	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Identify actions individuals can engage in to protect/restore water quality in watersheds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**It is a goal of my organization's B-WET-funded MWEE professional development that teachers will:**

	N/A	Don't know	No	Yes
Teach more about watersheds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Be more likely to implement MWEEs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Be more likely to implement MWEEs after they are no longer supported by our organization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Be more likely to use NOAA resources to enhance their students' MWEE experiences	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Be more likely to guide students through taking action to protect or restore watersheds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Be more likely to use science inquiry instruction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Be more likely to use the outdoors for instruction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Be more likely to use local community resources as part of instruction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Be more likely to use interdisciplinary approaches to instruction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Be more enthusiastic about teaching science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Be more likely to act to protect and/or restore ocean, coastal, or Great Lakes watersheds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**EVALUATION SECTION FOR ALL RESPONDENTS**

**Which of the following best describes the situation with regard to evaluation(s) of your organization's B-WET-funded programs?**

- Don't know
- No evaluation has been conducted and there are no plans to complete one
- No evaluation has been conducted, but there are plans to complete one
- An evaluation is being conducted, but it is not yet finished
- One or more evaluations has been completed
- Other (please describe) \_\_\_\_\_

**IF SELECTED ' One or more evaluations has/have been completed' ABOVE:**

**What type of evaluation has been completed?**

	Not conducted	Completed but no report is available	Completed and report is available
Needs assessment (determines the need for a project by considering aspects such as available resources, extent of the problem and need to address it, participant interest and knowledge, etc. This is also known as front-end evaluation.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Process/implementation (examines the implementation of a project, focusing on the effort invested in the project and its direct outputs. For example, an implementation evaluation might measure how the project is being delivered, who participated, and whether they were satisfied with it). Note that this type of evaluation is NOT the same as a program report!	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Outcome (shows the programs' direct effects on target outcomes and provides direction for program improvement. For example, outcome evaluation may show that a program was (or was not) successful in changing participants'; knowledge, attitudes, skills, intentions, or behaviors)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Impact (seeks to assess the broader, longer-term changes that occurred as a result of a project such as in improved environmental quality)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**IF SELECTED OUTCOME or IMPACT EVALUATION:** Please answer the following questions with regard to the outcome or impact evaluation your organization completed. If your organization completed more than one outcome or impact evaluation, please answer the following questions based on the evaluation

with the most rigorous research (e.g., valid/reliable instruments, appropriate sampling, use of control/comparison groups, content analysis of qualitative data, etc.) methods:

**Which of the following best describes who led the evaluation?**

- Don't know
- Internal staff member (someone who is an employee of your organization)
- External consultant (someone who is not an employee of your organization) If selected, please provide consultant/firm name: \_\_\_\_\_
- Other (please describe) \_\_\_\_\_

**Does the evaluation report include evidence of:**

	Don't know	Not measured	No	Yes
Increases in knowledge about watersheds (participants learned new information)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Changes in attitudes toward watersheds (participants'; changed their beliefs, opinions, feelings, or perspectives)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increases in the skills needed to engage in behaviors to protect and/or restore ocean, coastal and/or Great Lakes watersheds (verbal, mental, or physical)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increases in intentions to act on behalf of watersheds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participants engaging in actions that protect or restore watersheds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improved water quality (positive changes in physical watershed that can be attributed to participants'; actions)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improved academic performance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## EXPLORATORY SECTION FOR ALL RESPONDENTS

**To what extent do you (dis)agree with the following statement: As a result of NOAA B-WET, the public is more familiar with NOAA, such as NOAA science, resources, and experts?**

- N/A
- Strongly Disagree 1
- 2
- 3
- 4
- 5
- 6
- Strongly Agree 7

**Please explain why you selected the response you did. (essay box)**

**To what extent do you (dis)agree with the following statement: The B-WET grant has improved - or will improve - the overall quality of environmental education provided by my organization?**

- N/A
- Strongly Disagree 1
- 2
- 3
- 4
- 5
- 6
- Strongly Agree 7

**Please explain why you selected the response you did. (essay box)**

**To what extent do you (dis)agree with the following statement: NOAA B-WET has - or will have - a positive impact on environmental education in my area's formal education system?**

- N/A
- I don't know
- Strongly Disagree 1
- 2
- 3
- 4
- 5
- 6
- Strongly Agree 7

**Please explain why you selected the response you did. (essay box)**

**To what extent do you (dis)agree with the following statement: NOAA B-WET has had - or will have - a positive impact on education policy in my area?**

- N/A
- Strongly Disagree 1
- 2
- 3
- 4
- 5
- 6
- Strongly Agree 7

**Please explain why you selected the response you did. (essay box)**

**To what extent do you (dis)agree with the following statement: NOAA B-WET has had - or will have - a positive impact on environmental policy in my area?**

- N/A
- Strongly Disagree 1
- 2
- 3
- 4
- 5
- 6
- Strongly Agree 7

**Please explain why you selected the response you did. (essay box)**

**To what extent do you (dis)agree with the following statement: The health of our local watershed(s) has improved - or will improve - as a result of my organization's B-WET-funded professional development or MWEEs.**

- N/A
- Strongly Disagree 1
- 2
- 3
- 4
- 5
- 6
- Strongly Agree 7

**Please explain why you selected the response you did. (essay box)**

**This questionnaire was .... (circle one for each)**

Easy to complete	1	2	3	4	5	6	7	Difficult to complete
Informative	1	2	3	4	5	6	7	Not informative
Short	1	2	3	4	5	6	7	Long

**How can this questionnaire be improved? (essay box)**

**Anything else you would like to add? (essay box)**

**Thank you for completing this questionnaire!**

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**OMB Control Number: 0648-xxxx Expires: xx/xx/20xx**

**Paperwork Reduction Act Statement**

Public reporting burden for this collection of information is estimated to average 30-60 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other suggestions for reducing this burden to Bronwen Rice, NOAA Office of Education, Herbert C. Hoover Building, Room 6863, 14th and Constitution Avenue, NW Washington, DC 20230.

Responses are voluntary and collected and maintained as anonymous data. Information will be treated in accordance with the Freedom of Information Act (5 USC 552).

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## TEACHER PROFESSIONAL DEVELOPMENT QUESTIONNAIRE

### INTRODUCTION:

Please answer the following questions in reference to your most recently-completed *Meaningful Watershed Educational Experience* (MWEE) professional development (PD) provided by [name of organization]. You will be asked about a range of practices and outcomes that represent the diversity of MWEE PD funded by the National Oceanic and Atmospheric Administration's Bay Watershed Education and Training program (NOAA B-WET), some of which may not apply directly to your experience. It is acceptable to answer "not applicable" (N/A) in those instances.

Your responses will be entered anonymously and will not be associated with you as an individual. THANK YOU in advance for your candor and thoughtfulness in answering the questions. Your responses will be aggregated with other teachers' responses, and will be used by NOAA B-WET and B-WET-funded organizations to improve future professional development programs.

It will take about 20-30 minutes to complete this survey, depending on the nature of your professional development experience. Please complete the survey by [deadline].

Thank you.

[name and organization of MWEE PD provider]

and

Bronwen Rice  
NOAA B-WET National Coordinator

**TEACHER UNIQUE ID:** To allow us to compare your past, current, and future responses, please create a unique 8-digit ID number using the 2 digits of your birth month, the 2 digits of your birth day, and the last 4 digits of your most often used phone number. If you were born on March 9 and your home phone is 410.719.1234, your ID number would be 03091234.

**Are you currently a PreK-12 teacher or educator?**

- Yes
- No

If No Is Selected, Then Skip To End of Survey



**In what setting do you teach?**

- Public school
- Private school
- Non-formal education (e.g., environmental centers, zoos, museums, interpretive programs at local or state level parks, youth organizations)
- Home-school
- Other

**Did you recently complete a professional development opportunity focused on watersheds or water quality issues (also known as a Meaningful Watershed Education Experience {MWEE} professional development)?**

- Yes
- Not sure
- No

If Not sure Is Selected, Then Skip To End of Survey

If No Is Selected, Then Skip To End of Survey

**In what zip code is your school located?**

**Please answer all of the following questions based on the last MWEE (watershed education) professional development you participated in.**

**In which region(s) did you teach this past year? (check all that apply)**

- California
- Chesapeake Bay
- Great Lakes
- Gulf of Mexico
- Hawaii
- New England
- Pacific Northwest
- Other (please describe) \_\_\_\_\_

**In which grade level(s) do you primarily teach? (select all that apply)**

- PreK
- Elementary
- Middle
- High
- Other
- None

**What subject(s) do you primarily teach? (select one)**

- Science
- Math
- Language Arts
- Social studies
- Fine arts
- Multiple disciplines, including science
- Multiple disciplines, not including science
- Other

**Which of these categories best describes your school's community (during the school year)?**

- Rural (population of less than 10,000)
- Town/Suburban (population 10,000-99,999)
- Small urban (population 100,000-250,000)
- Urban (population greater than 250,000)

**Do you identify yourself as (check all that apply):**

- Hispanic or Latino
- American Indian or Alaska Native
- Asian
- Black or African American
- Native Hawaiian or Other Pacific Islander
- White
- Other \_\_\_\_\_
- I prefer not to answer

**Is the school where you teacher a Title 1 school?**

- No
- Yes
- N/A

**What percent of your students speak English as a second language (aka English Language Learners)?**

- Don't know
- Less than 20%
- 21-40%
- 41-60%
- 61-80%
- 81-100%

**About what percent of your students are (percent should equal 100):**

- Hispanic or Latino
- American Indian or Alaska Native
- Asian
- Black or African American
- Native Hawaiian or Other Pacific Islander
- White
- Other \_\_\_\_\_

**Did you conduct MWEEs with your students before participating in the MWEE professional development?**

- No
- Yes

**What was your PRIMARY reason for participating in the MWEE professional development? (check one)**

- To obtain information and resources for teaching
- Personal interest in the topic of the professional development
- To obtain continuing education, recertification, or graduate credit
- I was required to attend
- I was asked to attend
- Other, please describe:

**Please answer all of the following questions based on the last MWEE (watershed education) professional development you participated in.**

## **IMPLEMENTATION**

**Which type(s) of MWEE professional development did you participate in or receive: (please select yes or no for each type)**

	No	Yes
<b>TEACHER EDUCATION</b>		
One day workshops (usually less than 8 hours)	<input type="radio"/>	<input type="radio"/>
Teacher institute (usually on consecutive days that cumulatively consist of 40 hours or more)	<input type="radio"/>	<input type="radio"/>
Multi-day workshops (events that last at least 6 hours, but are less than 40 hours, e.g., a three-day workshop on a specific topic or a series of five Saturday sessions)	<input type="radio"/>	<input type="radio"/>
A college-level course	<input type="radio"/>	<input type="radio"/>
Professional development provider training (training for individuals who provide teacher professional development)	<input type="radio"/>	<input type="radio"/>
<b>TEACHER SUPPORT</b>		
Individual teacher coaching and support (e.g., curriculum planning, shared teaching, demonstrations and/or other forms of in-school or in-field support)	<input type="radio"/>	<input type="radio"/>
On-line professional development support (e.g., courses, webinars, discussion forums)	<input type="radio"/>	<input type="radio"/>

**About how many hours of MWEE professional development and/or support did you receive over the past 12 months?**

- 1-2 hours
- 3-5 hours
- 6-10 hours
- 11-20 hours
- 21-40 hours
- 41-60 hours
- 61-80 hours
- More than 80 hours

**About how many hours of those MWEE professional development hours did you spend outdoors?**

- None
- 1-2 hours
- 3-5 hours
- 6-10 hours
- 11-20 hours
- 21-40 hours
- 41-60 hours
- 61-80 hours
- More than 80 hours

**Which NOAA resources were used as part of your MWEE professional development?**

	No	Yes	Not sure
None	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Information from NOAA research studies, reports or websites	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Data collected by and accessible through NOAA IF YES: Name the NOAA data source _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NOAA expert (e.g., scientist, educator, Sea Grant staff member, policy expert)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NOAA curricula and education programs IF YES: Name the curricula or programs: _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NOAA labs or facilities IF YES: Name the lab or facility: _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NOAA National Marine Sanctuary	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NOAA National Estuarine Research Reserve	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**What education methods were used during your MWEE professional development? (select No or Yes for each method)**

	No	Yes
Outdoor field trip (i.e., excursion to learn about natural history and ecology in the outdoors, may or may not include data collection)	<input type="radio"/>	<input type="radio"/>
Field work (i.e., scientific study carried out somewhere other than in a classroom/laboratory, includes data collection)	<input type="radio"/>	<input type="radio"/>
Place-based education (i.e., an interdisciplinary instructional strategy that uses the local environment and community as the context for teaching and learning)	<input type="radio"/>	<input type="radio"/>
Issue investigation (i.e., an interdisciplinary instructional strategy that engages learners in investigating complex, real-world environmental issues and problem-solving as the context for teaching and learning)	<input type="radio"/>	<input type="radio"/>
Service learning (i.e., an instructional strategy that integrates meaningful community service with instruction and reflection to enrich the learning experience, teach civic responsibility, and strengthen communities)	<input type="radio"/>	<input type="radio"/>
Scientific-inquiry-based learning (i.e., an instructional strategy that gives students the opportunity to explore an idea or question. To arrive at an answer or to better understand the concept, students often collect and analyze data)	<input type="radio"/>	<input type="radio"/>

If responded Yes to “Scientific-inquiry-based learning” in “What education methods were used during your students’ MWEEs?”, then answer this question:

**As part of your MWEE professional development, were you involved in...**

	Don't recall	No	Yes
Formulating scientific questions that can be answered using data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Making predictions or hypotheses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Collecting data or using existing data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Analyzing and interpreting data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Making conclusions and adjusting predictions/hypotheses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Developing presentations of findings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Did you participate in an education/training workshop, institute, or class as part of your professional development?**

- Yes
- No

If No Is Selected, Then Skip To 16. What types of support did you rec...

**Did the workshops, institutes, or classes you participated in include the following professional development practices? (a) Please indicate yes or no for each statement. (b) Then indicate which 3 practices were most valuable in helping you implement MWEEs.**

	No	Yes	Select 3 most valuable practices
Sharing of information and examples illustrating how other teachers have integrated MWEEs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Discussion of how teachers may be able to integrate MWEEs into their own curriculum or classroom activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Discussion of alignment of MWEEs with state, regional, or national standards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Provision of examples of how MWEEs align with standards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Engaging you and other participating teachers in aligning MWEEs with your school or school district standards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Participating along with other teachers from my school, at the same time	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Allowing you and other participating teachers time to plan how to implement MWEEs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Engaging you and other participating teachers in activities/practices that can be used with your students	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Presentation of how NOAA data can be used to support student scientific inquiry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Discussion of how NOAA data can be used to obtain knowledge about local issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Examples of how other teachers have used NOAA data with their students	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Allow you and other participating teachers time to plan how to integrate the use of NOAA data with your students	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**What types of support did you receive from your MWEE professional development provider? (a) Please indicate yes or no for each statement. (b) Then indicate which 3 practices were most valuable in helping you implement MWEEs.**

	No	Yes	Select 3 most valuable practices
Assistance with conducting field trips or field work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Assistance with establishing schoolyard habitats	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Assistance with establishing restoration projects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Co-teaching in my classrooms or in field	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coaching in my classroom	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Demonstrations in my classroom	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Assistance with the use of equipment or technologies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Communicating with provider through personal phone calls or email	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Communication with provider through newsletters or web-site (e.g., an online community)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Which additional practices did your MWEE professional development and/or the support you received include? (a) Please indicate yes or no for each statement. (b) Then indicate which 3 practices were most valuable in helping you implement MWEEs.**

	No	Yes	Select 3 most valuable practices
Connections were made to local community organizations and resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Interactions were facilitated with NOAA scientists/staff	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Interactions were facilitated with natural resource professionals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I was provided with a stipend	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I was offered continuing education credits	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I was offered graduate credits	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I was provided with equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I was provided with instructional/educational/curriculum materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I was provided with information on how to obtain grants or funding for MWEEs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



**During your MWEE professional development, did you participate in any of these activities that protect and/or restore ocean, coastal, and/or Great Lakes watersheds?**

	No	Yes
Created a schoolyard or backyard habitat	<input type="radio"/>	<input type="radio"/>
Installed a rain barrel at school or at home	<input type="radio"/>	<input type="radio"/>
Gave presentation(s) about the local watershed (e.g., for school, other organizations)	<input type="radio"/>	<input type="radio"/>
Participated in or organized event(s) to raise awareness about the importance of watersheds	<input type="radio"/>	<input type="radio"/>
Participated in or helped coordinate a clean-up of a local stream or beach	<input type="radio"/>	<input type="radio"/>
Participated in a restoration activity (i.e., planting trees)	<input type="radio"/>	<input type="radio"/>
Limited or avoided the use of household chemicals including fertilizers, herbicides and pesticides	<input type="radio"/>	<input type="radio"/>
Told others about ways they can protect their local watershed	<input type="radio"/>	<input type="radio"/>
Monitored water quality	<input type="radio"/>	<input type="radio"/>

**Overall, what grade would you give your MWEE professional development experience?**

- F
- D
- C
- B
- A

**Briefly describe why you selected this grade: (essay box)**

## OUTCOMES

**As a result of participating in the MWEE professional development, I am better able to:**

	N/A	Strongly Disagree 1	2	3	4	5	6	Strongly Agree 7
Define the term "watershed"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Identify my local watershed(s)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Identify how watersheds are connected to the ocean via streams, rivers, and human-made structures	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Identify the functions that occur in a watershed (transport, store, and cycle water)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Recognize that both natural processes and human activities affect water flow and water quality in watersheds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Identify connections between human welfare and water flow and quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Identify possible point and non-point sources of water pollution	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Identify actions individuals can engage in to protect/restore water quality in watersheds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Did your B-WET professional development provider indicate that it was funded (in part) with funding from the National Oceanic and Atmospheric Administration (NOAA)?**

No

Yes

**Did participating in the B-WET professional development increase your knowledge of ...**

what NOAA does?	No	Yes
scientific data accessible through NOAA?	No	Yes
educational resources available through NOAA?	No	Yes

**For each statement, select one response for BEFORE, one response for AFTER, and one response for FUTURE.**

	BEFORE the MWEE professional development, <b>how confident were you</b> in your ability to:							AFTER the MWEE professional development, <b>how confident are you</b> in your ability to:							In the FUTURE, I intend to ...								
	Not at all confident = 1, 2, 3, 4,5, 6, 7=Extremely confident							Not at all confident = 1, 2, 3, 4,5, 6, 7=Extremely confident							Strongly disagree = 1, 2, 3, 4,5, 6, 7=Strongly agree								
Teach my students about local watersheds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Incorporate MWEEs into my curriculum	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Implement MWEEs without support from a professional development provider	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use NOAA resources to enhance my students' MWEE experiences	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Guide students through taking action to protect or restore watersheds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Research environmental issues affecting watersheds with students	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use scientific inquiry instruction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use the outdoors for instruction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Act to protect and/or restore ocean, coastal, or Great Lakes watersheds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**What component(s) of the MWEE professional development best prepared you to teach your students about local watersheds? (essay box)**

**How could the MWEE professional development be improved to better prepare teachers to teach about the watershed? (essay box)**

**Any other comments about the MWEE professional development? (essay box)**

**This questionnaire was .... (circle one for each)**

Easy to complete	1	2	3	4	5	6	7	Difficult to complete
Informative	1	2	3	4	5	6	7	Not informative
Short	1	2	3	4	5	6	7	Long

**How can this questionnaire be improved? (essay box)**

**Thank you for completing this questionnaire!**

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**OMB Control Number: 0648-xxxx Expires: xx/xx/20xx**

**Paperwork Reduction Act Statement**

Public reporting burden for this collection of information is estimated to average 30 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other suggestions for reducing this burden to Bronwen Rice, NOAA Office of Education, Herbert C. Hoover Building, Room 6863, 14th and Constitution Avenue, NW Washington, DC 20230.

Responses are voluntary and collected and maintained as anonymous data. Information will be treated in accordance with the Freedom of Information Act (5 USC 552).

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## TEACHER MWEE IMPLEMENTATION QUESTIONNAIRE

### INTRODUCTION:

Last year you participated in professional development (PD) offered by [MWEE PD provider organization] and funded by the National Oceanic and Atmospheric Administration's Bay Watershed Education and Training program (NOAA B-WET). We would like to get your feedback on implementing *Meaningful Watershed Educational Experiences* (MWEEs) with your students, if you did so since the PD.

You will be asked about a range of practices and outcomes that represent the diversity of MWEEs, some of which may not apply directly to your experience. It is acceptable to answer "not applicable" (N/A) in those instances.

Your responses will be entered anonymously and will not be associated with you as an individual. THANK YOU in advance for your candor and thoughtfulness in answering the questions. Your responses will be aggregated with other teachers' responses, and will be used by NOAA B-WET and B-WET-funded organizations to improve MWEE PD and student programs.

It will take about 20-30 minutes to complete this survey, depending on the nature of your MWEE implementation experience. Please complete the survey by [deadline].

Thank you.

[name and organization of MWEE PD provider]

and

Bronwen Rice  
NOAA B-WET National Coordinator

**TEACHER UNIQUE ID:** To allow us to compare your past, current, and future responses, please create a unique 8-digit ID number using the 2 digits of your birth month, the 2 digits of your birth day, and the last 4 digits of most often used phone number. If you were born on March 9 and your home phone is 410.719.1234, your ID number would be 03091234.

**Are you currently a PreK-12 teacher or educator?**

- Yes
- No

If No Is Selected, Then Skip To End of Survey

**In what setting do you teach?**

- Public school
- Private school
- Non-formal education (e.g., environmental centers, zoos, museums, interpretive programs at local or state level parks, youth organizations)
- Home-school
- Other

**In the past 12 months, did you implement a Meaningful Watershed Educational Experience (MWEE) with your students?**

MWEEs *Meaningful Watershed Educational Experiences (MWEEs)* are investigative, project-oriented, sustained activities that include one or more outdoor experiences, consider the watershed as a system, and are an integral part of a school instructional program.

- Yes
- No

**If No is selected, Please explain why you did not implement a MWEE. (essay box)**

If No Is Selected, Then Skip To End of Survey

**How many of your students participated in a MWEE during the most recent school year? (Please provide your best estimate, NOT a range)**

About \_\_\_\_ students

**On average, did students participate in a MWEE over the course of:**

- One day
- 2-6 days
- One week
- 2-3 weeks
- One month
- 2-3 months
- 4-8 months
- A full school year (about 9 months)
- A full calendar year
- Multiple years

**On average during the last school year, about how many hours did a typical student spend involved in MWEE activities? (check one)**

- None
- 1-2 hours
- 3-5 hours
- 6-9 hours
- 10-16 hours
- 17-24 hours
- 25-40 hours
- more than 40 hours

**On average during the last school year, about how many hours did a typical student spend outdoors during MWEE activities? (check one)**

- None
- 1-2 hours
- 3-5 hours
- 6-9 hours
- 10-16 hours
- 17-24 hours
- 25-40 hours
- more than 40 hours

If None Is Selected, Then Skip To End of Block

Where did the outdoor component of your students' MWEEs occur?

	No	Yes
On school grounds	<input type="radio"/>	<input type="radio"/>
Near the school (1-5 minute walk)	<input type="radio"/>	<input type="radio"/>
Walkable from the school (more than 5 minutes)	<input type="radio"/>	<input type="radio"/>
In a location to which the students were bussed or driven	<input type="radio"/>	<input type="radio"/>

To what extent do you agree or disagree with the following:

	NA	Strongly Disagree 1	2	3	4	5	6	Strongly Agree 7
Overall, what I taught my students about watersheds in the classroom was closely integrated with students' outdoor learning experience(s).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My students' outdoor learning experiences were designed to help them understand what they had been introduced to during regular science class	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My students' outdoor learning experiences were designed to reinforce what students learned during regular science class	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**“Preparation” of Preparation/Action/Reflection**

BEFORE students participated in their outdoor learning experience:

	NA	Strongly Disagree 1	2	3	4	5	6	Strongly Agree 7
I provided them with detailed information about what they were going to do	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I let students know what activities they were going to do	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I spent a lot of time preparing students for what to expect	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I introduced relevant science concepts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**“Action” of Preparation/Action/Reflection**

During the outdoor learning experience(s), my students:

	N/A	Strongly Disagree 1	2	3	4	5	6	Strongly Agree 7
Conducted a one-time data or sample collection	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Conducted water quality monitoring over a period of time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**“Reflection” of Preparation/Action/Reflection**

AFTER students participated in the outdoor learning experience(s):

	NA	Strongly Disagree 1	2	3	4	5	6	Strongly Agree 7
They discussed results based on their observations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
They offered explanations for what they observed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
They were expected to draw on what had been learned	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I spent a lot of time to make sure the students had integrated what they had learned	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Were your typical MWEs focused only on science concepts, or on concepts from multiple disciplines (e.g., science, math, social studies, literature, art, music)?**

- Only science concepts
- Concepts from multiple disciplines, including science
- Other



**To what extent was the content of your students' MWEEs aligned with:**

	N/A	To no extent <u>1</u>	2	3	4	To a great extent <u>5</u>
school district education standards	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
state education standards	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
national education standards	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
regional environmental/natural resources management priorities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Did students participate in any of the following activities to protect and/or restore ocean, coastal, and/or Great Lakes watersheds during their MWEE? (please indicate no or yes for each activity)**

	No	Yes
Created a schoolyard or backyard habitat	<input type="radio"/>	<input type="radio"/>
Conserved water at school to protect the local watershed	<input type="radio"/>	<input type="radio"/>
Installed a rain barrel at school	<input type="radio"/>	<input type="radio"/>
Reduced litter at the school	<input type="radio"/>	<input type="radio"/>
Gave presentation(s) about the local watershed (e.g., for school, other organizations)	<input type="radio"/>	<input type="radio"/>
Participated in an event to raise awareness about the importance of watersheds	<input type="radio"/>	<input type="radio"/>
Helped clean up or take care of a local stream or beach	<input type="radio"/>	<input type="radio"/>
Participated in a restoration activity (e.g., planting trees) to benefit watersheds	<input type="radio"/>	<input type="radio"/>
Told others about ways they can protect their local watersheds	<input type="radio"/>	<input type="radio"/>

**Which NOAA resources were used as part of your typical student MWEE?**

	No	Yes	Not sure
None	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Information from NOAA research studies or reports	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Data collected by and accessible through NOAA IF YES: Name the NOAA data source: _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NOAA expert (e.g., scientist, educator, Sea Grant staff member, policy expert)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NOAA curricula and education programs IF YES: Name the curricula or programs: _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NOAA labs or facilities IF YES: Name the lab or facility: _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NOAA National Marine Sanctuary	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NOAA National Estuarine Research Reserve	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**What education methods were used during your students' MWEEs? (select No or Yes for each method)**

	No	Yes
Outdoor field trip (i.e., excursion to learn about natural history and ecology in the outdoors, may or may not have included data collection)	<input type="radio"/>	<input type="radio"/>
Field work (i.e., scientific study carried out somewhere other than in a classroom/laboratory, included data collection)	<input type="radio"/>	<input type="radio"/>
Place-based education (i.e., an interdisciplinary instructional strategy that uses the local environment and community as the context for teaching and learning)	<input type="radio"/>	<input type="radio"/>
Issue investigation or problem-based education (i.e., an interdisciplinary instructional strategy that engages learners in investigating complex, real-world environmental issues and problem-solving as the context for teaching and learning)	<input type="radio"/>	<input type="radio"/>
Service learning (i.e., an instructional strategy that integrates meaningful community service with instruction and reflection to enrich the learning experience, teach civic responsibility, and strengthen communities)	<input type="radio"/>	<input type="radio"/>
Scientific-inquiry-based learning (i.e., an instructional strategy based on the idea that learning may be facilitated by giving students the opportunity to explore an idea or question on their own. To arrive at an answer or to better understand the concept, students often collect and analyze data)	<input type="radio"/>	<input type="radio"/>

**If responded Yes to "Scientific-inquiry-based learning" in "What education methods were used during your students' MWEEs?", then answer this question:**

**Which of the following steps did you engage students in...**

	No	Yes
Formulating scientific questions they can answer using data	<input type="radio"/>	<input type="radio"/>
Making predictions or hypotheses	<input type="radio"/>	<input type="radio"/>
Collecting data or using existing data	<input type="radio"/>	<input type="radio"/>
Analyzing and interpreting data	<input type="radio"/>	<input type="radio"/>
Making conclusions and adjusting predictions/hypotheses	<input type="radio"/>	<input type="radio"/>
Developing presentations of their findings	<input type="radio"/>	<input type="radio"/>

**Did your typical MWEE include any of the following learning objectives? Students will be able to:**

	No	Yes
Define the term "watershed"	<input type="radio"/>	<input type="radio"/>
Identify their local watershed(s)	<input type="radio"/>	<input type="radio"/>
Identify how watersheds are connected to the ocean via streams, rivers, and human-made structures	<input type="radio"/>	<input type="radio"/>
Identify the functions that occur in a watershed (transport, store, and cycle water)	<input type="radio"/>	<input type="radio"/>
Recognize that both natural processes and human activities affect water flow and water quality in watersheds	<input type="radio"/>	<input type="radio"/>
Identify connections between human welfare and water flow and quality	<input type="radio"/>	<input type="radio"/>
Identify possible point and non-point sources of water pollution	<input type="radio"/>	<input type="radio"/>
Identify actions individuals can engage in to protect/restore water quality in watersheds	<input type="radio"/>	<input type="radio"/>

**What is the most important benefit of MWEEs for your students? (essay box)**

**As a result of participating in MWEEs, I believe students:**

	N/A	Strongly Disagree 1	2	3	4	5	6	Strongly Agree 7
Know more about watersheds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Express greater caring and concern for their local watershed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are more confident in their ability to protect and/or restore watersheds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are more likely to act to protect or restore watersheds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are better able to make informed decisions about how to protect or restore watersheds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are better able to conduct scientific investigations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are better able to understand the nature of scientific research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are more likely to express an interest in pursuing science careers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Perform better in science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Perform better academically	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Perform better on state standardized tests	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are more engaged in their science learning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

As a result of participating in my typical MWEs, I believe students are more likely to \_\_\_\_\_ to protect and/or restore ocean, coastal, and/or Great Lakes watersheds.

	N/A	Strongly Disagree 1	2	3	4	5	6	Strongly Agree 7
Create a schoolyard or backyard habitat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Conserve water at school to protect the local watershed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Install a rain barrel at school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reduce litter at the school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Give presentation(s) about the local watershed (e.g., for school, other organizations)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participate in an event to raise awareness about the importance of watersheds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Help clean up or take care of a local stream or beach	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participate in a restoration activity (e.g., planting trees) to benefit watersheds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tell others about ways they can protect their local watersheds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other (please describe) _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**What are some things that could possibly be done by others to help you develop and implement improved MWEs? (essay box)**

**This questionnaire was .... (circle one for each)**

Easy to complete 1 2 3 4 5 6 7 Difficult to complete  
 Informative 1 2 3 4 5 6 7 Not informative  
 Short 1 2 3 4 5 6 7 Long

**How can this questionnaire be improved? (essay box)**

**Any final comments you would like to share about MWEs? (essay box)**

**Thank you for completing this questionnaire!**

**OMB Control Number: 0648-xxxx Expires: xx/xx/20xx**

**Paperwork Reduction Act Statement**

Public reporting burden for this collection of information is estimated to average 30 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other suggestions for reducing this burden to Bronwen Rice, NOAA Office of Education, Herbert C. Hoover Building, Room 6863, 14th and Constitution Avenue, NW Washington, DC 20230.

Responses are voluntary and collected and maintained as anonymous data. Information will be treated in accordance with the Freedom of Information Act (5 USC 552).

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## TEACHER MWEE IMPLEMENTATION NONRESPONSE QUESTIONNAIRE

### INTRODUCTION:

Last year you participated in professional development (PD) offered by [MWEE PD provider organization] and funded by the National Oceanic and Atmospheric Administration's Bay Watershed Education and Training program (NOAA B-WET). We would like to get your answers to a few questions about implementing *Meaningful Watershed Educational Experiences* (MWEEs) with your students, if you did so since the PD.

**It will take about 5 minutes to complete this survey. Please complete the survey by [deadline].**

Your responses will be entered anonymously, will not be associated with you as an individual, and will be aggregated with other teachers' responses. NOAA B-WET and B-WET-funded organizations will use the data you and other teachers provide to improve MWEE PD and student programs.

Thank you.

[name and organization of MWEE PD provider]

and

Bronwen Rice

NOAA B-WET National Coordinator

**TEACHER UNIQUE ID:** To allow us to compare your past, current, and future responses, please create a unique 8-digit ID number using the 2 digits of your birth month, the 2 digits of your birth day, and the last 4 digits of most often used phone number. If you were born on March 9 and your home phone is 410.719.1234, your ID number would be 03091234.

**Are you currently a PreK-12 teacher or educator?**

- Yes
- No

If No Is Selected, Then Skip To End of Survey

**In what setting do you teach?**

- Public school
- Private school
- Non-formal education (e.g., environmental centers, zoos, museums, interpretive programs at local or state level parks, youth organizations)
- Home-school
- Other

**In the past 12 months, did you implement a Meaningful Watershed Educational Experience (MWEE) with your students?**

MWEEs *Meaningful Watershed Educational Experiences (MWEEs)* are investigative, project-oriented, sustained activities that include one or more outdoor experiences, consider the watershed as a system, and are an integral part of a school instructional program.

- Yes
- No

**If No is selected, Please explain why you did not implement a MWEE. (essay box)**

If No Is Selected, Then Skip To End of Survey

**How many of your students participated in a MWEE during the most recent school year? (Please provide your best estimate, NOT a range)**

About \_\_\_\_ students

**On average, did students participate in a MWEE over the course of:**

- One day
- 2-6 days
- One week
- 2-3 weeks
- One month
- 2-3 months
- 4-8 months
- A full school year (about 9 months)
- A full calendar year
- Multiple years

**On average during the last school year, about how many hours did a typical student spend involved in MWEE activities? (check one)**

- None
- 1-2 hours
- 3-5 hours
- 6-9 hours
- 10-16 hours
- 17-24 hours
- 25-40 hours
- more than 40 hours

**On average during the last school year, about how many hours did a typical student spend outdoors during MWEE activities? (check one)**

- None
- 1-2 hours
- 3-5 hours
- 6-9 hours
- 10-16 hours
- 17-24 hours
- 25-40 hours
- more than 40 hours

**As a result of participating in MWEEs, I believe students:**

	N/A	Strongly Disagree 1	2	3	4	5	6	Strongly Agree 7
Know more about watersheds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Express greater caring and concern for their local watershed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are more confident in their ability to protect and/or restore watersheds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are more likely to act to protect or restore watersheds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are better able to make informed decisions about how to protect or restore watersheds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are better able to conduct scientific investigations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are better able to understand the nature of scientific research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are more likely to express an interest in pursuing science careers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Perform better in science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Perform better academically	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Perform better on state standardized tests	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are more engaged in their science learning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



**What comments would you like to share about MWEEs? (essay box)**

**Thank you for completing this questionnaire!**

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**OMB Control Number: 0648-xxxx Expires: xx/xx/20xx**

**Paperwork Reduction Act Statement**

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## SECONDARY STUDENT SELF REPORT ITEMS

### Pre/Post Matching Code

Assign each student a unique code for matching pre- and post-tests.

<b>Connection with Nature</b>					
How much do you agree or disagree with these statements?					
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I like being in nature	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I like to play outdoors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I like to spend time outdoors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I like sitting in sand	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I like sitting in grass	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I'm OK with getting my hands dirty	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I'm OK with sticking my hand in river water	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I'm OK with stepping in mud	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I like to touch water insects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I like to touch living fish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I like to touch plants in a stream, pond, lake or the ocean	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Walking through a creek sounds like fun	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Picking through algae from a pond sounds like fun	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<b>Connection to Water</b>					
<b>Now you're going to answer some questions about local bodies of water. Examples of local bodies of water are streams, rivers, lakes, bays, and the ocean.</b>					
How much do you agree or disagree with these statements?					
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I like to learn about a local body of water	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I search for information to learn about a local body of water	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I want to explore a local body of water	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I care about a local body of water	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<b>Science Inquiry Skills</b>			
Do you know how to ...			
	No	Yes	Not sure
Create science questions that you could answer by collecting data (measurements)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Make predictions or hypotheses?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Collect data (measurements) or use data collected by someone else?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Analyze the data and figure out what it means?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Make conclusions about what you found out?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Present to others what you found out about your science question?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<b>Science Engagement</b>					
How much do you agree or disagree with these statements?					
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I usually do well in science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would like to take more science in school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I enjoy learning science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I learn things easily in science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would like a job that involves using science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I need to do well in science to get the job I want	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<b>Conserve Water</b>			
Choose one answer for each statement.			
	No	Yes	Not sure
To conserve water, I would be willing to use less water when I shower or take a bath	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To conserve water, I turn off the water while I was my hands	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To conserve water, I turn off the water while I brush my teeth	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Knowledge of Actions and Intention to Act**

For each statement, mark a response to "I know how to..." and a response to "Within the next year, I plan to..."

	I know how to...					Within the next year, I plan to ...		
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	No	Yes	Not sure
Help clean up or take care of a local stream, river, or beach	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participate in a restoration activity such as planting trees or removing invasive plants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tell others about ways they can protect a local body of water	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Create a schoolyard or backyard habitat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Conserve water at home or school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Install a rain barrel at home	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Give a presentation about a local body of water	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Knowledge of Issues**

How much do you know about ..... ?

	Nothing	A little	A lot	Not sure
The loss of forests and other plants along streams and rivers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
High levels of nutrients in water and where they come from	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The loss of important habitats such as wetlands and underwater plants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
High levels of sediment (soil) in the water and where it comes from	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<b>Locus of Control</b>					
How much do you agree or disagree with these statements?					
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
By working on my own, I can make a difference in solving environmental problems at my school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
By working on my own, I can help protect the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There are things I can do that will protect the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
By working with others, I can make a difference in solving environmental problems at my school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
By working with others, I can help protect the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If everyone does their part, we can protect the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My community can make a difference in protecting the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**POST-TEST ONLY!**

<b>Branching Questions</b>
Did you learn during this school year about a local body of water and the land that drains into it?
<input type="radio"/> No
<input type="radio"/> Yes
<input type="radio"/> Not sure
<b>If responded Yes to “Did you learn during this school year about a local body of water and the land that drains into it?”, then answer this question:</b>
When you learned about a local body of water and the land that drains into it, did you go outside?
<input type="radio"/> No
<input type="radio"/> Yes
<input type="radio"/> Not sure
<b>If responded Yes to “When you learned about a local body of water and the land that drains into it, did you go outside?, then answer this question:</b>
When you went outside to learn about a local body of water and the land that drains into it, did you go out ... (choose one)
<input type="radio"/> On the school property?
<input type="radio"/> To an area within walking distance of school?
<input type="radio"/> To an area you had to take a car or bus to get to?
<b>If responded Yes to “When you learned about a local body of water and the land that drains into it, did you go outside?, then answer this question:</b>
About how many times did you go outside during this school year to learn about a local body of water and the land that drains into it?
<input type="radio"/> I don't remember
<input type="radio"/> Once
<input type="radio"/> 2-5 times
<input type="radio"/> 6 or more times

If responded Yes to “When you learned about a local body of water and the land that drains into it, did you go outside?, then answer this question:

**Preparation/Action/Reflection**

Choose one answer for each statement.

	No	Yes	Not sure
BEFORE we went outside to learn, we talked about what we were going to do outside.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
What we learned about local bodies of water in class was closely related to what we found out about them when we were outside.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We learned about related science concepts BEFORE we went outside to learn about local bodies of water.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
While we were outside, I spent time collecting samples or taking measurements.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Either outside of back in the classroom, I spent time analyzing the data or samples I collected while outside.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
While we were outside, I spent time helping to protect the area.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Things we learned outside helped me better understand what I learned during regular science class.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
AFTER we had gone outside, I had a chance to talk with my teacher and other students about what we did and learned.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If responded Yes to "When you learned about a local body of water and the land that drains into it, did you go outside?, then answer this question:

**Satisfaction**

How much do you agree or disagree with these statements?

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I liked learning about a local body of water and the land that drains into it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It was fun to learn about a local body of water and the land that drains into it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I liked to do the things we did outside while we were learning about a local body of water and the land that drains into it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I wish we would have spent more time learning about a local body of water and the land that drains into it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Demographics**

What grade are you in? (please check one)

- Grade 6
- Grade 7
- Grade 8
- Grade 9
- Grade 10
- Grade 11
- Grade 12

In science, do you usually get...

- Mostly A's?
- Mostly B's?
- Mostly C's?
- Mostly D's or below?
- Our school does not give this type of grades
- I prefer not to answer

Do you identify as (check all that apply):

- Hispanic or Latino
- American Indian or Alaska Native
- Asian
- Black or African American
- Native Hawaiian or other Pacific Islander
- White
- Other
- I prefer not to answer

Do you mostly speak English at home?
<input type="radio"/> No
<input type="radio"/> Yes
<input type="radio"/> I prefer not to answer

Are you ....
<input type="radio"/> Male
<input type="radio"/> Female
<input type="radio"/> I prefer not to answer



## ELEMENTARY STUDENT SELF REPORT ITEMS

### Pre/Post Matching Code

Assign each student a unique code for matching pre- and post-tests.

Connection with Nature				
Choose one answer for each statement.				
	Not at all	A little	A lot	Not sure
I like being in nature	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I like to spend time outdoors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I like sitting in sand	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I like sitting in grass	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I'm OK with getting my hands dirty	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I'm OK with sticking my hand in river water	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I'm OK with stepping in mud	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I like to touch water insects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I like to touch living fish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Walking through a creek sounds like fun	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Picking through algae from a pond sounds like fun	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Now you're going to answer some questions about local bodies of water. Examples of local bodies of water are streams, rivers, lakes, bays, and the ocean.**

### Connection to Water

Choose one answer for each statement.

	Not at all	A little	A lot	Not sure
I like to learn about my local body of water	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I search for information to learn about my local body of water	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I want to explore my local body of water	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I care about my local body of water	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<b>Science Inquiry Skills</b>			
Do you know how to do these things?			
	No	Yes	Not sure
Create science questions that you could answer by collecting data (measurements)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Make predictions or hypotheses?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Collect data (measurements) or use data collected by someone else?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Analyze the data and figure out what it means?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Make conclusions about what you found out?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Present to others what you found out about your science question?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<b>Conserve Water</b>			
Choose one answer for each statement.			
	No	Yes	Not sure
To conserve water, I would be willing to use less water when I shower or take a bath	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To conserve water, I turn off the water while I was my hands	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To conserve water, I turn off the water while I brush my teeth	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<b>Science Engagement</b>			
Choose one answer for each statement.			
	No	Yes	Not sure
I usually do well in science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would like to take more science in school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I enjoy learning science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I learn things easily in science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would like a job that involves using science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I need to do well in science to get the job I want	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Knowledge of Issues				
Choose one answer for each statement.				
	Nothing	A little	A lot	Not sure
The loss of forests and other plants along streams and rivers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
High levels of nutrients in water and where they come from	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The loss of important habitats such as wetlands and underwater plants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
High levels of sediment (soil) in the water and where it comes from	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Intention to Act			
Within the next year, I plan to ...			
	No	Yes	Not sure
Help clean up or take care of a local stream, river, or beach	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participate in a restoration activity such as planting trees or removing invasive plants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tell others about ways they can protect a local body of water	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Conserve water at home or school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Locus of Control			
Choose one answer for each statement.			
	No	Yes	Not sure
By working on your own, do you think you can help protect a local body of water?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
By working with others, do you think you can help protect a local body of water?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### POST-TEST ONLY!

Branching Questions
Did you learn about a local body of water and the land that drains into it during this school year?
<input type="radio"/> No
<input type="radio"/> Yes
<input type="radio"/> Not sure

<b>If responded Yes</b> to “Did you learn about a local body of water and the land that drains into it during this school year?”, then respond to this question:
When you learned about a local body of water and the land that drains into it, did you go outside?
<input type="radio"/> No
<input type="radio"/> Yes
<input type="radio"/> Not sure

<b>If responded Yes</b> to “When you learned about a local body of water and the land that drains into it, did you go outside?” then answer this question:
When you went outside to learn about a local body of water and the land that drains into it, did you go out ... (choose one)
<input type="radio"/> On the school property
<input type="radio"/> To an area within walking distance of school
<input type="radio"/> To an area you had to take a car or bus to get to

**If responded Yes** to “When you learned about a local body of water and the land that drains into it, did you go outside?”, then respond to this question:

Choose one answer for each statement.

<b>Satisfaction</b>				
	Not at all	A little	A lot	Not sure
I liked learning about a local body of water and the land that drains into it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It was fun to learn about a local body of water and the land that drains into it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I liked to do the things we did outside while we were learning about a local body of water and the land that drains into it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I wish we would have spent more time learning about a local body of water and the land that drains into it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**If responded Yes** to “When you learned about a local body of water and the land that drains into it, did you go outside?”, then respond to this question:

**Preparation/Action/Reflection**

Choose one answer for each statement.

	No	Yes	Not sure
BEFORE we went outside to learn, we talked about what we were going to do outside.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
While we were outside, I spent time collecting samples or taking measurements.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
While we were outside, I spent time helping to protect the area.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
AFTER we had gone outside, I had a chance to talk with my teacher and other students about what we did and learned.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Demographics**

What grade are you in?

- Grade PreK, 1, 2, or 3
- Grade 4
- Grade 5
- Grade 6
- Grade 7
- Grade 8
- Grade 9, 10, 11, or 12

In science, do you usually get...

- Mostly A's?
- Mostly B's?
- Mostly C's?
- Mostly D's or below?
- Our school does not give this type of grades
- I prefer not to answer

Do you identify as (check all that apply):
<input type="checkbox"/> Hispanic or Latino
<input type="checkbox"/> American Indian or Alaska Native
<input type="checkbox"/> Asian
<input type="checkbox"/> Black or African American
<input type="checkbox"/> Native Hawaiian or other Pacific Islander
<input type="checkbox"/> White
<input type="checkbox"/> Other
<input type="checkbox"/> I prefer not to answer

Do you mostly speak English at home?
<input type="radio"/> No
<input type="radio"/> Yes
<input type="radio"/> I prefer not to answer

Are you ....
<input type="radio"/> Male
<input type="radio"/> Female
<input type="radio"/> I prefer not to answer

## SECONDARY STUDENT WATERSHED LITERACY ITEMS

### Pre/Post Matching Code

Assign students a unique code for matching pre- and post-tests.

### Demographics

What grade are you in?

- Grade PreK, 1, 2, or 3
- Grade 4
- Grade 5
- Grade 6
- Grade 7
- Grade 8
- Grade 9, 10, 11, or 12

In science, do you usually get...

- Mostly A's?
- Mostly B's?
- Mostly C's?
- Mostly D's or below?
- Our school does not give this type of grades
- I prefer not to answer

Do you identify as (check all that apply):

- Hispanic or Latino
- American Indian or Alaska Native
- Asian
- Black or African American
- Native Hawaiian or other Pacific Islander
- White
- Other
- I prefer not to answer

Do you mostly speak English at home?

- No
- Yes
- I prefer not to answer

Are you ....

- Male
- Female
- I prefer not to answer

### Objective 1: Define the term "watershed"

How sure are you that you know what a watershed is?

- Not at all sure
- A little sure
- Very sure
- I'm positive

Which of these is the best definition of a watershed?

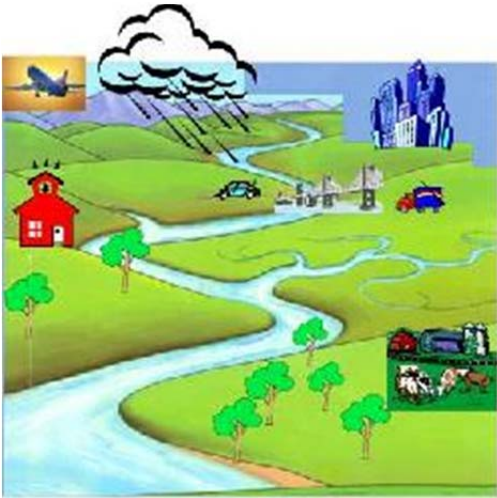
- A building at a water treatment plant
- An area of land that drains into a specific body of water
- A significant pollution event
- Another name for a river or stream
- Don't know

How sure are you that you know what groundwater is?

- Not at all sure
- A little sure
- Very Sure
- I'm positive

Watersheds contain groundwater.

- No
- Yes
- Don't know



Look at the picture. Which of the following is in this river's watershed?

	No	Yes	Don't know
The red school building	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The farm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The city	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The small creek on the right	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Objective 2: Identify their local watershed(s)**

Do you live in a watershed?

- No
- Yes
- Don't know

**Objective 3: Identify how watersheds are connected to the ocean via streams, rivers, and human-made structures**

Where does most of the water from the land eventually end up?

- Ocean
- River
- Sewer
- Lake
- Don't know

How sure are you that you know what a storm drain is?

- Not at all sure
- A little sure
- Very sure
- I'm positive

Ultimately, where does water end up after it enters a storm drain?

- Wastewater treatment plant
- A local body of water
- In the ground
- City sewer
- Don't know

**Objective 4: Identify the functions that occur in a watershed (transport, store, and cycle water)**

What are some of the functions that occur within a watershed?

	No	Yes	Don't know
The transport of water	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The transport of materials, like soil through rivers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The storage of water in lakes, rivers, groundwater, etc.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The transformation of water from one state to another (liquid, ice, vapor, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Objective 5: Recognize that both natural processes and human activities affect water flow and water quality in watersheds**

Which of these statements is FALSE? Watershed boundaries ...



- Hardly ever change; they are nearly permanent
- Can sometimes be changed by the actions of people
- Can sometimes be changed by natural processes
- Are constantly altered by both human activities and natural processes
- Don't know

Which of the following can change how water drains in a watershed?

	No	Yes	Don't know
A flood	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A landslide	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A dam	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The construction of a storm drain	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How sure are you that you know what stormwater is?

- Not at all sure
- A little sure
- Very sure
- I'm positive

Stormwater pipes are similar to streams and creeks because they both:

- Usually have greater water flow when it storms
- Are natural habitats for plants and animals
- Are constructed by people
- Usually receive most of the water from drains and ditches
- Don't know

When trees in a watershed are cut down and replaced with pavement and buildings, ...

	No	Yes	Don't know
More water will drain into local rivers and lakes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
More water will drain into groundwater	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Water will drain into local rivers and lakes faster	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There will be a greater chance of flooding and erosion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Vegetated buffers (that is, trees, shrubs, other plants along streams, rivers, and estuaries) ...

- Increase flooding along streams and rivers
- Decrease erosion and filter water flowing to streams and rivers
- Increase erosion and filter run-off along streams and rivers
- Increase the nutrients that flow into water
- Don't know

Which human activities might increase water pollution?

	No	Yes	Don't know
Water running off people's yards and farm fields	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Water running off streets and parking lots	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Putting chemicals down storm drains	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Draining wetlands, such as marshes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Removing trees and other plants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Nutrients (such as nitrogen and phosphorus) in a stream, river, lake, or ocean can be a form of pollution.

- No
- Yes
- Don't know

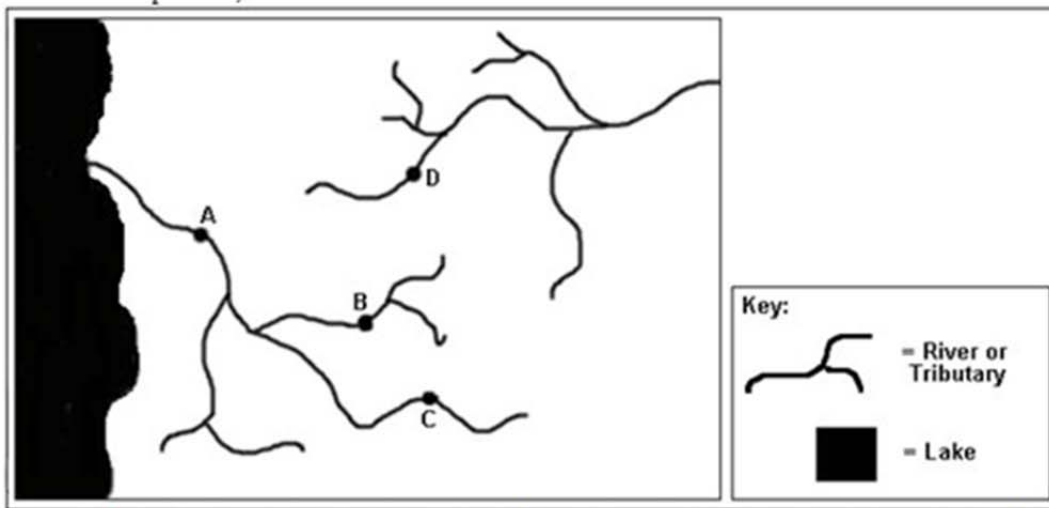
**Objective 6: Identify connections between human welfare and water flow and quality**

The quality of the water in rivers, lakes, and the ocean can affect the health of people living near them.

- No
- Yes
- Don't know

The water from bodies of water, such as rivers and creeks, is used ...

	No	Yes	Don't know
for drinking after it's cleaned	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
for farming	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
by wildlife	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



If a pollutant is put into the river at Town C, which town(s) (if any) would be directly affected by the pollution? Check all that apply.

- A
- B
- C
- D

**Objective 7: Identify possible point and non-point sources of water pollution**

How sure are you that you know what non-point source pollution is?

- Not at all sure
- A little sure
- Very sure
- I'm positive

Which of these is a type of non-point source pollution?

	No	Yes	Don't know
Oil in the water running off of streets and parking lots	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Soil in the water running off of farm fields	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fertilizer in the water running off of lawns	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Chemicals in the water coming out of a factory pipe	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Rivers are the major ways through which non-point source pollution enters the ocean.

- No
- Yes
- Don't know

How sure are you that you know what point source pollution is?

- Not at all sure
- A little sure
- Very sure
- I'm positive

Controlling point source pollution is typically easier than controlling non-point source pollution.

- No
- Yes
- Don't know

**Objective 8: Identify actions individuals can engage in to protect/restore water quality in watersheds**

Which of the following would help keep water clean?

- Disposing of household chemicals down the drain
- Washing the car on the grass instead of on pavement
- Leaving the water running while brushing teeth
- Cutting down native trees in the woods
- Don't know

People can help protect the water in their local watershed by:

	No	Yes	Not sure
Conserve water at home or school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Help clean up or take care of a local stream, river, or beach	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participate in a restoration activity such as planting trees or removing invasive plants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>