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Technical Memorandum

Date: December 23, 2011
To: Tom Schueler, Chesapeake Stormwater Network
From: Karen Cappiella, Joe Battiata, and Cecilia Lane, Center for Watershed Protection, Inc.
Re: Chesapeake Bay Stormwater Training Partnership Training Assessment Report

Introduction and Overview of Partnership

Over the past two years, the Chesapeake Bay Stormwater Training Partnership (Partnership) has delivered more than 34,000 hours of training to stormwater professionals from local government and private sectors in Maryland, Virginia, West Virginia and the District of Columbia. The goal of the Partnership, which is coordinated by the Chesapeake Stormwater Network (CSN) and the Center for Watershed Protection (CWP), is to provide effective and targeted training leading to enhanced nutrient removal through better design, installation and maintenance of stormwater practices at existing, new and redevelopment projects. A secondary goal is to evaluate different modes of training in order to help identify the most effective training formats for future training programs. This memorandum provides a detailed summary of the types of training provided by the Partnership and evaluates its effectiveness based on information collected through surveys and training evaluations.

What Types of Training Were Provided?

The major types of training provided by the Partnership were 1) webcasts, 2) 1-day design workshops, 3) 2-day Master Stormwater Practitioner workshops, and 4) online training modules. A fifth training mode that involved direct assistance to local plan reviewers and/or program administrators on specific projects was also tested out but did not take off due to the uncertainty of new state stormwater regulations, which has been a primary driver of the demand for training.

- **Webcasts** include approximately two hours of technical content and feature expert guest speakers to provide concrete examples and real world case studies of the topics at hand. While the phone lines can generally accommodate up to 300 registrants (1,000 with the internet audio option), attendees are free to invite their colleagues to watch the webcast in a conference room or other group location, which greatly increases the number of participants. The webcasts feature short breaks for question and answer sessions where participants can write in their questions and the speakers will answer as many as possible during the time allotted. A resources sheet that provides participants links to the various publications, websites, and other



sources referenced in the webcast, is provided for each webcast. The webcasts are also archived and posted on the Partnership website so they can be viewed in their entirety after the initial run.

- **1-day design workshops** are tailored for smaller groups of approximately 35 people and the audience is primarily composed of the local community. The goal of the workshops is to assist local governments to implement their new state stormwater requirements. These workshops are tailored to meet local needs and designed to be interactive. The typical agenda covers the State regulations and a “hands-on” exercise of implementing stormwater best management practices (BMPs) on a real world development site.
- **2-day Master Stormwater Practitioner (MSP) workshops** are ideally designed for small groups, but were also held for larger number of participants based on the demand for training, with the audience similarly composed of the local community. These workshops are intended to prepare individuals to understand the background and basis for the hydrologic and hydraulic design criteria and BMP specifications (including both structural and non-structural practices). More importantly, during these workshops, instructors lead discussion sessions on difficult issues and challenges in order for participants to be prepared to address complex review comments and provide in-house training to co-workers.
- **Online training modules** are technical training materials posted on the Partnership website to allow stormwater professionals to learn from them at their own pace without the expense and time commitment that a workshop or webcast would require. The types of materials provided in the online training modules included PowerPoint slideshows, compliance spreadsheets, archived webcasts, BMP design specs, and technical bulletins and research papers.

How Much Training Was Provided?

Since its inception through mid-December of 2011, the Partnership has trained 14,725 people and provided an estimated 34,811 training hours. Table 1 summarizes number of training events, number of participants and number of training hours for each of the major training modes. While online modules and webcasts attracted the most participants per event, the 2-day workshops actually generated the most training hours per event because of the length of time commitment required of participants. Tables 2-5 provide a summary of the training effort for webcasts, 1-day workshops, 2-day workshops and online modules.

Training Type	# of Events	# of Participants	# of Training Hours	Participants /Events	Training Hours/Event	# of Evaluations
Webcasts	18	4920	9510	273	528	463
1 day Workshops	22	870	5914	40	269	364
2 day Workshops	6	382	6558	64	1093	227
Online Modules	26	8553	12830	329	493	21
Total	72	14725	34811			1075

Date	Topic	Length (hrs)	Participants	Training Hours
4/19/2010	Bioretention	2	357	714
5/13/2010	Maryland Environmental Site Design	1.5	323	484.5
5/19/2010	Stormwater Design Adaptations for Karst Terrain	1.5	86	129
6/10/2010	Redevelopment	1.5	200	300
7/12/2010	West Virginia MS4 Permit	1.5	35	52.5
9/1/2010	Permeable Pavement	2	757	1514
10/20/2010	Rooftop Disconnection	2	302	604
12/1/2010	Rainwater Harvesting	2	116	232
3/16/2011	Design, Installation & Maintenance of Constructed Wetlands & Regenerative Stormwater Conveyance System	2	452	904
4/13/2011	Coastal Plain Stormwater Design	2	163	326
5/16/2011	Ultra-Urban Stormwater Design & Retrofitting	2	636	1272
6/15/2011	Industrial Stormwater Management	1.5	16	24
7/13/2011	The Top Actions That Local Governments Can Take To Address Numerical Goals, Such As TMDLs & WIPs	2	378	756
7/28/2011	Nutrient Accounting	2	212	424
8/11/2011	LID Maintenance	2	210	420
9/15/2011	Stewardship	2	162	324
9/22/2011	Stormwater Retrofitting	2	175	350
12/7/2011	Stream Restoration	2	340	680
Total			4920	9510

Date	Location	Length (hrs)	Participants	Training Hours
2/23/2010	Harford County, MD	4	52	208
5/27/2010	Washington County, MD	8	42	336
7/10/2010	Wicomico County, MD	8	45	360
8/2/2010	Garrett County, MD	8	30	240
9/23/2010	Carroll County, MD	8	46	368
10/13/2010	City of Bowie, MD	4	24	96
11/30/2010	Spotsylvania, VA	8	106	848
12/3/2010	Prince William, VA	8	46	368
1/20/2011	Warsaw, VA	8	31	248
1/12/2011	Washington, DC	5.5	25	137.5
2/17/2011	Lynchburg, VA	8	35	280
3/9/2011	Washington, DC	6	24	144
3/18/2011	Harford Glen, MD	4	206	824
3/24/2011	Baltimore City, MD	4		
3/28/2011	Carroll County, MD	4		
3/30/2011	Baltimore City, MD	4		
3/31/2011	Harford Glen, MD	4		
3/30/2011	Martinsburg, WV	8	42	336
5/24/2011	Annapolis, MD	4	28	112
9/21/2011	Virginia Beach, VA	8	38	304
9/22/2011	Virginia Beach, VA	8		304
10/19/2011	Verona, VA	8	50	400
Total			870	5913.5

Date	Topic	Location	Length (hrs)	Participants	Training Hours
March 9-11, 2010	Rooftop to the Bay	Staunton, VA	24	90	2160
April 8-9, 2010	Chesapeake Bay Stormwater Partners Retreat	Shepherdstown, WV	16	45	720
	MSP Training	Shepherdstown, WV	16	26	416
May 19-20, 2011	Chesapeake Bay Stormwater Partners Retreat	Shepherdstown, WV	16	65	1040
June 8-9, 2011	MSP Training	Chesapeake, VA	13	59	767
October 26-27, 2011	MSP Training	Fredericksburg, VA	15	97	1455
Total				382	6558

Table 5: Partnership Online Training Modules
Nutrient primer for Engineer
IC and Stream Health
Comparing BMPs
Runoff Reduction Theory
Green Roof Design
Sand Filter Design
Pond Design
Constructed Wetland Design
Bioretention Design, Installation & Maintenance
Bioretention Photo Tutorial
Swale Design
Infiltration Design
Design for Redevelopment
Design for Coastal Plain
Design for Karst Terrain
Stormwater Hotspots
MD ESD Requirements
Site Planning for Stormwater
A Practical Guide to Nutrient Accounting
Virginia Stormwater Regulations
Permeable Pavement
Ultra Urban Stormwater Design and Retrofitting
Rainwater Harvesting
Filter Strips and Soil Amendments
Non-Structural BMPs
Non-Structural BMP Maintenance and Inspections

Who Were the Trainees?

The Partnership training targeted design professionals and local plan reviewers in the Chesapeake Bay region. However, Partnership and training registrations show that trainings were accessed by people outside the Chesapeake Bay and from different disciplines. As part of the Partnership enrollment process, an online survey was provided to new Partners to assess training needs and current knowledge of and familiarity with new stormwater practices. Several of the survey questions were aimed at identifying the basic demographics of the people receiving the training. Results are summarized below.

The majority of Partners work on projects in Virginia (51%) and Maryland (31%) (Figure 1) and most work in the Coastal Plain (58%) and Piedmont (53%) areas versus the Valley and Ridge or Appalachian Plateaus. They consist of engineers and designers, local government stormwater plan review, regulatory, or environmental organizations (Table 6). Fourteen percent of the partners fell into the “other” work sector category and included areas of local government other than plan review (n=30), educators and students (n=20), and a contractor (n=1). The majority are experienced professionals, with 17% reporting 6-10 years experience and 37% reporting over 10 years of stormwater management experience. However, it is worth noting that approximately one-quarter of respondents report only 0-2 years experience.

The partners rated themselves most knowledgeable about their state’s current stormwater regulations, and reported their least knowledgeable subjects to be low impact development (LID) credits for flood control, design techniques to protect urban stream channels, and nutrient removal for stormwater practices.

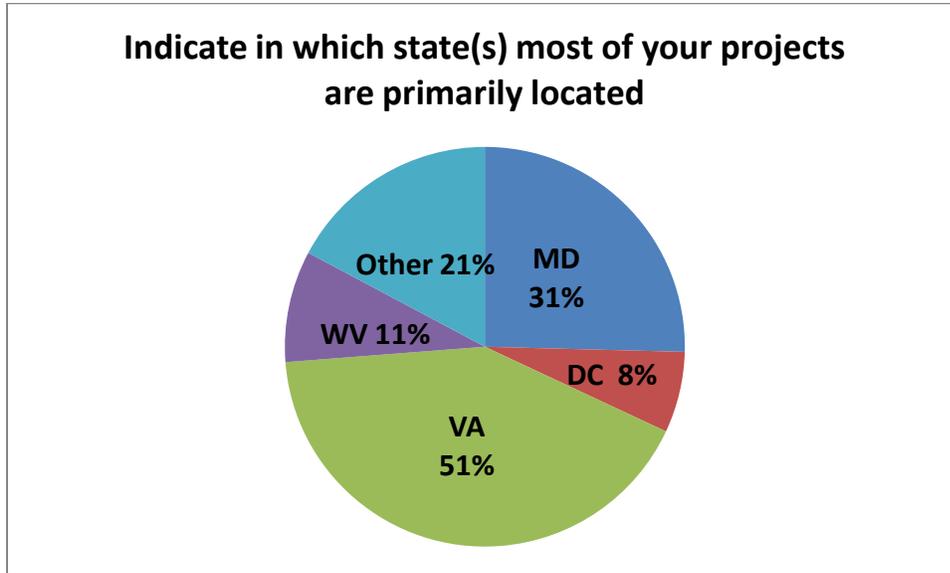


Figure 1. Location of Partner stormwater projects

Answer Options	Response Percent	Response Count
Engineering and design consulting	43.01%	206
Local government stormwater plan review	20.25%	97
Regulatory oversight (Federal or State)	12.32%	59
Environmental organization	10.44%	50
Other (please specify)	13.99%	67
	<i>answered question</i>	479
	<i>skipped question</i>	25

Most designers have not yet designed projects using the innovative practices at the heart of LID. For example, the bullets below indicate that percentage of Bay stormwater engineers that had never designed a project with the indicated practice:

- Green Roof: 68%
- Amended Soils: 64%
- Disconnection: 49%
- Dry Swale: 46%

- Filter Strip: 42%
- Rainwater Harvesting: 41%
- Permeable Pavement: 35%

Assessment of Training Effectiveness

The major goals of assessing the effectiveness of Partnership trainings were to: 1) identify changes in knowledge and behavior as a result of the training, 2) compare the different modes of training in terms of costs and effectiveness to inform recommendations about future trainings, and 3) summarize feedback on each type of training to inform future Partnership offerings.

The major assessment tools used were surveys and evaluations. First, an online survey was provided as part of the Partnership enrollment process. Of the 593 Partners to date, 504 elected to take the survey (see Appendix A for complete survey results). In August 2011, a shorter follow-up survey was sent to Partners and other attendees of training events to solicit feedback on Partnership training needs, measure knowledge of nutrient reduction strategies and quantify behaviors related to BMP implementation. The follow-up survey had 85 respondents. Appendix B summarizes the complete follow-up survey results. Results of the follow-up survey were compared to the baseline survey to determine if there was any effect of Partnership trainings on stormwater knowledge or behaviors.

Evaluations were conducted after each individual training event for webcasts, 1-day workshops, and 2-day workshops. A short 10 question online survey was sent to Partners to solicit feedback on the online training modules (see Appendix C for results). In total, 1,075 evaluations were collected. Results from the surveys and evaluations are summarized below as they relate to changes in “nutrient IQ,” BMP implementation and overall effectiveness of trainings.

Changes in “Nutrient IQ”

Both the baseline and follow-up survey included five multiple choice questions that addressed nutrient removal knowledge or “nutrient IQ.” Collectively, the baseline group gave the correct answer 26% of the time, while the follow up survey respondents answered correctly 45% of the time. This initial low-scoring of the baseline group reflects a lack of familiarity with the basic pollutant removal and performance characteristics of addressing stormwater runoff quality and a need for basic site design and BMP nutrient removal performance training. The baseline survey results prompted a re-tooling of the Partnership training to put more emphasis on nutrients, specifically how to boost nutrient removal in design. Table 7 presents the percent of correct responses for each of the surveys. While in both cases, the majority of respondents got one question correct, the percent of respondents that got 2, 3, 4 or 5 questions correct increased in the follow-up survey as compared to the baseline survey.

Nutrient IQ Questions	Baseline Survey Respondents (new Partners)		Follow-up Survey Respondents (some exposure to Partnership training)	
	Number of correct answers	Percent of whole	Number of correct answers	Percent of whole
0 correct	116	26.79%	4	5.13%
1 correct	164	37.88%	23	29.49%
2 correct	87	20.09%	19	24.36%
3 correct	53	12.24%	16	20.51%
4 correct	8	1.85%	13	16.67%
5 correct	5	1.15%	3	3.85%
Total	433	100.00%	78	100.00%
Skipped	71		7	

It is presumed that the improvement in nutrient IQ seen in the follow-up survey is reflective of the increases focus on nutrients in the Partnership trainings attended by the follow-up survey respondents. These changes indicate an overall increase in the understanding of how these practices work as a function of the training.

Changes in BMP Implementation

The extent of the Partners’ knowledge of and comfort with the new Runoff Reduction and Environmental Site Design practices is reflected in part by their reporting of practice implementation. Of the approximate 5,780 BMPs that were reported to have been designed by newly enrolled Partners taking the baseline survey in the last year, only 17% of those practices are included in the newly credited site design practices being encouraged in Maryland and Virginia (rainwater harvesting, permeable pavement, green roof, and compost amended soils). When this same question was posed to Partners and Partnership trainees through the follow-up survey, this number decreased to 12%. When implementation of bioretention (one of the more common “LID” practices that has long been included in state manuals) is included, the percentage of LID practices is still only 29% of the total for both the baseline and follow-up survey. Clearly, strong room for improvement is indicated.

The good news is that, as a percent of the total, implementation of some individual LID practices was reported as higher by follow-up survey respondents when compared to the baseline survey. This includes permeable pavement, compost amended soils and bioretention. In addition, implementation of some individual “Low performing” practices either stayed the same or decreased from the baseline to the follow-up, including: filtering practices, wet ponds and dry extended detention ponds. However, as a whole, Partnership trainees are still disproportionately designing or approving practices with low nutrient reduction performance. The pie charts in Figure 2 show the number of Low (dry ED ponds, filtering

practices, grass swales, proprietary filtering practices, wet ponds), Medium (constructed wetlands, filter strips, green roofs, impervious disconnection, soil amendments) and High (bioretention, rainwater harvesting, permeable pavement) performing practices installed in the last year by respondents of the baseline survey and follow-up survey. Interestingly, the overall decrease in implementation of High performing practices was due solely to a decline in the use of rainwater harvesting, while the increase in Low performing practice reflects an increase in implementation of grass swales.

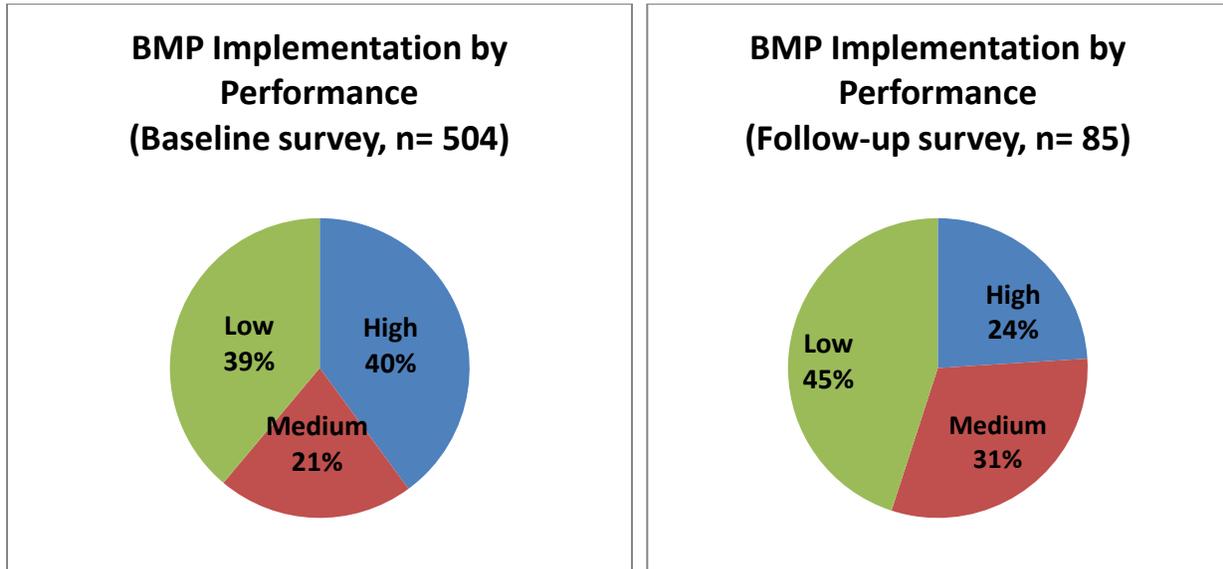


Figure 2. BMP Implementation by Performance

The apparent lack of change in BMP design behavior can be partially explained by three factors: 1) the delayed implementation of new stormwater regulations in the Chesapeake Bay watershed; 2) the relatively short time period between the baseline and follow up survey; and 3) the relative lack of familiarity with the new Runoff Reduction and Environmental Site Design practices. The development of the new state stormwater regulations in the Chesapeake Bay Watershed predates the creation of the Partnership. Maryland and Virginia began the arduous process of developing new regulations in 2006. The new regulations represent a significant shift in the practice of stormwater management in establishing a regulatory preference for the implementation of Runoff Reduction and Environmental Site Design practices over traditional basins. The anticipated need for training on these new regulations was considered essential for effective implementation. However, the local government adoption and implementation process in Maryland didn't occur until after May of 2010, and still hasn't occurred in Virginia. As expected, regardless of effective training, developers and designers will continue to use traditional stormwater practices that are familiar to plan reviewers and contractors as long as they are still being approved.

The two-year time period of the Partnership training program represents another timing issue. The timeline for most development projects, from initial project scoping and zoning, to design, plan approval, and construction is typically 18 months or longer. Therefore, it is likely that the Partnership trainees simply have not had enough time to exercise their new found expertise in more effective stormwater practices.

Finally, as noted in both the baseline and follow-up survey, there are obstacles to using Runoff Reduction and Environmental Site Design practices. The follow-up survey responses regarding the top obstacles to

using LID provide some insight into these somewhat discouraging results. The top three obstacles reported by Partnership trainees through the follow-up survey were:

1. High cost of practices
2. Code does not prohibit practices but presents barriers
3. No provision for accounting for large storm peak rate control

High cost of practices was also overwhelmingly the top obstacle reported in the baseline survey. The conclusion here is that training alone is not sufficient to significantly influence BMP implementation. While there is still debate over the capital and long term operation and maintenance costs of developing a site consistent with the incentivized LID approach as compared to traditional site design and stormwater management infrastructure, it is generally acknowledged that the costs will decrease as developers, planners, designers, and contractors become more familiar with the concept. Economic or other incentives to implement LID may be helpful to transition through these initial stages of new stormwater regulations. It should also be expected that there may be a lag time between when training occurs on code and ordinance review and peak rate control provisions and actual application of the knowledge gained. We hope to continue to address these obstacles during Phase 2 of the Partnership.

Feedback on Training

The response from the more than 1,000 training evaluations was that (a) training was Good to Great (b) they would recommend it to a colleague (c) it measurably increased their knowledge and comfort level with the stormwater practices. There were quite a few constructive suggestions as how to improve each delivery mode. A typical example of the evaluation and feedback from one webcast and one workshop is provided as Appendix D. A more detailed summary of the feedback is provided for each training mode below.

Webcasts

Feedback from the webcast evaluations shows that the majority of respondents agreed or somewhat agreed with the following (a) they can easily apply what they learned, (b) the information strengthened their skills/knowledge or provided them with new tools, and (c) the speakers were effective at communicating the messages. In addition, 92% of respondents reported that the materials were Good to Excellent and 91% would recommend all or part of the webcast to their colleagues. Ratings of the question and answer sessions were more variable by webcast, with 74% ranking them as Excellent or Good. The webcast length of 2 hours appears to be appropriate based on evaluation feedback, but a small proportion of respondents reported that 2 hours is too long. Lastly, respondents were split between whether they thought (a) the webcast was equal to a live training or (b) the webcast was not as good as a live training. None of the respondents thought it was better than a live training, pointing to the importance of keeping the face-to-face trainings as the primary training format in the Partnership portfolio. From the specific evaluation comments, some common themes were:

- attendees want more detail on the topics (and in many cases are looking for more design resources), but at the same time they request more time for questions and answers or some email follow up on the questions asked during the webcast;
- attendees are looking for more clarification from states on stormwater regulations;
- they are very interested in gaining CEUs or credits for certification as part of PE licenses; and
- audio problems were the most common complaint.

Workshops

The overall response to workshops was very favorable. Specific feedback on design exercises, session topics, and presentation materials were compiled using course evaluations at the conclusion of each workshop. This feedback was reviewed and applied to strengthen future workshop training sessions. Feedback on workshop evaluations indicate that the majority of participants reported increased

understanding for the topic(s) covered. A handful of participants rated themselves as very knowledgeable coming into the workshop leaving little room to increase their understanding. Even fewer indicated that they lost knowledge by attending the workshop. The majority of respondents rated the sessions as Great or Good and indicated that they would recommend the workshop to a colleague.

The evaluations also revealed that the selection of an appropriate workshop facility has a significant influence on the quality of the learning environment. In most cases, the facilities were highly rated. However, some workshops were held in the only space available to the local government or other local host, and even simple features such as the room geometry (a long skinny room), screen size, lighting, etc., can have a significant impact on the workshop's effectiveness.

In addition to the interactive learning atmosphere, the workshops provided discussions with the group to facilitate increased knowledge between and among participants. Many responders reported that additional workshop time would be useful.

1-day workshops

One day workshops were generally structured to provide lecture topics in the morning, covering the new state regulations and new BMP design criteria and performance credits. The afternoon was focused on the compliance spreadsheets and included a site design exercise. The site design exercise consisted of breaking the class into small groups of 3 to 5 participants to evaluate a real site plan that was stripped of extraneous detail. The groups evaluated the raw land and conducted a preliminary Environmental Site Design assessment, and then developed a BMP strategy using the respective state compliance spreadsheet. In all cases, participants found the hands on exercise to be extremely helpful in learning both how to use the compliance spreadsheet and the new regulations and BMP criteria.

In Virginia, as the development of the new regulations was delayed through the initial round of 1-day workshops, the uncertainty of the final technical criteria shifted the focus of the workshops away from the compliance spreadsheet and hands-on design exercises to lectures/presentations on the new BMP specifications. Removing this interactive element from the agenda was immediately recognized as a bad idea. While the workshop evaluations were only slightly less positive, the direct feedback from participants indicated the preference for the hands-on exercise.

2-day workshops

The 2-day MSP workshop format was initiated with an invitation only event in August of 2009 in Shepherdstown, WV. The participants in this first MSP workshop represented very knowledgeable and experienced stormwater experts in the Bay Watershed. The goal was to create an interactive workshop where the Partnership instructors could benefit from the experience of the participants in order to fine tune the topics and presentation materials. The number of participants, 26, represents the smallest group of all the 2-day workshops. This workshop also represented the most successful based on the direct feedback and workshop evaluations. It was determined that by building "forced" interaction elements into the presentations, the participants were quickly encouraged to break out of the "sit and listen" mode and become engaged in the discussion. This is in direct contrast to the initial Virginia 1-day workshop that was without the hands-on exercise – the "sit and listen" mode was clearly less effective.

The 2-day MSP workshops were very successful in that the demand became greater than the Partnership's capacity. Subsequent MSP workshops had 59 (Tidewater – June, 2011) and 97 (Fredericksburg – October 2011) participants. However, the change in the interaction was noticeable as some participants were reluctant to ask questions or offer insight in front of such a large number of people. Countering this phenomenon is the ability for participants to network with colleagues they may otherwise not have the opportunity to meet over lunch and breaks of a 2-day workshop.

Online Modules

Almost 95% of respondents to the module survey said they found the modules useful. Archived webcasts were ranked as the most useful type of online training material, followed closely by BMP design specs and Powerpoint slideshows. The four top-ranked module topics were Nutrients and Stormwater, Bioretention, Stormwater in the Coastal Plain, and Rainwater Harvesting. The majority of respondents spent 1-2 hours on the modules. While most (72.2%) respondents indicated that the modules provided a nice refresher and/or they learned a few things they did not know previously, the remaining 27.8% indicated that the modules significantly increased their knowledge level of the topic. Despite the ability of the modules to increase knowledge and understanding, survey responses indicate that the influence on stormwater behavior was more limited. Almost 39% of respondents said they used the modules to provide training to co-workers, colleagues and clients, while 33.3% have made changes in how they represent stormwater requirements to their clients. Almost 17% of respondents noted that they have changed the types of BMPs they consider for projects (but have not actually changed the types of BMPs they end up putting on the plans). Another one-third indicated they have not yet applied what they have learned from the modules and none of the respondents reported changing the types of BMPs they design for projects. A small percentage (5.6%) of respondents reported that they have made significant changes in their roles as stormwater professionals as a result of what they learned from the modules. Overall, the online modules appear to be an effective way to reach a large group of people to improve their knowledge and understanding of new stormwater practices. The modules also have a multiplying effect on knowledge because users turn around and train others using the module materials.

Training Costs

Costs of the different training modes were also evaluated relative to the training hours provided. Workshop and webcast costs are expressed as a range for two reasons. First, the Maryland workshops (provided by CSN) generally used the same format and content for each and did not require as much tailoring as the Virginia, West Virginia and DC workshops (conducted by CWP). Second, the CWP webcasts reflect the full cost to conduct the webcast, while the CSN webcasts were conducted through the Mid-Atlantic Water Program, which greatly reduced the cost to the Partnership. Costs per training hour were estimated at:

- Half-day workshops: \$10/training hour
- 1-day workshops: \$9- \$27/training hour
- 2-day workshops: \$11- \$18/training hour
- Webcasts: \$6- \$22/training hour
- Online modules: \$5/training hour

While the online modules are clearly the most cost-efficient training mode, the ability of this type of training to influence BMP implementation or even greatly increase nutrient IQ is limited. The in-person workshops, while generally more expensive, have the greatest potential to affect changes in BMP implementation and nutrient IQ. However, there is a limit to the training hours that can be provided through workshops because, as the number of registrants increases (above 40-50 participants), the quality of the workshops tend to go down (and the costs also go up). Conversely, the number of webcast participants can be increased without increasing cost or reducing quality. While the MAWP webcast format is more cost-efficient than the CWP webcasts, a limiting factor is its cap on registrants at 100 people.

Training Needs

Chesapeake Bay stormwater training needs were defined by the Partnership enrollment survey, training evaluations, and the results of a recent April 2011 survey of 170 stormwater professionals conducted by CSN. Major findings include:

- The majority of partners (66%) are willing to travel up to 50 miles to attend training
- The best days to hold the trainings are mid week.
- The major reason for not attending training is cost, followed by being too busy or unaware of training opportunities.
- Webcasts and 1-day workshops are the preferred training formats, followed by several day conferences and online/correspondence courses.
- New requested training formats included short training videos and field-based training.
- Training was also requested for new audiences, including elected officials and contractors
- Partners prefer trainings that are free, convenient, and accrue credits to maintain their professional certification.
- Top ranked training topics include:
 - Updates on New State Stormwater Regulations
 - Stormwater Retrofitting Techniques
 - Methods for Implementing Local TMDLs/WIPs
 - Bioretention Design, Installation and Maintenance
 - Design of Practices for Nutrient Reduction
 - Stormwater Design for Redevelopment Projects
 - Native Landscaping for Stormwater Practices
 - Design of Rainwater Harvesting Systems
 - Local Stormwater Outreach and Education
 - Techniques for Soil Infiltration Testing

Summary

Based on the above assessment, some major themes and recommendations as we enter Phase 2 of the Partnership include:

Partnership Training Improves Bay Stormwater Knowledge: Feedback from each of the major training modes confirms this statement, as do the results of the “nutrient IQ” survey. The major challenge now is moving beyond increased understanding to actual behavior change.

Much More Training Needed: The next lesson is that while we have tried to provide a “saturation-level” of training across the four states, we have only begun to meet the demand. The demand for training appears to be strongly linked to the rollout of new stormwater requirements. Demand was quite high in

Maryland and West Virginia because designers and localities were confronting new requirements. By contrast, demand was sluggish in Virginia and DC because the shape and nature of proposed regulations have not yet been resolved. It is clear that the size of the training population is much larger than we had originally anticipated.

Balance The Number Of Participants With The Desire to Engage Participants: The smaller class size (25 to 35 people) is preferred as a way to ensure full participation among all the participants. However, when larger crowds must be accommodated to meet the demand (as described above), incorporating interactive feedback questions into the presentation material and accommodating for extended discussion and Q&A sessions can overcome the reluctance to ask questions or offer feedback.

Utilize Hands-On Training Strategies Whenever Possible: The use of hands-on design exercises should be included in both the 1 and 2-day workshops as much as possible. They are very effective teaching tools, they break up the monotony of Powerpoint presentations, and they shift the participants into a problem solving mode that helps to foster legitimate questions regarding the training content.

Advance Scouting of the Training Facility: The quality of the facility is directly related to the effectiveness of the training. Multiple elements should be verified ahead of time: audio system, projector and screen size, room geometry, room temperature, etc. Any one of these elements being missed can bring the entire training program down several notches in effectiveness. And while really good coffee, Danish, and cookies can make up for a lot of other flaws, it's always better to have those things in addition to a good facility.

A Mix of Training Formats is Needed: While hands-on workshops are clearly in demand, it is not the most cost effective training method and not all trainees will be able to attend workshops as noted by baseline survey participants when asked about training obstacles.

Online training modules have been shown to be an effective and low cost way to reach a large number of trainees. This training mode could be an efficient way to broadly distribute new materials during Phase 2 of the Partnership, such as a compliance spreadsheet for Pennsylvania, while the existing modules can continue to be used by current and new Partners. The webcasts are also in high demand and the archived webcasts are the most highly ranked feature of the online modules. Webcasts are a sort of middle ground between workshops and modules in terms of the level of knowledge increase they provide.

In addition, new training formats such as short videos and hand-on field training have been requested by partners. Ultimately, it is clear that a one-size-fits all training is not appropriate and each method is needed to some extent for a comprehensive stormwater training program.