Utilizing Volunteers for Big-River Biological Monitoring

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Stream Team Biologist
Missouri Department of Conservation

Photo by Melanie Cheney

Missouri Stream Team

- Education
- Stewardship
- Advocacy
- 4200+ Teams

Conservation Federation of Missouri

Missouri Department of Conservation

Missouri Department of Natural Resources

Volunteer Water Quality Monitoring

- Biological Monitoring

Volunteer Water Quality Monitoring

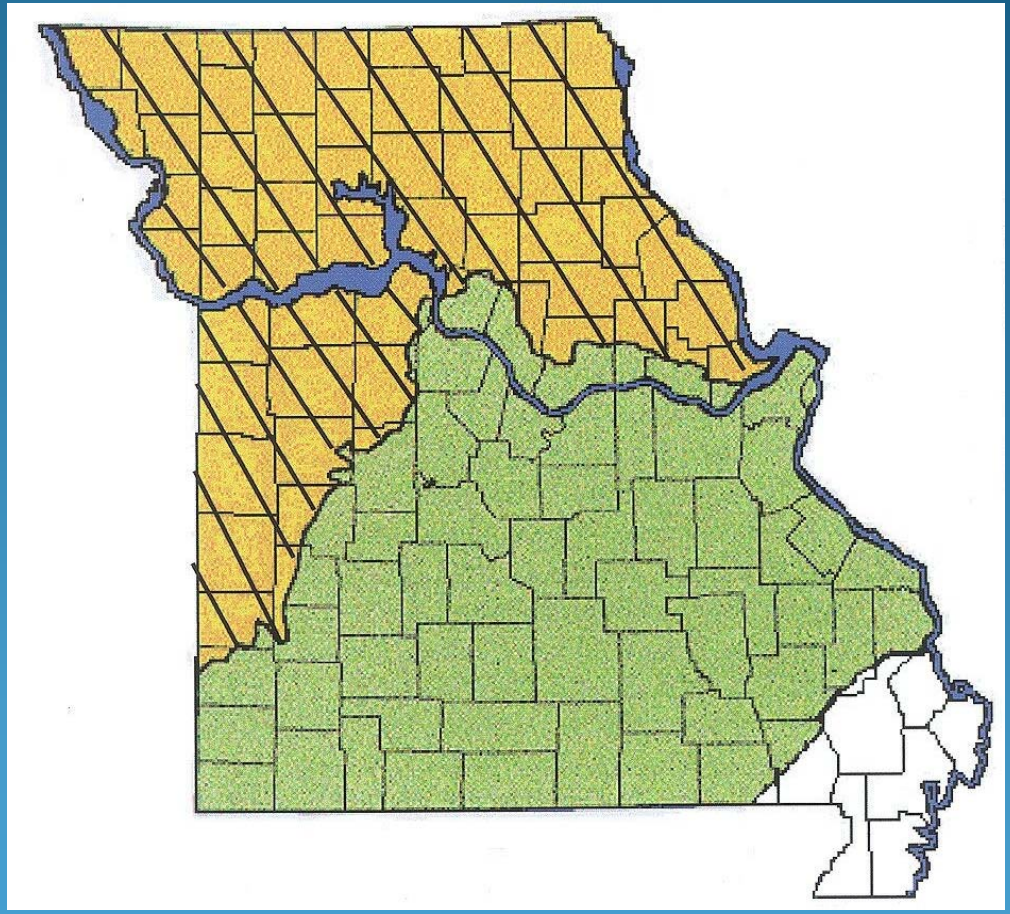
- Biological Monitoring
- Chemical Monitoring

Volunteer Water Quality Monitoring

- Biological Monitoring
- Chemical Monitoring
- Physical Monitoring
- Nearly 7000 Water Quality Monitors trained for wadeable streams

Missouri Faunal Regions

Big River Region
Lowland Region
Ozark Region
Prairie Region



What about non-wadeable rivers?

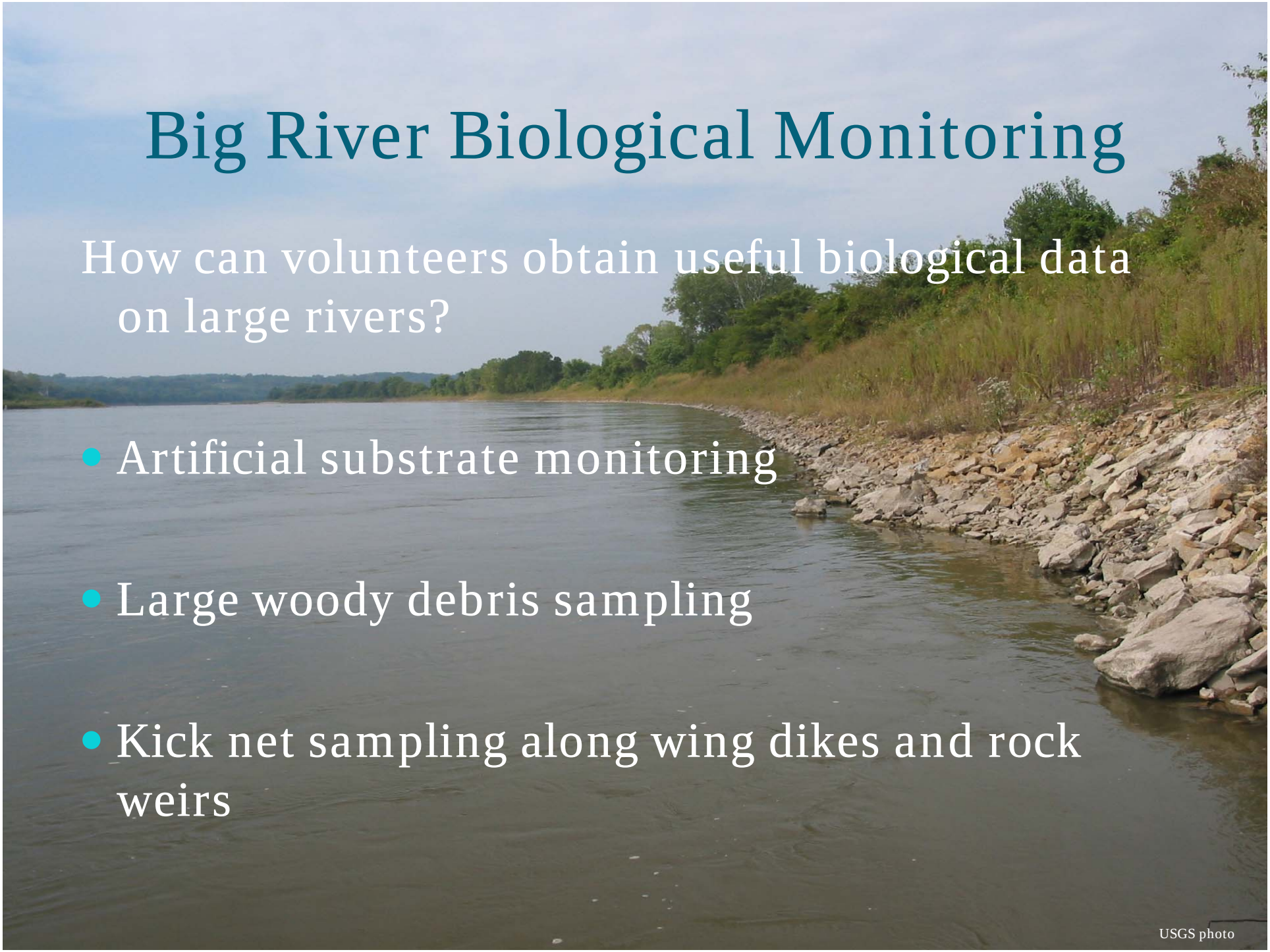
- Volunteers desire to learn more about large river fauna ("big-river obligates")
- Macroinvertebrate assemblages are relatively unknown and infrequently studied
- Many northern Missouri prairie streams lack suitable riffle habitats but volunteers and agencies seek biological water quality data

Locust Creek MODNR photo

Big River Biological Monitoring

How can volunteers obtain useful biological data on large rivers?

- Artificial substrate monitoring
- Large woody debris sampling
- Kick net sampling along wing dikes and rock weirs



USGS photo

Volunteer Protocol – Artificial Substrate Monitoring

- Monitor during periods of low flow and stable water levels (summer, fall)
- Never monitor alone; SAFETY FIRST
- Obtain artificial substrate basket made of galvanized wire mesh


USGS photo


Photo by Missouri River Relief

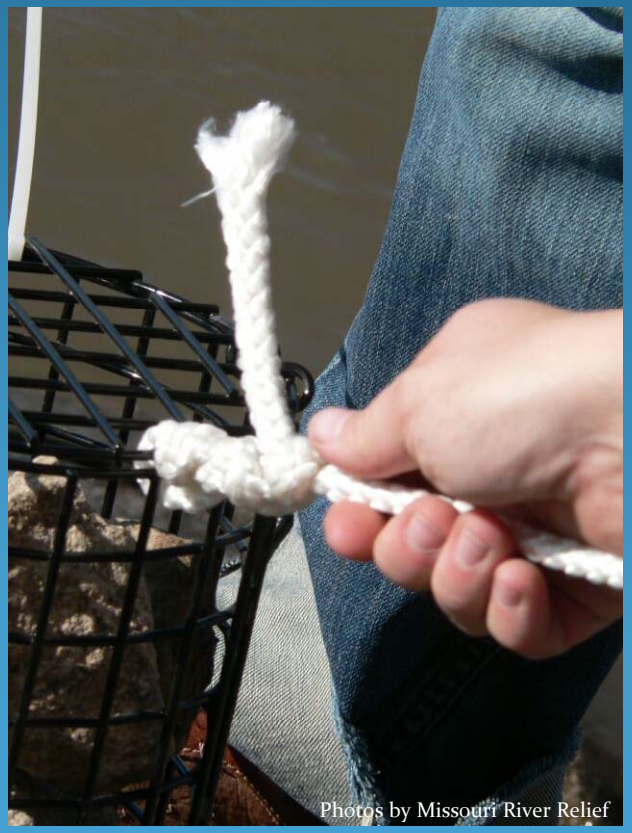
Volunteer Protocol – Deployment

- Fill about half-full with clean limestone cobble (2-3” diameter stones)

Photos by Missouri River Relief

Volunteer Protocol – Deployment

- Secure lid and attach basket to long braided nylon rope



Photos by Missouri River Relief

Volunteer Protocol – Deployment

- Sink basket in 6-8 ft of water where flow is moderate on outside bend of river or from wing dike

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Volunteer Protocol – Retrieval

- After 4-6 weeks of macroinvertebrate colonization, retrieve basket when conditions are safe (i.e., low water levels)
- Hold a 500 micron mesh dip net underneath basket while quickly pulling it up to the surface

Collecting Invertebrates

- Wash stones in a bucket with river water
- Pour bucket into 500 micron kick net or dip net
- Pick invertebrates and place into ice cube tray with river water


MDC photo


MO DNR photo


MDC photo

Collecting Invertebrates

- Identify and count invertebrates
- Record findings on Stream Team Macroinvertebrate Data Sheet


MO DNR photo


Photo by Missouri River Relief

MACROINVERTEBRATE DATA SHEET

Please check the box next to "Site #" *if this is a new site and please be sure to attach a map*

☐ Site # _____ Stream _____ County _____

Site Description _____ Time _____

Date _____ Trained Data Submitter (person assuming responsibility for these data) _____

Trained Data Submitter's Stream Team Number _____ Rainfall (inches in last 7 days) _____

Trained Participants

Invertebrate Type	*Net Set #1*	*Net Set #2*	*Net Set #3*	*Score*
Habitat type →	→	→		*After entering the number (#) of organisms collected, circle the number below for every type of organism collected. Add the numbers circled and record the total as your Water Quality Rating.*
Time Spent Picking (Minutes picking x number of people picking)	min. picking ____ x # people ____ = total min. ____	min. picking ____ x # people ____ = total min. ____	min. picking ____ x # people ____ = total min. ____	
Sensitive	**# of Organisms**	**# of Organisms**	**# of Organisms**	**Circle Types Present**
Caddisfly Larvae				3
Hellgrammites				3
Mayfly Nymphs				3
Gilled Snails (right)				3
Riffle Beetles				3
Stonefly Nymphs				3
Water Penny Larvae				3
Somewhat Tolerant	**# of Organisms**	**# of Organisms**	**# of Organisms**	**Circle Types Present**
Other Beetle Larvae				2
Clams/Mussels				2
Crane Fly Larvae				2
Crayfish				2
Dragonfly Nymphs				2
Damselfly Nymphs				2
Scuds				2
Sowbugs				2
Fishfly Larvae				2
Alderfly Larvae				2
Watersnipe Fly				2
Tolerant	**# of Organisms**	**# of Organisms**	**# of Organisms**	**Circle Types Present**
Aquatic Worms				1
Black Fly Larvae				1
Leeches				1
Midge Larvae				1
Pouch Snails (left)				1
Other Snails (flat)				1
< 12 = Poor	12 – 17 = Fair	18 – 23 = Good	> 23 = Excellent	**Water Quality Rating** ____

Comments (mention any changes from your usual readings) _____

Fish Present (Please Mark) ☐ **Yes** or ☐ **No**

PLEASE KEEP A COPY AND SEND ORIGINAL DATA TO:

Priscilla Stotts/Water Protection Program
Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102-0176

Volunteer Monitoring - 1/07

Water Quality Volunteer

The rock basket makes up one "net-set" so two more replications are needed to complete the data sheet

Other Sampling Methods

- Scrubbing of woody debris along sandbars and shorelines

Other Sampling Methods

Dip net or kick net sampling along wing dikes and rocky shorelines

USGS photos

Species that prefer a specific habitat or substrate type in the Lower Missouri River

Indicator Species	Habitat or Substrate Type						
	Rock Low Velocity	Rock Mod. Velocity	Channel Border (Sand)	Deposition Zone (Mud)	Clay Bank	Organic Snags	
Acroneuria evoluta						X	Stoneflies
Attaneuria ruralis						X	
Hydroperla fugitans		X					
Isoperla longiseta		X (extirpated from LMOR)					
Paragnetina kansensis						X	
Homoeoneuria alleni			X				Mayflies
Hexagenia spp. (4 species)				X			
Pentagenia vittigera	X (also in silt bars)						
Pseudiron centralis			X				
Raptoheptagenia cruenata	X						
Tortopus primus					X		
Hydropsyche orris		X					Caddisflies
Potamyia flava		X					
Epicordulia princeps						X	Dragonflies
Gomphurus spp.(2 species)	X						
Stylurus plagiatus			X				
Axarus sp.				X			Chironomids
Chernovskiia sp.			X				

Provided by B. Poulton, USGS

Big River Obligates

- 22 species of macroinvertebrates restricted to only large rivers (e.g., the Missouri, Mississippi Rivers and larger tributaries)

Pentagenia vittigera

mayfly

Homoeneuria sp.

mayfly

Potamyia flavida

caddisfly

MDC photos

Big River Obligates

- 22 species of macroinvertebrates restricted to only large rivers (e.g., the Missouri, Mississippi Rivers and larger tributaries)

stonefly

mayfly

mayfly

MDC photos

Next Steps

- Refine protocol based on volunteer feedback
- Continue educational presentations/events to create interest in large-river protocol
- Photo library development and completion
- Formal training workshops

Biological Monitoring

Wadeable Streams

- Inexpensive
- Safe
- Contain riffle habitats
- Simple and effective sampling methods available to collect quality data

Vs.

Big Rivers

- May require boats to retrieve samples
- Safety is a concern
- Alternative habitats available but can be difficult to sample
- Time-consuming
- Dependent on water levels
- Sample losses can occur due to high water events

Big-river Macroinvertebrate monitoring is optional for anyone willing to take on the challenge!

Partnerships in the Development of the Volunteer Big River Biological Monitoring Protocol

Photo by Mark Van Patten