



38th Annual Native American Fish & Wildlife Society National Conference

Workshop Agenda: Environmental (eDNA)

Oct 4, 2021 , 9:00 a.m. – 5:00 p.m.

Location: Pavilion II

Coordinators: Dr. James English, USGS Invasive Species Program Manager & Sean Cross, NAFWS Fish and Wildlife Biologist

Introduction - *Sequential talks covering how eDNA is used by natural resource managers, decision makers and scientists, explaining the tools utility and limitations, giving some context and background, aimed at a non-scientist audience level. Questions taken if under 15 mins, otherwise hold until the end)*

Introduction to eDNA

- 9:00 Maggie Hunter – Environmental DNA Essentials. Big-picture introductory talk discussing the kind of questions that eDNA can answer. How it is used. Brief limitations.
- 9:15 Steve Spear – eDNA basics & demonstration showing water getting filtered, DNA collected, step by step in collecting and processing DNA.
- 9:30 Cathy Richter – Boring but Important Technical Details / Introductory talk aimed at non-scientists about how eDNA analysis works, including related terms, methods, equipment, etc. & pre-recorded video clips from the CERC molecular lab.
- 9:45 Patrick DeHaan Whitney Lab – Evolution of a large eDNA monitoring program: lessons learned over the past decade.
- 10:00 Adam Sepulveda – Repeatable, reproducible and defensible eDNA methods and study designs. An introductory talk to identify critical elements of an aquatic invasive species eDNA surveillance program.
- 10:15 Q&A for this session
- 10:30 --Break

Case studies - *A wide variety of talks showing eDNA in use (Questions taken if under 15 mins, otherwise hold until the end)*

- 10:45 Margaret Hunter – Environmental DNA to inform imperiled and invasive species management
- 11:00 Matthew B. Laramie – Monitoring the status and trends of a reintroduced salmonid in a large, transboundary watershed
- 11:15 Jeff Duda & Carl Ostberg – Expanding the toolbox for fisheries research and monitoring through eDNA applications: Case studies and examples



38th Annual Native American Fish & Wildlife Society National Conference

- 11:40 Steve Spear – Portable eDNA: Using a point of use eDNA approach to detect zebra mussels on imported moss balls
- 11:55 Elliott Barnhart – Robotic Biosurveillance at USGS Streamgages – eDNA, Early Disease Detection, and More
- 12:10 Carter Atkinson – Monitoring Airborne eDNA for Invasive Fungal Pathogens of 'Ōhi'a (*Metrosideros polymorpha*), a Keystone Native Forest Tree in Hawaii
- 12:25 Bane Schill – Using eDNA to monitor COVID in wastewater
- 12:40 Q&A for this session
- 13:00 --Lunch Break
- 14:00 Adam Sepulveda – Evaluating potential management responses to detection of dreissenid mussel (*Dreissena* spp.) environmental DNA
- 14:15 Jason Ferrante – Standards and best practices for submitting eDNA data to the NAS database
- 14:30 Wes Daniel – Integrating eDNA into the NAS, Communicating this data to users
- 14:45 Katy Klymus – eDNA for Natural Resource Management in the Near Future
- 15:00 Q&A for this session
- 15:15 Q&A for Entire Session, Any Discussion

Brief Speaker Introduction:

Maggie Hunter, Ph.D.

Research Geneticist, U.S. Geological Survey, Wetland and Aquatic Research Center. Maggie's program applies many types of genetic tools to inform the management of invasive and imperiled species, including population genetics, eDNA, microbiome work and disease investigations. Her lab has a heavy focus on improving eDNA methodological tools, best practices in the field and the development of statistical analysis for data interpretation. Recently she has begun investigating alternative control strategies, including the development of genetic biocontrol tools, for invasive reptiles. Maggie is the colead for the Geo Bon Genetic working group, the North America colead for the IUCN conservation genetics working group, and a founding member of the newly formed international Coalition for Conservation Genetics. Feel free to reach out at: mhunter@usgs.gov

Stephen Spear

Research Biologist, U.S. Geological Survey, Upper Midwest Environmental Sciences Center (UMESC). Steve recently joined the USGS in December 2020 but has worked with environmental



38th Annual Native American Fish & Wildlife Society National Conference

DNA for the past ten years. He is part of the molecular lab group at UMESC and focuses on detection of both invasive species and native species of conservation concern, using both eDNA methods targeted at single species and metabarcoding approaches designed to identify multiple species at once. He is also focused on optimizing point of use eDNA approaches to provide managers greater flexibility in invasive species surveillance. He is also interested in using population genetics and genomics to address applied species questions. Please reach out: sfspear@usgs.gov

Cathy Richter

USGS Research Molecular Biologist at USGS, Columbia Environmental Research Center, Columbia, MO.
CRichter@usgs.gov

Patrick DeHaan

Project Leader, USFWS Whitney Genetics Lab, Onalaska WI. I've worked for USFWS since 2004 and started my current position in November of 2020. Our lab is primarily responsible for processing eDNA samples collected from the Great Lakes and Upper Mississippi River basins as part of a long-term monitoring program for invasive carp. Additionally our lab has several projects aimed at using eDNA to monitor the presence and distribution of native and invasive aquatic species. patrick_dehaan@fws.gov

Adam Sepulveda

Research Zoologist, U.S. Geological Survey, Northern Rocky Mountain Science Center (Bozeman, Montana). I conduct research to inform aquatic invasive species prevention, early detection and rapid response decision-making. I have been researching environmental DNA methods since 2011, where my focus has been on method development and validation to inform aquatic invasive species early detection monitoring. asepulveda@usgs.gov (406) 404-9155.

Matthew B. Laramie

Ecologist, U.S. Geological Survey – Forest and Rangeland Ecosystems Science Center (Boise, Idaho). My research focuses on aquatic ecology, and environmental DNA applications in aquatic and terrestrial ecosystems. Feel free to contact me at mlaramie@usgs.gov or 208-426-5230.

Jeff Duda

Research Ecologist, U.S. Geological Survey's Western Fisheries Research Center in Seattle, Washington. At USGS for 23 years, I conduct research to determine the ecological effects of human activities and natural disturbance regimes on a wide variety of aquatic and terrestrial organisms and ecosystems throughout the United States. Working with the eDNA team at our center, I have focused on applying eDNA to fish and amphibians in rivers and high mountain



38th Annual Native American Fish & Wildlife Society National Conference

lakes of the Olympic Peninsula. Please see <https://www.usgs.gov/staff-profiles/jeffrey-duda> for science projects, publications, and contact information.

Carl Ostberg

Research Fishery Biologist, U.S. Geological Survey, Western Fisheries Research Center (Seattle, Washington). My research focuses on the development and application of genetic tools in support of conservation and species recovery. Contact: costberg@usgs.gov.

Elliott Barnhart

Research Hydrologist (Microbiologist), Wyoming-Montana Water Science Center. My research focuses on using new DNA technology to better understand ecological processes, promote energy development and examine environmental issues. Projects have involved; (1) investigating how microorganisms turn coal and shale to natural gas underground, (2) inventing and testing new DNA sampling and analytical equipment, and (3) investigating the prevalence of microorganisms, pathogens and invasive species in different ecosystems. Feel free to contact me at: epbarnhart@usgs.gov

Carter Atkinson

Research Microbiologist, U.S. Geological Survey, Pacific Island Ecosystems Research Center. Recently retired from a 31 year career at USGS, I have worked mostly on the ecology of introduced vector-borne avian diseases on native Hawaiian forest birds. During the past few years, my work has shifted to recently introduced fungal pathogens of 'Ōhi'a (*Metrosideros polymorpha*) and development of rapid, portable, isothermal DNA amplification assays for invasive species. Contact: catkinson@usgs.gov

Bane Schill (William Ban Schill)

USGS Research Chemist, Eastern Ecological Science Center (Leetown Science Center)- Fish Health Lab wschill@usgs.gov

Jason Ferrante

Biologist, U.S. Geological Survey, Wetland and Aquatic Research Center. I am a molecular biologist whose involvement in eDNA research has focused on assay development and optimization, particularly using quantitative and digital PCR approaches. I am currently heading a project to facilitate eDNA data admission to the Nonindigenous Aquatic Species [\(NAS\) eDNA database](#) for display, and I am a co-lead for the USGS Community for Data Integration [eDNA Community of Practice](#). If I can be of help to you, please feel free to contact me at: jferrante@usgs.gov

Wes Daniel



38th Annual Native American Fish & Wildlife Society National Conference

Fish Biologist, Wetland & Aquatic Research Center, Gainesville, FL. Manager of the Nonindigenous Aquatic Species (NAS). wdaniel@usgs.gov

Katy Klymus

Research Biologist, U.S. Geological Survey, Columbia Environmental Research Center. With a background in molecular systematics, population genetics and animal behavior, I began at U.S.G.S in 2016 after completing two post-doctoral positions in environmental DNA research. I focus on developing eDNA tools and applications as well as understanding eDNA data. Our lab works with both invasive and native species, and we currently are working on several freshwater mussel eDNA projects. Feel free to contact me at kklymus@usgs.gov