

MS4 Monitoring “DIY”



Michael Dietz, Ph.D.

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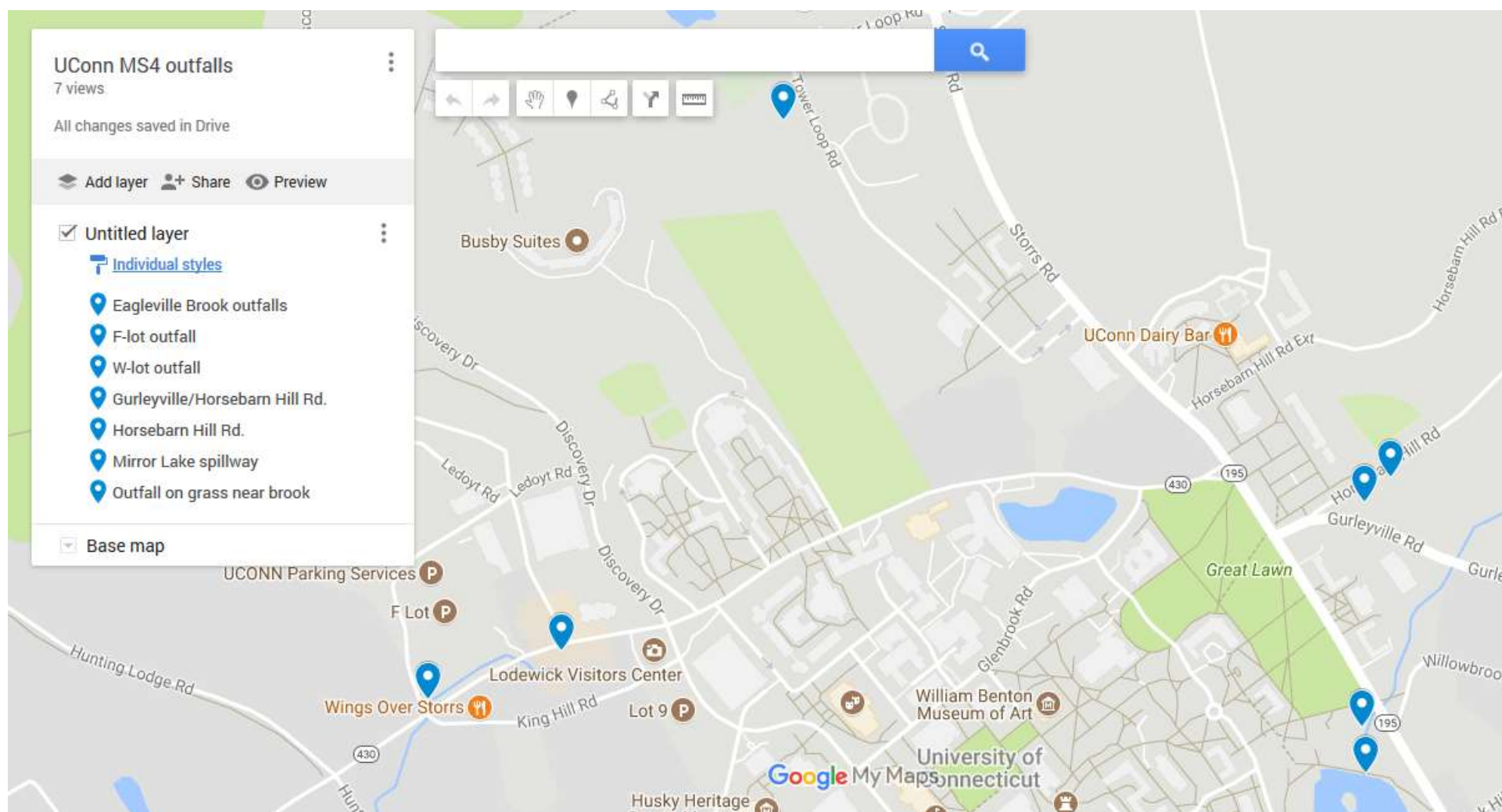
Center for Land Use Education and Research

University of Connecticut Extension

Preparation - inventory

- Inventory outfalls and provide unique identifier
- [Google map](#) with locations
- EpiCollect is another option

Outfall sampling locations



Preparation - who will be doing the work?

- Utilizing students on campus
- Dual benefit-
 - Cheap labor...
 - Provides an educational opportunity and resume builder
- Municipalities need to weigh staff time vs. hiring consultant

Preparation - field sheets

- Field checklist

UCONN MS4 MONITORING PROJECT

FIELD CHECKLIST

- Clipboard with field sheet
- Tote
- Field book
- YSI temperature/conductivity/salinity meter
- Sample bottles [500 mL qty. 10]
- Whirlpaks
- Cooler with ice packs
- Sampling pole
- Manhole cover hook
- Gloves
- Tape for labelling bottles
- Sharpie
- Partner

OUTFALL IDENTIFICATION GUIDE



Preparation – field sheet

UCONN MS4 MONITORING PROJECT FIELD SHEET

Name:	
Date:	
Dry (D) or Wet (W):	

Time collected	Sample ID	Cond. ($\mu\text{S}/\text{cm}$)	Salinity (ppt)	Temp. ($^{\circ}\text{C}$)

Preparation – what are you testing?

- Impaired waters – pollutant of concern
 - Typically nitrogen, phosphorus or bacteria
 - For “other pollutant of concern” test for turbidity
 - Outfall and in-stream above outfall
- IDDE
 - Pollutant of concern PLUS:
 - Free chlorine, conductivity, salinity, surfactants, temperature, *E. coli* (fresh water) or enterococcus (salt/brackish)

Preparation - custody sheet

- Important for accurate tracking of samples

UCONN MS4 MONITORING PROJECT
Chain of Custody form

Lab ID	Field ID	Date collected	Person checking in	Temp. (°C)	Cond. (µS/cm)	Salinity (ppt)	Turbidity (NTU)	Surfactants (mg/L)	Chlorine (mg/L)	NH ₃ -N (mg/L)	E. coli (col/100 mL)

Preparation- order supplies

- Whirl-paks
 - Sterile bags for bacteria sampling, but can be used for other analyses too
 - Grainger: Item #407L33, \$100/500 bags



- Gloves

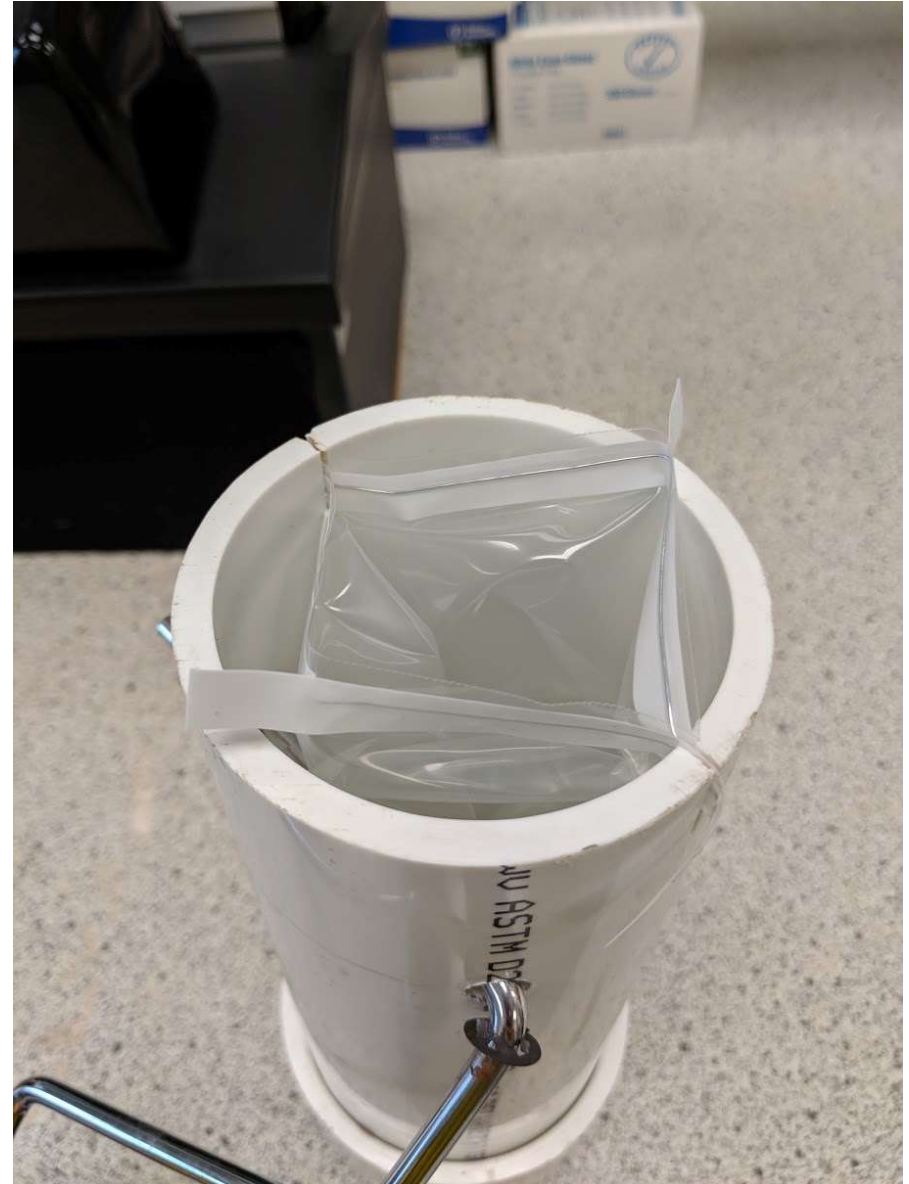
Preparation- order supplies

- Nalgene sample bottles from Fisher Scientific
 - If planning to reuse, you will need a special washing procedure with an acid bath to prevent contamination



Preparation – sampling pole

- May make sampling certain outfalls more convenient
- Can also be used for sampling in manholes if catchment investigation is needed



Preparation - order supplies

- Rinse bottle
 - Grainger item # 6FAV8
 - \$4.46
- Distilled water
 - For rinsing glassware in between samples



Preparation - order supplies

- Hach kits
 - Free chlorine, ammonia, surfactants
- Meters
 - Conductivity, temperature, salinity, free chlorine

****Note – there is no simple Hach kit or meter for total nitrogen or total phosphorus**

Preparation - Hach kits

- Free chlorine
 - <https://www.hach.com/free-chlorine-test-kit-model-cn-70f/product?id=7640219517>



Preparation - test kit

- Alternative (cheaper) free chlorine:
http://www.ctlscientific.com/cgi/display.cgi?item_num=91339



Preparation - Hach kits

- Ammonia
 - <https://www.hach.com/nitrogen-ammonia-test-kit-model-ni-sa/product?id=7640220995&callback=qs>



Preparation - Hach kits

- Surfactants/detergents
 - <https://www.hach.com/detergents-test-kit-model-de-2/product?id=7640218458&callback=qs#>



Preparation - meters

- Conductivity/temperature/salinity/TDS
 - Fancy version (YSI)
 - <https://www.y.si.com/pro30>
 - Budget version ([Amazon](#))



\$93.50

Preparation - meters

- Turbidity

- <https://www.hach.com/2100q-portable-turbidimeter/product?id=7640450963>



\$1,263

Analyses to have done at a professional lab

- *E. coli* & total coliform (fresh) or fecal coliform & enterococci (brackish/salt)
- NOTE 6 hour holding time for bacteria!!
- Total nitrogen, total phosphorus



Sampling procedure

- Use field checklist
- Label bottles/bags
- Record data at site
 - Temperature and perhaps other measurements
- Use PPE
 - Gloves, boots, reflective vests, other

Sampling procedure – other data

- (i) The date, temperature, time of the start of the discharge, time of sampling, and magnitude (in inches) of the rain event sampled.
- (ii) The duration between the rain event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) rain event.

Sampling procedure

- Sample in flowing water
- Fill up completely- no headspace



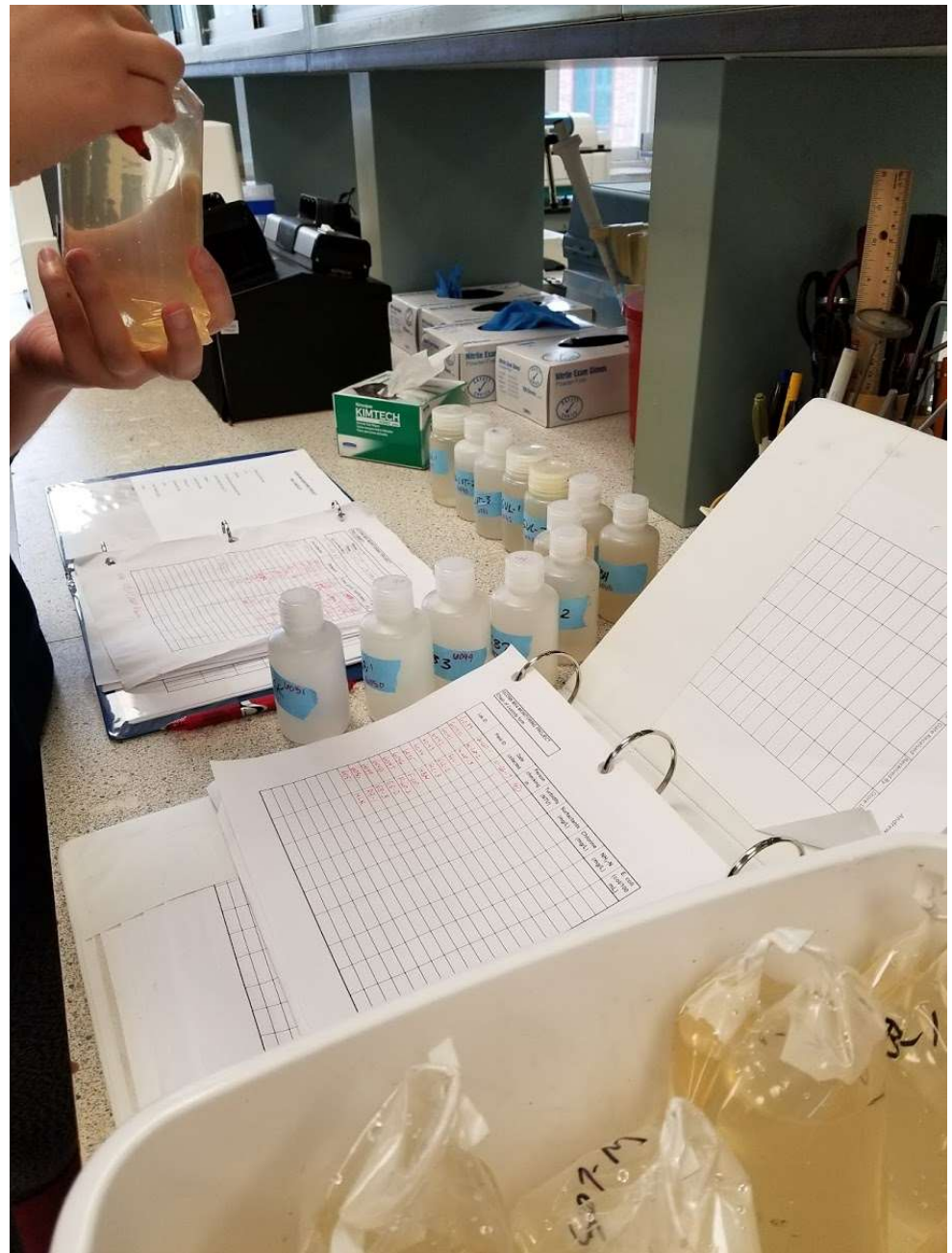
Sampling procedure

- Store on ice for transport to lab



Analysis

- Check samples in using chain of custody



Analysis – Hach kits

- Follow instructions included with kit
- Range from simple (dip strip in sample) to slightly complicated (mixing in reagents, waiting, reading on color wheel)

Managing data - impairment

- Follow-up needed when:
 - TN > 2.5 mg/L
 - TP > 0.3 mg/L
 - Bacteria
 - Fresh: *E. coli* > 235 col/100 mL (swimming) or > 410 (others) OR total coliform > 500 col/100mL
 - Salt: Enterococci > 104 col/100mL (swimming) or 500 (others) OR Fecal coliform > 31 col/100mL (SA) or > 260 (SB) OR
- Turbidity: more than 5 NTU > in-stream above outfall

Catchment investigation

- Investigating “up” from outfall in the system
- May be confined space considerations



Managing data - IDDE

Date	Field ID	Lab ID	Conductivity (µS/cm)	Salinity (ppt)	Temp (°C)	NH ₃ -N (mg/L)	Chlorine (mg/L)	E. coli (MPN/100mL)	Surfactants (mg/L)	Turbidity (NTU)	Need IDDE follow-up?
10/6/2017	GVL-1	6023	2207	1.1	17.6	0.5	0.01	28	0		NO
10/6/2017	GVL-2	6025	4175	2.2	18.6	0.3	0.01	<1	0		NO
10/6/2017	F-LOT-CB2-NW	6026	150	0.9	18.0	0.0	0.01	71	0		NO
10/6/2017	F-LOT-CB2-NE	6028	150	0.9	18.0	0.0	0.02	<1	0		NO
10/6/2017	MLK	6030	2266	1.2	21.0	0.3	0.05	3	0		NO
10/6/2017	RB1	6032	16	0.0	17.2	0.0	0.01	6	0		NO
10/6/2017	W-LOT-2	6033	2875	1.5	14.2	0.5	0.02	<1	0		NO
10/6/2017	EB-2	6035	3471	1.8	19.3	1.0	0.02	166	0		NO
10/6/2017	EB-3	6037	4820	2.6	16.9	1.0	0.01	23	0		NO
10/26/2017	W-LOT-1	6053	180	0.1	13.6	0.25	0.01	<1	0	1.72	NO
10/26/2017	W-LOT-2	6054	576	0.3	14.8	0.25	0.01	<1	0	2.15	NO
10/26/2017	W-LOT-3	6055	377	0.1	14.5	0.25	0.01	<1	0	2.35	NO
10/26/2017	GVL-1	6056	348	0.2	13.7	0.25	0.01	<1	0	0.95	NO
10/26/2017	GVL-2	6057	848	0.4	15.4	0.25	0.01	<1	0	1.25	NO
10/26/2017	GVL-3	6058	1238	0.6	15.9	0.25	0.01	<1	0	4.37	NO

*IDDE follow-up required where ammonia > 0.5 & surfactants > 0.25 & (*E. coli* > 235 or detectable chlorine)

Catchment investigation for IDDE

- Detailed requirements listed in permit
- Inspection with monitoring only if evidence of illicit discharge or dry weather flow
- May be confined space considerations
- More detail on this available on recordings from IDDE workshop

Follow-up - impairment

- Once half of all outfalls have been screened, pick six outfalls with highest readings and sample annually

Other resources

- https://www3.epa.gov/npdes/pubs/msgp_monitoring_guide.pdf

QUESTIONS??

michael.dietz@uconn.edu