

# Challenges from the Regional Monitoring Networks: Continuous Data Tools and Management

*Britta Bierwagen (USEPA)*

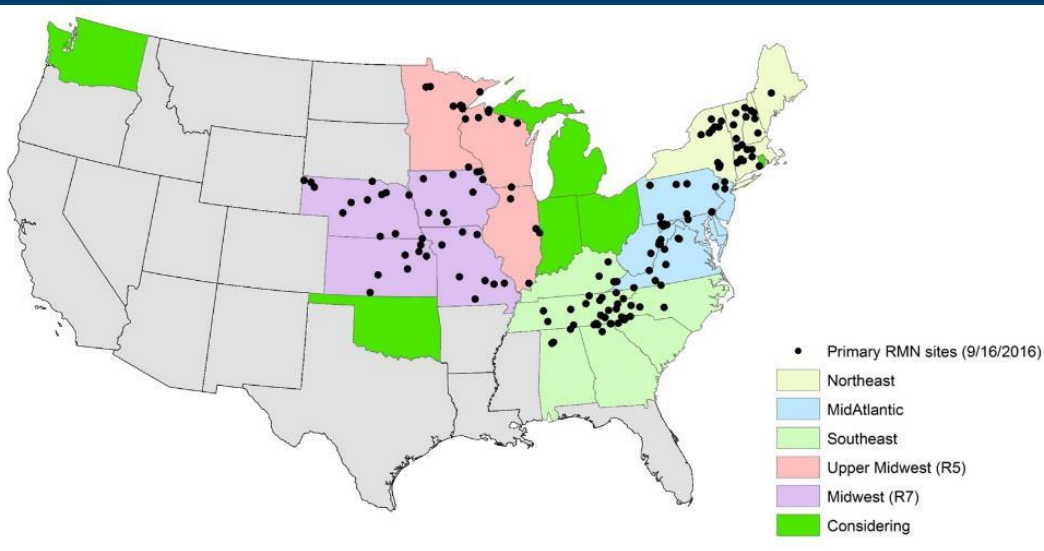


**2021 National Training Workshop**  
June 10, 2021

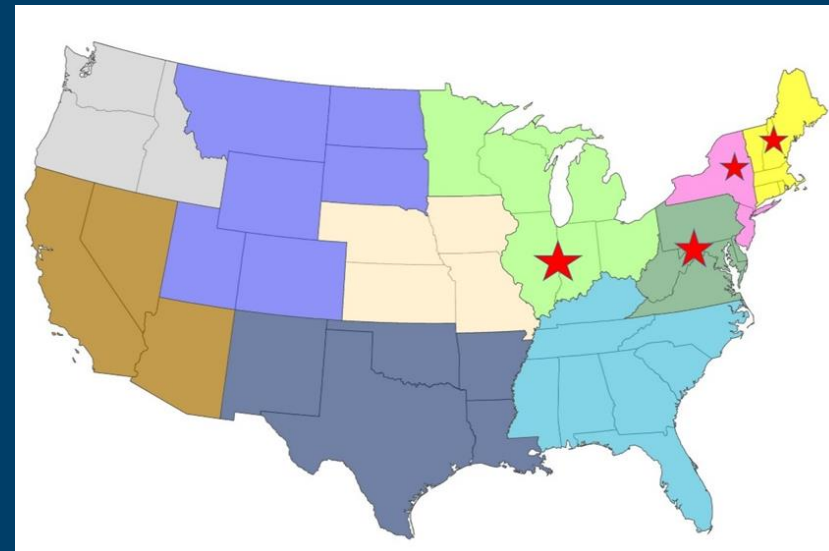
# Regional Monitoring Networks (RMNs)

- A voluntary, grassroots effort to document current conditions and detect long-term trends at a regional scale
- Collect biological, thermal, hydrologic, water quality and habitat data one or more times a year, for 10+ years, at a set of targeted sites, using regional protocols

Stream RMNs



Lake RMNs



Sampling efforts in streams began in the Northeast in 2012, followed by the Southeast in 2013, the Mid-Atlantic in 2014 and the Midwest in 2016-2017. Lake sampling started in 2018

# Why Monitor?

---

Baselines are changing.

We need to know how they are changing and how to respond

# Data collection at RMNs

- **Biological indicators**
  - Benthic macroinvertebrates, optional fish and periphyton
- **Temperature**
  - Continuous water and air temperature
  - Vertical profile
- **Hydrology**
  - Streams: Continuous water level data, converted to discharge
  - Lakes: Water level, ice cover
- **Habitat** (rapid visual habitat methods; quantitative optional)
- **Water chemistry**
  - Dissolved oxygen, secchi depth



# There are Many Challenges

- **Consistent data collection across organizations (each year, each site)**
- **Within and across organizations, consistency in methods used, quality control and formatting**
- **Variety of disciplines are required for data collection, but experts are not always available**
- **Data management form continuous and discreet data (e.g., QA/QC, accessibility)**



# Addressing Challenges


- Partnerships across organizations
- Tools to tackle data challenges
- Training on use of tools
- New approaches to collect data
- Learning from others



Generic Stream Monitoring Network QAPP  
Date: February 23, 2016  
EPA/600/R-16/034 Revision: 0  
Page 1 of 28


**GENERIC QUALITY ASSURANCE PROJECT PLAN**  
For  
**Monitoring Networks to Document Long-Term Conditions and  
Detect Changes in High Quality Wadeable Streams**

**A collaboration among:**  
U.S. Environmental Protection Agency  
U.S. Geological Survey  
State and Tribal Agencies  
River Basin Commissions  
Universities

 EPA  
United States  
Environmental Protection  
Agency

EPA/600/R-12/170F | May 2014 | www.epa.gov/ica

**Best Practices for Continuous  
Monitoring of Temperature and Flow  
in Wadeable Streams**



National Center for Environmental Assessment  
Office of Research and Development

# Evolution of R-based Tools for RMNs



Summary report Shiny app (spring 2022)

BioMonTools Shiny app (summer 2021)

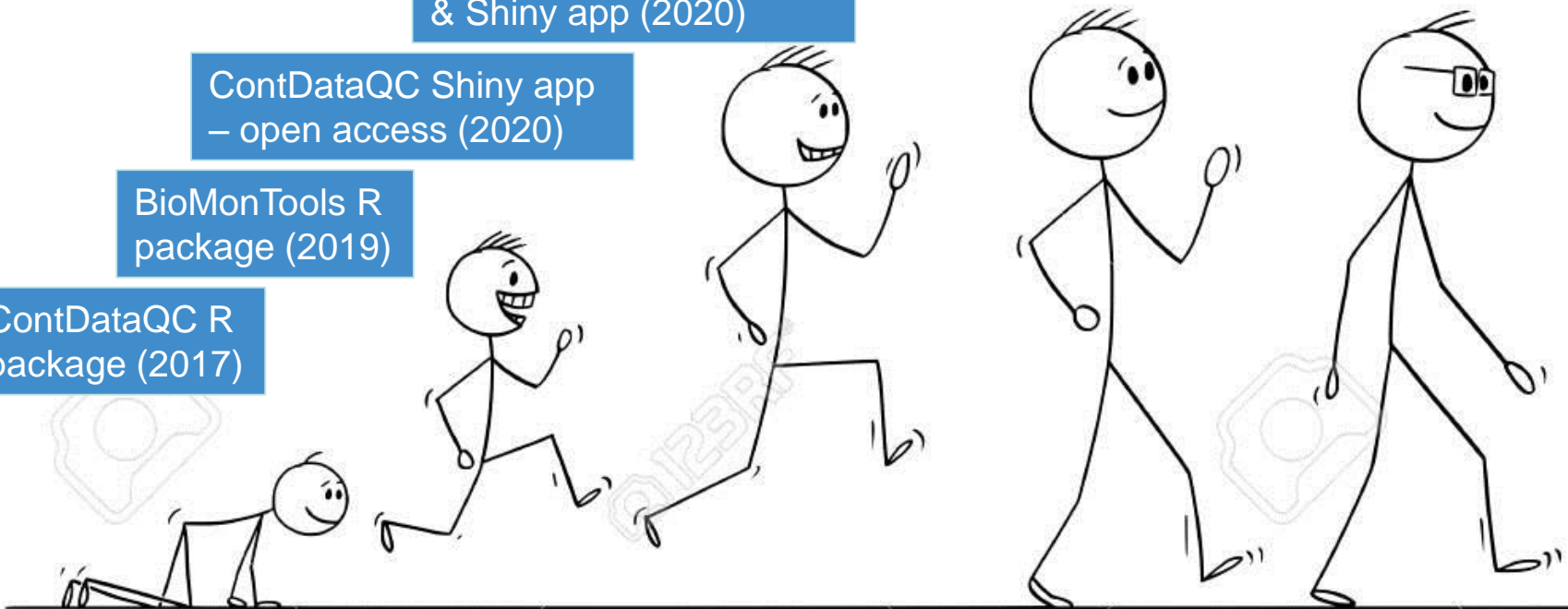
Tim Martin's QC Shiny app (2021)

LakeMonitoR R package & Shiny app (2020)

ContDataQC Shiny app – open access (2020)

BioMonTools R package (2019)

ContDataQC R package (2017)



# Learning from Others

- **Network of game cameras and ML connectivity classification - Mary Becker, CT DEP**
- **AI to interpret images and calculate flow - Ben Letcher, USGS**
- **R Shiny app for any continuous data - Tim Martin, MN DNR**
- **Data management - Bob Schuster, Mike Kusmiesz, NJ DEP; Lucas Marxen, Rutgers U.**





# All about Adaptation

**How can we use these tools in a different context to advance environmental protection?**

