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Appendix 1:
Field Data Collection Guide for Rapid Stream Assessment

Field Data Collection Guide for Rapid Stream Assessment

District Department of Energy & the Environment

Water Quality Division

2019

Edition #3

Contact	Telephone
Field Team Coordinator: Matt English	(202) 481-3943 (desk) (202) 308-0453 (cell)
For immediate threat to human health and/or the environment: **DC Fire and EMS Services (FEMS)** **DOEE Emergency Operations: Janye Deichmeister** *For controlled spill (typically 5 gallons or less under control), minor equipment leaks, minor sheen, sediment plumes, or sewage (observed or odor):* **DOEE MS4 Operations: Ibrahim Famuditimi**	**911** (202) 535-2262 (desk) (202) 369-3656 (cell) (202) 535-2643 (desk) (202) 439-5698 (cell)
Emergency/Police/Fire/Ambulance	911
Poison Control Center (National Toll Free)	(800) 222-1222
National Response Center	(800) 424-8802

Purpose

This *Field Data Collection Guide for Rapid Stream Assessment* documents data collection protocols, procedures, and assessment and scoring guidance for the evaluation of stream reaches conducted by DOEE's Natural Resources Administration. This guide is intended for use by field assessment teams to help ensure consistent data collection.

Important Safety Reminders

When conducting stream assessments, DOEE's number one priority is to do so safely. Important safety reminders include:

- Always conduct stream assessments in pairs

- Do not enter high stream flows, such as after a rainstorm

- Ensure you are visible, such as in high-traffic areas

- Make sure you carry a charged cell phone in case of emergency

- Make sure the field coordinator knows where you are conducting assessments for the day

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RAPID STREAM ASSESSMENT OVERVIEW

The intent of the Rapid Stream Assessment (RSA) is to collect information to provide a high-level overview of the entire wadeable stream network within the District. This information can help identify potential issues as well as locations that may warrant follow-up inspections or more in-depth evaluations. The information from the RSA can also serve as a baseline with which to compare information from these assessments in the future.

The RSA includes several types of assessments including:

- Reach assessments
    - Open channel (above-ground) streams;
    - Closed channel (underground) streams
    - Outfall reach
- Point assessments
- Watershed notes

Reach and Point assessment types, as well as watershed notes, are discussed further in the following pages.

An assessment will not be performed if:

- *There is no access to a site (e.g., site is fenced off, the property owners have expressly restricted site access),*
- *If there are dangerous conditions, or*
- *If the reach is part of the mainstem (only tributary reaches are assessed in the RSA).*

Reach Assessment: Open Channel Streams

Both perennial and temporary streams are evaluated through the RSA. Reach assessments are performed on 300-meter (approximately 1,000 foot) segments unless a change in stream character occurs first, which will trigger the beginning of a new stream reach. Changes in character may be the result of:

*Note: metric as well as **approximate** conversions in standard measurements (e.g., inches, feet) are provided to aid staff in quickly evaluating data in the field.*

- Changes in flow or water quality characteristics (*e.g.*, clarity, odor)

- Changes in stream geomorphology (*e.g.*, floodplain connectivity, approximate Rosgen classification)

- Changes of in-stream physical habitat (*e.g.*, substrate type, erosion, riparian area)

As shown in Figure 1, data collection will occur from downstream to upstream. The right and left banks will then be oriented as such while looking upstream.
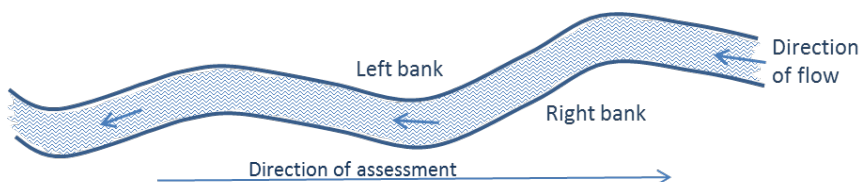

Figure 1. Direction of data collection

Additional discussion on differentiating between overall stream character and identifying the need for a Point Assessment, which captures these discrete issues, is included on page 8.

Within each stream reach, particular points of interest may be identified that are distinct from the overall stream character. This may include features such as a buffer deficiency, which may be visually distinct from the surrounding riparian area conditions.

It could also include distinct or discrete erosion points, which may be more dramatic than surrounding bank erosion.

For each stream reach:

- Basic data, such as field team members, will be recorded.
- A broad range of physical habitat metrics will be assessed for perennial reaches.
- An abbreviated assessment will be conducted on temporary reaches that includes fewer metrics.
- At least one representative photo will be provided for each reach regardless of flow type. Optional comments describing features of reach not fully captured in assessment questions.

How do I identify a temporary reach?

The RSA begins with a field crew following a perennial reach upstream. At some point in the assessment, flow will reduce and, ultimately, cease. While possibly dry during the RSA, there may be pathways for flow following rain events or when the water table is high.

Understanding temporary reaches is an important part of understanding the District's stream network. Identifying these temporary reaches, however, is often challenging as the channel can be inconspicuous, including being covered by leaves and lighter debris. Indicators of a temporary reach can include:

- *slight depression in the substrate*
- *presence of pools*
- *damp or black decomposing leaf litter*
- *silt or sediment accumulating on debris or plants*
- *drift lines where sticks, leaves, and other debris may accumulate on the streambank or surrounding vegetation*

A stream reach will be identified within the GIS-based field form as a line feature (as shown with the two red lines in Figure 2).

The process for identifying and assessing reaches includes:

1. Identifying where the stream reach begins (location "A")

2. Walking upstream from location "A"

3. Identifying any discrete issues that require a Point assessment (*e.g.*, dump sites, deficient buffers). See page 7 for additional information on conducting Point Assessments

4. Identifying when either 300 meters has been walked or there is a change in character that signifies the beginning of a new reach (location "B" in Figure 2)

   The measurement tool in Collector can be used to determine if 300 meters has been reached.

5. Drawing a line from the beginning of the reach (location "A) to the end of the reach (location "B")

6. Completing the questions associated with the stream reach metrics at location "B"
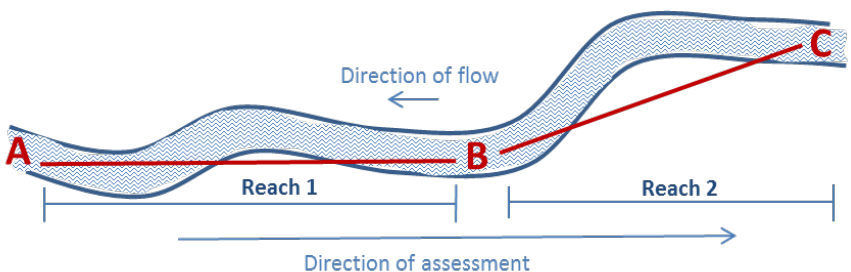

Figure 2. Open channel stream assessment

Note: The line depicting the stream reach (red line in Figure 2) may not coincide with the actual stream channel in some cases, which is acceptable in this assessment.

Reach Assessment: Closed-channel Streams

A closed channel, or underground or piped stream, is typically a conveyance that collects stream flow from an open channel and transports it to downstream point or another open channel reach. A simplified example is depicted in Figure 3, below. The process for identifying and assessing a closed-channel stream includes:

1. Assessing the preceding reach (Reach 1, Figure 2) as discussed on page 5

2. Beginning to draw a line from location "B" (the beginning of the closed channel reach)

   Note: this initial line may be short and not extend yet the length of the channel

3. Evaluating initial reach metrics at location "B"

4. Proceeding upstream to location "C", the end of the closed-channel reach, where the remainder of the metrics will be evaluated

5. Editing the line, if needed, to extend it fully to location "C"

> *Closed-channel stream – in line with the rest of the stream reach*
>
> *Outfall – pipes, ditches, and swales that discharges into a waterway*
>
> *Crossing – structure less than 75 meters that is placed across a waterway, such as a bridge. A crossing may also include culverts/ pipes through which stream flow moves*

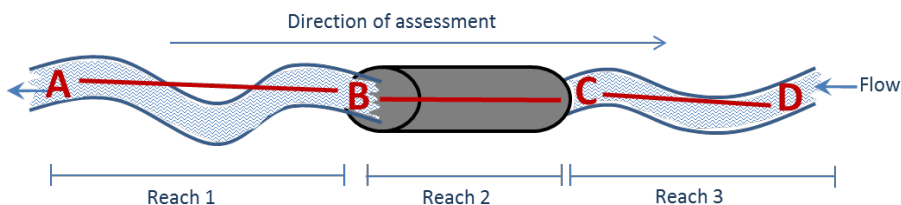Reach 3 (Figure 3) will then be assessed as discussed on page 5.

Figure 3. Closed channel stream assessment

Reach Assessment: Outfall Reach

These assessments are to be performed on reaches less than 75 meters in length that have been created by flow coming from an outfall. The same metrics will be evaluated for this assessment as are evaluated for open channel stream reach assessments. Additionally, the outfall at the end of the outfall reach also will need to be assessed separately within a point assessment.

Point Assessments

Points are considered locations within a stream reach where a distinct or discrete feature is identified. This includes:

- Deficient Buffers
- Crossings
- Dumpsites
- Erosion
- Pipes
- Utility lines
- Non-piped Blockage to Fish Passage
- Inaccessible Reach
- Other Impacts

General Data Collection Procedures

Reminder: Points are discrete in nature - they are not representative of an entire reach nor reflect a change in character of the reach, which would necessitate the beginning of a new stream reach.

Each Point Assessment can be flagged as requiring "urgent attention". This allows field staff to identify issues that will require additional follow-up. As the default for this question is "no", it must be actively changed to "yes" is a problem is flagged. Contacts are included in Appendix 4 of the QAPP.

Field teams will:

- Collect information on the Point features encountered in each reach regardless of perennial or temporary status.

- Record each observed instance encountered in the field with the following exception:

- o Discrete areas of erosion along a reach may be aggregated into a single point as long as the characteristics and impacts are identical.

- Place Point at center of each feature.

- Take at least one representative photo of each feature.

More than one photo should be taken at a Point if additional visual information will help provide clarification of an issue at a particular location.

- Optional comments describing features of the reach not fully captured in assessment questions.

- Place multiple points when a Point feature crosses a Reach break (*e.g.*, deficient buffer or erosion that spans two or more reaches).

Evaluating stream character vs. discrete issues

Stream buffers and erosion issues are evaluated both through the Reach Assessments as well as the Point Assessments. These metrics, however, are evaluated in different ways.

In a Reach Assessment, *Riparian Vegetation* and *Riparian Width* are assessed. These metrics are used to reflect the average character of a stream reach.

A Point Assessment is used to evaluate a specific *Erosion* point or *Deficient Buffer* at a particular location.

Figure 4 demonstrates, in a simplified way, how buffers and erosion points can be evaluated differently. "A" shows a "patchwork" of riparian buffer representing the character of the stream in the Reach Assessment (where green is a riparian buffer and the white gap is the deficient buffer). Alternatively, "B" shows a more isolated and specific location along the reach that should be evaluated further through a Buffer Point Assessment.

Similarly, "C" shows how erosion is part of the overall stream character (depicted through a Reach Assessment), while there are two discrete erosion points in "D" that can be specifically assessed through two Erosion Point Assessments.

Note: Points will be assessed as they are found as the field team walks the 300-meter (approximately 1,000 foot) stream reach (the reach may be shorter if it is determined the character of the reach has changed before this).

These Point assessments will be evaluated before the assessment for that Reach is completed. **It is important to finish either a point or a reach assessment before another is started. Data may be lost if field crews attempt to toggle between assessments.**

Flow ⟵
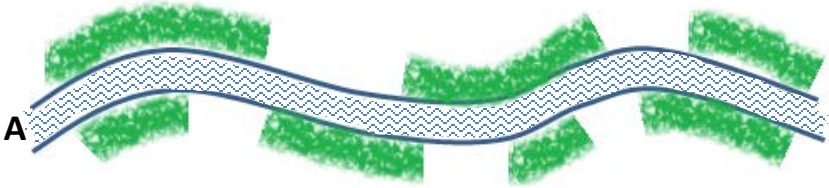
A A "patchwork" of riparian buffer represents the overall character of the stream reach.
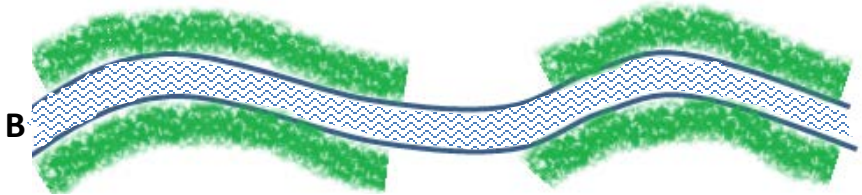
B An isolated gap in the riparian buffer is evaluated through a "Point Assessment".
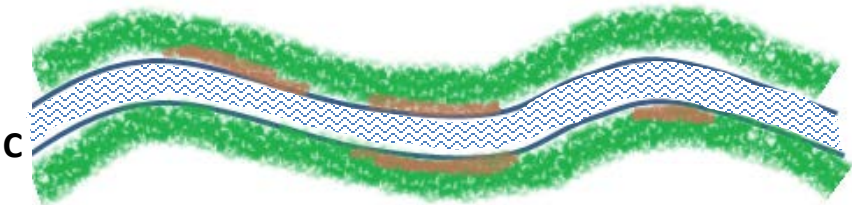
C Consistent or repeated erosion points represent character of the stream reach.
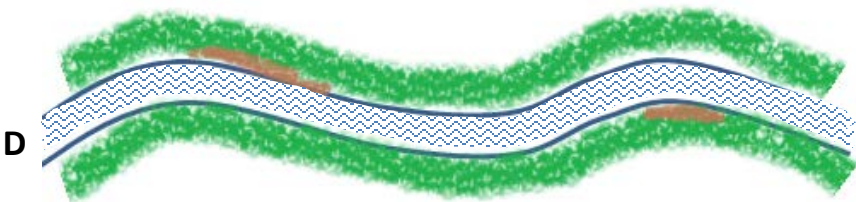
D Each isolated erosion point should be evaluated through a Point Assessment.

Direction of assessment ⟶

🟩 = riparian buffer

🟫 = erosion

Figure 4. Differentiating between stream character and Point Assessments

REACH ASSESSMENTS

Reach Assessment Metrics

For each stream reach, the following will be evaluated:

Water presence	Is water present: Yes / No - If water is present: is there flow or is the water stagnant/not flowing - If water is not present, but there are characteristics indicative of a stream channel or previous flow, the field form will focus the evaluation on metrics such as, riparian buffer width, etc.
Water clarity	Choose one or more of the following: Clear / Foamy / Greenish / Dark Brown / Light Brown / Milky / Oily Sheen / Reddish / Turbid / Iron Floc / Other - If water clarity is characterized as "other", describe in text box. - Take a photo of any water discoloration/ clarity issue that may be indicative of a larger issue or may warrant subsequent investigation
Odor (from water or sediment)	Choose one or more of the following: Chlorine / Fishy / Petroleum / Rotten Eggs / Sewage / None / Other If odor is characterized as "other", describe in text box

Maximum depth encountered	Record the maximum depth encountered along the reach in centimeters • Enter as positive, numeric value (no fractions)
Average depth	Record the estimated average depth of the reach 0-30 cm / 30-60 cm / >60 cm (0-12 in / 12-24 in / >24-in)
Maximum width	Record the wetted width of the stream in meters 0-1 m / 1-3 m / 3-6 m / >6 m (0-3 ft / 3-10 ft / 10-20 ft / >20 ft)
Aquatic vegetation (not algae)	Choose one or more of the following (examples shown below): Submerged / Emergent / Floating / None If present, note if vegetation type is extensive

Submerged

Emergent

Floating

Fish presence	Note if fish are absent or present. *(Only note if fish are seen, not if it is <u>possible</u> fish may be present)*
Algae	Note if algae are absent or present (examples shown below). • If present, note if algae area extensive (such as in the photos below)? • If extensive, take a photo of the algae for subsequent evaluation.

If there is a question regarding any metric (e.g., if algae are extensive or not), drop an "other impacts" point, record observations in the comment section, and take a photo at that point for subsequent follow-up.

Bacteria presence	Note if bacteria are absent or present. Bacterial presence can be identified by what appears to be an oily sheen or a rusty coating on the stream bank (iron flocculant).

If present:

- Is it extensive?

- If extensive, take a photo of the bacteria for subsequent evaluation.

- Describe the character (iron floc / sheen/ other)

Trash	Note if trash is:
	Absent **–** little or none visible in stream channel or riparian area
	Minor – trash present in minor amounts
	Moderate – trash present in moderate amounts
	Extensive – abundant and unsightly

Trash abundance:
1. Minor (e.g., one or two tires)
2. Moderate
3. Extensive (e.g., widespread within stream or riparian area)

Riparian vegetation width	Note the vegetation width on each side of the stream channel

Right bank: None / 0-25 m / 25-50 m / >50 m

(0-80 ft / 80-165 ft / >165 ft)

Left bank: None / 0-25 m / 25-50 m / >50 m

(0-80 ft / 80-165 ft / >165 ft)

Determine if any lack of vegetation is characteristic of the whole stream reach or if it is a discrete issue that will require further evaluation through a "Deficient Buffer" point assessment (reminder: see page 8). |
| Dominant riparian vegetation | Rank up to four the types of riparian vegetation in order of abundance within 50 meters of the stream (or visual distance if 50 meters is not within the sightline):

Right bank: Grasses / Forbs / Shrubs / Trees / None / Other

Left bank: Grasses / Forbs / Shrubs / Trees / None / Other

- If "other" is specified, describe in text box |

A forb is defined as an herbaceous plant that is not a grass.

Substrate type	Rank in order of abundance (up to 4):
	Sand / Gravel / Clay / Cobbles / Boulders / Concrete Channel / Bedrock / Other
	• If "other" is specified, describe in text box
Shading	Estimate degree and duration of shading during summer leaf-out as:
	Low shading – less than 25% shaded
	Medium shading – 25% to 75%
	High shading – more than 75% shaded

Floodplain Connectivity	The figure below provides a simplistic guide for evaluating how readily flows may escape the channel into the floodplain. Other indicators can include matted vegetation in the riparian area and deposition of sediment, trash or debris.

Characterize the connectivity to the floodplain:

High / Medium / Low:

High connectivity to floodplain

Low connectivity to floodplain

Bank height

Water level at low flow

Bank erosion	Evaluate the impact of erosion on each bank. The banks are oriented by looking upstream. The right bank and left bank will be evaluated separately. Check all that apply: • None (little to no erosion is present or does not appear to be causing issues) • Instream degradation (e.g., substrate sedimentation, filling in of riffles) • Adding to sediment loading (e.g., turbidity) • Slumping banks • Falling trees/vegetation • Threat to property (e.g., buildings, yards) • Threat to infrastructure (e.g., bridge or road may collapse, fence may fall) • Exposed infrastructure (e.g., exposed pipe) • Other (describe observations)
Woody debris and root wads	Count the woody debris/root wads within the channel as the field team moves up stream. This should include: • Woody debris >10 cm (4 in) diameter, more than 1.5 m (5 ft) long • Root wads on live trees with a diameter at breast height (DBH) of at least 15 cm (6 in) • Only woody debris or root wads found in wetted (or likely to become wetted) portions of stream

Approximate Rosgen Classification

Perform quick estimate of Rosgen Level I stream type classification using the following figure:

LONGITUDINAL, CROSS-SECTIONAL and PLAN VIEWS of MAJOR STREAM TYPES
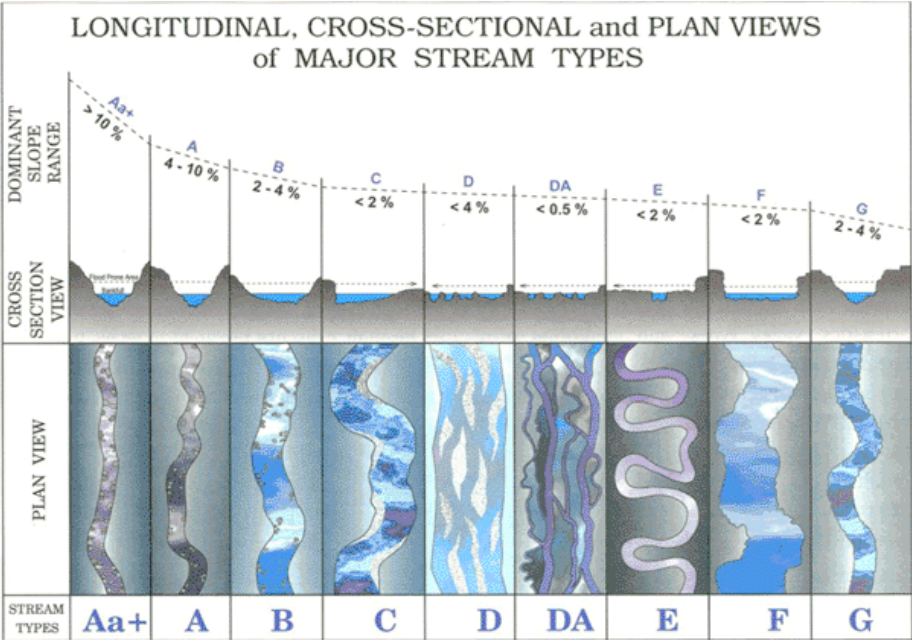
Rosgen, David L. "A classification of natural rivers." Catena 22 (1994): 179.   www.wildlandhydrology.com

Note: Photos can be labeled within the data collection platform to help distinguish what the photo is of (e.g., 1st photo: "downstream view", 2nd photo "upstream view".

Photo Tips

Where possible, take photo from a location that best captures channel sinuosity and slope represented by the Rosgen category.

Recreation evidence	Identify if there is any evidence of recreation along the stream reach. Select all that apply:
	None / Rafts / Life jackets / Rope swings / Marked Trails / Unmarked Paths / Coolers / Fishing line / Other
	If "other" is selected, describe observations.

Photo Tips

Take photo within channel. Photo should capture channel cross section and floodplain (see below) and should be representative of entire reach.

POINT ASSESSMENTS

Deficient Buffers
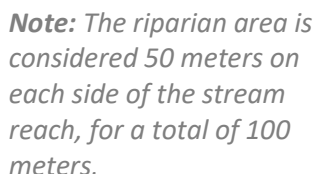
Deficient buffers are stretches of riparian area without sufficient canopy or understory. The deficient buffer may still include vegetation (*e.g.*, lawn) or may consist of impervious surface (*e.g.*, parking lot).

Stop: Does this point require urgent attention? If so, select "yes".

Buffer deficiencies should be recorded for areas within 50 meters (approximately 165 feet) of the stream channel.

Linear footage of the buffer deficiency should be reported as the longitudinal distance along the stream. A deficiency reported on both sides of the stream should be measured as the average distance on both sides of the stream

Note: The riparian area is considered 50 meters on each side of the stream reach, for a total of 100 meters.

Example: the deficiency should *not* be doubled if it appears on both sides of the stream; if there is 20 meters (65 feet) of deficiency on the right bank and 40 meters (130 feet) of buffer deficiency on the left bank, it should be recorded as 30 meters (approximately 100 feet) on both banks).

Stream bank where deficient buffer occurs	Looking upstream, on which side does the deficient buffer exist: • Right / Left / Both

Length of deficiency	The length of deficiency is the area along the length of stream
	Estimate the length of the deficiency within one of the following:
	0-25 m / 25-50 m / >50 m
	(80 ft / 80-165 ft / >165 ft)
Type of cover in deficient buffer area	Identify what types of cover are present within the 50-meter riparian area:
	Lawn / Invasives / Pavement / Structure (*e.g.*, retaining wall) / Other
	• If "other", describe in text box

Impact score	Estimate the extent of the impact that this deficient buffer has on the stream reach:

- *Severe:* Impervious/commercial area in close proximity to stream, banks may be modified or engineered. Stream character such as bank/bed stability, sediment deposition, and/or shading is obviously degraded by adjacent use.

- *Moderate:* Some impervious and/or just turf up to the bank, very little vegetation aside from turf within 50-meter (165 feet) riparian area, stream character probably degraded by adjacent uses.

- *Minor:* Encroachment mostly from residential uses and yard; some vegetation within 50-meter riparian area, but very little other than turf within remainder of 50-meter riparian area; stream character may be changed slightly by adjacent use.

- *None:* Vegetated buffer primarily intact within 50-meters of stream.

Photo Tips

Take photo that captures the buffer deficiency's proximity to the stream, if possible (*e.g.*, stream channel in the foreground). Also ensure that the buffer type is discernible.

Crossings

Crossings are defined as points within the stream reach through which the stream must pass. This is different than an underground/ piped stream reach, which is in line with the remaining stream bed and is often longer than a crossing would be. If a crossing has already been documented, it will be included on the map included in the Collector tool that includes DCGIS GIS information.

Stop: Does this point require urgent attention? If so, select "yes".

- If the Crossing is not inventoried (does not already exist on the map):
    - Drop a point within GIS
    - Assess the metrics
- If the Crossing is already documented:
    - Verify the information currently documented
        - If correct, no additional steps are needed.
        - If not correct, then drop a point and address the metrics.

Type	Box / Elliptical / Circular / Bridge / Foot Bridge / Other
	• If another type of crossing is identified, specify in the notes section
Diameter/ width	0-1m / 1-5m / >5m (0-3 ft / 3-16 ft / >16 ft)

Length	0-1m / 1-5m / >5m
	(0-3 ft / 3-16 ft / >16 ft)

Diameter / width

Length
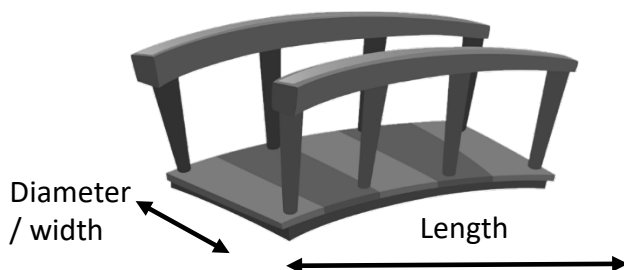
Material	Concrete / Corrugated Metal / Plastic / Wood / Other
	• If there is a material that is not one of the above, specify in the notes section
Downstream debris	Yes / No
Downstream bed erosion	Yes / No
	Erosion height: 0-1m / 1-2m / >2m
	(0-3 ft / 3-6 ft / >6 ft)
	• Erosion here can include the measurement from the bottom of the pipe, culvert, etc. to the stream bed.
Downstream sediment	Yes / No

Upstream debris	Yes / No
Upstream bed erosion	Yes / No Erosion height: 0-1m / 1-2m / >2m (0-3 ft / 3-6 ft / >6 ft) • Bed erosion is measured from the bottom of the pipe to the bottom of the eroded stream bed.
Upstream sediment	Yes / No
Impact score	Estimate the extent that this crossing has on the stream reach: • *Severe:* Condition probably poses threat to road or other structure. Problem should be addressed to avoid bigger problem in future. • *Moderate:* Condition does not appear to pose threat to road or other structure, but should be addressed to enhance stream integrity and future stability of structure. • *Minor:* Condition is noticeable but may not warrant repair. • *None:* No observable impact as a result of the crossing.

Photo Tips

Take photos at both the downstream and upstream ends of the crossing. If possible, take photos from within stream channel. Photo should provide appropriate context and include the crossing structure as well as the stream bed and banks. Include all barrels in single photo, if possible. Highlight erosion or sediment or debris deposition, if present, in additional photos, if needed.

Dumpsites

Dumpsites are points at which trash and debris has been purposely deposited (this is different than locations where trash appears to accumulate, although in some cases, distinguishing these may be difficult.

In general, record only dumpsites encountered within your visual distance within the riparian area.

Stop: Does this point require urgent attention? If so, select "yes".

Bank where the dumpsite is located	Right / Left / Both • Reminder: bank side (right or left) is determined by looking upstream.
Location of the dumpsite	Bank / Floodplain / Instream /Other • If "other", specify in the notes section
Cleanup potential	Yes / No • Consider the ease of access, the weight or bulk of the items, and any potential hazards to cleanup crews
Dumped material	Appliances / Petroleum / Tires / Trash / 55 gal drum / Other • If "other", specify in the notes section

Trash volume	<20 sq. m / 20-200 sq. m / >200 sq. m
	(215 sq ft / 215-2,150 sq ft / > 2,150 sq ft)
	• When estimating the volume of material at the dumpsite, this value must be a compacted volume. Estimates of volume should ignore void space and account only for the volume of physical materials that compromise the objects.
Impact score	*Severe:* Active and/or threatening. Material may be considered toxic or threatening to environment (concrete, petroleum, empty 55 gallon drums) or site is large (>750 sq. meters / 8,073 sq ft).
	Moderate: Dumpsite (<750 sq. meters) containing non-toxic material, does not appear to be used often, however clean-up would definitely be a benefit.
	Minor: Dumpsite appears small (<20 sq. meters / 215 sq ft) and material stable (will not likely be transported downstream by high water). Not high priority.
	None: No observable impact as a result of the dumpsite.

Photo Tips

Take photo that captures context of dumpsite relative to the
stream, if possible. Take additional photos that capture the largest
impact items.

Erosion

This Point Assessment is triggered by the identification of discrete erosion point that is distinct in nature from the character of the rest of the stream reach.

Stop: Does this point require urgent attention? If so, select "yes".

- Discrete areas of erosion along a reach may be aggregated into a single point as long as the characteristics and impacts are identical. For instance, similar erosion on both sides of a particular area of the stream bank can be included as one point.

- Multiple erosion points should be placed along the stream reach when erosion crosses a reach break (*e.g.*, erosion that spans two or more reaches).

- The length of the erosion point should be reported as the longitudinal distance along the stream.

- Reminder: bank side (right or left) is determined by looking upstream.

Erosion location	Note the side of the bank experiencing erosion: (Right / Left / Both)
Length	Note the length of the erosion point: Right bank: 0-3 m / 3-5 m / 5-8 m / >8 m (0-6.5 ft / 6.5-16 ft / 16- 26 ft / >26 ft) Left bank: 0-3 m / 3-5 m / 5-8 m / >8 m (0-6.5 ft / 6.5-16 ft / 16- 26 ft / >26 ft)

Bank height	Identify the bank height at the point of erosion:
	Right bank: 0-1m / 1-2m / 2-3m / 3-4m / 4-5m / 5-6m / >6m
	(0-3.5 ft / 3.5-6.5 ft / 6.5-10ft / 10-13 ft / 13-16 ft / 16-20 ft / >20 feet)
	Left bank: 0-1m / 1-2m / 2-3m / 3-4m / 4-5m / 5-6m / >6m
	(0-3.5 ft / 3.5-6.5 ft / 6.5-13 ft / 13-16 ft / 16-20 ft / >20 feet)
Impact	Evaluate the impact of erosion on each bank. The banks are oriented by looking upstream. The right bank and left bank will be evaluated separately. Check all that apply:

- None (little to no erosion is present or does not appear to be causing issues)
- Instream degradation (e.g., substrate sedimentation, filling in of riffles)
- Adding to sediment loading (e.g., turbidity)
- Slumping banks
- Falling trees/vegetation
- Threat to property (e.g., buildings, yards)
- Threat to infrastructure (e.g., bridge or road may collapse, fence may fall)
- Exposed infrastructure (e.g., exposed pipe)

Other (describe observations)

Photo Tips

Take photos that capture bank(s) with erosion in context of the stream. Also include area upstream or downstream of immediate erosion, if possible.

Pipes

Pipes, or discharge points to open channels, are discharges into the stream reach. In general, record only pipe outfalls that are encountered within your line of sight within the riparian area.

Stop: Does this point require urgent attention? If so, select "yes".
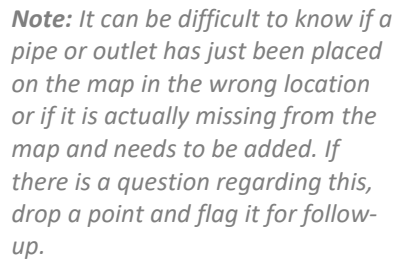
Standing water in a downstream channel should not be used as a surrogate for discharge quality parameters when no flow is present. Poor quality standing water should be noted, however, in the *Notes* field.

Upon locating a pipe that discharges into the stream reach determine if the pipe/discharge point is currently included/inventoried in the GIS data layer.

Note: It can be difficult to know if a pipe or outlet has just been placed on the map in the wrong location or if it is actually missing from the map and needs to be added. If there is a question regarding this, drop a point and flag it for follow-up.

- If the Pipe is **not** inventoried:
    o Drop a point within GIS
    o Assess the metrics in groups A and B.
- If the Pipe is already documented:
    o Verify the information currently documented
        ▪ If correct and the pipe has no discharge, no action is necessary.
        ▪ If correct but the pipe has discharge, assess metrics in group B

- If not correct, drop a point as if it was not inventoried and assess metrics in groups A and B.

A.

Bank where pipe is located	Right / Left / End of outfall reach
Pipe diameter	0-15cm / 15-30cm / 30-45cm / >45cm (0-6 inches / 6-12 inches / 12-18 inches / >18 inches)
Type of pipe material	Clay / Corrugated Metal / High-density Polyethylene (HDPE) / Iron / Polyvinyl Chloride (PVC) / Reinforced Concrete / Riprap / Other • If there is another type of material used, specify in the notes section
Floating solids/ trash	Yes / No
Erosion due to pipe	None / Minor / Moderate / Severe *Severe:* Large area of erosion that is damaging stream habitat and/or causing obvious instream degradation. *Moderate:* Moderate area of erosion that may be damaging habitat and causing some instream degradation. *Minor:* Minor area of erosion, no noticeable instream degradation.

Impact	Severe / Moderate / Minor / None
	Severe: Pipe causing a severe erosion and/or has discharge which may be illicit.
	Moderate: Pipe has discharge occurring but there is no indication this discharge is illicit.
	Minor: Pipe is causing some erosion but there is no discharge occurring.
	None: Pipe is not causing erosion problem and no discharge is occurring. No observable impact as the result of the pipe.
	• If severe, take a photo of the location

B.

Discharge concern	Indicate all immediate concerns regarding this discharge which may indicate there is an illicit connection.
	Sheen (e.g. oil, bacterial) / Odor (e.g. chlorine, fishy, petroleum, sewage, rotten eggs) / Discharge is foamy or ill colored (e.g. greenish, dark brown, milky, reddish) / Deposit or Stain / Other / None
	• If "other", specify in the text box
	• Enter "none" if discharge has no concerning characteristics

Photo Tips

Context is important, do not zoom in on pipe opening, include flow path out of pipe and erosion, if present.

Utility Line

Utilities are sometimes found near or crossing stream channels. In some cases, these crossings can impact the stream channel by causing erosion or by leaking pipe contents.

Stop: Does this point require urgent attention? If so, select "yes".

Utility line type	Is this an exposed sewer line: Yes / No • If not, note what type of utility line it is by entering text into the associated text box.
Utility line diameter	What is the diameter of this utility line? 0-6in / 6-12in / 12-18in / >18in
Utility line material	Note the type of material the utility line is made of from the drop down list: Clay / Corrugated Metal / High-density Polyethylene (HDPE) / Iron / Polyvinyl Chloride (PVC) / Reinforced Concrete / Riprap / Other
Utility line condition	Categorized the condition of the utility line: • Poor: utility line is exposed and in need of immediate repair or repair in the future • Fair: Utility line Is exposed and aging • Good: Utility line is exposed, but condition of pipe does not warrant urgent attention Take a photo of the utility line, being sure to capture any leaks or associated impacts to the stream reach.

Photo Tips

Include location of utility line relative to stream and/or banks. Use additional photos as necessary to capture any erosion or other impacts.

Non-piped blockage to fish passage

Blockages to fish passages are locations where there is greater than a **0.3 meters** (approximately one foot) change in stream bed elevation.

Fish blockage present	Record only non-piped blockages. Blockages will be assumed to be possible up/downstream of all closed channel reaches.
	Record the height of the fish blockage:
	0.3-0.5 meters / 0.5-1 meters / >1 meter
	(1-1.6 feet / 1.6-3.3 feet / >3.3 feet)
	Take at least one photo of the fish blockage.
	Note if the blockage is natural or man-made.

Inaccessible Reach

Occasionally, a stream reach that should be assessed may be visible, but inaccessible, from the location where the field team is currently assessing. For instance, a side channel may require assessment, but access to this reach may be blocked by a fence or is too deep.

The location of this inaccessible reach will be identified by dropping a point in GIS. Include in the comment box any information that may be needed for the subsequent investigation.

Other Impacts

Any additional issues identified by field staff during the RSA (*e.g.*, erosion and sediment control violations; exposed utilities that are causing erosion issues; anything unsafe, such as sudden drops from an outfall, partially collapsed crossing, etc.) should also be documented. To do this:

- Select "Other Impacts"
- Drop a point
- Take one or more photos of the impact
- Provide a brief description of the impact in the notes section

WATERSHED NOTES

Due to the comprehensive nature of the RSA, it is possible that field staff may make observations representative at a watershed scale, in addition to individual stream reaches. When field staff make these observations they should be documented as 'watershed notes' either in the Collector/Survey 123 tool or in the ArcGIS dashboard.

Hospitals/Emergency Care Facilities
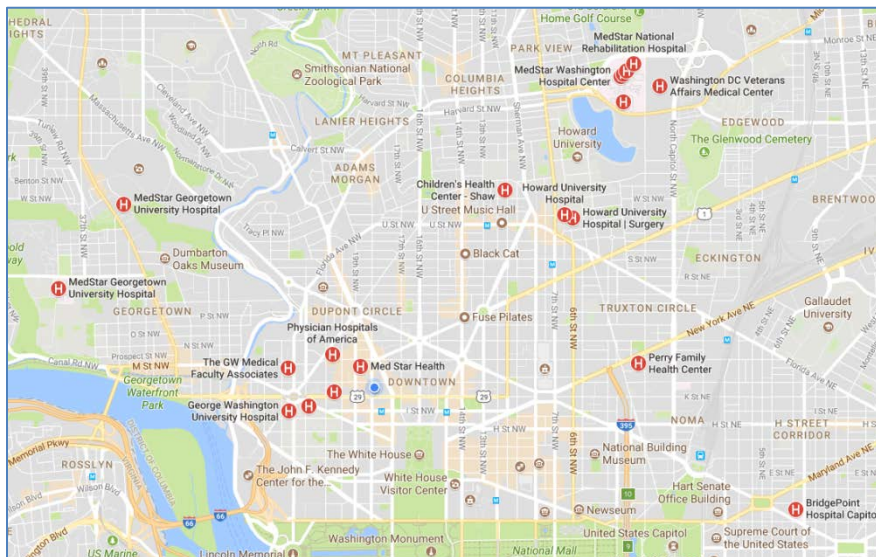
Hospital	Address	Phone Number
George Washington University Hospital	900 23rd Street NW	202-715-4000
MedStar Georgetown University Hospital	3800 Reservoir Road NW	855-546-2805
Howard University Hospital	2041 Georgia Ave NW	202-865-6100
Sibley Memorial Hospital	5255 Loughboro Road NW	202-537-4000
MedStar Washington Hospital Center	110 Irving Street NW	202-877-7000

Appendix 2:
Quality Assurance & Quality Control Program for Rapid Stream Assessments

Quality Control & Quality Assurance Program for Rapid Stream Assessments

District Department of Energy & the Environment

Water Quality Division

DEPARTMENT OF ENERGY & ENVIRONMENT

GOVERNMENT OF THE DISTRICT OF COLUMBIA

2019

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Water | Scientists
Environment | Engineers

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Purpose

The District Department of Energy and Environment's (DOEE) Water Quality Division (WQD) is responsible for assessment of receiving waters within the District of Columbia. The Rapid Stream Assessment (RSA) allows DOEE to provide a high-level overview of the entire wadeable stream network within the District.

DOEE developed the RSA program to comply with the District of Columbia's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit issued by the U.S. Environmental Protection Agency (USEPA).

This manual identifies a two-tiered approach to Quality Assurance and Quality Control in association with the RSA program and describes the level of accuracy and precision which is required to ensure RSA QAQC standards are upheld.

Important Safety Reminders

When conducting stream assessments, DOEE's number one priority is to do so safely. Important safety reminders include:

- Always conduct stream assessments in pairs

- Do not enter high stream flows, such as after a rainstorm

- Ensure you are visible, such as in high-traffic areas

- Make sure you carry a charged cell phone in case of emergency

- Make sure the field coordinator knows where you are conducting assessments for the day

Contents

Staff Certification

All certification related records (i.e. certification levels, training attendance, audit performance results) shall be maintained by the Project QA/QC Reviewer.

Certification Levels

The first tier of the RSA QA/QC approach is staff certification. All staff participating in the RSA program shall be certified to conduct these assessments. Certification level will be based upon completed training, audits, and the number of assessment hours complete. Certifications will be updated near the beginning of each field season immediately following annual training and audits.

Level A certification indicates that a staff person is an expert in the RSA program.

Level A certification can be obtained by staff members who have:

- Completed a lifetime minimum of 48 RSA hours as a Level B certified staff person
- Successfully completes annual training; and
- Passed a required field audits within the past two years

Level A certification is maintained by:

- Successfully completing annual training;
- Passing a required field audits every two years; and
- Completing a minimum of 48 RSA hours annually

Staff with Level A certification may serve as Field Data Collection Team Leads, conduct trainings, and/or serve as auditors.

Level B certification indicates that a staff person has demonstrated an ability to properly conduct assessments but does not have significant experience doing so.

Level B certification can be obtained by staff members who have:

- Completed a lifetime minimum of 16 RSA hours under the supervision of a Level A certified team lead;
- Successfully completed annual training; and
- Passed a required field audits within the past three years

Level B certification is maintained by:

- Successfully completing annual training;
- Passing a required field audits every three years; and
- Completing a minimum of 8 RSA hours annually

Whenever possible, Level B certified staff should work with a Level A certified staff person to conduct RSA activities. Level B certified staff should not be assigned to conduct RSA activities with an uncertified person.

Training Requirements

All staff participating in the RSA program will participate in appropriate training activities. All training will be conducted by Level A certified team leads. Returning staff will attend an annual, in-office training session focused on reviewing the procedures for RSA and for scoring the metrics described in the field manual. This annual training will be held each spring each spring within 1 month prior of RSA activities commencing. Training for new team members will consist of comprehensive in-office and field components.

Audit Requirements

All certified staff will be audited every 2-3 years based upon their certification level. The purpose of these audits are to ensure that all staff are able to demonstrate proper application of all knowledge and skills necessary for conducting RSAs. Audits will be held each spring within one month of RSA activities commencing. Audits will be performed by Level A certified staff observing auditees in the field while they conduct RSAs. A checklist of proficiencies which auditors expect to be demonstrated during these audits can be found in Appendix A.

All staff, regardless of certification level, must demonstrate 'acceptable' proficiency for at least 75% of the knowledge/skills. If 75% of the knowledge/skills are not deemed acceptable during an audit, field staff will receive repeat training before being allowed to retake their audit. Field staff who are unable to pass their audit will not participate in RSA that year. They may re-attempt certification the following field season.

Field Verification

The second tier of the RSA QA/QC approach is field verification. In order to ensure reproducible data are being collected, a subset of all streams (5%) will be assessed in duplicate. To the extent possible, both staff and streams for field verification will be selected at random.

Field verification will involve two assessment teams completing a RSA of the same stream reach(s) independently from one another. Teams will conduct the assessment at least two hours apart to minimize influence on each other, but on the same day to help ensure similar conditions exist in the reach. Teams will also record data using a mirror copy of the projects Collector/Survey123 data collection tool so that they cannot see each other's assessment data.

During the first year of the RSA program, duplicate assessments were used to determine expected levels of variation between by two, Level A certified teams. In subsequent years, field staff will be selected at random and the duplicate assessments they conduct must fall within the expected variation established in year one (Appendix B). Duplicate assessments will be evaluated using the appropriate acceptability rubric (Appendix C). If duplicate assessments exceed expected variation, the appropriate data flag will be assigned in the geodatabase and corrective action (i.e. additional training) will be taken as is detailed in the project's Quality Assurance and Protection (QAPP).

During subsequent years of the RSA program, field verification will occur on a monthly basis. A high-level review of the data will be performed to ensure that there are no significant differences in data collection that would warrant additional training or protocol review with staff. The full analysis of the QA/AC data will be performed at

the end of the field season to ensure sufficient data points[1] for a robust analysis.

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[1] If 5% of the total assessed distance does not yield at least 20 reaches, duplicate assessments should continue until this minimum is reached.

Appendix A: RSA Auditor Checklist

Knowledge/Skill	Acceptable	Not Acceptable (note why)
Staff conducts RSAs in the correct direction, relative to flow direction		
Staff records RSA observations/survey in the appropriate order and at the appropriate[2] locations		
Staff creates new line features in Collector as intended		
Staff creates new point features in Collector as intended		
Staff accesses Survey 123 forms from within Collector		
After submitting a Survey 123 form, staff verifies it has synced back to Collector (cellular data/wifi service permitting)		
Staff is able to turn reference layers on/off in the Collector map		
Staff never edits an already submitted Survey 123 form from within the Collector app		

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[2] Appropriate/appropriately is defined here as being done so according to applicable SOPs and protocols.

and they do not click the survey hyperlink within Collector in an attempt to re-open a previously submitted survey form.		
Staff demonstrates ability to use Collector's "measurement tool"		
Staff appropriately distinguishes between features characteristic of reach vs. discrete point features		
Staff knows where to appropriately break reaches based on maximum length		
Staff knows where to appropriately break reaches based on character change		
Staff appropriately identifies changes in flow or water quality (e.g. clarity, odor)		
Staff appropriately identifies changes in stream geomorphology (e.g. channel incision, Rosgen classification)		
Staff appropriately identifies changes of instream physical habitat (e.g. substrate type, erosion, riparian area)		
Staff appropriately identifies the presence of temporary reaches		

Staff appropriately identifies deficient buffers		
Staff appropriately identifies crossings		
Staff appropriately identifies dumpsites		
Staff appropriately identifies point erosion		
Staff appropriately identifies pipes		
Staff appropriately identifies utility lines		
Editing field collected data using RSA Dashboard (Level A staff only)		
Ability to contribute watershed notes (Level A staff only)		

Appendix B: Acceptable Variation in Data Collection

Many elements of the RSA program are inherently qualitative. Although staff certification is intended to help ensure that assessments are reproducible, some amount of variation is still expected. This section describes the amount of variation which is acceptable during field verification activities.

Two sets of criteria have been identified for this process. Criteria 1 includes the possible responses for each metric, as discussed below (e.g., identical match, difference with explanatory comment) at the site level (e.g., Overlap 1, Point 1). Each site will be scored according to the percent of all of the metrics passing at that site.

Criteria 2 includes the percentage of agreeance for a particular metric across all of the sites (e.g., shading at Overlap 1 through Overlap 18). Each metric will be assessed by factors such as the number of sites that matched identically for that metric and/or the percentage of responses that passed Criteria 1 evaluation.

Each of the metrics used in Criteria 1 and 2 are described below. Appendix C demonstrates how these criteria are scored and used in conjunction with one another to assess consistency at both the metric and overall site level.

Reach Assessment Metrics

Reach Type	90% of responses should pass. Passing Responses are:
	• Identical Match
	• Difference with explanatory comment *Example:* Team 1 - "Closed channel"; "Evidence of surface flow too" Team 2 - "Open channel"

Water presence	85% of responses should match identically and 90% of responses should pass. Passing responses are:
	• Identical Match
	• Difference with explanatory comment *Example:* Team 1 - "Yes" Team 2 - "No"; "Reach mostly dry but several wet patches present"
Water Flow	90% of responses should pass. Passing Responses are:
	• Identical Match
	• Difference with explanatory comment *Example:* Team 1 - "Stagnant" Team 2 - "Flowing"; "Very little to no distinguishable flow"
Water clarity	60% of responses should match identically and 75% of responses should pass. Passing responses are:
	• Identical Match
	• At least one common water clarity AND no more than two differing responses per assessment

Odor	80% of responses should match identically and 85% of responses should pass. Passing responses are:
	• Identical Match
	• If presence/absence of odor differs – no more than 1 odor present
	• If odor is present but differs – assessments should include at least one common odor
Maximum depth encountered	80% of responses should pass. Passing responses are:
	• Max depth is <100cm and responses differ by <5cm
	• Max depth is >100cm and responses differ by <20%
Average depth	75% of responses should match identically and 85% of responses should pass. Passing responses are:
	• Identical Match
	• Responses do not differ by more than one category
Maximum width	65% of responses should match identically and 85% of responses should pass. Passing responses are:
	• Identical Match
	• Responses do not differ by more than one category

Fish presence	85% of responses should pass. Passing responses are: • Identical Match
Aquatic vegetation	80% of responses should match identically and 85% of responses should pass. Passing responses are: • Identical Match • Assessments include at least one common vegetation type and no more than one differing type
Algae	80% of responses should match identically and 85% of responses should pass. Passing responses are: • Identical Match in regards to presence/absence • Compared responses do not indicate both "absent" and "extensive"
Bacteria presence	75% of responses should match identically and 85% of responses should pass. Passing responses are: • Identical Match in regards to presence/absence • Responses do not match in regards to presence/absence but bacteria is not extensive

Trash	60% of responses should match identically and 85% of responses should pass. Passing responses are: • Identical Match • Responses do not differ by more than one category
Riparian vegetation width	80% of responses should match identically and 85% of responses should pass. Passing responses are: • Identical Match • Responses do not differ by more than one category on either bank
Riparian vegetation type	85% of responses should pass. Passing responses are: • Top ranked vegetation type of Team 1 is within the top two vegetation types ranked by Team 2 and top ranked vegetation type of Team 2 is within the top two vegetation types ranked by Team 1 • Top ranked vegetation type of Team 1 is within the top two vegetation types ranked by Team 2 AND Top ranked vegetation type of Team 2 is listed by Team 1.

|	
Substrate type	85% of responses should pass. Passing responses are: • Top ranked substrate type of Team 1 is within the top two substrate types ranked by Team 2 AND Top ranked substrate type of Team 2 is within the top two substrate types ranked by Team 1. • Top ranked substrate type of Team 1 is within the top two substrate types ranked by Team 2 AND Top ranked substrate type of Team 2 is listed by Team 1.
Shading	60% of responses should match identically and 85% of responses should pass. Passing responses are: • Identical Match • Responses do not differ by more than one category
Floodplain Connectivity	75% of responses should match identically and 85% of responses should pass. Passing responses are: • Identical Match • Responses do not differ by more than one category

Bank erosion	75% of responses should pass. Passing responses are:
	• Identical Match
	• If presence/absence of bank erosion differs – Compared responses should not include both "non" and more than 1 impact
	• If bank erosion Is present – assessments should include at least one common impact and no more than 2 differing impacts
Woody debris and root wads	60% of responses should pass. Passing responses are:
	• Responses which do not differ by >5 or exceed 65% difference (whichever is greater)
Recreation evidence	60% of responses should match identically in regards to presence/absence and 85% of responses should pass. Passing responses are:
	• Identical Match
	• Responses which include "none" and not more than 1 recreation type
	• Responses which do not include "none" and include at least one common type and no more than 1 differing type of recreation per assessment

Rosgen Classification	60% of responses should match identically and 80% of responses should pass. Passing responses are:
	• Identical Match
	• Responses do not differ by more than one category

Point Assessment Metrics

Deficient Buffers

Bankside	80% of responses should match identically and 85% of responses should pass. Passing responses are: • Identical Match • Responses do not differ by more than one category
Length of deficiency	85% of responses should pass. Passing responses are: • Identical Match • One common bankside
Type of cover in deficient buffer area	85% of responses should pass. Passing responses are: • Identical Match • All, or all but one, type of covers are the same on both assessments
Impact score	85% of responses should pass. Passing responses are: • Identical Match • Responses do not differ by more than one category

Crossings

Type	85% of responses should pass. Passing responses are: • Identical Match
Diameter/width	65% of responses should match identically and 85% of responses should pass. Passing responses are: • Identical Match • Responses do not differ by more than one category
Length	65% of responses should match identically and 85% of responses should pass. Passing responses are: • Identical Match • Responses do not differ by more than one category
Material	75% of responses should pass. Passing responses are: • All, or all but one, of the material type(s) are the same on both assessments
Downstream debris	85% of responses should pass. Passing responses are: • Identical Match

Downstream bed erosion	75% of responses should match in regards to presence/absence and 85% of responses should pass. Passing responses are: • Responses match in regards to presence/absence and erosion height is within one category (if present) • Responses do not match in regards to presence/absence but erosion height is 0-1m
Downstream sediment	85% of responses should pass. Passing responses are: • Identical Match
Upstream debris	85% of responses should pass. Passing responses are: • Identical Match
Upstream bed erosion	75% of responses should match in regards to presence/absence and 85% of responses should pass. Passing responses are: • Responses match in regards to presence/absence and erosion height is within one category (if present) • Responses do not match in regards to presence/absence but erosion height is 0-1m
Upstream sediment	85% of responses should pass. Passing responses are: • Identical Match

Impact score	85% of responses should pass. Passing responses are:
	• Identical Match
	• Responses do not differ by more than one category

Dumpsite

Bankside	80% of responses should match identically and 85% of responses should pass. Passing responses are:
	• Identical Match
	• Responses do not differ by more than one category
Location of the dumpsite	80% of responses should match identically and 85% of responses should pass. Passing responses are:
	• Identical Match
	• Responses do not differ by more than one category
Cleanup potential	85% of responses should pass. Passing responses are:
	• Identical Match

Dumped material	80% of responses should pass. Passing responses are: • All, or all but one, of the dumped material(s) are the same on both assessments
Trash volume	80% of responses should match identically and 85% of responses should pass. Passing responses are: • Identical Match • Responses do not differ by more than one category
Impact score	85% of responses should pass. Passing responses are: • Identical Match Responses do not differ by more than one category

Erosion

Bankside	80% of responses should match identically and 85% of responses should pass. Passing responses are: • Identical Match • Responses do not differ by more than one category

Bank height	80% of responses should match identically and 85% of responses should pass. Passing responses are: • Identical Match • Responses do not differ by more than one category
Impact	75% of responses should pass. Passing responses are: • Identical Match • If presence/absence of bank erosion differs: Compared responses should not include both "none" AND more than 2 impacts. • If bank erosion is present: Assessments should include at least one common impact AND no more than 2 differing character type per assessment

Pipes

Bank where pipe is located	80% of responses should match identically and 85% of responses should pass. Passing responses are: • Identical Match • Responses do not differ by more than one category

Pipe diameter	75% of responses should match identically and 85% of responses should pass. Passing responses are:
	- Identical Match - Responses do not differ by more than one category
Type of pipe material	80% of responses should match identically and 85% of responses should pass. Passing responses are:
	- Identical Match - Difference with explanatory comment
Floating solids/ trash	85% of responses should pass. Passing responses are:
	- Identical Match
Erosion due to pipe	65% of responses should match identically and 75% should pass. Passing responses are:
	- Identical Match - If presence/absence of erosion differs: Compared responses should not include both "none" AND more than 2 impacts. - If erosion is present: Assessments should include at least one common impact AND no more than 2 differing character type per assessment

Impact	75% of responses should pass. Passing responses are:
	• Identical Match
	• Responses do not differ by more than one category
Discharge concern	85% of responses should pass. Passing responses are:
	• All, or all but one, of the discharge concern is listed on both assessments (is discharge is present)

Utility Line

Utility line type – Is this an exposed sewer?	85% of responses should pass. Passing responses are:
	• Identical Match
Utility line diameter	80% of responses should match identically and 85% of responses should pass. Passing responses are:
	• Identical Match
	• Responses do not differ by more than one category
Utility line material	80% of responses should match identically and 85% pass. Passing responses are:
	• Identical match
	• Difference with explanatory comment

Utility line condition	80% of responses should match identically and 85% of responses should pass. Passing responses are: • Identical Match • Responses do not differ by more than one category
Utility line impact score	85% of responses should pass. Passing responses are: • Identical Match • Responses do not differ by more than one category

Fish blockage

Man-made	85% of responses should pass. Passing responses are: • Identical Match
Height	85% of responses should pass. Passing responses are: • Identical Match • Responses do not differ by more than one category

Appendix C: Acceptability Rubrics

Reach Rubric

Point Rubric

Assessment Conflicts

Appendix 3:
Standard Operating Procedures for using RSA Technical Tools
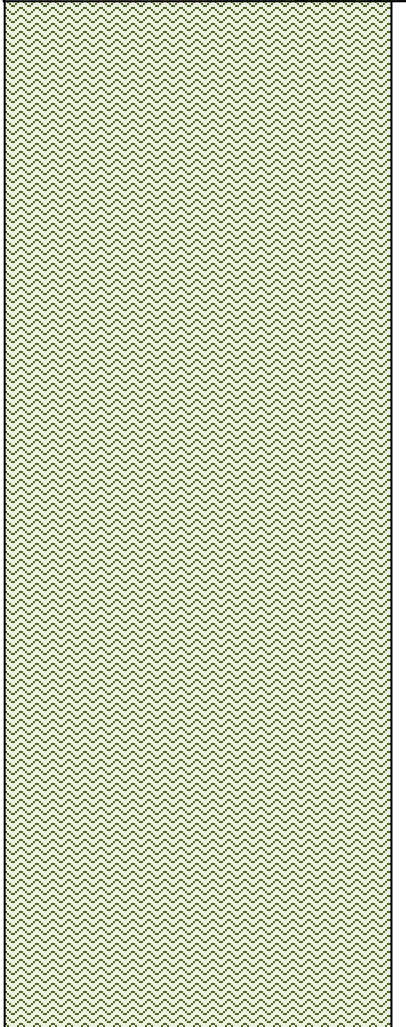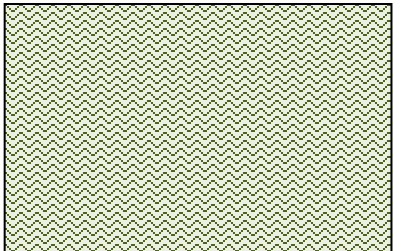
Standard Operating Procedures for Using RSA Technical Tools

Department of Energy & the Environment

Water Quality Division

★ ★ ★ **DEPARTMENT OF ENERGY & ENVIRONMENT**
GOVERNMENT OF THE DISTRICT OF COLUMBIA

2019

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Water | Environment | Scientists | Engineers

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Water Quality Division	
TYPE **Planning and Reporting Branch**	REVISION 0
TITLE **Standard Operating Procedures for Using RSA Technical Tools**	EFFECTIVE DATE **5/1/2019**
PURPOSE This document provides instructions for using Rapid Stream Assessment (RSA) Technical Tool including Collector for ArcGIS, Survey 123, and Operations Dashboard. It also covers procedures for backing up, viewing, and downloading collected data.	
REVISION SUMMARY 	
APPROVED BY Branch Chief _____ Date _____ Associate Director _____ Date _____ 	

Table of Contents

1.0   Background

The District Department of the Environment (DOEE) Water Quality Division is responsible for the assessment of receiving waters within the District of Columbia. The Rapid Stream Assessment (RSA) allows DOEE to provide a high-level overview of the entire wadeable stream network within the District. This information can help identify potential issues as well as locations that may warrant follow-up inspections or more in-depth evaluations. The information from the RSA can also serve as a baseline with which to compare information from these assessments in the future. This assessment is being used to help comply with the District of Columbia's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit issued by the U.S. Environmental Protection Agency (USEPA).

This document provides instructions for using Rapid Stream Assessment (RSA) Technical Tool including Collector for ArcGIS, Survey 123, and Operations Dashboard. It also covers procedures for backing up, viewing, and downloading collected data.

2.0   Hardware and Software Set-up

2.1. Selection of Mobile Devices

Mobile devices used for RSA data collection must have ESRI's Collector and Survey 123 downloaded (See Section 2.2 for system requirements). Devices must have cellular data service and/or be capable of connecting to a mobile wi-fi hotspot. In addition mobile devices should have a built-in camera and have GPS capabilities.

2.2. Mobile App Downloads

Mobile devices used for RSA data collection must have ESRI's Collector and Survey 123 downloaded. Downloading Adobe Acrobat Reader or another pdf reader is also recommended to allow the electronic version of the Field Guide to be saved to the device before initiating the RSA.

2.2.1. Collector

There are two versions of Collector currently available:
- Classic Collector
- Collector for ArcGIS[1]

The choice between which version of Collector can be made based upon the specs of the available mobile device and/or user preference. The RSA tool is fully featured and compatible with both.

The system requirements for Classic Collector can be referenced here:

https://doc.arcgis.com/en/collector-classic/overview/requirements.htm

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[1] Collector for ArcGIS is currently only available for iOS (*March 2019*)

The system requirements for Collector for ArcGIS can be referenced here:
https://doc.arcgis.com/en/collector/faq/requirements.htm

Classic Collector can be downloaded at:
https://doc.arcgis.com/en/collector-classic/

Collector for ArcGIS can be downloaded at:
https://www.esri.com/en-us/arcgis/products/collector-for-arcgis/resources

2.2.2. Survey 123

The system requirements for Survey 123 can be referenced here:
https://doc.arcgis.com/en/survey123/reference/systemrequirements.htm

Survey123 can be downloaded at:
https://doc.arcgis.com/en/survey123/download/

2.3. Login Credentials

An ArcGIS Online (AGOL) or Enterprise account will be needed to sign into Collector and Survey 123. Note that ESRI does not allow the same account to be logged into at the same time on multiple devices.

DOEE staff who do not have an AGOL or Enterprise account should contact IT in order to obtain one. Participating staff should contact the field coordinator with their AGOL/Enterprise username and request to be added to RSA AGOL group.

2.3.1. Signing in with an Enterprise account:
Collector:

1. Start Collector
2. Click on "Sign In with ArcGIS Online"
3. Click on "Enterprise Login" if not already selected
4. type "***dcgis***" in the box in front of ***.maps.arcgis.com*** (click on remember URL) if this step has already been done previously, skip down below
5. Click Continue
6. Click on the blue box with "DC GOV AD Credentials"
7. Sign in with your DC Network login information (email address and password)

Survey123:

1. Start Survey 123.
2. Click on the 3 dashes on the top right corner
3. Click Sign in
4. Click on "Enterprise Login" if not already selected
5. type "***dcgis***" in the box in front of ***.maps.arcgis.com*** (click on remember URL) if this step has already been done previously, skip down below
6. Click Continue

7. Click on the blue box with "DC GOV AD Credentials"
8. Sign in with your DC Network login information (email address and password)

2.3.2. Signing in with an AGOL account:
Collector:

1. Start Collector
2. Click on "Sign In with ArcGIS Online"
3. Click on "ArcGIS login" if not already selected/expanded
4. Sign in with your AGOL login information (username and password)

Survey123:

1. Start Survey 123.
2. Click on the 3 dashes on the top right corner
3. Click on "ArcGIS login" if not already selected
4. Sign in with your AGOL login information (username and password)

2.4. Collector Settings

2.4.1 Setting the GPS Receiver

Collector will use the devices internal GPS receiver unless otherwise specified. If an external GPS receiver is paired to your devices you select it within Collector's settings.

1   **2**   **3**
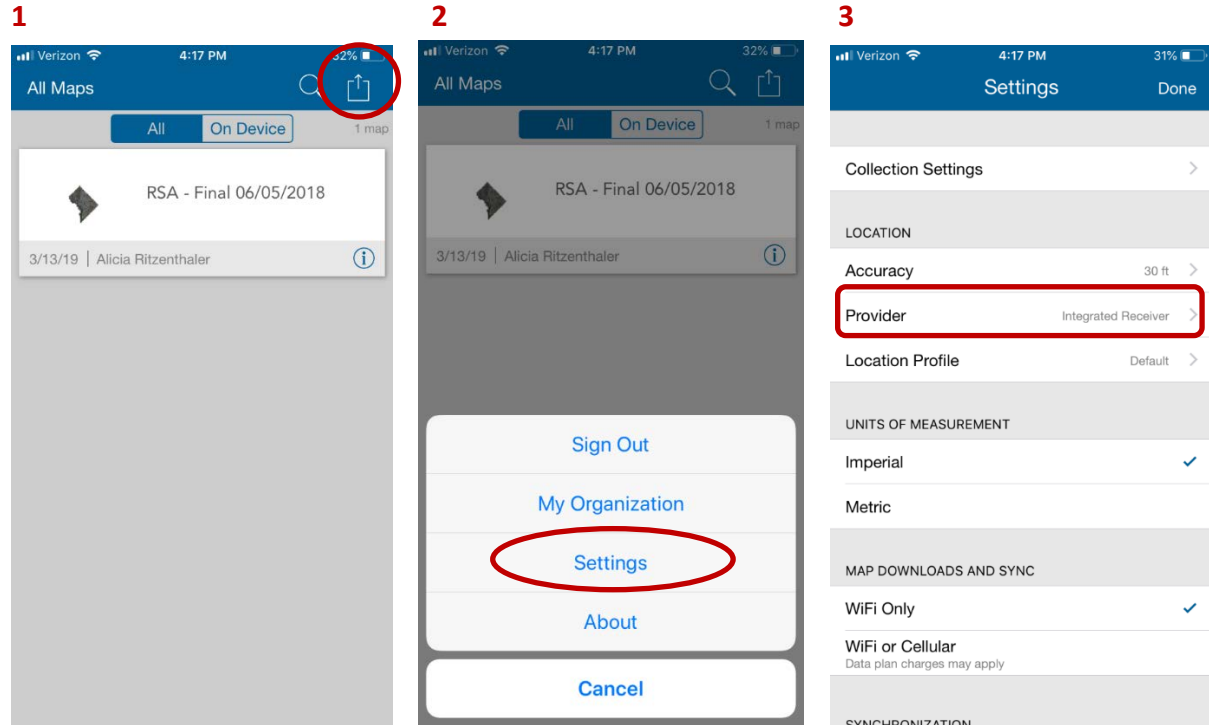
2.4.2 Required Accuracy

Although the RSA program will use manually placed points and features, not based upon the GPS, Collector may persistently notify the user if the GPS signal accuracy is out of range. To change the accuracy required by Collector, modify within Collector's settings.

1
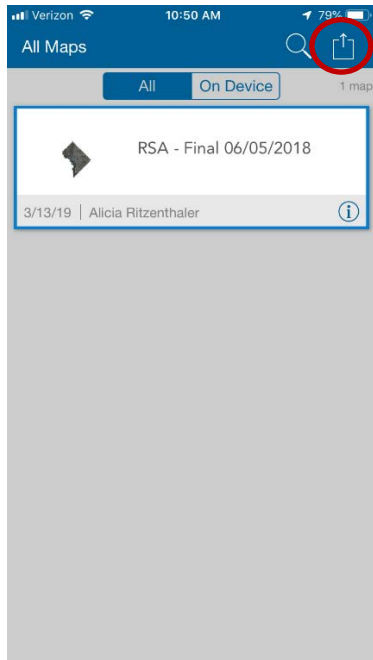
2
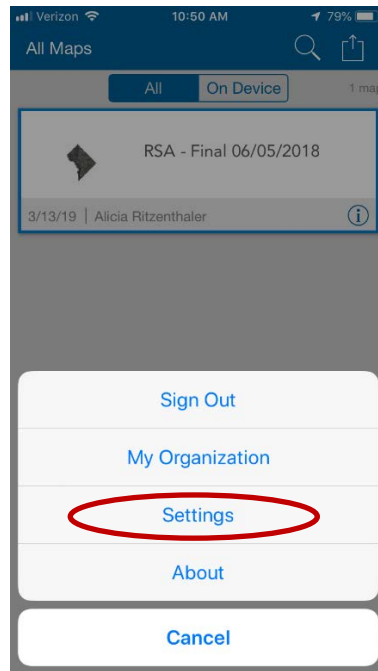
3
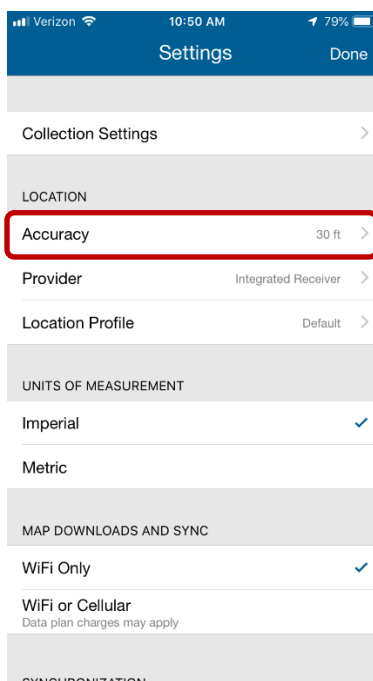
4
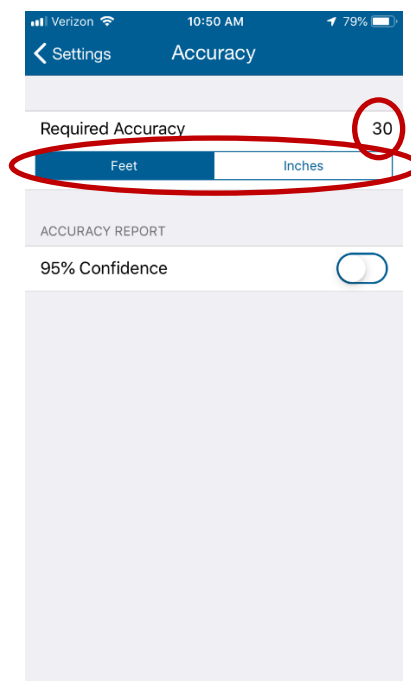
3.0   RSA Collector/Survey 123 Tool

3.1. Adding new points and reaches

Open Collector and sign in with AGOL user account info. Tap the final/most recent version of the RSA map to open it. If the GPS of the device is active, the map will open to your current location. Use the touchscreen to navigate, zoom in, and/or otherwise adjust your view.

1   **2**
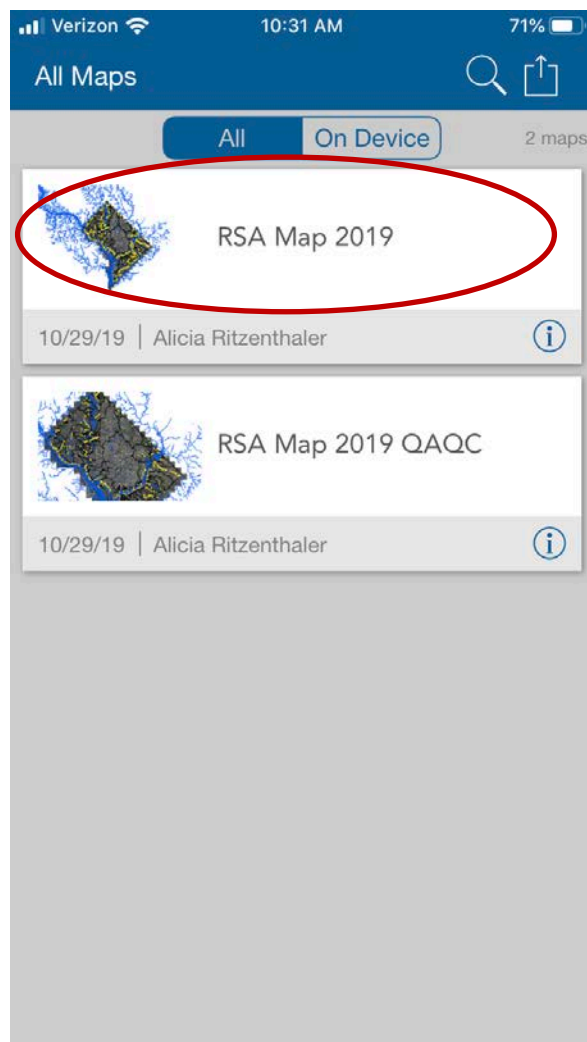
Briefly hold your finger on the screen where you would like to place a point or at one end of the reach you would like to draw. Lift finger and tap the box & arrow icon (1). Tap "Collect here" (2). Tap to select if the new feature is a point or a reach (3).
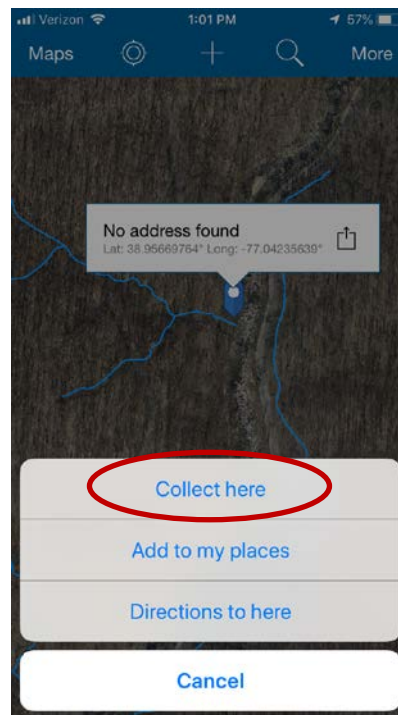
1   **2**   **3**
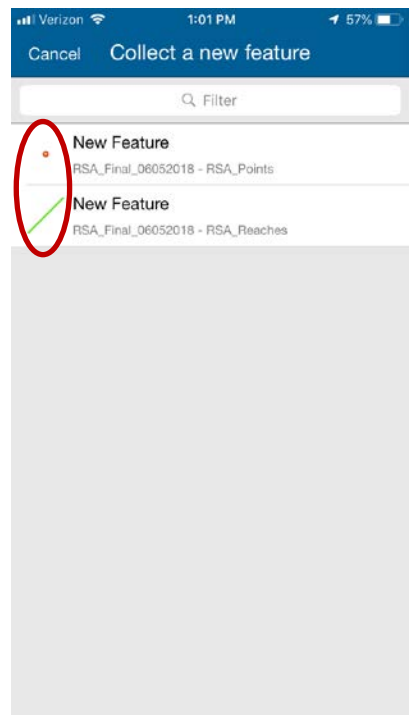
Select the red dot (•) to place a point feature. Select the green line (/) to place a reach feature.

1
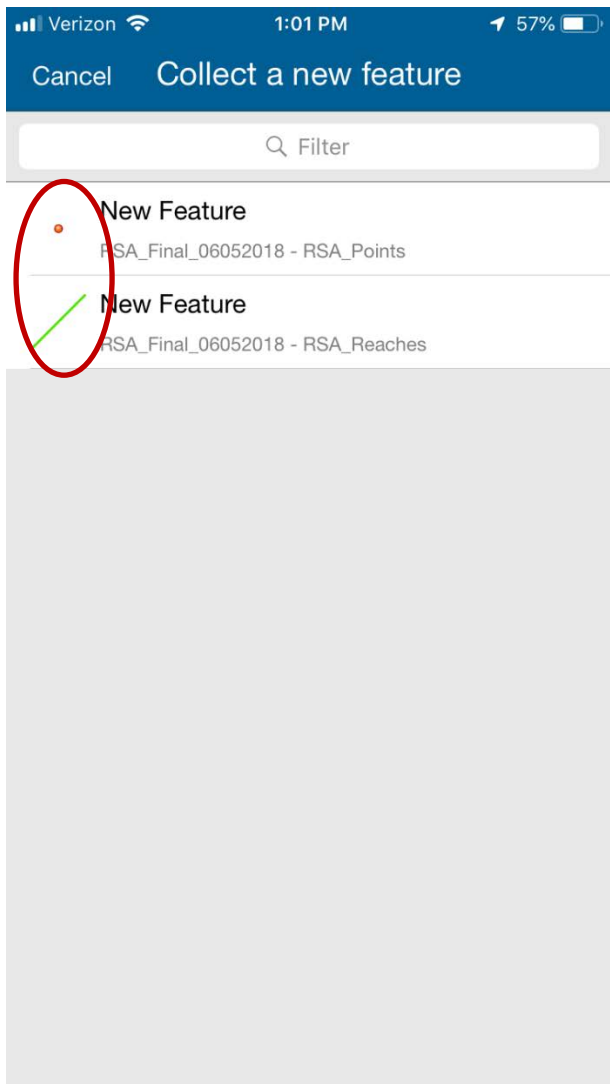
3.1.1. Point Features

Initiate a point survey (See Section 2.1).

Enter User defined PointID. This ID does not have to be unique but should be meaningful to you.

1 Tap PointID   **2** Type ID   **3** Tap Submit
                                  Tap 'Done'
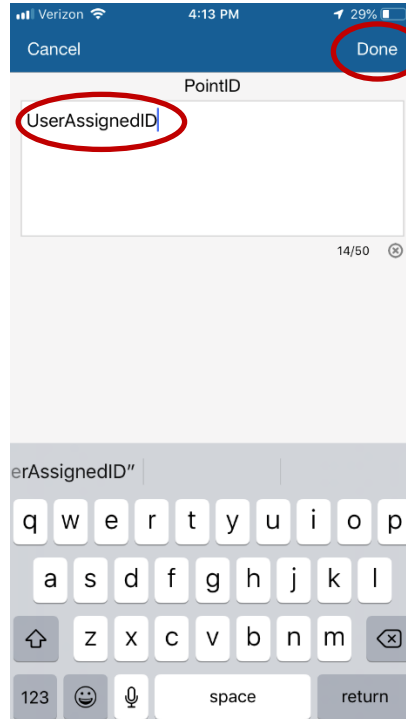
3.1.2. Reach Features

Initiate a reach survey (See Section 2.1).

Enter User defined ReachID. This ID does not have to be unique but should be meaningful to you.

1 Tap ReachID   **2** Type ID
                                          Tap 'Done'

Draw reach line onto the map and submit.

1 Tap the Map icon
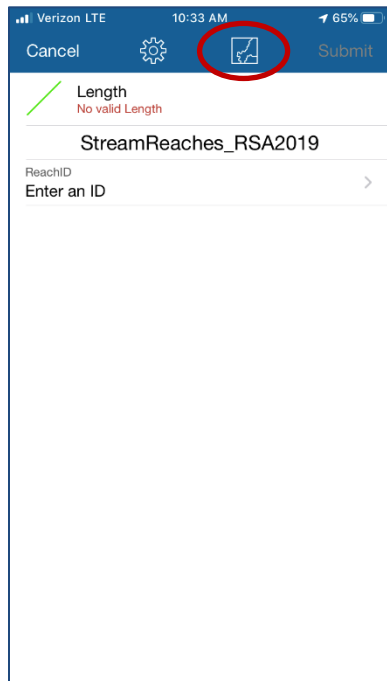
2 Feature will begin where survey was initiated

3 Tap on map to draw reach line
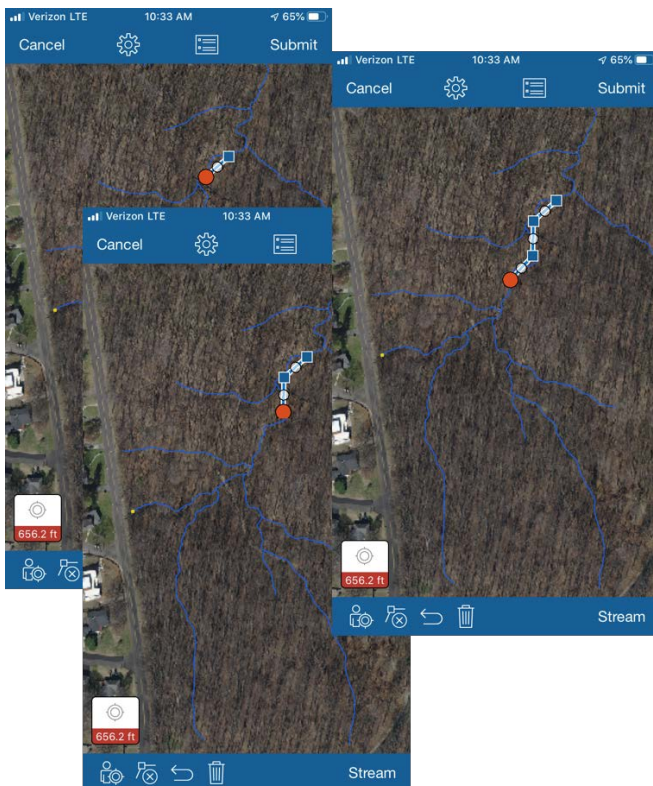
4 Use back button if you tapped the wrong place on the map and need to revise.
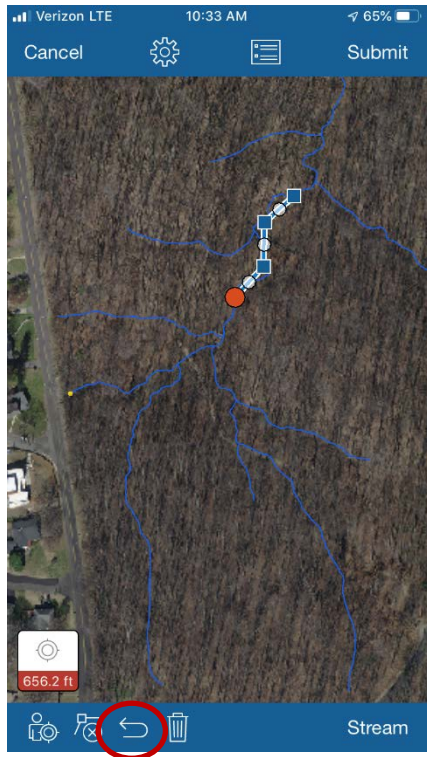
5 Submit reach feature when complete
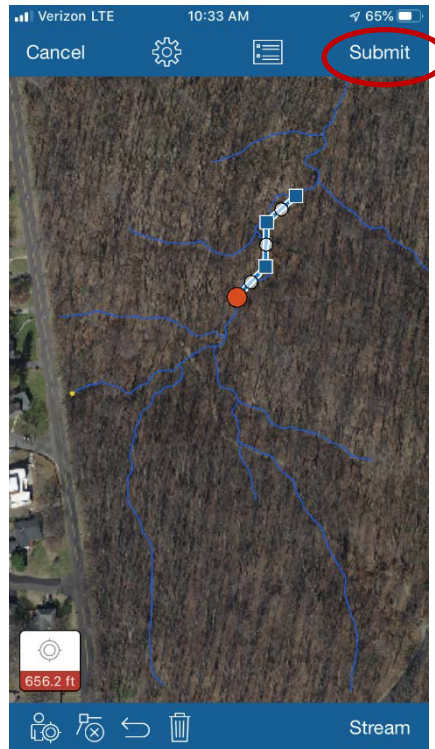
3.2. Initializing survey

Once the feature (point or reach) is submitted, Collector will return to the map. The new point (or reach) will be selected (notice teal outline around point and banner along bottom of the screen). Tap the banner along the bottom of the screen to open the new, selected feature. Avoid the box & arrow icon.
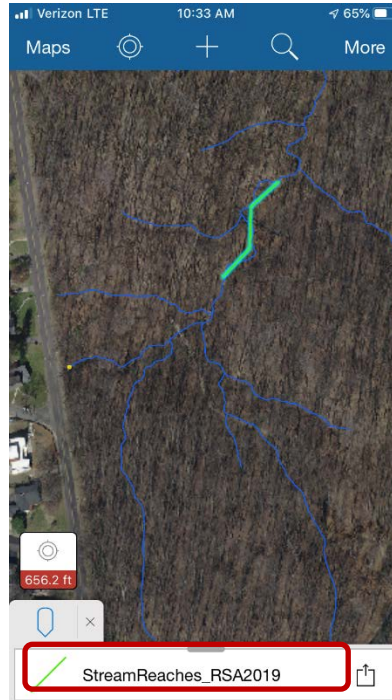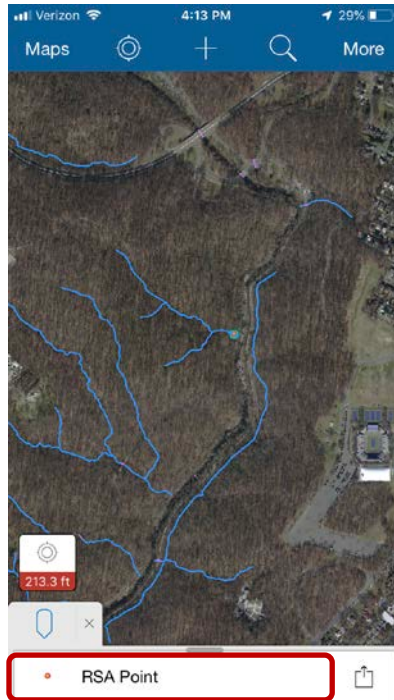
If you accidently tap the part of the banner with the box & arrow icon simply tap 'show details' to continue.
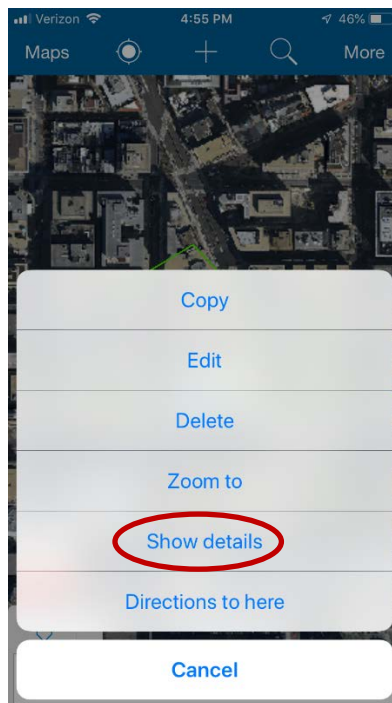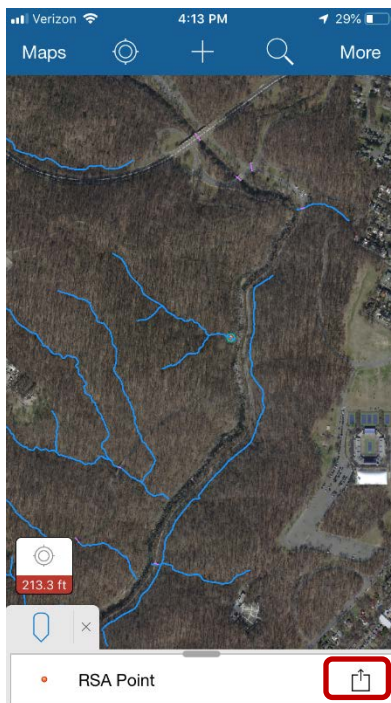
Verify the User defined Point ID (or Reach ID) and tap 'Click here to complete point assessment' (or 'Click here for reach assessment survey').

Don't be deceived, **DO NOT** tap 'new'!
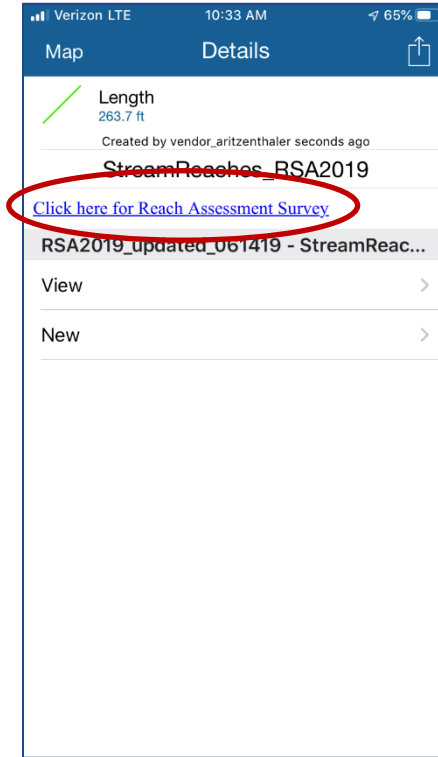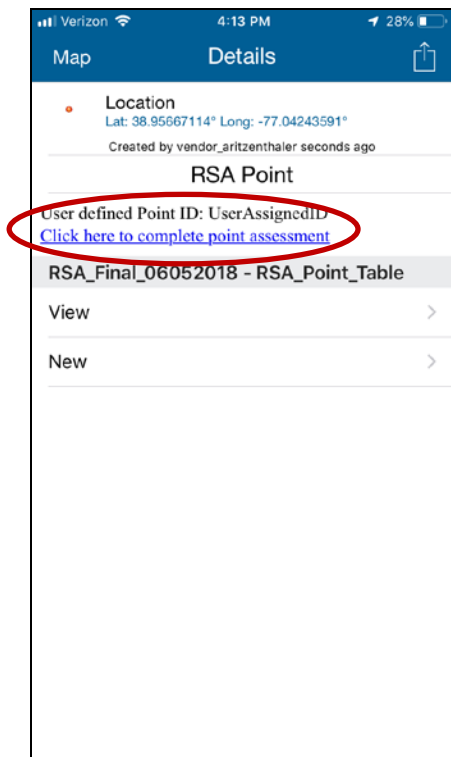
Survey 123 will launch and open, automatically, the correct survey form. DO NOT self-select a form, wait for a moment and let Survey 123 open the correct form for you! Continue to Section 2.3 and complete survey.

3.3 Complete Survey

1 Verify user defined Point/Reach ID   **2**   Respond to questions, take photos

3 Submit, tap the checkmark'   **4** 'Send now'

4.0   Watershed Notes

When observations are made at the watershed-scale, there notes should be added via the Collector/Survey 123 tool.

1 Tap watershed to select it
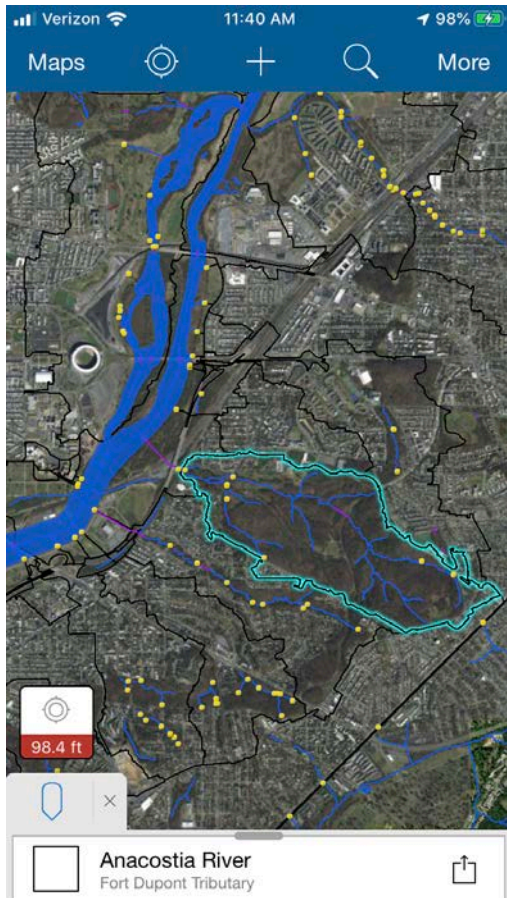
2 Tap the banner along the bottom of the screen to open the new, selected feature. Avoid the box & arrow icon.
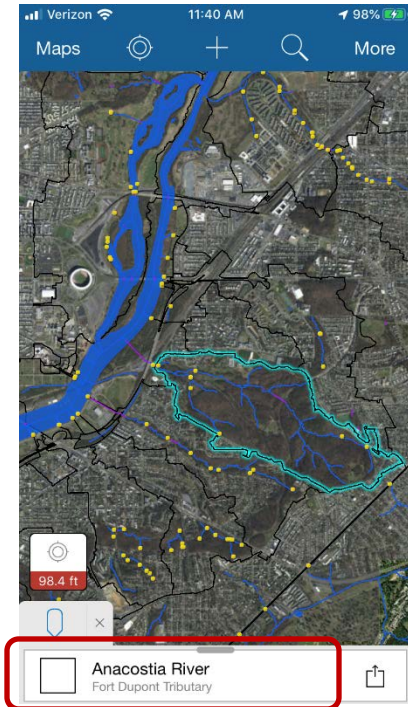
3 If you accidently tap the box & arrow icon, tap "Show detials".
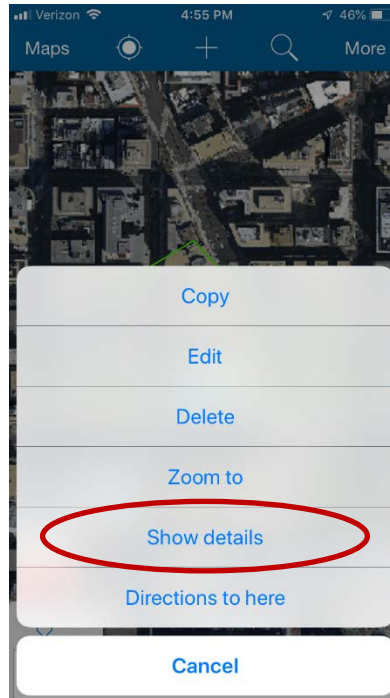
4 Verify the User defined Point ID (or Reach ID) and tap 'Click here to add notes associated with the (sub)watershed'.
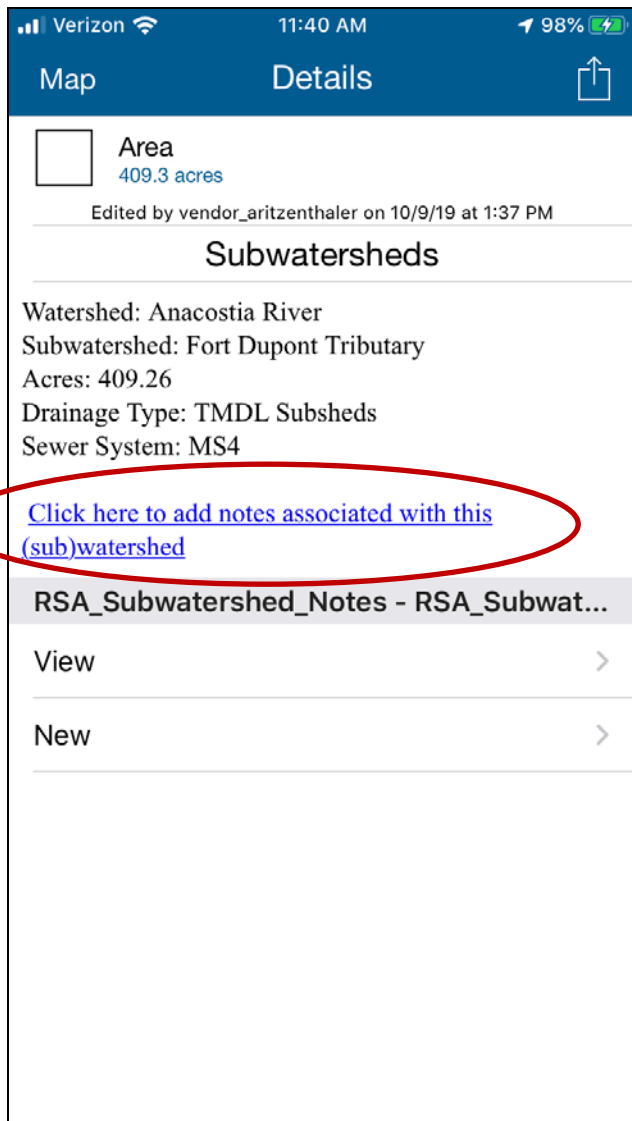
5 Survey 123 will launch and open, automatically, the correct survey form. DO NOT self-select a form, wait for a moment and let Survey 123 open the correct form for you!

6 Verify information and add your notes   **7** Tap "Send now" to save/submit.
in the "RSA_notes" section.

5.0   Operations Dashboard

The RSA Operations Dashboard allows staff to monitor assessment progress and provides and environment in which completed assessments can be edited if necessary.

5.1. Accessing the Dashboard

The RSA Operations Dashboard is hosted on AGOL. Users must log in with their AGOL or Enterprise credentials. https://dcgis.maps.arcgis.com/home/index.html
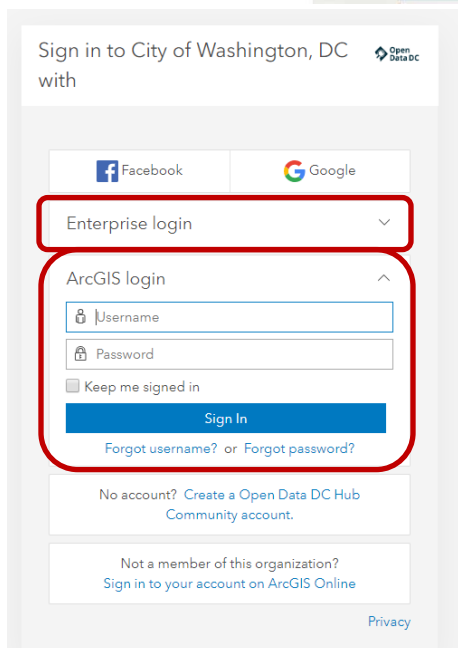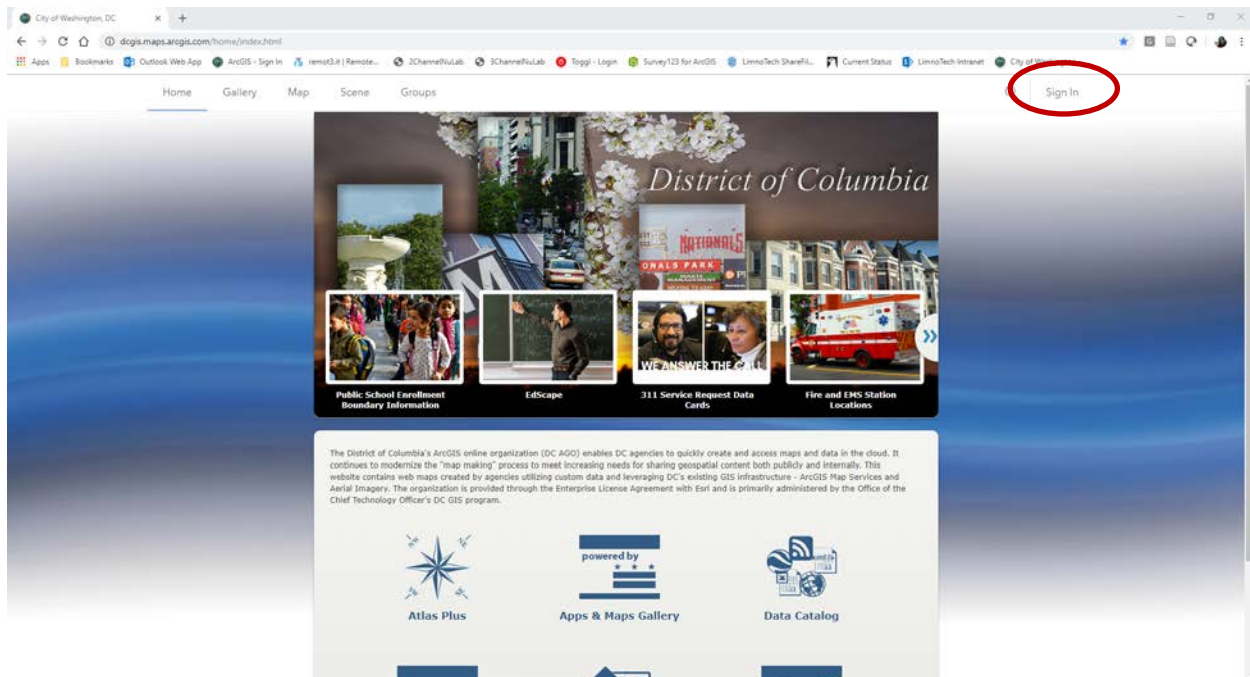
Navigate to the dashboard

5 Click "Groups"
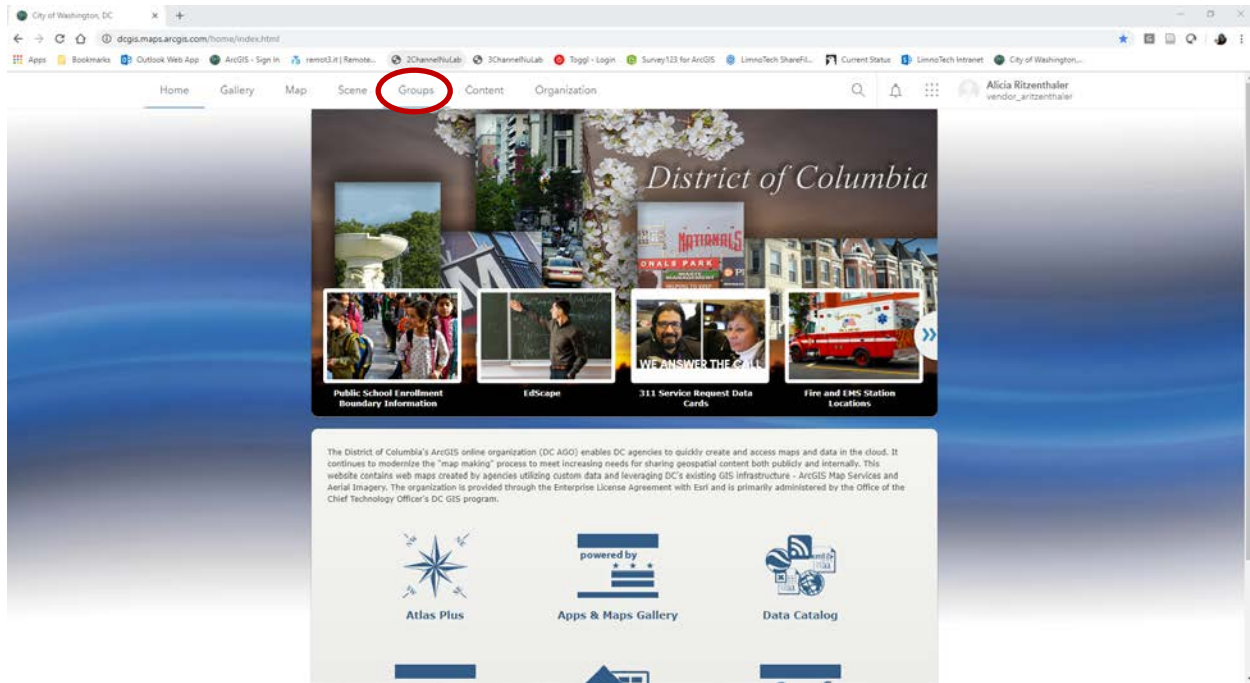
5 Find and click "Rapid Stream Assessment Team"
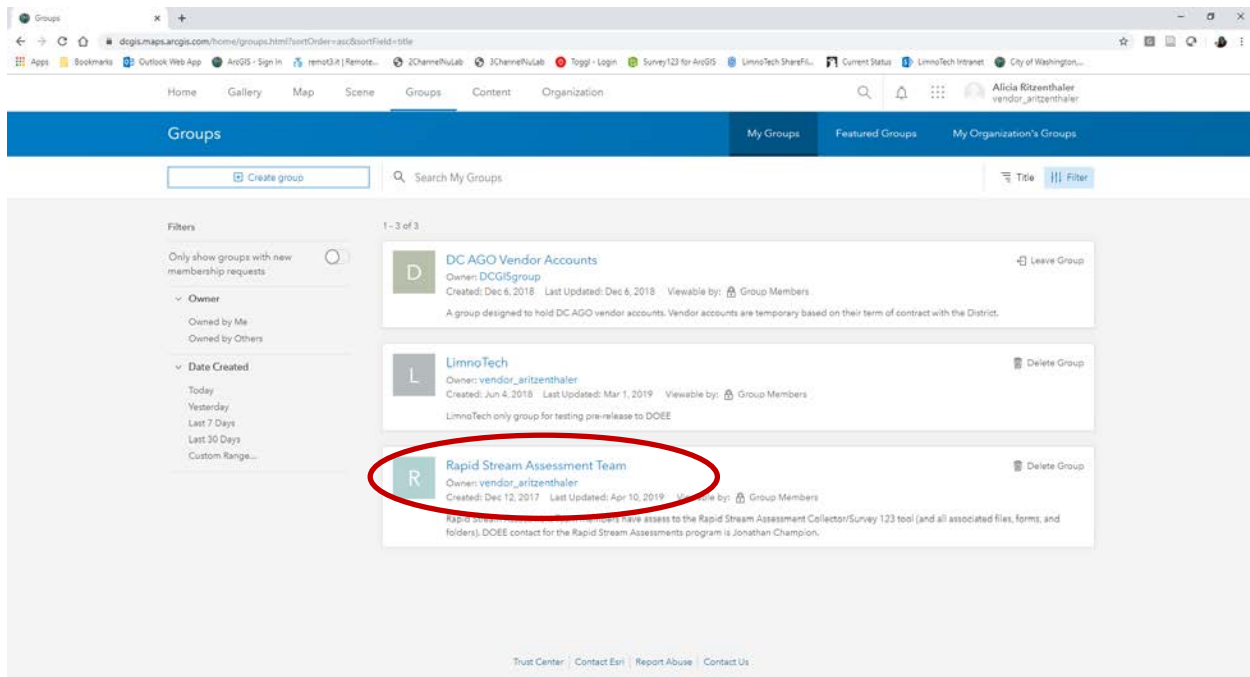
6 Find and click "RSA Dashboard"
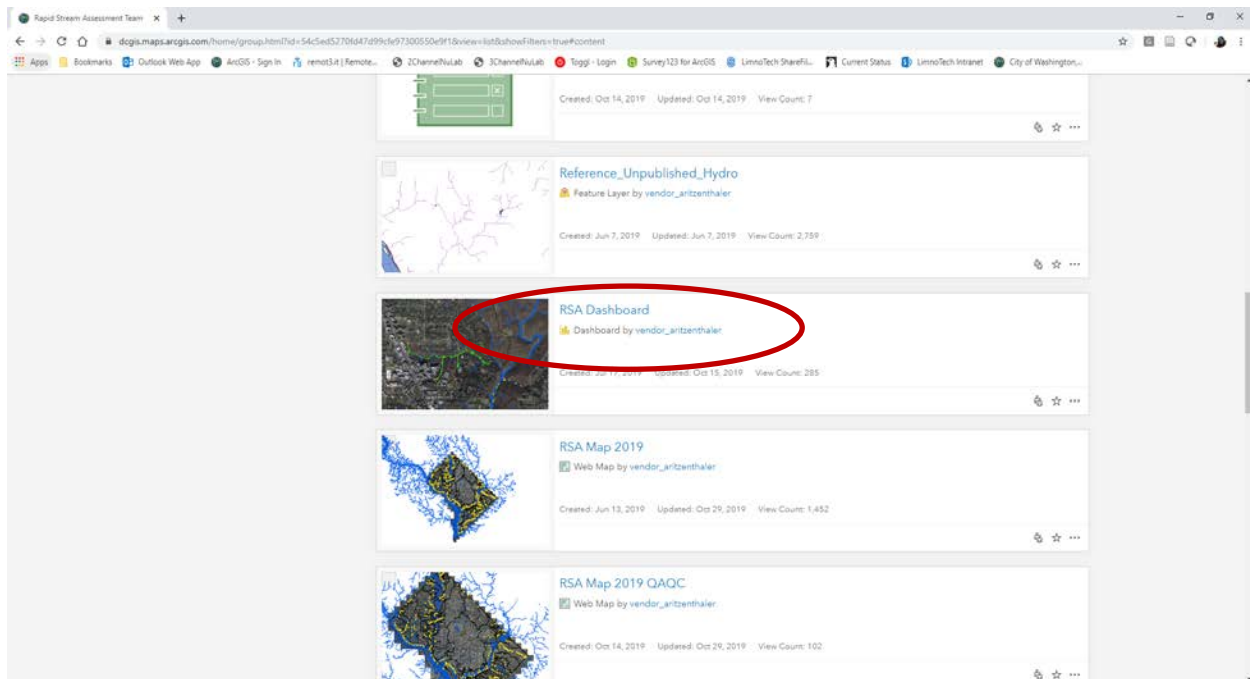
7 Click "View Dashboard"
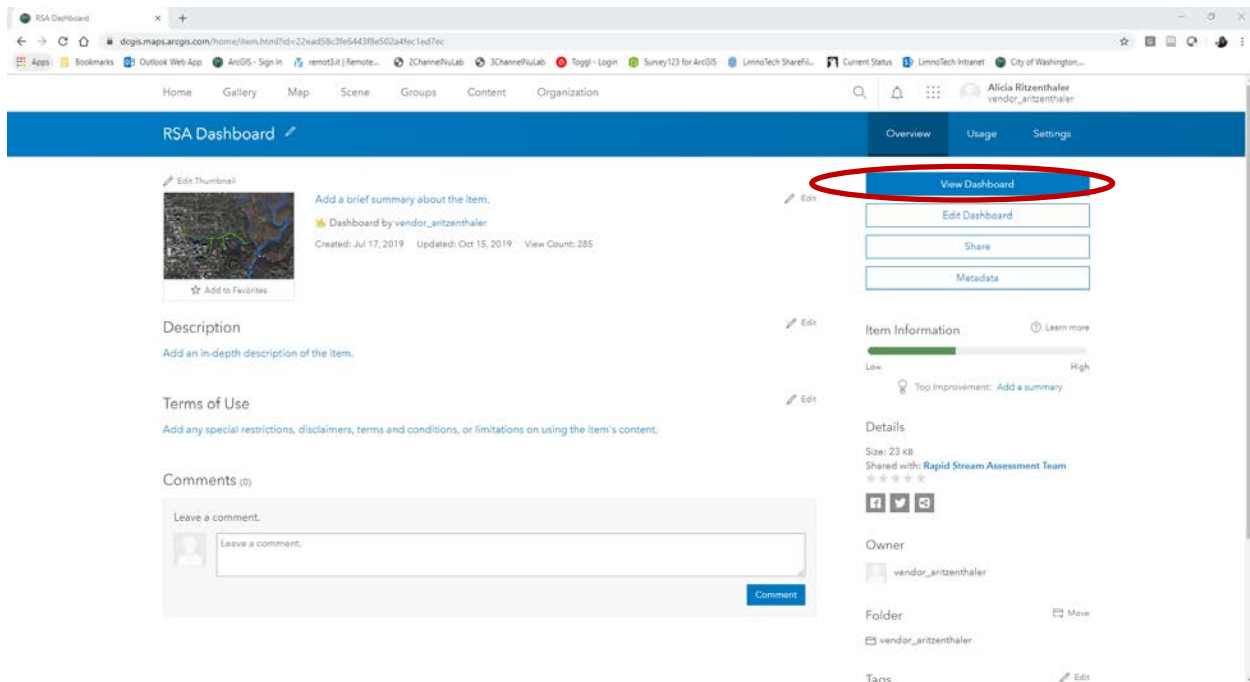
5.2. Interacting with the Dashboard

5.2.1. Monitoring Progress

The main page of the RSA Operations Dashboard displays real-time information regarding assessment progress.
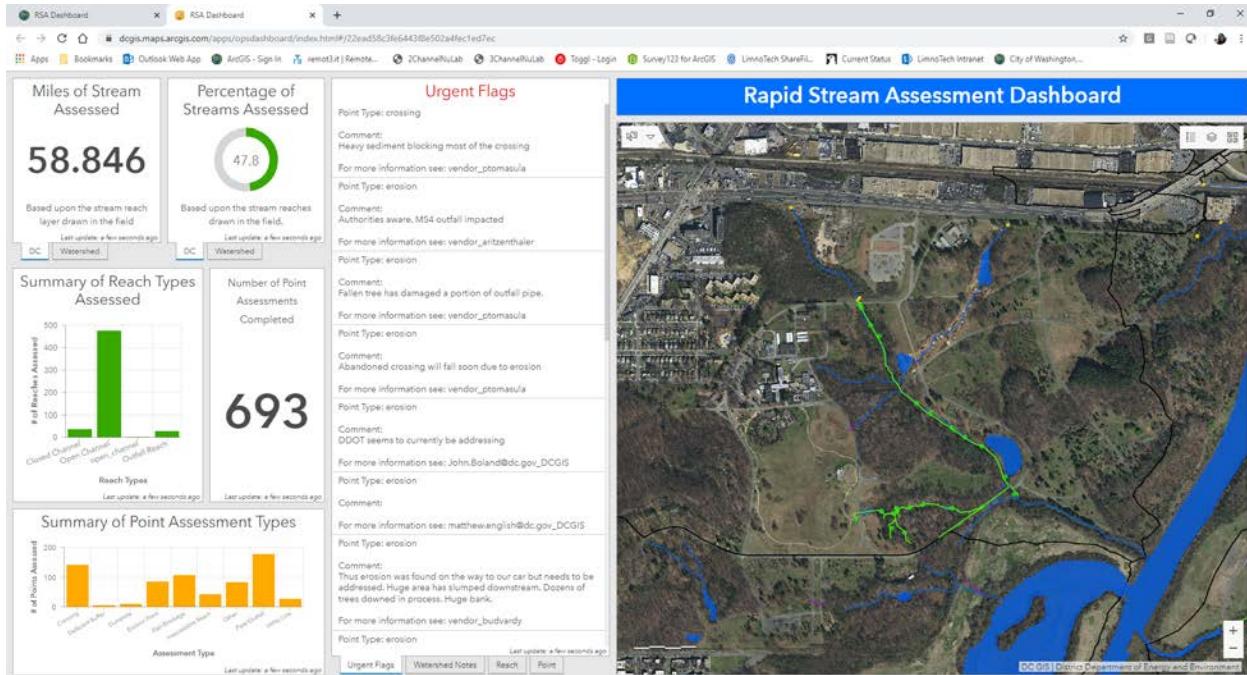
5.2.1. Editing Completed Surveys

The RSA dashboard provides a safe platform for editing already completed assessments.

1 Click the selection icon
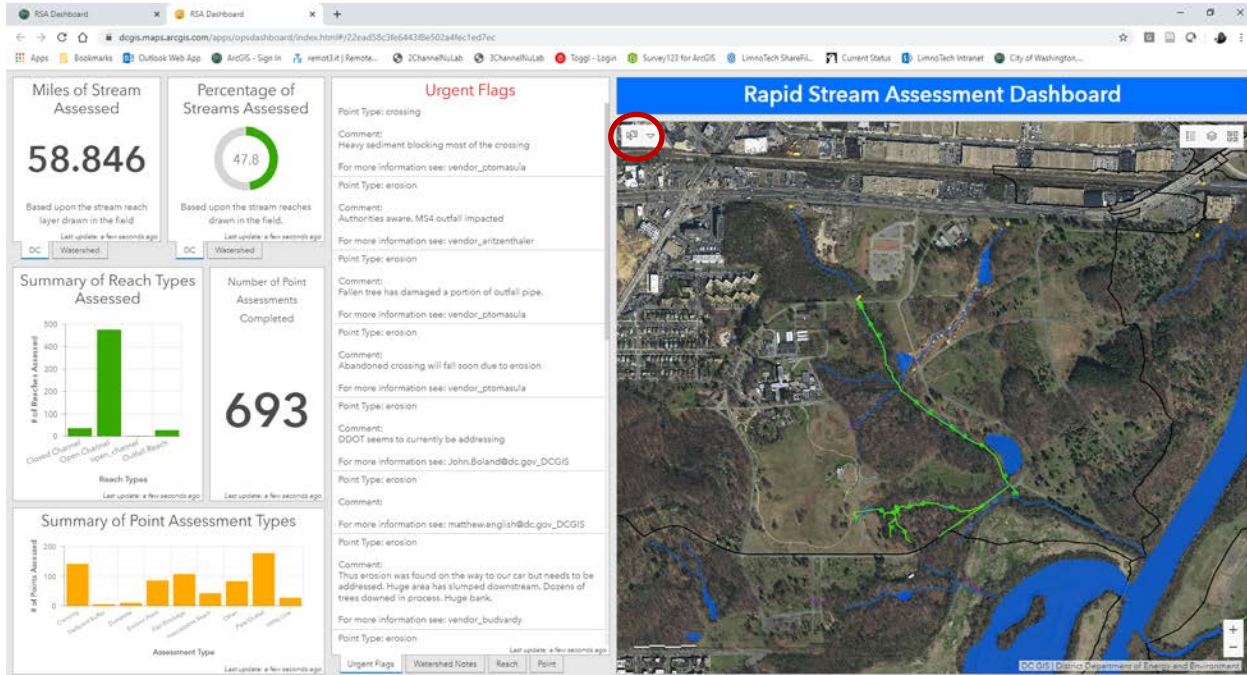
2 Tap the feature associated with the assessment requiring editing. Once selected, your feature will appear with a purple highlight.
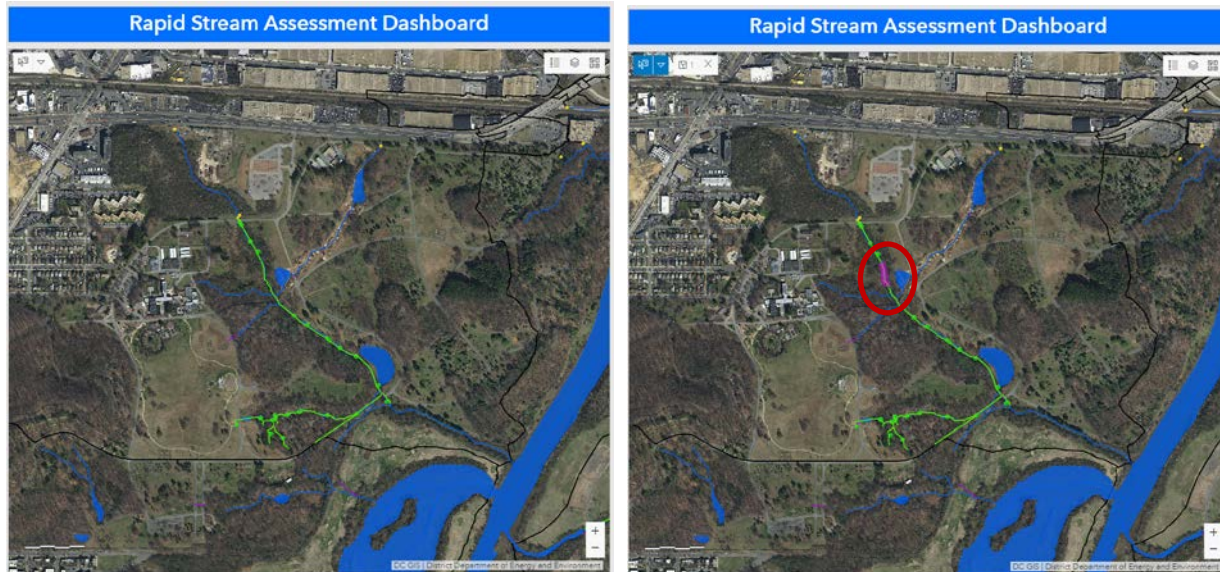
Note that you may be prompted to specify your tapped selection.

3 **Make sure you have only 1 selected feature before proceeding!!!!!** If you have multiple, click the "X" and try again.

4 Select the appropriate tab based upon what feature type you have selected.
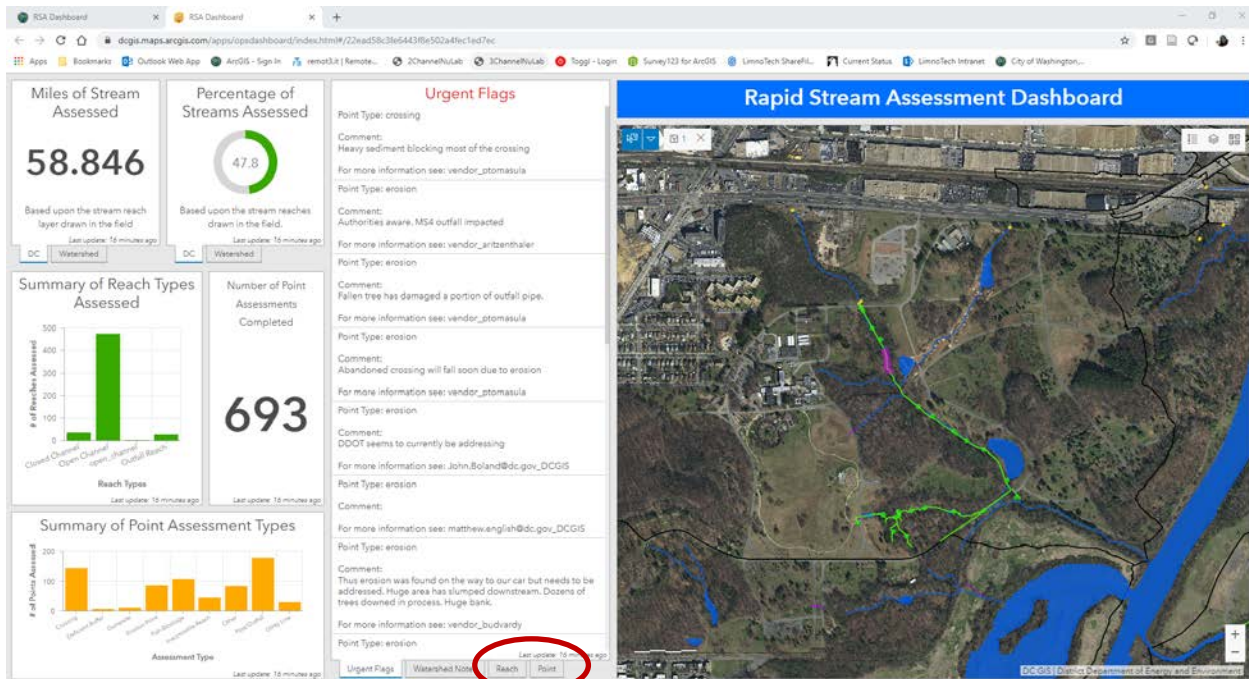
5 The previously completed Survey123 form will appear. Look through existing responses and ensure it's the one you want to edit!

6 Once your edits have been made, click "Submit"
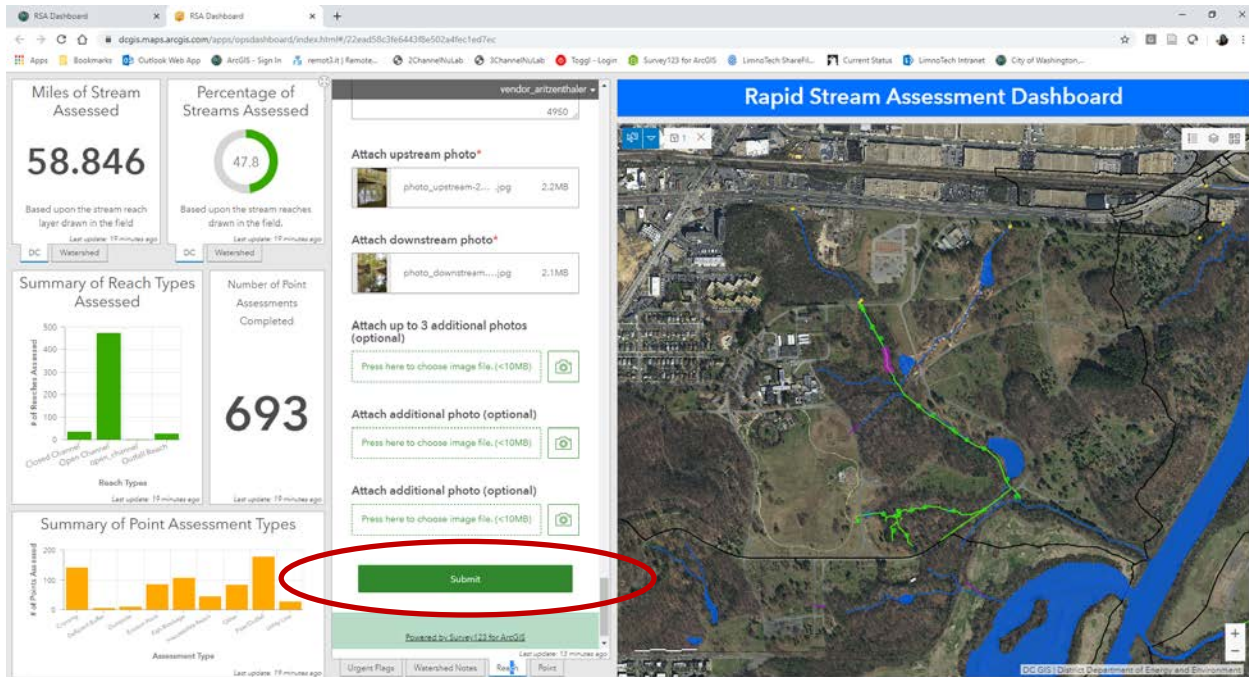
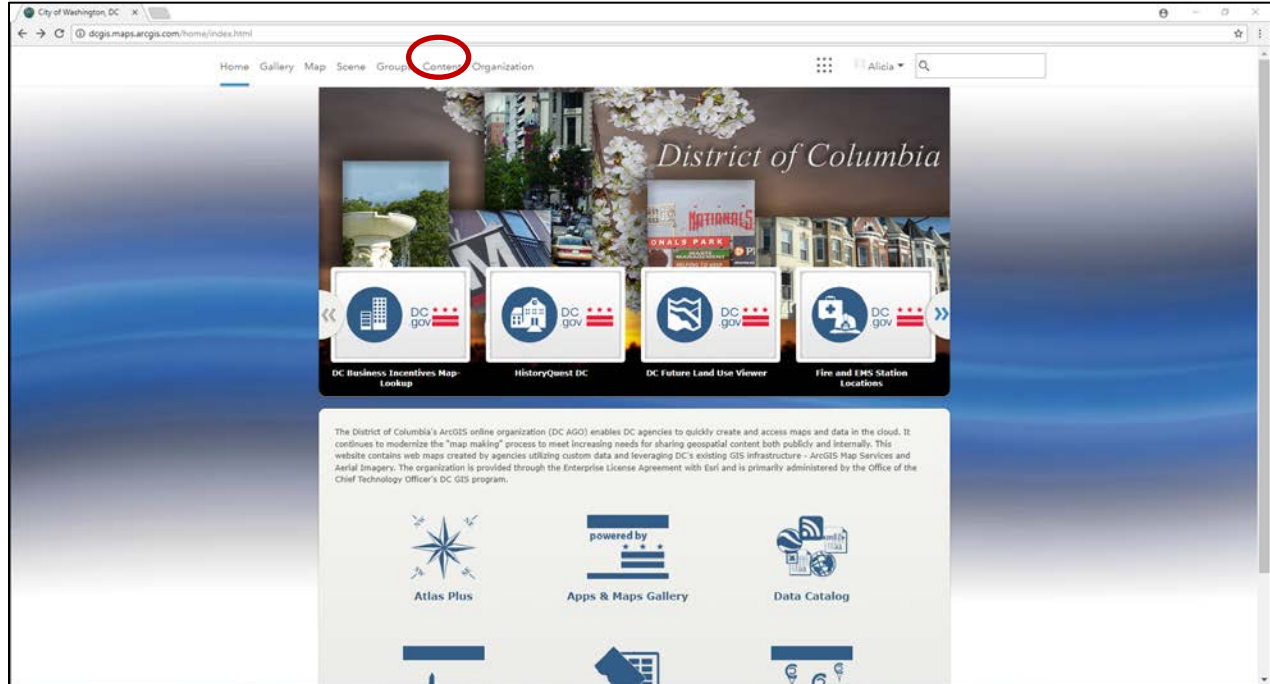**7** Finally, unselect feature on the map by clicking the "x" to ensure no accidental changes are made.
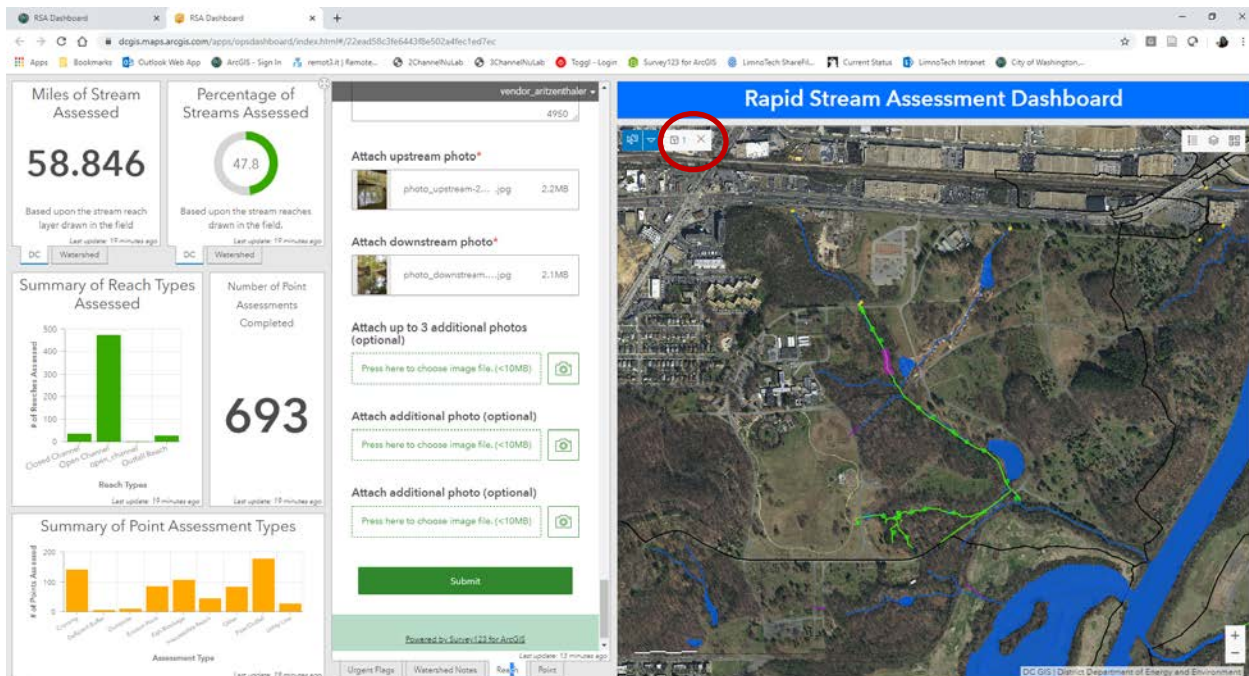
6.0   Viewing and Downloading Data

All data can be viewed in either ArcGIS online or by downloading a local copy to open and work within ArcMap/desktop.

6.1. Viewing in ArcGIS online
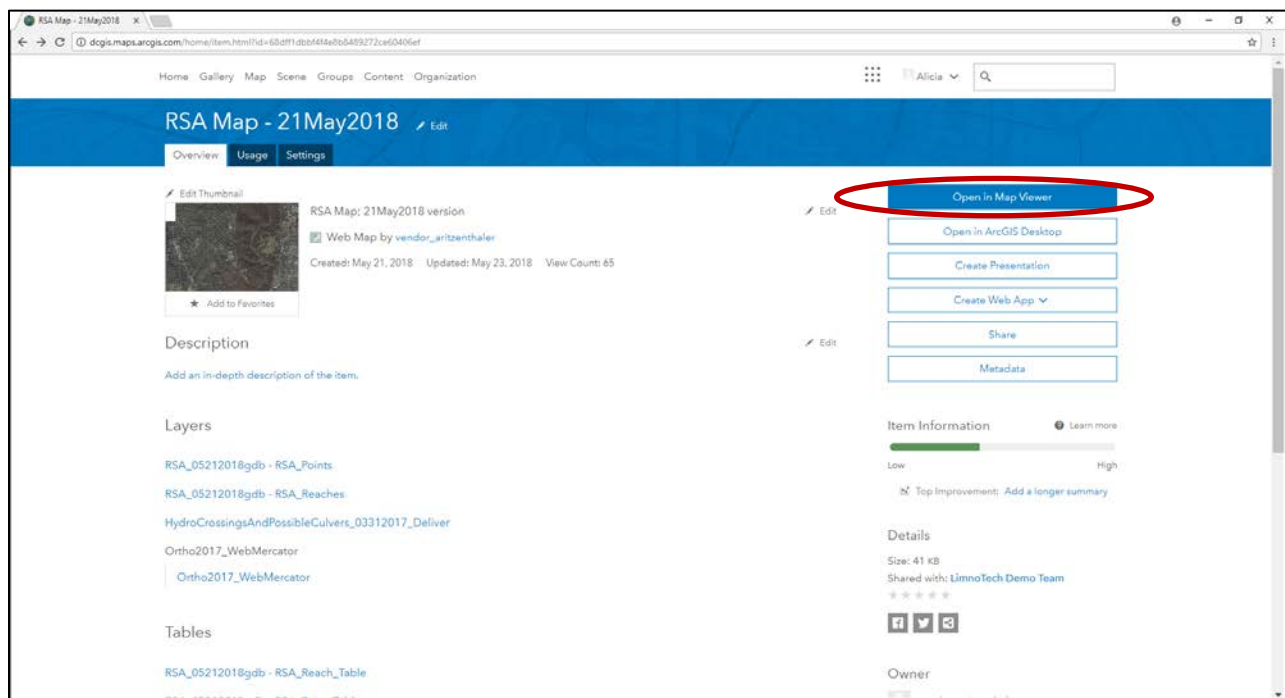
Sign into your ArcGIS online account.
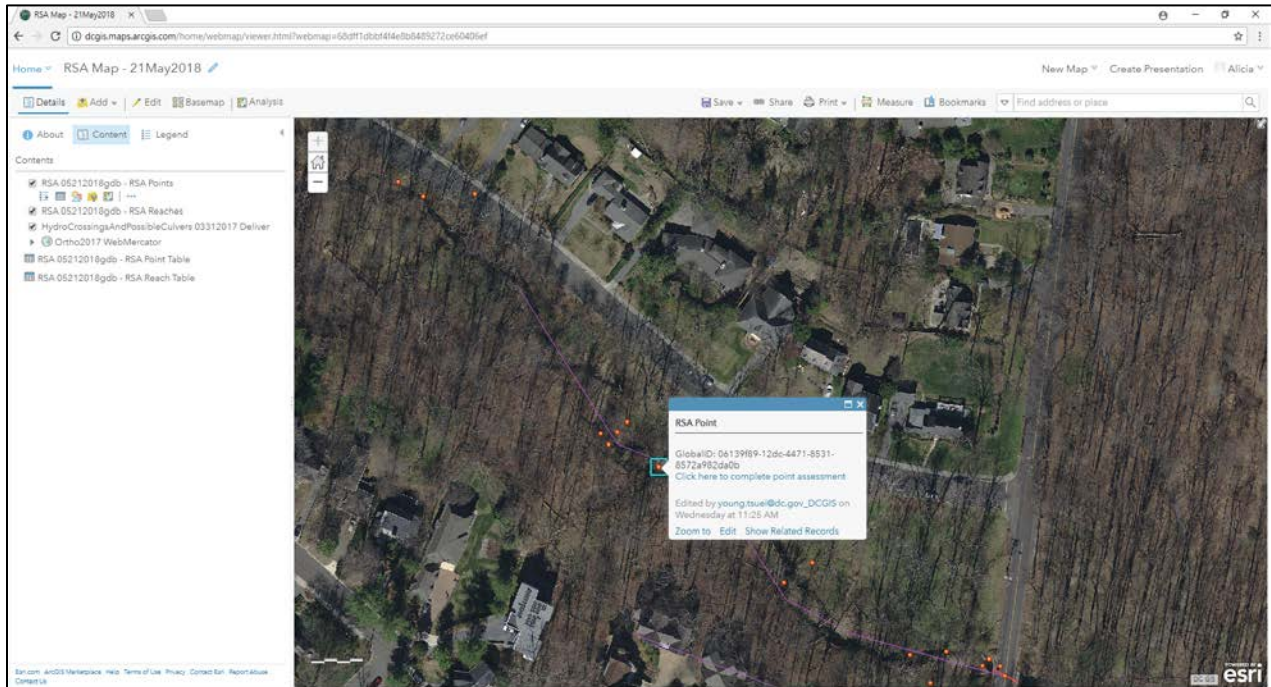
Click "Content"

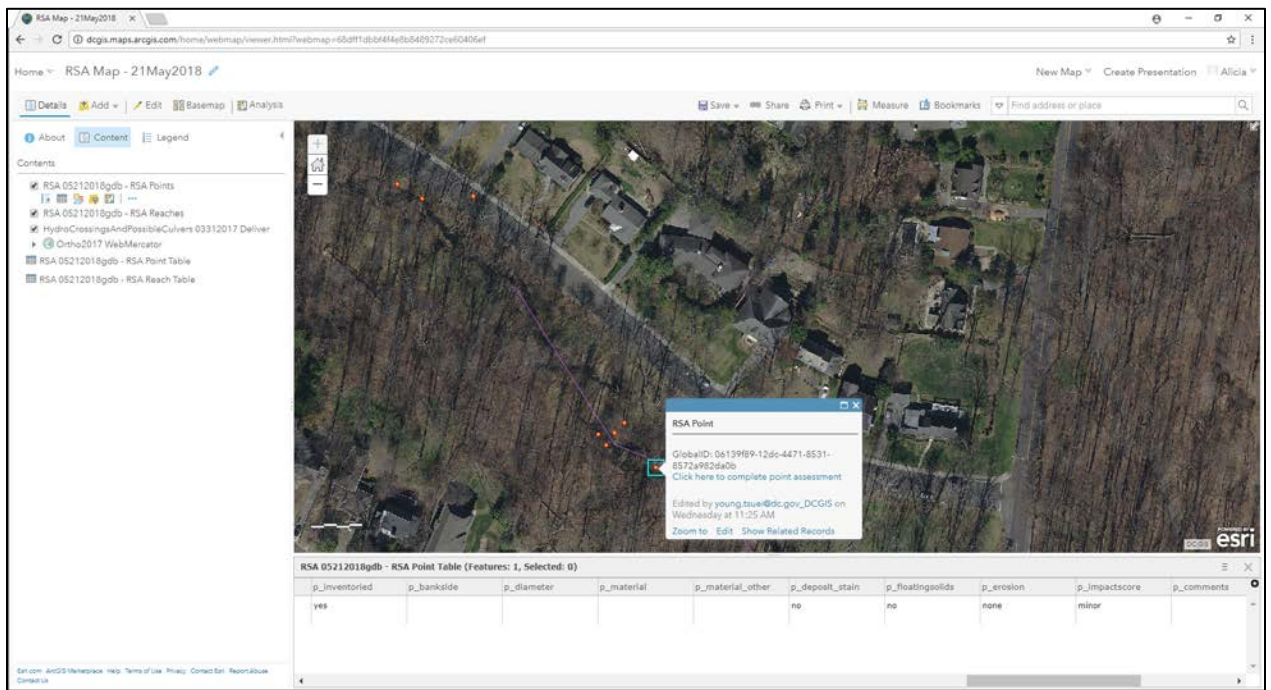Navigate to your Web Map (same Map as used in the field) and select by clicking its title.
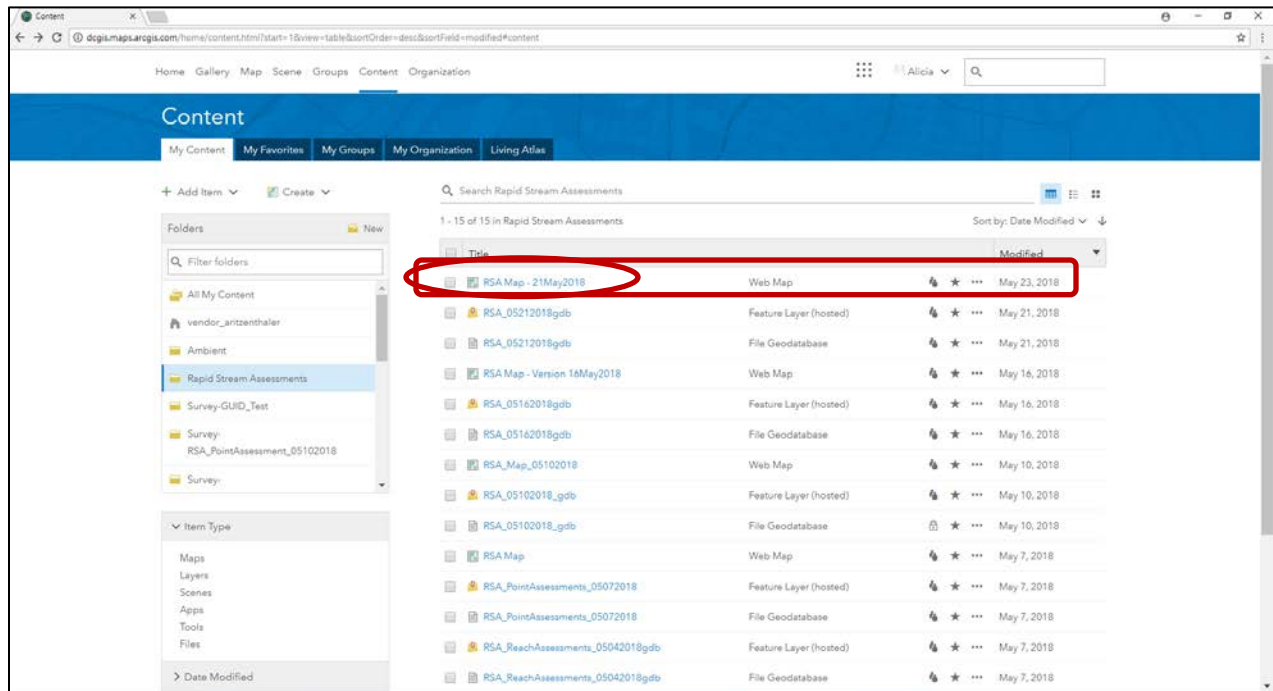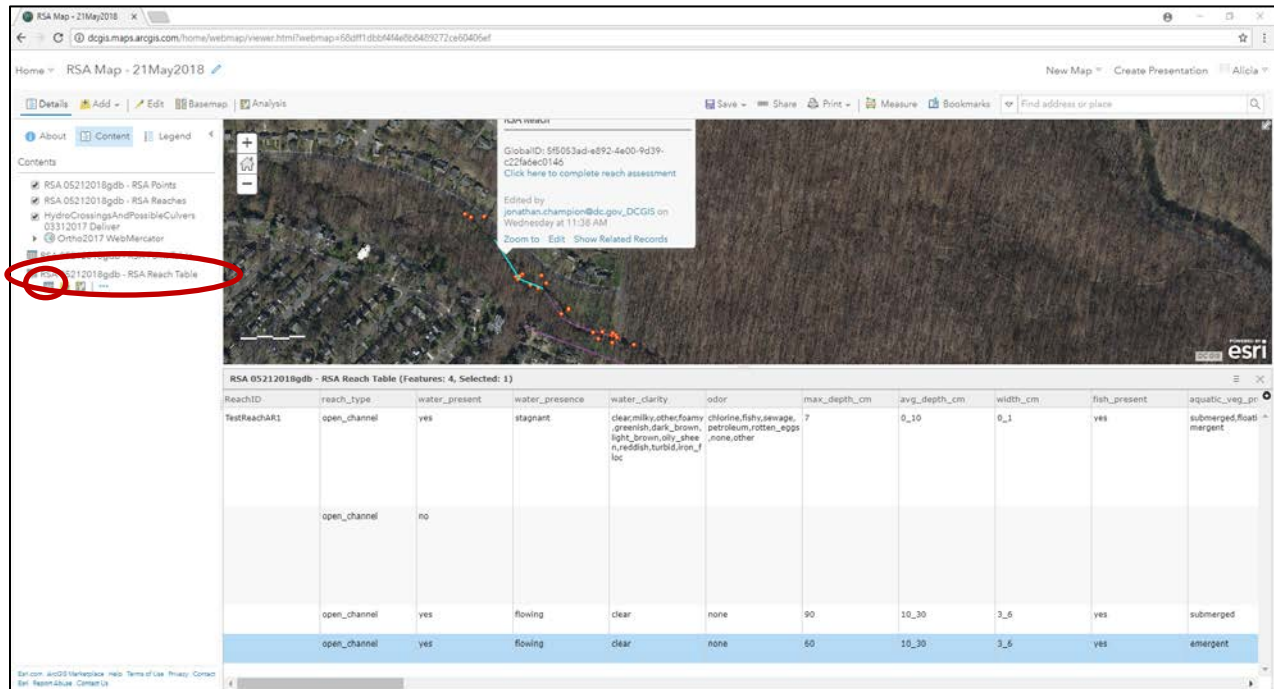

Click "Open in Map viewer"

Features on the map can be selected by clicking on them.

Attribute data collected about the selected feature can be viewed by clicking "Show Related Records" in the pop-up window.
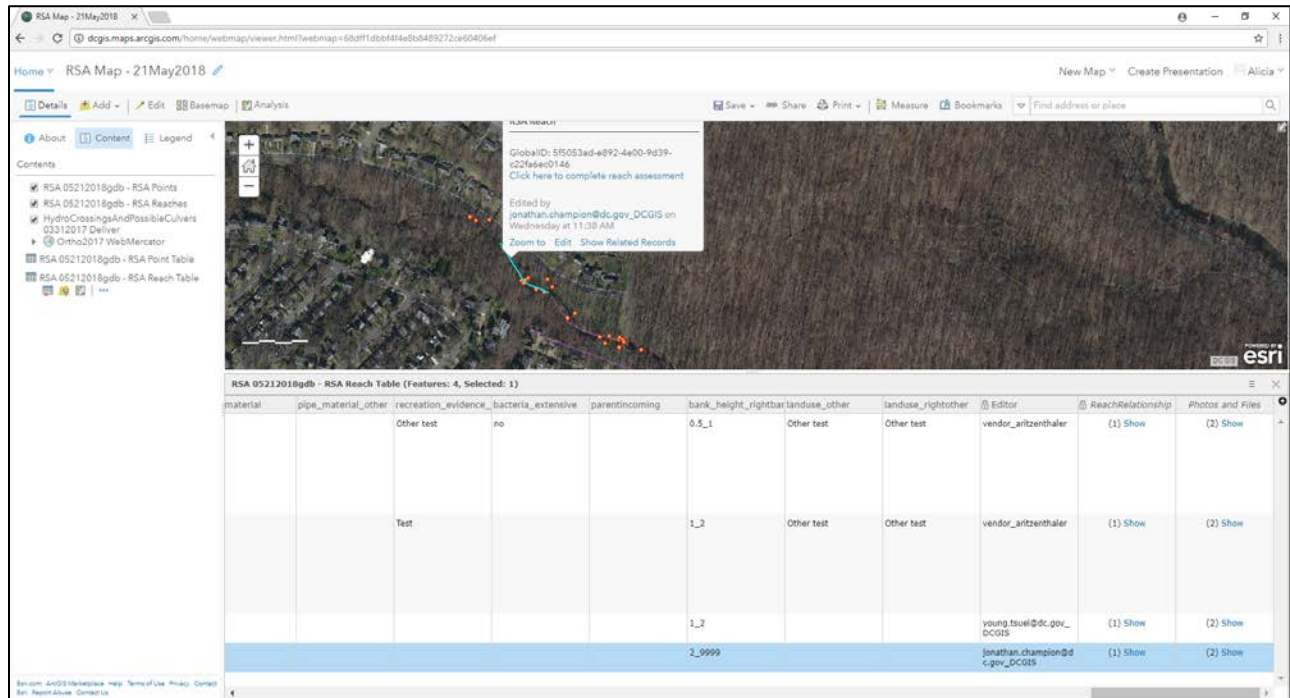
Attributes can also be viewed for all records at once, in a tabular format, by opening the table.

Once you're viewing attributes, either all records or for a selected record(s), scroll to the far right of the table to view photo attachments.

Right click photo to save and download if desired.

6.2. View in ArcMap

Sign into your ArcGIS online account.

Click "Content"
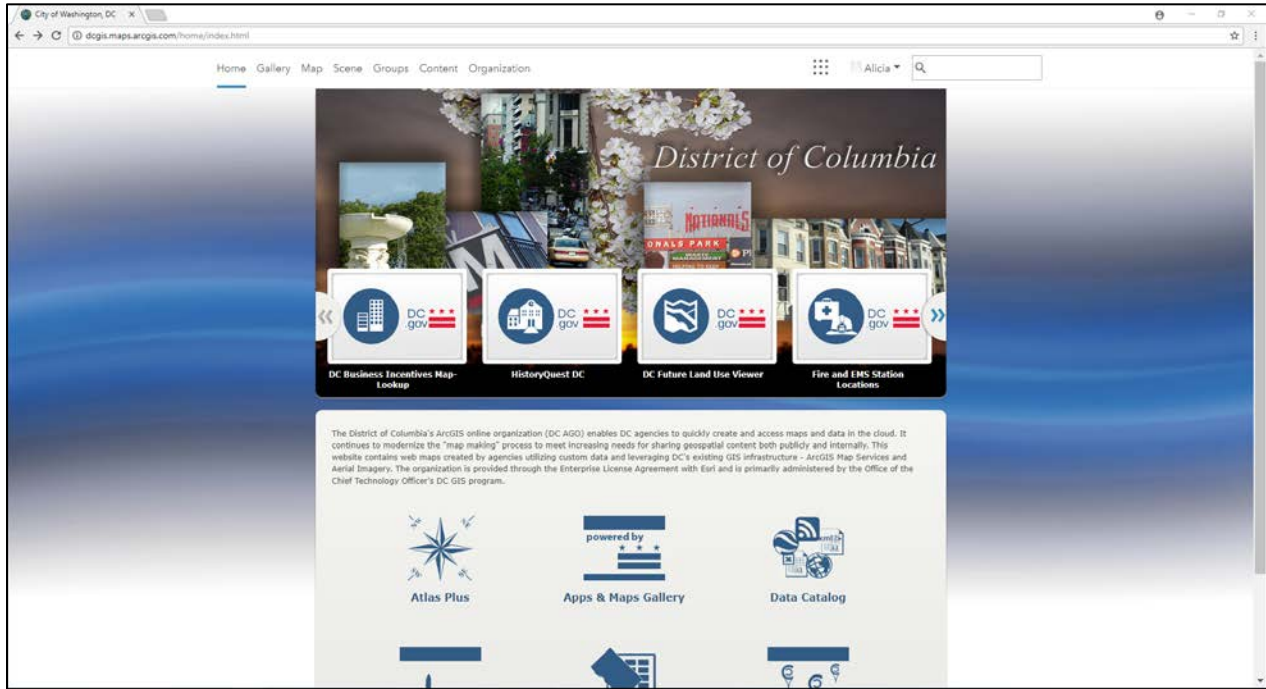
Navigate to your feature layer. Your feature layer is the file in which all data you've collected is saved.
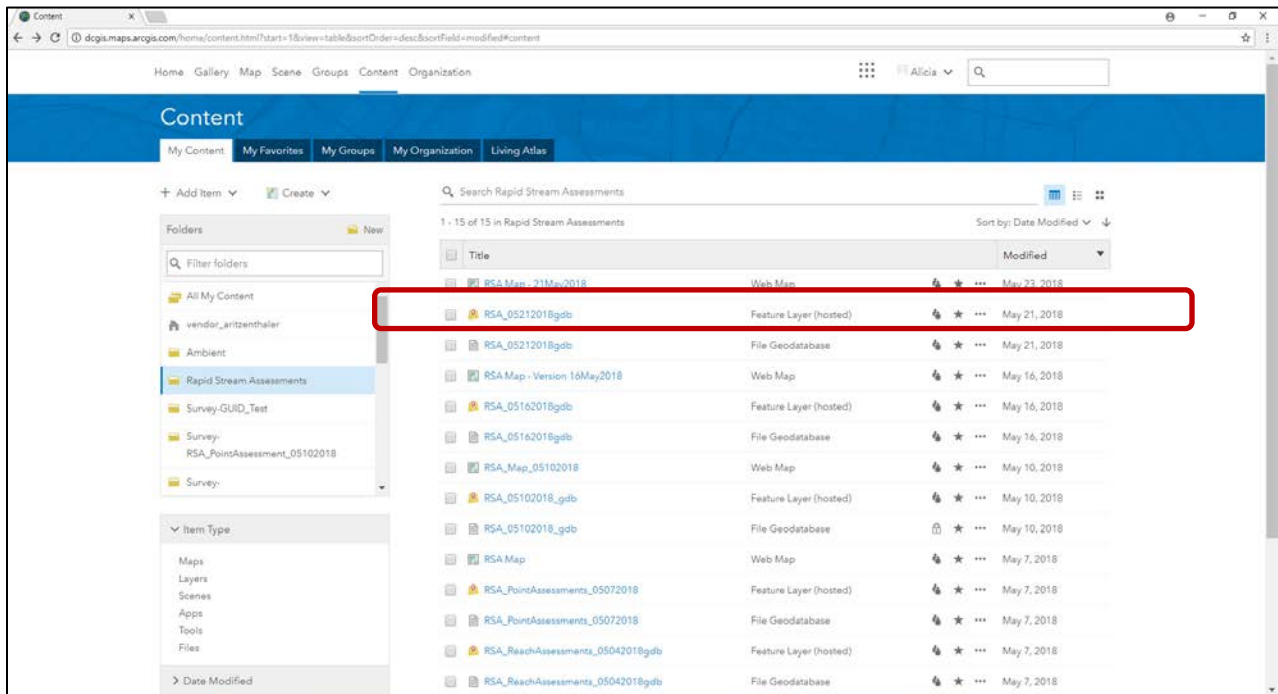
If you have trouble identifying which feature layer you need you can look this up by clicking on the Web Map that was used in Collector.
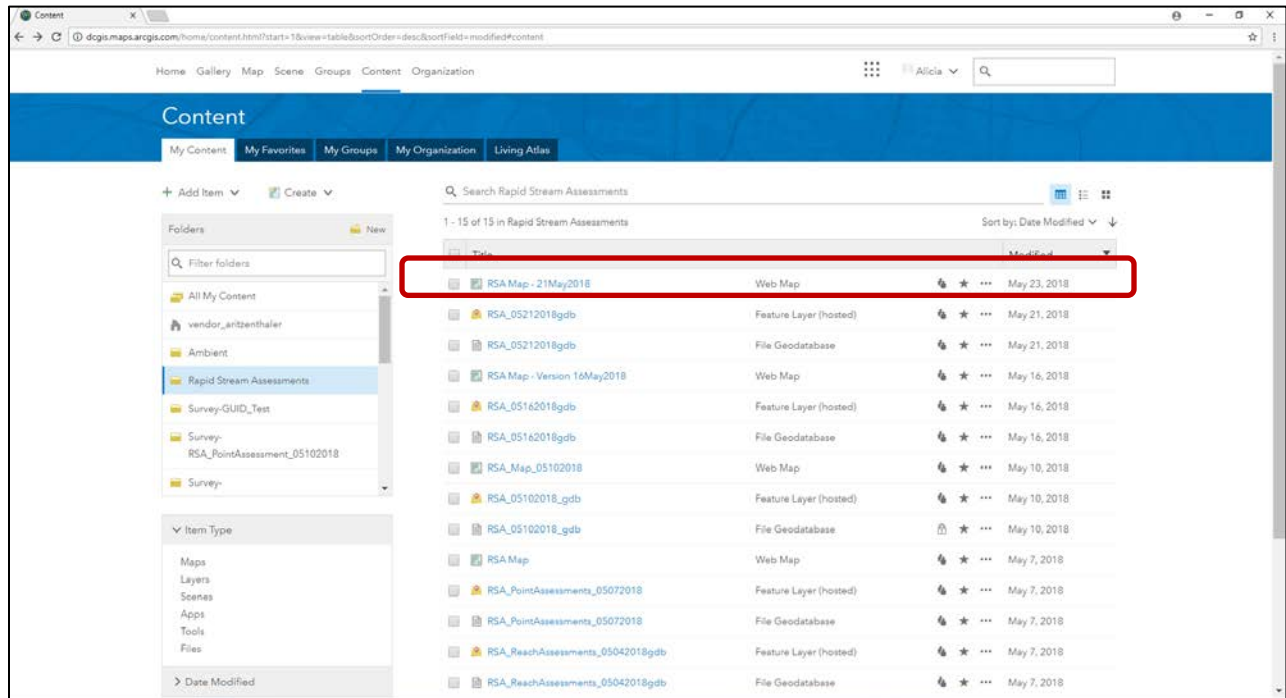
Check layer names present in map.
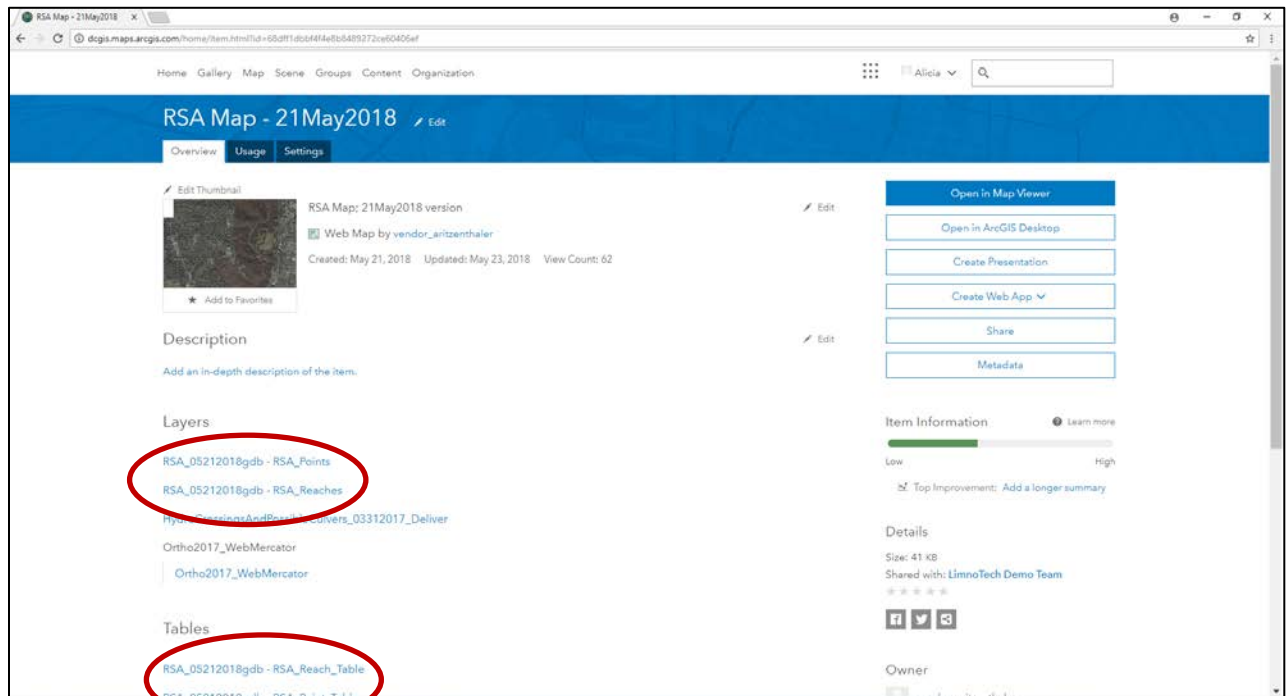
Once you've selected your feature layer click "Export Data".
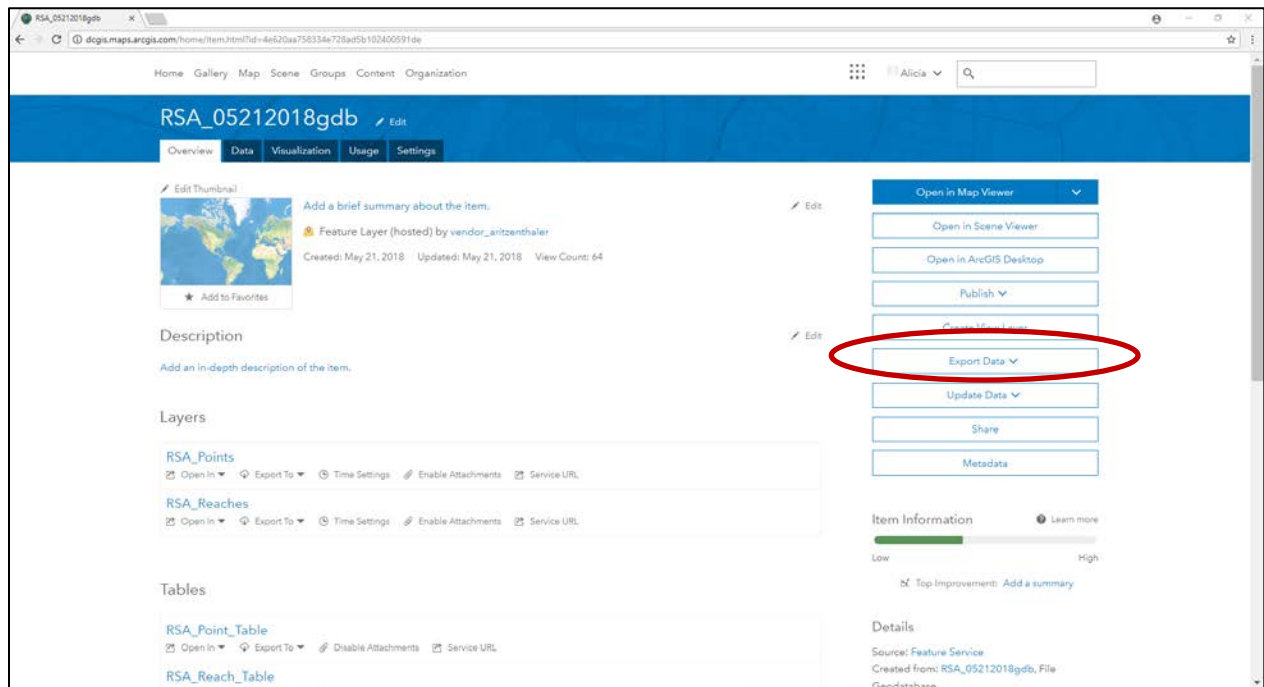
Then select "Export to FGDB".
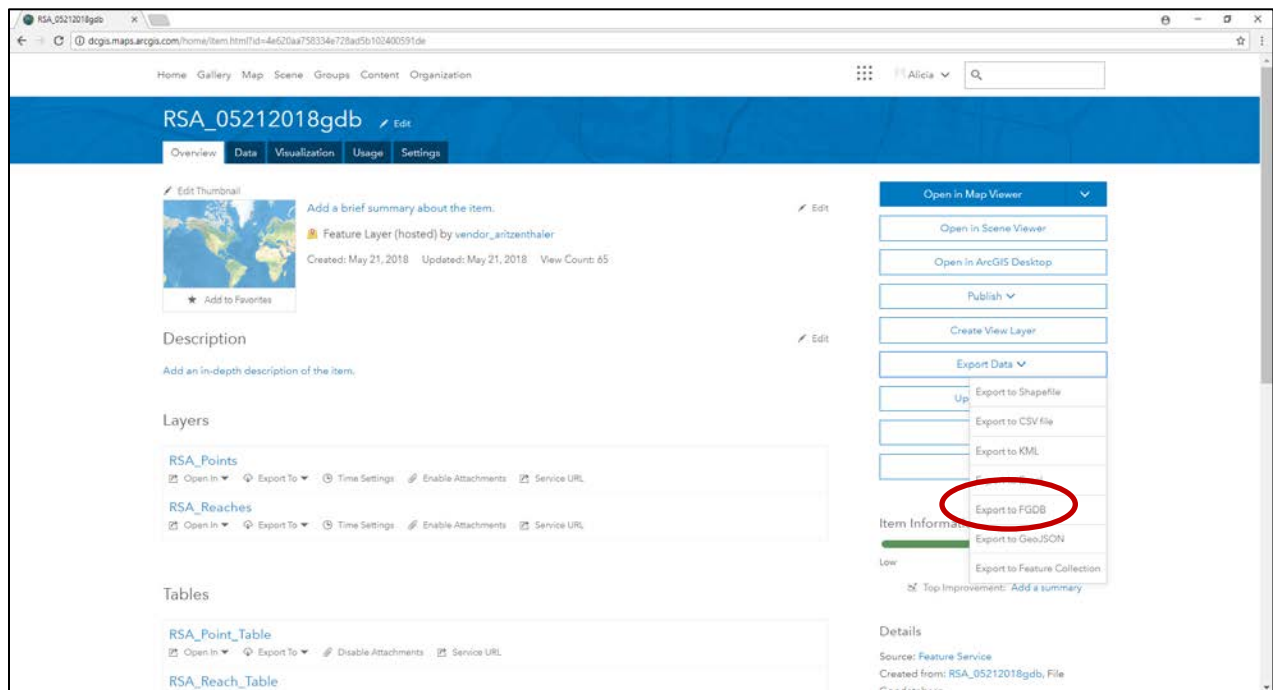
Provide title, tags, summary, and a folder to which the file will be saved. Click "Export".

After the export is complete, download a local copy by selecting "Download".

Open ArcMap.

Click the "   " icon and navigate to the folder your geodatabase is saved. Add your feature class(es), table(s), and ATTACH table(s) to your map.
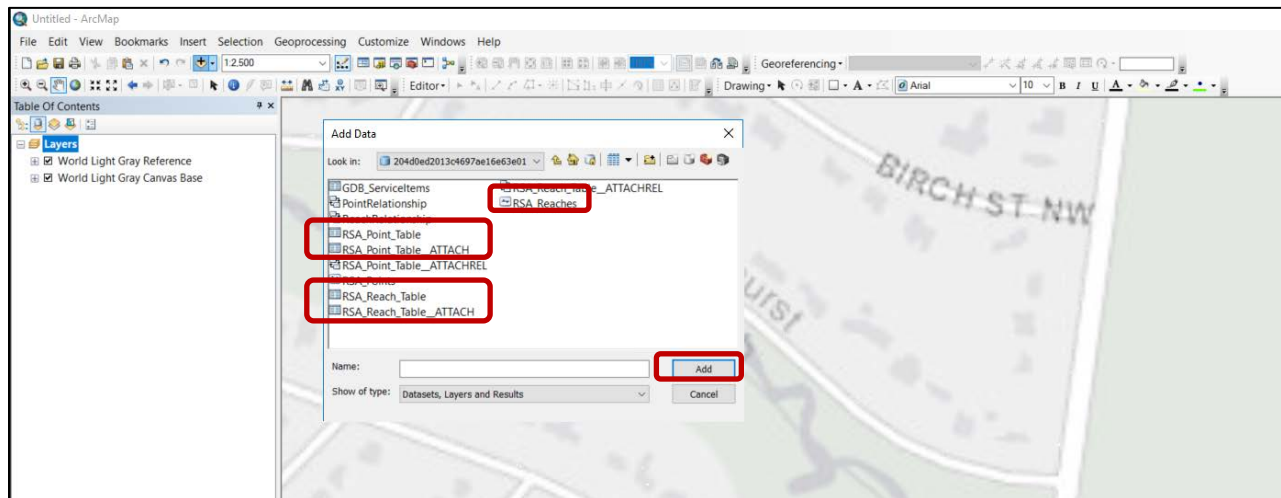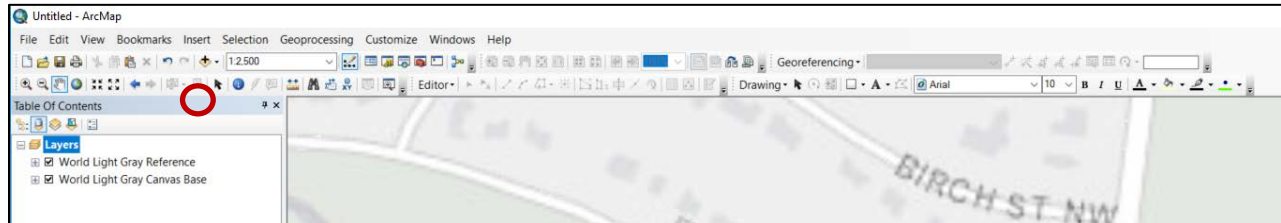
To see all the data in a single table, join the table and ATTACH table to the feature, as done below. Repeat the following steps for each set of features in your map (i.e. join the reach table, reach ATTACH table, and reach features. Repeat process with point table, point ATTACH table, and point feature.)

Right click the table and select "Join".

Join the ATTACH table to the table as illustrated below.
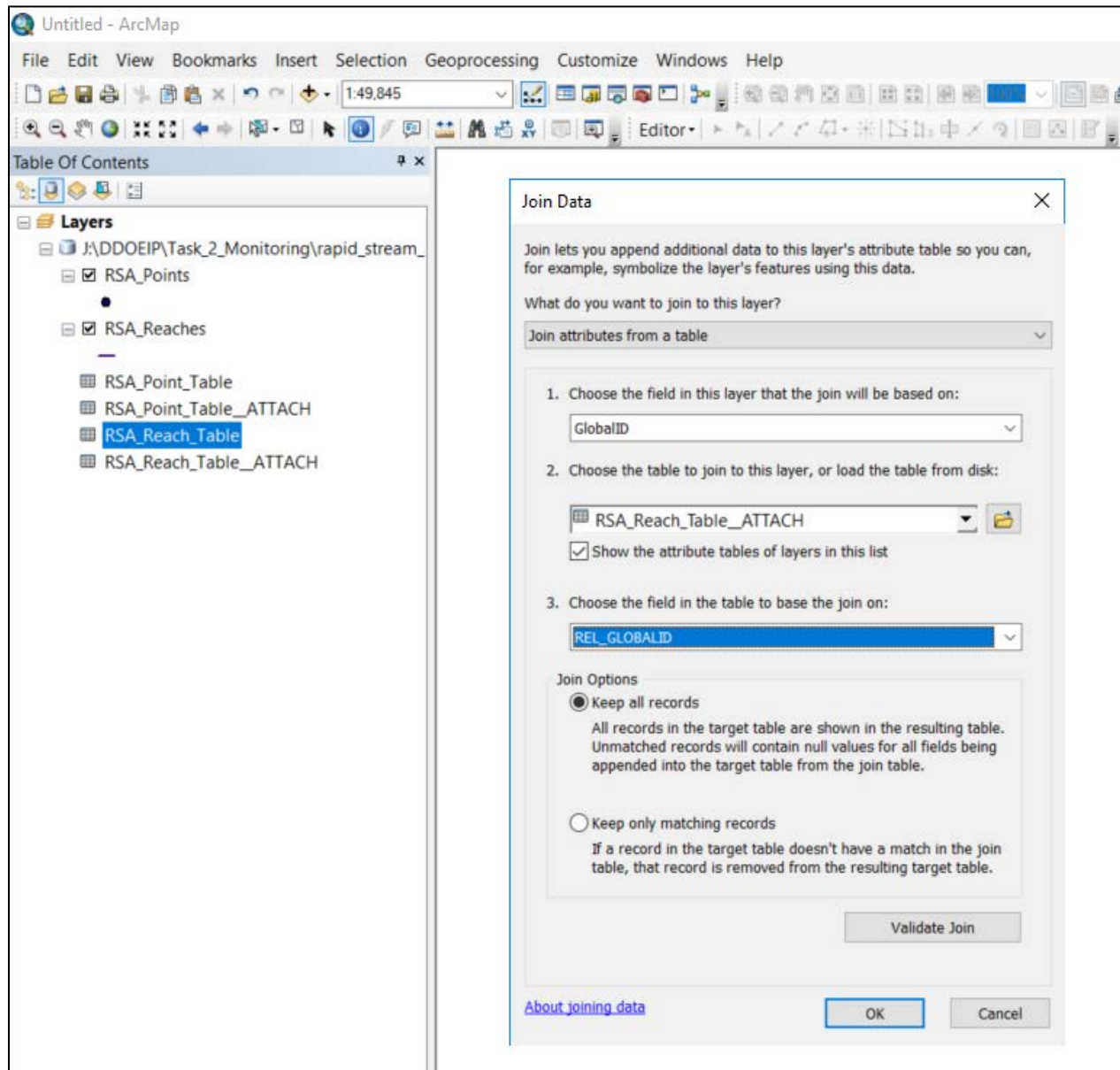
Now right click the feature and join the table to the features as shown below:
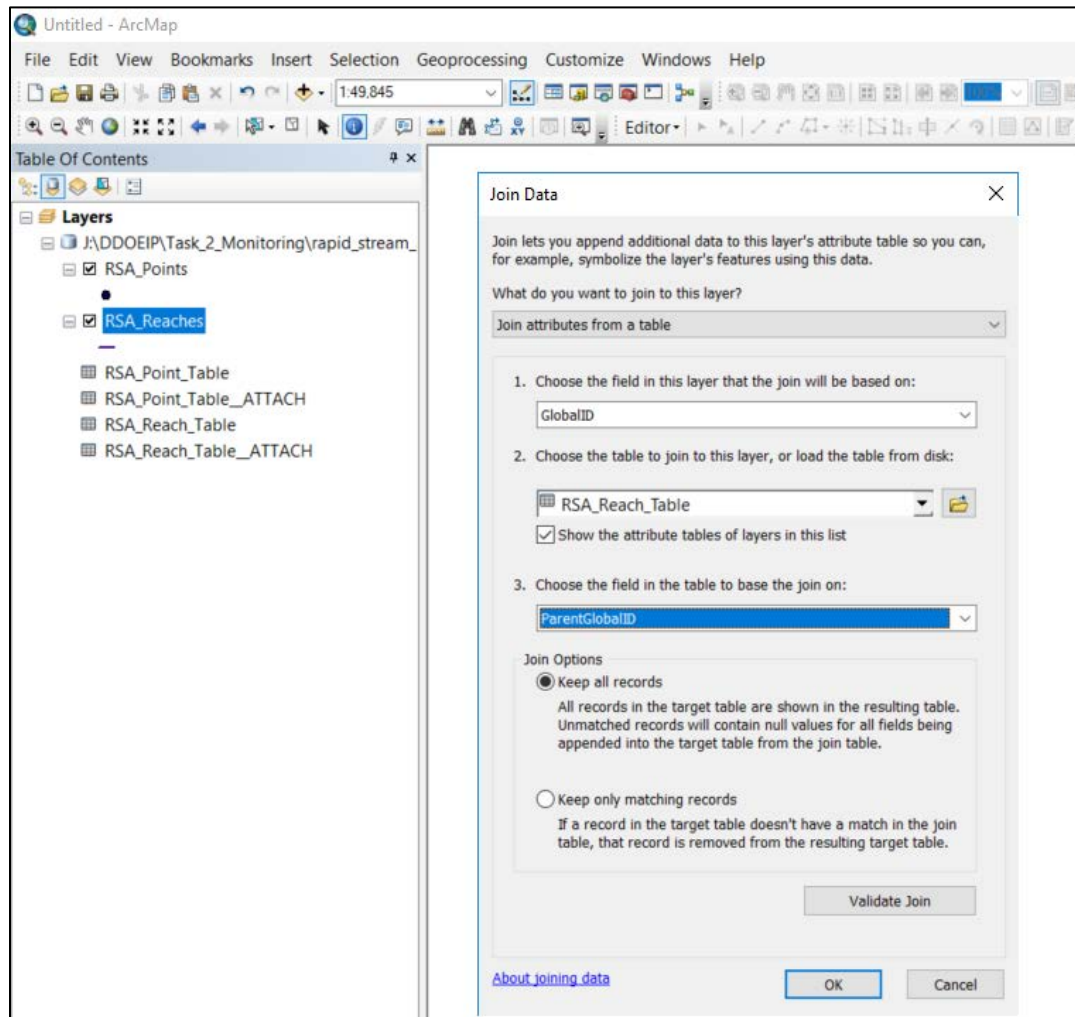
Data from the table can now be viewed in the attribute table of the feature class by right clicking the feature class and choosing "Open Attribute Table".
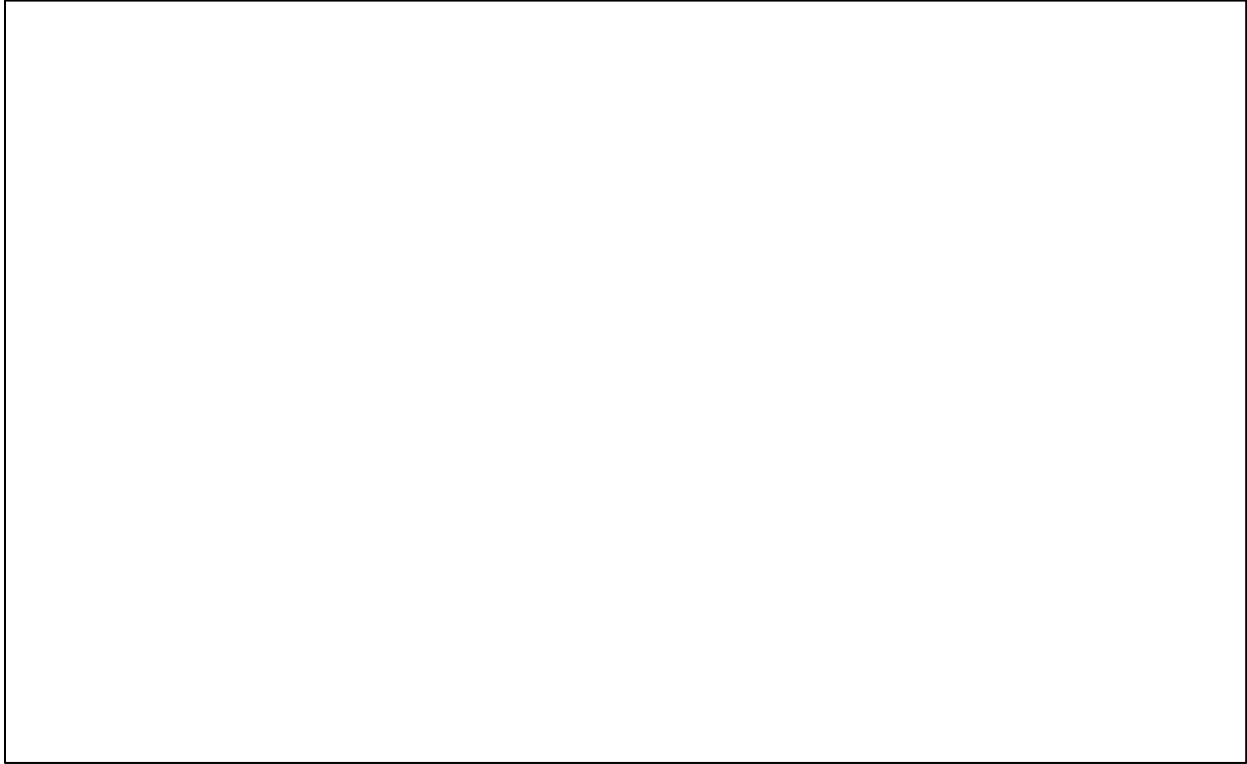
Using the "Identify" tool, you can view (and download) the photos associate with an identified feature by clicking on the feature of interest, expanding the nested related layers, and clicking on attachments.
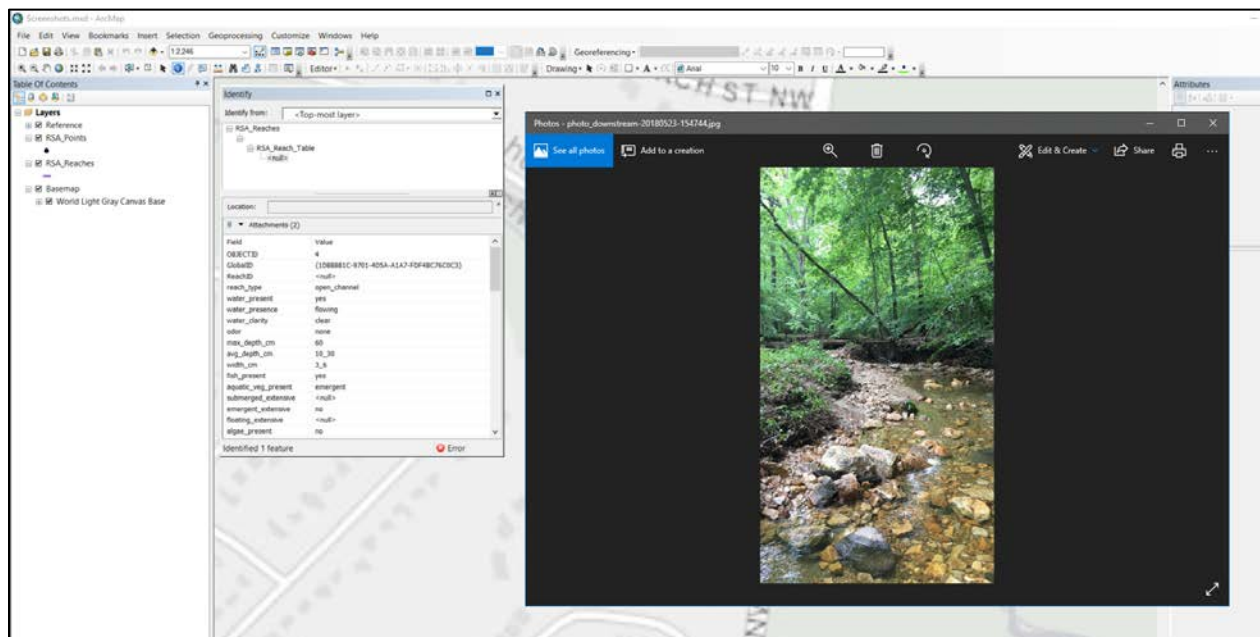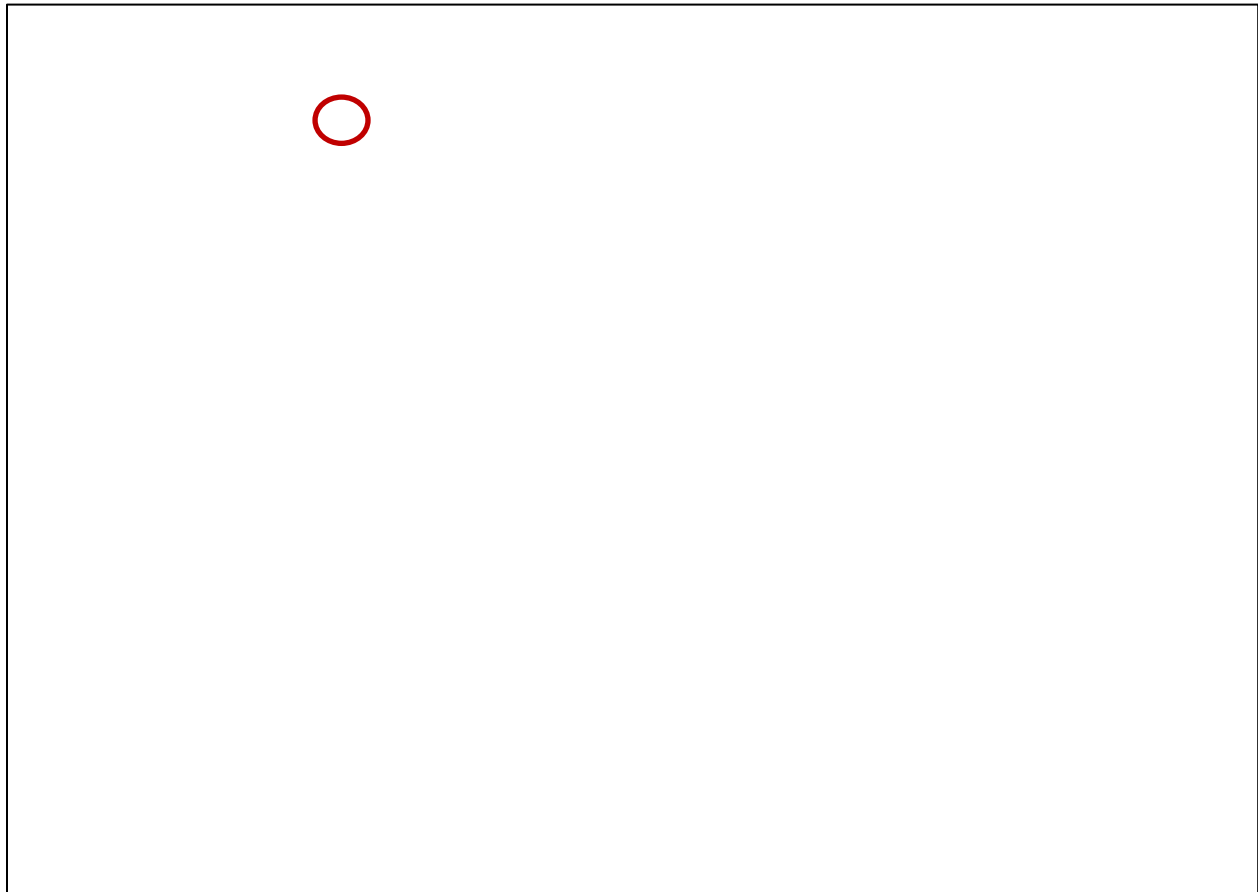
If you wish to export photos out of the geodatabase all at once you can do so following the directions
ESRI has provided online here: https://support.esri.com/en/technical-article/000011912

7.0   Data backup

Data collected using the Collector/Survey 123 tool is backed up from AGOL as a geodatabase and saved
to DOEE GIS servers using a python script, scheduled daily. This script is overseen by DOEE IT staff.

Appendix 4:
Contact List for Reporting Urgent Concerns/Flags

Appendix 4

Contact List for Reporting Urgent Concerns/Flags

Urgent concerns (i.e. downed power lines, leaking sewage lines, critical infrastructure damage threatening human safety) should be reported by the field collector immediately to the proper authority. The project manager or their designee should review the database for point assessments that have been flagged as needing non-urgent attention. Non-urgent concerns (i.e. dumpsite, bank erosion for potential restoration, aging infrastructure) should be reported to the appropriate department within six weeks of identifying the concern.

Contacts are as follows:

Issue	Contact
Immediate threats to humans and the environment	911
Downed power lines	202-872-3432 (Pepco)
Leaking sewage lines	202-612-3400
Water main breaks	202-612-3400
Fallen trees/limbs in public space	311 (DDOT)
Dumpsites	311 (DPW)
Severe bank erosion for potential restoration	NRA WPD
Illicit discharges	NRA IED
Deteriorating infrastructure • **Bridges** • **Outfalls**	DDOT –GI Section And Maintenance Division

Appendix 5:
Acceptability Rubrics

Appendix 5

Acceptability Rubrics

The following rubrics have been developed using the data collected during the first year of the Rapid Stream Assessment (RSA) program. This process has been used to establish an acceptable level of variation that can be expected between teams and across sites. As additional data are collected in subsequent years of this program, providing a more substantive basis upon which to establish acceptable variation, it is expected that minor modifications will be made (e.g., percentage of responses that must pass). Additionally, professional judgement should be taken into account in evaluating RSA data within these rubrics. This may include taking additional information into consideration in evaluating data including narrative comments associated with a site, the review of photos, and the a general understanding of a site/reach and its characteristics.

To ensure the quality of each survey conducted, 85% of the answers within each overlapping survey must achieve a passing score. To ensure the quality of all QAQC surveys throughout the field season, 85% of overlapping surveys must receive a passing score.

To determine if specific metric is being evaluated properly, 85% of all scores across all QAQC surveys throughout the field season must achieve a passing score for that specific metric.

Table 1. Reach Rubric

Metric	Criteria 1	Criteria 2
Reach Type	Identical Match	90% of responses should pass
	Difference w/ explanatory comment	
Water Presence	Identical Match	> 85% of responses should match identically **AND**
	Difference w/ explanatory comment	90% of responses should pass
Water Flow	Identical Match	90% of responses should pass
	Difference w/ explanatory comment	
Water Clarity	Identical Match	> 60% of responses should match identically **AND**
	At least one common water clarity **AND** no more than two differing response per assessment	75% of responses should pass

Odor	Identical Match	> 80% of responses should match identically **AND**
	If presence/ absence of odor differs: No more than 1 odor present	85% of responses should pass
	If odor is present but differs: Assessments should include at least one common odor	
Maximum Depth Encountered	Max depth is <100cm and responses differ by <5cm	80% of responses should pass
	Max depth is >100cm and responses differ by <20%	
Average Depth	Identical Match	> 75% of responses should match identically **AND**
	Responses which differ do not differ by more than one category	85% of responses should pass
Maximum Width	Identical Match	> 65% of responses should match identically **AND**
	Responses which differ do not differ by more than one category	85% of responses should pass
Fish Presence	Responses should match identically	85% of responses should pass
Aquatic Vegetation	Identical Match	> 80% of responses should match identically **AND**
	Assessments include at least one common vegetation type **AND** no more than one differing type	85% of responses should pass
Algae	Responses match in regards to presence/absence	> 80% of responses should match regarding presence/absence **AND**
	Compared responses do not indicate both "absent" and "extensive"	85% of responses should pass
Bacteria Presence	Responses match in regards to presence/absence	> 75% of assessments should match regarding presence/absence with common character **AND**

	Responses do not match regarding presence/absence but bacteria is not extensive	85% of responses should pass
Trash	Identical Match	> 60% of responses should match identically **AND**
	Responses which differ do not differ by more than one category	85% of responses should pass
Riparian vegetation width	Identical Match	> 80% of responses should match identically **AND**
	Responses which differ should not be more than one category apart on either bank.	85% of responses should pass
Riparian Vegetation Type - **Left Bank**	**Left Bank:** Top ranked vegetation type of Team 1 is within the top two vegetation types ranked by Team 2 AND Top ranked vegetation type of Team 2 is within the top two vegetation types ranked by Team 1.	85% of responses should pass
	Left Bank: Top ranked vegetation type of Team 1 is within the top two vegetation types ranked by Team 2 AND Top ranked vegetation type of Team 2 is listed by Team 1.	
Riparian Vegetation Type - **Right Bank**	**Right Bank:** Top ranked vegetation type of Team 1 is within the top two vegetation types ranked by Team 2 AND Top ranked vegetation type of Team 2 is within the top two vegetation types ranked by Team 1.	
	Right Bank: Top ranked vegetation type of Team 1 is within the top two vegetation types ranked by Team 2 AND Top ranked vegetation type of Team 2 is listed by Team 1.	

Substrate Type	Top ranked substrate type of Team 1 is within the top two substrate types ranked by Team 2 **AND** Top ranked substrate type of Team 2 is within the top two substrate types ranked by Team 1.	85% of responses should pass
	Top ranked substrate type of Team 1 is within the top two substrate types ranked by Team 2 **AND** Top ranked substrate type of Team 2 is listed by Team 1.	
Shading	Identical Match	> 60% of responses should match identically **AND**
	Responses which differ should not be more than one category apart.	85% of responses should pass
Floodplain Connectivity	Identical Match	> 75% of assessments should match identically **AND**
	Responses which differ should not be more than one category apart.	95% of responses should pass
Bank Erosion	Identical Match	75% of responses should pass
	If presence/absence of bank erosion differs: Compared responses should not include both "none" **AND** more than 1 impact.	
	If bank erosion is present: Assessments should include at least one common impact **AND** no more than 2 differing impacts per assessment	
Woody Debris	Responses should not differ >5 **OR** exceed 65% difference (whichever is greater)	60% of responses should pass
Recreation Evidence	Identical Match	> 60% of assessments should match identically in regards to presence/absence of recreation **AND**
	Compared responses include "none" **AND** 1 recreation type	85% of responses should pass

	Responses do **NOT** include "none" **AND** include at least one common type **AND** no more than 1 differing type per assessment		
Rosgen Classification	Identical Match	> 60% of responses should match identically **AND**
	Responses which differ should not be more than one category apart.	80% of responses should pass
OVERALL TARGETS	85% of All overlapping reaches pass	85% of all Metrics Pass

Table 2. Points Rubric

Metric		Criteria 1	Criteria 2
Deficient Buffer	Bankside	Identical response	> 80% of responses should match identically **AND**
		One common bankside	85% of responses should pass
	Length of deficiency	Identical response	85% of responses should pass
		Responses which differ do not differ by more than one category	
	Riparian Cover in Deficient Buffer Area	All, or all but two, of the cover type(s) are the same on both assesments.	85% of responses should pass
	Impact Score	Identical Match	85% of responses should pass
		Responses which differ do not differ by more than one category	
Crossing	Type	Responses should match identically	85% of responses should pass
	Diameter/width	Identical Match	>65% of responses should match identically **AND**
		Responses which differ do not differ by more than one category	85% of responses should pass
	Length	Identical Match	> 65% of responses should match identically **AND**
		Responses which differ do not differ by more than one	85% of responses should pass

		category	
	Material	All, or all but one, of the material type(s) are the same on both assessments.	75% of responses should pass
	Downstream debris	Responses should match identically	85% of responses should pass
	Downstream Erosion	Responses match in regards to presence/absence **AND** erosion height is within one category (if present)	> 75% of assessments should match regarding presence/absence with similar height **AND**
		Responses do not match in regards to presence/absence **but** erosion height is 0-1m	85% of responses should pass
	Downstream sediment	Responses should match identically	85% of responses should pass
	Upstream debris	Responses should match identically	85% of responses should pass
	Upstream Erosion	Responses match in regards to presence/absence **AND** erosion height is within one category (if present)	> 75% of assessments should match regarding presence/absence with similar height **AND**
		Responses do not match in regards to presence/absence **but** erosion height is 0-1m	85% of responses should pass
	Upstream sediment	Responses should match identically	85% of responses should pass
	Impact Score	Identical Match	85% of responses should pass
		Responses which differ do not differ by more than one category	
Dumpsite	Bankside	Identical response	> 80% of responses should match identically **AND**
		One common bankside	85% of responses should pass
	Location	Identical response	> 80% of responses should match identically **AND**
		At least one common location	85% of responses should pass
	Cleanup potential	Responses should match identically	85% of responses should pass
	Material dumped	All, or all but two, of the dumped material(s) are the	75% of responses should pass

		same on both assessments.	
	Trash Volume	Identical Match	> 80% of responses should match identically **AND**
		Responses which differ do not differ by more than one category	85% of responses should pass
	Impact Score	Identical Match	85% of responses should pass
		Responses which differ do not differ by more than one category	
Erosion	Bankside	Identical response	> 80% of responses should match identically **AND**
		One common bankside	85% of responses should pass
	LEFT Bank Height	Identical Match	> 80% of responses should match identically AND
		Responses which differ do not differ by more than one category	
	Right Bank Height	Identical Match	
		Responses which differ do not differ by more than one category	85% of responses should pass
	Impact of Erosion	Identical Match	75% of responses should pass
		If presence/absence of bank erosion differs: Compared responses should not include both "none" **AND** more than 2 impacts.	
		If bank erosion is present: Assessments should include at least one common impact **AND** no more than 2 differing character type per assessment	
Pipes	Bankside	Identical response	> 80% of responses should match identically **AND**
		One common bankside	85% of responses should pass
	Pipe diameter	Identical Match	> 75% of responses should match identically **AND**
		Responses which differ do not differ by more than one category	85% of responses should pass

	Pipe material	Identical Match	> 75% of responses should match identically **AND**
		Difference w/ explanatory comment	85% of responses should pass
	Floating solids/trash	Responses should match identically	85% of responses should pass
	Erosion due to pipe	Identical Match	> 65% of responses should match identically **AND**
		Responses which differ do not differ by more than one category	75% of responses should pass
	Impact Score	Identical Match	75% of responses should pass
		Responses which differ do not differ by more than one category	
	Discharge concern	All, or all but one, of the discharge concern is listed on both assessments (if discharge present)	85% of responses should pass
Utility Line	Exposed sewer	Responses should match identically	85% of responses should pass
		Fail Comparison	
	Utility diameter	Identical Match	> 80% of responses should match identically **AND**
		Responses which differ do not differ by more than one category	85% of responses should pass
	Utility material	Identical Match	> 75% of responses should match identically **AND**
		Difference w/ explanatory comment	85% of responses should pass
	Condition	Identical Match	> 80% of responses should match identically **AND**
		Responses which differ do not differ by more than one category	85% of responses should pass
	Impact Score	Identical Match	85% of responses should pass
		Responses which differ do not differ by more than one	

		category	
Fish Blockage	Man-made	Responses should match identically	85% of responses should pass
	Height	Identical response	85% of responses should pass
		Responses which differ do not differ by more than one category	
OVERALL TARGETS		85% of all overlapping points pass	85 % of all Metrics pass

Table 3. Assessment Conflicts Rubric

Conflict	Criteria 1	Criteria 2
Feature Conflicts	Feature type conflicts; Assessments describe similar conditions/observations	Should account for >65% of feature conflicts
	Feature type conflicts; Assessments describe incomplete conditions/observations	Should account for <35% of feature conflicts
	Feature type conflicts; Assessments do NOT describe similar conditions/observations	Should account for <5% of feature conflicts
Missing Points	Located along unassessed reach	Should not exceed 10% of all points assessed
	Unobserved - Deficient Buffer	
	Unobserved - Crossing	
	Unobserved - Dumpsite	
	Unobserved - Erosion	
	Unobserved - Pipes	
	Unobserved - Utility line	
	Unobserved - Fish blockage	
	Unobserved - Other	
Differing Point Assessments	Considered unobserved, missing points	

Missing Reaches	Distance of reach when a feature conflict occurs (if assessments do not describe conditions/observations, or describe them incompletely)	Should not exceed 10% of the assessed distance
	Distance of reach that is unobserved	
Differing Reach Assessment Type	Assessment contains explanatory note	Should account for >95% of reach assessment type conflicts
	Assessment contains no explanation	Should account for <5% of reach assessment type conflicts