

Illicit Discharge Detection and Elimination NHDES Merrimack River Basin Investigations



Presented at:

Nashua / Manchester Stormwater
Coalition Meeting
February 13th 2018

Presented by:

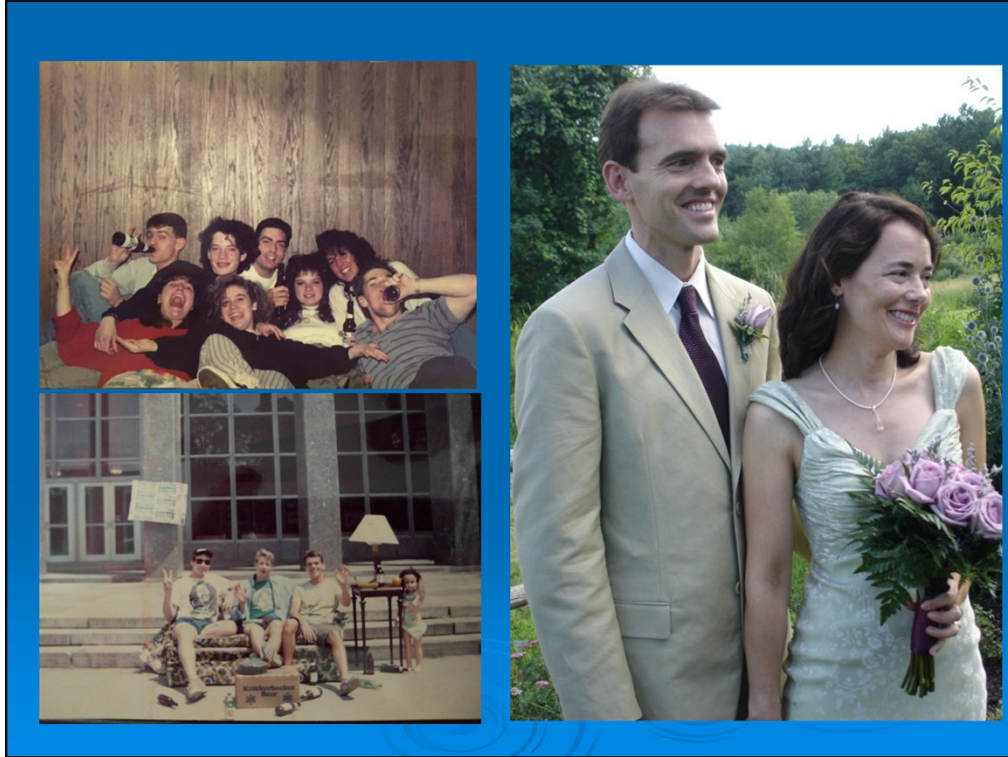
Stephen C Landry
NHDES – Water Division
Watershed Assistance Section



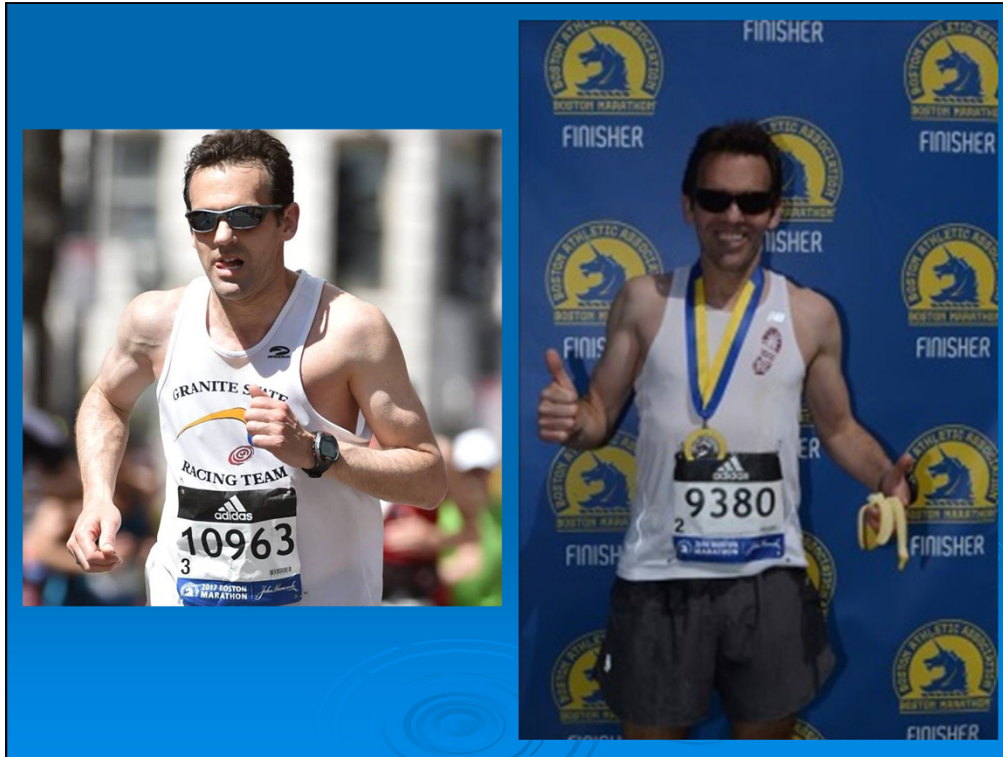
SPEAKER BIO SLIDES: I was born into a very fashion-forward family in 1969



At an early age, it was clear my NBA dreams would not come true and I switched to competing in high school X-country which was a much better fit for my build.



Somehow, I survived college, got married, and got addicted to qualifying for and competing in the Boston Marathon.



When I am not training for or recovering from racing the Boston Marathon...



I am under the hypnotic spell of our cats making sure that all their needs are addressed in a timely fashion.



With any remaining free time, I get to manage the New Hampshire Nonpoint Source Management Program and Watershed Assistance Section where I have the honor of working with the best NPS professionals on the planet.



One of our biggest missions in the Watershed Assistance Section and NH NPS Program is to provide the technical and financial support to conduct watershed planning and implementation projects on our beloved surface waters in NH.



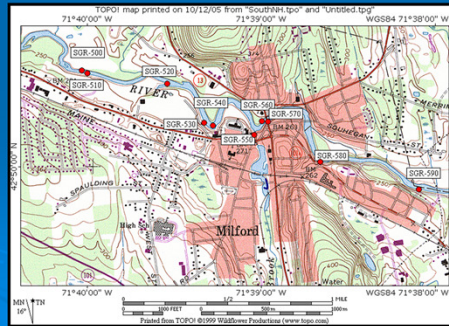
One program that achieved many positive results was the IDDE effort conducted in the Merrimack River basin in the early to mid 2000s where we tracked outfalls from the MA border up river through the lakes region on the main stem of the Merrimack River. We also conducted IDDE surveys along major tributaries to the Merrimack River with varying degrees of effort including the Nashua, Piscataquog, Pemigewasset, and Suncook Rivers. We also surveyed many, smaller tributaries and shorelines in communities along the Merrimack River corridor.



We learned on the job and got familiar with what ARE and what ARE NOT illicit discharges.

Merrimack River basin IDDE program

- Worked to develop (if not already completed) an inventory of storm sewer system (and other) outfalls and location of all waters that receive discharges from them



Merrimack River basin IDDE program

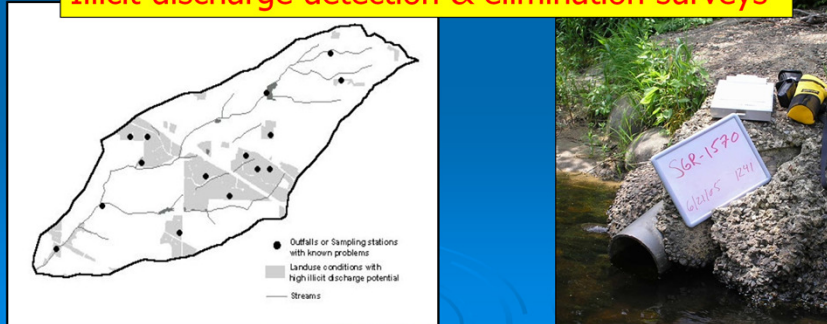
- Informed municipal officials, businesses, and public of hazards associated with illegal discharges and improper disposal of waste



Merrimack River basin IDDE program

- Developed and implemented a plan to detect and address illicit discharges, including illegal dumping to MS4s

Illicit discharge detection & elimination surveys



Merrimack River basin IDDE program

➤ Tools of the trade:

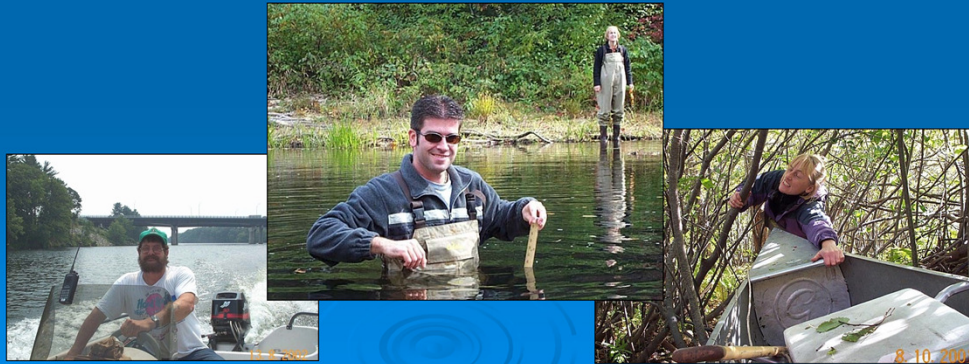
- Storm sewer and/or sanitary sewer maps
- GPS unit



Merrimack River basin IDDE program

➤ Tools of the trade:

- Transportation (boats, canoes, waders, boots etc.)



Merrimack River basin IDDE program

➤ **Tools of the trade:**

- Digital camera / phone
- Measuring stick and/or measuring tape
- Dry erase board & markers



Merrimack River basin IDDE program

➤ Tools of the trade:

- Field sheets
- Clipboard (metal)
- Sample bottles, ice & cooler
- Gloves and hand sanitizer



Merrimack River basin IDDE program

➤ Tools of the trade:

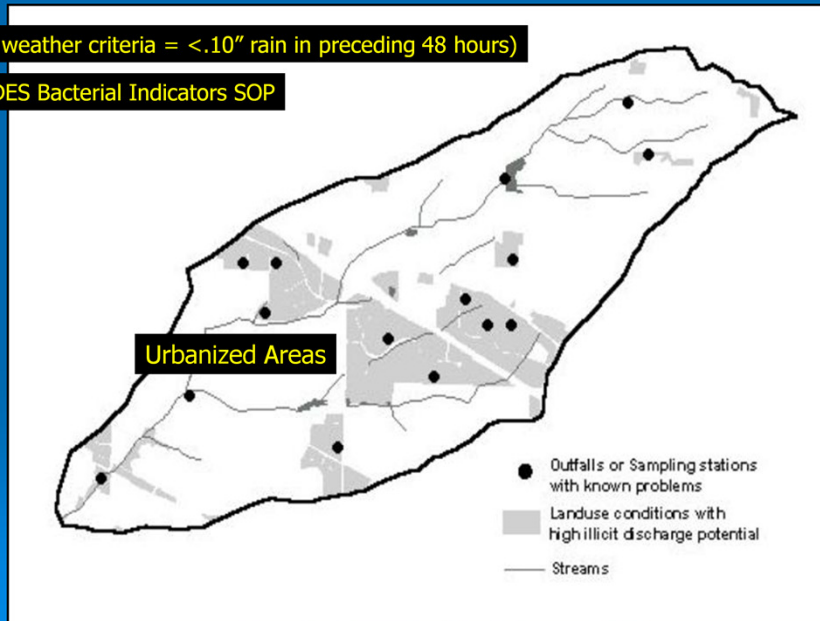
- Sampling pole
- Flashlight / mirror
- First aid kit
- Tetanus shot
- Hepatitis shot



Merrimack River basin IDDE program

Dry weather criteria = $<.10''$ rain in preceding 48 hours)

NHDES Bacterial Indicators SOP



Merrimack River basin IDDE program

Reconnaissance, reconnaissance, reconnaissance...



Always send your interns or seasonal staff to conduct reconnaissance before heading out yourself...

Merrimack River basin IDDE program

- Identified / confirmed outfalls
- Recorded outfall conditions
 - Type
 - Diameter
 - Material
 - Functioning?
 - Flow amount
 - Odor
 - Deposits

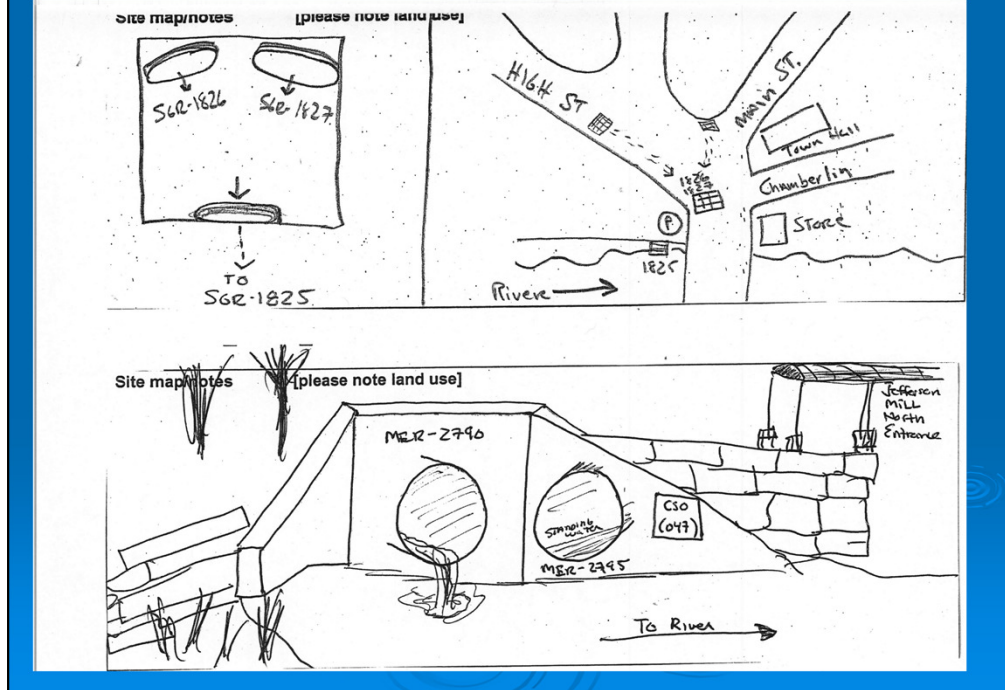


Merrimack River basin IDDE program

- Recorded GPS coordinates
- Assigned an outfall ID
- Site sketch
- Notes, observations, etc.



Merrimack River basin IDDE program



IDDE Field Data sheets were critical for outfall information documentation and allowing others to re-visit sites even if they had not been there before.

Shade in the box if a sample was collected at this site

2003 MERRIMACK SHORELINE SURVEY SHEET
NH DES Watershed Management Bureau, Watershed Assistance Section

Date: 8/22/03 Time: 1346 Contact: Andrea Dorton (x 8862) or Steve Landry (x 2969)

Town name: Nashua Direct waterbody affected: MERRIMACK RIVER Downstream waterbody affected: MERRIMACK RIVER

Collected by: S. Landry + A. Dorton Rainfall/Weather past 48 hours: _____ Latitude/Longitude: 42° 43' N 71° 50' W

Street and location information: Cedar Rd. Field measurements (temperature, conductivity, etc.): _____

Physical Observations:

Outfall type: pipe box culvert seep swale diameter: 20"

Outfall material: granite cast iron corrug. metal corrug. plastic concrete white PVC green PVC

Functioning? no possibly yes note condition: _____

Flow amount: dry moist drip trickle moderate standing water

Color: none sewage oil/gas laundry sulfide other: _____

Turbidity: none cloudy opaque brown yellow green other: _____

Floatables: none soap suds other: _____

Spills/stains: none black brown yellow white describe: _____

veg. growth: normal excessive inhibited

Site map/notes: (please note land use) 11-40-2

If samples collected, fill out sample info below:

Sample ID #	Date/Time Sampled	Parameter	RESULTS	Other/Notes
① BFB-075				
② BFB-105				

Shade in the box if a sample was collected at this site

2003 MERRIMACK SHORELINE SURVEY SHEET
NH DES Watershed Management Bureau, Watershed Assistance Section

Date: 8/22/03 Time: 1121 Contact: Andrea Dorton (x 8862) or Steve Landry (x 2969)

Town name: Nashua Direct waterbody affected: Bow, Field Branch Downstream waterbody affected: MERRIMACK RIVER + Merrimack

Collected by: A. Dorton + S. Landry Rainfall/Weather past 48 hours: DRY + HOT Latitude/Longitude: _____

Street and location information: Cedar Ave + 22 Cotton Rd Field measurements (temperature, conductivity, etc.): _____

Physical Observations:

Outfall type: pipe box culvert seep swale diameter: _____

Outfall material: granite cast iron corrug. metal corrug. plastic concrete white PVC green PVC

Functioning? no possibly yes note condition: _____

Flow amount: dry moist drip trickle moderate standing water

Color: none sewage oil/gas laundry sulfide other: _____

Turbidity: none cloudy opaque brown yellow green other: _____

Floatables: none soap suds other: _____

Spills/stains: none black brown yellow white describe: _____

veg. growth: normal excessive inhibited

Site map/notes: (please note land use) 11-40-2

If samples collected, fill out sample info below:

Sample ID #	Date/Time Sampled	Parameter	RESULTS	Other/Notes
① BFB-015				
② BFB-035				
③ BFB-035				

Full IDDE data sheets

Shade in the box if a sample was collected at this site

2002 MERRIMACK SHORELINE SURVEY SHEET
NH DES Watershed Management Bureau, Watershed Assistance Section

Date 10/16/03	Time 10:20am	Contact: Andres Donlon (x 8862) or Steve Landry (x 2969)	
Town name MERRIMACK	Direct waterbody affected Merrimack R.	Downstream waterbody affected MERRIMACK RIVER	
Collected by Steve Landry S. Heff	Rainfall/Weather past 48 hours Sunny, dry	Latitude/longitude N 42° 14' W 71° 27' 26.7"	
Street and location information E. Coli		Field measurements (temperature, conductivity, etc.)	

Physical Observations:

Outfall type: pipe box culvert seep swale diameter: _____

Outfall material: granite cast iron corrug. metal corrug. plastic concrete white PVC green PVC

Functioning? no possibly yes Note condition: _____

Flow amount: dry moist drip trickle moderate standing water

Odor: none sewage oil/gas laundry sulfide other: petroleum

Color: none gray brown yellow green other: _____

Turbidity: none cloudy opaque comments: _____

Floatables: none sewage oil sheen soap suds other: _____

Deposits/stains: none black brown yellow white describe: petroleum sheen

Veg. growth: normal excessive inhibited describe: _____

Site map/notes [please note land use]

If samples collected, fill out sample info below

Sample ID #	Date/Time Sampled	Parameter	RESULTS	Other Notes
MER-260	10/16/03 10:20am	E. coli	<10 cfs/100ml	
MER-305				

Site sketch art varies widely by personnel...

Merrimack River basin IDDE program

- Documented surrounding area
- Documented unusual sightings



Merrimack River basin IDDE program

➤ Sampled if necessary

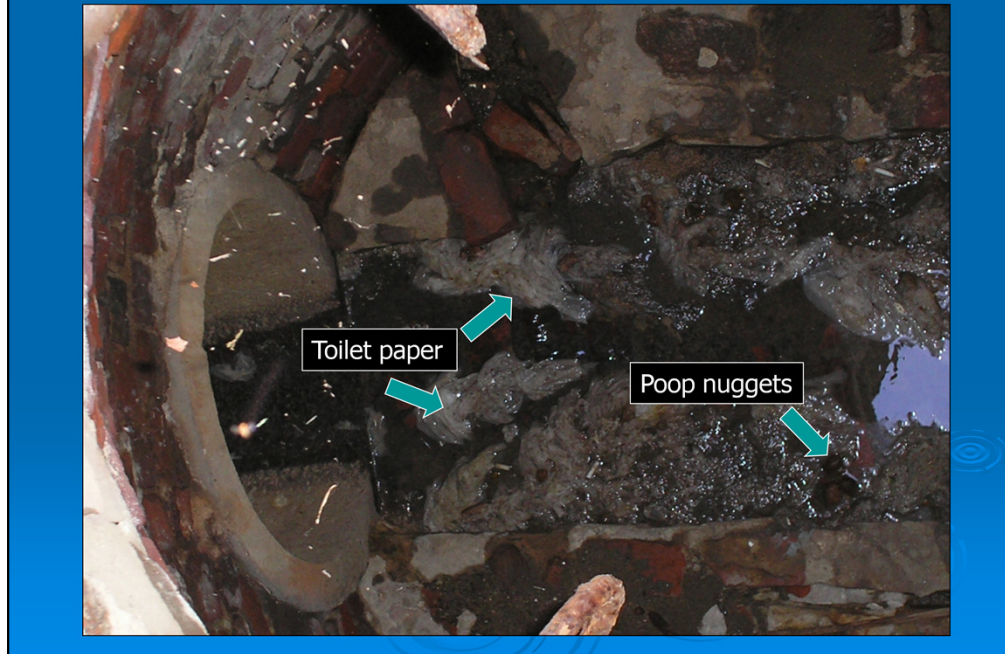


What do we mean by sampled if necessary?



If you find Veg-All floating underneath an outfall, you probably do not need to waste money on a bacteria sample!

What do we mean by sampled if necessary?



...or, if you see toilet paper and fecal matter, save your lab funding for later.

What do we mean by sampled if necessary?



Some optical brightener testing may be in order here...

Merrimack River basin IDDE program

- *E.coli* bacteria used as indicator
- Determine course of action for each outfall sampled based upon lab results
- Was a revisit necessary?
- Confirmation monitoring and source tracking



Tracking illicit sources

➤ Tools of the trade:

- Drainage system maps
- Sampling pole
- Dye tablets
- Pick & shovel
- Safety vests
- Traffic cones



Apologies for the non-OSHA compliant interns in these photos...

Tracking illicit discharges

- Dye testing



Always receive permission before using dye tablets. If people fear staining of their plumbing, you can always flush a Dunkin Donuts napkin since they have colorful logos and watch for down in the pipe of concern. YES...this really works if the connection is close enough.

Tracking illicit discharges

- Smoke testing



Once the general area is located, smoke testing may identify the specific source.



Always coordinate with local fire and police before undertaking this tracking approach. Need to inform all home owners and have them take necessary steps to close drains in the home beforehand.

Tracking illicit discharges

- Video inspections



Removing illicit sources

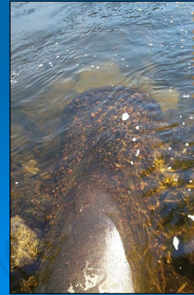
- Who is responsible?
- What methods will be used to repair?
- How long will repair take?
- How will removal be confirmed?



Removing illicit sources case study

➤ Franklin, NH

- A DES IDDE survey documents outfall and dry weather discharge
- Sample collected at outfall on Pemigewasset River



Removing illicit sources case study

➤ Franklin, NH

- E.coli results were $> 2,000$ cts/100mL
- Source tracking up the drain line reveals evidence of illicit discharge to MS4



Removing illicit sources case study

➤ Franklin, NH

- Review of sanitary sewer and storm sewer lines reveals a missed connection
- Dye testing of house confirms illicit source
- City of Franklin covers expense of sewer connection
- Homeowner refused to cover expense of interior hook-up to sewer line (sewer/water bills)



Removing illicit sources case study

➤ Franklin, NH

- City of Franklin contacts NHDES to request follow-up sampling at outfall
- Visual inspection of manhole indicates another illicit source
- A second round of investigations and dye testing confirms illicit discharge from two businesses



Removing illicit sources case study

➤ Franklin, NH

- Business owners, WWTF, and City collaborate to correct illicit connection
- City of Franklin Health Officer and DPW have been very responsive to DES findings
- Course of correction and responsibility for covering costs varies in Franklin (WWTF, etc.)



Available IDDE information

- Allenstown
- Amherst
- Auburn
- Bedford
- Derry
- Goffstown
- Greenville
- Hooksett
- Litchfield
- Manchester
- Milford
- Nashua
- Wilton
- Laconia
- Lakeport
- Concord
- Franklin
- Etc.

2002 MERRIMACK SHORELINE SURVEY AND LABORATORY SERVICES LOGIN SHEET
NH DES Watershed Management Bureau, Watershed Assistance Section

(S)

Date: 7-1-02 Time: 12:17 Project/Account #: 2035 NPS/Restoration
Contact: Andrea Donlon (x 8862) or Steve Landry (x 2969)

Town name: NASHUA Direct waterbody affected: NASHUA RIVER Downstream waterbody affected: MERRIMACK RIVER

Collected by: S. Landry / J. Updegr / A. Donlon Rainfall/Weather past 48 hours: DRY - HOT Latitude/longitude: 42° 45' 56.1" N 71° 21' 55.6" W

Street and location information: At Spina Ro - Behind "Cove" Field measurements (temperature, conductivity, etc.): (F. Cal.) - Photos Taken

Physical Observations:

Outfall type: pipe box culvert seep swale diameter: 4"

Outfall material: granite cast iron corrug. metal corrug. plastic concrete white PVC green PVC

Functioning? no possibly yes Note condition: clean algae fabric debris chlorine staining

Flow amount: dry moist drip trickle moderate standing water from an outlet "over" pipe

Color: none gray brown yellow green other: from waste at RUSA

Turbidity: none cloudy opaque comments: small little green only toward shore

Floatables: none sewage oil sheen soap suds other: Fishnet

Deposits/stains: none black brown yellow white describe: Bright orange staining beneath

Veg. growth: normal excessive inhibited describe: Low bacteria v. pool in outfall pool

Site map/notes [please note land use]

Matrix: A= Air S= Soil AQ= Aqueous Other:

Relinquished By: _____ Date/Time: _____ Received By: _____

Received For Laboratory By: _____ Date and Time: _____

Page _____ of _____ Date Reviewed By: _____ Date: 8/12/12

Sample ID #	Date/Time Sampled	Matrix	Parameter	Other/Notes	Lab ID # (For Lab Use Only)
NAR-150	7-1-02 12:23	AQ	F. Cal.	50	

All field sheets scanned as PDFs with GPS coordinates on each sheet and NHDES Environmental Monitoring Database Station IDs included (NAR-150 e.g) so you can search online for data attributed to these outfalls through DES OneStop.

Extend 7/24/03

2002 MERRIMACK SHORELINE SURVEY SHEET
NH DES Watershed Management Bureau, Watershed Assistance Section

Shade in the box if a sample was collected at this site

Date 7/22/02	Time 10:50	Contact: Andrea Dionon (x 8962) or Steve Landry (x 2969)	
Town Name NASHUA	Direct waterbody affected Salmon Brook	Downstream waterbody affected MERRIMACK RIVER	
Collected by A. Donlon + R. Dupuis	Radius/weather past 48 hours sunny, hot	Latitude/longitude N42°44'55.0" W71°28'47.2"	
Street and location information St. Joseph Hospital loading dock		Field measurements (temperature, conductivity, etc.)	

Physical Observations:

Outfall type: pipe box culvert seep swale diameter: _____

Outfall material: granite cast iron corrug. metal corrug. plastic concrete white PVC green PVC

Functioning? no possibly yes Note condition: _____

Flow amount: dry trickle moderate standing water

Odor: none sewage oil/gas laundry sulfide other: _____

Color: none gray brown yellow green other: _____

Turbidity: none cloudy opaque comments: _____

Foam/flores: none sewage oil sheen soap suds other: _____

Deposit/silt: none black brown yellow white describe: _____

Veg. growth: normal excessive inhibited describe: _____

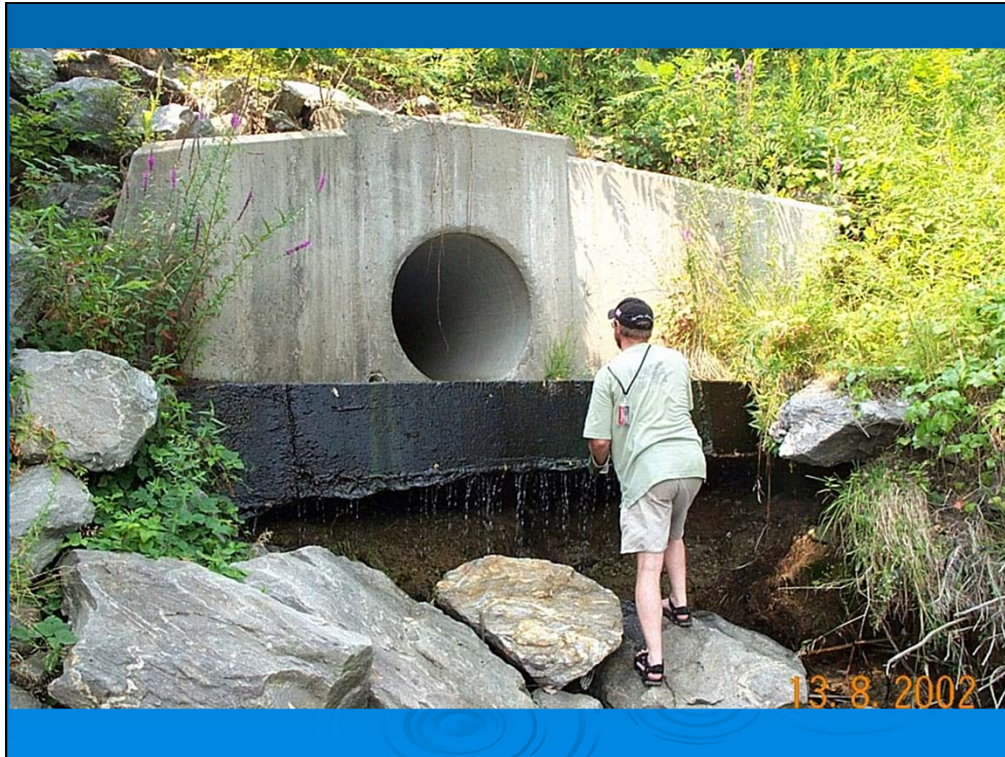
Site map/notes (please note land use)

Notes from site map:
 H20 is corrugated metal
 L615 is small cast iron
 L610 is concrete
 brown matter and foam coming out of L615
 Catch basin in flow
 Composites (standing water)

If samples collected, fill out sample info below

Sample ID #	Date/Time Sampled	Parameter	RESULTS	Other/Notes
SBH-1610	7/22/02 10:55	E.coli	1800	
SBH-1615	7/22/02 10:50	E.coli	20	
SBH-1620	7/22/02 11:00	E.coli	210	

If we tracked sources, separate field sheets were created to document where and when samples were taken and other outfalls located.



The IDDE data sets also include every photo taken of every outfall whether they were flowing...



...or not.



Thanks to Barbara McMillan and Deb Loiselle for helping to collect some of the IDDE data now available!

Thank You !

