

Texas Watershed Planning Training Project

Final Report 2020

The Texas Watershed Planning Short Course is hosted and coordinated by the Texas Water Resources Institute, part of Texas A&M AgriLife Research, the Texas A&M AgriLife Extension Service, and the College of Agriculture and Life Sciences at Texas A&M University.

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College of Agriculture and Life Sciences



Delivery of a Watershed Coordinator Development Program Final Report 2020

By

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Table of Contents

Delivery of a Watershed Coordinator Development Program Final Report 2019	2
Project Summary	4
Introduction	5
Project Description	5
Project Administration	6
Quarterly Progress Reports (QPRs)	6
Planning Team Coordination	6
Professional Trainings, Roundtables, and Watershed Planning Short Couse Coordination	7
Watershed Training Webpage	7
Past Courses, Roundtables, and Trainings: Online Schedule New Site	10
Past Courses, Roundtables, and Trainings: Online Schedule Old Site	11
Conduct Watershed Planning Short Course	11
Watershed Planning Short Course Event	11
Administer Questionnaires and Evaluations	12
Provide Professional Development Training	14
Introduction to Watershed Modeling Training	14
Agricultural Best Management Practices (BMPs)	14
Urban Best Management Practices (BMPs)	15
Social Media Training: Content, Conversations, and Discoverability – Quality Outreach and the Internet for Natural Resource Professionals	15
Implementing Watershed Based Plans	16
Fundamentals of Developing a Water Quality Monitoring Plan	16
Applied Environmental Statistics	17
Administer Questionnaires and Evaluations for Professional Trainings	17
Introduction to Watershed Modeling	17
Agricultural Best Management Practices (BMPs)	18
Urban Best Management Practices (BMPs)	19
Social Media Training: Content, Conversations, and Discoverability - Quality Outreach and the Internet for Natural Resource Professionals	20
Implementing Watershed Based Plans	21
Fundamentals of Developing a Water Quality Monitoring Plan	21
Practical Applied Environmental Statistics Course	22
Texas Watershed Coordinator Roundtables	23
Facilitate Texas Watershed Coordinator Roundtables	23
Administer Evaluations	23
July 2017 Roundtable	23
January 2018 Roundtable:	23
July 2018 Roundtable	23
January 2019 Roundtable	24
August 2019 Roundtable:	24
Appendices	25

Project Summary

Watershed planning remains a high priority to address the more than 574 impaired water body segments in Texas. To ensure that watershed protection efforts are adequately planned, coordinated, and implemented, proper training of watershed coordinators and water professionals is necessary. The Delivery of a Watershed Coordinator Development Program or Texas Watershed Planning Short Course (WPSC) project provides this training and is funded by the U.S. Environmental Protection Agency (EPA) through the Texas State Soil and Water Conservation Board (TSSWCB).

Through a coordinated effort led by the Texas Water Resources Institute (TWRI), the WPSC project brought together many partners to develop and conduct the project tasks and deliverables. Project partners included the Texas A&M AgriLife Extension Service, Texas A&M AgriLife Research, TSSWCB, Texas Commission on Environmental Quality (TCEQ), EPA, United States Department of Agriculture Agricultural Research Service (USDA ARS), the Texas Institute for Applied Environmental Research (TIAER), Texas A&M AgriLife Center at Dallas, Texas A&M University Spatial Sciences Lab (SSL), Tarrant Regional Water District, USDA Natural Resources Conservation Service (NRCS), and the Alabama Cooperative Extension

The project supports the Texas Nonpoint Source Management Program's goal of protecting and restoring water quality. It provides training to water professionals and supports the goal of data collection and assessment and implementation by providing these water and natural resource professionals with knowledge and tools to conduct studies to determine sources of pollution and to develop and implement strategies to address pollution in impaired water bodies.

The WPSC, the main course of the project, provides guidance on stakeholder coordination, education, and outreach; meeting EPA's nine key elements of a watershed protection plan; data collection and analysis; and tools available for plan development. Watershed professionals use these tools to work with stakeholders for successful watershed planning efforts. The WPSC was conducted from November 28 to December 1, 2017 in Navasota, Texas for 36 attendees and from February 28 to March 1, 2019 in Bandera, Texas for 21 attendees.

Along with the WPSC, water professionals are invited to attend biannual Texas Watershed Coordinator Roundtables that cover a variety of topics and issues at each one. TWRI also continued its efforts in watershed training programs by developing and conducting six additional courses: Introduction to Modeling; Agricultural Best Management Practices (BMPs); Urban BMPs; Implementation of Watershed Based Plans; Social Marketing for Natural Resources Professionals; and Fundamentals of Developing a Water Quality Monitoring Plan.

Besides the training courses, the project maintains the Texas Watershed Planning website and the Watershed Coordinators Listserv, with 379 subscribers receiving training updates and announcements (as of January 13, 2020). The listserv and the roundtables provide a forum for maintaining dialogue between watershed coordinators, facilitating interactive solutions to common watershed issues, and adding to the fundamental knowledge conveyed at the WPSC. The website had 11,208 visits from 8,212 unique visitors and 19,346-page views to date from October 1, 2017 to January 14, 2020.

The first in the state and only course in the country on the required EPA nine elements, this project has educated many water professionals, ensuring watershed protection efforts are adequately implemented and improving water quality restoration efforts statewide.

Introduction

According to the 2016 Texas Water Quality Inventory and 303(d) List, 574 water bodies in Texas are listed as impaired. To address these impairments and improve water quality across the state, a coordinated watershed planning approach implemented by well-trained water resource professionals is needed to provide the framework for focusing public and private sector efforts.

Watershed coordinators come from many different backgrounds, and in the role of watershed coordinator, they must be able to manage the project at a multi-disciplinary level. Watershed coordinators need to have a basic understanding of all the aspects of the nine elements, including: outreach and education, marketing, stakeholder facilitation, water quality monitoring, modeling and assessment techniques, and grants. The proposed project will seek to ensure the proper training, provide needed tools, and encourage the coordination of watershed coordinators and water resource professionals by continuing the delivery of the WPSC and other relevant trainings and the coordination of the semiannual Texas Watershed Coordinator Roundtables. These activities have led to significant improvements in planning and implementation efforts in Texas and are continually needed to ensure that new watershed planning efforts are adequately planned, coordinated, and implemented and that the results are properly assessed and reported.

Project Description

TWRI has assembled and will continue to coordinate closely with a project team made up of university, TSSWCB, TCEQ, EPA, and TIAER personnel. This project team guided the development of the WPSC under the previous project and continues to guide the delivery of the WPSC to water resource professionals throughout Texas. This project team meets and will continue to meet at least annually to review planned and ongoing project activities and provide recommendations and guidance. This project team has continued to be involved in the delivery of the weeklong WPSC. This course was developed to train watershed planners on how to develop each of the nine key elements of a watershed protection plan (WPP). Two WPSCs were offered during the project. Participation to date in the WPSC has ranged from 18 to 45 people including attendees from out of state. Our goal is to educate additional water resource professionals in Texas and the surrounding region about watershed planning. Experts from around the nation were brought in to discuss such topics as obtaining stakeholder involvement, developing each section of the WPP. Additionally, stakeholder involvement through such state programs as the Texas Watershed Steward Program, Texas Well Owner Network, Texas Riparian and Stream Ecosystem Education, and Texas Stream Team were highlighted.

TWRI and Auburn University worked with TSSWCB, TCEQ, and EPA to continue to facilitate semiannual Texas Watershed Coordinator Roundtables. In order to build upon the fundamental knowledge conveyed through the WPSC, there is an evident need to continue dialogue between watershed coordinators in order to facilitate interactive solutions to common issues faced by watershed coordinators statewide. A total of five roundtables were held throughout the project. In addition to the WPSC and roundtables, TWRI hosted and maintained the Texas Watershed Planning Website. Further, 9–10 additional training opportunities were provided on watershed modeling, social marketing outreach, developing a water quality plan, and other tools for watershed plan development and implementation. Trainings planned include: a workshop titled "Introduction to Modeling", two social marketing trainings, and a training on water quality monitoring. This also included the development of three new courses, Implementation, Urban BMPs, and Agricultural BMPs, to be offered one to two times each depending on the need. Based on guidance provided by TSSWCB and interest in these courses, the trainings offered will be adjusted to best meet the needs of the State and the watershed coordinators. TWRI worked closely with TSSWCB and the project team to ensure that the most appropriate and needed trainings were offered. This collaborative project between TWRI, TSSWCB, EPA, TIAER, USDA ARS, USDA NRCS, Texas A&M AgriLife Center at Dallas, TAMU SSL, and Tarrant Regional Water District will support development of WPPs, TMDLs, and TMDL-implementation plans, and will promote sustainable, proactive approaches to managing water quality at the state level.

Project Administration

TWRI has worked to effectively administer, coordinate, and monitor all work performed under this project including technical and financial supervision and preparation of status reports. TWRI also maintained web-based watershed planning resources for Texas watershed coordinators.

This collaborative effort started when the contract was signed, and the project period went from October 1, 2016 through September 30, 2019. During the project cycle, the project principal investigator was changed from Dr. Kevin Wagner to Dr. Lucas Gregory in August 2017. In January 2018, TWRI started a subcontract with Auburn University and the Alabama Cooperative Extension System to maintain Nikki Dictson, former TWRI employee, on the project. A budget revision was approved to accommodate Nikki's subcontract, and Nathan Glavy, TWRI Extension Program Specialist, became the new project manager as well.

The contract kickoff meeting was held in College Station on November 26, 2016 to discuss roles and responsibilities, major tasks, contract terms and conditions, scope of work, and schedule of deliverables of the project. TWRI provided technical and fiscal oversight of the staff and subcontractors to ensure tasks and deliverables were completed and within the budget.

TWRI will host and maintain a website for information sharing and use by watershed coordinators (<u>http://watershedplanning.tamu.edu/</u>). Information presented through the website includes:

- WPSC, workshop, and roundtable agendas and participant lists
- Roundtable presentations generated and roundtable agendas
- Schedule of upcoming programs
- Resources for watershed planning and implementation
- Links to other training opportunities
- Links to EPA tools for watershed planning

TWRI migrated to a new website during 2019 and ensured the appropriate information is available for use by watershed coordinators (<u>https://twri.tamu.edu/our-work/engaging-educating/texas-watershed-planning/</u>). Training information on the old website is still readily available under the workshop schedule section of the new website.

Quarterly Progress Reports (QPRs)

TWRI prepared electronic quarterly progress reports (QPRs) for submission to the TSSWCB. QPRs documented all activities performed within a quarter and were submitted by the 15th of January, April, July, and October each year.

Planning Team Coordination

TWRI hosted coordination meetings or conference calls, at least quarterly, with the planning team of project partners to discuss project activities, project schedule, communication needs, deliverables, and other requirements. The planning team discussed and assisted in the planning of timing and location as well as agendas for the trainings throughout the project. TWRI developed lists of action items needed following each project coordination meeting and distributed to project personnel.

TSSWCB reviewed and approved all agendas, registration forms, and news releases for the trainings throughout the contract prior to their release and use in advertising.

Professional Trainings, Roundtables, and Watershed Planning Short Couse Coordination

TWRI provided training, coordination, and professional development for watershed planners and coordinators throughout Texas and across the nation to ensure consistent, high quality WPPs are developed and implemented, and water quality improvements are achieved and sustained.

TWRI coordinated with Texas A&M University faculty and others to provide professional development and training for water resource professionals and watershed coordinators in Texas. Over the project duration, TWRI was able to offer 10 professional training programs on watershed modeling, BMPs, watershed outreach, and other tools for watershed plan development and implementation (i.e. three to four trainings per year). It was expected that each course would provide training for at least 15–20 water resource professionals for a total of 150–200 participants. At the end of the project, over 243 water and natural resource professionals had attended the trainings. The roundtable attendance ranged from 53–68 per meeting with a total of 296 altogether. The following professional training programs were delivered:

- Introduction to Modeling 1 event (21 attendees)
- Implementing Watershed Based Plans 1 event (33 attendees)
- Overview of Agricultural BMPs 1 event (21 attendees)
- Overview of Urban BMPs 2 events (57 attendees)
- Training on Green Infrastructure and Low Impact Development (LID) 1 event (34 attendees)
- Fundamentals of Developing a Water Quality Monitoring Plan 1 event (16 attendees)
- Social Marketing Training 2 events (40 attendees)
- Applied Environmental Statistics 1 event (21 attendees)

TWRI worked closely with TSSWCB and the project team to ensure that the most appropriate and needed trainings were offered to best meet the needs of the State and the watershed coordinators. TWRI coordinated with TSSWCB, TCEQ, and EPA to organize and facilitate a total of five semiannual Texas Watershed Coordinator Roundtables. These face-to-face roundtables build upon the fundamental knowledge conveyed through the WPSC and establish a continuing dialogue between watershed coordinators in order to facilitate interactive solutions to common issues faced by watershed coordinators statewide. These were typically held in January and July at various locations around the state.

TWRI coordinated and offered two WPSCs. TWRI, with assistance from the project team, identified key speakers for the course, made arrangements for facilities, advertised the WPSC, conducted registration, and facilitated the delivery of a minimum of one WPSC to water resource professionals in Texas, as well as other states. The WPSC agenda and speakers were modified to better meet the needs of watershed coordinators based on the past course evaluation results.

TWRI has developed and administered training evaluations after each program to gauge the knowledge gained and how effective the program was for each participant and to get input on future programs.

Watershed Training Webpage

TWRI hosts and maintains a website for information sharing and use by watershed coordinators. As mentioned earlier, TWRI migrated to a new website in 2019. TWRI ensured the appropriate information will continue to be presented for use by watershed coordinators (<u>https://twri.tamu.edu/our-work/engaging-educating/texas-watershed-planning/</u>). Information from the old website is still readily available under the workshop schedule section of the new website. Watershed coordinators are supported through the website, listserv, and professional development opportunities to equip them in all aspects of watershed planning.

The website has all of the training materials, videos, presentations, and manuals available for download. TWRI maintains, manages, and sends watershed-related information as well as advertises trainings on the Watershed Coordinators Listserv, which has 379 subscribers.



Comprehensive watershed protection plans that outline ways to preserve or restore watersheds are a voluntary and accepted approach to protecting Texas surface waters. Using a watershed approach to restore impaired water bodies addresses the problems in a holistic manner, and stakeholders in the watershed are actively involved in developing the management strategies and plans.



Upcoming Workshops

There are no upcoming events

Proper training of watershed coordinators and water professionals is needed to ensure that watershed protection efforts are adequately planned, coordinated and implemented and results are properly assessed and reported.

The Texas Watershed Planning project provides the needed training and promotes sustainable proactive approaches to managing water quality throughout the state. This weeklong course provides participants with guidance on stakeholder coordination, education and outreach; meeting the U.S. Environmental Protection Agency's (EPA) nine key elements of a watershed protection plan; data collection and analysis; and the tools available for plan development. This information is presented through lectures and case studies.



The course information and materials from the WPSCs conducted in 2017 and 2019 can be found online on the Texas Watershed Planning Website at:

- a. 2017 WPSC in Navasota: http://watershedplanning.tamu.edu/training/nov-28-2017-short-course/
- b. 2019 WPSC in Bandera: <u>http://watershedplanning.tamu.edu/training/feb-18-2019-texas-watershed-planning-short-course/</u>

TWRI created webpages for each of the following trainings to advertise the trainings, including the agendas and registration forms:

- a. Fundamentals of Developing a Water Quality Monitoring Plan training: http://watereducation.tamu.edu/schedule/2018/june-4-2018-water-quality-monitoring/
- b. Implementing Watershed Plans training: <u>http://watershedplanning.tamu.edu/training/dec-17-2018-implementing-watershed-based-plans-training/</u>
- c. Overview of Agricultural BMPs: <u>http://watershedplanning.tamu.edu/training/oct-10-2018-ag-bmps-for-watershed-planning-training/</u>
- d. Overview of Urban BMPs: <u>http://watershedplanning.tamu.edu/training/july-25-2018-urban-bmps-for-watershed-planning-training/</u> <u>http://watershedplanning.tamu.edu/training/may-30-2019-urban-bmps/</u>
- e. Introduction to Modeling training: <u>http://watershedplanning.tamu.edu/training/oct-5-2017-introduction-to-modeling/</u>

- f. Green Infrastructure and LID Workshop <u>http://nrt.tamu.edu/schedule/2017/feb-2-2017-green-infrastructure/</u>
- g. Finding Success for Science through Social Media Tips, Tools, and Tactics for Natural Resource Professionals Trainings: <u>http://watereducation.tamu.edu/schedule/2017/apr-13-14-2017-science-through-social-media/</u>
 - http://watershedplanning.tamu.edu/training/nov-6-7-2017-science-social-media/
- h. Texas Watershed Coordinator Roundtables: http://watershedplanning.tamu.edu/training/july-26-2017-watershed-roundtable/ http://watershedplanning.tamu.edu/training/july-24-2018-watershed-roundtable/ http://watershedplanning.tamu.edu/training/july-24-2018-watershed-roundtable/ http://watershedplanning.tamu.edu/training/july-24-2018-watershed-coordinator-roundtable/ https://twri.tamu.edu/our-work/engaging-educating/texas-watershed-planning/workshop-schedule/2019/june/implementing-watershed-plans-training/

Past Courses, Roundtables, and Trainings: Online Schedule New Site



ABOUT OUR TEAM OUR WORK

NEWS OUR EVENTS PUBLICATIONS RESOURCES CONTACT Q



⊙ 8:00 AM to 12:00 PM / ♀ College Station, TX

The Applied Environmental Statistics Course is set for Dec. 9-13, 2019 from 8 a.m.-5 p.m. Monday-Thursday and 8 a.m.-noon on Friday. The course will be held at the Thomas G. Hildebrand DVM '56 Equine Complex Andras A Classroom, 3240 F&B Road, College Station, TX, 77843.







Texas Watershed Coordinators Roundtable ⊙ 9:30 AM to 3:30 PM / ♀ Texas A@M AgriLife Center, Dallas, TX

Water and natural resource professionals are invited to the next Texas Watershed Coordinator Roundtable August 6 in Dallas.





Implementing Watershed Plans Training

⊙ 10:00 AM to 4:00 PM / ♀ Austin, Tx / ♀ watershed planning

Water and natural resource professionals are invited to the Implementing Watershed Plans Training set for June 4, 2019 from 10 AM - 4:00 PM at TCEQ Headquarters in Austin.





Ag BMPs for Watershed Planning Training

⊙ 9:00 AM to 4:00 PM / ♀ Riesel, TX

Past Courses, Roundtables, and Trainings: Online Schedule Old Site

Course	Location	Date
Implementing Watershed Plans Training	Austin, TX	Jun 4, 2019
Urban BMPs for Watershed Planning Training	Dallas, TX	May 30, 2019
Agricultural BMPs for Watershed Planning_Training	Riesel, TX	Apr 3, 2019
Texas Watershed Planning Short Course	Bandera, TX	Feb 18-21, 2019
Texas Watershed Coordinator Roundtable	Waco, Texas	Jan 31, 2019
Implementing Watershed Based Plans Training	College Station, TX	Dec 17, 2018
Agricultural BMPs for Watershed Planning_Training	Riesel, TX	Oct 10, 2018
Urban BMPs for Watershed Planning Training	College Station, TX	Jul 25, 2018
Texas Watershed Coordinator Roundtable	College Station, TX	Jul 24, 2018
Fundamentals of Developing a Water Quality Monitoring Plan	Austin, TX	Jun 4-5, 2018
Texas Watershed Coordinator Roundtable	Austin, TX	Jan 23, 2018
Texas Watershed Planning Short Course	Navasota, TX	Nov 28-Dec 1, 2017
Finding Success for Science through Social Media - Tips, Tools, and Tactics for Natural Resource Professionals	Lewisville, TX	Nov 6-7, 2017
Introduction to Watershed Modeling	Austin, TX	Oct 5, 2017
Texas Watershed Coordinator Roundtable	College Station, TX	Jul 26, 2017

Conduct Watershed Planning Short Course

Watershed Planning Short Course Event

TWRI coordinated and offered two WPSC multi-day trainings. To accomplish this, TWRI, with assistance from the project team, identified key speakers for the course, made arrangements for facilities, advertised the WPSC, conducted registration, and facilitated the delivery of the WPSCs. Certificates were provided to participants upon completion of the course. A \$400 registration fee was charged to WPSC participants. A scholarship was offered to assist those who lack funds to attend the WPSC. TWRI worked closely with TSSWCB and the project team to assess the need for and timing of these courses to best meets the needs of the state. As needed, travel for speakers were paid for through project funds and registration fees.

The WPSC is the only watershed planning course of its kind in the nation, and as such there are usually attendees from out of state. The four-day course combines 35 oral presentations by nine state and national experts with discussions, case

studies, and critical networking to provide a unique learning format. The agenda is routinely updated to deliver the latest information on new techniques and based on the evaluation comments from the previous trainings. Watershed coordinators from ongoing Texas projects also provide examples of WPP development. Participants are supported with a website, listserv, and professional development opportunities to equip them in all aspects of watershed planning.

Since initiation of the course, WPPs and the stakeholder-driven watershed planning process instilled through the course have become the foundation for water quality improvement efforts in Texas. Practitioners developing both WPPs and TMDL Implementation Plans have participated in the course and are now using the techniques learned to address water quality issues statewide. Approximately 65 watershed planning efforts including over 20 TMDLs Implementation plans have benefited from the training. Of the more than 300 participants for the 10 WPSCs, a majority are currently involved in watershed planning efforts statewide and elsewhere across the U.S.

Ultimately, the program's success was measured by the improvement of water quality in the state. Such improvements have been or are already being observed in watersheds across Texas by those participating in the course (i.e. Buck Creek, Attoyac Bayou, Leon and South Leon Rivers, Lower San Antonio River, Upper San Antonio River), and many more are expected. However, success was also measured in the knowledge gained by participants. Pre- and post-examinations given to WPSC participants have shown increases in knowledge ranging from -2%–196% and averaging 95% in knowledge increase, demonstrating the course's success. Participants leave the course very satisfied with their experience (95% mostly or completely satisfaction rating) and ready to implement what they have learned.

Besides the multi-day WPSC, water professionals are provided professional development opportunities through other educational courses including: Social Marketing for Natural Resources Professionals, Applied Environmental Statistics, Introduction to Modeling, and Fundamentals of Developing a Water Quality Monitoring Plan. Further, participants are provided a forum to discuss common watershed issues and solutions through Texas Watershed Coordinator Roundtables. Presentations and resources from all events are posted online and have been accessed by over 15,000 users and have had 36,063 unique page views since June 2011. Further exchange of information is facilitated through the Watershed Coordinators Listserv, which has 379 subscribers, and the Natural Resource Training Newsletter, which has 2,076 subscribers.

The training program coordinator contacted speakers regarding travel information, speaker biographies, and presentations and materials. Each participant was provided course binders with presentations, EPA Handbooks, and a USB thumb drive of course materials and additional resources. The 2017 WPSC was conducted on November 28–December 1, 2017 and had 31 attendees, and the 2019 WPSC was conducted on February 18–21, 2019 and had 14 attendees. A WPSC Scholarship was provided to Camille Wiseman for her daily attendance costs at the 2019 WPSC.

Administer Questionnaires and Evaluations

TWRI has administered questionnaires and evaluations to gauge the knowledge gained and how effective the course was for course participants. Results and comments are used to improve the next training.

During the current grant period from 2017 through 2020, two WPSC, 10 workshops and five roundtables have been delivered. Over the years, the planning team has continually improved each course and the website, added new trainings and tailored roundtables based on emerging issues and participant feedback. Questionnaires and evaluations were administered and collected for the all of these courses. The results of each of these were submitted to TSSWCB with the course deliverables.

Success of these trainings is also measured in the knowledge gained by participants. Pre- and post-examinations were given to WPSC participants. The average pre-test score from the 2017 WPSC was 37/100 points, while average post-test

score from the 2017 WPSC was 78/100 points. These test scores indicated an average increase in knowledge of 110%. The average pre-test score from the 2019 WPSC was 44/100 points, while average post-test score from the 2017 WPSC was 79/100 points. These test scores indicated an average increase in knowledge of 79%. This high increase in knowledge demonstrates the course's success.



Participants leave the course extremely satisfied with their experience (95% mostly or completely satisfied from the two WPSCs), ready to implement what they have learned. Feedback from these evaluations are reviewed by the planning team and instructors and taken into consideration for improvements or adjustments for the next training.

We asked many qualitative open-ended questions to get additional information about the course, topics, and needs. The most significant or valuable things they learned included: how to calculate LDCs, finding funding sources, comparing strengths of different plans, learning the expectations for each off the elements of the WPP and Outreach methods, and how to develop interim milestones and criteria to measure progress. In general, most respondents did not feel like there were any sections that were "least valuable" to the course. However, they did suggest providing more details with TMDL and LDCs and having presentation(s) detailing educational programs, watershed resources, and tools role in the WPP process.

Participants were overall very satisfied with the course, course materials, sequencing, and resources. Overall satisfaction with the location and facility was very high. Only a few responses were received on what could have been done better including: reducing the redundancy between the course presentations and providing more breaks (switch to more, shorter 10-minute breaks instead of few, longer 30-minute breaks).

We also had a question about what other tools, training, and capacity building they felt was needed in greater detail. The majority of the responses included: presenting more real world case studies, dealing and diversifying your stakeholders group, finding funding, and WPP milestones and criteria. Attendees were also asked about topics of interest that were not covered by the course; these included: more interactive presentations and group activities (ex: mock stakeholder meeting) and presentation(s) on "lessons learned" from WPP/BMP implementation.

Questionnaires and evaluations were administered and collected at the WPSC. A pre- and post-course exam was developed to gauge knowledge gained by participants. For the November 2017 course, 30 evaluations were submitted by participants providing input on the course that showed that they were very satisfied with the course. On a scale of 1–5 with 5 being the most satisfied, the overall course was rated a 4.8, and the ratings for individual presentations ranged from 4.40–4.90. Overall, the presentations averaged a 4.7 rating. For the February 2019 course, 14 evaluations were submitted by participants providing input on the course that showed that they were very satisfied with the course as well. On a scale

of 1–5, the overall course rated a 4.7, and the ratings for individual presentations ranged from 4.60–5.00. Overall, the presentations averaged a 4.90 rating.

Since the program's inception in 2007, 10 WPSCs, 35 workshops, and 21 roundtables have been delivered. Over the years, the planning team has continually improved each course and the website, added new trainings, and tailored roundtables based on emerging issues and participant feedback from questionnaires and evaluations.

Provide Professional Development Training

Introduction to Watershed Modeling Training

A one-day course developed by TWRI and Texas A&M University System personnel was delivered to provide watershed coordinators with an introduction to watershed modeling. Development occurred in year 1 and 2 and trainings were delivered in year 2 and 3. Topics of the course included (1) purposes and limitations of different models, (2) timelines, (3) data needs (watershed characterization, water quality information), (4) cost estimates, (5) literature values vs. monitoring, (6) Quality Assurance Project Plans (QAPPs), (7) request for bids, (8) presenting models to stakeholders, and (9) contractor interaction with stakeholder groups.

The TWRI Program Coordinator met with Dr. R. Srinivasan regarding setting up a planning meeting for the introduction to watershed modeling training. TWRI also coordinated with TCEQ to reserve a room for the training. Advertising materials were placed on the website about the training, and the registration was opened for the training on October 5, 2017. The registration form was updated, and the registration fee was determined to be \$100 for the one-day training. The training was conducted with 21 participants at the TCEQ in Austin, Texas for 147 contact hours.

A news release was developed titled "<u>Texas Water Resources Institute to host water modeling workshop Oct. 5 in Austin</u>" to help advertise the training. It was sent out on both the Natural Resource Training and the Watershed Planning Trainings Listservs. It was also included in TWRI's other online communications and calendars.

Agricultural Best Management Practices (BMPs)

Watershed coordinators identified agricultural BMPs as a training needed in Texas. This new course covered establishing and working with agricultural work groups and producers in developing and implementing WPPs, typical management measures included in WPPs to address agricultural non-point source pollution, top BMPs for addressing typical water quality issues, cost share programs for assisting implementation, educational programs available, and other topics.

TWRI coordinated with Kyle Wright and Cresencio Perez, USDA NRCS, and Todd Oneth, TSSWCB, for the development of course presentations and location selection. The team selected Riesel, Texas as the location of the workshop because TWRI was able to collaborate with Douglas Smith, director of USDA ARS Grassland Research Center in Reisel, to see and learn about on-the-ground agricultural BMPs for the afternoon portion of the training. TWRI secured the Riesel Lion's Club to host the morning portion of the training.

Advertising materials were placed on the website about the training, and registration was opened for the training on April 3, 2019. The registration form was updated, and the registration fee was determined to be \$50 for the one-day training. A news release was developed titled "<u>Watershed plan training April 3 in Riesel</u>" to help advertise the training, and it was sent out on both the Natural Resource Training and the Watershed Planning Trainings Listservs. The training was conducted with 21 participants for 147 contact hours.

An Agricultural BMP training was scheduled for October 10, 2018, but was postponed due to timing conflicts and low registration. After the successful completion of the April 2019 workshop, it was decided by TWRI and the Texas Watershed Planning Grant Coordination team to conduct only one Ag BMP workshop for this grant cycle.

Urban Best Management Practices (BMPs)

Watershed coordinators identified urban BMPs as another training needed in Texas. This new course covered establishing and working with urban NPS work groups, developers, and cities in developing and implementing WPPs; typical management measures included in WPPs to address urban NPS; top BMPs for addressing typical water quality issues; funding programs and codes for encouraging implementation; educational programs available; and other topics. This course also covered typical urban management measures used in watershed planning, such as green infrastructure for stormwater and LID. LID refers to practices that manage stormwater in an urbanized setting in a way that minimizes impact to the environment while increasing cost effectiveness and sustainability. LID practices include bioretention, green roofs, rainwater harvesting, and permeable pavement. Instructors included city officials, AgriLife Extension, TWRI, and Construction EcoServices.

Two Urban BMP trainings occurred during this grant cycle. The first training occurred on July 25, 2018 at the Hildebrand Equine Center in College Station, Texas with 20 participants for 140 contact hours. This training included a tour of the LID and green infrastructure practices at the Texas A&M University campus. The second training occurred on May 30, 2019 at the Texas A&M AgriLife Center in Dallas, Texas with 37 participants for 252 contact hours. This training included a tour of the LID and green infrastructure at the Texas A&M AgriLife Center at Dallas . Advertising materials were placed on the website, the registration form was updated, and the registration fee was determined to be \$50 for both one-day trainings.

News releases were developed for each training:

- Institute to host urban best management training July 25
- Water resources institute to host urban best management training May 30

TWRI was also able to offer a half-day LID and Green Infrastructure training in addition to the two-day long Urban BMP trainings. TWRI coordinated with Dr. Fouad Jaber, Texas A&M AgriLife Extension, to deliver this training at the Texas A&M AgriLife Center in Dallas, Texas on February 2, 2017 with 34 participants. This half-day training addressed the design, installation, and benefits of LID in urban areas. The training also included a tour of LID structures at the Texas A&M AgriLife Center at Dallas, including bioretention/rain gardens, green roofs, rainwater harvesting, and permeable pavement. Advertising materials were placed on the website, the registration form was updated, and the registration fee was determined to be \$50 for the half-day training. A news release was developed for this training as well:

• Green infrastructure, low-impact development focus of Feb. 2 workshop in Dallas

Social Media Training: Content, Conversations, and Discoverability – Quality Outreach and the Internet for Natural Resource Professionals

TWRI coordinated with instructor Amy Hays, Noble Research Institute course instructor, to conduct two trainings titled: Content, Conversations, and Discoverability – Quality Outreach and the Internet for Natural Resource Professionals, targeted to natural resource and watershed professionals. The web is over 28 years old from the first design by Tim Berners-Lee to what we know today. Things have changed dramatically in design, writing standards, and search ability. In addition, smart devices have outsold desktops significantly in recent years. This means that outreach and education strategies have to continue to grow our expertise in learning how to connect the consumer to the important information we provide. We need to understand how content is found, how conversations and learning networks start, how to be discovered, and what constitutes quality outreach. We have to know where to post, when to post, and what to build on our websites. We have to learn how to reach our traditional clients as well as new clients. This course covered many successful models that can be used and applied in natural resource outreach and education that can help us down the road of discoverability, whether via websites, Facebook, blogs, Twitter, and Instagram. TWRI worked with Amy Hays to develop fliers, advertise, and conduct the two social media trainings. The first training was held in Austin at TCEQ on April 13–14, 2017 with 11 attendees. The second training was held in Lewisville at Upper Trinity Regional Water District on November 6–7, 2017 with 29 attendees. Participants were provided an evaluation at the end of both trainings, and 400 contact hours were conducted from the two trainings.

Implementing Watershed Based Plans

Implementation strategies and moving from planning to implementation have been identified by watershed coordinators as a training need in Texas. TWRI, with assistance from Texas A&M AgriLife Extension, Auburn University, and Tarrant Regional Water District, refined and delivered this new course covering topics such as implementing WPPs, maintaining watershed groups, tracking implementation, developing updates, roles of the watershed coordinator, and other topics. A \$50 registration was charged for the WPP Implementation training.

TWRI conducted the one-day Implementing Watershed Based Plans training in College Station at Texas A&M Forest Service on December 17, 2018 with 33 attendees. Participants were provided an evaluation at the end of this training, and 198 contact hours were conducted at this training. A news releases was developed for this training as well:

• Texas Water Resources Institute to host watershed plan training

Fundamentals of Developing a Water Quality Monitoring Plan

TWRI and the project coordination team developed a training to cover monitoring for watershed characterization and evaluation of water quality improvements and BMP effectiveness from implementation activities. The workshop provided water professionals with tools to develop and implement a surface water quality monitoring program and covered surface water quality monitoring for watershed characterization and evaluation of water quality improvements as well as BMP effectiveness from implementation activities. Through presentations and case studies, this training provided participants with an understanding of what monitoring is needed for watershed protection planning. Participants learned about inventorying existing resources, selecting monitoring design, stormwater sampling, and considerations to build a successful monitoring plan. This course also included hands-on experience with creating a monitoring plan and equipment demonstrations.

Training topics included:

- Data quality objectives
- Identifying available data
- Determining data gaps and needs
- Monitoring plan development to meet data quality objectives and support modeling
- Selecting monitoring types, locations, equipment, and laboratory analysis
- Obtaining stakeholder input
- Developing QAPPs for monitoring and acquiring data
- Workshop for collaboratively creating monitoring plans

The course registration fee was \$150, which included course materials and a certificate of completion. The TWRI project manager and program coordinator met (via conference call and emails) with Dr. Larry Hauck and Anne McFarland, both of TIAER, to discuss date and participants. All of the instructors were contacted to determine the best date and their availability. TWRI worked with TSSWCB, EPA, TCEQ, TIAER, Oklahoma Water Resources Center, and Texas Stream Team to finalize the agenda and topics for this training. The date was set and advertised for the training June 4–5, 2018 in Austin at TCEQ. Once the agenda was finalized, the materials were placed on the website. Registration was opened and it was advertised on the Watershed Coordinators Listserv, on the website, and through a news release:

Fundamentals of developing water quality monitoring plan focus of Austin workshop

Training materials were compiled, and the workshop manual was updated and printed for the course. This event had 16 participants and 240 contact hours during this two-day workshop.

Applied Environmental Statistics

TWRI coordinated with Practical Environmental Statistics instructor, Dr. Dennis Helcel, to bring their course to College Station, Texas for watershed coordinators and natural resource professionals on December 9–13, 2019. This training was held at the Hildebrand Equine Complex with 28 participants for 1,008 contact hours. This 4.5-day event covered applied statistical methods tailored to the environmental sciences. Exercises using R statistical software at the end of each lesson ensured that students can confidently perform each procedure when they return to their offices. The course doubles as an introduction to using the free R software. The full course outline can be found at http://practicalstats.com. Topics included:

- Trend analysis is it getting better or worse?
- Confidence, prediction, and tolerance intervals
- How hypothesis tests work
- Parametric, nonparametric, and permutation tests when to use which
- How to build a good regression equation
- Dealing with outliers
- Introduction to handling nondetect data
- How many samples do I need?

Promotion occurred for this workshop though the Watershed Coordinators Listserv and TWRI's Water Training Newsletter. Training materials were compiled and provided to attendees by email link prior to the course. Attendees brought their own devices with the free R software to work on through the training. Registration cost for the event was \$400.

Administer Questionnaires and Evaluations for Professional Trainings

TWRI oversaw the administration of questionnaires and evaluations to gauge the knowledge gained and the effectiveness of the course for each participant. Questionnaires and evaluations were used at each course to demonstrate the course's effectiveness and to identify areas needing adjustment.

Introduction to Watershed Modeling

Training evaluations were developed and conducted for the Introduction to Modeling workshop held on October 5, 2017. Evaluation results were submitted to TSSWCB with training deliverables. The summary of the evaluations included: the overall course rating, rating for the how helpful the course information was, and the percent of participants that rated the course and information as Good and Excellent. The evaluations also asked what the most valuable aspects and least valuable aspects of the training were. The most valuable aspects included how to communicate models effectively to your stakeholders, learning the pros/cons of each model, the comprehensive overview of different watershed models, how they can be utilized, and case studies. The overall course had an 81% Good to Excellent rating. The least valuable was the QAPP information and reducing the redundancy of information in the stakeholder communication presentation. Each presentation at the training was evaluated on a 1–4 scale of Poor, Average, Good, or Excellent. The results are included on the table below.

The questionnaires were also used to gather information on the participants including: affiliation, why the training was important and what they hoped to gain, what their greatest challenges were, what tools or methods they were currently using, and what their greatest needs were in that area for feedback on future trainings.

This training was important to participants because they were hoping to bring new skills and understanding to a variety of different watershed projects, understand the role modeling plays in general, help secure funding, and use models to generate better projects and studies. The greatest challenges program participants were facing were determining what model would be appropriate for their projects and stakeholder input. Further, many participants did not have any prior monitoring experience, so they were hoping to be able to learn what models to use and when. The greatest needs were modeling in terms of watershed planning, estimating needed pollutant load reductions, and analyzing effectiveness of model applied. The tools that are currently being used to estimate loads and load reductions include LDCs and SELECT, STEPL, SWAT, HECRAQ, QUALZK, APEX, and SWMM.

Introduction to Watershed Modeling	Octo	ber 2017
Presentations	Rating (1- 4)	% Good Excellent
Overall Course (Scale of 1-5)	4.1	81
Introductions & Workshop Overview [L. Gregory, TWRI]	3.4	94
Models Overview [S. Srinivasan, SSL]	3.6	100
Modeling Factors [S. Srinivasan, SSL]	3.4	100
Using Simple Tools [L. Hauck, TIAER]	3.6	100
QA Project Plans [Sandra Arismendez, TCEQ]	2.8	69
Stakeholder Communications [L. Gregory, TWRI]	3.6	88

Agricultural Best Management Practices (BMPs)

Training evaluations were developed and conducted for the Agricultural BMPs training held on April 3, 2019. Evaluation results were submitted to TSSWCB with training deliverables. The summary of the evaluations included: the overall course rating, rating for the how helpful the course information was, and the percent that rated the course and information as Good and Excellent. The evaluations also asked what the most valuable aspects and least valuable aspects of the training were. The most valuable aspects included viewing the on-the-ground practices at the USDA research center during the afternoon portion of the class, learning both the USDA NRCS and SWCD roles in agriculture conservation practices, and the knowledge the course speakers had. The overall course had a 100% Good to Excellent rating. Program attendees stated that no particular portion of the course was least valuable; however, they did mention the need for this training to be delivered to a target audience (ex: SWCD technicians and agricultural producers). Each presentation at the training was evaluated on a 1–4 scale of Poor, Average, Good, or Excellent, and the results are included on the table below.

In the future, participants stated that this training should include presentations from the point of view of a producer/landowner who has participated in the types of BMPs and programs that were discussed during the training, examine the topic of rotational grazing further, and examine how to market to producers to try new, progressive farming techniques.

Agricultural BMPs Apr		2019
Presentations	Rating (1- 4)	% Good Excellent
Overall Course (Scale of 1-5)	4.6	100
Introductions & Workshop Overview [L. Gregory, TWRI]	3.9	100
Agricultural NPS Program [T. Oneth, TSSWCB]	3.6	94
Implementing BMPS for Water Quality [K. Wright, USDA NRCS]	3.9	100
Implementing Conservation Plans [C. Perez, USDA NRCS]	3.9	100
Tour of USDA ARS Grassland Center [D. Smith, USDA ARS]	4.0	100

Urban Best Management Practices (BMPs)

Training evaluations were developed and conducted for the Urban BMPs training held on July 25, 2018 in College Station and May 30, 2019 in Dallas. Evaluation results were submitted to TSSWCB with training deliverables. The summary of the evaluations included: the overall course satisfaction, overall satisfaction of material presented and instructors, participant understanding of several urban BMPs (ex: rain garden, green roofs, etc.) before and after the training, and the likeliness of participant adopting a BMP discussed during the training. The overall course satisfaction rating for the July 2018 training was 93%, while the May 2019 training had an overall course satisfaction rating of 98%.

When examining participants' understanding of a particular urban BMP before and after the training, participants rated their understanding on a scale of 1–4. A score of 1 indicated little to no knowledge of the topic while a score of 4 indicated a sound understanding of and familiarity with the topic. See tables below for results from knowledge gained at the two trainings. Average overall knowledge gained about urban BMP topics from the July 2018 training showed an increase of 24%, while the May 2019 training showed an average knowledge gained increase of 34%.

Your Understanding of Topic:	Average Before Program (Scale 1-4)	Average After Program (Scale 1-4)	Knowledge Gained
Why is stormwater a concern	3.5	3.9	9%
What is a rain garden	3.1	3.9	23%
How does a rain garden work	2.8	3.7	33%
How to design a residential rain garden	2.1	3.1	47%
How to design a commercial rain garden	2.1	2.9	38%
Performance of rain gardens with regards to water volume and quality	2.4	3.5	44%
Maintenance of rain gardens	2.1	3.1	48%
What are green roofs	3.3	3.7	14%
Green roof performance	2.5	3.3	35%
What is permeable pavement	2.9	3.7	30%
Performance of permeable pavements	2.5	3.6	42%

Urban BMPs- July 2018 Training

Urban BMPs-May 2019 Training

Your Understanding of Topic:	Average Before Program (Scale 1-4)	Average After Program (Scale 1-4)	Knowledge Gained
Why is stormwater a concern	3.5	3.9	9%
What is a rain garden	2.6	3.8	43%
How does a rain garden work	2.4	3.8	59%
How to design a residential rain garden	1.8	3.3	81%
How to design a commercial rain garden	1.7	3.2	88%
Performance of rain gardens with regards to water volume and quality	1.8	3.5	93%
Maintenance of rain gardens	1.8	3.4	86%
What are green roofs	2.7	3.5	31%
Green roof performance	2.0	3.4	65%
What is permeable pavement	2.8	3.7	31%
Performance of permeable pavements	2.3	3.5	55%

The training evaluations also asked attendees about the likeliness of adopting a BMP for projects of their own. BMP choices included: residential rain garden, commercial rain garden, green roof, permeable pavement, bioswales, pet waste management, promoting LID, and other stormwater practices. BMP adoption likeliness choices included: definitely will not, probably will not, undecided, probably will, definitely will, already adopted, and not applicable. With this information, TWRI examined the number of attendees who selected "probably will" and "definitely will" from both trainings. It was discovered that an average of 40% of July 2018 training attendees and an average of 45% of May 2019 training attendees would "probably will" or definitely will" adopt a BMP that was discussed at the training.

The evaluations also asked what the most valuable aspects and least valuable aspects of the trainings were. The most valuable aspects of both trainings included the examples and pictures of urban BMPs provided during the presentations, the knowledge and presentation skills of the instructors, and the afternoon outdoor tours of urban BMPs that occurred at both workshops. Program attendees stated that no particular portion of the course was least valuable; however, they did mention offering time for discussion and providing more information regarding the regulatory framework, if any, of urban BMPs.

Social Media Training: Content, Conversations, and Discoverability - Quality Outreach and the Internet for Natural Resource Professionals

Training evaluations were developed and conducted for the Social Media training held on April 13–14, 2017 in Austin and November 3–7, 2017 in Lewisville. Evaluation results were submitted to TSSWCB with training deliverables. The summary of the evaluations included: the overall training expectation rating (scale 1–5), the most and least valuable aspects of the trainings, and an open-ended question to provide any additional comments.

The evaluations also asked what the most valuable aspects and least valuable aspects of the training were. The most valuable aspects included the generational messaging information, the ins and outs of different social media platforms, and the group discussions that occurred during the trainings. Program attendees felt no particular part of both trainings was least valuable. Attendees did suggest eliminating the repetitiveness found in presentations and updating outdated

statistical figures in presentations. The overall course satisfaction rating for the April 2017 training was a 4.4 (89%), and the overall course satisfaction rating for the November 2017 training was 4.8 (97%).

Implementing Watershed Based Plans

Training evaluations were developed and conducted for the Implementing Watershed Based Plans training held on December 17, 2018 in College Station. Evaluation results were submitted to TSSWCB with training deliverables. The summary of the evaluations included: the overall course rating for meeting attendees' expectations (scale 1-5), the most and least valuable aspects of the training, and an overall satisfaction rating of each presentation. Each presentation at the training was evaluated on a 1–4 scale of Poor, Average, Good, or Excellent, and the results are included on the table below.

The overall training received a rating of 4.7/5 when participants were asked their overall satisfaction rating for meeting their expectations; 96% of participants gave a rating of 4 or 5 rating when describing if the training met their expectations. The most valuable aspects included the examples given with engaging stakeholders, the implementation case studies and examples, and the input/advice given with writing a successful grant. Program attendees stated that no particular portion of the course was least valuable; however, they suggested eliminating redundancy in WPP steps that were described in the first two presentations.

Implementation Training	December 20	18
Presentations	Rating (1-4)	% Good Excellent
Overall Satisfaction (Scale of 1-5)	4.7	96
Introductions & Workshop Overview [L. Gregory, TWRI]	3.9	100
Completed Plan Now What? [N. Dictson, Auburn]	3.7	96
Implementing WPP: Alligator & Geronimo Creek [W. Ling, TAMU Soil & Crop Sciences]	3.8	100
Implementing Watershed Plans: North TX [T. Hendon, Tarran Regional Water District]	t 3.8	96
Tracking WPP Implementation [N. Dictson, Auburn]	3.8	96
Implementing Costs & Funding Sources [L. Gregory, TWRI]	3.8	100

Program attendees were also asked an open-ended question about other topics they would like more information on from this training. The majority of participants stated the program was well balanced; however, participants stated that this training should include presentations on more specific BMPs and adoption (why people adopted particular BMP) and information on how to continue project activities after life of project ends.

Fundamentals of Developing a Water Quality Monitoring Plan

A questionnaire was used at the beginning of this training to gather information on the participants including: affiliation, why the training was important and what they hoped to gain, what their greatest challenges were, what tools or methods they were currently using, and what their greatest needs were in that area for feedback on future trainings. Training evaluations and questionnaires were administered and compiled for the Fundamentals of Water Quality Monitoring Training on June 4–5, 2018.

When looking at the pre-workshop questionnaire, the training was important for participants because they were already or were about to work on water quality monitoring plans/projects and hoped to learn more about the tools, best practices, methods, timing, and techniques to be able to either conduct the work or evaluate a contractor conducting the monitoring.

Many were interested in how monitoring worked into watershed-based plans. Challenges participants were facing before the workshop were little or no experience, little availability of good examples, expense of monitoring equipment and samples, needing training, gathering resources and available data, matching funds for monitoring grants, and properly planning where and how much to monitor. Prior to the workshop many responded that they were not developing plans or monitoring, while the others were using TCEQ SWQM methods and guidance documents, public outreach, contract out monitoring plan, and reviewing other existing plans. The greatest needs regarding design and statistical analysis were how to effectively communicate scientific principles to a non-scientific audience, how to manage collected data on a regular basis, and how to effectively mitigate risk and uncertainty.

Evaluation results were submitted to TSSWCB with training deliverables. The summary of the evaluations includes the overall course rating, rating for the how helpful the course information was, and the percentage that rated the course and information as Good and Excellent. The evaluations also asked what the most valuable aspects and least valuable aspects of the training were. Each presentation at the training was evaluated on a 1-4 scale of Poor, Average, Good, or Excellent. The most valuable aspects were the presentations on uncertainty and stressing stakeholder communication, statistical analysis techniques used for water quality monitoring, and the information provided to create an effective water quality monitoring plan. The least valuable aspects included the repetitiveness of information provided throughout the trainings and the need for better distinction of water quality plans and other options.

Water Quality Monitoring Training June 2018		e 2018
Presentations	Rating (1-4)	% Good Excellent
Overall Course (Scale of 1-5)	4.5	92
Data Quality Objectives and Project Planning (J. Uramkin, TCEQ)	3.9	100
Inventorying and Acquiring Existing Resources (Eagle & Cawthon, TCEQ)	3.6	100
Watershed Characterization and Sufficient Data (McFarland, TIAER)	3.6	100
Quality Assurance Project Plans (Rodibaugh, TCEQ)	3.8	100
Selecting Monitoring Design (Hauck, TIAER)	3.8	100
Other Considerations & Review Building a Successful Monitoring Plan (Hauck, TIAER)	3.8	100
Case Study: Selecting Monitoring Design (Wagner, Oklahoma Water Resources)	3.5	92
Introduction to Stormwater Sampling (Gregory, TWRI)	3.8	100
Monitoring Demonstration (Group)	3.8	100
Statistical Tools for Analysis (McFarland, TIAER)	3.8	100
Uncertainty in Monitoring (Gregory, TWRI)	3.6	100
Stakeholder Communication & Wrap Up (Hauck, TIAER)	3.6	100

Practical Applied Environmental Statistics Course

Training evaluations were developed and conducted for the training held on December 9–13, 2019 in College Station. The summary of the evaluations included: the overall course rating for meeting attendees' expectations (scale 1–5), the most and least valuable aspects of the training, and an overall satisfaction rating of each presentation. Each presentation at the training was evaluated on a 1–4 scale of Poor, Average, Good, or Excellent.

The overall course satisfaction was 90%, with 92% of participants giving the course a Good to Excellent rating (4 or 5). The most valuable aspects of the training were repeated by many attendees including: multiple regression and trend analysis, learning R statistical software, access to books/scripts/tutorials, the relevant examples, the applied nature of the class overall, and the professionalism and knowledge the course instructor had. The least valuable aspects of the course

were very few, but some wanted more time to practice in class and limit the emphasis on PowerPoint presentations. Further, some attendees mentioned the large amount of information provided was too much for a 4.5-day course, suggesting making the class longer.

Regarding the presentations presented throughout the course, the average satisfaction rating received was 91%. The comments were all great except for a few sections where participants thought the instructor went a little fast. Participants were also asked an open-ended question to provide any additional comments on the course. Several mentioned the course was very applicable to their jobs. Some attendees urged the need to find another teacher to continue this course for natural resource professionals; Dr. Helsel will no longer be conducting the in-person course as he is retiring.

Texas Watershed Coordinator Roundtables

Facilitate Texas Watershed Coordinator Roundtables

TWRI coordinated with the TSSWCB, TCEQ, and EPA to organize and facilitate a total of five semiannual Texas Watershed Coordinator Roundtables. These face-to-face roundtables build upon the fundamental knowledge conveyed through the WPSC and establish a continuing dialogue between watershed coordinators in order to facilitate interactive solutions to common issues faced by watershed coordinators statewide. Periodically, TWRI, in conjunction with the project team, reviewed the continued need for semiannual roundtables as well as their specific timing. As such, these roundtables were held around January and July at various locations around the state. Overall, there was a positive reaction to the roundtable meetings, and many of those surveyed did not find anything in need of changing.

Administer Evaluations

TWRI administered evaluations to gauge the knowledge gained and the effectiveness of the roundtable for each participant. Evaluations were administered at the end of each roundtable to determine future topics of discussion. Training evaluations were developed and conducted for the Texas Watershed Coordinator Roundtables conducted on July 26, 2017, January 23, 2018, July 24, 2018, January 31, 2019, and August 6, 2019.

July 2017 Roundtable

We received 30 evaluations from the 65 participants, for a 46% response rate. The most valuable topics included learning more about funding opportunities, social science/outreach in watershed planning, lawn/turf resources, and stakeholder engagement/communication. Topics participants wanted addressed or more information about included TCEQ/TSWCB grant updates, how to attract people to become more involved in watershed, and how to partner with the private sector. Suggestions for topics of future roundtables included innovative funding alternative session/talk, WPP success stories, and having a panel discussion with TCEQ/EPA/TSSWCB.

January 2018 Roundtable:

We received 32 evaluations from the 55 participants, for a 58% response rate. The most valuable topics discussed were the breakout session, ESA & CHARM information, WPP design and implementation process, and the Texas Communities Watershed Partners presentation. Topics that should have been addressed more thoroughly were keeping stakeholders involvement, guidelines for WPP update, how to document effectiveness, and public education as a management tool. Suggestions for topics of future roundtables included continuing breakout sessions to increase attendees' interaction/networking, WPP success stories, and presentation on nontraditional funding resources.

July 2018 Roundtable

We received 34 evaluations from the 55 participants, for a 62% response rate. The most valuable topics included WPP updates, funding and partnership opportunities, urban BMPs, panel discussions, and ideas to keep stakeholders interested and motivated to stay involved. Respondents stated that they would like the following topics to be addressed more in depth: updates on current WPP success stories, partnership and funding developments, and climate and weather's impact

on water quality. Suggestions for future roundtables included difficulties for water resources protection in Texas, lessons learned from watershed coordinators from implementing WPPs, and continuing to highlight particular watershed efforts.

January 2019 Roundtable

We received 32 evaluations from the 68 participants, for a response rate of 47%. The most valuable topics discussed at the roundtable were agency updates from TSSWCB, EPA, and TCEQ and the Geronimo Creek WPP update on implementation. The topics that should have been addressed more in depth included engaging with elected officials and decision makers to secure support, bacteria source tracking, and water quality data needed for WPP development. Suggestions for the next roundtable included including a site visit option to examine BMPs at the next roundtable location, continue specific watershed example presentations, and stormwater management.

August 2019 Roundtable:

We received 33 evaluations from the 53 participants, for a response rate of 62%. The topics that attendees found most valuable were engaging and keeping urban stakeholders involved, watershed planning stories and development, and the tour of LID and WaterSense projects. Respondents thought the following topics should have been addressed more thoroughly at the roundtable: more time allocated with panel discussions, stakeholder development and involvement (e.g. Texas Stream Team), and potential more technical topics such as flooding. Suggestions for topics at future meetings included: presentation on diversifying funding sources, watershed characterization, and information on state flood plan.

	Roundtable	Feedback: Jul. 20	017–Aug. 201	9
Roundtables	Course Rating (Scale 1-4)	Course Good/Excellent	Info Help (Scale 1-4)	Information that will Help Good/Excellent
Jul 2017	3.7	100%	3.7	100%
Jan 2018	3.7	100%	3.6	97%
Jul 2018	3.8	100%	3.7	100%
Jan 2019	3.7	100%	3.6	100%
Aug 2019	3.7	100%	3.6	94%
Avg	3.7	100%	3.6	98.2%

Appendices

Appendix A: Watershed Training Schedule	. 26
Appendix B: Short Course Instructor Biographies	27
Appendix C: Watershed Planning Short Course Agenda	34
Appendix D: Watershed Planning Short Course Evaluation	42
Appendix E: Agendas for Roundtables and Trainings	46

Appendix A: Watershed Training Schedule

Workshop	Instructor	Workshop Date	Location	Course Attendees
		Nov. 28–Dec. 1,	College	
Short Course	multiple	2017	Station	36
Short Course	multiple	Feb. 18-21, 2019	Bandera	19
Texas Watershed			College	
Coordinator Roundtable	multiple	Jul. 26, 2017	Station	65
Texas Watershed				
Coordinator Roundtable	multiple	Jan. 23 <i>,</i> 2018	Austin	55
Texas Watershed			College	
Coordinator Roundtable	multiple	Jul. 24, 2018	Station	55
Texas Watershed				
Coordinator Roundtable	multiple	Jan. 31, 2019	Waco	68
Texas Watershed				
Coordinator Roundtable	multiple	Aug. 6, 2019	Dallas	53
Intro Modeling Training	Srinivasan	Oct. 5, 2017	Austin	21
			College	
Implementation	multiple	Dec. 17, 2018	Station	33
Ag BMPs	multiple	Apr. 3, 2019	Reisel	21
Green Infrastructure and				
LID	multiple	Feb. 2, 2017	Dallas	34
			College	
Urban BMPs	multiple	Jul. 25, 2018	Station	20
Urban BMPs	multiple	May 30, 2019	Dallas	37
Social Marketing Training	Hays	Apr. 13–14, 2017	Austin	11
Social Marketing Training	Hays	Nov. 6–7, 2017	Dallas	29
Fundamentals of WQ				
Monitoring	Hauck	June 4–5, 2018	Austin	16
Applied Environmental			College	
Statistics	Helsel	Dec 9–13, 2019	Station	21

Texas Watershed Planning Short Course

Instructor Biographies: November 2017

Michael R. Bira is with the U.S. Environmental Protection Agency Region 6 Water Quality Protection Division, in the Watershed Section. Mike graduated from the University of Tampa with a BS degree in Marine Biology and Chemistry. He then earned his MS in Aquatic Biology from Southwest Texas State University.

After college, Mike worked for five years as an aquatic biologist/field investigator for the Texas Water Commission (now Texas Commission on Environmental Quality), performing inspections and sampling of domestic, municipal, industrial, and agricultural wastewater dischargers and coordinating the Commission's North Central Texas surface water monitoring program.

Mike began his career with EPA as an environmental scientist at Region 6 in Dallas in 1988. As a hazardous waste enforcement coordinator, his duties included coordination of federal enforcement actions against violators of regulations under the Resource Conservation and Recovery Act (RCRA). Since 1990 Bira has been in the Water Quality Protection Division and worked in the Clean Lakes Program, Nonpoint Source Program, water quality standards, watersheds, nutrient criteria development, and water quality outreach.

As volunteer monitoring coordinator for the region, Bira has been actively involved with citizen monitoring programs and assisting states and communities with addressing water quality problems through education and the watershed protection approach. He has helped conceptualize and develop volunteer water quality monitoring programs in Texas, Oklahoma, Louisiana, and Arkansas. He has assisted with training of state personnel and volunteer monitors and has assisted with federal financial support for citizen monitoring efforts.

Bira's current responsibilities for EPA Region 6 include nutrient co-coordinator, volunteer monitoring coordinator, and program manager for the Nonpoint Source Program in the State of Texas.

Mike lives in the Dallas area with his hottie wife, Kristi. He also has two grown unmarried daughters who are out of the house but still in his wallet. Mike loves to get outside whenever he can and immensely enjoys fishing, hunting, and shooting, and fishing some more. He has always needed to be near or in water. When he was very young, his Mom worried that he might grow gills. In his 30s he finally realized he could never be a fish, so he took up hunting. He eats a lot better now.

Thomas E. Davenport is presently an environmental consultant on projects in Vietnam and the United States. He worked for the U.S. Environmental Protection Agency from 1984 to 2015 and was EPA's national NPS expert since 1991. He administered the Section 319 National Nonpoint Source Monitoring Program and provided technical and program assistance to the watershed, urban storm water wetlands, lakes, and TMDL and NPS programs nationally.

Davenport received a BS in Forestry and Natural Resource Management from the University of Wisconsin-Stevens Point in 1977 and an MS from the University of Washington in Forest Hydrology in 1981. In 1982, he received a Master of Public Administration from Sangamon State University.

Davenport led the Water Program for the Great Lakes/Baltic Seas Watershed Management Capacity Building Project and was technical manager on the Chile Free Trade Environmental Project, EPA's Alberta Lake Management Program, Venice Lagoons Assistance, and Panama Canal Expansion Training. He served as a resident faculty member and co-designer/manager of the Watershed Partnership Seminar for the Office of Personnel Management. He also worked with Canada on the implementation of the Great Lakes Water Quality Agreement's Annex 4 provisions and provided management and technical assistance to EPA programs at the regional, national, and international levels.

While at the Illinois Environmental Protection Agency, Davenport assisted in the development and establishment of the state's Watershed, Clean Lakes, and Nonpoint Source Programs. His responsibilities included the management of the USDA Rural Clean Water Program's Comprehensive Monitoring and Evaluation Project for Highland Silver Lake and the Blue Creek Special Water Quality Project.

Davenport authored "The Watershed Project Management Guide" and coauthored the urban management measures chapter of the "Coastal Zone NPS Management Guidance." He authored the urban nonpoint source management chapter in the UNESCO publication, "Assessment and Control of Nonpoint Source Pollution of Aquatic Ecosystems/A Practical Guide" and "The Framework for Managing Lakes in the US" chapter in The Lakes Handbook, Volume 2: Lake Restoration and Rehabilitation.

He previously served on the editorial board of EPA's Nonpoint Source News Notes newsletter and the Center for Watershed Protection's Watershed Protection Techniques Bulletin and was agency advisor to the Conservation Technology Information Center and an associate research editor of the Journal of Soil and Water Conservation, as well as an editorial board member.

Nikki Dictson is an extension program specialist III for the Texas A&M Institute for Renewable Natural Resources and Texas Water Resources Institute in College Station. She received her BS in Wildlife Science and Fisheries Science at New Mexico State University and her MS in Wildlife and Fisheries Science at Texas A&M University. Dictson is coordinating the Texas Stream and Riparian Ecosystem Education and the Texas Watershed Planning Training programs while also working on watershed planning and TMDL projects at the institute. Dictson coordinates a variety of professional and landowner trainings through these programs, as well as roundtables, group presentations, and conferences across the state. In addition, she manages the programs websites, listserv, and outreach efforts of each program. During the previous seven years with Texas A&M University's Soil and Crop Sciences Department, Dictson was the coordinator for the Plum Creek Watershed Protection Plan and Implementation Program, developed many educational publications and outreach programs, and was on the team conducting the Geronimo and Alligator Creeks Watershed Protection Plan and the Texas Watershed Steward Educational Program. She has been on the planning team, a facilitator, and instructor at the Watershed Planning Short Course since the course's beginning.

Dictson has been with Extension for almost 14 years, beginning in the Rangeland Ecology and Management (RLEM) Unit where she coordinated the Water for Texans Educational Program, a statewide educational program of paired plot watershed demonstrations evaluating various management practices on runoff and sediment loss. While with the RLEM Unit, she also developed rangeland stream, riparian, and upland health educational materials; developed an online RLEM 101 agent training course; and conducted field day trainings and educational programs across the state. Dictson has also been an instructor for workshops of the Texas Riparian Association and is currently on its board. Prior to working with Extension, she was a natural resource consultant in Seattle, working on a variety of watershed issues with a focus on biological assessments of major construction projects for endangered species issues with local, state, and federal agencies.

Dr. Lucas Gregory currently serves as a research scientist and the quality assurance officer for the Texas Water Resources Institute. In this role, he develops effective and efficient projects and provides leadership for multiple watershed assessment, planning and implementation projects, focusing on water quality

impairments in rural Texas water bodies. He is also leading efforts to develop a research program at Texas A&M that is focused on investigating how degradation of water quality will affect human health.

Gregory's research interests include: 1) bacteria fate and transport in aquatic and soil environments, 2) watershed assessment, planning and management, 3) watershed assessment tool application and development, 4) water quality monitoring, 5) efficient water resource utilization, 6) implications of water policy on local watershed decision making, and 7) groundwater hydrology.

Dr. Larry Hauck has recently retired from his full-time position of lead scientist at the Texas Institute for Applied Environmental Research (TIAER) at Tarleton State University located in Stephenville, Texas and currently has a half-time position as a senior research scientist. He has been employed at TIAER for almost 25 years. Prior to his present employment, he worked for various governmental agencies and environmental consulting firms resulting in 40-plus years of professional experience. The duties of Dr. Hauck's current position include mentoring of young professionals and management of several projects funded by Texas river authorities and the Texas Commission on Environmental Quality (TCEQ).

Dr. Hauck's research interests include landscape loading of nutrients and indicator bacteria, biological and chemical response of receiving waters to nutrient enrichment, connection of land management of agricultural and urban practices to receiving water quality, and development and application of watershed loading models and hydrologic/water quality models. He is currently involved in several total maximum daily load (TMDL) projects regarding impairments due to excessive levels of bacteria and depressed dissolved oxygen, computer modeling of Texas reservoirs, and investigations into response of macrophytes to nutrients in wadeable streams.

Tina Hendon is the watershed program manager for Tarrant Regional Water District. She has over 25 years of experience in watershed protection. Her previous work includes Nonpoint Source Program manager and water quality standards coordinator with the U.S. Environmental Protection Agency, environmental consulting, and research on the effects of land use practices on Texas receiving waters.

Michael Jones currently serves as a water resource specialist for the Meadows Center for Water and the Environment. In this role, he provides support for Texas Stream Team's Citizen Science Program and the Meadows Center's Watershed Services Program, including program development and reporting, conducting training and educational outreach activities, water quality and environmental monitoring, maintenance of supplies, assistance with data analysis, and report generation. Additional activities include conducting research with using GIS for data analysis of water quality, water quantity, and surface/groundwater interactions and using GIS to integrate water quality data and environmental, geographic, and other data sources into maps for research and publications.

His research interests include: 1) physical, chemical, and biological processes operating within aquatic ecosystems, 2) nature and behavior of dissolved organic matter in karst aquifer systems, 3) active microbial processes that could affect carbonate weathering and water quality in caves and karst systems.

Education: BS – Geography Water Resources, Minor in Geology, Certificate in Geographic Information Science.

Brian Koch received his BS in Range and Wildlife Management from Texas A&M University Kingsville in 2003. After a short stint in the commercial nursery business, Brian joined the Texas State Soil and Water Conservation Board in 2005 as the regional watershed coordinator serving TSSWCB's Wharton Regional Office service area covering 47 counties in Southeast and South Central Texas. As regional watershed coordinator, Brian has aided in the development and implementation of several WPPs and TMDL I-plans, including Plum Creek,

Geronimo Creek, Mill Creek, Cedar Bayou, Double Bayou, Bacteria Implementation Group, Mission and Aransas Rivers, and Upper San Antonio River, and is currently assisting and has assisted in development and implementation of several more. Brian also represents the agency on the Coastal Coordination Advisory Council, Galveston Bay Estuary Program, and Coastal Bend Bays and Estuaries Program, and assists with the TSSWCB's Water Quality Management Plan Program.

Texas Watershed Planning Short Course

Instructor Biographies: February 2019

Michael R. Bira is with the U.S. Environmental Protection Agency Region 6 Water Quality Protection Division, in the Watershed Section. Mike graduated from the University of Tampa with a BS degree in Marine Biology and Chemistry. He then earned his MS in Aquatic Biology from Southwest Texas State University.

After college, Mike worked for five years as an aquatic biologist/field investigator for the Texas Water Commission (now Texas Commission on Environmental Quality), performing inspections and sampling of domestic, municipal, industrial, and agricultural wastewater dischargers and coordinating the Commission's North Central Texas surface water monitoring program.

Mike began his career with EPA as an environmental scientist at Region 6 in Dallas in 1988. As a hazardous waste enforcement coordinator, his duties included coordination of federal enforcement actions against violators of regulations under the Resource Conservation and Recovery Act (RCRA). Since 1990 Bira has been in the Water Quality Protection Division and worked in the Clean Lakes Program, Nonpoint Source Program, water quality standards, watersheds, nutrient criteria development, and water quality outreach.

As volunteer monitoring coordinator for the region, Bira has been actively involved with citizen monitoring programs and assisting states and communities with addressing water quality problems through education and the watershed protection approach. He has helped conceptualize and develop volunteer water quality monitoring programs in Texas, Oklahoma, Louisiana, and Arkansas. He has assisted with training of state personnel and volunteer monitors and has assisted with federal financial support for citizen monitoring efforts.

Bira's current responsibilities for EPA Region 6 include nutrient co-coordinator, volunteer monitoring coordinator, and program manager for the Nonpoint Source Program in the State of Texas.

Mike lives in the Dallas area with his hottie wife, Kristi. He also has two grown unmarried daughters who are out of the house but still in his wallet. Mike loves to get outside whenever he can, and immensely enjoys fishing, hunting, and shooting, and fishing some more. He has always needed to be near or in water. When he was very young, his Mom worried that he might grow gills. In his 30's he finally realized he could never be a fish, so he took up hunting. He eats a lot better now.

Thomas E. Davenport is presently an environmental consultant on projects in Vietnam and the United States. He worked for the U.S. Environmental Protection Agency from 1984 to 2015and was EPA's National NPS Expert since 1991. He administered the Section 319 National Nonpoint Source Monitoring Program and provided technical and program assistance to the watershed, urban storm water wetlands, lakes, and TMDL and NPS programs nationally.

Davenport received a BS in Forestry and Natural Resource Management from the University of Wisconsin-Stevens Point in 1977 and an MS from the University of Washington in Forest Hydrology in 1981. In 1982, he received a Master of Public Administration from Sangamon State University.

Davenport led the Water Program for the Great Lakes/Baltic Seas Watershed Management Capacity Building Project and was technical manager on the Chile Free Trade Environmental Project, EPA's Alberta Lake Management Program, Venice Lagoons Assistance, and Panama Canal Expansion Training. He served as a resident faculty member and co-designer/manager of the Watershed Partnership Seminar for the Office of Personnel Management. He also worked with Canada on the implementation of the Great Lakes Water Quality Agreement's Annex 4 provisions and provided management and technical assistance to EPA programs at the regional, national, and international levels. While at the Illinois Environmental Protection Agency, Davenport assisted in the development and establishment of the state's Watershed, Clean Lakes and Nonpoint Source Programs. His responsibilities included the management of the USDA Rural Clean Water Program's Comprehensive Monitoring and Evaluation Project for Highland Silver Lake and the Blue Creek Special Water Quality Project.

Davenport authored "The Watershed Project Management Guide" and coauthored the urban management measures chapter of the "Coastal Zone NPS Management Guidance." He authored the urban nonpoint source management chapter in the UNESCO publication, "Assessment and Control of Nonpoint Source Pollution of Aquatic Ecosystems/A Practical Guide" and "The Framework for Managing Lakes in the US" chapter in The Lakes Handbook, Volume 2: Lake Restoration and Rehabilitation.

He previously served on the editorial board of EPA's Nonpoint Source News Notes newsletter and the Center for Watershed Protection's Watershed Protection Techniques Bulletin, and was agency advisor to the Conservation Technology Information Center and an associate research editor of the Journal of Soil and Water Conservation, as well as an editorial board member.

Nikki Dictson is a watershed coordinator and outreach Administrator with Alabama Cooperative Extension System at Auburn University and formerly an extension program specialist III for the Texas Water Resources Institute in College Station. She received her BS in Wildlife Science and Fisheries Science at New Mexico State University and her master's in Wildlife and Fisheries Science at Texas A&M University. Dictson assists in coordinating the Texas Watershed Planning Training, Texas Stream and Riparian Ecosystem and Urban Stream Processes and Restoration programs. Dictson assists in coordinating a variety of professional and landowner trainings through these programs, as well as roundtables, presentations, and conferences across the state. In addition, she helps manage the programs websites, listserv, and outreach efforts. For seven years, in Texas A&M University's Soil and Crop Sciences Department, Dictson was the coordinator for the Plum Creek Watershed Protection Plan and Implementation Program, developed many educational publications and outreach programs, and was on the team conducting the Geronimo and Alligator Creeks WPP and the Texas Watershed Steward Program. She has been on the planning team, a facilitator, and instructor at the Watershed Planning Short Course since the course's beginning. Dictson has been with Extension for over 16 years, beginning in the Rangeland Ecology and Management (RLEM) Unit where she coordinated the Water for Texans Educational Program, a statewide educational program of paired plot watershed demonstrations evaluating various management practices on runoff and sediment loss. While with the RLEM Unit, she also developed rangeland stream, riparian, and upland health educational materials; developed an online RLEM 101 agent training course; and conducted field day trainings and educational programs across the state. Prior to working with Extension, she was a natural resource consultant in Seattle, Washington working on a variety of watershed issues with a focus on biological assessments of major construction projects for endangered species issues with local, state, and federal agencies.

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Dr. Hauck's research interests include landscape loading of nutrients and indicator bacteria, biological and chemical response of receiving waters to nutrient enrichment, connection of land management of agricultural and urban practices to receiving water quality, and development and application of watershed loading models and hydrologic/water quality models. He is currently involved in several total maximum daily load (TMDL) projects regarding impairments due to excessive levels of bacteria and depressed dissolved oxygen, computer modeling of Texas reservoirs, and investigations into response of macrophytes to nutrients in wadeable streams. In addition, Dr. Hauck is directing a project that is investigating and comparing the three standard laboratory methods of measuring ambient-water chlorophyll-a involving seven different laboratories and another project investigating the use of quantitative polymerase chain reaction (qPCR) as a rapid turnaround test for the monitoring of bacteria levels for Texas coastal beaches.

Tina Hendon is the watershed program manager for Tarrant Regional Water District. She has over 25 years of experience in watershed protection. Previous work includes Nonpoint Source Program manager and water quality standards coordinator with the U.S. Environmental Protection Agency, environmental consulting, and research on the effects of land use practices on Texas receiving waters.

Jenna Walker, MAGeo is a senior program manager with the watershed services division of The Meadows Center for Water and the Environment at Texas State University. She currently manages several grant-funded programs, including the Texas Stream Team, a statewide citizen science-based water quality monitoring program designed to educate citizens about water resources, support watershed protection efforts, and build community-based partnerships. Jenna also leads the "How Much Water is in the Hill Country?" project, a multi-year research effort focused on developing baseline groundwater-surface water interaction and water quality data to gain a clearer understanding of the complex hydrogeology of Hill Country rivers, aquifers and springs. She is also involved in coordinating watershed planning activities in the Cypress Creek, the Pedernales, the Guadalupe, the San Marcos, and the North Bosque Rivers.

Ms. Walker's previous positions include several leadership roles within the City of Waco, including watershed administrator, legislative liaison, member of the Brazos River Watermaster Advisory Committee, and director of a regional environmental coalition of city leaders, agricultural producers, and landowners to protect the Bosque watershed. She has served as director of several environmental NGOs and has experience working as an educator, a senior program manager for a large multi-national corporation, and a legislative aide at the Texas Senate.

Jenna holds a Master of Applied Geography in Resource and Environmental Studies from Texas State University and a bachelor's in International Studies from Texas A&M University. Jenna is a seventh generation native of the Texas Hill Country and resides in New Braunfels.

Texas Watershed Planning Short Course

Course Agenda –November 2017

Tuesday, Nov. 28, 20	17 Facilitator: Lucas Gregory
11:00 – 1:00 pm Lunch 12 – 1 pm	Registration (Distribute Knowledge Assessment) A pre-course examination will determine the knowledge level of each participant prior to going through the course. The pre-course exam results will be compared to the post-course exam results to assess course impact/knowledge gained.
1:00 – 1:30 pm	Welcome & IntroductionGregory This session will provide (1) the opportunity for participants to introduce themselves and the watersheds they are working in, (2) information on facilities and ground rules, and (3) an overview of the course and its purpose and structure.
1:30 – 2:00 pm	Watershed Basics
2:00 – 3:00 pm	Working with Stakeholders to Move the Process ForwardGregory Stakeholders form the backbone of your watershed planning effort. Learn tips on how to get off on the right foot and keep the energy going throughout your watershed planning and implementation program. Topics to be addressed include: determining who needs to be involved, making meetings count, diffusing conflict, making decisions using a consensus-based approach, and sustaining the stakeholder group.
3:00 – 3:20 pm	Break
3:20 – 4:05 pm	Partnership Building Experiences in Plum CreekDictson Experiences in Plum Creek watershed with getting local involvement, announcing meetings, setting up the committee and subcommittees, publicizing the effort, what needs to be discussed/decided at each meeting, and timelines will be discussed. Sample invitation letters, ground rules, press releases, and other materials will be provided.
4:05 – 4:35 pm	Expectations for Element ABira The expectations for and an example of Element A will be reviewed and discussed to provide participants an understanding of what is necessary to identify causes and sources of water quality impairments and concerns.
4:35 – 5:30 pm	Gathering data to assess your watershedHendon What data do you need? Where do you find the data? How do you get info from TCEQ and other agencies? This session will examine (1) materials from Chapters 5-6 of the <i>Handbook</i> ; (2) how GIS may be used for watershed analysis, source identification and watershed characterization; and (3) sources of data in Texas and how best to obtain it.
6:00 pm	Dinner
7:30 pm	Evening Social

Wednesday, November 29, 2017

7:30 – 8:00 am	Breakfast
8:00 – 8:30 am	Gathering animal density dataDictson
8:30 – 9:00 am	Estimating OSSF density in watershedsGregory This session will discuss an approach to estimating on-site sewage facility (OSSF) numbers and locations in watersheds.
9:00 – 10:00 am	Analyzing Data to Characterize Your WatershedDavenport How do you analyze your data? What tools are available? Is modeling needed? This session will review Chapters 7 and 8.1-8.2 of the <i>Handbook</i> in order to provide participants an understanding of the methods/options available for analyzing watershed data and estimating pollutant loads. Simplistic methods for calculating loads and assessing sources will be presented. The session will also examine refining goals, identifying management objectives, and determining load reductions needed (Chapter 9 of the <i>Handbook</i>).
10:00 – 10:20 am	Break
10:20 – 10:50 am	Expectations for Element BHendon The expectations for Element B will be reviewed and discussed to provide participants with an understanding of the level of detail and effort needed to determine 'acceptable' pollutant loadings and whether or not load reductions are needed to reach acceptable levels.
10:50 – 11:20 am	Overview of Models for Estimating Pollutant Loads & Reductions Hauck If modeling is needed, what models are available and how do you select a model? This session will provide an overview of models available, expectations for what each model can deliver, costs, and factors to consider when selecting models.
11:20 – 12:00 pm	Overview and Expectations for Element CBira This session will provide a discussion of expectations for Element C as well as steps to select management practices.
12:00 – 1:00 pm	Lunch
1:00 – 1:50 pm	Agricultural NPS Measures
1:50 – 2:30 pm	Texas Riparian and Stream EcosystemsDictson This session will present information on riparian and stream ecosystems and their function and benefits.
2:30 – 3:00 pm	Break
3:00 – 3:50 pm	Urban NPS Measures
3:50 – 4:35 pm	Wastewater Treatment Systems, Issues, and PermitsGregory

	This session briefly reviews wastewater treatment systems (WWTFs and OSSFs), their impacts, and effectiveness in removing pollutants in addition to identifying and addressing wastewater treatment system issues in your watershed.
4:35 – 5:00 pm	Estimating Load Reductions from BMPs & Assignment 1Gregory
6:00 pm	Dinner
7:00 – 7:45 pm	Introduction to Load Duration Curve (LDC) and Demonstration Gregory
7:45 – 8:30 pm	Social & Assignment: Estimating Pollutant Loads for Attoyac Bayou Using LDCs

Thursday, November 30, 2017

Facilitator: Lucas Gregory

7:30 – 8:00 am	Breakfast
8:00 – 8:30 am	Other Common Measures (Wildlife, Pets, etc.) Dictson
8:30 – 9:20 am	Targeting Critical Areas Davenport To achieve the most effective and immediate benefit, BMP implementation must be targeted to the most critical areas. This session discusses the targeting of control measures and the importance of this to the ultimate success of the WPP.
9:20 – 9:35 pm	Expectations for Element EBira The expectations for and an example of Element E will be reviewed and discussed to provide participants with an understanding of the information/ education components of the WPP.
9:35 – 10:20 pm	Using Outreach to Develop and Implement WPPsDictson Outreach is a powerful tool to get stakeholders involved early in the planning process, promote behavior change in the watershed, and enhance implementation of management strategies in the watershed. Learn tips and tools to conduct effective outreach without breaking the bank.
10:20 – 10:50 am	Break
10:50 – 11:20 pm	Watershed Resources and Tools AvailableDictson Presentation provides an overview of watershed resources and tools available, kiosks, online modules, web apps, and TWRI's watershed planning website.
11:20 – 12:00 pm	Expectations for Elements F, G, and H & AssignmentBira The expectations for Element F, G, and H will be reviewed to provide insight on the level of detail and effort needed to schedule implementation, describe interim milestones, and establish criteria to determine if load reductions are achieved.
12:00 – 1:00 pm	Lunch
1:00 – 2:00 pm	Designing & Implementing Effectiveness Monitoring – Element I Hauck This session will provide guidance on selecting an appropriate experimental design that incorporates previous and ongoing monitoring efforts.
2:00 – 3:00 pm	Developing Interim Milestones & Criteria to Measure Progress Davenport

	This session will discuss developing interim measurable milestones (Element G) and establishing a set of criteria to measure progress (Element H) toward meeting water quality goals (Chapter 12.4-12.5 of the <i>Handbook</i>). This is the point in the WPP where you define in realistic terms how you will determine (1) if you are on track and making progress or not, (2) how/when you evaluate your progress, and (3) what to do if watershed improvements are not on track.
3:00 – 3:30 pm	Break
3:30 – 4:00 pm	Scheduling Management Measure ImplementationHendon
4:00 – 4:15 pm	Break / Hayride to River for Next Presentation <i>Please note: This is a light field exercise at the onsite creek. Appropriate field attire for expected</i> <i>weather is recommended. Participants will divide into 3 groups for the presentations below.</i>
4:15 – 5:45 pm	Water Quality Monitoring: Practical Guidelines & Lessons LearnedGregory/Jones An overview of the how to use automated samplers, multi-probes, flow meters, and Texas Stream Team volunteer monitoring will be provided. *sessions are 45 minutes each
6:00 pm	Dinner
8:00 pm	Evening Social – Ice Cream Sunday Bar
Friday, December 1,	2017 Facilitator: Nikki Dictson
7:30 – 8:00 am	Breakfast
8:00 – 8:45 am	Assignment: Consistency Review of Elements F, G, and H
8:45 – 9:00 pm	Discuss Elements F, G, and H Assignment
9:00 – 9:30 am	Expectations for Element DBira This session will discuss expectations for Element D, which describes the financial and technical assistance needs and identifies the sources/authorities that will be relied on for implementation (Chapter 12.7 of the <i>Handbook</i>).
9:30 – 10:15 am	Implementation Costs and Sources of FundingGregory This session will discuss sources of funding in Texas for implementation of WPPs along with match requirements and the mechanisms for requesting it.
10:15 – 10:25 am	Overview & Discussion of Assignment on Load CalculationsGregory
10:25 – 10:45 am	Putting it All Together and Next StepsDictson This session will discuss assembling a WPP, gaining stakeholder approval, and submitting the WPP for state and federal review.
10:45 – 11:15 am	Knowledge Assessment/Course Evaluation A post-course examination will be distributed to determine course impact and knowledge gained. A course evaluation will also be distributed to gain feedback on how to improve the course.
11:15 – 11:30 am	Adjourn & Room Check Out Certificates will be distributed as the class turns in their post-course exam and course evaluations.

Texas Watershed Planning Short Course

Course Agenda – February 2019

Facilitator: Lucas Gregory

Monday, Feb. 18, 2019

11:00 - 1:00 pm**Registration (Distribute Knowledge Assessment)** Lunch 12 - 1 pm A pre-course examination will determine the knowledge level of each participant prior to going through the course. The pre-course exam results will be compared to the post-course exam results to assess course impact/knowledge gained. 1:00 – 1:30 pm Welcome & Introduction......Gregory This session will provide (1) the opportunity for participants to introduce themselves and the watersheds they are working in, (2) information on facilities and ground rules, and (3) an overview of the course and its purpose and structure. Watershed Basics Dictson 1:30 - 2:00 pmAn introduction to watersheds. 2:00 - 3:00 pmWorking with Stakeholders to Move the Process ForwardGregory Stakeholders form the backbone of your watershed planning effort. Learn tips on how to get off on the right foot and keep the energy going throughout your watershed planning and implementation program. Topics to be addressed include: determining who needs to be involved, making meetings count, diffusing conflict, making decisions using a consensus-based approach, and sustaining the stakeholder group. Break 3:00 - 3:20 pm 3:20 – 4:05 pm Partnership Building Experiences in Plum Creek Dictson Experiences in Plum Creek watershed with getting local involvement, announcing meetings, setting up the committee and subcommittees, publicizing the effort, what needs to be discussed/decided at each meeting, and timelines will be discussed. Sample invitation letters, ground rules, press releases, and other materials will be provided. Expectations for Element ABira 4:05 - 4:35 pm The expectations for and an example of Element A will be reviewed and discussed to provide participants an understanding of what is necessary to identify causes and sources of water quality impairments and concerns. Gathering data to assess your watershed......Hendon 4:35 – 5:30 pm What data do you need? Where do you find the data? How do you get info from TCEQ and other agencies? This session will examine (1) materials from Chapters 5-6 of the Handbook; (2) how GIS may be used for watershed analysis, source identification and watershed characterization; and (3) sources of data in Texas and how best to obtain it. 6:00 pm Dinner 7:30 pm **Evening Social**

Tuesday, February 19, 2019

7:30 – 8:00 am	Breakfast
8:00 – 8:30 am	Gathering animal density dataDictson
8:30 – 9:00 am	Estimating OSSF density in watershedsGregory This session will discuss an approach to estimating on-site sewage facility (OSSF) numbers and locations in watersheds.
9:00 – 10:00 am	Analyzing Data to Characterize Your WatershedDavenport How do you analyze your data? What tools are available? Is modeling needed? This session will review Chapters 7 and 8.1-8.2 of the <i>Handbook</i> in order to provide participants an understanding of the methods/options available for analyzing watershed data and estimating pollutant loads. Simplistic methods for calculating loads and assessing sources will be presented. The session will also examine refining goals, identifying management objectives, and determining load reductions needed (Chapter 9 of the <i>Handbook</i>).
10:00 – 10:20 am	Break
10:20 – 10:50 am	Expectations for Element BHendon The expectations for Element B will be reviewed and discussed to provide participants with an understanding of the level of detail and effort needed to determine 'acceptable' pollutant loadings, and whether or not load reductions are needed to reach acceptable levels.
10:50 – 11:20 am	Overview of Models for Estimating Pollutant Loads & Reductions Hauck If modeling is needed, what models are available and how do you select a model? This session will provide an overview of models available, expectations for what each model can deliver, costs, and factors to consider when selecting models.
11:20 – 12:00 pm	Overview and Expectations for Element CBira This session will provide a discussion of expectations for Element C as well as steps to select management practices.
12:00 – 1:00 pm	Lunch
1:00 – 1:50 pm	Agricultural NPS Measures
1:50 – 2:30 pm	Texas Riparian and Stream EcosystemsDictson This session will present information on riparian and stream ecosystems and their function and benefits.
2:30 – 3:00 pm	Break
3:00 – 3:50 pm	Urban NPS Measures
3:50 – 4:35 pm	Wastewater Treatment Systems, Issues, and PermitsGregory

	This session briefly reviews wastewater treatment systems (WWTFs and OSSFs), their impacts, and effectiveness in removing pollutants in addition to identifying and addressing wastewater treatment system issues in your watershed.
4:35 – 5:00 pm	Estimating Load Reductions from BMPs & Assignment 1Gregory
6:00 pm	Dinner
7:00 – 7:45 pm	Introduction to Load Duration Curve (LDC) and Demonstration Gregory
7:45 – 8:30 pm	Social & Assignment: Estimating Pollutant Loads for Attoyac Bayou Using LDCs

Wednesday, February 20, 2019

Facilitator: Lucas Gregory

7:30 – 8:00 am	Breakfast
8:00 – 8:30 am	Other Common Measures (Wildlife, Pets, etc.) Dictson
8:30 – 9:20 am	Targeting Critical AreasDavenport To achieve the most effective and immediate benefit, BMP implementation must be targeted to the most critical areas. This session discusses the targeting of control measures and the importance of this to the ultimate success of the WPP.
9:20 – 9:35 pm	Expectations for Element EBira The expectations for and an example of Element E will be reviewed and discussed to provide participants with an understanding of the information/ education components of the WPP.
9:35 – 10:20 pm	Using Outreach to Develop and Implement WPPsDictson Outreach is a powerful tool to get stakeholders involved early in the planning process, promote behavior change in the watershed, and enhance implementation of management strategies in the watershed. Learn tips and tools to conduct effective outreach without breaking the bank.
10:20 – 10:50 am	Break
10:50 – 11:20 pm	Watershed Resources and Tools AvailableDictson Presentation provides an overview of watershed resources and tools available, kiosks, online modules, web apps, and TWRI's watershed planning website.
11:20 – 12:00 pm	Expectations for Elements F, G, and H & AssignmentBira The expectations for Element F, G, and H will be reviewed to provide insight on the level of detail and effort needed to schedule implementation, describe interim milestones, and establish criteria to determine if load reductions are achieved.
12:00 – 1:00 pm	Lunch
1:00 – 2:00 pm	Designing & Implementing Effectiveness Monitoring – Element IHauck This session will provide guidance on selecting an appropriate experimental design that incorporates previous and ongoing monitoring efforts.
2:00 – 3:00 pm	Developing Interim Milestones & Criteria to Measure Progress Davenport

	This session will discuss developing interim measurable milestones (Element G) and establishing a set of criteria to measure progress (Element H) toward meeting water quality goals (Chapter 12.4-12.5 of the <i>Handbook</i>). This is the point in the WPP where you define in realistic terms how you will determine (1) if you are on track and making progress or not, (2) how/when you evaluate your progress, and (3) what to do if watershed improvements are not on track.
3:00 – 3:30 pm	Break
3:30 – 4:00 pm	Scheduling Management Measure ImplementationHendon
4:00 – 4:15 pm	Break / Hayride to River for Next Presentation <i>Please note: This is a light field exercise at the onsite creek. Appropriate field attire for expected</i> <i>weather is recommended. Participants will divide into 3 groups for the presentations below.</i>
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6:00 pm	Dinner
8:00 pm	Evening Social
Thursday, February	21, 2019 Facilitator: Nikki Dictson
7:30 – 8:00 am	Breakfast
8:00 – 8:45 am	Assignment: Consistency Review of Elements F, G, and H
8:45 – 9:00 pm	Discuss Elements F, G, and H Assignment
9:00 – 9:30 am	Expectations for Element DBira This session will discuss expectations for Element D, which describes the financial and technical assistance needs and identifies the sources/authorities that will be relied on for implementation (Chapter 12.7 of the <i>Handbook</i>).
9:30 – 10:15 am	Implementation Costs and Sources of FundingGregory This session will discuss sources of funding in Texas for implementation of WPPs along with match requirements and the mechanisms for requesting it.
10:15 – 10:25 am	Overview & Discussion of Assignment on Load CalculationsGregory
10:25 – 10:45 am	Putting it All Together and Next StepsDictson This session will discuss assembling a WPP, gaining stakeholder approval, and submitting the WPP for state and federal review.
10:45 – 11:15 am	Knowledge Assessment/Course Evaluation A post-course examination will be distributed to determine course impact and knowledge gained. A course evaluation will also be distributed to gain feedback on how to improve the course.
11:15 – 11:30 am	Adjourn & Room Check Out Certificates will be distributed as the class turns in their post-course exam and course evaluations.

Appendix D: Watershed Planning Short Course Evaluation

Texas Watershed Planning Short Course Evaluation November 28–December 1, 2017

Name______ 1. Overall, how would you rate the short course? Unsatisfactory Most Satisfactory $1 \Box$ $2 \Box$ $3 \Box$ $4 \Box$ $5 \Box$

2. Using the scale above, how <u>satisfied</u> were you with each of the course topics below?

TOPICS	Level of Satisfaction				n
Introduction (Gregory)	1	2	3	4	5
Watershed Basics (Dictson)	1	2	3	4	5
Working with Stakeholders to Move the Process Forward (Gregory)	1	2	3	4	5
Partnership Building Experiences in Plum Creek (Dictson)	1	2	3	4	5
Expectations for Element A (Bira)	1	2	3	4	5
Gathering Data to Assess your Watershed (Hendon)	1	2	3	4	5
Gathering Animal Density Data (Dictson)	1	2	3	4	5
Estimating OSSF Density in Watersheds (Gregory)	1	2	3	4	5
Analyzing Data to Characterize your Watershed (Davenport)	1	2	3	4	5
Expectations for Element B (Hendon)	1	2	3	4	5
Overview of Models for Estimating Pollutant Loads & Reductions (Hauck)	1	2	3	4	5
Overview and Expectations for Element C (Bira)	1	2	3	4	5
Agricultural NPS Measures (Koch)	1	2	3	4	5
Texas Riparian and Stream Ecosystems (Dictson)	1	2	3	4	5
Urban NPS Measures (Davenport)	1	2	3	4	5
Wastewater Treatment Systems, Issues, and Permits (Gregory)	1	2	3	4	5
Estimating Load Reductions from BMPs (Gregory)	1	2	3	4	5
Introduction to Load Duration Curves and Demonstration (Gregory)	1	2	3	4	5
Other Common Measures (Wildlife, Pets, etc.) (Dictson)	1	2	3	4	5
Targeting Critical Areas (Davenport)	1	2	3	4	5
Expectations for Element E (Bira)	1	2	3	4	5
Using Outreach to Develop and Implement WPPs (Dictson)	1	2	3	4	5
Watershed Resources and Tools Available (Dictson)	1	2	3	4	5
Expectations for Elements F, G, and H (Bira)	1	2	3	4	5
Designing & Implementing Effectiveness Monitoring – Element I (Hauck)	1	2	3	4	5
Developing Interim Milestones & Criteria to Measure Progress (Davenport)	1	2	3	4	5
Scheduling Management Measure Implementation (Hendon)	1	2	3	4	5
Water Quality Monitoring (Gregory, Jones)	1	2	3	4	5
Expectations for Element D (Bira)	1	2	3	4	5
Implementation Costs and Sources of Funding (Gregory)	1	2	3	4	5
Putting it All Together and Next Steps (Dictson)	1	2	3	4	5

- 3. If you were <u>not</u> "completely satisfied" with the short course, please tell us what we could have done better in order for you to have been "completely satisfied?"
- 4. What was the most significant thing(s) you learned from this short course?
- 5. Which topic(s) covered by this short course, if any, would you have liked discussed in greater detail?
- 6. What topic(s), if any, did you have a particular interest in but was <u>not</u> covered by the short course?
- 7. What topic(s), if any, should be omitted from future short courses?
- 8. Overall how <u>satisfied</u> were you with the following aspects of the course (please check one of the boxes below):

	Completely	Mostly	Somewhat	Slightly	Not at all
Quality of					
Course					
Materials					
Sequencing					
of Topics					
Training					
Location					
and Facility					

- 9. What will be the first 3 steps you'll implement as a result of taking this training?
- 10. Looking beyond the course, in your opinion what could the state and/or federal agencies do to best serve you in your WPP efforts?
- 11. What other tools, training, capacity building, etc. (if any) would you suggest to serve your efforts in WPP planning?
- 12. How would you rate the WPP you are involved in as meeting the intent of EPA's WPP guidelines?
- 13. In your watershed, what are the local strengths for success?
- 14. In your watershed, what are the local obstacles for success?

Overall, how would you r	ate the short	course?						
Unsatisfactory			Ν	Aost Sat	isfac	torv		
1 □	2 🗆	3 □	4 🗆		5 🗆	Je-J		
Using the scale above, ho	w <u>satisfied</u> w	vere you with ea	ach of the cour	se topic	s bel	ow?		
TOPICS				L	evel o	of Satis	sfactio	<u>n</u>
Introduction (Gregory)				1	2	3	4	5
Watershed Basics (Dictson)				1	2	3	4	5
Working with Stakeholders to I	Move the Proce	ess Forward <i>(Grego</i>	ry)	1	2	3	4	5
Partnership Building Experience	es in Plum Cre	ek (Dictson)		1	2	3	4	5
Expectations for Element A (B	ira)			1	2	3	4	5
Gathering Data to Assess your	Watershed (He	ndon)		1	2	3	4	5
Gathering Animal Density Data	a <i>(Dictson)</i>			1	2	3	4	5
Estimating OSSF Density in W	atersheds (Greg	ory)		1	2	3	4	5
Analyzing Data to Characterize	your Watershe	ed (Davenport)		1	2	3	4	5
Expectations for Element B (H	endon)			1	2	3	4	5
Overview of Models for Estimate	ating Pollutant	Loads & Reductio	ons (Hauck)	1	2	3	4	5
Overview and Expectations for	Element C (Ba	ira)		1	2	3	4	5
Agricultural NPS Measures (Gr	egory)			1	2	3	4	5
Texas Riparian and Stream Eco	systems (Dictso	n)		1	2	3	4	5
Urban NPS Measures (Davenpor	t)			1	2	3	4	5
Wastewater Treatment Systems	, Issues, and Pe	ermits (Gregory)		1	2	3	4	5
Estimating Load Reductions from	om BMPs <i>(Greg</i>	zory)		1	2	3	4	5
Other Common Measures (Wil	dlife, Pets, etc.)	(Dictson)		1	2	3	4	5
Targeting Critical Areas (Daven	bort)			1	2	3	4	5
Expectations for Element E (B	ira)			1	2	3	4	5
Using Outreach to Develop and	d Implement W	PPs (Dictson)		1	2	3	4	5
Watershed Resources and Tool	s Available <i>(Di</i>	ctson)		1	2	3	4	5
Expectations for Elements F, C	G, and H (Bira)			1	2	3	4	5
Designing & Implementing Eff	ectiveness Mor	nitoring – Element	t I <i>(Hauck)</i>	1	2	3	4	5
Introduction to Load Duration	Curves and De	emonstration (Greg	gory)	1	2	3	4	5
Developing Interim Milestones	& Criteria to N	Measure Progress (Davenport)	1	2	3	4	5
Water Quality Monitoring (Greg	gory, Walker)			1	2	3	4	5
Scheduling Management Measu	ire Implementa	tion (Hendon)		1	2	3	4	5
Expectations for Element D (B	ira)			1	2	3	4	5
Implementation Costs and Sou	rces of Funding	g (Gregory)		1	2	3	4	5
Putting it All Together and Nex	t Steps (Dictson	1)		1	2	3	4	5

3. If you were <u>not</u> "completely satisfied" with the short course, please tell us what we could have done better in order for you to have been "completely satisfied?"

- 4. What was the most significant thing(s) you learned from this short course?
- 5. Which topic(s) covered by this short course, if any, would you have liked discussed in greater detail?
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- 7. What topic(s), if any, should be omitted from future short courses?
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	Completely	Mostly	Somewhat	Slightly	Not at all
Quality of					
Course					
Materials					
Sequencing					
of Topics					
Training					
Location					
and Facility					

- 9. What will be the first 3 steps you'll implement as a result of taking this training?
- 10. Looking beyond the course, in your opinion what could the state and/or federal agencies do to best serve you in your WPP efforts?
- 11. What other tools, training, capacity building, etc. (if any) would you suggest to serve your efforts in WPP planning?
- 12. How would you rate the WPP you are involved in as meeting the intent of EPA's WPP guidelines?
- 13. In your watershed, what are the local strengths for success?
- 14. In your watershed, what are the local obstacles for success?

Appendix E: Agendas for Roundtables and Trainings

Texas Watershed Coordinator Roundtable

July 26, 2017 9:30 a.m. — 3:30 p.m.

Hildebrand Equine Center, 3240 F and B Rd., College Station

9:00 – 9:30 a.m.	Registration	
9:30 – 9:45 a.m.	Welcome & Introductions	Lucas Gregory
9:45 – 10:15 a.m.	Healthy Lawns / Healthy Waters research & education	Reagan Hejl
10:15 – 11:30 a.m.	Field tour on turfgrass runoff research	Reagan Hejl
11:30 – 12:00 p.m.	HGAC Watershed Programs	Justin Bower
12:00 – 12:30 p.m.	Catered networking lunch (or bring your own) [RSVP requir	ed]
12:30 – 1:00 p.m.	Use of the social sciences in watershed planning	Patrick Bixler
1:00 – 1:30 p.m.	Landowners' preferred communication channels, motivation and barriers to adopting best management practices	s, Allen Berthold
1:30 – 2:00 p.m.	Discussion on use of social science in watershed planning	Roundtable
2:00 - 2:15 p.m.	Break	
2:15 – 2:45 p.m.	Central Texas Freshwater Mussels Program	Kimberly Horndeski
2:45 – 3:15 p.m.	Mitchel Foundation programs, priorities & collaboration	Sarah Richards
3:15 – 3:30 p.m.	 Wrap-Up Upcoming Trainings Next Roundtable – January 23, 2018 at UT Pickle Center 	Nikki Dictson r, Austin

Texas Watershed Coordinator Roundtable Agenda

January 23, 2018 9:30 a.m. — 3:30 p.m.

Texas Advanced Computing Center – Seminar and Training Room UT JJ Pickle Research Campus, Austin

9:00 a.m.	Registration		
9:30 a.m.	Welcome, Agency Updates & Introductions	Lucas Gregory, TWRI	
9:45 a.m.	Evolution of WPPs In Texas	Lucas Gregory, TWRI	
10:15 a.m.	Riparian Areas in the Blackland Prairie Ecoregion: Characterization and Management Implications Ana Gonzalez, City of Austin Watershed Protection		
11:15 p.m.	Texas Community Watershed Partners	Charriss York, Coastal Watershed Program	
12:00 p.m.	Catered networking lunch (or bring your own) [RSVP required]	
1:00 p.m.	ESA and watershed planning	Mike Marshall, NRI	
1:30 p.m.	Break		
1:50 p.m.	Breakout Discussion Groups		
2:30 p.m.	Breakout Group Reports		
3:00 p.m.	Urban Riparian & Stream Restoration Program	n Entwistle / Jaber	
3:15 p.m.	Wrap-Up • Upcoming Trainings • Next Roundtable – July 2018	Nathan Glavy, TWRI	

Texas Watershed Coordinator Roundtable Draft Agenda

July 24, 2018 9:30 a.m. — 3:30 p.m.

Hildebrand Equine Center, 3240 F and B Rd., College Station

9:00 a.m.	Registration			
9:30 a.m.	Welcome, Agency Updates & Introductions		Lucas Gregory, TWRI	
9:45 a.m.	WPP Updates Follow Up, Agency Panel Perspectives and Discussion			
	Panelists:	Philip Crocker, USEPA Faith Hambelton, TCEQ TJ Helton, TSSWCB	Moderator:	Lucas Gregory, TWRI
11:00 a.m.	Coastal On-Site Sewage	e Facilities Inventory: Over Ryan Gerlich, TAMU B	view and Lesso Biological and A	ns Learned gricultural Engineering
12:00 p.m.	Catered networking lun	ch (or bring your own) [RS	VP required]	
1:00 p.m.	Implementing the Leon	River WPP: Ag and OSSF	Perspectives	Andy James, NRI
1:30 p.m.	Break			
1:45 p.m.	Urban BMP Implement	ation: HGAC Progress		Justin Bower, H-GAC
2:45 p.m.	Texas Stream Team		Jenna Walker	, TST/Meadows Center
3:15 p.m.	Wrap-Up • Upcoming	Trainings		Nathan Glavy, TWRI

• Next Roundtable – January 2019 – Dallas

Texas Watershed Coordinator Roundtable Agenda

January 31, 2019 9:30 a.m. — 3:30 p.m.

Texas Farm Bureau Conference and Training Center, 7410 Fish Pond Road, Waco

9:00 a.m.	Registration				
9:30 a.m.	Welcome & Introductions			Jay Bragg, TFB	
9:40 a.m.	Agency Updates, Pane	el Perspectives and Discussio	n		
	Panelists:	Mike Bira, EPA Faith Hambleton, TCEQ TJ Helton, TSSWCB	Moderator: Lu	cas Gregory, TWRI	
10:15 a.m.	Comal River WPP and	d Dealing with Deer Populati	ons Mark End	lers, New Braunfels	
11:00 a.m.	Texas A&M Forest Se	ervice Programs		Lori Hazel, TFS	
12:00 p.m.	Catered networking lu	nch (or bring your own) [RS	VP required]		
1:00 p.m.	Communicating Wate	rshed Plans to Elected Offici	als	Group Discussion	
1:30 p.m.	Break				
1:45 p.m.	Watershed Update		V	Vard Ling, AgriLife	
	2:45 p.m. Texas	Water Specialist & Master I	Naturalist Volunteer	Melissa Alderson, TP	WD
3:15 p.m.	Wrap-Up • Upcoming • Next Rou	g Trainings ndtable – July 2019 – Dallas	Na TBD	than Glavy, TWRI	

Texas Watershed Coordinator Roundtable Agenda

August 6, 2019 9:30 a.m. — 3:30 p.m.

Texas A&M AgriLife Dallas Center, 17360 Coit Rd., Dallas, TX, 75252

9:00 a.m.	Registration			
9:30 a.m.	Welcome, Introductions	s and Tour	Clint Wolf Fouad	fe, TAMU AgriLife and Jaber, TAMU AgriLife
11:30 a.m.	Agency Updates, Panel	Perspectives and Discussi	on	
	Panelists:	Mike Bira, EPA Faith Hambleton, TCEQ TJ Helton, TSSWCB	Moderator:	Lucas Gregory, TWRI
12:00 p.m.	Catered networking lun	ch (or bring your own) [R	SVP required]	
1:00 p.m.	Communicating to Elec	ted Officials	Mary Thiel Lue	deker, J.D., TAMU and Julia Lancaster, TAMU
1:30 p.m.	Break			
1:45 a.m.	North Texas Watershed	Updates and Panel		
	Panelists:	Tina Hendon, Tarrant Reg Galen Roberts, North Tex Aaron Hoff, Trinity River	Moderator: gional Water Dis kas Municipal W r Authority	Lucas Gregory, TWRI strict ater District
3:15 p.m.	Wrap-Up • Upcoming • Next Round	Trainings dtable – January 2020 –TB	BD	Nathan Glavy, TWRI

Fundamentals of Developing a Water Quality Monitoring Plan June 4-5, 2018 TCEQ Building B, Room 201, Austin

Agenda

Monday, June 4		9:00 a.m. to 5 p.m.
9:00 – 9:30 a.m.	Introductions & Workshop Overview Group introductions and Workshop purpose: Provide participants with monitoring program for watershed characterization and evaluation of effectiveness from implementation activities. Brief watershed overview day.	Larry Hauck, TIAER the tools to develop and implement a water quality improvements and BMP of case studies presented throughout the
9:30 – 10:00 a.m.	Data Quality Objectives & Project Planning Defining the water quality problem, determining monitoring objectives, at the outset. Long term data needs of the watershed; analytical framew watershed protection plan; routine monitoring vs. BMP evaluation (Ele	. Jessica Uramkin, TCEQ , and establishing data quality objectives work to determine loadings in a ements H and I)
10:00 – 10:15 a.m.	Case Study: Introduction	Kevin Wagner, OWRC
10:15 – 10:30 a.m.	Break	
10:30 – 11:00 a.m.	Inventorying and Acquiring Existing Resources <i>Review 305(b) process & existing monitoring framework</i> <i>Inventory existing/historic monitoring sites & data (TCEQ, USGS, other</i>)	Sarah Eagle & Tim Cawthon, TCEQ
11:00 – 11:45 a.m. W	Vatershed Characterization & Sufficient Data Review/select experimental/statistical design – reconnaissance/synoptic above-and-below watersheds, paired watersheds, multiple watersheds, Assess ability of existing data to meet objectives & identify data gaps a Assessing # of additional sites, samples, and frequency needed	Anne McFarland, TIAER c, plot, single watershed/before-after, trend stations nd data needs
11:45 – 12:00 p.m.	Case Study: Defining the problem, monitoring objectives, and da	ata quality Inventorying and
	acquiring existing data, selecting experimental design, and assess	sing data sufficiency and data gaps.
12:00 – 1:00 p.m.	Lunch (catered lunch or bring your own)	
1:00 – 1:30 p.m.	Quality Assurance	. Kelly Rodibaugh, TCEQ
1:30 – 2:45 p.m.	Selecting Monitoring Design Scale – point, plot, field, watershed Sample type – grab, composite – time or flow weighted, depth integrate Variables monitored (cost & cost cutting considerations) Sample locations, sampling frequency, and monitoring duration Station types – discharge measurement, water sample collection – grab Collection & Analysis Methods – collection, preservation, transport, an Routine monitoring vs. BMP evaluation; flow and surrogates for flow National Water Quality Monitoring Handbook	<i>Larry Hauck, TIAER</i> ed, continuous o vs automated, precip nalysis, QA/QC
2:45 – 3:00 p.m.	Break	
3:00 – 3:30 p.m.	Other Considerations & Review Building a Successful Monito Monitoring plan development to meet data quality objectives and Suppo	oring Plan Larry Hauck, TIAER ort Modeling; equipment; budgets;

personnel constraints and available resources; and the importance of project planning.

Tuesday, June	5 8:30 a.m. to 3:30 p.m.
8:30 – 9:30 a.m.	Workshop Follow Up: Present/Discuss Monitoring Plan Each group presents monitoring plan (10 minutes per group).
9:30 – 10:00 a.m.	Introduction to Stormwater Sampling
10:00 – 10:15 a.n	n. Break & Travel to Monitoring Site
10:15 – 12:00 p.n	 Monitoring Demonstrations
12:00 – 1:00 p.m.	Travel to Workshop Location & Lunch (catered lunch or bring your own)
1:00 – 2:00 p.m.	Statistical Tools for Analysis
2:00 – 2:30 p.m.	Uncertainty in Monitoring Lucas Gregory, TWRI
2:30 – 3:00 p.m.	Stakeholder CommunicationsLarry Hauck, TIAERDetermining BMPs; incorporating analysis of sampling uncertainty and translating both to stakeholders; getting information up front.to stakeholders; sinclude list of contacts for regional offices; RRC, etc. (who to contact for complaints)
3:00 – 3:30 p.m.	Wrap Up Larry Hauck, TIAER Discuss how monitoring folds into watershed based plans and ties back to watershed-based planning efforts. Complete Evaluations and receive certificates



Agricultural BMPs for Watershed Planning Riesel Lyons Club 1270 E. Frederick St., Riesel, TX 76682 Agenda ~ April 3, 2019

- 8:30 Meeting Registration
- 9:00 Introductions, Overview and Role in Watershed Planning
 - Lucas Gregory, Texas Water Resources Institute
- 9:30 Agricultural NPS Programs
 - Todd Oneth, Texas State Soil and Water Conservation Board
- 10:15 Break
- 10:45 Planning and Implementing BMPs for Water Quality
 - Kyle Wright, USDA Natural Resource Conservation Service
- 11:45 Catered Lunch Provided
- 12:45 Implementing Conservation Plans with the most needed Practices - Cresencio (Cris) Perez, Comal-Guadalupe SWCD
- 1:15 Tour the Riesel USDA ARS Grassland Research Center
 - Director Douglas Smith, USDA ARS Grassland Soil & Water Lab
- 3:45 Course Evaluation
- 4:00 Wrap up and Head Home!

Field Tour Address: USDA Grassland Research Center 1702 Blackland Rd, Riesel, TX 76682

The Texas Watershed Planning education program is managed by the <u>Texas Water Resources Institute</u>, part of <u>Texas</u> <u>A&M AgriLife Research</u>, <u>AgriLife Extension</u> and College of Agriculture at <u>Texas A&M University</u>. The training course is supported by funding through a federal Clean Water Act Section 319(h) Nonpoint Source Grant administered by the Texas State Soil and Water Conservation Board from the Environmental Protection Agency

Urban BMP Training

TAMU Equine Center, Andras Classroom

Agenda – July 25, 2018

9:00 a.m.	Introductions, Overview and Role in Watershed Planning Lucas Gregory, TWRI Provide participants with an introduction to how Urban BMPs fit into WPPs.
9:30 a.m.	Typical Urban Management Measures and Resources Lucas Gregory, TWRI <i>This presentation will provide a broad overview of typical Urban Best Management Practices and Resources available.</i>
10:00 a.m.	Break
10:15 a.m.	Low Impact Development and Green Infrastructure
12:15 p.m.	Lunch
1:00 p.m.	Ordinances to Prevent and Control Pollution and Encourage Implementation .Debbie Stickles and Caroline Ask, City of College Station
	This presentation will cover how cities use ordinances and encourage implementation.
1:45 p.m.	Promoting LID: Getting Developer Buy-In
2:30 p.m.	Break

- 4:00 p.m. Evaluation and Wrap Up Nathan Glavy, TWRI



Watershedplanning.tamu.edu/

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Urban BMP Training

Texas A&M AgriLife Center at Dallas

Agenda – May 30, 2019

9:00 a.m.	Introductions, Overview and Role in Watershed Planning Lucas Gregory, TWRI <i>Provide participants with an introduction to how Urban BMPs fit into WPPs</i> .
9:30 a.m.	Typical Urban Management Measures and Resources Lucas Gregory, TWRI <i>This presentation will provide a broad overview of typical Urban Best Management Practices and Resources available.</i>
10:00 a.m.	Break
10:15 a.m.	Ordinances to Prevent and Control Pollution and Encourage Implementation Susan Alvarez, City of Dallas
	This presentation will cover how cities use ordinances and encourage implementation.
11:00 a.m.	Low Impact Development and Green Infrastructure
12:00 p.m.	Lunch
12:45 p.m.	Low Impact Development and Green Infrastructure Cont'dFouad Jaber, TAMU
1:45 p.m.	Promoting LID: Getting Developer Buy-In Anthony Kendrick, EcoServices <i>This presentation will cover getting developer buy-in; why LID; and examples of multifunctional design; and maintenance.</i>
2:30 p.m.	Break

- 2:45 p.m. Tour of LID and Green Infrastructure Dr. Jaber, Texas A&M AgriLife Center at Dallas
- 4:00 p.m. Evaluation and Wrap Up Nathan Glavy, TWRI



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Finding Success for Science through Social Media – Tips, Tools, and Tactics for Natural Resource Professionals

The Web is now 25 years old from the first design by Tim Berners-Lee to what we know today in 2014. Things have changed dramatically in design, writing standards, and search ability. In addition, smart devices have outsold desktops significantly in the last 5 years. What does that mean to those in outreach and education? It means we have to continue to grow our expertise in learning how to connect the consumer to the important information we provide. We need to understand how content is found, how conversations and learning networks start, how to be discovered, and what constitutes quality outreach. We have to know where to post, when to post, and what to build on our websites. We have to learn how to reach our traditional clients as well as new clients. There are many successful models that can be used and applied in natural resource outreach and education that can help us down the road of discoverability.

Location:

Texas Commission on Environmental Quality Room 201A, Building B 12100 Park 35 Circle, Austin, TX 78753

> Trainer: Amy E. Hays www.linkedin.com/in/amyehays/

April 13th: 1 PM-4 PM 🛛 🚹 💌 🐨 💌

Finding your Tribe – this half day is designed to help you figure out who is using what platforms and why. One of the most common mis-steps in your social media plan is working on the wrong platforms for your goals. Find out what research and user-data tells you about where to put your resources and efforts. We will do some hands-on learning to discover where you tribe is and how your message can reach them. We will look at some of the new platforms as well as your materials and you want to use them. We will cover accounts, designing strategies, learning best practices, analyzing outreach and planning schedules.

NO LUNCH

April 14th: 8:30 AM-3:30 PM

Getting Found With All the Noise— We will look at Facebook, Instagram, Pinterest and some of the biggest platforms to learn how writing changes between them and making the most out of your content. How do you get found with so many competing voices? We'll go through various exercises to help you build good content. We will look at some additional graphics and analysis tools to help you refine your reach. Learn some quick tricks and tips to get you down the road.

LUNCH PROVIDED

Register online: http://naturalresourcestraining.tamu.edu/ \$100 Registration fee includes course materials and completion certificate Lunch on Day 2 provided in fee

Finding Success for Science through Social Media – Tips, Tools, and Tactics for Natural Resource Professionals

The Web is almost 30 years old from the first design by Tim Berners-Lee to what we know today in 2017. Things have changed dramatically in design, writing standards, and search ability. In addition, smart devices have outsold desktops significantly in the last 5 years. What does that mean to those in outreach and education? It means we have to continue to grow our expertise in learning how to connect the consumer to the important information we provide. We need to understand how content is found, how conversations and learning networks start, how to be discovered, and what constitutes quality outreach. We have to know where to post, when to post, and what to build on our websites. We have to learn how to reach our traditional clients as well as new clients. There are many successful models that can be used and applied in natural resource outreach and education that can help us down the road of discoverability.

Location: Upper Trinity Regional Water District 900 North Kealy Street, Lewisville, TX, 75067

Trainer: Amy E. Hays www.linkedin.com/in/amyehays/

November 6th: 1 PM-4 PM 👩 🌌 🐻 💌

Finding your Tribe – this half day is designed to help you figure out who is using what platforms and why. One of the most common mis-steps in your social media plan is working on the wrong platforms for your goals. Find out what research and user-data tells you about where to put your resources and efforts. We will do some hands-on learning to discover where you tribe is and how your message can reach them. We will look at some of the new platforms as well as your materials and you want to use them. We will cover accounts, designing strategies, learning best practices, analyzing outreach and planning schedules.

NO LUNCH

November 7th: 8:30 AM-3:30 PM

Getting Found With All the Noise— We will look at Facebook, Instagram, Pinterest and some of the biggest platforms to learn how writing changes between them and making the most out of your content. How do you get found with so many competing voices? We'll go through various exercises to help you build good content. We will look at some additional graphics and analysis tools to help you refine your reach. Learn some quick tricks and tips to get you down the road.

LUNCH PROVIDED

Register online: http://naturalresourcestraining.tamu.edu/ \$100 Registration fee includes breaks, course materials and completion certificate Please Bring your own device for this workshop!

Funding provided through a federal Clean Water Act §319(h) Nonpoint Source Grant administered by the Texas State Soil and Water Conservation Board from the U.S. Environmental Protection Agency

Implementing Watershed Based Plans

College Station/ December 17, 2018

Agenda

Monday, December 17

<u>10 a.m. to 4 p.m.</u>

- 10:00 a.m. **Introductions and Overview of Implementing Watershed Plans......Lucas Gregory** *Provide participants with an introduction to implementing watershed plans. Participants will gain an understanding of what is needed for implementing and tracking watershed protection plans.*

11:00 a.m. Implementing Watershed Protection in Geronimo and Alligator Creeks......Ward Ling This presentation will discuss working with local partners to acquire implementation grants, keeping stakeholders engaged, as well as implementing outreach and BMPs programs in Geronimo and Alligator Creeks Watershed.

1:00 p.m.Implementing Watershed Plans to Protect Drinking Water in North Texas......TinaHendon

This presentation will discuss working with local partners on watershed planning and land stewardship, implementing outreach and BMPs programs, tracking and evaluating implementation in north Texas watersheds to protect drinking water.

- 2:00 pm **Tracking WPP Implementation**......**Nikki Dictson** This session will focus on Watershed Protection Plan implementation efforts built upon the stakeholder efforts and partnerships developed during the WPP development process. Case Study examples of implementation strategies, tracking implementation, evaluating progress, and adaptive management.
- 2:30 p.m. Break
- 2:45 pm **Implementation Costs and Sources of Funding.....Lucas Gregory** This session will discuss sources of funding in Texas for implementation of WPPs along with match requirements and the mechanisms for requesting it.
- 3:45-4 p.m. Wrap Up and EvaluationsNathan Glavy

The Texas Watershed Planning education program is managed by the <u>Texas Water Resources Institute</u>, part of <u>Texas</u> <u>A&M AgriLife Research</u>, <u>AgriLife Extension</u> and College of Agriculture at <u>Texas A&M University</u>. The training course is supported by funding through a federal Clean Water Act Section 319(h) Nonpoint Source Grant administered by the Texas State Soil and Water Conservation Board from the Environmental Protection Agency.

^{12:00} p.m. **Lunch** (catered lunch or bring your own)

Fundamentals of Developing a Water Quality Monitoring Plan June 4–5, 2018

June 4–5, 2018 TCEQ Building B, Room 201, Austin Agenda

Monday, June 4	<u>9:00</u> a.m. to 5 p.m.
9:00 – 9:30 a.m.	Introductions & Workshop Overview
9:30 – 10:00 a.m.	Data Quality Objectives & Project Planning Jessica Uramkin, TCEQ Defining the water quality problem, determining monitoring objectives, and establishing data quality objectives at the outset. Long term data needs of the watershed; analytical framework to determine loadings in a watershed protection plan; routine monitoring vs. BMP evaluation (Elements H and I)
10:00 – 10:15 a.m.	Case Study: Introduction
10:15 – 10:30 a.m.	Break
10:30 – 11:00 a.m.	Inventorying and Acquiring Existing Resources Sarah Eagle & Tim Cawthon, TCEQ Review 305(b) process & existing monitoring framework Inventory existing/historic monitoring sites & data (TCEQ, USGS, others); Acquiring existing data
11:00 – 11:45 a.m.	Watershed Characterization & Sufficient Data Anne McFarland, TIAER Review/select experimental/statistical design – reconnaissance/synoptic, plot, single watershed/before- after, above-and-below watersheds, paired watersheds, multiple watersheds, trend stations Assess ability of existing data to meet objectives & identify data gaps and data needs Assessing # of additional sites, samples, and frequency needed
11:45 – 12:00 p.m.	Case Study: Defining the problem, monitoring objectives, and data quality Inventorying and acquiring existing data, selecting experimental design, and assessing data sufficiency and data gaps.
12:00 – 1:00 p.m.	Lunch (catered lunch or bring your own)
1:00 – 1:30 p.m.	Quality Assurance
1:30 – 2:45 p.m.	Selecting Monitoring Design
2:45 – 3:00 p.m.	Break

3:00 – 3:30 p.m. <i>TIAER</i>	Other Considerations & Review Building a Successful Monitoring Plan Larry Hauck,		
	Monitoring plan development to meet data quality objectives and Support Modeling; equipment; budgets; personnel constraints and available resources; and the importance of project planning.		
3:30 – 4:00 p.m.	Case Study: Selecting Monitoring Design	WRC	
4:00 – 5:00 p.m.	Workshop: Create a Monitoring Plan	^t roup	
<u>Tuesday, June 5</u>	8:30 a.m. to 3:30	<u>p.m.</u>	
8:30 – 9:30 a.m.	Workshop Follow Up: Present/Discuss Monitoring Plan <i>G</i> Each group presents monitoring plan (10 minutes per group).	Froup	
9:30 – 10:00 a.m.	Introduction to Stormwater Sampling	TWRI	
10:00 – 10:15 a.m.	Break & Travel to Monitoring Site		
10:15 – 12:00 p.m.	Monitoring Demonstrations	v/TST	
12:00 – 1:00 p.m.	Travel to Workshop Location & Lunch (catered lunch or bring your own)		
1:00 – 2:00 p.m.	Statistical Tools for Analysis Anne McFarland, The Review and demonstrate common statistical analysis for water quality data analysis. Discuss role statistics in final reporting of data, how they are tied back to overall monitoring objectives, and us evaluating BMP effectiveness and quantifying load reductions.	IAER of se for	
2:00 – 2:30 p.m.	Uncertainty in Monitoring Lucas Gregory, 7	<i>WRI</i>	
2:30 – 3:00 p.m.	Stakeholder Communications	IAER	
3:00 – 3:30 p.m.	Wrap Up Larry Hauck, The Discuss how monitoring folds into watershed based plans and ties back to watershed-based plann efforts. Complete Evaluations and receive certificates.	IAER ing	

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Applied Environmental Statistics

Statistics, down to earth

This 4.5 day course develops handson expertise for all environmental scientists who interpret data and present their findings to others. A complete understanding of how statistical methods work unfolds through applications to field-oriented problems in water quality, air quality, and bio contaminants. Statistical methods are explained in the light of data with nondetects, outliers, and skewed distributions. Methods for estimation and prediction are illustrated along with their common pitfalls. Emphases include nonparametric methods, including permutation tests and bootstrapping.

Course Content:

- Trend analysis is it getting better or worse?
- Confidence, prediction, tolerance & equivalence intervals.
- How hypothesis tests work.
- Parametric, nonparametric and permutation tests. When to use which.
- How to build a good regression equation.
- Dealing with outliers.
- When are transformations OK?
- How many samples do I need?and more.



Interactive and relevant Student exercises follow each lecture to ensure that when you return to the office, so does your new knowledge

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Applied Environmental Statistics

Course Outline

DAY 1

Describing Data in a Group

When to use a median vs a mean Dealing with skewed, non-normal data Dealing with outliers When to transform the scale Seven urban legends in env. statistics

How Hypothesis Tests Work

Their common denominators Their jargon explained 1-sided and 2-sided tests Parametric, nonparametric and permutation tests

Statistical intervals

Confidence, prediction, tolerance intervals Coping with skewed data Intervals for small data sets Bootstrap intervals — better than t-intervals

DAY 2

Comparing Two Groups of Data

Are means, medians different? Parametric, nonparametric and permutation tests Have standards been met? Testing paired data Permutation tests - test the mean of non-normal data

How many observations do I need? [if there's time]

Weaknesses of standard formulae Interactions between variation, power, and dollars Software available

Comparing Three or More Groups

One- and two-factor ANOVA Nonparametric Kruskal-Wallis test Multiple comparison tests: who's different? Permutation tests - testing means for non-normal data

Testing differences in Variability/Precision

Characterizing differences in variability Levene's & Fligner-Killeen tests Why NOT to use Bartlett's test

DAY 3

Correlation

Linear and monotonic correlation r, rho and tau Permutation test for Pearson's r The Theil-Sen line: a linear median

Linear Regression

Building a good regression model Measures of quality better than r-squared Hypothesis tests, confidence and prediction intervals Consequences of transforming the Y variable Bootstrapping tests for significance

Multiple Regression

How to build a good multiple regression model Why plots of Y vs X don't work, and what to do instead Dealing with multi-collinearity Model selection methods better than stepwise Bootstrapping tests for significance, not transforming

Which test to use?

Get the answer from the guide on our website.

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Applied Environmental Statistics

Course Outline

DAY 4

Analysis of Covariance

Do two lines differ? Modeling seasonal changes Testing differences in slope and intercept

Trend Analysis

Selecting a trend test Regression vs. Mann-Kendall approaches Monotonic and step trends Dealing with seasonality: the Seasonal Kendall test Detecting consistent regional trends R routines for trend testgin

Final Exam

DAY 5

Handling Nondetect Data Correctly

Why not substitute 1/2 the detection limit? Simple methods without substitution Introduction to survival analysis methods

Contingency Tables

Does the frequency change between groups? Application to nondetect and other categories Bootstrapping contingency tables

Logistic Regression

Regression for categorical responses Effect of X variables on the odds Modeling nondetects, qualitative methods, more Multicollinearity and hypothesis tests Download the free course textbook Statistical Methods in Water Resources. Published by the US Geological Survey in 2002, it can be downloaded from the course page at: http://practicalstats.com/training/aes/

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