



# Wetlands Working Group

The Wildlife Society



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December 2017

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## 2017 STUDENT AWARD WINNERS ANNOUNCED!

We had an excellent pool of applications for the 2017 Student Travel Award and are excited to announce two winners who tied for 1st place:

*Congratulations to Paul Taillie and Drew Fowler!*

Paul Taillie is a PhD candidate in the Fisheries, Wildlife, and Conservation Biology Program at North Carolina State University. Inspired by the complex ecological relationships observed in natural systems, Paul's research explores patterns in the distribution and abundance of wildlife, particularly birds. While these patterns help us understand the world we live in and how it is changing, Paul emphasizes the importance of applied research that informs the way we manage wildlife and wildlife habitats. In regards to coastal ecology, Paul is exploring how wetland systems are changing as a result of sea level rise, the landward movement of saltwater, and the response of wildlife to these changes. Previous studies have highlighted the



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Drew Fowler is a third year PhD student in the School of Natural Resources at the University of Missouri where he studies harvest management of overabundant light geese and their body condition during spring migration. Prior to initiating his PhD in 2014 he worked as a wetland ecologist for a private wetland mitigation provider in Louisiana where he collaboratively designed wetland and stream restoration plans for impaired wetlands. Drew received his BS in Wildlife and Fisheries Sciences from Texas A&M University and his MS in Renewable Natural Resources from Louisiana State University where his master's research focused on soil salinity dynamics in managed wetlands within semi-arid ecosystems. While Drew's current research

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# Adding Value to Monitoring Efforts with Environmental DNA

by: Adam J. Sepulveda, U.S. Geological Survey, Northern Rocky Mountain Science Center, Bozeman, MT  
Andrew M. Ray, National Park Service, Greater Yellowstone Inventory and Monitoring Network, Bozeman, MT  
Anna M. McKee, U.S. Geological Survey, South Atlantic Water Science Center, Norcross, GA

**Over the last decade, environmental DNA (eDNA)** has emerged as a detection and surveillance tool for the presence of aquatic and terrestrial species. eDNA is a molecular approach that analyzes DNA expelled by organisms into the environment, such as into water and sediment. Compared to conventional survey methods, eDNA offers the advantages of being highly sensitive, not dependent on taxonomic expertise, and noninvasive (Thomsen and Willerslev 2015). However, the temporal and spatial scales of eDNA inference have not yet been resolved so it is unclear if results represent a current snapshot of organisms present at a sampled site. Despite this and other complications, eDNA is now being applied to multiple conservation issues including invasive species early detection and eradication efforts (e.g., Dunker et al. 2016), status (McKee et al. 2015) and trend monitoring (Spear et al. 2014), and climate change adaptation planning (McKelvey et al. 2016).

**To date, application of eDNA** to conservation issues has primarily targeted detection of one or a few known species for which species-specific molecular markers have been developed. For example, we have used eDNA to document the presence of four native amphibians in Grand Teton and Yellowstone national park wetlands.



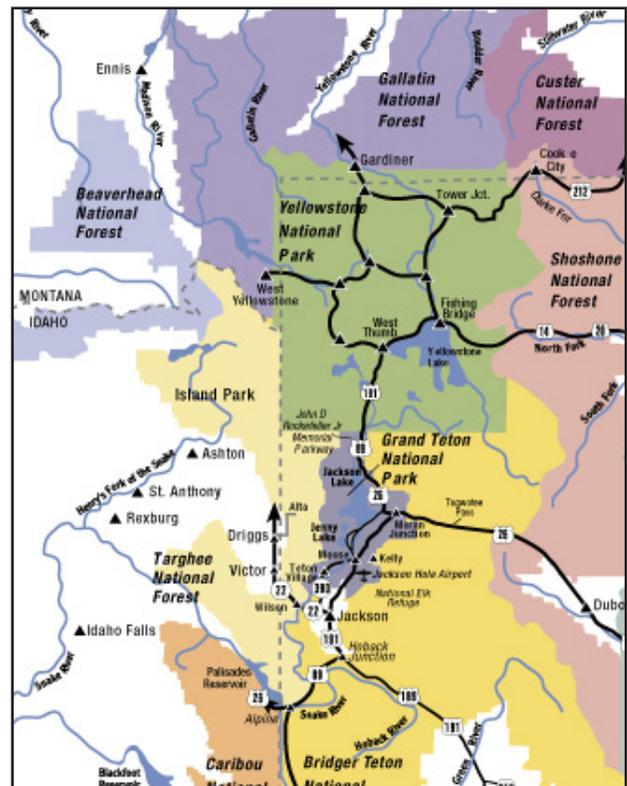
Western tiger salamanders. Photo courtesy of Jeff Arnold, NPS.

Advances in DNA sequencing technologies now enable identification of many taxa from DNA present in an environmental sample. This approach, termed eDNA metabarcoding, uses molecular markers that are inclusive of all species within a larger taxonomic group of interest (e.g., fishes or vertebrates) to amplify rare DNA with polymerase chain reaction (PCR). The amplified DNA is then sequenced using a high throughput platform and the resulting sequences, which can number in the billions, are filtered and then compared to a taxonomic reference sequence library

database of targeted sequences from verified and curated specimens. Taxonomic identities can be resolved when sequences match those in the reference library database. Though the challenges involved with reliable and repeatable taxonomic identification are large (Ficetola et al. 2015), there are now numerous examples of eDNA metabarcoding applications in freshwater, marine and terrestrial environments (e.g., Hänfling et al. 2016).

**We recently explored** how eDNA metabarcoding could add value to a long-term (2006 – present) amphibian monitoring program in Yellowstone and Grand Teton national parks led by the National Park Service's Greater Yellowstone Inventory and Monitoring Network (GRYN). GRYN surveys 300+ wetlands in more than 30 catchments annually and documents evidence of amphibian breeding (i.e., eggs, larvae or recently metamorphosed individuals; Gould et al. 2012). Importantly, most surveyed wetlands are multiple miles from the nearest road and require considerable effort to access. Given that resources for monitoring and assessment of resource condition are

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Greater Yellowstone Area. Map from <http://www.jacksonhole.net/>.

## Monitoring & Environmental DNA (continued from page 2)



Collecting water samples. Photo courtesy of the authors.

limited, we recently evaluated if eDNA metabarcoding could expand the GRYN program's survey efforts beyond amphibians. What else could be learned once a crew had spent hours hiking to a site? We worked with Yellowstone National Park resource managers to generate a target list of species, which ranged from fairy shrimp to grizzly bears, for which eDNA presence data would help inform management decisions.

**We collected** 200 mL water samples from multiple wetlands in Yellowstone and Grand Teton national parks and the Bridger-Teton National Forest (Wyoming). Water samples were filtered through 0.45-um nitrocellulose filters and preserved in ethanol. All eDNA metabarcoding processing and analyses were then done in cooperation with the University of Georgia and the Georgia Genomics Facility. In brief, DNA from field samples and negative controls was PCR-amplified using two mitochondrial markers (COI and 12s; Leray et al. 2013 and Miya et al. 2015) and then sequenced. Raw sequence data were filtered

and edited and then compared to a reference library database, which was developed by searching GenBank and Barcode of Life Data System public repositories for sequence data of the targeted taxa at the COI and 12s regions. DNA from a target species was considered present if sequence data matched to a target species in the database. When a species was detected at both marker sets and at least one marker had a percent of sequence readings greater than 0.2%, we had high confidence in actual species DNA presence (i.e., false positive unlikely).

### Eleven species from our target list

were detected across all samples: dragonfly, fairy shrimp, water boatmen, Boreal chorus frog, tiger salamander, mallard, bison, elk, moose, grizzly bear and wolf. However, only tiger salamanders, mallards and grizzly bears, at a single site each, met our high confidence criteria. Though the number of hits that matched with a target species in the database was much lower than hoped, we did demonstrate capacity to extend survey efforts beyond amphibians and document use by a number of wetland-dependent species. Further refinement of markers and sequence filtering techniques are likely to provide a more encompassing picture of organism-use of wetlands and more fully characterize the biodiversity benefits of wetlands to larger landscapes. Lastly, eDNA metabarcoding is likely to transform current bioassessment and monitoring strategies in ways that more accurately assess the structural and functional complexity of aquatic habitats (Gibson et al. 2015) and revolutionize the detectability of species. See page 7 for literature cited.



Water boatman. Photo from MDC.



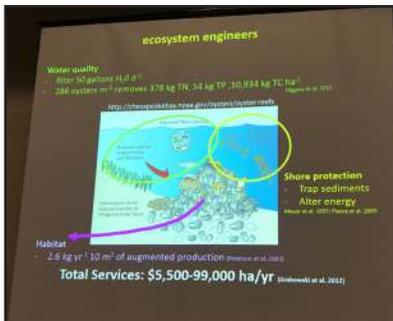
Photos (from left to right): Bison by Daniel Mayer; mallard from <https://en.wikipedia.org/wiki/Mallard>; and grizzly bear by Jim Peaco, NPS.

# Wetlands, Water, & Wildlife

## Finding Common Ground Among Diverse Stakeholders

2017 Symposium Review by Drew Fowler, Vice Chair

At the 2017 Wildlife Society Annual Conference this past October, in Albuquerque, NM, the Wetlands Working Group (WWG) sponsored a symposium titled *Wetlands, Water, and Wildlife: Finding Common Ground among Diverse Stakeholders*. Drs. Adam Janke and Sammy King, as well as Adonia Henry, prepared the symposium and organized a diverse group of speakers who discussed aspects of a central theme: water - its changing quantity and quality, and the impacts to wetlands and wetland-dependent organisms. Symposium attendees were left with an appreciation for the dynamic ecosystem services of wetlands and the challenges that arise resulting from changes in abiotic processes. For example, Dr. Bruce Dugger and his student, Megan Zarzycki, discussed the importance of spring wetland habitat conditions at western stopover sites on influencing productivity of Northern Pintails during breeding. However, water availability in the west is severely limited and high consumption from agricultural producers can affect not only quantity but also the timing of availability, sometimes resulting in a mismatch for wetland and waterbird management. Accordingly, Dr. Fritz Reid and Dustin Taylor each gave presentations describing opportunities to integrate wetland management techniques within large-scale agricultural production areas to best optimize competing water interests. Yet, the symposium was clear that water issues are not restricted just to



the west. Even within the Mississippi Alluvial Valley, continued upstream changes in water availability such as groundwater pumping or anthropogenic flow alterations have profound implications for wetlands, ranging from changes in bottomland hardwood forest composition to the ecological and economic impacts of oyster beds. Regardless of where you live, your wetlands are likely facing issues related to water quantity or quality and continued research of these resources are imperative for understanding the effects

of new and growing challenges. The WWG would like to thank all the presenters for their willingness to participate and for their intriguing work that made this symposium worthwhile. If you missed out on this symposium, don't worry! Conference attendees can access recorded presentations at the [TWS Live Learning Center](#). Mark your calendars to attend the 2018 Society of Wetland Scientists conference this May in Denver, where the WWG is co-sponsoring another great symposium titled *Arid Wetlands: Conservation Challenges and Research Needs*.



### Arid Wetlands Symposium at SWS 2018 Annual Meeting

Join WWG members and meet members of the SWS Wildlife Group, co-sponsors of the Arid Wetlands Symposium at the SWS 2018 Annual Meeting. Visit the [SWS Annual Meeting website](#) for a complete list of symposia, schedule updates, and to register. We look forward to seeing you in Denver!

## Wetlands in the News

### Wetlands keep harmful nitrates out of rivers

University of Minnesota study finds [wetlands provide significant water quality benefits](#).

### Wisconsin Wetland Permit Exemptions Bill revised

Is it enough to [protect wetland habitats](#)?

### China moves to protect coastal wetlands

used by migratory birds through [tightened regulations and new reserves](#).

### Long-standing state water dispute arguments

heard by [U.S. Supreme Court](#).

### How to build a city that doesn't flood?

Turn it into a [sponge!](#)

### Milton Weller

A pioneer in understanding linkages between wetland birds and their habitats, passes away at 88. [A Tribute gift in his name](#) can be made by calling

The Nature Conservancy at 703-841-5300 and request that your [kind donation be specific to wetlands projects](#).



Milton Weller at Roseau River WMA, MN, June 1980

Photo courtesy of Bill Hohman.

# 2018 STUDENT AWARD

In order to increase student awareness and participation in the Wetlands Working Group (WWG), we have again committed to funding early registration conference fees for one student member of the WWG to attend the 2018 Annual TWS Conference in Cleveland, Ohio. New and existing student members are encouraged to apply! Students interested in being considered for this award should email a CV and a brief cover letter discussing their interest in wetland research, management, and conservation to Johanna Duffy (jduffy@bartonandloguidice.com) by May 25, 2018. Students will be notified if they are selected for this award by June 15th and will be reimbursed early registration cost (~\$300.00) at the annual WWG meeting in Cleveland. Applicants must be a member of the WWG by the travel award application deadline. Attendance at the WWG annual meeting (at the Annual TWS Conference) is highly recommended. The awards will be announced in front of the membership at that time.

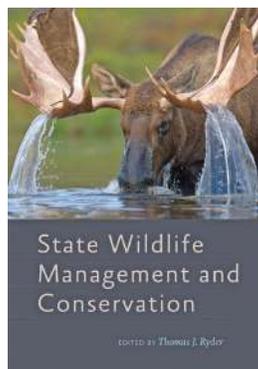
## Join the WWG Board!!

### Nominate Yourself for Vice Chair

Board Meetings are once a month by conference call (1 hr), so **you can participate from anywhere!** Including monthly meetings, time commitments average 2-4 hrs/month for vice chair, past chair, and secretary/treasurer, and 4-8 hrs/month for Chair. The duties are outlined in the WWG Charter.

**Contact any of the current board members if you're interested or if you have questions. Stay tuned for our official nominations announcement this spring!**

**NEW BOOK**  
from TWS and  
Johns Hopkins  
University Press



## State Wildlife Management and Conservation edited by Thomas J. Ryder

Review by Nancy Sasavage, TWS Director of Publications and Communications

Are you thinking about a career with a state wildlife agency or already a seasoned professional working for one? Either way, this newest book in TWS' Wildlife Conservation and Management series, "State Wildlife Management and Conservation," is a must have. TWS Past President Tom Ryder, now retired after a long career with the Wyoming Game and Fish Department, brings together wildlife leaders from practical, policy, and academic backgrounds to tell the story of state wildlife agencies, chronicling their efforts to restore and protect our nation's natural resources. With more than 40 contributors, the book provides a comprehensive, nationwide account of state management efforts. It will aid professors training the next generation of wildlife professionals, students hoping to enter the profession, and anyone working with wildlife to develop a more sophisticated understanding of what it means to be a state wildlife biologist. [Click here to order!](#)

# 2017 STUDENT AWARD WINNERS

Paul Taillie (continued from page 1)

importance of marsh migration to the persistence of coastal marshes as sea levels rise, but the relative influence of the various drivers, such as saltwater intrusion and fire, are poorly known. Paul's work aims to better understand these processes and the implications for coastal marsh birds like rails, bitterns, and marsh sparrows.



Drew Fowler (continued from page 1)

has a focus on waterfowl ecology he remains committed to studying and conserving diverse wetland ecosystems and the abiotic processes that facilitate productive waterbird communities. His recent exploits in wetland science involved a two week field course in prairie pothole wetlands of the US and Canada studying the effects of climatic conditions of pothole wetlands on waterfowl productivity. In July 2017, Drew traveled with a collaborative team to the Jilin Province of China to assess and recommend wetland management practices that serve to conserve migratory waterbirds, including endangered Siberian Cranes. Originally from the Texas coastal prairie, Drew enjoys duck and goose hunting as well as hiking and camping with his wife and daughters.



# Training Opportunities & Upcoming Conferences

Association of State Wetland Managers  
Calendar of Events for webinars, trainings, & special events

New England Estuarine Research Society  
Joint Meeting with  
New England's National Estuarine Research Reserves  
26-28 April 2018, Portsmouth, NH  
*Including a full-day workshop on salt marshes*

National Mitigation & Ecosystem Banking Conference  
8-11 May 2018, Louisville, KY

Society of Wetland Scientists Annual Meeting  
29 May - 1 June 2018, Denver, CO  
Wetland Science: Integrating Research, Practice and Policy -  
An Exchange of Expertise  
*Arid Wetlands Symposium (see page 4 for details)*

The Waterbird Society 42nd Annual Meeting  
19-20 August 2018, Vancouver, BC, Canada

National Conference on Ecosystem Restoration  
26-30 August 2018, New Orleans, LA  
Building Connections from the Local to Landscape Scale  
*Including an all day series on Gulf of Mexico Ecosystem Restoration*

The Wildlife Society 25th Annual Conference  
7-11 October 2018, Cleveland, OH  
Call for Proposals Now Open  
Call for Abstracts 19 February - 22 March 2018

Society for Ecological Restoration Northwest Chapter  
and Society of Wetland Scientists Pacific Northwest  
Chapter Joint Meeting  
15-19 October 2018, Spokane, WA  
Restoring Resilient Communities in Changing Landscapes

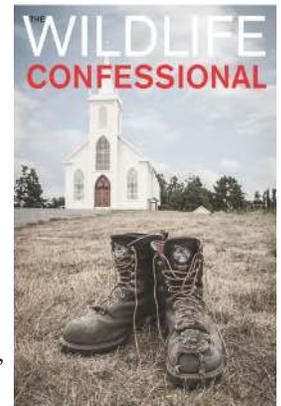
## The Wildlife Confessional

presented by The Wildlife Society - Western Section

The Wildlife Society – Western Section is excited to announce that The Wildlife Confessional anthology, a collection of short stories by dyed-in-the-wool wildlife biologists that endeavors to show the humor and poignancy in our day-to-day adventures that sometimes define and enlighten the profession or that, sometimes, we'd rather forget, is now live.

[Click here](#) to purchase your copy today!

The anthology is a collection of fifteen stories by thirteen biologists, including Western Section members Brian Cypher, Ivan Parr, Matthew Bettelheim, and the late Thomas A. Roberts, and takes place across North and Central America. Pre-sale copies are available for \$20 paperback / \$10 ebook, and their goal is to sell 250 copies by February 28th, at which time the Oakland, CA publisher Inkshares will begin the editorial/marketing outreach engines to boost the project nationally.



## Make TWS Journals Your Publishing Choice in 2018

Summarized from an article by Nancy Sasavage, TWS Director of Publications and Communications and Editor-in-Chief of The Wildlife Professional

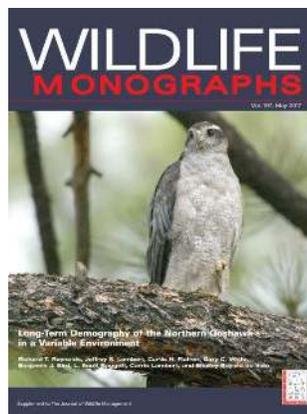
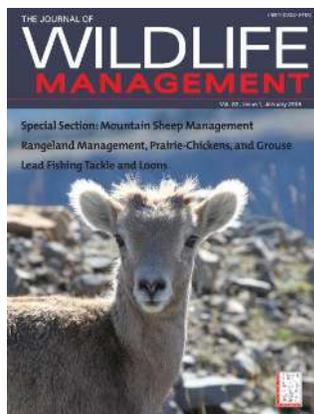
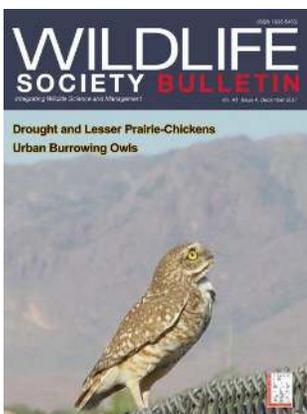
A lot of factors go into choosing where to publish your wildlife research findings. TWS wants to make our journals your first choice in 2018. Here's what we are doing to encourage members to publish in one of the Society's three scholarly journals.

**Reduced page charges for members:** As a TWS member, you are eligible for 40 percent off the standard page charges. We have also eliminated all color page charges.

**Streamlined guidelines for authors:** The journal editors and editorial staff have revised the guidelines and put all information you need for quick-reference at the very beginning of the guidelines.

One of TWS' strategic themes is being a recognized and trusted organization for expertise on science-based wildlife management and conservation. When you publish with your Society, you are lending support to our strategic plan.

[Click here](#) for more information on page charges and publishing in the Society's journals.



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Gros Ventre River floodplain wetlands (above) and trumpeter swans wintering in the Greater Yellowstone Area (right). Photos by Adonia Henry.

## Questions?

Interested in sharing  
your wetland experiences  
and contributing to the  
Newsletter?

Contact Us!

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## How to Join WWG

When you renew your TWS membership, sign up for the Wetlands Working Group!

If you're already a member of TWS, you can add membership in the Wetlands Working Group at any time by logging into your account at

<http://wildlife.org/>.

Membership dues are only \$5 annually, which helps support activities at meetings and outreach events.



## Support the WWG

Reusable Chico Bags  
only \$10 each

(free shipping)

Contact Adonia at  
[adoniarhenry@gmail.com](mailto:adoniarhenry@gmail.com)  
to get yours today!

Newsletter formatted and edited by Adonia Henry.

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