



H₂O
Sentinels

Volunteer Water Quality Monitoring to Protect Your Streams



Three volunteers work together searching for macroinvertebrates in Menominee County. The more eyes helping to look, the better!

December 2011
Session 2:
Recruiting Helpers; Funding – how much?
Media and Public Outreach
More on Photo Documentation Data –
Track, Store, Use, Present
Let's Make a Plan

Rita Chapman
Water Sentinels Program Director
Sierra Club Michigan Chapter

1

What we'll cover

1. Items missed in Session 1: websites & more ☺
2. Recruiting experts, helpers & volunteers
3. Funding – do you need it? If so, how much? How to get it?
4. Media & Public Outreach
5. Photo documentation
6. Data: track, store, use, report it, present it
7. Let's make a *plan!* "If it ain't writ down, it ain't a plan."




2

My Favorite Websites for Monitoring Info & Stuff:

- <http://www.epa.gov/owow/monitoring/volunteer/> EPA's Volunteer Monitoring Website, tons of "how to" resources, data repositories, links to states' data.
- <http://www.epa.gov/owow/monitoring/volunteer/issues.htm> The Volunteer Monitor Newsletter page, with links to all back issues, again tons of info on how others have done their monitoring.
- <http://www.hach.com> Very nice resource for water chemistry kits and small meters
- <http://www.benmeadows.com> Where I generally get all my "bug" equipment and small hand-held meters (pH, conductivity, etc.)
- <http://www.carolina.com/> great resource for teachers!
- <http://www.ysi.com> expensive but nice hand-held meters for things like DO
- <http://www.micorps.net/> Michigan Clean Water Corps, or MiCorps, this one has links to resources, lots of "how to", connections with local experts, and even funding sources. If you're serious about monitoring, they can help.

3

Water Chemistry: some common parameters

What?	How?	Approx cost?	Where?
<i>E. coli</i> or fecal coliforms	 Lab sample	\$10 - \$35 per sample, it really pays to price shop	Get list of state-approved microbiology labs: http://www.michigan.gov/deq/0,4561,7-135-3307_4131_4156---00.html , plus some drinking water labs can do these tests.
	Grow your own: 3M PetriFilms, or another. Can incubate in chicken egg ← incubator, shown here, only \$28!	\$1.50 - \$5 per Sample, but may tradeoff credibility, accuracy. Good screening tool, though!	From last week: information about Bacteria monitoring: http://www.epa.gov/owow/monitoring/volunteer/newsletter/volmon18no1.pdf
Dissolved Oxygen or DO	HACH chemistry kit	This is sort of difficult, but have patience, it's worth it for cost savings.	http://www.hach.com
	Hand-held meter	~\$900 / instrument, plus \$100 / year upkeep, but data are reliable & credible See http://www.ysi.com →	

4

Water Chemistry: some common parameters

What?	How?	Approx cost?	Where?
BOD – biological oxygen demand, indicate level of nutrients in water	Lab sample	\$10 - \$35 per sample, it pays to price shop	Get list of state-approved microbiology labs, some drinking water labs can do.
pH and / or Conductivity (measures capacity of water to carry a current)	Hand-held meters	\$60 to hundreds	http://www.benmeadows.com or any other supplier
Turbidity – clarity of water	Inexpensive viewing tube, or can purchase more expensive hand-held meter	Not much to hundreds	Same
Hardness	Lab sample or chemistry kit	\$10 and up	Same, or http://www.hach.com

5

Water Chemistry: some common parameters

What?	How?	Approx cost?	Where?
Arsenic, Lead, Copper	Lab sample	Depends – can be a lot.	Get list of state-approved water chemistry labs
Pesticides	Lab sample	Same	Same
Water flow	Apple method is often good enough, can also measure w/ expensive meter	60 cents to hundreds	same
Total Dissolved Solids	Hand-held meter	Can be hundreds	http://www.benmeadows.com

6

Recruiting Experts / Advisors

Recruiting experts –

- People who may provide your training, advise your program, help with project design & statistical analysis, help choose methods & equipment, how to calibrate and use equipment
- Help with grant writing, identifying bugs, how to get a grab sample, interpret lab reports, & lend your project credibility with media & agency staff.
- **And don't forget to consider agency staff as your experts - they may even volunteer. Most are scientists, and they like using their science training to do more than just write permits!**

Where to find these experts?

- **Get on the internet!** Check university extension programs, local colleges or universities, grad students looking for work, watershed groups, state agency volunteer monitoring programs.
- **Pay attention at public meetings about your cause, you may meet someone there.**
- They may want to know if there is funding. This isn't because they're greedy – just that they have costs to cover for equipment use, calibration solutions, etc. They will also want to know what kind of time commitment you're expecting or anticipating.

7

More on Recruiting Experts / Advisors

Example: I'm no expert – but I rely greatly on people who are, and meanwhile I've learned a lot along the way, so that I'm always improving my work. What we're doing isn't rocket science, so we can learn to do it. We just want to assure we're doing it right.



Example:

When ECCSCM and Lynn Henning needed to learn how to sample water downstream from CAFOs, they went straight to the top – they were taught by EPA enforcement staff. Their quality assurance project plan spells out their sample collection & chain of custody procedures, as they were taught by EPA staff.

8

More on Recruiting Experts / Advisors

Example:

For the Menominee Co. project, I applied for and received a grant from MiCorps, Michigan's Volunteer Monitoring Program. As a condition of the grant, I was required to write a QAPP & to have it approved before I could begin monitoring. I also picked their brains early & often for guidance on the project. Rather than reinvent any wheels, I used forms & training materials from their website. <http://www.micorps.net>

Example:

In 2001 I worked on the Pine River in Gratiot County. Gratiot County is home to Alma College, where Dr. Murray Borrello (Chair of Environmental Studies Program) was already using the Pine as a study site for his students. The Pine was polluted by 2 oil refineries, and an old chemical factory downstream in St. Louis. Dr. Borrello & I agreed to work together on a water monitoring project. We also asked MDEQ for assistance in training our 45 new volunteers! The project lasted 5 years, with lots of media coverage, and helped raise community awareness of the river. The agencies are still investigating & negotiating on the cleanup of the old chemical factory. It will get done.

Recruiting Helpers & Volunteers

Recruiting Helpers – how many you need depends on what type of monitoring you'll do.

If you're sampling macroinvertebrates, then the jobs you need to cover for each monitoring site are: **Team Leader (w/ clipboard), Collector, Collector Assistant, and 1 or 2 Pickers.** You'll also want a **site photographer**, but the Team Leader may be able to do that.

If you're sampling bugs at 6 – 10 sites, you'll want **18 to 50** people, allowing 4 to 5 at each site.

If the streams are 1-4 feet wide and 2 feet or less deep, then 4 volunteers per team is plenty, or 5 at larger streams. You can also ask teams to monitor 2 sites, if you don't have enough people.

10

More on Recruiting Helpers & Volunteers

If you're using hand-held meters or taking samples to test, then the jobs may be fewer for each monitoring site. You may still want: **Team Leader (w/ clipboard), a meter tech, and someone to measure the water velocity and other physical parameters, etc.** But your time spent at each site should be less, so one or two teams may be able to do all the monitoring sites.

The number of people may be influenced by how fast you need to get in and out of a site. If you're monitoring around CAFOs, you'll want to move pretty quick – Lynn's rule of thumb is 2-3 minutes per site. She does this by having everything turned on & ready in the trunk of her car, with all equipment already calibrated. She carries extra batteries, and checks the batteries before she gets to the site. Plus she keeps her cell phone and her camera turned on & ready to use.



11

Volunteer Time and Motivation

Volunteers need to know what time commitment you're asking them for. You'll want a range of tasks that a volunteer can pick and choose, or some way of breaking up the day so that someone who can't be there all day can still help out for half the day. It's important to respect a volunteer's time, the most important gift they can give.



It's also important to delegate out the jobs that you can!

I've learned people have different motives for helping a project (though they may be close!)

Some people monitor to protect the river or to protect nature.

Some do it for fun and social time with like-minded people.

Some do it to get outside and hear the birds.

Some may want to bring the kids because "it's good for them" to learn about ecology or about protecting rivers. And maybe it is – but you may want to assure the kids are old enough to not jeopardize your QA/QC! I've found kids are great at helping as Bug Pickers – because their young eyes see the little critters that we may miss.

*Clip art licensed from the Clip Art Gallery on DiscoverySchool.com"

12

Make it enjoyable, and your volunteers will come back

- Make monitoring day an Event, with food and time for social interaction (often while bug picking, or during lunch).
- Make sure volunteers feel confident with good thorough training.
- Encourage people to become friends – arrange for non-monitoring-day time together. Share data with the group after monitoring day with a cookout.
- Together, work on presenting your data to local groups, like the Rotary, local township, or library board.



The Shakey Water Sentinels in Menominee County enjoy a lunch cookout after a full morning of stream monitoring.

Everyone pitches in, they all enjoy themselves, and catch up on the neighborhood news, including about the would-be mining company.

13

Funding – do you need it?

Do you need funding in order to start a monitoring project?

The answer is – it depends:

- on your monitoring goals,
- and your methods or parameters, and therefore your equipment needs.



14



Funding – do you need it?

Create a plan & a budget to figure out what your needs are.
It's possible you don't need an outside source of funding.

Benefits: Don't need to submit monthly or quarterly reports to a funder; don't need to worry about creating a nonprofit group with 501(c)3 tax status, or collaborating with one, just to get a grant. Some foundations don't want to grant money to purchase expensive equipment – or they may want you to give them the equipment at the end of the grant period.

Example: I want to monitor dissolved oxygen in streams near CAFOs.

Equipment needed – one YSI handheld meter

Cost – \$850, for meter & carry case

If you won't monitor any other parameters, if you are likely to work with only one or two other people, and if you can afford to pay for the meter yourself, then you may want to do that. That way, it's your meter. If you can't afford it, then you may want to connect with a larger group that has 501(c)3 status, and apply for funding from a foundation or other source.

15



Funding – do you need it?

If you plan to sample *E. coli* in streams near CAFOs, then you will need to decide several items:

- Which lab will you use?
- How often will you monitor?
- How many sites?
- For how long?
- How much does the lab charge to run (to culture) one sample?
- Will they give you a break if you promise them some number of samples per month, or if you were to pre-pay for a large number of tests?
- Will you run duplicates, or blanks, or split samples?
- Will you monitor upstream and downstream every time?
- Say you have \$500 for *E. coli* monitoring. At \$6 per sample, that would give you 83 samples – how would you use them?

16



Funding – do you need it?

If you plan to sample water for a number of chemical parameters at a certified lab, some of the same questions apply:

- Which lab will you use?
- How often will you monitor?
- How many sites?
- For how long?
- How much does the lab charge for each parameter for one sample?
- Will they give you a break if you promise them some number of samples per month or per year, or if you were to pre-pay for a large number of tests?
- Will you run duplicates, or blanks, or split samples?

When you figure out what you'll do, add up the numbers, and you'll know how much you want.

17



Who can you ask for funding?

Think about....

- **Community Foundations**
- **Public health agencies**
- **State agencies**
- **Non-profit organizations often have grant opportunities –**
 ex: Freshwater Future – works with grantees on capacity building & technology grants
 Your own non-profit group, or neighborhood group, or church, other people who want to monitor!
- **Michigan: Michigan Clean Water Corps <http://www.micorps.net>**

18

Media & Public Outreach

Why announce your project to the media, and the public?

Attract volunteers, experts, funders

Garner invitations to speak at gatherings, recruit volunteers or get donations.

Let the public know what you're doing and why.

Get public attention to an issue the public may know nothing about.

Let them hear YOUR side of the story.



19

Media & Public Outreach

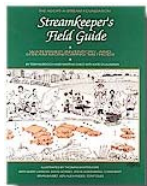
How to tell your story?

- You will want a website at some point.
- Facebook! <http://www.facebook.com>
- Twitter <http://twitter.com/>
- Local news & statewide press, too – reach those people who have a 2nd home in your monitoring area.
- Blog your results! Again – tell your story.
- Announce your events: <http://www.publicdrum.org>



20

Back to monitoring: these are Really Really Cool Resources



[Streamkeeper's Field Guide, Watershed Inventory and Stream Monitoring Methods.](http://www.streamkeeper.org/catalog/books.htm)

by Tom Murdoch & Martha Cheo with Kate O'Laughlin, funded by the Adopt-a-Stream Foundation ; ISBN 0-965210901, some 20 copies available "used" at Amazon.com starting at less than \$7, and available here new for less than \$30:

<http://www.streamkeeper.org/catalog/books.htm>



USEPA's [Volunteer Stream Monitoring: A Methods Manual](http://www.epa.gov/volunteer/stream/stream.pdf), released Nov. 1997, this is a **free** download, a little less than 4MB

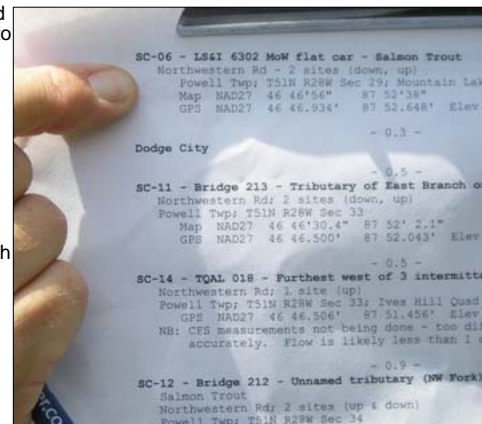
<http://www.epa.gov/volunteer/stream/stream.pdf>

Both of these are excellent resources that are used in many volunteer monitoring programs.

21

Photo Documentation

I learned early that when I spend a whole day looking at streams to choose appropriate monitoring sites or even to monitor, that all those streams can really look a lot alike, once I'm home downloading the photos. OY - This is annoying!



Even if there was something special about a site, if I didn't make detailed notes to go with the photos, I can still forget which was which. Note this photo - I see I should have had the camera on date-time stamp mode, too. This is also why the ongoing habitat assessment is important, because we're noting any physical changes since last time.

22

More on Photo Documentation

Right: Here's another good way to know where a photo was taken. This means Sierra Club site 8. And this time there's a date stamp!



Below: I learned from John Rebers in Marquette how to indicate in the photo whether I'm facing upstream or downstream. See the pointing finger? Upstream! Thanks, John!



Left: Plus, when photographing this site, we always stand on this bridge facing south toward that leaning tree. We get other photos, too, but this angle is easily compared to other photos at that site. See that nice sandy substrate in the stream? The amount of material deposited there can indicate the energy of the stream flow, whether it's been recently scoured out, or if there's a change in the amount and distribution of the materials.

23

A picture really is worth 10,000 words...

In early spring, Michigan has "frost laws". Heavy trucks can use dirt roads that are still frozen solid, but are supposed to stay OFF the roads once they start thawing until the roads are dry and solid again.

This was Kennecott's damage - and the sediment and mud is flowing downhill (to the right) toward the river. It's not just the mining itself that is an issue!

This is what I meant last time when I described the idea of "major changes in land use" also having an impact on the streams, and not just the mining itself.



This is northern Marquette County, these roads don't normally get that kind of traffic. And the logging truck drivers know better.

24

Data: track, use, store, and present it

It's tempting, after a long monitoring day, to just dump the forms into a pile and tell yourself you'll deal with them later. But after a few months pass by, you've suddenly got a large pile, and now it's catch-up time – ugh. And matching the now old photos to the forms – more ugh. Who can remember?

You'll want to figure out the best way to **track** your data in a spreadsheet, and the format of it will depend on what data you're tracking and how you'll use it. Parameters down the left side, and results across the top? Or the other way around? Play with it and see what you come up with. And it's much easier to do that when you've only got a few forms to enter instead of 50!

25

Data: track, use, store, present it

What can be done with the data, information, and photos?

- You can tell a story with it. Create a newsletter, whether on paper or online or email, with an annual report, with graphs, tables and photos. Include people in your photos, plus the natural resources and habitat.
- You can use data to compare to USGS gauges, see how your info stacks up. They usually monitor flow, flood stage, temperature, maybe dissolved oxygen or other stuff. <http://waterdata.usgs.gov/nwis/rt> The rt at the end of the URL stands for "real time".
- You can compare your data to the consultants', once they've released theirs for permit applications. They HAVE to share whatever goes in permit applications.
- You can use it to make presentations to groups. Maybe you're monitoring a stream that flows through a northern Michigan town. You could offer to present the data to a group at the local library or church or conservation district board. And of course, share it with the paper's editorial board and reporters, too!

26

Example for sharing the data with your volunteers, using Google Docs, that your volunteers also have access to edit:

Google docs sSELF Data Sheet

Group Name	Date	time	Location Name	Lar	Long	Tide	Precip	Trend	% Cloud Cover	Cloud type	wind speed MPH	Air Temp °C	%Rel Humid
Al & Diane	7/21/2009		Ketchams Creek	40.67047	73.40396	high			100%	stratus	0	73	93.9
Al & Diane	8/6/2009	1930	Amityville Ck	40.66	73.41	H	none	dry	75	strat_cir_cum	0.8	77	65
Al & Diane	8/21/2009	1600	Amityville Ck	40.66	73.41	Low	none	dry	10	rolling cum sw		91	66
Al & Diane	9/17/2009	1830	Dock	40.66	73.41	rising	None	dry	15	cirrostratus	0	64F	60
Al & Diane	10/6/2009	1830	Dock	40.66	73.41	low	none	dry	90%	and stratus	0	59.6	48
Al & Diane	10/23/2009	1730	Amityville Ck	40.66	73.41	mid	none	rain	100%	stratus	10	52	76
Brackish Brigade	5/29/2009	1500	Nissequogue	40.5149*	73.1201	High	none		80%	Cirro Stratus	2.5	66.7	70
Brackish Brigade	6/19/2009	1800	Nissequogue	40.5149*	73.1201	low	none		2%	Cumulus	2.1	85.1	91
Brackish Brigade	7/2/2009	1500	Nissequogue	40.5149*	73.1201	low	none		69%	Stratocumulus	1.4	79.5	73.6
Brackish Brigade	7/16/2009	1530	Nissequogue	40.5149*	73.1201	low	none		59%	Cirro Stratus	0.6	82.9	70.6
Brackish Brigade	7/31/2009	1400	Nissequogue	40.4318.24	73.1201	low	none	rain	10%	Cumulonimbus	2.7	86.3	75.2
Brackish Brigade	8/14/2009	1530	Nissequogue	40.4318.24	73.1201	low	None	Dry	2%	Cumulus	3.1	84.6	62.7
Brackish Brigade	8/26/2009	1515	Nissequogue	40.4318.24	73.1201	low	Rain	Rain	100%	NimboStratus	0.5	71.3	59
Brackish Brigade	9/12/2009	1525	Nissequogue	40.4318.24	73.1201	low	none	Dry	1%	Altostratus	3.6	74.7	57.6
Brackish Brigade	9/12/2009	1430	Nissequogue	40.4318.24	73.1201	low	none	Rain	100%	Nimbostratus	1.4	70.6	80.1
Brackish Brigade	10/2/2009	1600	Nissequogue	40.4318.24	73.1201	low	none	Dry	100%	Nimbostratus	1.5	62.8	63.5
Green Creekers	5/31/2009	1300	Green's Creek	40.4318.24*	73.524.00	High	None	Dry	30	Strato	2.8	77.8	65.1
Green Creekers	6/26/2009	1300	Green's Creek	40.4318.24*	73.524.00	High	None	Drizzle	100	Nimbostratus	5.9	66	96.6
Green Creekers	7/4/2009	1300	Green's Creek	40.4318.24*	73.524.00	High	None	Dry	50%	Cirrocumulus	1.4	82.5	53
Green Creekers	7/26/2009	1300	Green's Creek	40.4318.24*	73.524.00	High	None	Dry	75%	Cirrocumulus	3.6	79	86%
Green Creekers	8/6/2009	1300	Green's Creek	40.4318.24*	73.524.00	High	None	Dry	96%	Altostratus	6	77	85
Green Creekers	8/26/2009	1300	Green's Creek	40.4318.24*	73.524.00	High	None	Dry	30%	Stratocumulus	2.4	79	80
Green Creekers	9/13/2009	1300	Green's Creek	40.4323.7*	73.526*	low	None	dry	75%	Cumulus	2.2	75.4	70.7
Green Creekers	9/27/2009	1300	Green's Creek	40.4323.7*	73.526*	Low	Yes	Wet	100%	Nimbostratus	3.2	65.3	66.6

<http://liwatersentinel.org>

I am so jealous – this is fabulous! (Long Island Sentinels!)

LI WATER SENTINELS

Water Sentinels (green) and sSELF (blue) Water Quality Test Sites

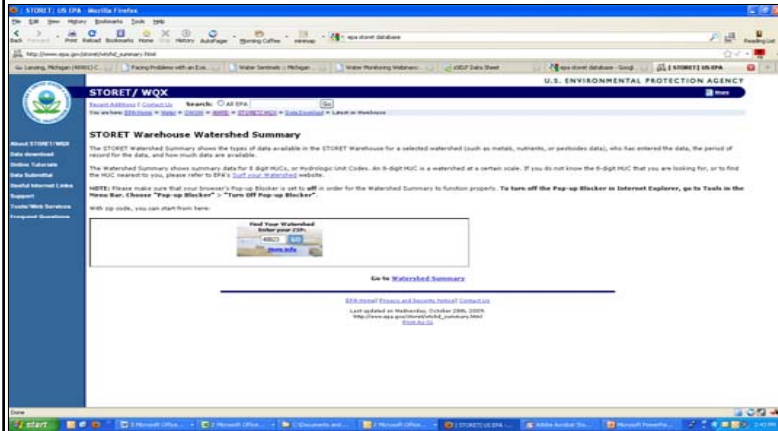
Water Sentinels Test Data

Group Name	Date	time	Location Name	Lar	Long	Tide	Precip	Trend	% Cloud Cover	Cloud type	wind speed MPH	Air Temp °C	%Rel Humid
Al & Diane	5/17/2009	1830	Dock	40.66	73.41	rising	None	dry	15	cirrostratus	0	64F	60

http://www.liwatersentinel.org/index.php?option=com_content&view=article&id=81&Itemid=65

28

USEPA's STORET: STORAge & RETreival Database:
http://www.epa.gov/storet/wtshd_summary.html



This one is harder, you need an approved quality assurance plan – but everyone will see and have access to your data.

Ok – Time to make a plan!

At this point it's time to consider your plan.

- Write it down, with benchmarks, so you can track your progress.
- Why do you want to monitor? What is your goal?
- What do you want to monitor for?
- How much will it cost? Time to make a budget.
- Do you need a grant? Can you start without one?
- How many sites will you monitor?
- How many volunteers do you need? Adults, or school kids?
- How will you recruit them?
- How will you train them? Who will you ask to be an advisor?
- How will you publicize your monitoring events?
- How will you track your data?
- What will you do with your data, once you've got a couple years worth or more?
- How long do you plan to do this?

30



H₂O
Sentinels

Thank you!

If you want to help monitor water in Michigan, please contact Rita Chapman at the Sierra Club Michigan Chapter office at 517-484-2372

109 E. Grand River Avenue
Lansing, Michigan 48906

<http://www.michigan.sierraclub.org>
<http://www.sierraclub.org/watersentinels>

or send email to:

rita.chapman@sierraclub.org



31