Appendix 1. FLOwPER Quick Guide 2.0

See User's Guide for more complete information. FLOwPER Quick Guide is available as a separate downloadable file at https://pubs.er.usgs.gov/publication/ofr20201075.

1. **Observer Name** (enter text)
2. **Organization** (choose one)
   - 1.1. USFS
   - 1.2. USGS
   - 1.3. BLM
   - ….many choices not shown…
   - 1.12. Other
3. **Sampling Scheme**
   - 3.1. Opportunistic (default)
   - 3.2. Designed
     - 3.1.1. Plot ID
4. **Date of Observation** (automated)
5. **Location of Observation** (automated)
6. **Stream Name**
   - 6.1. Yes (if USGS name known)
     - 6.1.1. Name: (enter text)
   - 6.2. No
7. **Flow Status** *(*current flow condition observed in 10-m observation reach*)*
   - 7.1. Continuous Flow
   - 7.2. Discontinuous flow
   - 7.3. Dry
   - 7.4. No data
8. **Stream Type** *(*choose one or enter text*)*
   - 8.1. Natural channel
   - 8.2. Leveed or channelized
   - 8.3. Ditch or canal
   - 8.4. Other (enter text)
9. **Channel Bed** (choose one)
   - 9.1. No obvious channel
   - 9.2. Fine sediment (clay, silt, mucky)
   - 9.3. Coarse sediment (sand, gravel cobble)
   - 9.4. Bedrock
   - 9.5. Artificial (concrete, riprap)
   - 9.6. No data (default)
10. **Road or Trail Crossing** (Y/N)
    - 10.1. Yes: Continue below
    - 10.2. No: Skip to #11

Crossing Type *(select one)*

- 10.2.1. Culvert
- 10.2.2. Bridge
- 10.2.3. Ford (constructed)
- 10.2.4. Natural crossing
- 10.2.5. Other
- 10.2.6. No data (default)

Observation Direction *(select one)*

- 10.2.7. Upstream of crossing
- 10.2.8. Downstream of crossing
- 10.2.9. No data

Crossing Name *(enter text)*

- 10.2.10. Yes (if road/trail name known)
- 10.2.11. Name: (enter text)
- 10.2.12. No

11. **Special Conditions** (select all that apply)
    - 11.1. Tributary Junction (trib. jct.)
      - 11.1.1. Mainstem: downstream of trib jct.
      - 11.1.2. Mainstem: upstream of trib. jct.
      - 11.1.3. On tributary
    - 11.2. Diversion Junction
      - 11.2.1. Stream: **downstream** of diversion
      - 11.2.2. Stream: **upstream** of diversion
      - 11.2.3. On diversion
    - 11.3. Upstream limit of continuous flow
    - 11.4. Channel Head
      - 11.4.1. Continuous
      - 11.4.2. Discontinuous
12. **Judgement calls - not observed**

(If observer is estimating the expected condition at late summer low flow – then select one):

- 12.1. Likely to be perennial
- 12.2. Likely to be intermittent
- 12.3. Likely to be ephemeral
- 12.4. Likely upstream limit of continuous perennial flow
- 12.5. No data

OPTIONAL DATA - Please do if you have time

13. Bankfull (or active) channel width
    - 13.1. <1 meter
    - 13.2. 1–2 meters
    - 13.3. 2–5 meters
    - 13.4. >5 meters
    - 13.5. No data
14. Active valley floor width (as a multiple of active channel width)
    - 14.1. 1x (no floodplain)
    - 14.2. 2x
    - 14.3. 3x
    - 14.4. 4x
    - 14.5. 5+x or greater
    - 14.6. No data
15. **Max water depth** (enter number)
    - 15.1. *10,000 is null entry (no data)
    - 15.2. Units
    - 15.3. cm
    - 15.4. inches

    Type of water depth observation *(choose one)*

    - 15.5. None
    - 15.6. Measured
    - 15.7. Exceeds recorded value
16. **Pertinent Notes (enter text) & Photos**

FLOwPER Quick Guide 2.0

FLOwPER 2.0 Quick Guide (See User's Guide for more complete information)

Use an ACCURATE External GPS Antenna

The 10-m OBSERVATION REACH:

- Observation is based on estimates averaged over a 10 m (30 ft) reach of stream.
- Ignore portions of the reach obviously disturbed by artificial structures (for example, roads) and (or) associated components (for example, wedges of sediment accumulated above a culvert, plunge-pool below the culvert, etc.).
- ***CRITICAL*** - Record whether reach has continuous flow, discontinuous flow, or is dry
- Observations upstream of the road are preferred.

7. **Flow Status: Observed**

Option 7.1 Continuous Flow denotes visible surface water over the full length of the 10 m observation reach. If there are multiple channels, only a single channel need have continuous flow for the entire reach to be categorized "Continuous Flow."

Option 7.2 Discontinuous Flow is assigned where some portion of the length of the observation reach is dry across the full width of the active channel. If there are multiple channels, then all channels must be dry, at some point along their length.

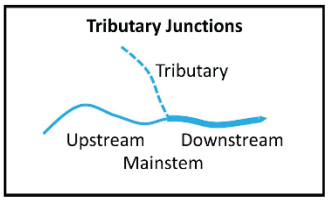
Option 7.3 Dry denotes a channel that has no flowing or standing water anywhere over the length of the 10 m observation reach.

Note: If only a part of the 10-m (30-ft) observation reach is visible, oftentimes when an observer cannot safely exit the vehicle and (or) physically walk the observation reach, the user should make the best judgement on determining the flow status on the part of the observation reach that is visible.

11. **Special Conditions:**

Option 11.1 Tributary Junctions pose a special challenge in that three potentially different stream channels all connect at a single point. FLOwPER data can be collected from any (or all) of the three channels, but they must be labeled as shown because GPS accuracy may not correctly associate the point with the correct channel.

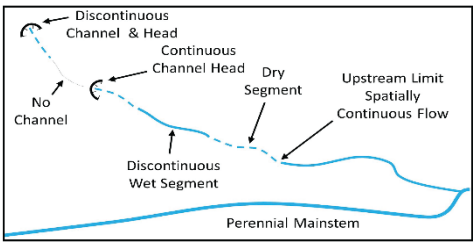
Note: Where two tributaries join to form the mainstem, the larger one should always be denoted as the "upstream mainstem." If they are of exactly equal size, the left-most tributary (looking upstream) should be denoted as the "upstream mainstem."



Option 11.2 Diversion junctions are treated similarly to tributary junctions requiring identification of the specific channel segment on which the observation is made.

Option 11.3 Note the upstream limit of spatially continuous flow on the date of observation. Accurate determination of these points will require walking a substantial portion of the channel. This is the highest point in the stream network below which flowing water is spatially continuous with the remainder of the stream network; above this point the stream is spatially intermittent.

Options 11.4 A continuous channel head is the highest point in the geomorphic channel network, below which a continuous and distinct channel (signs of scour or deposition, vegetation free, and distinct banks; may not have flowing water) connects to the remainder of the channel network. A discontinuous channel head marks the upper most extent of any geomorphic channel that is separated from the continuous channel network downstream by an area lacking evidence of a channel.



12. **Judgement Calls**

In some stream survey protocols, observers use indicators to estimate expected condition at late summer low flow. Locations where late summer conditions are estimated must be identified here and kept distinct from observed conditions recorded in the field at the time of the survey.

OPTIONAL DATA:

Collection of the following variables is optional. We think that these will improve our ability to model the break-point between perennial and intermittent stream reaches. However, we also recognize that these values may be difficult to estimate (or measure in the case of maximum depth) and may become too time consuming.

A Note on Channel & Valley Floor Width:

Channel widths can be estimated. The focus of the variables is to provide an "index" of the capacity of the valley-floor sediment to conduct subsurface flows. Deep and coarse sediment in a steep and wide valley allows substantial subsurface flow and, for a given drainage area, these streams are more likely to be dry. Conversely, if the valley floor is scoured to bedrock, any flow will be visible on the surface so that bedrock channels will be more likely to be perennial.

13. **Bankfull (or Active) Channel Width:**

The stream channel lying below bankfull stage. The channel typically shows signs of recent scour and is free of perennial vegetation (it may be colonized each year by annuals). Recent large floods or debris flows may dramatically increase the width of the scoured zone; scour lines from such events do not represent the true width of the bankfull channel.

Typical indicators of the bankfull stage include (1) The height of depositional features, especially the top of point bars such as gravel bars on the inside of a meander bend, which define the lower possible water level for bankfull stage; (2) a change in vegetation, especially the lower limit of perennial species; (3) a slope break from the flat floodplain to the steeper bank; (4) a change in the particle size of bank material, such as the boundary between coarse cobble or gravel of the streambed with fine-grained sand or silt of the floodplain; (5) undercuts in the bank, which usually reach an interior elevation slightly below bankfull stage; and (6) stain lines or the lower extent of lichens on boulders (modified from Harrelson and others, 1994).

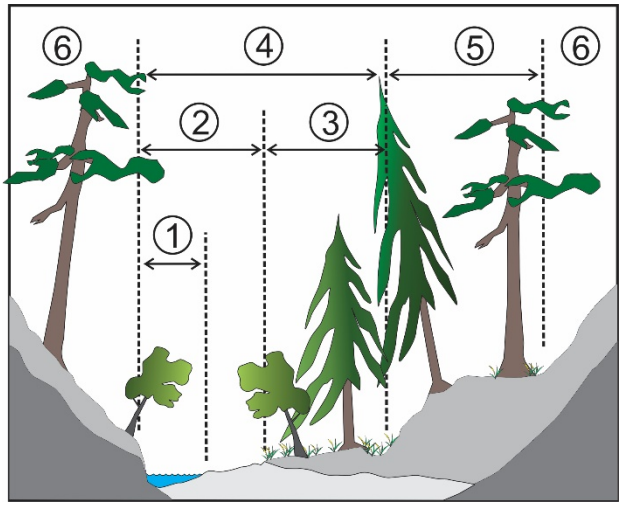
14. **Active Valley Floor Width:**

The portion of the valley floor that can be inundated during floods and where scour and (or) deposition of sediment can occur. The active valley floor includes both the active floodplain and the bankfull channel. Note that floodplains may be discontinuous, present on only one side of the channel, or completely absent (modified from Harrelson and others, 1994). Floodplains can be difficult to identify in steep mountain streams, and in some locations, the active channel may encompass the entire width of the valley so that no floodplain is present.

A Note on Maximum Wetted Depth:

Maximum depth within the wetted channel is measured with a ruler. This will be the deepest single point within the reach. If it is not safe to wade in the stream, or if the water is too deep, then measure the deepest point you can measure safely and enter "Max depth exceeds recorded value" for the "Type of depth observation."

Road-based observers will not be able to collect maximum water depth observations. Leave the null-value of 10,000 and enter "none" for the "Type of depth observation."



Example of a headwater valley showing: (1) wetted channel; (2) bankfull channel; (3) active floodplain; (4) active valley floor; (5) terrace; and (6) uplands / hillslopes. [This example, typical of a small western Oregon stream, shows an unvegetated gravel bar within the bankfull channel and slight differences in vegetation among the other surfaces. Note that the bankfull channel width is included in the width of the active valley floor as shown in this figure, and in this case, the active valley floor is approximately two times the width of the bankfull channel.]