# 2018 Environmental Data: Discharge/Flow

<p align="center">

<img src="https://github.com/tdube2014/Discharge/blob/master/Avery.JPG" width="800" title="Avery Brook">

</p>

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## \*\*Introduction\*\* <a name="introduction"></a>

This repository describes data collection (format, storage,and QAQC), methods and Study locations for the environmental data, Discharge/Flow

## \*\*Stream Locations\*\* <a name="paragraph1"></a>

### Pond Brook <a name="subparagraph1"></a>

+ Location

- Montague MA

+ GPS 42°32'23.25"N 72°31'57.67"W

- [Pond Brook](https://github.com/tdube2014/Discharge/blob/master/Pond%20Brook.jpg) \_Google earth image with study site marked out\_

- [Pond Brook Virtual](https://earth.google.com/web/@42.54169389,-72.52916484,77.13338182a,858.30646247d,35y,-0h,0t,0r) \_LInk to google Earth\_

+ Elevation

- 203 ft

+ Discharge Measurement Method

- Transects

- Onset Level Logger

+ Study

- YOY development

### West Whatley Brook <a name="subparagraph2"></a>

+ GPS 42°27'33.47"N 72°40'55.73"W

- [West Whatley](https://github.com/tdube2014/Discharge/blob/master/West%20Whatley%20Study%20Site.jpg) \_Google earth image with study site marked out\_

- [West Whatley Virtual](https://earth.google.com/web/@42.46125586,-72.68963205,235.23846823a,3802.45316621d,35y,0h,0t,0r) \_LInk to google Earth\_

+ Elevation

- 710 ft

+ Discharge Measurement Method

- Transects

- Onset Level Logger

+ Study

- YOY development

### Sanderson <a name="subparagraph3"></a>

+ GPS 42°26'7.57"N 72°41'0.49"W

- [Sanderson](https://github.com/tdube2014/Discharge/blob/master/Sanderson%20Study%20Site.jpg) \_Google earth image with study site marked out\_

- [Sanderson Virtual](https://earth.google.com/web/@42.43712866,-72.68623953,207.65527677a,679.42286314d,35y,0h,0t,0r) \_LInk to google Earth\_

+ Elevation

- 617 ft

+ Discharge Measurement Method

- Transects

- Onset Level Logger

+ Study

- YOY development

### Upper Sanderson Brook <a name="subparagraph4"></a>

+ GPS 42°26'7.57"N 72°41'0.49"W

- [Upper Sanderson](https://github.com/tdube2014/Discharge/blob/master/Sanderson%20Study%20Site.jpg) \_Google earth image with study site marked out\_

- [Upper Sanderson Virtual](https://earth.google.com/web/@42.43712866,-72.68623953,207.65527677a,679.42286314d,35y,0h,0t,0r) \_LInk to google Earth\_

+ Elevation

- 620 ft

+ Discharge Measurement Method

- Transects

- Onset Level Logger

+ Study

- YOY development

### Upper Obear Brook <a name="subparagraph5"></a>

On Google Earth/maps Obear is labeled Ground Brook.

+ GPS 42°25'55.08"N 72°40'40.94"W

- [upper Obear](https://github.com/tdube2014/Discharge/blob/master/Obear%20Study%20Site.jpg) \_Google earth image with study site marked out\_

- [Upper Obear Virtual](https://earth.google.com/web/@42.43341862,-72.6780941,183.5252371a,1486.12773821d,35y,12.39177316h,0t,0) \_LInk to google Earth\_

+ Elevation

- 615 ft

+ Discharge Measurement Method

- Transects

- In Situ Level Logger

- Stream Cam

+ Study

- YOY development

### Roaring Brook <a name="subparagraph6"></a>

+ GPS 42°14'15.44"N 72°50'56.35"W

- [Roaring Brook](https://github.com/tdube2014/Discharge/blob/master/Roaring%20Brook%20Study%20Site.jpg) \_Google earth image with study site marked out\_

- [Roaring bRook Virtual](https://earth.google.com/web/@42.23863562,-72.85076745,215.67079346a,752.95555861d,35y,46.38134956h,0.13622574t,-0r) \_LInk to google Earth\_

+ Elevation

- 529 ft

+ Discharge Measurement Method

- Transects

- Onset Level Logger

+ Study

- YOY development

### 4 Mile Brook <a name="subparagraph7"></a>

+ GPS 42°37'19.94"N 72°27'30.76"W

- [Four Mile](https://github.com/tdube2014/Discharge/blob/master/Roaring%20Brook%20Study%20Site.jpg) \_Google earth image with study site marked out\_

- [Four Mile Virtual](https://earth.google.com/web/@42.62585853,-72.46686453,128.59308485a,3790.36706796d,35y,20.79310042h,0.12809756t,0r) \_LInk to google Earth\_

+ Elevation

- 391 ft

+ Discharge Measurement Method

- Transects

- Onset Level Logger

+ Study

- YOY development

### West Brook Brook <a name="subparagraph8"></a>

+ GPS 42°25'51.99"N 72°39'50.58"W

- [West Brook](https://github.com/tdube2014/Discharge/blob/master/West%20Brook%20Study%20Site.jpg) \_Google earth image with study site marked out\_

- [West Brook Virtual](https://earth.google.com/web/@42.43328879,-72.66589853,138.46171818a,974.86929826d,35y,10.22475928h,0.26815088t,-0r) \_LInk to google Earth\_

+ Elevation

- 411 ft

+ Discharge Measurement Method

- Transects

- Onset Level Logger

+ Study

- YOY development

### Obear Brook <a name="subparagraph9"></a>

On Google Earth/maps Obear is labeled Ground Brook.

+ GPS 42°26'1.84"N 72°40'19.99"W

- [Obear](https://github.com/tdube2014/Discharge/blob/master/Obear%20Study%20Site.jpg) \_Google earth image with study site marked out\_

- [Obear Virtual](https://earth.google.com/web/@42.43341862,-72.6780941,183.5252371a,1486.12773821d,35y,12.39177316h,0t,0) \_LInk to google Earth\_

+ Elevation

- 539 ft

+ Discharge Measurement Method

- Transects

- Solenst Level Logger

+ Study

- YOY development

### Jimmy Brook <a name="subparagraph10"></a>

+ GPS 42°26'4.48"N 72°40'14.39"W

- [Jimmy](https://github.com/tdube2014/Discharge/blob/master/JImmy%20Brook%20Study%20Site.jpg) \_Google earth image with study site marked out\_

- [Jimmy Virtual](https://earth.google.com/web/@42.43657275,-72.67089559,166.34894806a,946.98182528d,35y,10.22138767h,0.26814971t,0r) \_LInk to google Earth\_

+ Elevation

- 456 ft

+ Discharge Measurement Method

- Transects

- Solenst Level Logger

+ Study

- YOY development

### Mitchell <a name="subparagraph11"></a>

+ GPS 42°26'0.29"N 72°40'5.97"W

- [Mitchell Brook](https://github.com/tdube2014/Discharge/blob/master/Mitchell%20Brook%20Study%20Site.jpg) \_Google earth image with study site marked out\_

- [MItchell Brook Virtual](https://earth.google.com/web/@42.43970464,-72.66825028,193.0077318a,3340.35339468d,35y,4.92018235h,0.11517627t,-0r) \_LInk to google Earth\_

+ Elevation

- 456 ft

+ Discharge Measurement Method

- Transects

- Solenst Level Logger

+ Study

- YOY development

## \*\*Discharge Data collection\*\* <a name="paragraph2"></a>

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### Download Schedule <a name="subparagraph12"></a>

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### Transect SOPs <a name="subparagraph13"></a>

The second paragraph text

#### Equipment

+ Flow Meter

+ Meter Stick

+ Measuring Tape

+ Depth Chart

+ Data book Pencil

+ Waders

#### Selecting a transect Site

Transect site should be in a free flowing run, straight with uniform unobstructed flow.

There should not be any side channels so that all the water flows through the main channel.

Avoid pools, do not select areas with areas where there is excess woody debris or large boulders. These characteristics can disturb flow creating turbulence eddies and slack water. Be conscious of how the flow is affected by tributaries and if you want that include in your measurement.

#### Recording Discharge Measurements

1. Tighten a measuring tape across the stream at right angles to the flow. It should be taut and not sag in the middle.

2. Measure the total stream width and record this measurement.

3. The standard method is to divide the width by 20, This will be done for brooks such as West Brook and Roaring Brook. Tribs such as Mitchell, Obear and West Whatley will be measured every 10cm.

4. Place Meter ( Rod held vertical, Meter directed into flow) at first measuring point. Always stand downstream of tape and measurement.

5. Record the distance to the bank. Measure total stream depth and record this depth. If the stream Is less than 2.5 ft/.76m we will take the V measurement at .6 depth, deeper than 2.5ft/.76 the V measurement will be taken at .2 and .8 of depth [(Discharge Measurement Heights.xlsx)](https://github.com/tdube2014/Discharge/blob/master/Data/Discharge%20Measurement%20Heights.xlsx). Repeat until you have completed transect. (It is common to record three measurements at each point and then take the average.)

### Data Storage <a name="subparagraph14"></a>

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### Data QA/QC <a name="subparagraph15"></a>

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### \*\*Data Loggers\*\* <a name="subparagraph16"></a>

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#### Onset <a name="subparagraph17"></a>

<img src="https://github.com/tdube2014/Discharge/blob/master/Equipment/In%20-Situ/HOBO-U20-Water-Level-Data-Logger-U20-001-04.jpg" width="250" height="150" />

[Onset pdf](https://github.com/tdube2014/Discharge/tree/master/Equipment/In%20-Situ)

#### In-Situ <a name="subparagraph18"></a>

<p>The Level TROLL 500 logs continuous measurements of water level, water pressure, and temperature. Titanium construction offers durability and long-lasting performance in fresh or saline groundwater environments. Available in vented (gauged) pressure ranges up to 1153 ft (351 m).<p>

<img src="https://github.com/tdube2014/Discharge/blob/master/Equipment/In%20-Situ/Level\_TROLL\_500.jpg" width="300" height="300" />

[Level Troll 500 pdf](https://github.com/tdube2014/Discharge/tree/master/Equipment/In%20-Situ)

#### Solinst <a name="subparagraph19"></a>

<img src="https://github.com/tdube2014/Discharge/blob/master/Equipment/In%20-Situ/Solinst%20Level%20Logger-Junior-DS.jpg" width="200" height="100" />

[Solinst Logger pdf](https://github.com/tdube2014/Discharge/blob/master/Equipment/In%20-Situ/3001-user-guide.pdf)

#### Flow Cams <a name="subparagraph20"></a>

<img src="https://github.com/tdube2014/Discharge/blob/master/Equipment/In%20-Situ/Stream%20Cam%20119877C\_1.jpg" width="300" height="300" />

[Game Cam pdf](https://github.com/tdube2014/Discharge/blob/master/Equipment/In%20-Situ/119874C-119875C-119876C-119877C-Trophy-Cam-HD-Aggressor.pdf)

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[Level Troll 500 pdf](https://github.com/tdube2014/Discharge/tree/master/Equipment/In%20-Situ)