

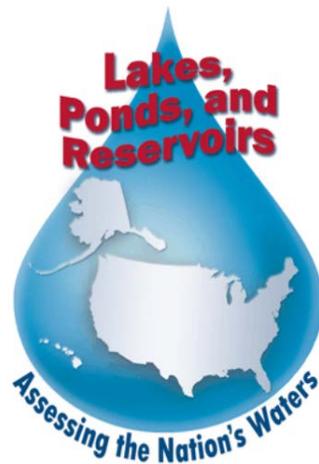


United States Environmental Protection Agency
Office of Water
Washington, DC
EPA 841-B-12-008

2013-2014

National Rivers and Streams Assessment

Site Evaluation Guidelines



DRAFT

NOTICE

The intention of the National Rivers and Streams Assessment 2013-2014 is to provide a comprehensive “State of Flowing Waters” assessment for rivers and streams across the United States. The complete documentation of overall project management, design, methods, quality assurance, and standards is contained in four companion documents, including:

National Rivers and Streams Assessment 2013-2014: Quality Assurance Project Plan (EPA-841-B-12-007)

National Rivers and Streams Assessment 2013-2014: Site Evaluation Guidelines (EPA-841-B-12-008)

National Rivers and Streams Assessment 2013-2014: Field Operations Manual (EPA-841-B-12-009)

National Rivers and Streams Assessment 2013-2014: Laboratory Operations Manual (EPA-841-B-12-010)

This document (*Site Evaluation Guidelines [SEG]*) contains an overview of the processes involved in locating a sampling site, evaluating the site, and selecting appropriate alternate sites when necessary, and is based on the guidelines developed and followed in the Western Environmental Monitoring and Assessment Program (Peck et al. 2003) and the National Rivers and Streams Assessment 2008-2009. Methods described in this document are to be used specifically in work relating to the NRSA 2013-2014. Mention of trade names or commercial products in this document does not constitute endorsement or recommendation for use. More detail of the project overview and of specific methods for field sampling, sample handling, and sample processing can be found in the appropriate companion document.

The suggested citation for this document is:

USEPA. 2012. National Rivers and Streams Assessment 2013-2014: Site Evaluation Guidelines. EPA-841-B-12-008. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

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1.0 INTRODUCTION

This document is provided to clarify all of the steps involved in the process of locating and evaluating a sampling site for the National Rivers and Streams Assessment (NRSA) 2013-2014. There are 5 steps involved in this process (**Figure 1**):

- Locate the index site (“x-site”) on a topographic map and verify that the x-site is aligned with an actual channel segment
- Obtain permission to access the site
- Verify that the site is sampleable
- Sample the site *OR* replace with an alternate site

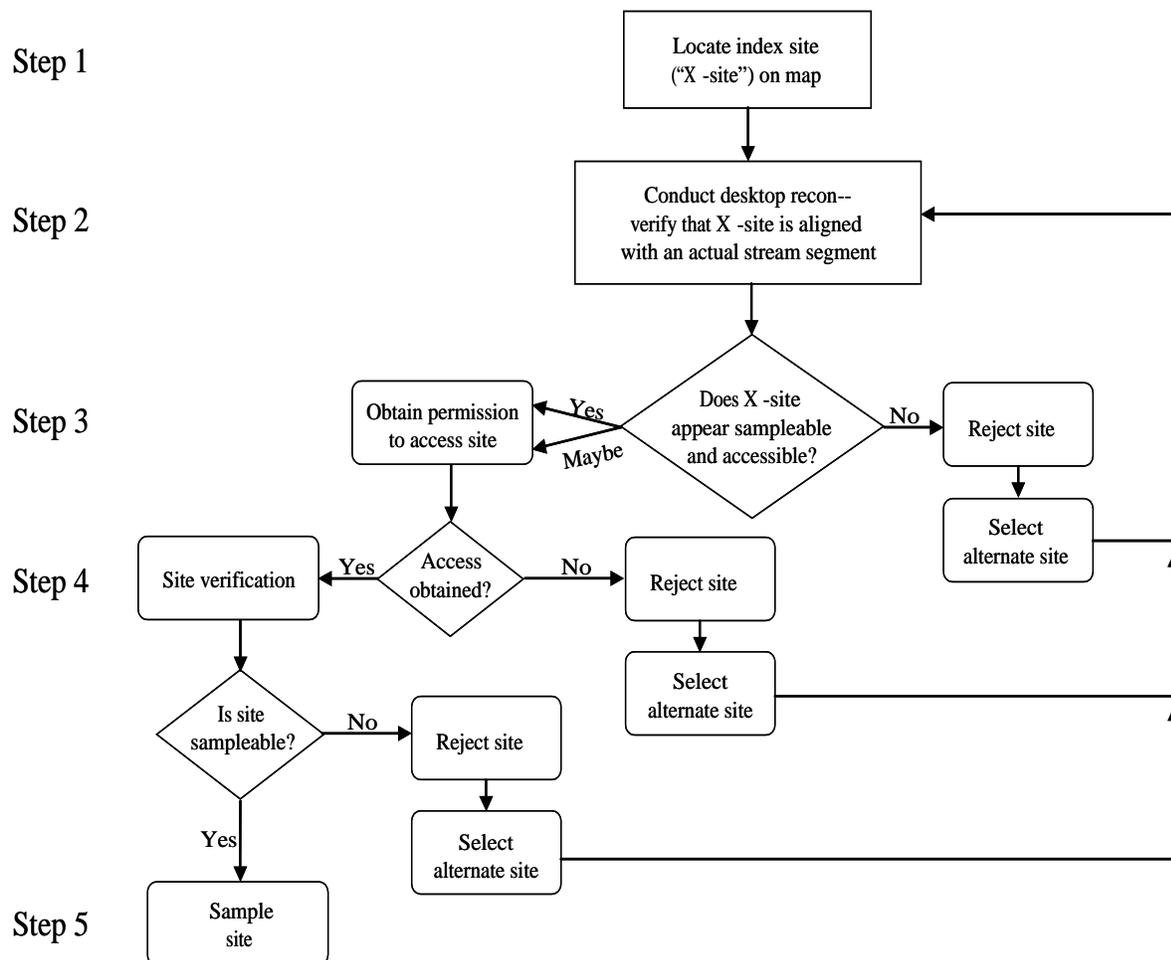


Figure 1. Site Evaluation Process

Field crews must assemble a dossier containing important locational and access information for each site they are scheduled to visit. The dossier must contain the appropriate maps, contact information,

copies of permission letters (if applicable), and access instructions. If the field crew is not a state agency, he/she must interact with the state to verify site locations. Before a site visit, each field team should confirm access to the waterbody if possible. The landowner(s) listed in the dossier should be contacted to confirm permission to sample and to identify any revisions to the information in the dossier.

2.0 SURVEY DESIGN

1.1 Target Population

The target populations consists of all streams and rivers within the 48 contiguous states that have flowing water during the study index period excluding portions of tidal rivers up to head of salt. The study index period extends from April/May to September and is generally characterized by low flow conditions. The target population includes the Great Rivers. Run-of-the-river ponds and pools are included while reservoirs are excluded. A complete definition of the target population is given in the field operations manual.

1.2 SAMPLE FRAME

The sample frame was derived from the medium National Hydrography Dataset (NHD), in particular NHD-Plus. Attributes from NHD-Plus and additional attributes added to the sample frame that are used in the survey design are:

- **MajorRiver:** rivers identified as major rivers or additional rivers in the book: Rivers of North America.
- **Strahler order**
- **Strahler category** where categories are RiversMajor (5th and higher), RiversOther (5th and higher), LargeStreams (3rd,4th order), and SmallStreams (1st, 2nd order).
- **BorderRiver:** rivers and streams that occur on state and country boundaries. Each reach is identified by two-state postal codes such as MO:IL for the portion of the Mississippi river that forms the boundary between Missouri and Illinois. A border river/stream is assigned to one of the two states for the survey design.
- **Ecological Reporting Region:** Nine aggregated Omernik ecoregions that are used for reporting.
- **Omernik and North American ecoregions** Levels I, II, III and IV.

1.3 SURVEY DESIGN

The survey design consists of two major components (NRSA14 design and NRSA09 design) in order to address the dual objectives of (1) estimating current status and (2) estimating change in status for all flowing waters.

- **NRSA09 Design:** The NRSA09 survey design is a subsample of the NRSA 2008-9 sites that were target and sampled in the NRSA 2008-9. The major objective for this design is change estimation, although all sites sampled in 2013-14 will be used when change is estimated. The expected sample sizes were based on the nine ecological reporting regions and two Strahler

order categories of Rivers (5th and greater) and Streams (1st through 4th).

- **NRSA14 Design:** The NRSA14 survey design is a new survey design that will select new sites. The expected sample sizes were based on the nine ecological reporting regions and four categories of RiversMajor (5th and greater), RiversOther (5th and greater), LargeStreams (Strahler order 3rd, 4th), and SmallStreams (Strahler order 1st, 2nd).

1.4 RESAMPLE SITES

The overall survey design included having 10% of the sites be visited twice in 2013/14. This was accomplished by allocating 4 sites (2 Rivers and 2 Streams sites) to each of the 48 states for revisits (192 sites total). All of these revisit sites were assigned to the NRSA09 design. More over the sites selected to be revisited were also the same sites that were visited twice in 2008/09. This results in 192 sites that were visited twice in 2008/09 and will be visited twice in 2013/14.

3.0 LOCATING THE INDEX SITE ON MAPS

Stream sampling points were chosen from the "blue line" stream network represented on 1:100,000 scale USGS maps, following a systematic random site selection process developed for NRSA 2013/14 . Each point is referred to as the "index site" or "X-site." The "X-site" is the mid-point of the segment to be sampled. The latitude/longitude of the X-site was listed on a regional sampling site spreadsheet that was distributed electronically to the field crews and EPA Regional Coordinators. Digital maps were distributed to each field crew with site locations marked. The maps include the X-site location(s), at scales appropriate for 1) locating the site more generally in a region of the state, and 2) isolating the most efficient approach (es) to the site. There are three maps distributed by EPA to the field crews. One shows the topographic map, one the aerial image, and the third shows the road map in relation to the X-site. The sites are identified as base or oversample in the "panel" column of the spreadsheet. The base, or primary, sites are those of interest for this project. The alternate "oversample" sites are only considered if the primary sites are rejected.

The line work for US EPA's National Hydrologic Database –Plus (NHD-Plus) is based on 1:100,000-scale Digital Line Graphs and, therefore, will not match exactly with the 1:24,000-scale maps. Use the NHD-Plus line work to locate important features such as confluences or bends in the channel to assist in placing the X-site accordingly on the 1:24,000-scale (or 7.5") map. All NHD-Plus lines are shown even though many are not channel traces. Line segments for lakes, inundated areas, wetlands and, occasionally, even map boundaries are shown as NHD-Plus line work. EPA Region, USGS Cataloging Unit number, state, county and UTM zone are also included. All information, including the longitude/latitude, refers to the location of the X-point.

If you have any questions about the site maps or how to use them please contact Ellen Tarquinio (202-566-2267, tarquinio.ellen@epa.gov).

4.0 OBTAINING PERMISSION TO ACCESS CANDIDATE SITE

Each field crew is responsible for obtaining permission for their sampling team to access their sampling

sites. Obtaining permission prior to the sampling day is often important to minimize loss of time on the part of the field team. Contact with the landowner can be done either through an “in-person” recon visit or through mailing out landowner permission request letters, similar to the attached cover letter signed by the Regional Monitoring Coordinator (Figure 2) with a permission slip (**Attachment A: Example of Landowner Permission Slip**) for the landowner to return. This is an example that can be used and made specific to your program or organization. In either case, a signed permission slip is important to use as documentation on the day of sampling. Some teams will choose to deal with access issues on the day of the sampling event. This method is usually adequate if a “desk-top reconnaissance” shows that the area around the site includes enough public land to gain access to the waterway. If the site is in an area that is largely privately owned land, waiting until the day of sampling could pose unnecessary delays and access issues that should have been resolved prior to the scheduled sampling day.

Landowner information can be obtained from the county tax assessor office. Tax assessor maps will display landowner boundaries, addresses and, oftentimes, phone numbers. This information enables the team to contact landowners before the sampling day, and identifies which landowner owns which portions of the stream or river banks. The provision of county maps for the field crews will help clarify access to the targeted sampling reach.

(Date)

Dear Landowner:

The US Environmental Protection Agency, in cooperation with State agencies, is conducting an environmental assessment of rivers and streams across the United States. A computer was used to randomly select these streams. A total of approximately 1,800 sampling sites in rivers and streams were selected for sampling in 2013 and 2014. Water quality chemistry, aquatic life, and habitat will be evaluated at each site. The findings of the study are not will not be used for enforcement or regulatory purposes.

We are contacting you prior to the site visit to obtain permission (form enclosed) to access the sampling site. We have enclosed a copy of a topographic map(s) with the site(s) identified by an “X” at the specific point on the stream to be sampled. We realize that working on your property is a privilege and we will respect your rights and wishes at all times.

Please return the completed Access Permission Form in the enclosed envelope by (date). If you have any questions concerning this request, please contact me (phone number). We are looking forward to hearing from you.

Sincerely,

(Name)

Regional Monitoring Coordinator

Figure 2. Example Permission Cover Letter

5.0 SITE VERIFICATION

While traveling from a base location to a site, record a detailed description of the route taken on the **Verification Form (front)**. This information will allow others to find the site again if it is selected for a repeat visit in the future. Upon reaching the X-site for a stream or river channel, confirm its location and that the team is at the correct location. Record the information on the **Verification Form (front)**. Complete a **Verification Form** for each site visited (regardless of whether it is sampled), following the procedures described below.

1.5 SITE VERIFICATION PROCEDURES

1. Find the site location in the field corresponding to the X-site coordinates and the "X" marked on the map (X-site) prepared for each site. Record the routes taken and other directions on the **Verification Form** so that others can visit the same location in the future.
2. Use a GPS receiver to confirm the latitude and longitude of the X-site with the coordinates for the site. Make sure the GPS unit is set to reference the NAD 83 geospatial data set. Record these on the **Verification Form**.
3. Use all available means to ensure that you are at the correct location as marked on the map including: 1:24,000 USGS map, topographic landmarks, county road maps, local contacts, etc.
4. Scan the channel upstream and downstream from the X-site, determine whether the site is sampleable using the guidelines provided below, and mark the appropriate box on the **Verification Form**.
5. Do not sample non-target or "Non-sampleable" or "No Access" sites. Place an "X" in the "NO" box for "Did you sample this site?" and check the appropriate box in the "Non-Sampleable" or "No Access" section of the **Verification Form**; provide detailed explanation in comments section.

1.6 Sampleable Categories

- **Wadeable** – There is continuous water flow and >50% of the sample reach is wadeable.
- **Boatable** – Boat is required for sampling >50% of sample reach.
- **Partial Sampled by Wading** – >50% of reach sampled by wadeable protocols.
- **Partial Sampled by Boat** – >50% of reach sampled by nonwadeable protocols.
- **Wadeable or Boatable Interrupted** – The flow of water is not continual, but there is water in the sample reach (e.g., isolated pools); >50% of the reach has water present.
- **Altered Channel** – There is a stream at the location marked with the X-site on the map, but the stream channel does not appear the way it is drawn on the map. An example of this is a channel rerouting following a flood event that cut off a loop of the stream. Establish a new X-site at the same relative position in the altered channel. (Make careful notes and sketches of the changes on the Verification Form.)

1.7 Non-Sampleable Categories

1.7.1 Non-Sampleable (permanent condition; stream becomes non-target)

- **Dry Channel** – A discernible stream channel is present but there is no water anywhere within a 150-m reach centered on the X-site. If determined at the time of the sampling visit, record as "Dry-Visited"; if site was determined to be dry (or otherwise non-perennial) from another source and/or field verified before the actual sampling visit, record as "Dry-Not visited."
- **Wetland** – (No definable stream channel) there is standing water present, but no definable stream channel. In cases of wetlands surrounding a recognizable stream channel, define the site as sampleable but restrict sampling to the stream channel.
- **Map Error** – No evidence that a water body or stream channel was ever present at the coordinates provided for the X-site.
- **Impounded stream** – The stream is submerged under a lake or pond due to man-made or natural (e.g., beaver dam) impoundments. If the impounded stream, however, is still wadeable, record the stream as "Altered" and sample.
- **Other** – The site is non-target for reasons other than those above. Examples include underground pipelines or a non-target canal. A sampling site must meet both of the following criteria to be classified as a non-target canal:
 - The channel is constructed where no natural channel has ever existed.
 - The sole purpose/usage of the reach is to transfer water. There are no other uses of the waterbody by humans (e.g., fishing, swimming, boating).

1.7.2 Non-Sampleable (temporary condition; stream can be revisited)

- **Other** – The site could not be sampled on that particular day, but is still a target site. Examples might include a recent precipitation event that has caused unrepresentative conditions.

1.8 No Access to Site Categories

- **Access Permission Denied** – You are denied access to the site by the landowners.
- **Permanently Inaccessible** – Site is unlikely to be sampled by anyone due to physical barriers that prevent access to the site (e.g., cliffs).
- **Temporarily Inaccessible** – Site cannot be reached at the present time due to barriers that may not be present at some future date (e.g. forest fire, high water, road temporarily closed, unsafe weather conditions).

The primary distinction between "Sampleable" and "Non-Sampleable" rivers or streams is based on the presence of a defined channel and water content. If the site is non-sampleable or inaccessible, the site visit is completed, and no further sampling activities are conducted. The site must then be replaced by an alternative site.

1.9 BLACKWATER SITES

For the NRSA 2013/14, we are looking to evaluate how many target sites are considered “blackwater” sites by the field sampling crews and local experts. If the site you are sampling is a blackwater site, please mark that on the field **Verification form (front)** and sample the site. This is for data analysis purposes only and should not be a factor in site evaluation.

1.10 TIDAL SITES

The NRSA design includes sites that are **above the head of salt**. This means that tidal sites are included in the NRSA target population that are above the head of salt. Consult the NOAA head of salt maps for reconnaissance information about these sites in relation to the head of salt. Mark if sites are tidally influenced on the Site Verification Form.

However, sites are considered non-target if they are below the head of salt. In addition to looking at the NOAA maps, crews must evaluate tidal sites salinity levels in the field. Sites that are tidal and exceed the salinity threshold of $>.5\text{ppt}$ are considered non-target and should not be sampled. They should be replaced following the over-sample procedures.

1.11 RUN-OF-THE-RIVER RESERVOIRS

Large streams and rivers with run-of-the-river reservoirs on them are considered target for the NRSA 2013/14. The determination if a site with a dam is a run of the river or a reservoir is based on the residency time of the water. **Sites with less than 7 days residence time are considered target for the NRSA. Sites with greater than 7 days residence time are considered NON-TARGET for the NRSA.**

6.0 SELECTING ALTERNATE SITES

The sampling site lists for the NRSA 2013/14 are organized by state and replacement is done within the state. Each spreadsheet contains a list of all primary (panel=base) and alternate (panel=oversample) sites in the State. The sites are listed on the spreadsheet in the order in which they were randomly selected. **All primary (base) sites must be evaluated for potential sampling and must be sampled unless they are determined to be non-sampleable or not accessible.** If a primary site is rejected because it is non-sampleable or not accessible, then it will be replaced by an alternate (oversample) site within the same State within the same category.

1.12 Site Sampling Categories

There are six sampling categories for the NRSA 2013/14. They are listed in **Table 8.1**.

Table 8.1. Site Sampling Categories

NRSA 09 Rivers
NRSA 09 Streams
NRSA 14 Rivers Major
NRSA14 Rivers Others

NRSA14 Large Streams

NRSA14 Small Streams

If a primary site is deemed Non-target during the reconnaissance process or in the field, a site from the oversample site must replace it. The replacement must be done within the State and within the site categories. For example, if a site is dropped in AR, it must be replaced by a site in AR within the same category. If it was a 1st through 4th order stream from the NRSA09 Streams Category, it must be replaced by a 1st through 4th order stream from the NRSA09 Streams category. **The replacement site must be the next site in site ID order that is in the same category. Oversample sites MUST be replaced in order.** If a site is dropped it must be replaced by the next oversample site in that category. **Table 8.2** lists the site categories with their replacement codes.

Table 8.2. Site Replacement

Replacement Category	Base Sites	Replace by Oversample Sites
NRSA09 Rivers	Base_09River & Base09River_RVT	Over_09River
NRSA09 Streams	Base_09Stream & Base09Stream_RVT	Over_09Stream
NRSA14 Rivers Major	Base_NewRiversMajor	Over_NewRiversMajor
NRSA14 Rivers Other	Base_NewRiversOther	Over_NewRiversOther
NRSA14 Large Streams	Base_NewLargeStreams	Over_NewLargeStreams
NRSA14 Small Streams	Base_NewSmallStreams	Over_NewSmallStreams

Site Evaluation Point of Contact: Ellen Tarquinio (202-566-2267)

7.0 LITERATURE CITED

Peck, D.V., J.M. Lazorchak, and D.J. Klemm (editors). Unpublished draft.

Environmental Monitoring and Assessment Program -Surface Waters: Western Pilot Study Field Operations Manual for Wadeable Streams. EPA/XXX/X-XX/XXXX. U.S. Environmental Protection Agency, Washington, D.C.

U.S. EPA. 2004. Wadeable Streams Assessment: Site Evaluations Guidelines.

EPA841-B-04-006. U.S. Environmental Protection Agency, Washington D.C.

U.S. EPA. 2008. National Rivers and Streams Assessment: Site Evaluations Guidelines.

EPA841-B-07-006. U.S. Environmental Protection Agency, Washington D.C. Attachment 1

8.0 ATTACHMENT A: EXAMPLE OF LANDOWNER PERMISSION SLIP

I grant permission to the biological field crew from (state agency, Cooperator, or contractor) to access the stream sampling site located on my property as part of the EPA's National Rivers and Streams Assessment project.

_____ Do grant permission

_____ Do grant permission but with the following restrictions:

_____ Do not grant permission

Landowner Name (Please print): _____

Landowner Signature: _____

Date: _____

Phone Number: _____

Address: _____

*If the operator is different than the landowner, please list the name and phone number below so that we may contact the operator before the site visit.

9.0 ATTACHMENT B: EXAMPLE ELECTRONIC RECONNAISSANCE FORM

Metadata Page

Please see the 2013-2014 National Rivers and Streams Assessment: Site Evaluation Guidelines for more detailed information on site reconnaissance.	
Please complete one row of information for each site in your organization's draw. <i>For a number of fields, a drop-down menu button will appear when you click in the box; please select from these options.</i> If you drop sites during the desk top reconnaissance, please complete fields for the appropriate overdraw sites. If you drop or skip sites in your list for any reason during the field season, please complete an updated spreadsheet with both the dropped site and the replacement site AND an explanation for why the site was dropped or skipped. <u>All sites in the list through to the final site you sample MUST have site recon information completed or a comment on why site recon information was not completed.</u>	
You may not be able to complete some information until a site visit is made. It would be useful if the other information could be completed and submitted to EPA as soon as possible to assist in field preparations. Please note in comments if a field visit is still planned for recon purposes.	
Field name	Description
Site Name	Completed by EPA: Name of Site as Provided On the NRSA-Provided Spreadsheet.
Alternate/Corrected Site Name and Explanation	If pertinent, provide alternative names (State, local, etc) or correct name if the NRSA name is wrong. Provide brief explanation as needed.
Site ID	Completed by EPA: NRSA provided site ID. This will always begin with the state abbreviation.
Site ID from NRSA 09	Completed by EPA: The site ID from NRSA 2008-2009.
State	Completed by EPA: Two letter abbreviation for the State in which the site is located. All capital letters.
Strahler Stream Order	Indicate the Strahler Order as Identified on the NRSA-provided spreadsheet. Be sure to use this information in determining which overdraw site is appropriate if a site is dropped (the next site within the 1st-4th order or the next 5th order and above category.)
Alternate/Corrected Strahler Stream Order and Explanation	If pertinent, provide alternative Strahler Stream Order. Provide brief explanation for change.
Based Over-sample	Completed by EPA: Indicate whether the site is a base or over-sample site.
Latitude	If site is visited for recon purposes, please provide a GPS latitude reading.
Longitude	If site is visited for recon purposes, please provide a GPS Longitude reading.
Is the Site Considered Target? (Yes or No)	Please indicate whether the site is deemed to be target according to this study. Target sites are streams and rivers within the 48 contiguous states that have flowing water during the study Index period. The study Index period extends from late May to September and is generally characterized by base flow conditions. The target population includes the Great Rivers. Run-of-the-river ponds and pools are included. Non-target sites include portions of tidal rivers up to head of salt and reservoirs. If you have questions about whether a site is target, please contact your regional survey representative or another member of the EPA survey team.
Is the Site Sampleable? (Yes or No)	Indicate whether you have determined the site to be sampleable using the drop down list (Yes or No).
If Yes, Select One	If the site is sampleable, use the drop down list provided to indicate what type of stream will be sampled. The options are listed below: <ul style="list-style-type: none"> - Wadeable - Continuous water, greater than 50% wadeable - Boatable - Partial - Sampled by wading (>50% of reach sampled) - Partial - Sampled by boat (>50% of reach sampled) - Wadeable Interrupted - not continuous water along reach - Boatable Interrupted - not continuous water along reach - Altered - stream/river channel present but differs from map
If No, Select One	If the site is not sampleable, use the drop down list provided to indicate why. For example, reasons a site might be physically inaccessible include: falls/rapids, cliffs or steep banks, heavy vegetation (including poison ivy/oak or brambles), deep muck that prevents safe wading, but yet it's too shallow to use a boat on, too remote to access safely according to the agency policies, etc. The options are listed below: <ul style="list-style-type: none"> - Dry (visited) - Dry (not visited) - Wetland (no definable channel) - Map Error (no evidence channel/waterbody ever present) - Impounded (underneath lake or pond) - Physically inaccessible - Not boatable (need a different crew; reschedule this year) - Not wadeable (need a different crew; reschedule this year) - Access permission denied - Permanently Inaccessible (unable/unsafe to reach site) - Temporarily Inaccessible (fire, etc; reschedule next year) - Estuarine river - Other
Please Provide Additional Explanation why a Site is Dropped or Recon is not completed (Please note if there are special situations for why a site is skipped or dropped, i.e. only sampling certain site classes for state/tribal enhancements, etc. If the state/tribe is only recognizing wadeable sites, please include note stating "not sampleable")	Provide additional text documentation of why a site was dropped/skipped as appropriate or why a site was not reconned.
Tidally Influenced? (Yes or No)	Is the site tidally influenced? Answer Yes or No
Backwater? (Yes or No)	Is the site a backwater site? Answer Yes or No
Name of Person who Completed the Recon	Provide the name of the person who completed the recon for this site.
Telephone Number and Email	Include a telephone number and email address for the person who completed the recon.
Additional Comments	Include other text comments regarding this site.

