

# Vermont Stream Geomorphic Assessment

## Appendix A - Phase 2 Field Forms



Field Notes Form for Steps 1 - 5

Cross-Section Worksheet

Field Quick Refer Tables

Quality Assurance Data Sheet

Rapid Habitat Assessment (RHA)

Rapid Geomorphic Assessment (RGA)

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# Rapid Stream Assessment Field Notes

Stream Name: \_\_\_\_\_  
 Location: \_\_\_\_\_  
 Observers: \_\_\_\_\_  
 Organization /Agency: \_\_\_\_\_  
 Weather: \_\_\_\_\_  
 Flood history known: Y / N (date of known flood \_\_\_\_\_)

Segment I.D: \_\_\_\_\_  Sub-Reach  
 Date: \_\_\_\_\_  
 Town: \_\_\_\_\_  
 Segment Length: \_\_\_\_\_ ft.  
 Segment Not Assessed: W/I/N/G/B/O  
 Rain Storm within past 7 days: Y / N

Segment Impacted by TSI Flooding or recent flood (within last 1-5 yrs) Y/N; Segment Altered by Flood Work Y/N

## 1. Valley and River Corridor

**1.1 Segmentation:** GC/CD/SS/PS/DF/CE/BB/FS/PA/SR/VW/OT/None  
**1.2 Alluvial Fan (FIT):** Yes/No/UK

| 1.3 River Corridor Encroachments (FIT) | Reach or Segment Length |            |                | 1.4 Slope of the Adjacent Terrace or Hillside |                |               |                                    |                |               |                |        |               |      |
|--|-------------------------|------------|----------------|---|----------------|---------------|------------------------------------|----------------|---------------|----------------|--------|---------------|------|
|  | One Bank                | Both Banks | Height from tw | Left Corridor                                 |                |               | Right Corridor                     |                |               |                |        |               |      |
| Berms                                  |                         |            |                | flat (0-3%)                                   | hilly (4-8%)   | steep (9-15%) | flat (0-3%)                        | hilly (4-8%)   | steep (9-15%) |                |        |               |      |
| Roads                                  |                         |            |                | very steep (16-25%)                           | x-steep (>25%) |               | very steep (16-25%)                | x-steep (>25%) |               |                |        |               |      |
| Railroads                              |                         |            |                | <b>Continuous w/bank</b> A / S / N            |                |               | <b>Continuous w/bank</b> A / S / N |                |               |                |        |               |      |
| Improved Paths                         |                         |            |                | <b>Within 1x Wbkf</b> A / S / N               |                |               | <b>Within 1x Wbkf</b> A / S / N    |                |               |                |        |               |      |
| Development                            |                         |            | NA             | <u>Texture of Exposed Slope</u>               |                |               | <u>Texture of Exposed Slope</u>    |                |               |                |        |               |      |
|  |                         |            |                | till  | boulder/cobble | gravel        | sand                               | silt           | till          | boulder/cobble | gravel | sand          | silt |
|  |                         |            |                | clay  | bedrock        | other         | Not Evaluated                      |                | clay          | bedrock        | other  | Not Evaluated |      |

| 1.5 Confinement  | 1.6 Grade Controls (FIT)  | Total Height (0.0 ft) | Height Above Water Surface (0.0 ft) | Photo Yes / No |
|--|---|-----------------------|-------------------------------------|----------------|
| Valley width / Channel width<br>Valley Width: _____ <input type="checkbox"/> Gorge<br>Estimated / Measured<br><input type="checkbox"/> Human caused change in valley width | <input type="checkbox"/> none <span style="font-size: small;">Fill out height fields for grade controls if applicable →</span><br><b>Location in Reach</b><br>(record locations on field map)<br><br><b>Waterfall // Ledge // Dam // Weir</b> |                       |                                     |                |
| Narrowly Confined (>=1 & < 2)  |   |                       |                                     |                |
| Semi-confined (>2 & < 4)   |   |                       |                                     |                |
| Narrow (>= 4 & < 6)  |   |                       |                                     |                |
| Broad (>= 6 & < 10)  |   |                       |                                     |                |
| Very Broad (>= 10)   |   |                       |                                     |                |

## 2. Stream Channel

**2.1 Bankfull Width:** \_\_\_\_\_ ft.    **2.1a Wetted Width:** \_\_\_\_\_ ft.  
**2.1b Ratio ( $W_{wetted} / W_{bkf}$ ):** \_\_\_\_\_    **2.2 Max. Bankfull Depth:** \_\_\_\_\_ ft.    **2.3 Mean Bankfull Depth:** \_\_\_\_\_ ft.  
**2.4 Floodprone Width:** \_\_\_\_\_ ft.    **2.5 Recently Abandoned FP :** \_\_\_\_\_ ft.    **2.6 Ratio  $W/d_{mean}$ :** \_\_\_\_\_  
**2.7 Entrenchment:** \_\_\_\_\_    **2.8 Incision Ratio:** \_\_\_\_\_  $IR_{net}$  : \_\_\_\_\_    **2.9 Sinuosity:** \_\_\_\_\_  
**2.10 Riffles/Steps:** complete / eroded / sedimented / NA / NE    **2.11 Riffle/Step Spacing:** \_\_\_\_\_ ft.

Dimensions Altered by Flood Y/N ; Altered by Flood Work Y/N ; Channel Enlargement Measure = \_\_\_\_\_

### 2.12 Bed Substrate Composition (percent):

| 1<br>Bedrock | 2<br>Boulder | 3<br>Cobble | 4<br>Gravel<br>Course   Fine | 5<br>Sand | 6<br>Silt or Clay | Embeddedness |             | 2.13 Avg. Size of Largest Particles on:<br>Bed: _____ Bar: _____<br>circle: inches or millimeters<br><br>2.13a % Exp. Substrate: _____ |
|--------------|--------------|-------------|------------------------------|-----------|-------------------|--------------|-------------|--|
|              |              |             |                              |           | Y / N             | Mean Channel | Mean Margin |  |
|              |              |             |                              |           |                   |              |             |  |

**2.14 Stream Type:** A G F B E C D 1 2 3 4 5 6 a b c  
 Cascade Step-Pool Plane Bed Riffle-Pool Ripple-Dune Braided  Reference Type

Stream Type

**3. Riparian banks, Buffers, and Corridors**

|                    |   |                       |                      |                  |                       |             |  |           |                         |           |  |
|--------------------|---|-----------------------|----------------------|------------------|-----------------------|-------------|--|-----------|-------------------------|-----------|--|
| 3.1                | <b>Typical Bank Slope</b>                   |                       | shallow              | moderate         | steep                 | undercut    | <b>(evaluate on the higher of the two banks)</b> |           |                         |           |  |
|                    | <b>Bank Texture-RB</b>                      | <b>Lower</b>          | bedrock              | boulder/cobble   | gravel                | sand        | silt/clay  | mix       | cohesive / non-cohesive |           |  |
|                    |   | <b>Upper</b>          | bedrock              | boulder/cobble   | gravel                | sand        | silt/clay  | mix       | cohesive / non-cohesive |           |  |
|                    | <b>Bank Texture-LB</b>                      | <b>Lower</b>          | bedrock              | boulder/cobble   | gravel                | sand        | silt/clay  | mix       | cohesive / non-cohesive |           |  |
|                    |   | <b>Upper</b>          | bedrock              | boulder/cobble   | gravel                | sand        | silt/clay  | mix       | cohesive / non-cohesive |           |  |
|                    | <b>Bank Erosion (FIT)</b>                   | <b>Left</b>           | <b>Length:</b>       | ft.              | <b>Height:</b>        | ft.         | <b>Bank Revetment Type:</b>                      |           | <b>Length:</b>          | ft.       |  |
|                    |   | <b>Right</b>          | <b>Length:</b>       | ft.              | <b>Height:</b>        | ft.         | <b>Bank Revetment Type:</b>                      |           | <b>Length:</b>          | ft.       |  |
|                    | <b>Near Bank Vegetation Type</b>            | <b>Trees</b>          | L % cover            | Invasive         | Conifer               | Deciduous   | R % cover  | Invasive  | Conifer                 | Deciduous |  |
|                    |   | <b>Shrubs / Saps.</b> | L % cover            | Invasive         | WADs                  | Saplings    | R % cover  | Invasive  | WADs                    | Saplings  |  |
|                    |   | <b>Herbs</b>          | L % cover            | Invasive         | Grasses               | Forbs       | R % cover  | Invasive  | Grasses                 | Forbs     |  |
| <b>Bank Canopy</b> | <b>Left</b>                                 | 76 - 100%             | 51 - 75%             | 26 - 50%         | 1 - 25%               | 0%          | <b>Channel Canopy</b>                            |           |                         |           |  |
|                    | <b>Right</b>                                | 76 - 100%             | 51 - 75%             | 26 - 50%         | 1 - 25%               | 0%          | Open   | Closed    |                         |           |  |
| 3.2                | <b>Buffer Width (dom/sub) (FIT 0-25 ft)</b> | <b>Left</b>           | 0 – 25 ft.           | 26 – 50 ft.      | 51 – 100 ft.          | > 100 ft    | none (SD).                                       |           |                         |           |  |
|                    |   | <b>Right</b>          | 0 – 25 ft.           | 26 – 50 ft.      | 51 – 100 ft.          | > 100 ft    | none (SD).                                       |           |                         |           |  |
|                    | <b>Buffer Vegetation Type</b>               | <b>Trees</b>          | L % cover            | Invasive         | Conifer               | Deciduous   | R % cover  | Invasive  | Conifer                 | Deciduous |  |
|                    |   | <b>Shrubs / Saps.</b> | L % cover            | Invasive         | WADs                  | Saplings    | R % cover  | Invasive  | WADs                    | Saplings  |  |
|                    |   | <b>Herbs</b>          | L % cover            | Invasive         | Grasses               | Forbs       | R % cover  | Invasive  | Grasses                 | Forbs     |  |
| 3.3                | <b>Riparian Corridor (dom/sub)</b>          | <b>Left</b>           | forest shrub-sapling | crop/pasture/hay | commercial/industrial | residential | bare   | none (SD) |                         |           |  |
|                    |   | <b>Right</b>          | forest shrub-sapling | crop/pasture/hay | commercial/industrial | residential | bare   | none (SD) |                         |           |  |

4.1 Springs or Seeps: extensive / present / minimum / none / altered 4.2 Adjacent Wetlands: extensive / present / minimum/none/altered

4.3 Flow status: base / low / avg. 4.4 Current Debris Jams (FIT): # \_\_\_\_\_

Flood related jam yes/no ; If yes = Significant for (all that apply) habitat/channel adjustment / flood damage concerns

4.5 Flow Regs. & Withdrawals (FIT): TYPE: withdrawal / bypass / r-o-r / store & release / none / unk

SIZE : small / large ; USE: drinking / irrigation, flood-control / hydro-electric / recreation / other

4.6 Upstream/Downstream Flow Regs. : upstream / downstream / both / none

4.7 Stormwater Inputs (FIT): tile drain \_\_\_ / road ditch \_\_\_ / urban stormwater \_\_\_ / field ditch \_\_\_ / overland flow \_\_\_

4.8 Constrictions  none menu: instream culvert // bridge // old abutment // bedrock outcrop // other

| Constriction Type (from menu) | Width (ft) | Photo Yes / No | Problems (check all that apply) |                          |                  |                  |             |             |           |      |
|-------------------------------|------------|----------------|---------------------------------|--------------------------|------------------|------------------|-------------|-------------|-----------|------|
|                               |            |                | channel constriction            | floodprone constriction  | deposition above | deposition below | scour above | scour below | alignment | none |
|                               |            |                | <input type="checkbox"/>        | <input type="checkbox"/> |                  |                  |             |             |           |      |
|                               |            |                | <input type="checkbox"/>        | <input type="checkbox"/> |                  |                  |             |             |           |      |
|                               |            |                | <input type="checkbox"/>        | <input type="checkbox"/> |                  |                  |             |             |           |      |

4.9 Beaver Dams (FIT): # \_\_\_\_\_ ft. of the segment affected.  Bridge & Culvert Assessments

**5. Channel Bed and Planform Changes (5.0 to 5.3 record on tally sheet)**

5.4 Stream Ford or Animal Crossing (FIT): Yes / No

5.5 Channel Alterations (FIT) (circle all that apply): dredging gravel mining commercial mining none  
 Length of Straightening: \_\_\_\_\_ (With Windrowing : Yes / No) Alteration from Flood Work Yes/No

Flood Berms : material from channel / material pushed out of field / notes \_\_\_\_\_

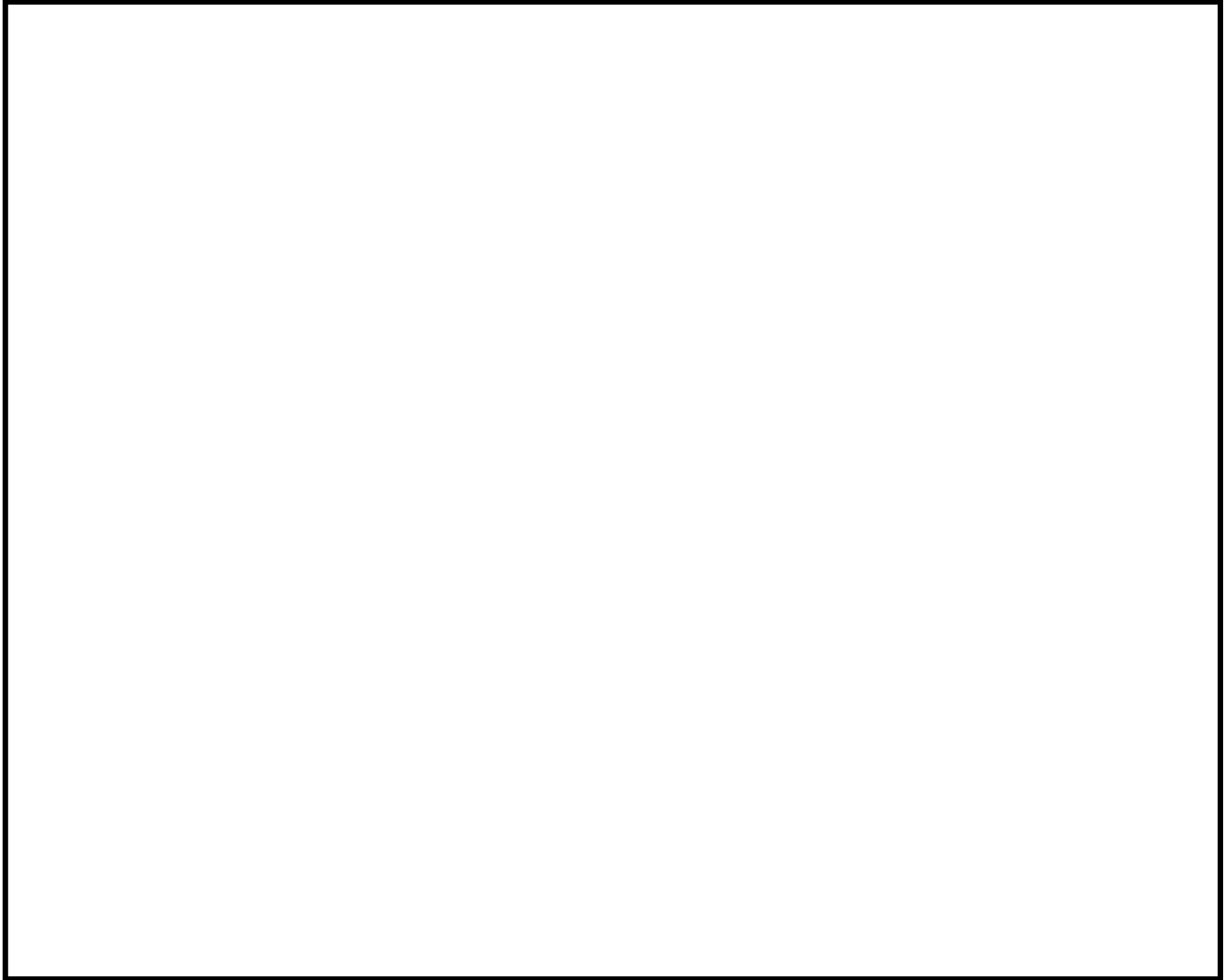
Comments:

# Sketch Form for Sites – Segments – Reaches

Stream Name: \_\_\_\_\_  
Date: \_\_\_\_\_  
Observers: \_\_\_\_\_  
Organization /Agency: \_\_\_\_\_

Segment or Site ID: \_\_\_\_\_  
Town: \_\_\_\_\_  
Elevation: \_\_\_\_\_ Ft.

**Site Sketch** - see reverse side for sketch codes and tally columns for left and right bank erosion, revetments, and corridor developments and calculating the total length of the segment affected by beaver flowages.



Height of bankfull features above water surface (Ft.)

\_\_\_\_\_ Selected BKF Height  
\_\_\_\_\_

**LWD tally  
Debris Jams  
Stormwater**


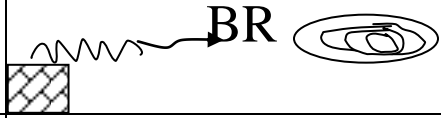
**Constrictions**

$\alpha$

# FIT Features

## Parameters

## Map Codes and Sketch Examples

|   |   |
|---|---|
| Alluvial Fan  | <b>AF</b>   |
| Bank Revetments   | <b>rprp</b> XXXXXXXX Rip Rap<br><b>trvt</b> XXXXXXXX Tree-revetment   |
| Bars and other Depositional Features  | <b>Pbr</b> Point Bar<br><b>Mbr</b> Mid-channel Bar<br><b>Dbr</b> Diagonal Bar<br><b>Dtbr</b> Delta Bar<br><b>Sbr</b> Side Bar <b>BS</b>  <b>-Bar</b> |
| Bed Features  | <b>Rf</b> Riffle <b>Stp</b> Step <b>P</b> Pool  |
| Bedrock   |  <b>BR</b>   |
| Benchmark Locations   | <b>BM</b>   |
| Berms   | <b>B</b>  |
| Buffers   | <b>Bfr</b> eeeeeeeeee   |
| Chutes, Cut-offs and Avulsions  | <b>FC</b> Flood Chutes<br><b>NC</b> Neck Cut-off<br><b>CA</b> Channel Avulsion  |
| Cross Section Locations and Number  | <b>CS#</b> __   |
| Culverts and Bridges  | <b>Cul</b> Culvert<br><b>Brg</b> Bridge   |
| Debris Jam Locations  | <b>DJ</b> Debris Jam  |
| Developments  | <b>D-R</b> Residential<br><b>D-C</b> Commercial / Industrial  |
| Eroding E <u>                        </u> Scale: <u>                        </u>    | <b>BF</b> Bank Failure<br><b>MF</b> Mass Failure  |
| Floodplains and Terraces  | <b>Fp</b> Floodplain<br><b>Tr</b> Terrace   |
| Flow Direction  |   |
| Flow Regulation or Withdrawal Structures  | <b>Dam</b><br><b>Weir</b> →<br><b>Snow</b> Snowmaking<br><b>Irrig</b> Irrigation  |
| Grade Controls  | <b>GC</b> (also note type of control)   |
| Head-cuts and Steep Riffles   | <b>HC</b> Head Cut<br><b>ST</b> Steep Riffle  |
| Longitudinal Profile  | <b>LP-start</b> and <b>LP-end</b>   |
| North Arrow   | <b>N</b>  |
| Pebble Count (mark start and end points)  | ↑            PC-start and PC-end  |
| Photo Points  | <b>P#</b> (# to correspond w/ photo log #)  |
| Reach and Segment start/end points<br>(also include reach number from Phase 1 data) | <b>R-start</b> and <b>S-start</b><br><b>R-end</b> and <b>S-end</b>  |
| Roads, Railroads, Improved Paths  | <b>RD</b> Roads<br><b>RR</b> Railroads<br><b>IP</b> Improved Path   |
| Seep / Spring   | <b>S</b>  |
| Stormwater Features   | <b>SI</b> Stormwater Input<br><b>G</b> Gully  |
| Stream Fords or Animal Crossings  | <b>SF</b> Stream Ford<br><b>AC</b> Animal Crossing  |
| Tributary   | <b>Trib</b>   |

List showing the field data that will need exact location in the FIT

| Impact                               | Shape    | Sub-Impact   |
|--------------------------------------|----------|--|
| Beaver Dam                           | Point    | N/A  |
| Cross Section Location               | Point    | NOT Representative<br>Representative   |
| Debris Jam                           | Point    | N/A  |
| Gully                                | Point    | N/A  |
| Mass Failure                         | Polyline | N/A  |
| Steep Riffle or Head Cut             | Point    | Head Cut<br>Steep Riffle   |
| Storm Water Input                    | Point    | Field Ditch<br>Other<br>Overland Flow<br>Road Ditch<br>Tile Drain<br>Urban Storm Water Pipe  |
| Stream Crossing                      | Point    | Animal Crossing<br>Stream Ford   |
| PHASE 1 UPDATE                       |          |  |
| Alluvial Fan                         | Point    | N/A  |
| Bank Armoring or Revetment           | Polyline | Rip-Rap<br>Hard Bank<br>Other  |
| Bridge and Culvert                   | Point    | Bridge<br>Culvert<br>Other   |
| Buffer Less than 25 feet             | Polyline | N/A  |
| Development                          | Polyline | N/A  |
| Dredging                             | Polyline | Commercial Mining<br>Dredging<br>Gravel Mining   |
| Encroachment                         | Polyline | Berm<br>Improved Path<br>Railroad<br>Road  |
| Erosion                              | Polyline | N/A  |
| Flow Regulation and Water Withdrawal | Point    | Large Bypass<br>Large Run of River<br>Large Store and Release<br>Large Withdrawal<br>Small Bypass<br>Small Run of River<br>Small Store and Release<br>Small Withdrawal |
| Grade Control                        | Point    | Dam<br>Ledge<br>Waterfall<br>Weir  |
| Migration                            | Point    | Avulsion<br>Braiding<br>Flood Chute<br>Neck Cutoff   |
| Straightening                        | Polyline | Straightening<br>With Windrowing   |

**Database - Photo Log**

Photo ID: \_\_\_\_\_  
Photo Date: \_\_\_\_\_  
Photographer: \_\_\_\_\_

Photo Type: aerial photo / digital photo / referenced aerial  
Site Type: degraded / gage / reference / restoration  
Instability Type: dimension / hydrology / lateral / pattern  
profile / sediment regime  
Management Activities: floodplain / in channel /  
riparian / watershed

Site ID (If location is in Sites table): \_\_\_\_\_  
Stream Name: \_\_\_\_\_  
Town: \_\_\_\_\_  
Waterbody ID: \_\_\_\_\_  
Valley Type: \_\_\_\_\_  
XS #: \_\_\_\_\_

- Graphic Enhanced
- Clear Bankfull Indicators
- People
- Structure
- Monitoring Photo point

**Database - Photo Log**

Photo ID: \_\_\_\_\_  
Photo Date: \_\_\_\_\_  
Photographer: \_\_\_\_\_

Photo Type: aerial photo / digital photo / referenced aerial  
Site Type: degraded / gage / reference / restoration  
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Site ID (If location is in Sites table): \_\_\_\_\_  
Stream Name: \_\_\_\_\_  
Town: \_\_\_\_\_  
Waterbody ID: \_\_\_\_\_  
Valley Type: \_\_\_\_\_  
XS #: \_\_\_\_\_

- Graphic Enhanced
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Stream Name: \_\_\_\_\_  
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Valley Type: \_\_\_\_\_  
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- People
- Structure
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profile / sediment regime  
Management Activities: floodplain / in channel /  
riparian / watershed

Site ID (If location is in Sites table): \_\_\_\_\_  
Stream Name: \_\_\_\_\_  
Town: \_\_\_\_\_  
Waterbody ID: \_\_\_\_\_  
Valley Type: \_\_\_\_\_  
XS #: \_\_\_\_\_

- Graphic Enhanced
- Clear Bankfull Indicators
- People
- Structure
- Monitoring Photo point





# Tally Sheet (page 1)

Stream Name: \_\_\_\_\_  
 Location: \_\_\_\_\_

Segment I.D.: \_\_\_\_\_  
 Date: \_\_\_\_\_

Sub-Reach

**Step 2.1 Height of bankfull above water surface**

| Bankfull Height | Chan. Wdth | Comments (describe indicators) |
|-----------------|------------|--------------------------------|
|                 |            |                                |
|                 |            |                                |
|                 |            |                                |
|                 |            |                                |
|                 |            |                                |

**Step 5. Channel Bed and Planform Changes**

| Record actual number of features |                                  |               | Tally    |
|----------------------------------|----------------------------------|---------------|----------|
| 5.1                              | Depositional Features (Bar Type) | Mid           |          |
|                                  |                                  | Point         |          |
|                                  |                                  | Side          |          |
|                                  |                                  | Diagonal      |          |
|                                  |                                  | Delta         |          |
|                                  |                                  | Island        |          |
| 5.2 FIT                          | Flood Chutes                     |               |          |
|                                  | Neck Cut-offs                    |               |          |
|                                  | Channel Avulsions                |               |          |
|                                  | Braiding                         |               |          |
|                                  | Migration                        |               |          |
| 5.3 FIT                          | Aggrade                          | Steep Riffles |          |
|                                  | Degrade                          | Head Cuts     |          |
| Tributary Rejuvenation?          |                                  |               | Yes / No |

**Step 3.1 Bank Erosion FIT**

| Left Bank Length | Height      | Right Bank Length | Height      |
|------------------|-------------|-------------------|-------------|
|                  |             |                   |             |
|                  |             |                   |             |
|                  |             |                   |             |
|                  |             |                   |             |
|                  |             |                   |             |
|                  |             |                   |             |
|                  |             |                   |             |
|                  |             |                   |             |
|                  |             |                   |             |
|                  |             |                   |             |
| <b>Total:</b>    | <b>Avg.</b> | <b>Total:</b>     | <b>Avg.</b> |

**Step 3.3 Mass Failures and Gullies FIT**

| Mass Fail - Length |       | Height | Gully - Length |       | Length |
|--------------------|-------|--------|----------------|-------|--------|
| Left               | Right |        | Left           | Right |        |
|                    |       |        |                |       |        |
|                    |       |        |                |       |        |
|                    |       |        |                |       |        |
|                    |       |        |                |       |        |
|                    |       |        |                |       |        |
|                    |       |        |                |       |        |
|                    |       |        |                |       |        |
|                    |       |        |                |       |        |
|                    |       |        |                |       |        |
|                    |       |        |                |       |        |

| Step 3.1 Bank Revetment FIT Length |               |
|------------------------------------|---------------|
| Left Bank                          | Right Bank    |
|                                    |               |
|                                    |               |
|                                    |               |
|                                    |               |
|                                    |               |
|                                    |               |
|                                    |               |
|                                    |               |
|                                    |               |
|                                    |               |
|                                    |               |
| <b>Total:</b>                      | <b>Total:</b> |

**Step 4.8 Channel Constrictions**

| Constriction Type | Width | Photo? | GPS? | Ch. Constr. | FP. Constr. | DA | DB | SA | SB | A | None |
|-------------------|-------|--------|------|-------------|-------------|----|----|----|----|---|------|
| 1.)               |       |        |      |             |             |    |    |    |    |   |      |
| 2.)               |       |        |      |             |             |    |    |    |    |   |      |
| 3.)               |       |        |      |             |             |    |    |    |    |   |      |
| 4.)               |       |        |      |             |             |    |    |    |    |   |      |
| 5.)               |       |        |      |             |             |    |    |    |    |   |      |

**Tally**

|           |                              |   |
|-----------|------------------------------|---|
| Step 2.12 | <b>Large Woody Debris</b>    |   |
| Step 4.4  | <b>Debris Jams</b>           |   |
| Step 2.11 | <b>Riffle/Step Spacing:</b>  |   |
| Step 2.13 | <b>Avg. Largest Particle</b> | <b>On Bed:                      On Bar:</b> |

**Step 1.3 River Corridor Encroachments FIT**

| Type | Length   |            | Height of Fill |
|------|----------|------------|----------------|
|      | One Side | Both Sides |                |
|      |          |            |                |
|      |          |            |                |
|      |          |            |                |
|      |          |            |                |
|      |          |            |                |

**Step 4.6 Stormwater FIT**

**Tally**

|                         |  |
|-------------------------|--|
| <b>Field Ditch</b>      |  |
| <b>Overland Flow</b>    |  |
| <b>Road Ditch</b>       |  |
| <b>Tile Drain</b>       |  |
| <b>Urban Stormwater</b> |  |
| <b>Other</b>            |  |

# Tally Sheet (page 2)

Stream Name: \_\_\_\_\_  
 Location: \_\_\_\_\_

Segment I.D.: \_\_\_\_\_  
 Date: \_\_\_\_\_

Sub-Reach

Note CPOM, algae, location of fines

### 6.1 Large Woody Debris and Jams

| Rank                        | D <sub>large</sub> (ft) | L (w <sub>bkf</sub> ) | Tally | # | % |
|-----------------------------|-------------------------|-----------------------|-------|---|---|
| 1                           | 0.5 - 1.0               | < 0.5                 |       |   |   |
| 2                           | 0.5 - 1.0               | > 0.5                 |       |   |   |
| 3                           | 1.0 - 2.0               | < 0.5                 |       |   |   |
| 4                           | 1.0 - 2.0               | > 0.5                 |       |   |   |
| 5                           | > 2.0                   | < 0.5                 |       |   |   |
| 6                           | > 2.0                   | > 0.5                 |       |   |   |
| <b>Total LWDs</b>           |                         |                       |       |   |   |
| <b># LWDs / mile</b>        |                         |                       |       |   |   |
| <b># Debris jams</b>        |                         |                       |       |   |   |
| <b># Debris jams / mile</b> |                         |                       |       |   |   |

### 6.2 Pools (note vegetative cover, surface turbulence, fines)

| Rank                  | D (ft)    | L, W (w <sub>bkf</sub> ) | Tally | # | % |
|-----------------------|-----------|--------------------------|-------|---|---|
| 1                     | 1.0 - 2.0 | < 0.5                    |       |   |   |
| 2                     | 1.0 - 2.0 | > 0.5                    |       |   |   |
| 3                     | 2.0 - 3.0 | < 0.5                    |       |   |   |
| 4                     | 2.0 - 3.0 | > 0.5                    |       |   |   |
| 5                     | > 3.0     | < 0.5                    |       |   |   |
| 6                     | > 3.0     | > 0.5                    |       |   |   |
| 7                     | > 3.0     | ≥ 1.0                    |       |   |   |
| <b>Total pools</b>    |           |                          |       |   |   |
| <b># Pools / mile</b> |           |                          |       |   |   |

### 6.3 Refuge Areas / Connections

| ID | Location | Q <sub>access</sub> | Notes |
|----|----------|---------------------|-------|
|    | in / out | low / bkf           |       |
|    | in / out | low / bkf           |       |
|    | in / out | low / bkf           |       |
|    | in / out | low / bkf           |       |
|    | in / out | low / bkf           |       |
|    | in / out | low / bkf           |       |
|    | in / out | low / bkf           |       |

### 6.4 Undercut Banks (note stability, overhanging vegetation)

| Rank                           | D <sub>max</sub> (ft) | L (ft) | Tally | # | % |
|--------------------------------|-----------------------|--------|-------|---|---|
| 1                              | 0.5 - 1.0             | < 2.0  |       |   |   |
| 2                              | 0.5 - 1.0             | > 2.0  |       |   |   |
| 3                              | 1.0 - 2.0             | < 2.0  |       |   |   |
| 4                              | 1.0 - 2.0             | > 2.0  |       |   |   |
| 5                              | > 2.0                 | < 2.0  |       |   |   |
| 6                              | > 2.0                 | > 2.0  |       |   |   |
| <b>Total undercuts</b>         |                       |        |       |   |   |
| <b># undercut banks / mile</b> |                       |        |       |   |   |

# Cross-Section Worksheet

Stream Name: \_\_\_\_\_  
 Reach-Segment: \_\_\_\_\_  
 Location: \_\_\_\_\_  
 Date: \_\_\_\_\_  
 Observers: \_\_\_\_\_

### Cross-Section Notes Codes

|                                     |                            |                  |
|-------------------------------------|----------------------------|------------------|
| LTER = Left Terrace                 | RTER = Right Terrace       | TW = Thalweg     |
| LFPA = Left Flood Plane             | RFPA = Right Flood Plane   | LPIN = Left Pin  |
| LTOB = Left Top of Bank             | RTOB = Right Top of Bank   | RPIN = Right Pin |
| LBF = Left Bankfull Stage           | RBF = Right Bankfull Stage |                  |
| LEW = Left Edge of Water            | REW = Right Edge of Water  |                  |
| RAF = Recently Abandoned Floodplain |                            |                  |

## Cross-sections - Number and Location Description: (bkf height = \_\_\_\_\_)

| Note | Distance | Depth | Note | Distance | Depth | Note | Distance | Depth |
|------|----------|-------|------|----------|-------|------|----------|-------|
|      |          |       |      |          |       |      |          |       |
|      |          |       |      |          |       |      |          |       |
|      |          |       |      |          |       |      |          |       |
|      |          |       |      |          |       |      |          |       |
|      |          |       |      |          |       |      |          |       |
|      |          |       |      |          |       |      |          |       |
|      |          |       |      |          |       |      |          |       |
|      |          |       |      |          |       |      |          |       |
|      |          |       |      |          |       |      |          |       |
|      |          |       |      |          |       |      |          |       |
|      |          |       |      |          |       |      |          |       |
|      |          |       |      |          |       |      |          |       |
|      |          |       |      |          |       |      |          |       |
|      |          |       |      |          |       |      |          |       |
|      |          |       |      |          |       |      |          |       |
|      |          |       |      |          |       |      |          |       |
|      |          |       |      |          |       |      |          |       |
|      |          |       |      |          |       |      |          |       |
|      |          |       |      |          |       |      |          |       |
|      |          |       |      |          |       |      |          |       |
|      |          |       |      |          |       |      |          |       |
|      |          |       |      |          |       |      |          |       |

|   |   |   |
|---|---|---|
| Bankfull Width _____                    | Bankfull Width _____                    | Bankfull Width _____                    |
| Max. Depth _____                        | Max. Depth _____                        | Max. Depth _____                        |
| Mean Depth _____                        | Mean Depth _____                        | Mean Depth _____                        |
| Floodprone Width _____                  | Floodprone Width _____                  | Floodprone Width _____                  |
| Low Bank Height _____                   | Low Bank Height _____                   | Low Bank Height _____                   |
| Width/depth Ratio _____                 | Width/depth Ratio _____                 | Width/depth Ratio _____                 |
| Entrenchment _____                      | Entrenchment _____                      | Entrenchment _____                      |
| Incision Ratio _____                    | Incision Ratio _____                    | Incision Ratio _____                    |
| IRhef _____                             | IRhef _____                             | IRhef _____                             |
| Wetted Width _____                      | Wetted Width _____                      | Wetted Width _____                      |
| Ratio ( $W_{wetted} / W_{bkf}$ ): _____ | Ratio ( $W_{wetted} / W_{bkf}$ ): _____ | Ratio ( $W_{wetted} / W_{bkf}$ ): _____ |
| *Channel Enlargement _____              | * Channel Enlargement _____             | * Channel Enlargement _____             |
| XS Changed by Flooding Yes/No _____     | XS Changed by Flooding Yes/No _____     | XS Changed by Flooding Yes/No _____     |
| Altered by Flood Work Yes/No _____      | Altered by Flood Work Yes/No _____      | Altered by Flood Work Yes/No _____      |

Drawing of Typical Cross-Section \* channel enlargement measure ( $E = A_{tob}/A_{curve} \times 100$ )

### Bed Substrate Composition

| Size Class               | Millimeters | Inches      | Relative Size              |     |     | Distribution of 100 Particles |     |     |     |     | Percent |
|--------------------------|-------------|-------------|----------------------------|-----|-----|-------------------------------|-----|-----|-----|-----|---------|
| 1-Bedrock                | > 4096      | > 160       | Bigger than a VW Bug       |     |     |                               |     |     |     |     |         |
| 2-Boulder                | 256 – 4096  | 10.1 – 160  | Basketball to VW Bug       |     |     |                               |     |     |     |     |         |
| 3-Cobble                 | 64 – 256    | 2.5 – 10.1  | Tennis ball to basketball  |     |     |                               |     |     |     |     |         |
| 4-Coarse Gravel          | 16 – 64     | 0.63 – 2.5  | Marble to tennis ball      |     |     |                               |     |     |     |     |         |
| 4-Fine Gravel            | 2 – 16      | 0.08 – 0.63 | Pepper corn to marble      |     |     |                               |     |     |     |     |         |
| 5-Sand or Smaller        | < 2.00      | < 0.08      | Smaller than a pepper corn |     |     |                               |     |     |     |     |         |
| Embeddedness             | Ch1         | Ch2         | Ch3                        | Ch4 | Ch5 | Ma1                           | Ma2 | Ma3 | Ma4 | Ma5 |         |
| Largest mobile particles | Bd1         | Bd2         | Bd3                        | Bd4 | Bd5 | Br1                           | Br2 | Br3 | Br4 | Br5 |         |

# Step 1: Valley and Floodplain Corridor – Quick Refer Menus and Tables

## 1.1 SEGMENTATION

|           |                                    |
|-----------|------------------------------------|
| <b>GC</b> | Grade Control                      |
| <b>CD</b> | Channel Dimensions                 |
| <b>SS</b> | Substrate Size                     |
| <b>PS</b> | Planform and Slope                 |
| <b>DF</b> | Depositional Features              |
| <b>CE</b> | Corridor Encroachments             |
| <b>BB</b> | Banks and Buffers                  |
| <b>FS</b> | Flow Status                        |
| <b>PA</b> | Property Access                    |
| <b>OT</b> | Other Reason – Explain in Comments |
| None      | No segments                        |

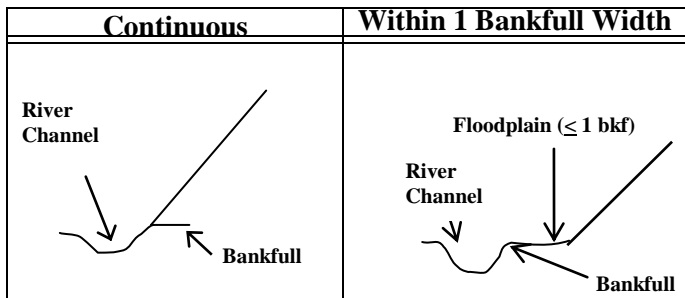
## 1.2 ALLUVIAL FAN

|                |   |
|----------------|---|
| <b>Yes</b>     | Segment or reach potentially on alluvial fan.             |
| <b>No</b>      | Segment or reach not potentially on alluvial fan.         |
| <b>Unknown</b> | Unknown whether the segment is located on an alluvial fan |

## 1.3 CORRIDOR ENCROACHMENTS

|            |   |
|------------|---|
| <b>Yes</b> | Encroachment within the corridor            |
| <b>No</b>  | Encroachment <u>not</u> within the corridor |

## 1.4 ADJACENT SIDE SLOPE



| Classification         | Percent Slope |
|------------------------|---------------|
| <b>Flat</b>            | 0-3%          |
| <b>Hilly</b>           | 4-8%          |
| <b>Steep</b>           | 9-15%         |
| <b>Very Steep</b>      | 16-25%        |
| <b>Extremely Steep</b> | >25%          |

### Slope Texture

|                   |                      |               |               |                           |
|-------------------|----------------------|---------------|---------------|---------------------------|
| <b>Bedrock</b>    | <b>Boulder</b>       | <b>Cobble</b> | <b>Gravel</b> | <b>Sand</b>               |
| <b>Silt /Clay</b> | <b>Mixed Texture</b> |               | <b>Other</b>  | <b>Not Evaluated (NE)</b> |

## 1.5 CONFINEMENT

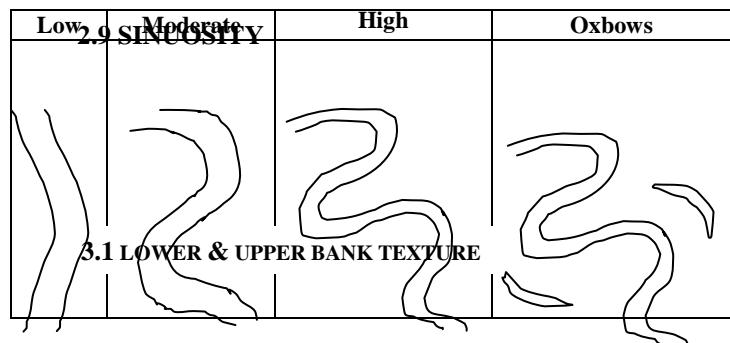
| Valley Description       | Valley Width / Channel Width Ratio               |
|--------------------------|--|
| <b>Narrowly Confined</b> | ≥1 and < 2                                       |
| <b>Semi Confined</b>     | ≥2 and <4  |
| <b>Narrow</b>            | ≥4 and <6  |
| <b>Broad</b>             | ≥6 and <10                                       |
| <b>Very Broad</b>        | ≥10 with abandoned terraces on one or both sides |

## 1.6 GRADE CONTROLS

|                   |  |
|-------------------|--|
| <b>Waterfalls</b> | Bedrock that extends across the channel and forms a vertical, or near vertical, drop in the channel bed, usually ≥ 2 feet high.                        |
| <b>Ledge</b>      | Bedrock that extends across the channel and forms no noticeable drop in the channel bed, or only a gradual drop in the channel bed, usually < 2' high. |
| <b>Dams</b>       | High cross-channel structures.   |
| <b>Weirs</b>      | Low cross-channel structures.  |

- 2.6 WIDTH / DEPTH RATIO:** Divide the bankfull width (2.1) by the mean depth (2.3)
- 2.7 ENTRENCHMENT RATIO:** Divide flood-prone width (2.4) by the bankfull width (2.1)
- 2.8 INCISION RATIO:** Divide the low bank height (2.5) by the bankfull maximum depth (2.2)

3.1 TYPICAL BANK SLOPE



3.1 BANK REVETMENTS

|                       |   |
|-----------------------|---|
| <b>Complete</b>       | channel and are perpendicular, or slightly askew, to the channel banks or steps completely cross the channel banks  |
| <b>Eroded</b>         | Including partially eroded riffles/steps that do not completely cross the channel (scour process). Predominately runs, riffles/steps washing out or not present, as seen in a sediment limited reach or where bed degradation is occurring.                                 |
| <b>Sedimented</b>     | Including steep diagonal or transverse riffle/step features that cross the channel at a sharp angle in relation to the channel banks (depositional process). Riffles/steps may appear continuous, as seen during an aggradation process, and appearing on a same plane bed. |
| <b>Not Applicable</b> | 3.2 BUFFER WIDTH appear in ripple dune and plane bed streambed types.   |
| <b>Not Evaluated</b>  | Riffles and steps were not evaluated for completeness – Comment on reason.  |

2.11 Riffle / Step Spacing

|                         | Spacing                                  |
|-------------------------|--|
| Cascade / Step-pool     | A<br>1-3 times $W_{bkf}$                 |
| Step / Riffle-pool      | B<br>3-5 times $W_{bkf}$                 |
| Riffle-pool             | C & E<br>5-7 times $W_{bkf}$             |
| Plane bed / Ripple-dune | any<br>Riffles and steps are not present |

2.12 BED SUBSTRATE COMPOSITION

|                  | Relative Size |            |                              |
|------------------|---------------|------------|------------------------------|
| <b>1-Bedrock</b> | > 4096        | > 160      | Bigger than a Volkswagen Bug |
| <b>2-Boulder</b> | 256 – 4096    | 10.1 - 160 | Basketball to Volkswagen Bug |
| <b>3-Cobble</b>  | 64 – 256      | 2.5 - 10.1 | Tennis ball to basketball    |
| <b>4-Gravel</b>  | 2 – 64        | 0.1 – 2.5  | Pepper corn to tennis ball   |
| <b>5-Sand</b>    | 0.062 – 2.00  | 0.002 -0.1 | Smaller than a pepper corn   |
| <b>6 – Silt</b>  | <.062         | <.08       |                              |

2.14 STREAM TYPE

| 3.1 BANK VEGETATION TYPE   | trenchment (+ or - 0.2)  | (2) Width/d (+ or - 2) | 3.2 BUFFER VEGETATION TYPE (+ or - 0.2) | (See Note)   | Slope Subscript | Slope % |
|----------------------------|--|------------------------|---|--------------|-----------------|---------|
| <b>A – Single Thread</b>   | <1.4 - Entrenched  | <12 – Low              | <1.2 – Low                              | <b>4-10</b>  | a               | 4-10    |
| <b>G – Single Thread</b>   | <1.4 - Entrenched  | <12 – Low              | >1.2 – Low to Mod.                      | <b>2-4</b>   | b               | 2-4     |
| <b>F – Single Thread</b>   | <1.4 - Entrenched  | >12 – Mod. to High     | >1.2 – Low to Mod.                      | <b>&lt;4</b> | c               | <2      |
| <b>B – Single Thread</b>   | 1.4 -2.2 – Moderately Entrenched   | >12 – Moderate         | >1.2 – Low to Mod.                      | <b>2-4</b>   |                 |         |
| <b>E – Single Thread</b>   | >2.2 – Slightly Entrenched   | <12 – Very Low         | >1.5 – Very High                        | <b>&lt;2</b> |                 |         |
| <b>C – Single Thread</b>   | >2.2 – Slightly Entrenched   | >12 – Mod. to High     | >1.2 – Moderate                         | <b>&lt;2</b> |                 |         |
| <b>D – Multiple Thread</b> |  | >40 – Very high        | <1.2 - Low                              | <b>&lt;4</b> |                 |         |
| <b>Cascade</b>             | Generally occur in very steep channels, narrowly confined by valley walls. Characterized by longitudinally and laterally disorganized bed materials, typically bedrock, boulders, and cobbles. Small, partial channel-spanning pools spaced < 1 channel width apart common.  |                        |   |              |                 |         |
| <b>Step-Pool</b>           | Often associated with steep channels, low width/depth ratios and confining valleys. Characterized by longitudinal steps formed by large particles (boulder/cobbles) organized into discrete channel-spanning accumulations that separate pools, which contain smaller sized materials. Step-pool systems exhibit pool spacing of 1 to 4 channel widths.  |                        |   |              |                 |         |
| <b>Plane Bed</b>           | Occur in moderate to high gradient and relatively straight channels, have low width/depth ratios, and may be either unconfined or confined by valley walls. Composed of sand to small boulder-sized particles, but dominated by gravel and cobble substrates. Channel lacks discrete bed features (such as pools, riffles, and point bars) and may have long stretches of featureless bed.                                     |                        |   |              |                 |         |
| <b>Riffle-Pool</b>         | Occur in moderate to low gradient and moderately sinuous channels, generally in unconfined valleys, and has well-established floodplain. Channel has undulating bed that defines a sequence of bars, pools, and riffles. Pools spaced every 5 to 7 channel widths in a self-formed e-pool channel.   |                        |   |              |                 |         |
| <b>3.1 BANK CANOPY</b>     | iated with low gradient and highly sinuous channels. Dominated by sand-sized substrates. Channel may exhibit point bars or other bedforms forced by channel geometry. Typically undulating bed does not establish distinct pools and riffles.  |                        |   |              |                 |         |
| <b>Dune-Ripple</b>         |  |                        |   |              |                 |         |
| <b>Bedrock</b>             | Lack a continuous alluvial bed. Some alluvial material may be temporarily stored in scour holes, or behind obstructions. Often confined by valley walls.   |                        |   |              |                 |         |
| <b>Braided</b>             | Multiple channel system found on steep depositional fans and deltas. Channel gradient is generally the same as the valley slope. Ongoing deposition leads to high bank erosion rates. Bed features result from the convergence/divergence process of local bed scour and sediment deposition. Unvegetated islands may shift position frequently during runoff events. High bankfull widths and very low meander (belt) widths. |                        |   |              |                 |         |

## 4.2 ADJACENT WETLAND

|                 |                                      |
|-----------------|--------------------------------------|
| <b>Undercut</b> | upper bank overhanging the streambed |
| <b>Shallow</b>  | bank slope (<30%)                    |
| <b>Moderate</b> | bank slope (31-50%)                  |
| <b>Steep</b>    | bank slope (>51%)                    |

## 4.1 SPRING, SEEPS AND TRIBUTARIES

|                  |   |
|------------------|---|
| <b>Rip-rap</b>   | Blanket of rock covering the bank, usually large angular boulders   |
| <b>Hard Bank</b> | Walls of large rocks, concrete blocks or rectangular gabion wire baskets (filled with stone) lining banks |
| <b>Other</b>     | e.g.: tree revetments or vanes intended to stop the lateral erosion of the stream channel                 |
| <b>None</b>      | No bank revetments observed   |

|                       |  |
|-----------------------|--|
| <b>Bedrock</b>        | Very resistant to erosion  |
| <b>Boulder/Cobble</b> | (boulders > 10 inches / cobbles 2.5 to 10 inches) Moderately resistant to erosion  |
| <b>Gravel</b>         | (0.1 to 2.5 inches) Moderate to high bank erodibility when present as dominant component or as part of the bank materials            |
| <b>Sand</b>           | High bank erodibility when present as dominant component or as part of the bank materials  |
| <b>Silt/Clay</b>      | Non-cohesive silt has very high / extreme bank erodibility; while cohesive clays are relatively resistant to erosion                 |
| <b>Mix</b>            | Variety of particle sizes present from very small to very large. Glacial till may be an example of mixed bank materials (Figure 3.3) |

|                    |
|--------------------|
| <b>0 – 25 ft.</b>  |
| <b>26 – 50 ft.</b> |
| <b>51 – 100 ft</b> |
| <b>&gt; 100 ft</b> |

|                        |   |
|------------------------|---|
| <b>Coniferous</b>      | Trees that keep their leaves year round i.e. pine, cedar, hemlock   |
| <b>Deciduous</b>       | Trees that lose their leaves seasonally i.e. elm, butternut, maple, oak   |
| <b>Shrubs-saplings</b> | Small trees, saplings, and brush species, such as alder, willows, sumac, and dogwood  |
| <b>Herbaceous</b>      | Native grasses, rushes and sedges, & plants such as asters, goldenrod   |
| <b>Lawn</b>            | Mowed lawn  |
| <b>Pasture</b>         | Land managed for grazing livestock  |
| <b>Bare</b>            | Bare soil, no or very sparse vegetation. This does not pertain to unvegetated features such as point-bars, mid-channel bars or shoals.    |
| <b>Invasives</b>       | Non-native invasive plant species: Phragmites, Japanese knotweed, Purple looestrife, Honeysuckle (note there are native honeysuckles too) |

|                        |   |
|------------------------|---|
| <b>Coniferous</b>      | Trees that keep their leaves year round. i.e. pine, cedar, hemlock  |
| <b>Deciduous</b>       | Trees that lose their leaves seasonally. i.e. elm, butternut, maple, oak  |
| <b>Mixed Trees</b>     | A fairly even mix of conifers and deciduous trees   |
| <b>Shrubs-Saplings</b> | Small trees, saplings, and brush species, such as alder, willows, sumac, and dogwood  |
| <b>Herbaceous</b>      | Native grasses, rushes and sedges, & plants such as asters, goldenrod   |
| <b>Invasives</b>       | Non-native invasive plant species: Phragmites, Japanese knotweed, Purple looestrife, Honeysuckle (note there are native honeysuckles too) |
| <b>None</b>            | No buffer present, bare ground up to the top of the bank  |

## 3.3 RIPARIAN CORRIDOR

|                   |                               |
|-------------------|-------------------------------|
| <b>76 – 100 %</b> | canopy over stream channel    |
| <b>51 – 75%</b>   | canopy over stream channel    |
| <b>26 – 50%</b>   | canopy over stream channel    |
| <b>1 – 25 %</b>   | canopy over stream channel    |
| <b>0 %</b>        | no canopy over stream channel |

|                              |  |
|------------------------------|--|
| <b>Forest</b>                | Woodlands of deciduous or coniferous trees   |
| <b>Shrub-sapling</b>         | Fallow field or wetland  |
| <b>Crop Pasture Hay</b>      | Agricultural lands planted in row crops, mowed as a hay field, or pastured with livestock. Circle the appropriate type of agriculture. |
| <b>Commercial Industrial</b> | Retail businesses with land developed for buildings, roads, and parking areas  |
| <b>Residential</b>           | Land developed with houses, lawns, and driveways   |
| <b>Bare</b>                  | Bare soil, no or very sparse vegetation. Pertains to gravel pits, construction sites, and similar bare ground                          |

## Step 4: Flow Modifiers – Quick Refer Menus and Tables

|                 |  |
|-----------------|--|
| <b>Abundant</b> | Numerous small tributaries, springs and/or seeps entering the segment (reach)    |
| <b>Minimal</b>  | Infrequent small tributaries, springs and/or seeps entering the segment (reach)  |
| <b>None</b>     | No small tributaries, springs and/or seeps observed entering the segment (reach) |

|                 |   |
|-----------------|---|
| <b>Abundant</b> | Extensive wetlands present along stream site.                     |
| <b>Minimal</b>  | Wetlands present but to small extent along stream segment (reach) |
| <b>None</b>     | No wetlands observed along stream segment (reach)                 |

### 4.3 STAGE

|                 |   |
|-----------------|---|
| <b>Low</b>      | Flow in channel low due to drought conditions   |
| <b>Moderate</b> | Flow in channel is typical summer flows         |
| <b>High</b>     | Flow in channel is high as a result of flooding |

### 4.6 UPSTREAM FLOW REGULATION OR WATER WITHDRAWAL

|                   |   |
|-------------------|---|
| <b>Upstream</b>   | Flow regulation or water withdrawal upstream affecting the reach.                     |
| <b>Downstream</b> | Flow regulation or water withdrawal downstream affecting the reach.                   |
| <b>Both</b>       | Flow regulation or water withdrawal both upstream and downstream affecting the reach. |

### 4.8 CHANNEL CONSTRICTIONS

|                          |  |
|--------------------------|--|
| <b>Instream culverts</b> | Structures under a transportation route through which the stream flows   |
| <b>Bridges</b>           | Structures under a transportation route under which the stream flows   |
| <b>Old abutments</b>     | Bridge abutments that no longer have a travel deck between them.   |
| <b>Bedrock outcrops</b>  | Bedrock outcrops on both the right and left banks between which the stream flows   |
| <b>Other</b>             | Other built structures that constrict the channel, for instance rock rip-rap or gabions on both banks that constrict flood flows |
| <b>None</b>              | No structures or features exist within the segment (or reach) that constricts the bankfull or floodprone widths or flows         |

### 4.5 FLOW REGULATION

#### TYPE:

|                   |  |
|-------------------|--|
| Withdrawal        | A withdrawal of water from the stream  |
| Bypass            | The water is diverted away from the channel and re-enters down stream.   |
| Run of River      | Upstream or in reach flows are impounded. Flow quantity spilling or released below the dam is the same as flow quantity entering the impoundment at all times. |
| Store and Release | Water is impounded and stored and released only during certain times.  |
| None              | No known flow regulation or water withdrawals. Select “none” if you have completed the appropriate research and have found no evidence of flow regulations.    |
| No Data           | No data sources are available to determine if a flow regulation or water withdrawal exists.  |
| Not Evaluated     | All data sources (as described by the meta data) HAVE NOT been evaluated.  |

#### SIZE:

|       |   |
|-------|---|
| Small | Impoundments not much wider than river itself or withdrawals not affecting the channel forming flow.                              |
| Large | Impoundments much wider than river itself (creating a reservoir) or withdrawals significantly affecting the channel forming flow. |

## Step 5: Channel Bed and Planform Changes – Quick Refer Menus and Tables

### 5.1 BED SEDIMENT STORAGE AND BAR TYPES

|                       |  |
|-----------------------|--|
| <b>Mid-Channel</b>    | Sediment deposits in the middle of the channel with split flow   |
| <b>Point</b>          | Unvegetated sediment deposits located on inside of channel meander bend  |
| <b>Side (Lateral)</b> | Unvegetated sediment deposits located along the margins of the channel in locations other than the inside of channel meander bends |
| <b>Diagonal</b>       | Bars that cross the channel at sharp oblique angles, associated with transverse riffles  |
| <b>Delta</b>          | Sediment deposits where tributary enters the mainstem.   |
| <b>Islands</b>        | Well vegetated mid-channel deposits of sediment  |
| <b>None</b>           | No deposits of sediment evident.   |

### 5.4: CHANNEL ALTERATIONS

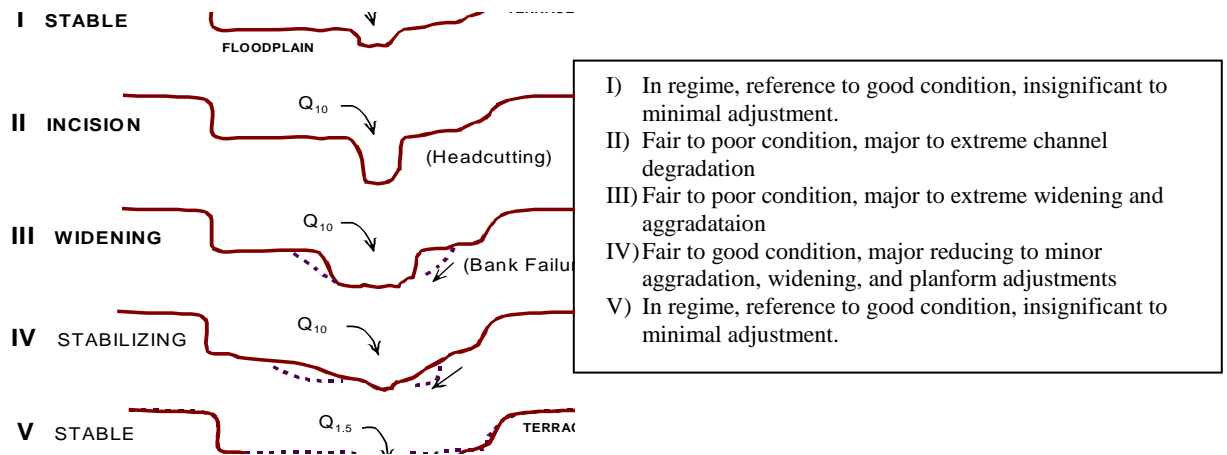
|                                     |  |
|-------------------------------------|--|
| <b>Dredging</b>                     | Evidence of removal of sediments and other material from the channel.  |
| <b>Commercial Mining</b>            | Historic (pre-1988) large-scale commercial extraction of gravel from channel.  |
| <b>Bar scalping / gravel mining</b> | Bar scalping: gravel has been removed from the top of bars.<br>Gravel mining: gravel has been removed from bars or bed of river. |
| <b>None</b>                         | No evidence that any channel alterations have been done  |

### 5.5 CHANNEL STRAIGHTENING

|                        |  |
|------------------------|--|
| <b>Straightening</b>   | Evidence that there has been the removal of meander bends and realignment of channel. Historically done in village centers and along roadways, railroads, and agricultural fields. |
| <b>With Windrowing</b> | Pushing gravel up from the stream bed onto the top of either bank as a part of the straightening of the river.   |

## Step 7: Rapid Geomorphic Assessment - Quick Refer Menus and Tables

### 7.5 Channel Adjustment Process



Schumm Channel Evolution Model – See Appendix C for Vermont modified versions

### 7.6 Stream Condition

|                    |                     |
|--------------------|---------------------|
| <b>0.85 – 1.0</b>  | Reference Condition |
| <b>0.65 – 0.84</b> | Good Condition      |
| <b>0.35 – 0.64</b> | Fair Condition      |
| <b>0.00 – 0.34</b> | Poor Condition      |

### 7.7 Phase 2 Stream Sensitivity Ratings

| Existing Stream Type      | In regime – Reference or good condition | Major Adjustment – Fair Condition | Stream Type Departure or Poor Condition |
|---------------------------|---|-----------------------------------|---|
| <b>A1, A2, B1, B2</b>     | Very Low                                | Very Low                          | Low                                     |
| <b>C1, C2</b>             | Very Low                                | Low                               | Moderate                                |
| <b>G1, G2</b>             | Low                                     | Moderate                          | High                                    |
| <b>F1, F2</b>             | Low                                     | Moderate                          | High                                    |
| <b>B3, B4, B5</b>         | Moderate                                | High                              | High                                    |
| <b>B3c, C3, E3</b>        | Moderate                                | High                              | High                                    |
| <b>C4, C5, B4c, B5c</b>   | High                                    | Very High                         | Very High                               |
| <b>A3, A4, A5, G3, F3</b> | High                                    | Very High                         | Extreme                                 |
| <b>F4, F5, G4, G5</b>     | Very High                               | Very High                         | Extreme                                 |
| <b>D3, D4, D5</b>         | Extreme                                 | Extreme                           | Extreme                                 |
| <b>C6, E4, E5, E6</b>     | High                                    | Extreme                           | Extreme                                 |



## Phase 2 – Quality Assurance Worksheet

Stream Name: \_\_\_\_\_  
 QA Team Leader: \_\_\_\_\_  
 ANR Team Leader: \_\_\_\_\_

Watershed: \_\_\_\_\_ Date: \_\_\_\_\_  
 Organization /Agency: \_\_\_\_\_

|  |                |  |
|--|----------------|--|
| Check one or more boxes to indicate the types of ANR sponsored training received by field team members | <b>Phase 2</b> |  |
|  | <b>QA</b>      |  |

|   |  |
|---|--|
| Segment/Reach Sketch and Map Documentation completed                |  |
| Phase 1 Assessment used in Phase 2 analysis of geomorphic condition |  |
| ANR SGA Handbook Protocols and Database used exclusively            |  |
| Other protocols used:   |  |

| Phase 1 Step Number | Tool Used to Collect Data | Confidence Level  | Date Completed | Date Updated | Date of Local QA Team Review | Date of State QA Team Review | Comments |
|---------------------|---------------------------|---|----------------|--------------|------------------------------|------------------------------|----------|
| <b>Step 1</b>       |                           | Low to Moderate<br>Moderate<br>Moderate to High<br>High |                |              |                              |                              |          |
| <b>Step 2</b>       |                           | Low to Moderate<br>Moderate<br>Moderate to High<br>High |                |              |                              |                              |          |
| <b>Step 3</b>       |                           | Low to Moderate<br>Moderate<br>Moderate to High<br>High |                |              |                              |                              |          |
| <b>Step 4</b>       |                           | Low to Moderate<br>Moderate<br>Moderate to High<br>High |                |              |                              |                              |          |
| <b>Step 5</b>       |                           | Low to Moderate<br>Moderate<br>Moderate to High<br>High |                |              |                              |                              |          |
| <b>Step 6</b>       |                           | Low to Moderate<br>Moderate<br>Moderate to High<br>High |                |              |                              |                              |          |
| <b>Step 7</b>       |                           | Low to Moderate<br>Moderate<br>Moderate to High<br>High |                |              |                              |                              |          |