

Improving Wetland Restoration "Success" - What We've Learned So Far

Jeanne Christie, Executive Director

&

Marla J. Stelk, Policy Analyst

Association of State Wetland Managers





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AGENDA

- **Welcome, Introductions & Overview** (10 minutes)
- **Improving Wetland Restoration “Success”:
What We’ve Learned So Far** (30 minutes)
- **Panel Discussion** (60 minutes)
 - Mary Kentula, EPA; David Olson, ACOE; Larry Urban, Montana DOT
- **Question & Answer** (15 minutes)
- **Wrap up** (5 minutes)



WEBINAR PRESENTERS



Jeanne Christie
Executive Director
ASWM



Marla Stelk
Policy Analyst
ASWM



WEBINAR PANELISTS



Dr. Mary Kentula
Wetlands Ecologist
U.S. EPA National
Health and
Environmental Effects
Laboratory's Western
Ecology Division



David Olson
*Regulatory Program
Manager*
U.S. Army Corps of
Engineers
Headquarters



Larry Urban
*Wetland Mitigation
Specialist*
Montana Dept. of
Transportation

WEBINAR SCHEDULE & RECORDINGS

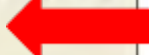
Association of State Wetland Managers - Protecting the Nation's Wetlands.



ASWM Upcoming Webinars

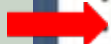
- Stream/Wet Meadow Restoration - September 8, 2015
- The Florida Wetlands Integrity Dataset: Part 2 - September 16, 2015
- Solar Project Siting and Wetland Permitting - September 29, 2015

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ASWM Publications

Journal of Monitoring and Assessment in Wetland Programs

Association of State Wetland Managers released a new report - *Uses of Wetland Monitoring and Assessment: Considerations for State and Tribal Programs*. This report - which was prepared with technical assistance from an EPA State Wetland Program Development Grant - explores the various ways that states and tribes could make better use of existing monitoring and assessment methods to obtain science-based answers to wetland management problems. While it provides an overview of many common approaches to wetland monitoring, the focus is primarily on **why** these methods are selected for a given purpose. This report encourages the thoughtful identification of the most appropriate and efficient methods in light of available financial and staff resources.



Picture of the Week *Lovely Weeds*



Jeanne Christie Photo

For information about this picture and to see past pictures of the week click [here](#).

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ASWM Webinars/Conference Schedule

The Association of State Wetland Managers holds webinars on various topics, most of which relate to a specific project and work group. In addition, ASWM holds webinars as part of its members' webinar series on topics of interest to members. Please click on the webinar group name below for more details about individual webinars. In all cases, if you have any questions about registering for a webinar, please contact Laura at laura@aswm.org.

If you haven't used Go To Webinar before or you just need a refresher, please view our guide prior to the webinar here.

The Association of State Wetland Managers (ASWM) and the Society of Wetland Scientists (SWS) share the common goal of encouraging sound science in wetland research, management, restoration, policy, and conservation. To meet this goal, the two organizations developed a formal partnership in 2018. ASWM is pleased to provide a link to SWS's new Members Webinar Series and encourage you to investigate their webinar series as well as our own.

For a full list of all available webinar recordings with links, [click here](#).

Members' Wetland Webinar Series

For Members of ASWM Only

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Hot Topics Webinar Series

Using Remote Sensing to Monitor Wetland Restoration Success: An Introduction to the Google Earth Engine Platform (GEE)

Improving Wetland Restoration Success Project

Improving Wetland Restoration Success: 2014 - 2011 Webinar Series

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Improving Wetland Restoration "Success" - What We've Learned So Far

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Association of State Wetland Managers





ASWM Wetland Restoration Project

- 2 U.S. EPA Wetlands Division Grants
 - ▣ Identifying Best Management Practices for Restoration (2013-2014)
 - ▣ Raising the Bar on Wetland Restoration Success (2015-2016)
- Interdisciplinary work group of 22 experts
- Monthly webinar series
- White paper based on webinars and participant feedback
- Pursuing strategies that:
 - ▣ Maximize outcomes for watershed management
 - ▣ Include ecosystem benefits
 - ▣ Consider climate change
 - ▣ Improve permit applications and review
- Develop a national strategy for improving wetland restoration “success”
 - ▣ Implementation: identify current actions & key future actions & players

ASWM Wetland Restoration Work Group

- Jeanne Christie, Association of State Wetland Managers (Chair)
- Marla Stelk, Association of State Wetland Managers (Facilitator)
- Lisa Cowan, PLA, StudioVerde
- Rebecca Dils, U.S. EPA Office of Water, Wetlands Division
- Norman Famous, Consultant
- Mark Fonseca, Ph.D., CSA Ocean Sciences
- Tom Harcarik, Ohio EPA's Division of Environmental and Financial Assistance
- Ted LaGrange, Nebraska Game and Parks Commission
- Roy R. "Robin", Lewis, III, Lewis Environmental Services, Inc., & Coastal Resources Group, Inc.
- Michael McDavit, U.S. EPA Office of Water, Wetlands Division
- Mick Micacchion, Midwest Biodiversity Institute
- Myra Price, U.S. EPA Office of Water, Wetlands Division
- Bruce Pruitt, Ph.D., PH, PWS, USACE Engineer Research and Development Center
- Joseph Shisler, ARCADIS
- Marcia Spencer-Famous, Maine Department of Agriculture, Conservation and Forestry
- John Teal, Ph.D., Woods Hole Oceanographic Institution
- James Turek, NOAA Fisheries Restoration Center
- Lawrence Urban, Montana Department of Transportation
- Richard Weber, P.E., USDA Natural Resources Conservation Service Wetland Team
- Scott Yaich, Ducks Unlimited
- Sally Yost, USACE Engineer Research and Development Center
- Joy Zedler, Ph.D., University of Wisconsin-Madison

White Paper Available to Review

[http://www.aswm.org/pdf lib/wetland restoration whitepaper 041415.pdf](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.

Wetland Restoration **Contemporary Issues & Lessons Learned**

v. 7.24.15

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



ASWM Upcoming Webinars

- Using Beaver as a Wetland Restoration Tool - July 29, 2015
- The Florida Wetlands Integrity Dataset: Part 2 - September 16, 2015

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Improving Wetland Restoration Success Project

Recent news articles from 2013, such as Architects of the Swamp published in Scientific American, have sounded the alarm about the success, or lack thereof, of wetland restoration. ASWM responded by completing two publications in 2013. The first publication titled, Permits for Voluntary Wetland Restoration: A Handbook was completed in November of 2013. However, during discussions among the stakeholder working group, it became apparent that some positions or concerns advanced by participants could not be readily resolved through the publication of a handbook. So a white paper titled, Voluntary Restoration of Wetlands: Complex Issues in the Regulation of Restoration Projects was developed in order to document those unresolved concerns – including suggested program modifications that would require regulatory and/or statutory changes beyond the purview of most wetland program managers. In July of 2014, ASWM published a report titled, Ecosystem Service Valuation for Wetland Restoration: What it is, How To Do it, and Best Practice Recommendations, as a way to improve wetland restoration planning, prioritization and garner more public and policy support.



Wetland restoration panel discussion moderated by Jeanne Christie (with Joseph Shisler and Rob Brooks; Robin Lewis and Joy Zedler participated in the panel by remote broadcast)

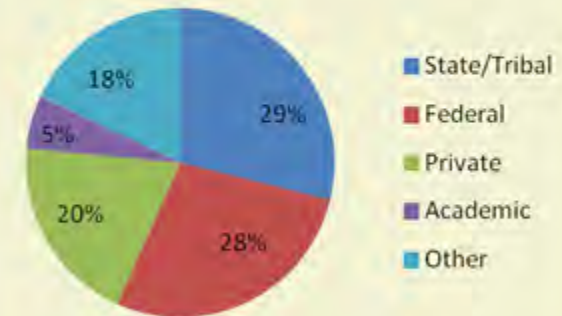
However, in March of 2014, ASWM held its annual Federal/State/Tribal Coordination Meeting at the NCTC in West Virginia. During that 4 day meeting, an expert panel session was held on Why Do Wetland Restoration and Mitigation Projects Fail? Robin Lewis, Joe Shisler, Joy Zedler and Rob Brooks participated on the panel. During that panel and in a later evening restoration workshop, ASWM was able to glean some insight in to some of the barriers to successful restoration and suggestions for potential solutions. In April of 2014, ASWM continued this effort by developing a Wetland Restoration Work Group consisting of twenty-five experts including practitioners, regulators, policy makers, scientists and academics. The work group was tasked with developing a series of webinars to delve into the issue more deeply as well as contribute to a white paper and a restoration bibliography. This webinar series is the result of this collective effort.

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Overall Challenges



#1: INCONSISTENT & SUBJECTIVE EVALUATION OF WETLAND RESTORATION OUTCOMES

“I restored it, so it’s a success.”

“It’s green, so it’s a success.”

“We spent a million bucks, so it’s a
\$ucce\$\$.”



“I saw a marsh bird,
so it’s a success.”

“I took a course in restoration, so it’s
a success.”

“Mom likes it, so it’s a success.”



I CAN'T BELIEVE SCHOOLS
ARE STILL TEACHING KIDS
ABOUT THE NULL HYPOTHESIS.
I REMEMBER READING A BIG
STUDY THAT CONCLUSIVELY
DISPROVED IT YEARS AGO.



Why it's time to publish research
“failures”

Publishing bias favors positive
results; now there's a movement to
change that.

Source: Elsevier.com

If NO THING is right,
It's still “on its way to success.”

#2: VAGUE PERFORMANCE CRITERIA & INSUFFICIENT MONITORING HORIZONS

- ❑ Water quality inputs and existing soil conditions.
- ❑ 3-5 years time window.
- ❑ Reference wetlands.



#3: *NARROWLY FOCUSED REGULATIONS & PERMIT APPLICATIONS DON'T ANTICIPATE VARIABILITY*

- ❑ Wetlands are diverse.
- ❑ Regions of the U.S. vary ecologically.
- ❑ Site location on the landscape and surrounding land use practices matter.
- ❑ Different goals and methods for wetland restoration (voluntary vs compensatory), enhancement, creation & construction.



#4: LACK OF ACCESS TO EXPERTISE, TRAINING & KNOWLEDGE SHARING

- ❑ Prohibitive costs to academic journals.
- ❑ Insufficient time to review literature.
- ❑ Lack of undergraduate and graduate studies.
- ❑ Lack of training opportunities for practicing professionals.
- ❑ Lack of access to information about performance of wetlands previously restored.
- ❑ Professional silos.



Photo credit: Jeanne Christie

#5: UNDERESTIMATION OF RESTORATION COSTS IN DEVELOPING COST ESTIMATES

- Restoration costs, particularly pre and post construction costs, are frequently underestimated.
- Pressure to further reduce anticipated costs.
- Very little information available to compare restoration costs.
- Restoration benefits often undervalued because they are public goods.

2 + 2 = 3...?

#6: *LACK OF CERTIFICATION, ACCOUNTABILITY & ENFORCEMENT*

- Monitoring and assessment reports rarely result in revisions and changes.
- There is no penalty for a restored wetland that doesn't meet performance criteria.
- Monitoring reports are usually provided by the permit applicant.



Photo credit: Jeanne Christie

#7: ALTERED LANDSCAPES & CHANGING LAND USES

- Lack of consideration of the historical, current and projected future context of the proposed restoration site constrains restoration.
- Drainage
- Soil condition
- Modified streams and rivers
- Future LULC



Photo credit: Edwin Ami

#8: CLIMATE CHANGE

- Wetlands are at risk.
- An effective tool to both mitigate and adapt.
- Flora, fauna, hydrology and soil condition may not be suited to that site in the future.
- Wetland may need to move across the landscape (i.e., marsh migration).



Photo credit: Jeanne Christie

#9: SILOS FOR WETLAND & STREAM RESTORATION

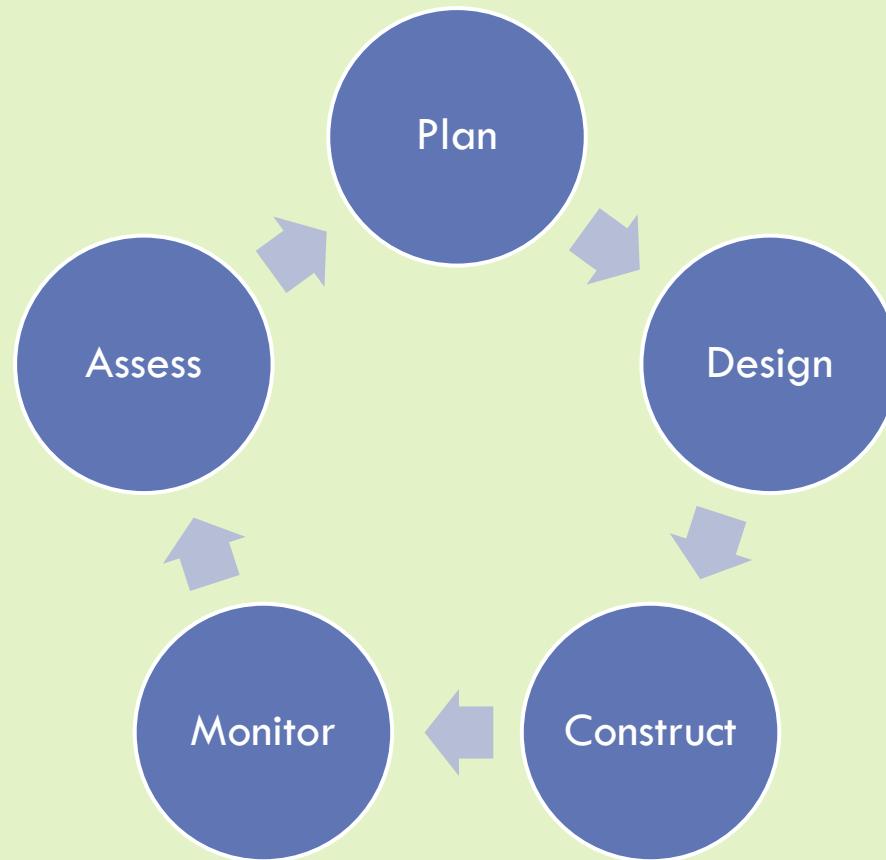
- Wetland and stream restoration are still largely addressed separately.
- Wetland projects determined to be a “success” by all wetland scientists can have serious negative impacts on stream and floodplain function - the same occurs for stream restoration projects.



Photo credit: Rennet Stowe

#10: *LACK OF AN ADAPTIVE MANAGEMENT FRAMEWORK*

“The unexpected is to be expected.” (Cottam, 1987)

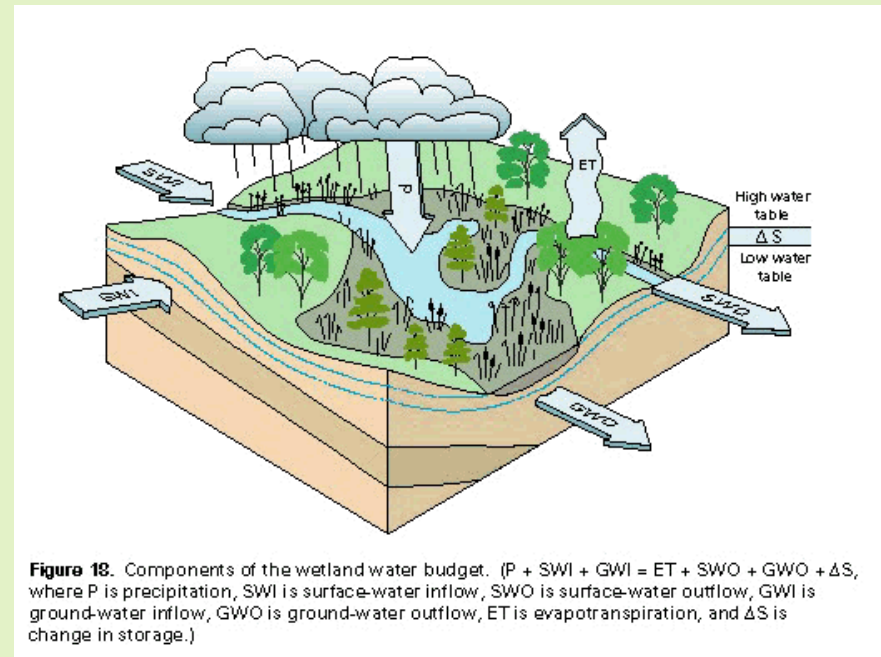


PRE-CONSTRUCTION: PLANNING PHASE & DESIGN PHASE



Planning & Design

- ❑ Poor site selection.
- ❑ Inadequate assessment of hydrology.
- ❑ Failure to fully assess and plan for soils.
- ❑ Inappropriate plant selection.



Source: USGS

DURING CONSTRUCTION PHASE



Construction

- ❑ Failure to adequately implement design.
- ❑ Soil compaction.
- ❑ Lack of consistent oversight.
- ❑ Lack of sufficiently experienced construction teams.



Photo credit: Erik Stockdale

POST-CONSTRUCTION: MONITORING & ASSESSMENT PHASE



Monitoring & Assessment

- ❑ Lack of access to monitoring reports
- ❑ Poor record keeping.
- ❑ Monitoring period too short.
- ❑ Performance standards may be insufficient.



Photo credit: Jeanne Christie

OVERALL RECOMMENDATIONS



Photo credit: Peter van der Sluijs

Provide a meaningful way to define wetland goals.



Create adaptive & quantifiable performance criteria.

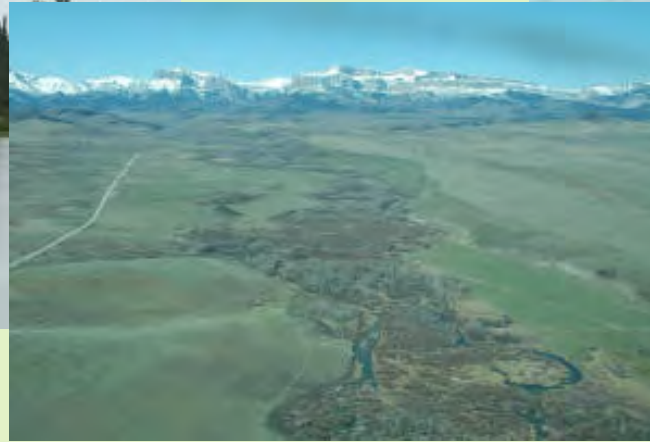


Photo credit: Jeanne Christie

Create a common taxonomy by type.



Racquette River floodplain wetland.
Photo credit: John McShane



Riverine wetlands. Photo credit: Montana DEQ



Prairie Pothole wetlands.
Photo credit: USFWS



Bog. Photo credit: Jeanne Christie

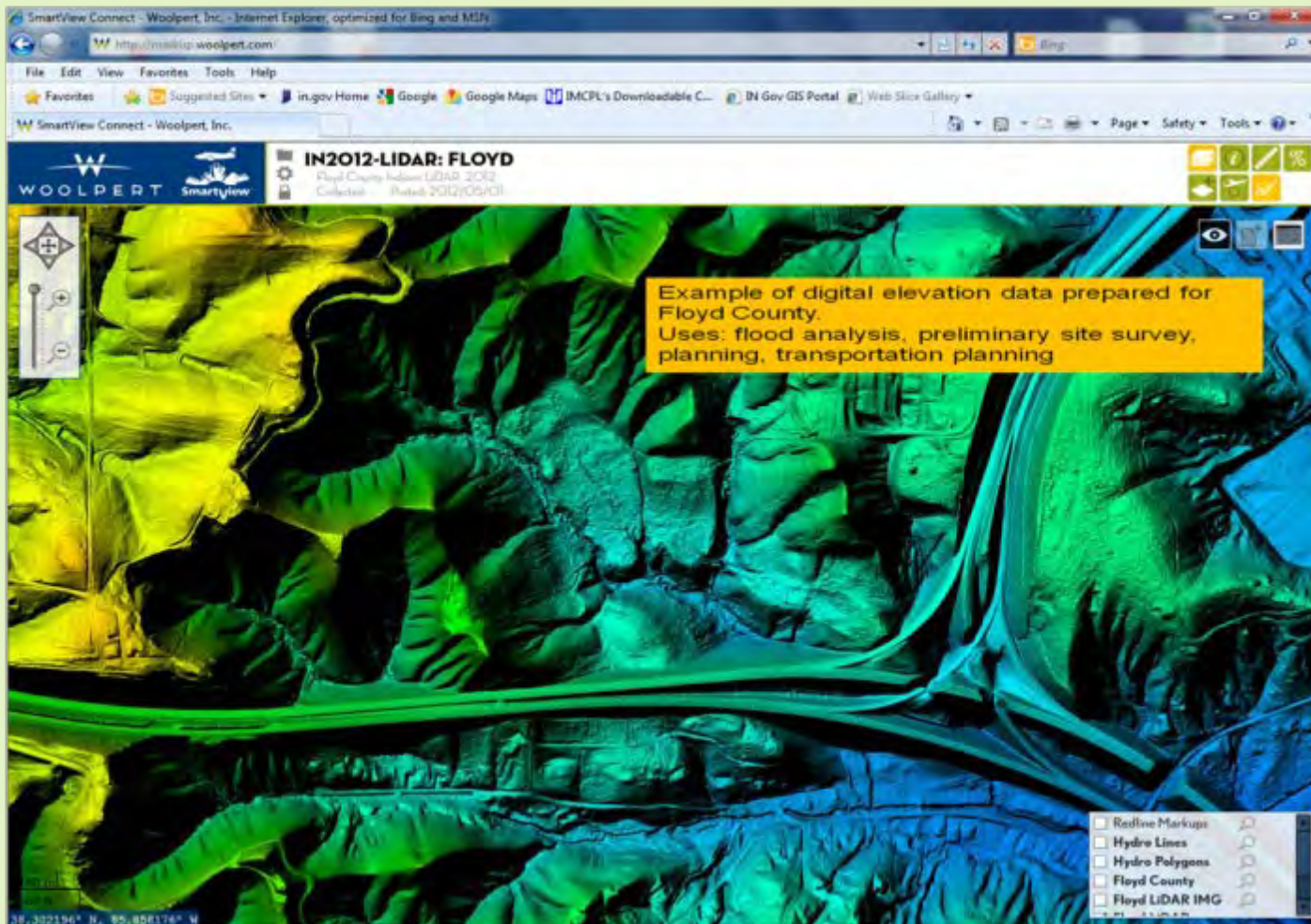


Tidal salt marsh. Photo credit: US EPA



Vernal pool. Photo credit: Jeanne Christie

Revise regulations & permit applications to reflect variability .



Source: Indiana Geographic Information Office

Enforce accountability.



Photo credits: Jeanne Christie

Improve access to knowledge & training.



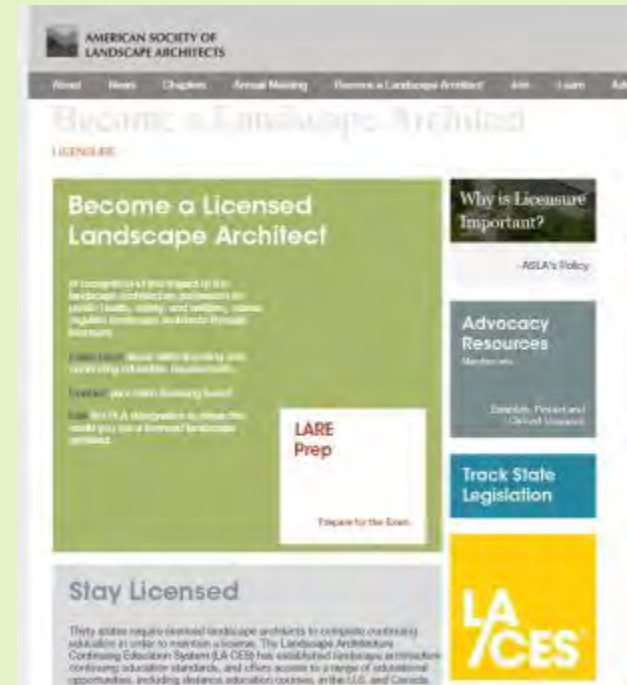
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Require documentation of credentials.



**Society of Wetland Scientists
Professional Certification Program**

"The PWS program is very special, in the fact that it upholds strong ethical values and it shows support for the hard working wetland professionals."
Key McMurry, Owner, Key Environmental Solutions



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- ASLA's Policy

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Stay Licensed
Thirty states require licensed landscape architects to complete continuing education in order to maintain a license. The Landscape Architecture Continuing Education System (LA CES) has established landscape architecture continuing education standards, and offers access to a range of educational opportunities, including distance education courses, in the U.S. and Canada.

LA CES



National Society of Professional Engineers

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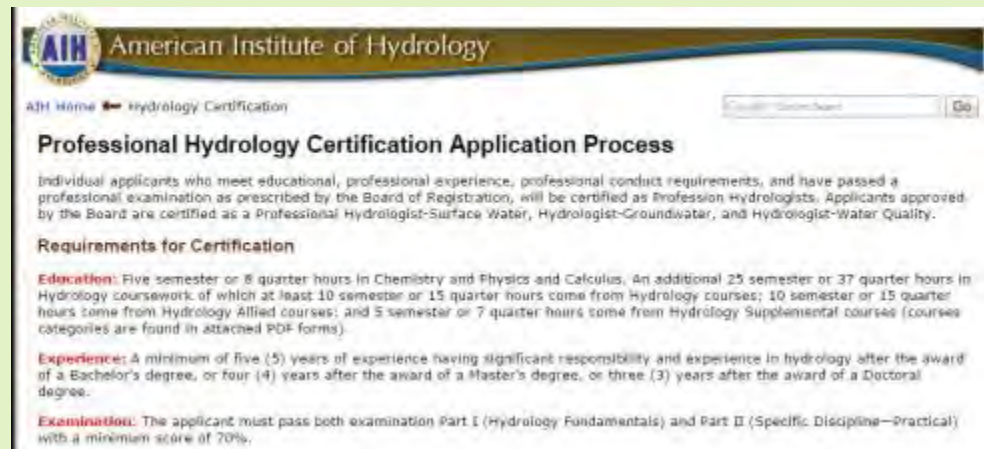
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Individual applicants who meet educational, professional experience, professional conduct requirements, and have passed a professional examination as prescribed by the Board of Registration, will be certified as Professional Hydrologists. Applicants approved by the Board are certified as a Professional Hydrologist-Surface Water, Hydrologist-Groundwater, and Hydrologist-Water Quality.

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Experience: A minimum of five (5) years of experience having significant responsibility and experience in hydrology after the award of a Bachelor's degree, or four (4) years after the award of a Master's degree, or three (3) years after the award of a Doctoral degree.

Examination: The applicant must pass both examination Part I (Hydrology Fundamentals) and Part II (Specific Discipline-Practical) with a minimum score of 70%.

Engage Multi-Disciplinary, Integrated Teams.



Photo credit: Jeanne Christie

Next Steps: Determine Actions Needed

- Identify concrete actions that can be taken within specific practice areas (i.e., regulatory, policy, planning & design, construction, etc.).
- Identify who and/or what organization(s) is best suited to implement those actions (or is already working on them).
- Determine how actions can be best implemented.
- Develop a national strategy for improving wetland restoration practice and outcomes.

Coming in 2016.....

- Continuing Webinar Series Each Month and Beginning to Look at Solutions
- Opportunities to Offer Recommendations on Actions Needed
- Identification of Activities Already Underway to Encourage Information sharing and Evaluation
- Peer Review of White Paper
- Finalize White Paper



Resources

- ASWM Wetland Restoration Bibliography
<http://www.aswm.org/pdf lib/restoration webinar/wetland restoration bibliography 0415.pdf>
- Wetland Restoration: Contemporary Issues & Lessons Learned (draft white paper)
<http://www.aswm.org/pdf lib/wetland restoration whitepaper 041415.pdf>
- Ecosystem Service Valuation for Wetland Restoration: What It Is, How To Do It, and Best Practice Recommendations
<http://www.aswm.org/state meeting/2014/ecosystem service valuation for wetland restoration.pdf>
- Permits for Voluntary Wetland Restoration: A Handbook
<http://www.aswm.org/pdf lib/permits for voluntary wetland restoration handbook.pdf>
- Voluntary Restoration of Wetlands: Complex Issues in the Regulation of Restoration Projects
<http://www.aswm.org/pdf lib/voluntary restoration of wetlands.pdf>
- ASWM Restoration Webpages <http://www.aswm.org/wetland-science/wetland-restoration>

Questions for Panelists

**Mary Kentula, EPA; David Olson, ACOE; and
Larry Urban, Montana DOT**

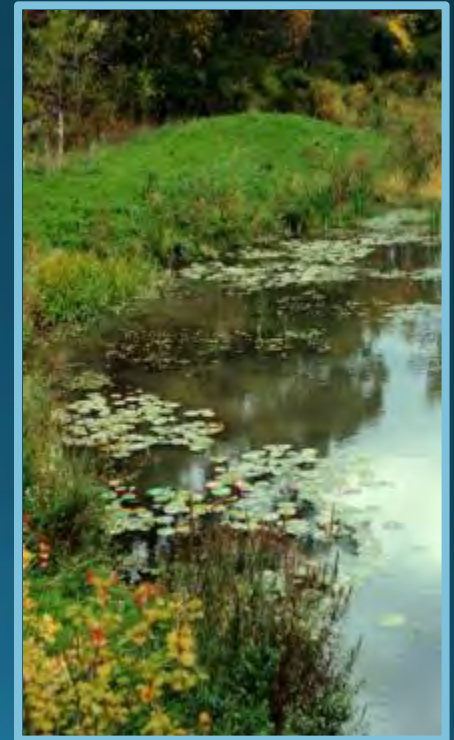
1. Are the identified barriers to achieving wetland restoration goals consistent with your experience or is your list different, and if so how?
2. What are some advances in wetland restoration that were highlighted in the webinars or that you have observed?
3. Has listening to the webinars adjusted your thinking about barriers and solutions?
4. What do you think are the most important actions to take to improve restoration outcomes?

Question #1:

Are the identified barriers to achieving wetland restoration goals consistent with your experience or is your list different, and if so how?

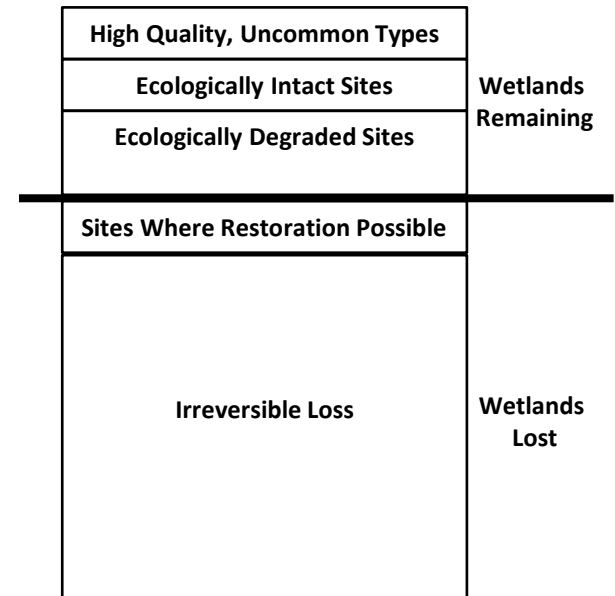
Barriers to Achieving Restoration Goals:

- Vague performance criteria and insufficient monitoring horizons
- Lack of accountability and enforcement
- Underestimation of restoration costs



Q.1 - Barriers to achieving wetland restoration goals (previously known and new)

- Sparse technical training for decision-makers
- Declining number of sites with good restoration potential
- Failure to consider the system and processes (both for wetlands and landscape)
- Restoration performance in a rapidly changing environment
- Not understanding limits of reference sites



Bedford, BL. 1999. Cumulative effects on wetland landscapes. *Wetlands* 19:775-788.

1. Are the identified barriers to achieving wetland restoration goals consistent with your experience or is your list different, and if so how?

- ❖ Regulations & permitting - Regional differences in the development of wetland restoration projects that need to be taken into account by regulatory agencies. Performance standards are not all the same for every region of the country. What works in South Carolina does not work in Montana and vice versa. There is no cookbook or cookie cutter approach to wetland performance standards but would be helpful from a regional standpoint to develop some examples for practitioners to think about in planning projects.
- ❖ Regional concerns – In the western US, water rights are a huge factor as to whether or not you can develop a restoration project. Understanding hydrology and the water law is integral to projects in the west and how it applies.
- ❖ Wetland designs and specifications that adequately identify and explain how the project is to be constructed.
- ❖ Lack of construction contractors experienced in the science behind aquatic restoration projects.



Understanding of things like undulating roughened bottoms for wetlands is not building a motocross track.

Question #2:

What are some advances in wetland restoration that were highlighted in the webinars or that you have observed?

Q.2 – Advances in wetland restoration



- Importance of different scales (site, landscape, region)
- More emphasis on first restoring appropriate hydrology and hydrodynamics, and soils
- Increased availability of tools for site-selection, design, monitoring
- Restoring/repairing ecological processes, instead of form
- Understanding need for different approaches by region and wetland type

2. What advances have you observed in aquatic restoration activities in your work experience?

- ❖ A Primary advancement that is integral in today's restoration science is an understanding for the proper selection of potential sites and placement of projects within the context of a landscape / watershed setting. More focus is occurring today to utilize the science of Hydrogeomorphology to insure positioning within the watershed that lead to desirable outcomes for the project.
- ❖ Improvements in the identification of suitable reference areas that are the least disturbed in the surrounding landscape in order to plan, design and implement restoration projects. Setting appropriate performance objectives and goals can be based upon the functionality of that reference ecosystem if done properly.



Advances in Wetland Restoration:

- Increased specificity in identification of details to be incorporated into the restoration plan
- Use of hydrologic and hydrogeomorphic information and data in siting and design
- Recognition of importance of the landscape/regional setting

Question #3:

Has listening to the webinars adjusted your thinking about barriers and solutions?

3. Has listening to the webinars adjusted your thinking about barriers and solutions?

- ❖ It certainly has adjusted my thinking in the planning and implementation of MDT's restoration projects. I am constantly learning from each webinar and have begun to integrate some of things that I have learned into improving the aquatic resource projects that I am involved with through each stage of the project. Integration has included:
 - ❖ Development of site appropriate performance standards and monitoring requirements based upon reference site information.
 - ❖ Implementation during each phase of a project to add experienced restoration peer reviewers (hydrologists/geomorphologists/biologists) to review project design plans before submission to agencies and prior to construction.
 - ❖ Improving project designs, construction details and specifications for construction contractors to understand.
 - ❖ Hiring of experienced restoration personal to provide oversight during the construction phase of projects.
 - ❖ Creation of a Pre-qualified list of Construction contractors with aquatic resource restoration experience

How have the webinars affected my thinking on barriers and solutions?

- Surprise at how much has and hasn't changed since the publication of Kusler and Kentula
- Impressed with the progress in diagnosis of site conditions and techniques to deal with them
- Optimistic about the expertise available to do and improve restoration



Photo by J. Nestlerode

Q.3 – Changes in thinking about barriers or solutions



- Get the hydrology right and give restoration projects time to develop
- Do more acquisition/long-term protection of well-functioning wetlands
- Biology of invasive and non-native species
- Weigh benefits vs. cost
 - Costs to attain desired ecological performance
- Alternatives to wetland restoration in highly altered landscapes



Question #4:

What do you think are the most important actions to take to improve restoration outcomes?

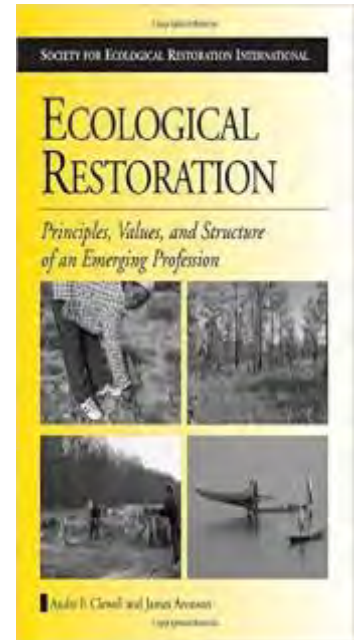
Actions to improve restoration:

- Improve the credibility of the restoration profession
- Create and adopt adaptive and quantifiable performance criteria
- Enforce accountability



Q.4 - Important actions to take to improve restoration outcomes

- Concise technical restoration guidebooks, by wetland type
- Careful site selection
- Understanding of:
 - Ecosystem dynamics and development
 - State of the landscape and changing environment
 - Limiting factors, expected future conditions
- Monitor performance and take action (adaptive management)



Clewell, A.F. and J. Aronson. 2013. Ecological Restoration: Principles, Values, and Structure of an Emerging Profession (2nd ed.)

4. What do you think are the most important actions to take to improve restoration outcomes

- ❖ Expect the unexpected as the science of wetland restoration is still in many instances unknown. However be prepared by conducting sufficient studies and evaluation of all the integral components of the project site. Conduct sufficient studies that evaluate the hydrology, soils, geology, plant communities, etc.
- ❖ Be prepared to conduct adaptive management if necessary to achieve the desirable outcomes. Build into the performance standards opportunities to re-plant dead woody shrubs/trees, or allow for planting of such species at a later date to allow for the hydrologic regime to establish within the site.
- ❖ Improvements in the identifying and locating suitable reference areas that are the least disturbed in the surrounding landscape in order to plan, design and implement restoration projects, as well as setting appropriate performance objectives and goals based upon those ecosystems.
- ❖ Keep it simple principle.

Questions?

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