BLM Lotic Assessment, Inventory, and Monitoring (AIM)

Evaluation & Design Management Protocol

2023 Field Season
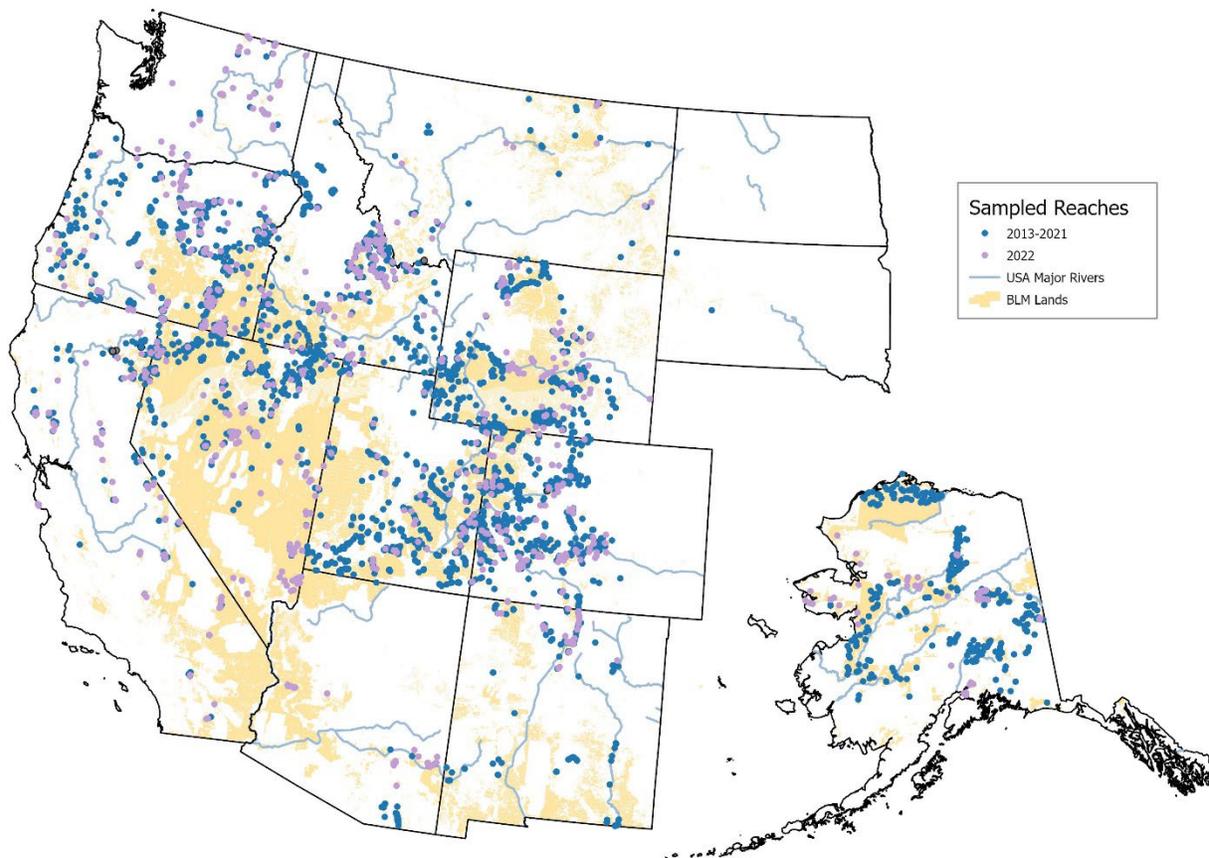
Points on map represent sampled Lotic AIM locations from 2013-2022

Produced by BLM National Operations Center (NOC) – 3/2023

VERSION 6.0

Contents

Introduction and Design Concepts

1.1 How to use this protocol

Design management consists of six iterative steps (Fig. 1) which are outlined in the step-by-step instructions below. For each of the six steps, the protocol outlines the responsible parties, required files and tools, and detailed instructions; supporting information include design concepts and helpful tips.

Terms formatted with bold italics are defined in the glossary (e.g., ***random point***), single quotes are the column names for items in the design tools (e.g., 'EvalStatus'), double quotes indicate data in a specific cell of a table (e.g., "Ready to Field Visit"), and blue underline indicate links (e.g., TR 1735-2).

1.2 What is reach evaluation and design management?

Reach evaluation is the process of determining and documenting which reaches need to be sampled, how a crew will access point coordinates, whether field crews successfully sampled each reach, and why some reaches were not sampled; reach evaluation can involve both office and field investigations. Design management is the process of documenting reach evaluation outcomes, both office and field based. Proper design management is important to maintain the statistical validity of your ***sample design*** and the subsequent inferences drawn from collected data. Reach evaluation and design management begin prior to the start of the field season and continue until the desired sample size is met for the entire ***sample design***.
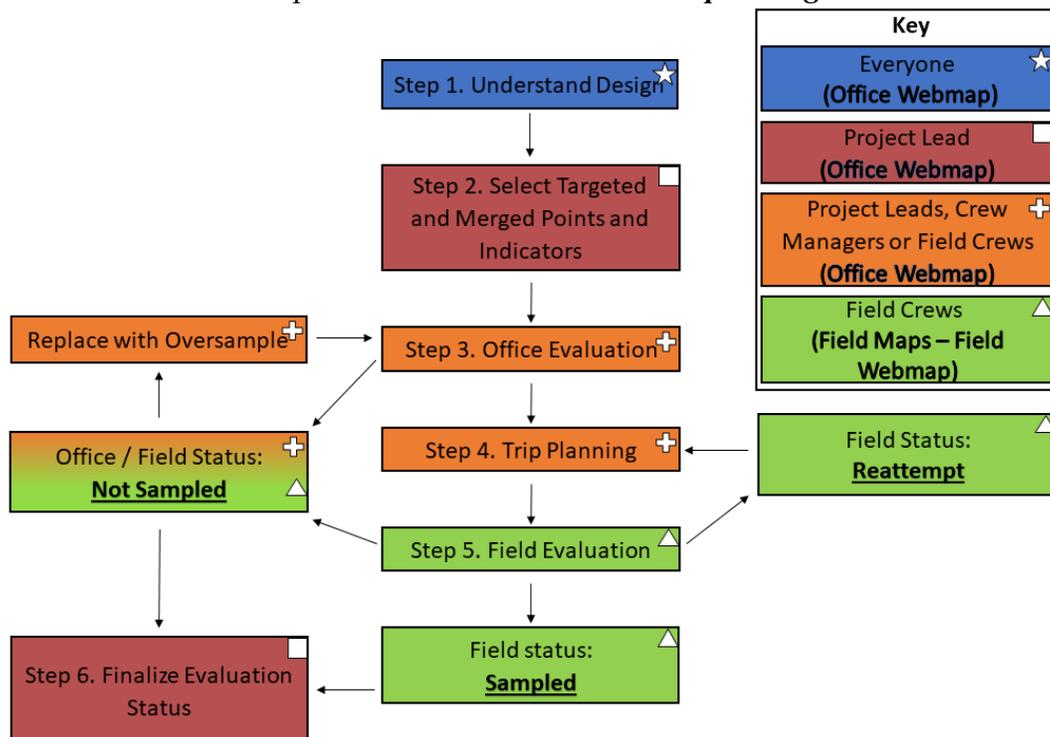
Figure 1. Flow chart showing the six design management steps color coded and symbolized by responsible parties. The branches of the model indicate the iterative process of office and field evaluation, replacing reaches that were not sampled, and rescheduling reaches that should be reattempted until desired sample sizes have been achieved. The tools used for each step are called out in bold black text in the key and discussed in the Step-by-Step Directions section.

1.3 External Links

For clarity and ease of use, this section contains helpful external hyperlinks – clicking these will launch a webpage.

Documentation

All protocols and documentation are stored permanently on the [BLM Library](#).

This includes:

- Field Protocol for Wadeable Lotic Systems TR 1735-2
- Lotic AIM Evaluation and Design Management Protocol
- Lotic AIM Data Management and QAQC Protocol
- Lotic AIM Technology and Applications Manual
- Lotic AIM Gear List

ArcGIS Online
[BLM Natl Lotic AIM Group](#)

Helpful Pages
[2023 Guidance on Getting Access to Lotic AIM Webmaps](#)

1.4 Design concepts for reach evaluation and design management

Base, oversample, and targeted point types
Each point in a design is classified as either:

- **base**: points in a *random design* that correspond to the desired sample size for a given *stratum*. Ideally, all base points would be successfully sampled, and no oversample points would be needed. However, for a variety of reasons, base points are frequently rejected and subsequently not sampled.
- **oversample**: points in a *random design* that are used as replacements for points that are rejected or cannot be sampled.
- **targeted**: points identified by field office staff for sampling that are not part of a *random design*.

Evaluation Status
Reaches are assigned one of four evaluation statuses based on information gained by office and/or field evaluations. Evaluation statuses can change based on the situation but must be finalized at the end of the field season for all attempted reaches.

- **Sampled**: A reach where chemical, physical, and/or biological data were collected. When a *random design* reach is sampled, it is considered a member of the *target population;* data are collected and eventually used for analysis and reporting.
- **Not Sampled**: A reach that was either rejected during the office evaluation process or one that the crew failed to sample because it met the Reason Not Sampled criteria below. This category <u>must</u> be approved by the BLM project lead by the end of the field season.

- **Reattempt:** A reach where:
  - A crew attempted to sample, but for one of several reasons did not sample and the project lead or crew manager decided they should return to the reach during the current field season and reattempt a sample effort.
  - A specialized crew, such as the boating crew, is needed. See the Reason Not Sampled section below to record this situation correctly. In most cases, these points should be reattempted the next year.
- **Ready to field visit**: A reach that was office evaluated but the crew has not yet attempted to field evaluate.

Reason Not Sampled

Reaches classified as "Not Sampled" must have an accompanying reason as to why the reach could not be sampled. There are many different reasons that a reach may not be sampled, but they can be broken into 4 main groups (Table 1):

- **Nontarget**: Reaches not sampled because the selected reach location was ephemeral, lentic, a map error, etc., and therefore not considered a part of the *target population*. Nontarget reaches are removed from estimates of stream kilometers in different condition categories but are used to estimate errors in the NHD and resulting BLM stream kilometer estimates. Therefore, it is very important to accurately record why a reach was classified as nontarget.
- **Permanently Inaccessible**: Reaches that cannot be sampled now or in the foreseeable future (e.g., 10 years) because of terrain barriers, landowner access, or wadeability issues. The decision to classify a reach as permanently inaccessible should not be taken lightly, as omitting reaches can create holes or gaps in the design (see "Holes in the design" section below), thus reducing the design's statistical rigor.
- **Unknown**: Reaches that fall prior to the last evaluated reach within a *stratum* for a given year (i.e., have a lower *Order Code*) that were skipped, categorized as "too close" to another sample reach in the same design, or not evaluated in the *sample design* are classified as "unknown" and are counted as holes in the design. Unknown reaches can have a negative effect on the statistical rigor and inference of the *sample design* and efforts should be taken to avoid having reaches with such a status. Ideally at the end of the study, no sample reaches would be classified as "unknown".
- **Reattempt- Boatable crew needed**: Reaches that are intended to be sampled but a crew is unable to collect the minimum amount of data with the wadeable protocol. Project leads should determine if they will report on all rivers and streams or only wadeable rivers and streams for their AIM project. If reporting on all streams and rivers, boatable reaches should be sampled by a boat crew. If reporting on only wadeable streams and rivers, non-wadeable systems would be considered "Nontarget Boatable". A boatable crew can also be used if access to the point requires boats but the reach itself is wadeable.

Table 1. Reasons for which lotic AIM reaches are rejected or not sampled and respective evaluation status.

Not sampled status	Reason not sampled	Description
Reattempt	Above bankfull or flow too high	The water is above bankfull or temporarily too deep or swift to wade but could be sampled when flows recede.
	Boatable crew needed	The project lead wants boatable reaches to be sampled and the reach must be sampled by boat because the water will *always* be too high for wading. See below for other boatable options.
	Other temporarily inaccessible	Field data collectors attempted to gain access or sample the reach but were unable to complete sampling and the reach should be reattempted later. Temporarily inaccessible examples include taking a different route; gaining landowner permission or rescheduling if they were unavailable during possible sample times; running out of time; inclement weather or fire danger; an overnight backpacking trip, more capable truck, or ATV are required.
Permanently Inaccessible	Private access denied	This reach can only be accessed by crossing posted private land, and landowner permission was explicitly denied.
	Terrain access denied	All possible routes were attempted, but natural barriers such as cliffs, slopes > 50%, waterfalls, extremely dense vegetation, or beaver complexes prevented access.
	Not wadeable nor boatable	The reach will *always* be unsafe to wade or boat (e.g., reaches with long segments of class V whitewater, steep creeks in constrained gorges).
Nontarget	Dry	The reach was determined to be dry (<5 main transects with water) either by field visit, or two lines of evidence during office evaluation. For field visits, specify if the reach was *intermittent* or *ephemeral* (TR 1735-2 Appendix B). Office personnel should also specify if the reach is *always dry during the sample season or ephemeral* or if it *possibly has flow during some sample seasons* based on either office or field evaluations.
	Lentic	The reach is a wetland, pond, or is otherwise impounded and no defined channel is present with identifiable bankfull indicators. Do not use this classification for lotic reaches that have definable channels and bankfull indicators but are not wadeable due to beaver ponds or have adjacent beaver complexes.
	Map error	There is no evidence that a waterbody or stream channel exists, the stream is an artificial channel such as a diversion ditch, or the point does not fall on BLM land because ownership has changed since the design was created.
	Reach too short	The point coordinates fall on a reach that contains less than 100 m of contiguous BLM land identified during office evaluation (e.g., small parcel) or the crew cannot move the reach to locate ≥5 transects on BLM.
	Boatable	The project lead does not want to sample boatable reaches as part of the design. Even though the reach is boatable, it should not be sampled. These reaches are not part of the target population.
Unknown	Too close to other monitoring location	The BLM project lead chose to not sample the reach because it was very close to another reach *within the same design* and met all strict criteria detailed in Step 2 below (office rejection criterion only).
	Skipped	Reach was skipped for various reasons: crew ran out of time, project lead chose to not sample the reach, the project lead is unsure why the crew did not sample, but the sample season is over, etc.

Evaluation and sampling order

All points in a design are intended to be sampled in the order in which they appear *within each stratum*. As a rule of thumb, start by evaluating and sampling base points with the lowest *'Order Code'* for each **stratum**. If a point (base or oversample) is rejected and classified as "Not Sampled", replace it with the first oversample point with the lowest *'Order Code'* within a given **stratum** to achieve the desired sample size. *'Order Code'* is a sequential number assigned to each point within each **stratum** and used to ensure points are in the correct order.

It is not always practical to visit points in their exact order. Below are some best practices for evaluating and sampling base and oversample points:

- Base points may be evaluated (office and/or field) in any order if you are confident all base points within a **stratum** will be evaluated or sampled by the end of the field season. Whenever possible, base points should be prioritized before oversample points.
- Evaluate all base points in each **stratum** first. Then assess the base point failure rate for each **stratum** by counting the number of inaccessible or nontarget reaches. Use this failure rate to estimate how many oversample points may be needed per **stratum**. For example, if there are ten base points and five fail, ten more oversample points are likely needed to ensure five more sampleable points on average. *If during the field season it seems as though an insufficient number of oversample points were drawn in the design to achieve desired sample sizes, contact the person responsible for office evaluation and the National AIM Team.*
- Use the above failure rates and anticipated oversample points to plan field trips so that both base and oversample points are visited. This can be advantageous if potentially needed oversample points are located near base points that you plan to sample, and it would be difficult or resource intensive to revisit these oversample points later. *However, determining how many oversample points are needed can be a guessing game. Therefore, the first trips should consist of only base points until you have a better idea of how many points will be rejected.*
- If points are sampled out of order, it is important that no holes are left in the design by the end of the field season.

Holes in the design

Sampling reaches out of order or having many inaccessible reaches can cause holes in the design. Holes result from "inaccessible" or "unknown" reach designations that fall between evaluated reaches, including sampled reaches. *As a rule of thumb, ensure that holes do not make up >30% of evaluated reaches. Check the Data Review Dashboard to determine the percentage of holes in your design.*

Some holes are inevitable due to restricted private property, unsafe access, or sampling conditions. Depending on the desired sample size, one or two holes in a **sample design** are generally acceptable. However, if too many reaches are classified as "inaccessible" or "unknown" (>30% of reaches), a systematic bias may be created that can impact condition estimates. For example, if all inaccessible reaches are located in remote wilderness areas with minimal anthropogenic impacts, excluding these reaches from your analysis could result in worse overall condition estimates than if those reaches were sampled.

When managing a design, it can be difficult to determine how much effort should be spent sampling difficult reaches because the number of holes in the design is unknown. As design implementation progresses, the importance of putting extra effort into accessing very remote points, or those with otherwise difficult access issues, will become more obvious.

Design Management Example
In the example design **stratum** below (Table 2), the desired sample size is seven (i.e., 7 base points). The first three reaches were sampled but reach XX-SS-1046 was rejected as nontarget and needed to be replaced. The first possible replacement was reach XX-SS-1057 which also turned out to be nontarget and thus the next oversample in the list, XX-SS-1063, was evaluated and sampled. The next evaluated reaches were XX-SS-1048, 1052, and 1055, two of which were sampled and one of which was rejected as inaccessible and needed to be replaced. The next available oversample reach was XX-SS-1066, which was also inaccessible. The next reach that should have been evaluated was XX-SS-1071, which was skipped for some unknown reason, thereby creating another hole. While the sample size (n=7) was finally met when XX-SS-1079 was sampled, the person managing the **sample design** inadvertently created another hole in their design by skipping reach XX-SS-1071. This mistake could affect the statistical rigor of the design, especially since 30% of the points (not considering nontarget reaches) are classified as holes (i.e., "unknown" or "inaccessible"). It would be advantageous to try to access and sample the unknown reach if there is time during the current year's sampling season. If you cannot do this, sample one or more extra oversample reaches to increase the number of sampled reaches compared to the number of holes.

Table 2. Example columns from a completed design illustrating the outcome of replacing failed reaches with oversamples and the concept of holes. The desired sample size for stratum XX-SS is seven. There are two nontarget reaches (not holes), two inaccessible reaches, and one unknown reach which creates a total of three holes.

Order Code	PointID	PointType	EvalStatus	ReasonNotSampled	Design consequence
1	XX-SS-1000	Base	Sampled		Used in analysis
2	XX-SS-1020	Base	Sampled		Used in analysis
3	XX-SS-1035	Base	Sampled		Used in analysis
4	XX-SS-1046	Base	Not Sampled	Nontarget - Lentic	Not a hole: replace with oversample XX-SS-1057
5	XX-SS-1048	Base	Sampled		Used in analysis
6	XX-SS-1052	Base	Not Sampled	Permanently Inaccessible - Private Denied Access	HOLE: replace with oversample XX-SS-1063
7	XX-SS-1055	Base	Sampled		Used in analysis
8	XX-SS-1057	OvrSmp	Not Sampled	Nontarget - Reach Too Short	Not a hole: use next oversample to find replacement for XX-SS-1046
9	XX-SS-1063	OvrSmp	Sampled		Used to replace XX-SS-1052, used in analysis
10	XX-SS-1066	OvrSmp	Not Sampled	Permanently Inaccessible - Terrain Denied Access	HOLE: use next oversample to replace XX-SS-1046
11	XX-SS-1071	OvrSmp	Not Sampled	Unknown - Skipped	HOLE
12	XX-SS-1079	OvrSmp	Sampled		Used to replace XX-SS-1046
13	XX-SS-1084	OvrSmp	Oversample		Sample size met, point not needed

Step by Step Directions

Step 1 – Understanding Your Design and Design Management Tools

Overview: The National AIM Team and project leads work together to decide what kind of design is most appropriate: *randomly selected points*, *targeted* (e.g., designated monitoring areas), or a mixture of both. All design-based decisions are documented in Monitoring Design Worksheets and all members of the lotic AIM implementation team should understand the difference between *random* and *targeted points*, what *strata* were used, how to utilize base versus oversample points, why the sample order matters, and the desired design sample sizes. Once design concepts are understood, review your design management tools to understand how the Office Webmap, Field Webmap, and the Design Status tab of the Data Review Dashboard are used; all can be accessed by both BLM and our partners.

Responsible Parties: All parties involved in implementing a *sample design*

Files and Tools:
- **Monitoring Design Worksheet** – BLM document outlining monitoring objectives and the Monitoring Design.
- **Office Webmap** – Webmap used for tracking all design points and associated

information. This should only be used on a computer, not on a tablet. Information entered into this map will be automatically synced to the Field Webmap (explained below) when the crew is online. This term is synonymous with Office Eval or Evaluation Webmap.

- **Design Status tab of the Data Review Dashboard** – Displays the desired sample size per *strata*, the number of sampled and nontarget reaches, and the number of holes that are recorded in the Office Webmap.
- **Field Webmap** – A Webmap for field crews to use in the Field Maps application on their iPad. All information entered into this map will be automatically synced to the Field Visits layer of the Office Webmap when the crew takes their iPad back online. Crews will also sync Survey123 Data to this webmap, and all raw field collected data will upload to layers and related tables on the Field Webmap. More information can be found in the Lotic AIM Data Management Protocol and the Lotic AIM Technology Manual for the current field season.

Detailed instructions – How to use your design management tools:
1. Understand all design concepts described above.
2. Project leads should review their Monitoring Design Worksheet.
3. Access the Office Webmap: Follow the 2023 Guidance on Getting Access to Lotic AIM Webmaps instructions to ensure you have access to the appropriate tools. Once you have access, open the following links with your Google Chrome web browser:
   a. BLM users: Access the BLM Natl Lotic AIM Group. The first time you use this link, locate the bell icon in the upper right-hand corner of the screen and click "view your invitations" to accept access to the Webmap Group. After accepting, re-click the link or navigate to the "BLM Natl Lotic AIM" Group page. From here you will see links for several tools including the Office Webmap
   b. GeoPlatform users (automatically added to group): Access the BLM Natl Lotic AIM Group. On the BLM Natl Lotic AIM AGOL Group page, locate the Office Webmap hyperlink in the group description and click it.
4. Understand how to use the Office Webmap.
   a. Review the QuickStart Guide (Appendix 1); this will orient you with Esri Webmaps and provides detailed information about the layers, symbology, and functions you will use.
   b. Review all layers.
      i. See below, 'Layers in the Office Webmap', for a description of each layer.
      ii. Review Office Webmap Metadata (Appendix 2); this will explain all columns in the two key layers (Points and Field Visits) and serves as a quick reference to understand which columns must be filled out/by whom.
   c. Filter the Webmap for your use, common filters for each task are listed below:
      i. Office Evaluation: 'Project'; also, might initially filter by 'StrataName' to display one *stratum* at a time and 'PointType' so that only base points are visible. However, oversample points will need to be included once all base points are office evaluated.
      ii. Trip Planning: 'Project' and 'EvalStatus'; only points that are "Ready to Field Visit" and "Reattempt" (consider labeling with *'Order Code'* or

'Trip').

    iii. <u>Finalizing Eval Status</u>: 'Project' and 'EvalStatus'; only points that are "NotSampled- not yet BLM approved" or "Ready to Field Visit".

  d. Edit Points to change the evaluation status, add indicators, or give directions.

    i. Click a point and choose "Edit" in the pop-up window, edit the text and then re-click "Edit" when you're finished (top left corner). You can also edit in the attribute table by double clicking on a cell.

    ii. Column names with padlock icons (orange square) are locked and cannot be edited. If the attribute name does not have a padlock icon (blue square), you can double click the cell for editing.

🔒 OrderCode	🔒 PointID	StreamName	🔒 StratumName	🔒 PointType	🔒 DesignLat	🔒 DesignLong
3	BS-LS-1010		BSWI-Large Streams (2&3)	Base	62.136194	-161.075217
4	BS-LS-1016		BSWI-Large Streams (2&3)	Base	65.676924	-159.133357
5	BS-LS-1018		BSWI-Large Streams (2&3)	Base	62.428519	-160.108964
6	BS-LS-1023	Little East Fork	BSWI-Large Streams (2&3)	Base	62.380318	-156.802753
7	BS-LS-1024		BSWI-Large Streams (2&3)	Base	63.760245	-160.285866

Preliminary 2023 Points (Features: 1167, Selected: 1)

Figure 2. Points attribute table showing columns that can be edited (blue square) and columns that are locked to editing (orange square).

5. Understand how field data syncs to the Office Webmap via the Field Visits layer.

  a. Remember: The Points layer should only be edited on a computer by those responsible for Office Evaluation and Design Management tasks. The Field Visits layer should only be edited by crews on their iPads using the Field Maps application.

  b. In the Points layer, when a point's 'EvalStatus' is "Ready to Field Visit", the crew will navigate there and add it to the Field Visits layer in the Field Webmap.

  c. The Field Visits layer in the Field Webmap syncs directly with the Field Visits layer in the Office Webmap once the crew gets service and syncs the Field Maps application.

    i. The field visited point will now appear on the Office Webmap. Within the Points layer, there will also now be a related record for the visited points. You can view these visits two ways:

        1. In the popup for a point, you can select "Show Related Records" and a table of all the Field Visits for that specific point will appear.

        2. In the table, click the "Show" link in the 'FieldVisits' column to show related records. The number listed in this column is the number of times the crew field evaluated the reach.

6. Understand how the Design Status tab of the Data Review Dashboard works:

  a. All instructions are listed in the "Data Review Dashboard Quick Start" guide

   linked in the left side panel of the dashboard.

 b. Select a project using the Project Selector at the top of the page to display sample sizes, holes, etc.

   i. The formulas in this tool are based on information in the 'EvalStatus' and 'ReasonNotSampled' columns in the Points layer of the Office Webmap.

 c. The Design Status tab of the Data Review Dashboard updates immediately when the 'EvalStatus' or 'ReasonNotSampled' fields are edited in the Points layer.

 d. If the numbers in the Sample Size Dashboard appear off, ensure that your Points layer is up to date and refresh the dashboards webpage. If issues persist, contact the National AIM team.

<u>Layers in the Office Webmap:</u>

- **Points:** Used to view all points in a design for a given year and to track progress toward meeting desired sample sizes. This layer tracks:
  - Office evaluation comments and general information (Office evaluator, date evaluated, merging of points, contact information, and directions)
  - Reach evaluation statuses ('EvalStatus')
  - Reasons a reach is not sampled ('ReasonNotSampled')
  - Indicators to collect at each reach (e.g., 'TNTP', 'Turbidity')
  - When initial data QC is completed by the project lead or crew manager ('EvalStatus' of "Sampled- Data Summary Reviewed")
  - Trip information ('Trip' and 'TripNotes')
  - Reaches on the boating crew's sample list ('BoatingFilter')
  - Point labels will appear when you zoom in

- **Field Visits:** Used to track individual field visits and is related to all the raw field data collected with Survey123 (e.g., WaterQuality, Transects, Slope, etc.).
  - Every time a crew attempts to visit a point, the crew should create a new record. Each point can have multiple recorded field visits before successful sampling occurs.
  - Each visit should have an appropriate 'FieldEvalStatus' and possibly 'ReasonNotSampled' along with all other associated columns completed (see Step 5- Field Evaluation for more details).
  - Once the crew syncs the Webmap and Survey123 data forms this layer will relate directly to all the raw data collected at the reach and also to a Data Summary PDF.

- **National Hydrography Dataset (NHD):** The NHD layer the National AIM team uses to draw points for most designs.
  - The national NHD is visible at a large scale, but if you need to click this layer for additional attributes and information, zoom into a local area. The resolution of the layer adjusts based on your zoom.
  - In some areas there will be two NHD layers because we used different NHDs for the local designs and for the National design.
  - The NHD will appear and be a "clickable" feature as you zoom in.

- **Lotic Previously Evaluated Points:** This layer contains a record of every reach that has been previously evaluated as part of the BLM's Lotic AIM program.
    - This layer should be referenced while office evaluating points to prevent duplicated office evaluation efforts across years and to learn from previous evaluations.
    - Any points that have a record in the Previously Evaluated Points layer should have "Yes" for 'PreviouslyEvaluated' in the Points layer; access information from the previously evaluated points layer may be particularly useful.
    - Previously evaluated reaches classified as "Not Sampled" should not automatically be written off as unsampleable, consider if reach conditions may have changed across years and the validity of previous evaluations.
    - This layer will appear as you zoom into a local area.

- **Other useful layers:**
    - BLM administrative unit boundaries (i.e., BLM NATL Public Admin Unit)
    - BLM ownership (e.g., Surface Management Agency)
    - USGS stream gauges (i.e., Live Stream Gauges)
    - Imagery (Add basemap imagery for zoomed detail)

- **Add basemaps, your own layers, or already published layers to this map as well:**
    - Basemaps are added from the basemap menu above your map content.
    - Click the "Add" option above the map content and add layers from various sources. If you are adding a shapefile, it must be in a zipped folder.

Step 2 – Select Targeted Points, Points for Potential Merging, and Contingent or Supplemental Indicators

Overview: Project leads identify *targeted points* for sampling, if applicable, and specify which points need contingent or supplemental indicators collected. In addition, project leads determine if any *random points* can be merged with existing monitoring locations to maximize opportunities for trend assessments and data applicability to management decisions. Lastly, points from the same design that are very close in proximity are evaluated for potential skipping.

Responsible Parties: Project leads

Files and Tools:
- **Office Webmap**
- **Shapefiles or CSV** of other existing monitoring locations (MIM, PFC, AREMP, PIBO, other) – shapefiles must be in a zipped folder to add to the map.
- **Targeted Point Request Form** – Survey123 Web Form used when requesting that a <u>new</u> or an <u>existing</u> targeted *PointID* be generated. You must have acquired access to the AIM Lotic Webmap Group prior to using this form.
- **Current year's task order**

Detailed Instructions – Targeted Points:
1. Ensure you have access to the AIM Lotic Webmap Group (See Step 1- Understanding your Design and Design Management Tools).

2. Open a Targeted Point Request Form found on the AGOL group page. Refer to the quick start guide linked at the top of the form for detailed information.
3. In the form, determine if:
   a. Your point has been previously evaluated as a part of Lotic AIM (Previous Random or Targeted points).
   b. You can use this year's random point from your design as a targeted sample location. These can be either base or oversamples. Because you assume all base points will be sampled by the end of the season there is no need to request these. Oversample points can be prioritized as *targeted points* and will be reclassified as "oversample-targeted" for data collection and implementation purposes.
   c. A random or previously evaluated point does not fall in a desired location, if so, we recommend requesting a targeted point exactly where you want it located.
4. Request the targeted point.
   a. If the point is an oversample from the current year's design: go to the Office Evaluation Webmap, turn on the Points layer, and then mark the point as "Ready to field visit" and make notes in the 'OfficeEvalComments' that it should be sampled as a targeted location and provide the information listed below. Please directly contact the National AIM team to request that the 'PointType' be changed to "oversample-targeted".
   b. If the point is a new location or previously evaluated: submit a targeted point request form. The form will walk you through entering the following information about your targeted point.
      i. Previous *'PointID'* if the point has been previously evaluated
      ii. The latitude and longitude in decimal degrees; WGS84, six decimal places (e.g., 49.452684, -119.562379)
      iii. Stream or drainage name (not required)
      iv. Field office the point falls in
      v. Reason for choosing this targeted point location
      vi. If and how far the point can be moved. This usually depends on the reason for choosing a reach. A restoration reach usually can't be moved. If you just want a sampled reach somewhere on a specific stream, it can usually be moved to make sure the crew can sample the whole reach.
      vii. Is there a temporal constraint on when the point needs to be sampled?
5. Once the National AIM Team receives the request, they will work on appending the point to your project in the Points layer or updating the Point type. It may take up to 24 hours for the point to be added. Once a targeted point has been appended to the Points layer, the crew will have to take their device back online to sync the newly added *'PointID'*.

Detailed Instructions – Merging or skipping reaches:
1. Examine the location of point coordinates in the AIM design in relation to pre-existing sample reaches or new AIM reaches to be sampled on the same stream. Point coordinates located in close proximity to an existing sample reach can be considered for merging or skipping. If points are not from the same design, consider merging. In contrast, points within the same design cannot be merged, but they can be considered for skipping. To merge or skip a reach, the *random sample* point coordinates must meet **ALL** of the following criteria:
   a. Be within the following distance of the other point:

        i.   Small streams (1st and 2nd order): 500 m
       ii.   Large streams (3rd and 4th order): 1000 m
     iii.   Rivers (5th+ order): 2000 m

  b. No geomorphic differences exist between the two sample reaches. Specifically, determine if valley confinement and the subsequent extent of the floodplain area and vegetation type appear similar between the two sample reaches.

  c. No perennial or intermittent tributaries enter between the two sample reaches.

  d. No management changes exist between the two sample reaches. Specifically, determine if fence lines, changes in land ownership, or other land-use activities differ between reaches.

2. Document merged points as follows if <u>all</u> of the above criteria are met:

  a. Record the point identifier of the point you want to merge with your current design point in the 'MergedPointID' column in the Points layer. This is called ***'PointID'*** for all AIM points, but for non-AIM points record whatever that program uses for an identifier or name for that location. If there is no specific ID, use something generic such as stream name so we can link the two sample efforts together in the future.

  b. Record the monitoring program you are merging the point to in the 'MergedMonProgram' column (PIBO, MIM, AREMP, PFC, AIM, other).

  c. The location of the new sample point needs to be moved to the location of the existing monitoring location to ensure spatial compatibility of monitoring data and so the crew knows the correct location to sampled. To do this:

        i.   Type new point coordinates into the "Find Address" search bar at the top right of the Webmap, hit enter/return, and click "Add to Map Notes" in the popup. This will drop a pin on the Webmap.

           1. Coordinates should be typed in decimal degrees format (e.g., 45.179384, -116.282024)

       ii.   Click the AIM point you are moving and select "edit" on the lower section of the popup window. Then click and drag the point to the desired sample location i.e., the dropped pin.

     iii.   Review the 'CurrentLat' and 'CurrentLong' attribute fields and ensure that they were updated to the new coordinates you moved the point to. Also ensure that the field 'Current point distance from design' is greater than 0. This step is essential because the crew will field visit the coordinates recorded in 'CurrentLat' / 'CurrentLong'.
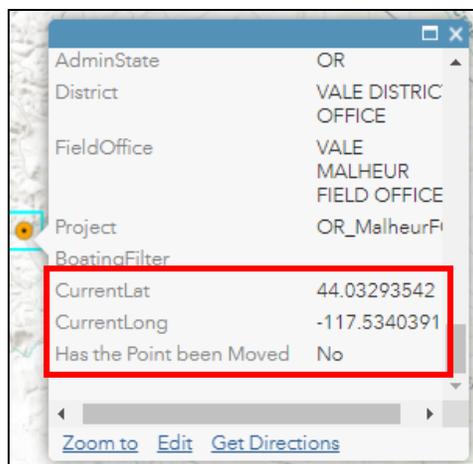
   d. For all points being merged with other AIM points, please email Kevin Poole (kpoole@blm.gov) to let him know you've merged a point in your design. He will swap the current *'PointID'* and the 'MergedPointID', so the crew collects data using the previously evaluated *'PointID'*.

   e. For all points being merged with non-AIM points (e.g., "PIBO", "MIM", "Other"), the original AIM *'PointID'* from the design will be used for data collection and not the *'MergedPointID'*.

   f. Points within the same design cannot be merged! Consider skipping one of the points but remember skipping points will create holes.

3. Document any skipped points as follows if all of the above criteria are met:

   a. Record the 'EvalStatus' as either "Not sampled- BLM approved" if you are a BLMer, or "Not-sampled- Not yet BLM approved" if you are not a BLMer and set the 'ReasonNotSampled' to "Unknown - Too close to other monitoring location".

   b. You must make a comment in the 'OfficeEvalComments' about which point it was too close to, why it was skipped, and explain how it met all criteria.

   c. You do not have to skip points that meet the too close criteria and skipping points may negatively impact the statistical rigor of your design by creating holes.

Detailed Instructions – Selecting contingent or supplemental indicators to be collected at each reach:

1. Core indicators should be collected at all ***random points***.

2. Project leads should identify additional contingent or supplemental indicators to be collected at each reach. Not all reaches require the same contingent and supplemental indicators to be collected. A list for each point ensures the crew knows the correct indicators to collect.

   a. Reference the Monitoring Design Worksheets and contract/agreement (if applicable) for more information about which indicators are to be collected at each reach.

   b. In each of the Contingent Indicator columns within the Points layer, select yes or no to indicate if it will be collected.

   c. In the Supplemental Indicators column within the Points layer, type which supplementals you want collected.

   d. If you have a default set of indicators to be collected at every reach, please contact

the National AIM Team to make these changes and avoid manually clicking through every point in your design.

3. In some cases, a subset of core indicators may be collected and specified in the 'CoreSubset' columns. Please contact the National AIM Team for guidance on when this may be appropriate.
4. Contingent indicators selected in the Points layer are ultimately passed into Survey123 when Forms are launched. The indicators you select in the Points layer will determine the default options when the crew opens a form. If indicators are not set properly in the Points Layer, the user will be able to override the defaults in Survey123 so that the correct data is collected.

Step 3 – Office Evaluation

Overview: The purpose of office evaluation is threefold: 1) to determine whether a reach meets the definition of the *target population* (e.g., perennial wadeable streams on land managed by the BLM within the Bruneau Field Office) and should be sampled or is not part of *the target population* and should not be sampled (Table 1); 2) to assess the accessibility of a reach; and 3) to plan travel routes to the point coordinates. Field crew efficiency and productivity is often directly related to how well reaches are evaluated and thus the value of this process cannot be underestimated. Office evaluation involves using available geospatial information and local knowledge to determine if a field visit is needed and to record access information. Rejected points need to be replaced by oversample points until the desired sample size is met. This process requires iteratively updating the 'EvalStatus' throughout the season and finalizing this field at the end. All points are assigned "Base" and "Oversample" as their 'EvalStatus' at the beginning of the field season to properly symbolize the points on the Webmap. 'PointType' is a noneditable column that permanently stores "Base" or "Oversample" designations.

Responsible Parties: Project leads, crew managers, and/or field crews

Files and Tools:
- **Office Webmap**

Detailed instructions – Completing office evaluations in the Office Webmap: Document all

information obtained, and decisions made during the office evaluation process in the 'Points' layer as follows:

1. For each point, consider the area you are assessing for perennial flow, wadeability, access, and land ownership.
   a. A minimum of 75 m up and downstream of the point coordinates needs to be evaluated, but this length should increase for larger systems (reach length = 20x bankfull width).
   b. Note that crews have the ability to move point coordinates during the field visit to meet the sampling criteria (See Field Protocol for Wadeable Lotic Systems - Section 3.2).

2. Determine whether a reach meets the definition of the ***target population*** and is accessible (see below for a list of example stream flow, access, and ownership questions):
   a. If the sample reach is believed to be a member of the ***target population*** (e.g., perennial stream on BLM land within your reporting unit), determine if the reach is accessible and provide access information:
      i. If it is inaccessible:
         1. The 'EvalStatus' of "Not Sampled – BLM approved" should be used by BLM project leads.
         2. The 'EvalStatus' of "Not Sampled – Not yet BLM approved" should be used by anyone other than the BLM project lead conducting the evaluation.
            i. All points with an 'EvalStatus' of "Not Sampled – Not yet BLM approved" will need to be verified by a BLM project lead and changed to "Not Sampled – BLM Approved" by the end of the field season if in agreement. See Step 6- Final Evaluation Status below.
         3. Clearly state the reasons why a reach was determined to be permanently inaccessible in the 'OfficeEvalComments' column.
         4. Two sources of "NotSampledEvidence" are mandatory for points rejected during office evaluation. What were the tools you used to determine this designation (e.g., local BLM knowledge, imagery, gauges, SMA, etc.)?
      ii. If you think the reach could be accessible:
         1. Use the 'EvalStatus' column in the Points layer to select the "Ready to Field Visit" option.
         2. Provide all relevant notes for the field crew regarding point access, the timing of sampling, etc. in the 'OfficeEvalComments' column.

3. Provide any landowner contact information and names in the 'ContactInfoForAccess' column. <u>Do not record names, phone numbers, or emails</u> in 'OfficeEvalComments' or other columns.

b. If the sample reach DOES NOT meet the definition of the ***target population***, set the 'EvalStatus' field to "Not Sampled" and fill out the appropriate 'ReasonNotSampled' (Table 1).

   i. All points with a 'ReasonNotSampled' of "Nontarget" <u>must</u> have 'NotSampledEvidence1' and 'NotSampledEvidence2' filled out. Include the tools you used to determine this designation (e.g., local BLM knowledge [give name if not yourself], imagery, gauges, SMA, etc.).

   ii. Also clearly state the reasons why a reach was determined to not be part of the ***target population*** in the 'OfficeEvalComments' column (e.g., the point falls in the Salmon Field Office, but this is the Upper Snake Field Office design and should only include points in Upper Snake FO).

c. If questions persist about reach qualifications or accessibility, use the 'BLMAdviceRequested' column to specify who you need advice from and clearly record in the 'OfficeEvalComments' column what you need advice or assistance with as follows:

   i. Select "…advice needed" if additional information is needed before you can determine if a point should be marked as "Ready to field visit" or "Not Sampled".

ii. Do NOT select "…advice needed" if you have all the needed information and a point just needs to be "Not Sampled-BLM approved".

Stream flow, access, and ownership considerations

1. <u>Stream Flow Considerations</u>: Examine the location of the reach in the Office Webmap to determine:

   a. **Does the reach fall on or near an actual stream?** If not, record the 'ReasonNotSampled' as "Nontarget- Lentic" or "Nontarget- Map Error" (Table 1).

   b. **Is the system likely to be perennial?** Streams should be sampled if they contain water at five or more of the eleven main transects during the time of sampling, even if that water is no longer flowing. If the office evaluator is not sure, the point coordinates should be visited by a field crew.

      i. For non-perennial reaches that the office evaluator is sure will never contain water during the sample period (usually June 1-Sept 31), use the "Nontarget- always dry during the sample season or ephemeral" designation (Table 1).

      ii. If you are office evaluating in a drought year or at the end of the season you may find a reach that is dry at the moment, but will likely have water in future years, or earlier in the sample season. To avoid permanently writing off these points as dry use the "Nontarget- possibly has flow during some sample seasons" designation.

      iii. If you are unsure if a reach will always be dry, use the "Nontarget- Dry but possibly has flow during some sample seasons" designation so the point is re-evaluated at another time.

      iv. Furthermore, two sources of 'NotSampledEvidence' are <u>mandatory</u> for Nontarget rejections.

   c. **Is there a specific time of year the reach should be sampled** based on when the stream might be influenced by runoff, weather, dam operations or irrigation withdrawals and returns?

   d. **Can the reach be boated but not waded?** Consult with the project lead and determine if boatable reaches should be sampled as part of the design, or if the project lead is only intending to report on wadeable streams and rivers.

   i. Boatable reaches that should be sampled need to be sampled by a specialized crew with a different protocol. If you cannot return to the point later in the season and wade at least 50% of the reach, then use the 'Not Sampled Reason' of "Reattempt- Boatable crew needed".

   ii. If the project lead wants to report on only wadeable streams and rivers and not sample any boatable systems, then use "Nontarget- Boatable (not sampling boatable reaches for this design)".

   iii. If the project lead is unsure, please contact the National AIM Team to determine the appropriate next steps.

  e. **Is the reach both unsafe to wade and unsafe to boat?** If so, record the 'ReasonNotSampled' as "Permanently inaccessible- Not wadeable nor boatable" (Table 1).

2. <u>Access Considerations</u>: Examine the location of the reach in the Office Webmap to gain an understanding of potential access routes and terrain. Document answers to the following questions in the 'OfficeEvalComments' column in the Points layer:

  a. **Is the point safe to access?** If not, record the 'ReasonNotSampled' as "Permanently Inaccessible-Access denied terrain" (Table 1). Permanently Inaccessible should only be used if the point is truly inaccessible and multiple attempts have been made to visit the point coordinates and access will be impossible/impractical by all crews for at least 10 years into the future. This status creates holes in the design.

  b. **What are the driving directions to access the point coordinates and what will road conditions be like?** Provide multiple suggestions when possible.

  c. **How long (in miles) is the hike from the parking area to the sample point?** Lotic AIM does not have a maximum hike distance used to reject points like Terrestrial AIM. Crew and project leads should assess the situation and determine if the crew is capable of making the hike and it is safe to attempt, 3-5-mile hikes are not rare.

  d. **How difficult is the hike** (easy/moderate/hard/very difficult)?

  e. **Are there unique challenges that might affect access** (e.g., cliffs or private land)?

  f. **Are there any specific access directions** (e.g., access directly from the north and pick your way between the cliff bands) that need to be provided to crews?

3. <u>Landownership Considerations</u>: In the Office Webmap, examine the location of the point in relation to public and private land and determine if you need permission to cross private land to access the point. If so, research and document answers to the following questions in the 'OfficeEvalComments' or 'ContactInfoForAccess' columns:

  a. **Is there less than 100 m of stream on BLM land on a small, isolated parcel?**

   i. If yes, can you move the point to accommodate 100 m of BLM land and ≥5 transects?

    1. If yes, continue to office evaluate the reach.

    2. If no, consider rejecting the reach as "Not Sampled" and 'ReasonNotSampled' as "Nontarget – Reach too short" (Table 1).

   ii. If no, and there is more than 100 m of stream on BLM land but it's still a small, isolated parcel, consider the size of the stream (small stream, large stream, river) and whether 5 transects could fit on BLM land. If it's a small stream with a reach length of 150 meters and the stream appears to be going through the center of the parcel, then it could be possible to sample ≥5 transects. If it's a large stream with

a potential total reach length greater than 150 meters, then 5 transects may or may not fit depending on the required transect spacing and the size of the BLM parcel. Continue to office evaluate the reach. If it is determined that it is not possible to sample ≥5 transects then consider rejecting the reach as "Not Sampled" and 'ReasonNotSampled' as "Nontarget – Reach too short" (Table 1).

b. **If there is greater than 100 m of BLM land but the point falls on the edge of BLM land**, the field crews can move the point in the field to sample the reach fully on BLM.

c. **Where is private land in relation to the point** (e.g., upstream, East, etc.)?

d. **Have you arranged to access the point?** If not, what are the next steps toward arranging access?

e. **Who is the point of contact to gain access and how should the person be contacted?** Only record contact information in the 'ContactInfoForAccess' column. All personally identifiable information will be removed at the end of the field season.

f. **What are the access stipulations/directions from the landowner?**

g. **Have all private landowners denied access and no other routes are possible?** If so, record the 'ReasonNotSampled' as "Permanently Inaccessible-Private access denied" (Table 1).

4. <u>Trend Considerations:</u> Consider if you are interested in reach-specific trends at previously sampled locations and determine if you would like to sample around the same time of the season as previously sampled. If this is the case, we recommend sampling within two weeks of the previously sampled date to reduce the typical within season variability (e.g., Point XY-SS-55555 was sampled June 7, 2015, revisit between June 1 and June 14, 2020). Assessing the trend of conditions across the landscape does not require sampling within the two-week window. Contact the National AIM Team for more information.

Step 4 – Trip Planning

<u>Overview</u>: Once reaches are office evaluated, trip planning begins by logically grouping and planning to sample reaches labeled "Ready to Field Visit". Crews can typically sample one reach per day if drive times are not too long. Trip planning is an iterative process that should be re-assessed after each trip considering rejected, nontarget, temporarily or permanently inaccessible reaches, and the need for oversample points. To retain statistical validity of the design while also being efficient with your sampling efforts, it is important to balance the sampling order, sample size, and spatial extent of each trip. Use the Design Status tab of the Data Review Dashboard to review the number of sampled reaches, progress towards achieving desired sample sizes, and number of holes. As a reminder the Points layer 'EvalStatus' must be up to date for correct values to appear in the Design Status tab of the Data Review Dashboard.

<u>Responsible Parties</u>: Project leads, field crew leads, or crew managers may complete this step.

<u>Files and Tools</u>:
- **Office Webmap**
- **Design Status tab of the Data Review Dashboard**

<u>Detailed Instructions – Trip Planning</u>:

1. Select groups of reaches that are spatially close together, while considering the following:
   a. The number of selected reaches for each sampling trip will depend on the length of trip, the distance between point coordinates, stream size, the difficulty of point access, and the likelihood of point failure. If the points are within 1–2 hours drive of each other, and the hike to each point is relatively short (less than ~2 miles each way), crews can typically sample one point per day. If drive time and hike distances are longer, more time will need to be budgeted per point.
   b. When selecting points geographically close together, you should always consider the sample order and potential for creating holes in the design.
   c. Make sure to filter out any Boating reaches by using the 'BoatingFilter' unless your crew is specifically sampling boatable reaches.
   d. The National AIM Team strongly recommends adding several extra points to every trip, so that the crew has backup options in the event that points are rejected or temporarily inaccessible. Base the number of backups on the likelihood of rejection for each point scheduled on the trip.
2. Review evaluation information in the Points layer to determine if additional information or contacts are needed – allow enough time to follow up for more information if needed.
   a. Review if the point has been merged or moved, and if this was intentional.
      i. Specifically, review the 'MergedPointID', 'CurrentLat', 'CurrentLong', 'Current point distance from design', and 'OfficeEvalComments'.
      ii. Follow up with the office evaluator and project lead if the point was moved, but there is no indication in the notes or merged info that would support this.
   b. Review information about private landowners or field personnel that should be contacted and determine if there is enough time do to so before the trip begins.
   c. Review the driving and access routes in your Office Webmap or other available resources to determine if supplemental maps or information are needed. When reviewing maps, pay particular attention to areas that could prohibit access (e.g., cliffs). If terrain impediments are identified, consider other routes, even if alternative routes will require longer hiking.
3. Create a list of points to visit on the field trip.
   a. Based on the above, create a list of points the crew should attempt to visit on their field trip. The list should include the order in which the crew should sample points and a list of backup points. Backup points should include notes such as 'sample this point if point XYZ fails' or 'sample if extra time'. Make sure the crew clearly understands any special point access instructions before departing.
   b. In the Points layer, use the 'Trip' column to record which points should be sampled during each trip and the 'TripNotes' field to record notes about sample order. These are included to be used as a tool to assist trip planning and will be reused later on to streamline data review once the crew returns from the field.
      i. For the 'Trip' column we suggest using crew name followed by a trip number to ensure this field is unique across all crews and projects. The 'Trip' field is important for communication and easily filtering Field Maps and the lotic AIM dashboards. If a point is not visited during the trip, simply update the trip column when the crew returns to the office and before they leave for their next trip.
      ii. For the 'TripNotes' column we suggest using this to explain sample order

or priority for the trip and any notes about a reach, including which points should be picked up if others fail. Neither 'Trip' nor 'TripNotes' are stored in our database so only use them for temporary trip planning information. Make sure all other information is put into the 'OfficeEvalComment' field or other appropriate fields.

Tips for trip planning:
- Filtering the Points layer by your 'Project', which points have a 'EvalStatus' of "Ready to field visits" and "Reattempt" will help remove clutter on the map during trip planning.
- Schedule difficult points for the start of the field trip when the crew has more time and energy.
- Plan easy points at the end of the trip in case the crew is running short on time and energy.
- Plan easy points for the entire first trip of the season, hardest points in the middle of the field season, and easy points at the end of the season when the crews are running out of time and energy.
- Consider snowpack, flow regimes, and irrigation withdrawals, but generally plan Small Steam *strata* at the beginning of the season (before some of them dry up), Large Streams in the middle (so that flows are safe to wade), and Rivers at the end (when flows are lowest so there's a greater chance of wadeability).

Step 5 – Field Evaluation

Overview: Field crews can sample, not sample, or reschedule points for another visit. Field crews are responsible for recording the outcome of all attempted field visits in the Field Visit layer (See Table 1 for possible point statuses). Any rejected points need to be replaced by oversample points until the desired sample size is met.

Responsible Parties: Field crews

Files and Tools:
- **Field Webmap** – Field Visits are added to this map through the Field Maps application.

Detailed Instructions – Field Evaluation: Content can be viewed and updated with or without internet access. All crews should be able to take a Webmap offline in the Field Maps application by specifying an area on the Webmap to cache. After editing or creating field visits on the offline Webmap, open the Field Maps application while online to sync all changes.
1. Using either the Field Webmap or the Trip Preview Dashboard, ensure you have all the necessary information.
    a. Crew reviews their trip schedule: Look at each point on the list and review the directions and access information. If there are questions, the crew should follow up with the office evaluator before departing on the trip.
    b. Review merged or moved points: Ensure any moved or merged points were intentional by looking at the 'MergedPointID', 'CurrentLat', 'CurrentLong', 'Current point distance from design', and the 'OfficeEvalComments' columns. Follow up with the office evaluator and project lead if there is no indication in the notes or merged info to support the merge or move.
    c. Review indicators to be collected: Review which indicators should be collected at

which reaches. Not all reaches will have the same indicators to collect so be careful not to miss anything. Check that you have the gear to sample those indicators and that you understand the field protocol to sample them.

    d. <u>Review revisit report (if applicable):</u> If a point is a revisit reach and has been sampled before, review the revisit report and photos prior to sampling.

2. Create your offline area in Field Maps.
   a. At the beginning of the season prior to the crews first trip, the crew lead, or the person signing in on the iPad while sampling, should log in to Field Maps and locate the Field Webmap.
   b. Locate the ellipse icon (…) to the right of the Field Webmap thumbnail and click "Add offline area". Ensure your offline area encompasses the entire area you will be working for the remainder of the field season.
   c. Remember to sync your map when you return to service.
   d. More information is provided in the pre-training material and the [Lotic AIM Technology and Applications Manual](#).

3. Field visit points and know what to record in Survey123 and Field Maps applications.
   a. Crews should follow field evaluation methods found in Section 3 of the [Lotic Field Protocol for Wadeable Lotic Systems](#) when evaluating reaches in the field.
   b. All attempted field visits MUST be recorded through Field Maps in the Field Visits layer with the appropriate 'FieldEvalStatus'. This includes reaches the crew attempted but did not sample and should be reattempted during a future trip. If a reach is not sampled, ensure that proper comments have been recorded in the Not Sampled Reaches form. This ensures that the appropriate information for revisiting points is documented and that any rejected reaches are also properly documented for analysis.
   c. If you did not attempt to access the point on the trip, you do not need to record a Field Visit.

4. Record a Field Visit for all attempted visits.
   a. Crews need to record a Field Visit for both Sampled and Not Sampled reaches in both the Field Maps and Survey 123 applications. Each attempt must be recorded as its own record in the layer. All Survey 123 forms will be launched from the crew's Field Visit once it has been created.
   b. **Field Maps**: Creating a Field Visit in the Field Visits layer must be done in the field while you are located at the <u>point coordinates</u> or <u>F transect</u> if the point was moved. For more information see the [Lotic AIM Technology Manual](#) and Appendix 2 Table 2.
   c. **Survey123**:
      i. If the point is sampleable, enter the reach specific information in the Verification form <u>while standing at the F transect</u>; then complete the remaining forms. Reference the [Lotic AIM Technology Manual](#) for more information on Lotic Survey123 Forms and Workflows and the [Lotic Field Protocol for Wadeable Systems](#) for details on data collection methods.
      ii. If the point is not sampleable, complete the Not Sampled form <u>while standing at the design coordinates,</u> or as close as you can get to the design coordinates.

Step 6 – Finalize Evaluation Status

Overview: Project leads are responsible for ensuring the accuracy and completeness of all point statuses at the end of the season and contacting the National AIM Team when complete. However, the project lead, crew lead, or crew manager (depending on Roles and Responsibilities of your specific project) should iteratively update this information throughout the season, not just at the end of the season.

Responsible Parties: Project leads (final and ongoing review), crew managers, and crew leads (ongoing review only)

Files and Tools:
- **Office Webmap**
- **Design Tab of the Data Review Dashboard**

Detailed Instructions – Finalizing Evaluation Status: This process is much easier if iteratively completed by the project lead (or crew manager) throughout the season (e.g., after each trip or every 2 weeks).

1. Finalize 'EvalStatus' for all sampled reaches (these steps can be done by the BLM project lead or others).
    a. Review the Data Summary and ensure all QAQC is completed. See the Lotic Data Management and Lotic AIM Technology Manuals for more information.
    b. Change the 'EvalStatus' column to say "Sampled- Data summary reviewed".
2. Finalize 'EvalStatus' for all reaches classified as "Not sampled".
    a. The BLM project lead must approve any point classified as "Not Sampled- Not yet BLM approved" by the end of the field season. Review all comments and 'NotSampledEvidence1' and 'NotSampledEvidence2' to ensure you agree with the 'EvalStatus' and 'ReasonNotSampled'.
    b. If the reach was classified as "Not sampled" during field evaluation:
        i. Review field and office information:
            1. Comments, directions, notes provided to the crew, previous evaluation information.
            2. Crew's comments, pictures, notes from the field visit.
        ii. Determine if the crew made the correct classification and edit the Points layer.
            1. If there is agreement by the BLM project lead or the crew manager:
                a. BLM project lead should update the 'EvalStatus' attribute in the Points layer to **"Not Sampled – BLM Approved"** and make sure the 'ReasonNotSampled' matches the reason the crew selected.
                b. Crew managers should update the 'EvalStatus' column in the Points layer to **"Not Sampled – Not Yet BLM Approved"** and make sure the 'ReasonNotSampled' matches the reason the crew selected.
            2. If there is disagreement with the crew, decide whether the point should be reattempted, or if there is a different reason the point was not sampled.

      a. Different 'ReasonNotSampled':
         i. For instance, the crew classified a point as "Nontarget- Map Error", but the project lead looks at the photos and it looks to be a lentic system. They talk to the crew and decide it was in fact a lentic system. This should be recorded in the Points layer as "Nontarget- Lentic".
         ii. The 'FieldEvalStatus' and 'ReasonNotSampled' in the Field Visits layer should not be changed, but a comment should always be made in the 'OfficeEvalComments' column in the Points layer to clearly explain why the project lead disagreed with the Field Visit 'ReasonNotSampled'.
      b. Reattempt:
         i. For instance, the crew identified a point as being "Permanently inaccessible", but the project lead identified another possible access route, then the 'EvalStatus' in the Points layer should be set to "Reattempt".
         ii. If a point is designated as such during the field season, this status lets the crew and crew manager know that they should reattempt sampling this point. If they do not reattempt, the point will become a hole (See Finalizing Design for the Season section below).

3. Part of this process is to assess progress made towards sample size goals and ensure the number of holes stays to a minimum.
    a. For this process, use the Design Tab of the Data Review Dashboard.
    b. Manage the design such that each *stratum* will have fewer than 30% holes at the end of the season (see Holes in the design in the design concepts section). If you find that you will likely have more than 30% holes at the end of the season, carefully review all "inaccessible" points to determine which points might be feasible to reattempt. If possible, reattempt and sample some of these points. If this is not possible, consider increasing your sample size in this *stratum* to reduce the ratio of holes to sampled points. If you need additional guidance, contact the National AIM Team.

Finalizing Design for the Season

At the end of each field season, the Points layer needs to be finalized. Once finalized, send the National AIM Team an email and they will archive the Points and Field Visits layers for database ingestion.

Detailed instructions – Finalizing the design at the end of the Season:
1. Ensure you have updated the 'EvalStatus' for all reaches.
2. Ensure all "Not sampled" reaches have associated comments and evidence.
    o Ensure that any random "Reattempt" points that do not require a specialized crew (e.g., boating) are updated to "Not sampled" with associated reason, comments,

and evidence. For *strata* with >30% holes you might need to transfer the "Reattempt" points to the follow year to sample, so before updating the status to "Not sampled" discuss this situation with the National AIM team. If you are managing an Alaska design this step should only be done on your last year of data collection.

- o *Targeted points* with a "Reattempt" status will be pushed to next year's points list unless they are changed to a "Not Sampled" status.
- o Review all points that were rejected for beaver impacts.
  - ▪ If you believe beavers are temporarily in the area, or do not have well established colonies and the point may be sampleable in future years, update the 'ReasonNotSampled' to "Reattempt- Other temporarily inaccessible."
  - ▪ If you believe that beavers are permanently established in the area and the reach will not be sampleable for the foreseeable future, update the 'ReasonNotSampled' to "Permanently inaccessible- Terrain access denied".

3. Ensure that all "Ready to field visit" reaches are updated. If you are managing an Alaska design, this step should only be done on your last year of data collection.
   - o All "Base" points at the end of the field season should have been evaluated.
   - o If you have a point that still has an 'EvalStatus' of "Base" or a base point still designated as "Ready to field visit" change it to "Not Sampled" with the appropriate 'ReasonNotSampled'.
   - o All unevaluated "Oversample" points that fall prior to the last evaluated reach of a particular 'StratumName' are considered holes and should be recorded as "Not sampled" "Unknown- Skipped". Please reference the holes in the design section for more information. Also consider quickly office evaluating to determine if it is possibly a "Nontarget" reach which is not considered a hole.
   - o All "Oversample" points that fall after the last evaluated reach in a *stratum* are considered unneeded and should be reverted back to or left as "Oversample".

4. Review and clean up all comments so that they are clear and make sense to people that were not involved in this year's process.

5. Make sure any merged points have the 'MergedPointID' and 'MergedMonProgram' columns in the Points layer filled out and that the crew sampled the correct location.

6. Make sure that the National AIM Team has received final data for all reaches and that all evaluated reaches are properly recorded in the Points layer.

7. Review the sample size tables in the Design Tab of the Data Review Dashboard and verify that the values are correct. Also consider how results from this year could inform your planning for next field season. If numbers in the Sample Size Dashboard appear incorrect, ensure that 'EvalStatus' and 'ReasonNotSampled' in your Points layer is the properly filled out. If questions persist, contact the National AIM Team.

8. Email the National AIM team to inform them that you are complete with your Design Management for the current field season.

Glossary

Sample design: A framework, or road map, that serves as the basis for the selection of sample points and affects many other important aspects of a survey as well (Sage Research 2017). Provides information on the *target population*, sample sizes, *strata* definitions, time period over which data will be collected and the sample selection methodology. This term can be used interchangeably with 'sample plan,' 'survey design,' 'sampling plan,' 'sampling design,' and 'study design.'

Order Code: sequential number in the points layer starting at one and ending with the total number of points within that *stratum* of the design. The number is used to assist with assessing the order in which points/reaches should be evaluated and sampled.

PointID: Each point in a design is given a unique identifier called a *PointID*. The *PointID* is used to track the fate of each point (i.e., was it sampled or rejected) and all data and samples that are associated with that monitoring location. Therefore, it is <u>extremely</u> important that the *PointID* is accurately recorded when evaluating points in a design or collecting data at the associated location. <u>Always</u> double (or triple) check the *PointID*.

Generally, the *PointID* for ***random points*** consists of a two or three letter prefix that represents the *stratum* in which the point falls, followed by a two-letter code that represents the stream size category associated with the order of the stream, followed by a five-digit number that is derived from the master sample point selection tool (e.g., PF-SS-12345). Commonly the *stratum* will be associated with the field office in which the point falls (e.g., PF = Price Field Office). Stream order categories are as follows unless stated otherwise: small streams (SS - 1st and 2nd order streams), large streams (LS - 3rd and 4th order streams), and rivers (RV - 5th order and above) [1].

The *PointID* for ***targeted points*** has a similar structure where the first two letters of the *PointID* are associated with the field office the point falls in. The second two letters are 'TR' identifying the point as targeted. The *PointID* will conclude with a randomly generated 4-digit number (e.g., RA-TR-1023).

Strata *or* ***Stratum:*** In the context of monitoring, stratification refers to dividing a population or study area into sub-groups or subunits called *strata* for the purposes of sampling or data analysis. Example reasons to stratify include: 1) ensuring a sufficient sample size in reporting units; 2) ensuring uncommon portions of a study area are sampled; and 3) placing sample points in homogeneous groups to account for natural environmental gradients (BLM AIM 2017). Examples of possible *strata* for lotic systems are field offices, Strahler stream order, or stream slope.

Random points *or* ***Random design:*** Method of point selection in which every unit in the *target population* has some non-zero probability of being selected. The selected sample units are representative of the target population and can be used to derive population estimates. For random *sample designs*, the *target population*, *strata*, and design weights or selection

---

[1] Stream size categories in Alaska may be calculated differently.

probabilities are explicitly known. AIM selects random points from the National Hydrography Dataset streams layer in a spatially balanced manner that results in a subsample of the population that is representative of the entire population of interest (e.g., Ator et al. 2003; Olsen; Olsen et al. 2012). The fate of all *random points* must be determined and documented for use during analysis and reporting.

Targeted points: Method of point selection using a non-random method. Sample units are selected deliberately, using the judgement of the sampler or project lead. Elements of the *sample design* (e.g., *target population*, selection probabilities) are unknown.

Target population: The target population for a survey is the entire set of sample units (e.g., plots, stream reaches) for which the survey data are to be used to make inferences. Thus, the target population explicitly defines those units for which the findings of the survey are meant to generalize (Sage Research 2017).

Appendix 1. QuickStart Guide: AIM Lotic Office Webmap

AIM Lotic Office Evaluation Webmap   Quick Start Guide

Filter: Points

Applying a Filter in the Content window

Click the filter icon under the layer you want to filter. The first box is the field name you want to filter on, the second box is the "operator", and the third box is the value. The "Unique" button will give you a list of potential values. Example, "Project is ID_UpperSnakeFO" would only show points for ID_UpperSnakeFO.

Open table options to Show Selected Records, Clear Selections, Show/Hide Columns, etc.

Expand pop-up

Editing a Feature

The editing function is used to change the EvalStatus, add indicators, or give directions.

Click on the point you want to edit. In the bottom of the pop-up window click on "Edit". You can now type in values or use the drop down menus to add information to the feature.

You can also edit features by double clicking on a cell in the table to bring up the drop down menu or type in values.

Show Related Records opens the FieldVisits/ Points table related to the point.

Points: TU-LS-17260

OrderCode	20
StreamName	Pie Cre
StratumName	Tuscar Stream
PointType	OvrSm
DesignLatWGS	41.245
DesignLongWGS	-115.91
OfficeEvaluator	
OfficeEvalDate	
PreviouslyEvaluated	No
MergedSiteCode	

Zoom to   Edit   Get Directions
Show Related Records

Appendix 2. Office Webmap Metadata

Table 1. Points layer column metadata. Blue indicates the column is prepopulated. Orange indicates that the project lead, crew manager, or crew is responsible for filling out. Red indicates that it is only the project lead's responsibility for filling the column out.

Column name	Who's responsible	Description
OrderCode	NOC	A sequential number in the points layer for each stratum of the design as it is displayed on the webmap.
PointID	NOC	Each point in a design is given a unique identifier called a 'PointID'. 'PointID' is used to relate all data associated with that monitoring location.
StreamName	NOC	NHD designated stream or river name.
StratumName	NOC	Stratum in which the point falls such as a field office or ecoregion. See glossary for more information.
PointType	NOC	Specifies if the point is base, oversample or targeted or a combination (Base, OvrSmp, Targeted, OvrSmp - Targeted).
DesignLat	NOC	Original latitude of the point in WGS84 coordinate system.
DesignLong	NOC	Original longitude of the point in WGS84 coordinate system.
OfficeEvaluator	Project lead Crew manager Crew lead	The first and last name of the person doing office evaluation.
OfficeEvalDate	Project lead Crew manager Crew lead	The date and time the reach was office evaluated.
PreviouslyEvaluated	NOC	Whether the reach was or was not previously evaluated in past years (Yes or No).
MergedPointID	Project lead	The unique identifier for the point that is being merged with this one (if applicable). For example, a PIBO site identifier might be "015-09-IKS".
MergedMonProgram	Project lead	The monitoring program of the merged point (e.g., AIM, PIBO), if applicable.
EvalStatus	Project lead (must approve all Not Sampled points) Crew manager Crew lead	Used to track a point/reach status throughout the season from design to office evaluated, and from ready to field visit to field evaluated and data reviewed. At the end of the season all reaches that have been sampled should have a status of "Sampled- Data Summary Reviewed" and all reaches that have been rejected should have a status of "Not Sampled- BLM approved".
ReasonNotSampled	Project lead Crew manager Crew lead	Specifies the reason that a reach was not sampled (e.g., Nontarget, or Permanently inaccessible).
NotSampledEvidence1	Project lead Crew manager Crew lead	The first line of evidence used to reject the reach and classify in the appropriate 'ReasonNotSampled' category (e.g., field visit, local knowledge, imagery, gauges, SMA).
NotSampledEvidence2	Project lead Crew manager Crew lead	A second separate line of evidence used to reject the reach and classify in the appropriate 'ReasonNotSampled' category (e.g., field visit, local knowledge, imagery, gauges, SMA).
BLMAdviceRequested	Project lead Crew manager Crew lead	A domain-controlled field that can be used to request advice from the National AIM Team or Local staff.

OfficeEvalComments	Project lead Crew manager Crew lead	Directions on how and when to access the point (e.g., use Deer Creek road and sample early in the season because it may go dry later in season). Other pertinent information such as any specific sampling directions if it is a targeted point. Note landowner contact information should be put in the 'ContactInfoForAccess' column and not here.
ContactInfoForAccess	Project lead Crew manager Crew lead	Phone number or other landowner contact information needed to access the point.
NOCComments	NOC	A text field that will be hidden until late in the season. Primarily used by the National AIM Team to provide notes about design implementation and final evaluation status type stuff. Users will be able to filter to see where we have questions or concerns.
Trip	Project lead Crew manager Crew lead	A text field to group points together while planning trips.
TripNotes	Project lead Crew manager Crew lead	A text field to type notes about the trip. Open ended, let the user decide how they want to use it kind of field. We will not store this when the season is over.
CollectTNTP	Project lead	Whether or not this indicator should be collected at the reach; Prepopulated based on project information but may be edited for individual reaches.
CollectTurbidity	Project lead	Whether or not this indicator should be collected at the reach; Prepopulated based on project information but may be edited for individual reaches.
CollectThalwegDepthProfile	Project lead	Whether or not this indicator should be collected at the reach; Prepopulated based on project information but may be edited for individual reaches.
CollectBankAngle	Project lead	Whether or not this indicator should be collected at the reach; Prepopulated based on project information but may be edited for individual reaches.
CollectExtraBankPlots	Project lead	Whether or not this indicator should be collected at the reach; Prepopulated based on project information but may be edited for individual reaches.
CollectPoolTailFines	Project lead	Whether or not this indicator should be collected at the reach; Prepopulated based on project information but may be edited for individual reaches.
CollectNativeWoody	Project lead	Whether or not this indicator should be collected at the reach; Prepopulated based on project information but may be edited for individual reaches.
CollectGreenlineVegComp	Project lead	Whether or not this indicator should be collected at the reach; Prepopulated based on project information but may be edited for individual reaches.
CollectVegComplexity	Project lead	Whether or not this indicator should be collected at the reach; Prepopulated based on project information but may be edited for individual reaches.
CollectCoreSubset1	Project lead	Specifies a group of core indicators that should be collected if all core indicators are not to be collected at the reach.
CollectCoreSubset2	Project lead	Specifies a group of core indicators that should be collected if all core indicators are not to be collected at the reach.

CollectCoreSubset3	Project lead	Specifies a group of core indicators that should be collected if all core indicators are not to be collected at the reach.
Supplementals	Project lead	Text field to specify any supplemental indicators that should be collected at the reach.
AdminState	NOC	The BLM administrative state associated with the point.
District	NOC	The BLM district office associated with the point.
FieldOffice	NOC	The BLM field office associated with the point.
Project	NOC	The AIM project associated with the point.
BoatingFilter	NOC	Yes/No Domain controlled field. Added to make it even easier for folks to filter out boating reaches without having to use contains style queries.
SpeciesState	NOC	A text field used to indicate which species list should be used in the event that a state has multiple species lists or for projects that span multiple species lists.
Current Lat	Autogenerated	Latitude based on the point location on the map, this should be used by the crew during field evaluation. This value will be different from the 'DesignLat' if this point was merged/moved, but otherwise should be the same.
Current Long	Autogenerated	Longitude based on the point location on the map, this should be used by the crew during field evaluation. This value will be different from the 'DesignLong' if this point was merged/moved, but otherwise should be the same.
Current point distance from design (meters)	Autogenerated	Indicates if the point has been moved on the Webmap. If there is no mention of the point being merged/moved but this number is greater than 0, please check with project leads to ensure you are sampling the correct location. Occasionally, this number will be slightly larger than 0 as a result of snapping points to the NHD.

Table 2. Field Visits layer column metadata. Green indicates that field crews should fill out all columns in this layer using the Field Maps application on an iPad. Yellow indicates columns that are auto populated based on the Points layer or are calculated on the fly. As soon as crews sync via Wi-fi edits will be displayed on the Office Webmap in the Field Visits layer.

Column name	Description
PointID	Each point in a design is given a unique identifier called a *'PointID'*. *'PointID'* is used to relate all data associated with that monitoring location.
Project	Dropdown list of projects for the crew to select from when creating a Field Visit.
FieldEvalDate	Date the point was visited.
FieldEvalStatus	Whether or not the reach was sampled or could be sampled at a later date. If it was sampled, the type of sample should be selected (e.g., interrupted flow vs. full reach).
CollectTNTP	Prepopulated when a field visit is created based off what the project lead selected in the Points layer. This field will then be passed to Survey 123 when a form is launched, defaulting which indicators should be collected.
CollectTurbidity	Prepopulated when a field visit is created based off what the project lead selected in the Points layer. This field will then be passed to Survey 123 when a form is launched, defaulting which indicators should be collected.
CollectThalwegDepthProfile	Prepopulated when a field visit is created based off what the project lead selected in the Points layer. This field will then be passed to Survey 123 when a form is launched, defaulting which indicators should be collected.
CollectBankAngle	Prepopulated when a field visit is created based off what the project lead selected in the Points layer. This field will then be passed to Survey 123 when a form is launched, defaulting which indicators should be collected.

CollectExtraBankPlots	Prepopulated when a field visit is created based off what the project lead selected in the Points layer. This field will then be passed to Survey 123 when a form is launched, defaulting which indicators should be collected.
CollectPoolTailFines	Prepopulated when a field visit is created based off what the project lead selected in the Points layer. This field will then be passed to Survey 123 when a form is launched, defaulting which indicators should be collected.
CollectNativeWoody	Prepopulated when a field visit is created based off what the project lead selected in the Points layer. This field will then be passed to Survey 123 when a form is launched, defaulting which indicators should be collected.
CollectGreenlineVegComp	Prepopulated when a field visit is created based off what the project lead selected in the Points layer. This field will then be passed to Survey 123 when a form is launched, defaulting which indicators should be collected.
CollectVegComplexity	Prepopulated when a field visit is created based off what the project lead selected in the Points layer. This field will then be passed to Survey 123 when a form is launched, defaulting which indicators should be collected.
CollectCoreSubset1	Prepopulated when a field visit is created based off what the project lead selected in the Points layer. This field will then be passed to Survey 123 when a form is launched, defaulting which indicators should be collected.
CollectCoreSubset2	Prepopulated when a field visit is created based off what the project lead selected in the Points layer. This field will then be passed to Survey 123 when a form is launched, defaulting which indicators should be collected.
CollectCoreSubset3	Prepopulated when a field visit is created based off what the project lead selected in the Points layer. This field will then be passed to Survey 123 when a form is launched, defaulting which indicators should be collected.
Supplementals	Prepopulated when a field visit is created based off what the project lead selected in the Points layer. This field will then be passed to Survey 123 when a form is launched, defaulting which indicators should be collected.
BankfullMeters1	Bankfull width in a representative section of the reach used to determine reach length, transect spacing and thalweg spacing.
BankfullMeters2	Bankfull width in a representative section of the reach used to determine reach length, transect spacing and thalweg spacing.
BankfullMeters3	Bankfull width in a representative section of the reach used to determine reach length, transect spacing and thalweg spacing.
BankfullMeters4	Bankfull width in a representative section of the reach used to determine reach length, transect spacing and thalweg spacing.
BankfullMeters5	Bankfull width in a representative section of the reach used to determine reach length, transect spacing and thalweg spacing.
AvgTypicalBankfullWidths	Average bankfull width calculated in Field Maps based on BankfullMeters1-5. This calculation is used to determine reach setup parameters.
ProtocolReachLength	Calculated field based off AverageBankfull.
TransectSpacing	Calculated field based off AverageBankfull.
MidTransectSpacing	Calculated field based off AverageBankfull.
EvaluationID	Evaluation ID tracks individual visits to a point and is composed of concatenating PointID followed by the field evaluation date.
PDFgenerate	Yes/No field that is used to trigger a new DataSummaryPDF be generated for a particular visit.
DataSummary_URL	Hyperlink that will open a PDF Data Summary for the reach in a new tab of your browser.
BoatingFilter	Field used to specify whether the reach was sampled using the wadeable or boatable protocols. Defaulted to wadeable.

References

Ator, S.W., A.R. Olsen, A.M. Pitchford, and J.M. Denver. 2003. Application of a multipurpose unequal probability stream survey in the Mid-Atlantic Coastal Plain. Journal of the American Water Resources Association 39:872-885.

Lavrakas, P. (2019, January 9) Encyclopedia of Survey Research Methods. Retrieved from methods.sagepub.com

Olsen, A.R. Generalized Random Tessellation Stratified (GRTS) Spatially-Balanced Survey Designs for Aquatic Resources. https://archive.epa.gov/nheerl/arm/web/pdf/grts_ss.pdf

Olsen, A.R., T.M. Kincaid, and Q. Payton. 'Chapter 6. Spatially balanced survey designs for natural resources'. *Design and Analysis of Long-term Ecological Monitoring Studies*. Ed. R.A. Gitzen, Ed. A.B. Cooper, Ed. J.J. Millspaugh, Ed. D.S. Licht. 2012. Cambridge University.