The Association of State Wetland Managers Presents:

Improving Wetland Restoration Success Webinar Series

Establishing Reference Conditions for Performance Standards & Long Term Monitoring Results: Soils, Hydrology and Vegetation

Presenters:

Dr. Robert Brooks, Pennsylvania State University, Riparia

Dr. W. Lee Daniels, Virginia Tech

Dr. Eric D. Stein, Southern California Coastal Water Research Project

Moderators: Jeanne Christie & Marla Stelk

Supported by EPA Wetland Program Development Grant 83578301

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AGENDA

- **Welcome and Introductions** (10 minutes)
- **Establishing Reference Conditions for Performance Standards & Long Term Monitoring Results: Soils, Hydrology and Vegetation** (90 minutes)
  - Using Reference Wetlands for Restoration and Mitigation Design - Dr. Robert Brooks
  - Development of Performance Standards for Wetland Soil Reconstruction - Dr. W. Lee Daniels
  - Improving Mitigation Success through Use of Performance Curves (Trajectories) and Tiered Performance Standards - Dr. Eric Stein
- **Question & Answer** (15 minutes)
- **Wrap up** (5 minutes)

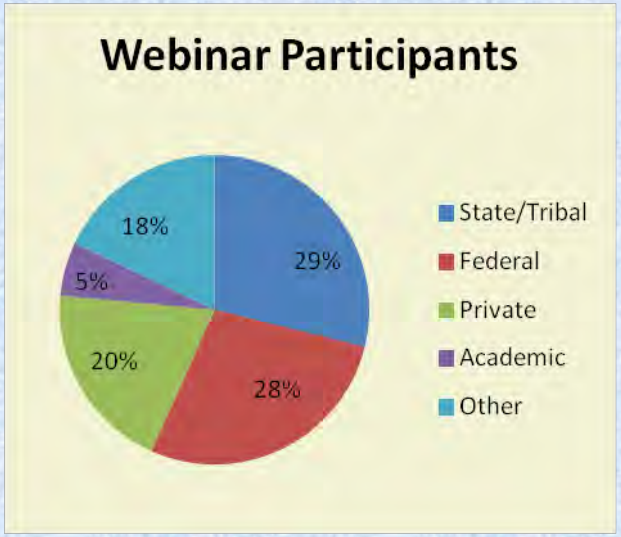
WEBINAR MODERATORS

Jeanne Christie,
Executive Director

Marla Stelk,
Policy Analyst

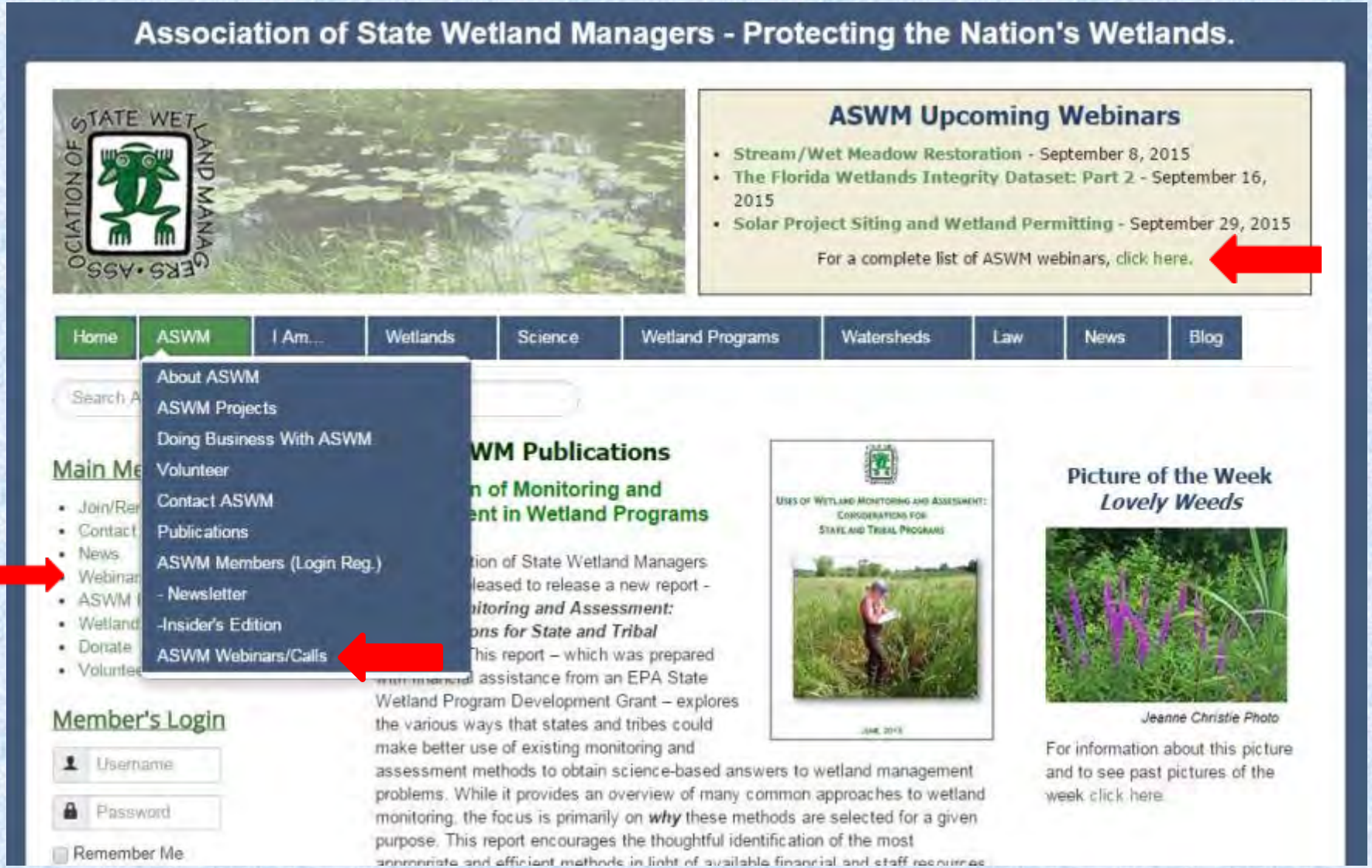
WETLAND RESTORATION PROJECT

- Interdisciplinary workgroup of 22 experts
- Monthly webinar series
- Draft white paper based on webinars, participant feedback, external review
- Pursuing strategies that:
  - Maximize outcomes for watershed management
    - Ecosystem benefits
    - Climate change
    - Invasive species
  - Improve permit applications and review
  - Develop a national strategy for improving wetland restoration success



ACTION PLAN ➡ IMPLEMENTATION

WEBINAR SCHEDULE & RECORDINGS



WEBINAR SCHEDULE & RECORDINGS

FUTURE SCHEDULE

Topics for 2016:

- Gulf Coast Restoration Post-Katrina
- Bottomland Hardwood Restoration
- How to Select the Right Wetland Restoration Team
- How to Incorporate Wetland Restoration in to Landscape Planning
- Prioritizing Wetland Restoration Mitigation Site Selection in the Face of Climate Change
- Final draft report: A National Strategy for Improving Wetlands Restoration Outcomes

FOR FULL SCHEDULE, GO TO: http://aswm.org/aswm/6774-future-webinars-improving-wetland-restoration-success-project

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*If you need CEUs for your participation in today's webinar, you **must request** documentation from ASWM.*

*Please note that we will send the documentation to you **for you to forward** to the accrediting organization.*

Please contact **Laura Burchill**
laura@aswm.org
(207) 892-3399

Provide:

- Your full name (as registered)
- Webinar date and Title

PRESENTERS

Dr. Robert Brooks,
Professor, Pennsylvania State University and Director, Riparia

Dr. W. Lee Daniels,
Professor, Virginia Tech

Dr. Eric Stein,
Principal Scientist, Southern California Coastal Water Research Project

A "COOKBOOK" APPROACH TO WETLAND RESTORATION WON'T WORK

There are too many variables.

- *Every landscape is different*
- *Purpose of restoration varies*
- *Even a good design may not anticipate events*
- *Time needed varies*
- *Intervention and adaptation may be needed during and after construction*
- *Evaluating progress and completeness is needed*

Major Reasons for Failure (examples)

Overarching

- Poorly Defined Outcomes/Performance Criteria
- Lack of Access to Expertise and Training
- Lack of Accountability and Enforcement
- Altered and Changing Landscapes/Climate
- Separation of Professions – The ‘Silo’ effect

Site-Specific

- Planning issues, i.e., Inadequate Assessment of landscape, hydrology & soils
- Construction issues, i.e., failure to implement design, no adaptive management
- Post construction issues, i.e., poor record keeping, limited follow up activity to address problems

How Do We Improve?

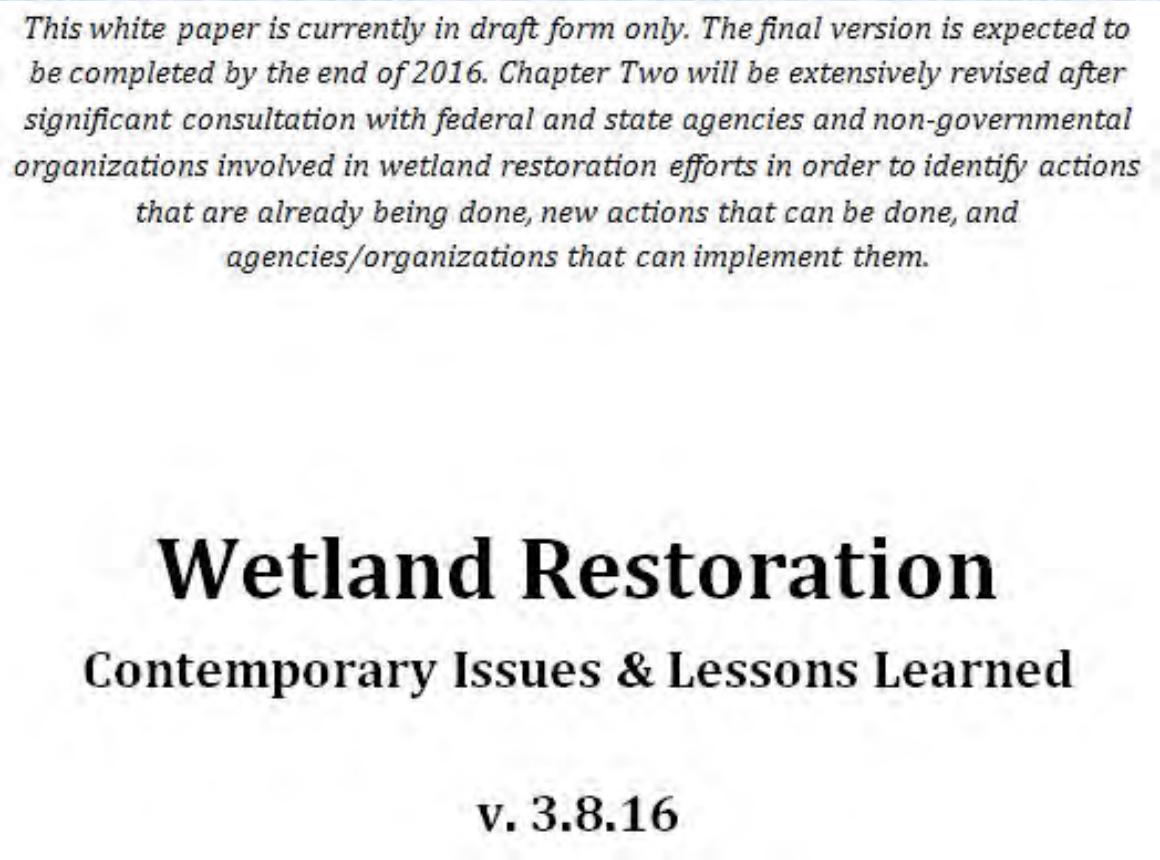
- Better defined goals and performance criteria
- Improve Access to Knowledge and Training
- Require Accountability
- Require Documentation of Credentials
- Develop a Common Taxonomy
- Adopt New Science and Technology into Regulations and Guidance
- Engage Multi-Disciplinary, Integrated Teams
- Regional Data Depositories to Document Reasons for Success and Failure

EACH WETLAND RESTORATION PROJECT IS UNIQUE:

- *Consider both historic and current landscape setting*
- *Analyze how water moves into and out of the site*
- *Evaluate soils present and identify any onsite drainage*
- *Focus first on hydrology and soil first, last on plants*
- *Develop a plan that is achievable for the site*
- *Develop comprehensive cost estimates*
- *Ensure plan is followed*
- *Hire experienced and knowledgeable contractors*
- *Adapt plan as needed during construction*
- *Determine if monitoring criteria will measure progress*
- *Keep good records and share with others*

WHITE PAPER AVAILABLE TO REVIEW

http://www.aswm.org/pdf_lib/wetland_restoration_whitepaper_041415.pdf



This white paper is currently in draft form only. The final version is expected to be completed by the end of 2016. Chapter Two will be extensively revised after significant consultation with federal and state agencies and non-governmental organizations involved in wetland restoration efforts in order to identify actions that are already being done, new actions that can be done, and agencies/organizations that can implement them.

Wetland Restoration

Contemporary Issues & Lessons Learned

v. 3.8.16

Additional Information: http://www.aswm.org/wetland-science/wetland-restoration

Chapter 2: Actions to Improve Wetland Restoration

Overall Recommended Actions

This current document identifies needed actions. In 2015 & 2016, this part of the paper will be expanded and revised to identify how these changes could be implemented by suggesting who, what and how.

RECOMMENDED ACTION #1: Develop Clear Project Goals & Use Appropriate and Quantifiable Performance Standards to Measure Progress

RECOMMENDED ACTION #2: Develop Achievable Performance Criteria for Short Term Evaluation and Establish a Long-Term Management Plan

RECOMMENDED ACTION #3: Establish Appropriate Performance Criteria Based on Restoration Goals & Project Type

RECOMMENDED ACTION #4: Research the Site's Land Use History and Model Potential Future Stressors Using Historical Trend Data

RECOMMENDED ACTION #5: Use a Watershed Approach

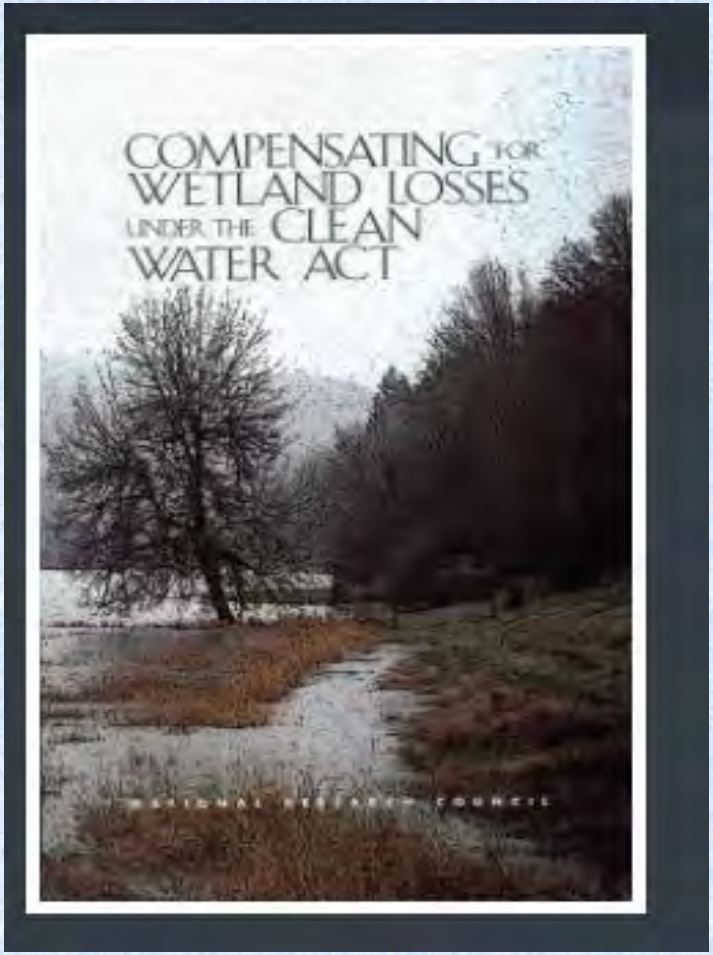
RECOMMENDED ACTION #6: Include Pre and Post Construction Costs in Estimates

RECOMMENDED ACTION #7: Use an Adaptive Management Approach Throughout the Life of the Project

RECOMMENDED ACTION #8: Require Documentation of Credentials, Provide Incentives & Enforce Accountability

RECOMMENDED ACTION #9: Improve Access to Knowledge & Training and Engage Multi-Disciplinary Interdisciplinary Teams

Identifying Challenges Can Lead to Solutions: A Previous Case



National Mitigation Action Plan Recommendations

Example: The Corps and EPA, in conjunction with USDA, DOI, and NOAA, working with States and Tribes, will co-lead the development of guidance on the use of on-site vs. off-site and in-kind vs. out-of-kind compensatory mitigation by the end of 2003.

RECOMMENDED ACTION #2:

DEVELOP ACHIEVABLE PERFORMANCE CRITERIA FOR SHORT TERM EVALUATION AND ESTABLISH A LONG-TERM MANAGEMENT PLAN

Seeking Specific Recommendations

- Who should take action (can be many parties)?
- What should they do?
- How should they do it?

Recommendations Welcome

- Please submit to:

Marla Stelk (one of your moderators today!)

marla@aswm.org

Establishing Reference Conditions for Performance Standards & Long Term Monitoring Results

IT WILL TAKE US A FEW MOMENTS TO MAKE THE SWITCH…

Photo Credit: Marla Stelk

Brooks Recommendations

Cause of Failure	Recommendation	Selected Measures
Projects do not mimic natural wetlands	Use data from reference wetlands for design and performance	Match landscape position, appropriate wetland type; match hydrology, soil, and vegetation metrics; avoid chronic stressors
Use of inappropriate evaluation metrics & permit conditions	Use the same methods for assessing conditions and functions, as for evaluating performance	Variables from 3 levels: 1 – Landscape, 2 – Rapid Assessment with stressors, and 3 – Intensive Assessment
Insufficient match of hydrology	Use predictive model or reference hydrographs	Match to regional hydrographs & metrics; record data over variable conditions or simulate variation in models (e.g., WetBud)
Inappropriate use and selection of plants species	Compare to appropriate reference wetlands (proper type); build in lag time for maturation	Vegetation – Floristic Quality Index (FQI) Wentworth Index (wetland indicator status) Invasive species management & control
Selecting/creating improper soil type	Excavating into subsoil = less organic matter; requires amendments	Soil texture; organic matter from initiation; hydric soil if available; match reference sites

Daniels Recommendations

Cause of Failure	Recommendation	Selected Measures
Low soil organic matter levels limit microbial reduction processes, plant rooting etc.	Save and replace native high OM hydric soil materials (where feasible) and/or add appropriate organic amendments.	If possible, stockpile native O+A horizon materials and maintain them in a wet and vegetated condition. Direct haul topsoil from donor to creation site. Add stable low N+P composts at 25 to 35 dT/Ac.
Soil compaction limits rooting, water penetration, organic matter incorporation and microbial activity.	Limit subsoil compaction when and where possible. Rip and loosen graded subsoils to necessary rooting depth. Loosen topsoil following placement.	If water budget design requires a compacted "perching seal", estimate and reconstruct required rooting depth. Monitor bulk-density post-construction. Rip and loosen when > 1.35 for fine-textures and >1.75 for sands. Limit major grading & ripping to driest periods of year.
Inaccurate interpretation of relict soil redox features indicates soils are hydric when they are not "active".	Carefully describe and assess redox features with depth before and immediately after site construction. Follow-up with detailed assessments at years 1, 3, 5 etc.	Describe soils in multiple test pits before development and quantify color (including size and abundance) of all horizons vs. depth. Conduct follow-up assessments with sufficient observations to allow statistical tests of whether matrix chroma is shifting down, Fe-concentration abundance is increasing, etc.
Hydrology is not correct; e.g. wrong hydroperiod for intended wetland type.	Use HGM to provide input for an appropriate and rigorous *a priori* water budget estimation during the design process.	Determine HGM setting of both the impact and the proposed creation site. Quantify whether or not groundwater is a significant input via a minimum of 6 month of field data for mid-winter to early summer. Avoid bias in W-N-D year selection for water budgeting and include groundwater when applicable.

Stein Recommendations

Cause of Failure	Recommendation	Selected Measures
Monitoring and management periods are too short	Develop regional programs to allow for monitoring and management for min of 20 yrs.	Mitigation sites meet functional success criteria within acceptable (asymptotic) ranges of variability at 10, 15, 20 years post installation. Recovery following episodic disturbances (e.g. fire, flood) occurs within 5-7 years
Performance standards do not require development of physical template and functional hydrology	Work with permitting agencies to develop function based performance measures that are implemented in a tiered manner	Mitigation sites achieve hydrologic function necessary for success within first three years following installation. Plant success measures deferred until after hydrologic functions are achieved
Poor site selection and design	Incorporate landscape ecology and historical ecology understanding into design	Analyze historical distributions of wetlands at the watershed scale. Create templates for watershed-scale restoration based on this understanding. Mitigation projects must select and design sites consistent with the overall watershed plan
Performance standards not adequately anchored to reference conditions	Develop regional reference networks and make the data readily available. Reference sites monitoring routinely over time	Every region maintains a set of reference wetlands representing all wetland types. Reference sites are routinely monitored and data is made broadly and easily available

Questions?

Dr. Robert Brooks: rpb2@psu.edu

Dr. W. Lee Daniels: wdaniels@vt.edu

Dr. Eric Stein: erics@sccwrp.org


Thank you for your participation!
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