MS4 Monitoring “DIY”

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MS4 Monitoring Workshop | June 20, 2019

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

- 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
## UCONN MS4 MONITORING PROJECT
### FIELD SHEET

<table>
<thead>
<tr>
<th>Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date:</td>
</tr>
<tr>
<td>Dry (D) or Wet (W):</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time collected</th>
<th>Sample ID</th>
<th>Cond. (µS/cm)</th>
<th>Salinity (ppt)</th>
<th>Temp. (°C)</th>
</tr>
</thead>
<tbody>
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</table>
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

<table>
<thead>
<tr>
<th>Lab ID</th>
<th>Field ID</th>
<th>Date collected</th>
<th>Person checking in</th>
<th>Temp. (°C)</th>
<th>Cond. (µS/cm)</th>
<th>Salinity (ppt)</th>
<th>Turbidity (NTU)</th>
<th>Surfactants (mg/L)</th>
<th>Chlorine (mg/L)</th>
<th>NH₃-N (mg/L)</th>
<th>E. coli (col/100 mL)</th>
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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
Preparation - test kit

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

• Ammonia
Preparation - Hach kits

- Surfactants/detergents
Preparation - meters

- Conductivity/temperature/salinity/TDS
  - Fancy version (YSI)
    - https://www.ysi.com/pro30
  - Budget version (Amazon)

$93.50
Preparation - meters

• Turbidity

$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.
### Outfall/Catchment Screening Form

<table>
<thead>
<tr>
<th>Catchment ID:</th>
<th>Town:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspector:</td>
<td>Date:</td>
</tr>
<tr>
<td>Street Name:</td>
<td></td>
</tr>
<tr>
<td>Last rainfall event (date and amount):</td>
<td></td>
</tr>
<tr>
<td>Type of Sampling Event</td>
<td>Location:</td>
</tr>
<tr>
<td>□ Dry Weather Screening</td>
<td>□ Outfall</td>
</tr>
<tr>
<td>□ Wet Weather Sampling</td>
<td>□ Manhole</td>
</tr>
<tr>
<td>□ Catch Basin</td>
<td>□ Interconnection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Is outfall submerged/inundated?</th>
<th>□ Yes □ No</th>
</tr>
</thead>
<tbody>
<tr>
<td>If YES screen/sample at 1st non-influenced structure:</td>
<td>□ MH □ CB</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location ID:</th>
<th>Latitude:</th>
<th>Longitude:</th>
</tr>
</thead>
</table>

#### Shape of Pipe/Swale (check one)

- ![Pipe Diagram](image1)
- ![Swale Diagram](image2)
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**

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

<table>
<thead>
<tr>
<th>Date</th>
<th>Field ID</th>
<th>Lab ID</th>
<th>Conductivity (µS/cm)</th>
<th>Salinity (ppt)</th>
<th>Temp (°C)</th>
<th>NH₃-N (mg/L)</th>
<th>Chlorine (mg/L)</th>
<th>E. coli (MPN/100mL)</th>
<th>Surfactants (mg/L)</th>
<th>Turbidity (NTU)</th>
<th>Need IDDE follow-up?</th>
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<tbody>
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<td>10/6/2017</td>
<td>GVL-1</td>
<td>6023</td>
<td>2207</td>
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<td>17.6</td>
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<td>0.01</td>
<td>28</td>
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<td>F-LOT-CB2-NW</td>
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<td>150</td>
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<td>18.0</td>
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<td>166</td>
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<td>W-LOT-1</td>
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<td>4.37</td>
<td>NO</td>
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</table>
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??

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