River Instream Flow Stewards

Volunteer Manual





Contents

Safety	1
Field Checklist	1
Definitions	2
What's a Rating Curve?	8
What to Look For	3
How to Read a Staff Gage	3
How to Enter Data	4
Data Retrieval	6
Contact Information	9

Safety

Logistics

Be sure to let someone know where you are going, when you will return, and what to do if you don't return on time. If possible, work in pairs.

Traffic

Park your car off the road where it does not block traffic or create a hazard, but not on the sidewalk or private property.

Weather

Listen to weather reports and be prepared. Do not sample in unsafe weather conditions or if it is unsafe to reach the sampling location. Be aware of high winds that could cause tree branches to fall or slippery banks that can be caused by even light rain or frost.

Water safety

Volunteers should not need to enter the water to collect stage height data for RIFLS. If you cannot read the staff gage from the bank, use a pair of binoculars.

First Aid

Keep a first aid kit in your car and be aware of potentially serious allergic reactions, such as those caused by bee stings or poison ivy. Check for ticks, which may carry Lyme Disease, after each field visit.

Emergencies

Call 911 in the event of an emergency.

Field Checklist

- ✓ Field notebook
- ✓ Pen or pencil
- ✓ Binoculars
- ✓ Cell phone/camera

Definitions

Discharge (Q): The volume of fluid passing a point per unittime, commonly expressed as cubic feet per second. The product of the cross-sectional area of a stream (A) and the average water velocity (V). $Q = V^*A$

Rating curve: A mathematical or graphical relationship between water depth and discharge.

Staff gage: A graduated stick permanently installed in a river to measure the relative depth of water at a single location.

Stage: Water depth at a specific location in the river.

Stream flow: Same meaning as "Discharge".

What to Look For

The rating curve is sensitive to changes in the shape of the river bed, pooling from downstream constrictions, and movement of the staff gage. If any of these changes occur, the rating curve will need to be recalibrated. Please contact Ryan O'Donnell at IRWA (978) 412-8200, rodonnell@ipswichriver.org) if you notice any of the following changes at your site, or any other changes that might affect the rating curve:

- > A beaver dam downstream that backs up water all the way to the staff gage;
- Newly fallen trees, large debris, or excessive vegetation growth near the staff gage;
- > Extreme scour, erosion, or shifting sand bars near the gage;
- Movement or vandalism of the staff gage; or
- > Excessive leaf buildup at the downstream riffle.

How to Read a Staff Gage

Binoculars are needed to read a staff gage. Our staff gages are marked in feet, tenths, and hundredths of feet (not inches!!). These are the norm for much of the hydrologic work in the United States. The gages are labeled every two hundredths of a foot, so you will have to estimate when the water level is between two marks. If the water level on the upstream side of the staffgage is higher than the water level on the downstream side, record the average. The gage may not be installed with the stream bed at 0.00 feet

- Record your observations in the same place every time (e.g., a field notebook)
- Note the date and time of your reading
- Note weather conditions or other relevant information.
 - Take a photo of the site from the same location at least 4 times per year to document different water levels, seasons, and/or unusual conditions or events.





- 5.03 feet

How to Enter Data

- 1. Got to https://eeaonline.eea.state.ma.us/DFG/RIFLS/#/home; click the "Volunteer Login" link on the upper right. You must must first have your email address registered by the Mass. Division of Ecological Restoration to be able to login. Contact Ryan at rodonnell@ipswichriver.org or (978)412-8200 to request this.
- 2. On the next screen (see below), enter your e-mail address in the space provided and click "Submit."

→ C O B erannine-erastatem	NIN/DEG/REE S/#/home			R +
Apps 📒 Bookmarks Menu 🕥 ArcGIS Onlin	e 😮 eTapestry Login 😝 Facebook - Log In o 😵 WordPress Log	pin 🖽 Current Volunteer I 😭 Volunteer Inquiries 😭 Project Ideas for Int 🧿 4/11	our Designs 🛞 Mass DER Streamf 😭 Wenham Swamp Di	» 🧧 Other bookmarks 🔠 Reade
	Streamflow Restoration	Volunteer Login ×		
	RIFLS River Instream Flow Stewards	Please log in to the RIFLS data entry system by providing a valid email address. Contact us if you do not have a valid email address for entering data.	40 VOLUMTER LOOM	
	RIFLS Sites Debine of refering literate	Email address*	Select Site	
		Charles and	Select One	
	Contraction (201)	X CLOSE SUBHIT.		
	Contrast Con		Division of Ecological	
			Restoration +	
	8		251 Causeway Street, Suite 400.	
	Secondente		Boston, MA 02114	
		Providence 0	Diractions >	
	e Hanfford Westwee	Edition Bandat	Email	
	Westerning Person	Fallen and Harden Angeleration	Kate Bentsen	
	Dareney New Havan Hersleichen Philosport Long		kate.bentsen@mass.gov *	
	mach Summer		DELATED	
	States and a part of the same	EN HERE GAMEN FAC USES FRA. NPS COST	Streamflow Restoration+	

3. Select your site from the "Select a Site" drop-down box, select "Enter observations," then click "Submit."

🚺 Ipswich River Watershed Associal 🗙 🕅 Re I	D Winter sampling - rodonni 🗙 T 🔹 HERRING COUNT - Ip	oswich River 🗙 🔓 Google	× 💩 STREA	MFLOW MONITORING ×	Mass DER Streamflow Program	× 🛨	_	- C - X
← → C ① ■ eeaonline.eea.state.m	a.us/DFG/RIFLS/#/choosesite						e 🗴 🔳 🗊 🗖	* 🚯 E
🛗 Apps 📒 Bookmarks Menu 🌘 ArcGIS Onlin	e 🔇 eTapestry Login 😗 Facebook - Log In o 😵 V	WordPress Login 🖪 Current Volu	unteer I 🚹 Volunteer Inquiries	😭 Project Ideas for Int 🧿 All You	ar Designs 🛞 Mass DER St	reamf 🚹 Wenham Swamp Di	» 📒 Other bookmarks	🔛 Reading list
	Mass.gov Division of Ecological Restoration			An officia	al application of the Commo	nwealth of Massachusetts		î
	Division of Ecological Streamflow Resto	Restoration ration Program HOME	DASHBOARD	ENTER D	ATA	Ryan, O'Donnell		
	Enter Data							
	Select a Site* Select One Required!							
	Select a Task*: Enter Observations Uplo	ad an Image						
	SUBMIT ->							
		Executiv Energy a Environr	ve Office of and mental Affairs	Department of Fish & Game				
🚳 🚞 🕰 Ps 😬	🐸 💽 🎯 😍 🔼 🛛	X	Real Property in the local sector	-		And the second s	🖸 🕸 🖬 🤷 🖷 🖿 🖸	1247 PM 1/5/2022

4. Enter the date, time, and staff gage readings in the formats specified. In the "Comments" field, enter notes about changes at the site that may affect the rating curve, problems noticed, fish kills, rain events, water pollution, or any other field observations. If you have more data to enter, simply click the "Submit" button and return to the data entry form.

🚺 Ipswich River Watershed Associal 🗙 📕 Re ID Winter sampling - rodo	nn: x 🔹 HERRING COUNT - Ipswich River 🗴 🔓	Google 🗙 🔮 STRE	MFLOW MONITORING X () Mass DER Streamflow Prog	ram × 🗭	
← → C ① i eeaonline.eea.state.ma.us/DFG/RIFLS/#/enti	erobservations/108				8 x 🔳 🗊 🖬 🛪 🚳 🗄
🗮 Apps 📒 Bookmarks Menu 🔮 ArcGIS Online 😵 eTapestry Login	😝 Facebook - Log In o 😵 WordPress Login 🖽 (Current Volunteer I 🚹 Volunteer Inquiries	🖬 Project Ideas for Int 🧿 All Your Designs 🛞 Mass	DER Streamf 🚼 Wenham Swamp Di 🕷	Cther bookmarks
Str	reamflow Restoration Prog	gram			
A CAR				Ryan, O'Donnell	
	HOME	DASHBOARD	ENTER DATA	LOGOUT D	
Enter	r Data				
lpswic	h River: Haverhill St	treet			
Enter your ob	servation details and click SUBMIT.				
For an observ	vation to be valid a date and depth m	ust be entered. Comment is op	tional.		
Date and Tim	ne* Depth/Ft.* (Comments Ø			
	m				
B DELETE ROW					
+ ADD AN 0851	RVATION ROW				
< PREVIOUS	× CANCEL		SUBMIT →		
🚳 📰 🖉 📴 🖾 💽	۵ 😫 🖪 🖻			۵	12:49 PM 🔮 🕐 🏷 🚸 12:49 PM 15/2012

***Please double check your data for typos before hitting This will save everyone a lot of time and headache down the road!

How to Upload a Photo

- Please take a photograph of the site from the same location at least once a week. Return to the site selection page, choose your site again, and then select "Upload an Image" and click "Submit."
- 2. Select the date and time that the photograph was taken. The date can be easily entered by typing it in directly or clicking on the calendar icon next to the date field, then clicking on the correct date.
- 3. Select an image type from the dropdown.
- Select an image file or drag and drop. Then enter a name for the photo in the "Image Name" field. Use the name of the river and a unique identifier (such as Ipswich_River_flood).

- 5. Enter a simple description of the photo you've chosen. These photos will be a visual documentation of habitat conditions under different stream flows. After you'refinished.
- 6. Click "Submit." You can upload as many photos as you want, but only one at a time.

🔝 Ipswich River Watershed Associat 🗴 📉 Re ID	Winter sampling - rodonne 🗴 🛛 🌒 HERRING COUNT - Ipswich River 🗴	G Google x STREAMFLOW MONITORING x Mass DER Streamflow Program x +	
← → C ☆ @ eeaonline.eea.state.max	us/DFG/RIFLS/#/uploadimages/108		@ 🖈 🔳 🕼 🖬 🎒 E
👯 Apps 📒 Bookmarks Menu 🌘 ArcGIS Online	😵 eTapestry Login 📢 Facebook - Log In o 🔵 WordPress Login	🧱 Current Volunteer I 👔 Volunteer Inquiries 👔 Project Ideas for Int 🔕 All Your Designs – 🛞 Mass DER Streamfi 👔 Wenham Swamp Di	😕 📒 Other bookmarks 📑 Reading list
	Ipswich River: Haverhill	Street	ĺ
	Date and Time*	Image Type*	
		Select One v	
	Colork an impage file to upload or drag and		
	drop below*		
	Click to upload or drop an image here		
	Image Name		
	Description 🛛		
	PREVIOUS X CANCEL	ѕивміт →	
👧 🐃 🖪 🖪 🗰			🖪 🕸 🖬 💣 🛤 🏲 🗂 🔃 1252 PM

Data Retrieval

The staff gage data that you have recorded and entered into the Website is instantly available so that your observations and all past observations may be viewed.

Go to the RIFLS main page and zoom in on the map to the site you're interested in. Select the site you're interested in from the dropdown list on the right. Alternatively, clicking on the site in the map will reveal a pop-up box with site information and a link to more info. Click on this link to go to the site page.

ps 🧧 Bookmarks Menu 🌘 ArcGIS Onli	saulor Schröder (Login 🚯 Freebook - Login o 🚳 Word Press Login 🔠 Current Volunteer L 🔛 Volunteer Inquisies 🔛 Project Ideas for Sec 🎯 All	Your Designs ~ (B) Mass DEE Streamf (C) Wenham Source Di. (a) (C) Other bookmarks (C) (C) Reader
	RIFLS	
	River Instream Flow Stewards	
	🚯 RIFLS Sites Division of Ecological Restoration	Select Site
	+ o Find address or place Q. Hendbary Hendrary Hendrary	Select Die 👻
	Incomp	CONTACT
	Gather State	Division of Ecological
	Loss is br BIFLS sites: North Reading	Restoration +
	Samo TOWN North Reading settle	Address
	Active2011 Active SPILS_ID 108	251 Causeway Street, Suite 400, Boston, M& 02114
	Note at Heverhill St. Project, Na. Spevich River at Heverhill St.	Directions +
	Summer BFLS a const 234.460.09	
	y more \$24,736,25	Email
		Kate Bentsen
	et Physical Providence	kate.bentsen@mass.gov +
	and Salar Providence Dividence	
	A S . THE A WALL THE ACTION	RELATED
	Tail borr upp and the second s	Streamflow Restoration+
	and the animal and the second s	
	The Division of Ecological Destoration's DIELS program enables local groups to document	

This opens a new page which shows a graph of the most recent staff gage data. A drop-down menu at the top allows you to select a 1- 3-, 6-, 9-, or 12-month period to be displayed as a graph. A custom range can also be selected, then click "Go."

	S/#/analytics/108				Q C 🛧 📕 🕼 🛱 🧐
🛛 Apps 📋 Bookmarks Menu 🚳 ArcGIS Online 🔇 eTapest	ry Login (Pacebook - Log In o 🧕 WordPre	ss Login 🔢 Current Volunteer I 🚹 Voluntee	er Inquiries 🚹 Project Idea	is for Int 🧿 All Your Designs – 🛞 Mass DER Streamfi 😭 Wer	ham Swamp Di » 🧧 Other bookmarks 🔠 Readin
	lpswich R	liver: Haverhill Stree	et. North Re	ading	
				0	
	Drainage Area: 37.85 sq	uare miles		Select Site	
	Watershed: lpswich			Salaci Dra 🗸	
	Group: Ipswich River Wa	tershed Association		RE ATTO	
	Description: This site wa	is established in 2012 to provide additional inform	nation to understand	Streamflow Restoration	
	the impact of nearby m	unicipal well withdrawals.			
	Depth Chart				
	Data are available betw	wn 2012-06-11 and 2021-12-28 dates. Please seld	of the dates		
	accordingly.	an acta con them acta ta acta chere. Proper sen			
	View Custom: • Scatter Chart	Line Chart Starkeri Ava Chart Da	13		
	Dates: From - To		-		
	2021-12-30 - 2022-01-05				
	Like to Days		00 0		
	Last 8 Months	Ipswich River: Haverhill Street			
	Last 9 Months Last 12 Months	2021-11-28 thru 2021-12-28	•Cw0		
	Cueton Marge				
	3				
	Deed				
	alle -	•			
	2 *				

Discharge (cfs) data is also displayed for sites where a rating curve has been established. As with depth charts, discharge charts can also be viewed in 1- 3- to 12-month periods or as a custom chart.

What's a Rating Curve?

Rivers are unique and dynamic systems. Each stream bed has a different shape and depth of water. Unlike a pipe or concrete culvert where water depth and flow velocity is a straightforward calculation because of the uniform nature of these structures, the variability of a river and its shape must be taken into account when determining the volume of water flowing past a point in a given unit of time, known as discharge.

A single discharge measurement is the product of the cross-sectional area of a stream — captured by 15 - 30 width,depth, and velocity measurements in a line across the stream (Fig. 1) — and the average velocity measured at each point. Multiple measurements of discharge are made at different times and at different water levels throughout the year. These measurements, along with the staff gage readings, are used to create a rating curve (Fig. 2).

By describing the relationship between stream depth and discharge, a rating curve accounts for the natural variability of rivers. This curve can be used as a guide to convert your stream depth readings from a staff gage into discharge (flow) estimates.



cubic feet per second



Contact Information

Ryan O'Donnell Programs Coordinator Ipswich River Watershed Association 143 County Rd. Ipswich, MA 01938 (978) 4121-8200 rodonnell@ipswichriver.org