Overview: Sediment and Habitat Management Tool

William Puknat - Montana DEQ

The National Water Quality Data Management Training Workshop

May 31, 2017

Context

Montana has **1196** unique Assessment Units and growing each year/

Our water quality metric database (raw data) contains 1,742,356 records (2,794,798 if you include those not submitted to WQX)

Facility Group	Facility	Data Manager	Number of Results
National WQX Organizations (1,742,356)	MBMG_WQX	Jolene M.	3,354
	MDEQ_REM_WQX	Jolene M.	76,209
	MDEQ_WQ_WQX	Jolene M.	624,539
	MONT_DEQ_WQX	Jolene M.	481,235
	MONT_PPL_WQX	Jolene M.	221,835
	MTNWE	Jolene M.	41,684
	MTVOLWQM_WQX	Jolene M.	11,031
	MTWTRSHD_WQX	Jolene M.	157,753
	OCC	Jolene M.	49,613
	R8MONTWQ	Jolene M.	7,623
	TSWQC_WQX	Jolene M.	67,480
MDEQ IEMB[1] Organizations (849,676)	IEMB_ABSALOKA_COAL	Martin Van O.	60,276
	IEMB_BIGSKY_COAL	Martin Van O.	165,684
	IEMB_BULL_COAL	Martin Van O.	100,142
	IEMB_DECKER_COAL	Martin Van O.	193,276
	IEMB_OTTER_COAL	Martin Van O.	0
	IEMB_ROSEBUD_COAL	Martin Van O.	213,884
	IEMB_SAVAGE_COAL	Martin Van O.	24,747
	IEMB_SPRING_COAL	Martin Van O.	91,667
Not Grouped	DEMOTEST_WQX	None	2,187
	MT305b_SecondaryData	Jolene M.	64
	POPLAR_PIPELINE	Jolene M.	34,311
	SILVERTIP	Jolene M.	164,977
	BIGSKY_SPILL	Jolene M.	1223
	SedHab	William P.	500

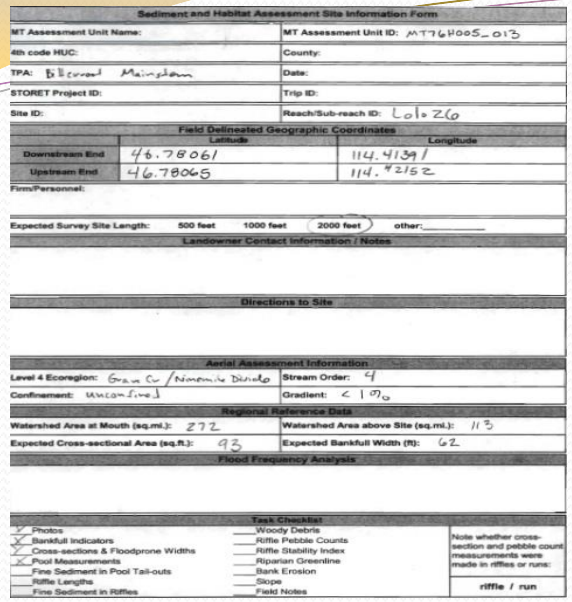
Problem Statement?

Most of the impairments in Montana rivers are Sediment related. A better way to store collected data for later analysis is needed?

Where is the data and what can we do with it once it is found?

PURPOSE

- Monitoring staff record a variety of observations on a segment of a river or stream to check for quality
  - Riverbank measurements
  - Pebble counts
  - Pool and riffle characteristics
  - Bank erosion determination (sediment loading)
- Prior to this tool all the data was stored on paper and placed in a file cabinet
- Retrieving and analyzing the data was cumbersome
- Databases containing water chemistry constituents are common, but few data storage formats currently catalogue the physical information typically used for sediment investigations



Sediment and Habitat Assessment Site Information Form

MT Assessment Unit Name:	MT Assessment Unit ID: MT76H005_013
4th code HUC:	County:
TPA: Bitterroot Mainstem	Date:
STORET Project ID:	Trip ID:
Site ID:	Reach/Sub-reach ID: Lolo26

Field Delineated Geographic Coordinates

	Latitude	Longitude
Downstream End	46.78061	114.41391
Upstream End	46.78065	114.42152

Firm/Personnel:

Expected Survey Site Length: 500 feet 1000 feet (2000 feet) other:

Landowner Contact Information / Notes

Directions to Site

Aerial Assessment Information

Level 4 Ecoregion: Grave Cr / Nimemix Districts — Stream Order: 4

Confinement: unconfined — Gradient: < 1%

Regional Reference Data

Watershed Area at Mouth (sq.mi.): 272	Watershed Area above Site (sq.mi.): 113
Expected Cross-sectional Area (sq.ft.): 93	Expected Bankfull Width (ft): 62

Flood Frequency Analysis

Task Checklist

- X Photos
- X Bankfull Indicators
- X Cross-sections & Floodprone Widths
- X Pool Measurements
- ___ Fine Sediment in Pool Tail-outs
- ___ Riffle Lengths
- ___ Fine Sediment in Riffles
- ___ Woody Debris
- ___ Riffle Pebble Counts
- ___ Riffle Stability Index
- ___ Riparian Greenline
- ___ Bank Erosion
- ___ Slope
- ___ Field Notes

Note whether cross-section and pebble count measurements were made in riffles or runs: riffle / run

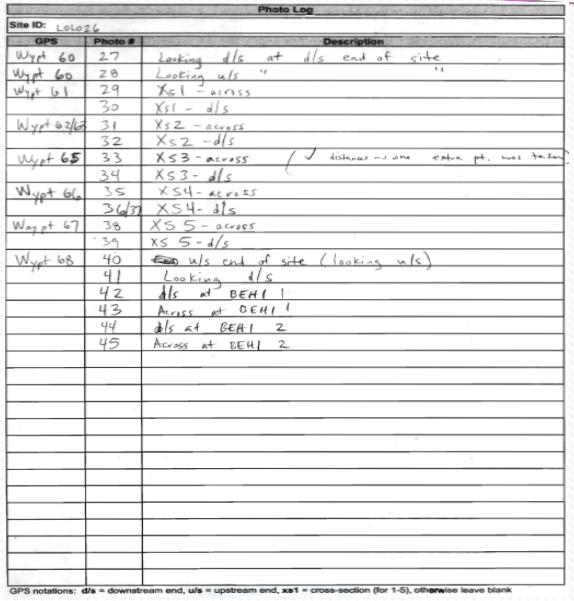
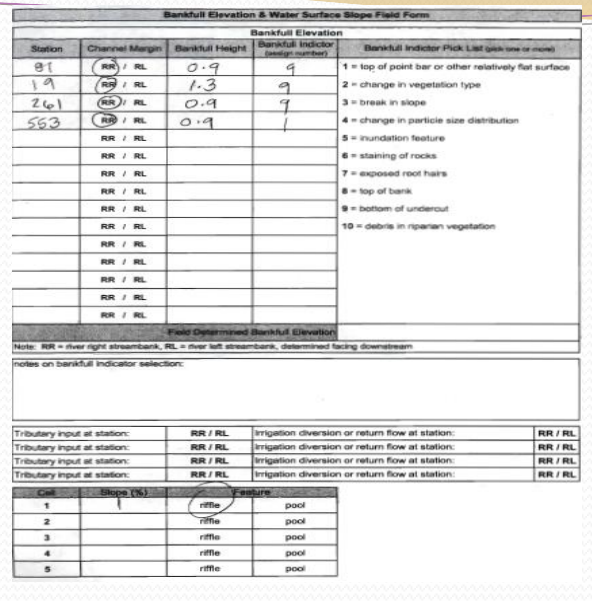


Photo Log

Site ID: Lolo26

GPS	Photo #	Description
Wypt 60	27	Looking d/s at d/s end of site
Wypt 60	28	Looking u/s " "
Wypt 61	29	XS1 - across
	30	XS1 - d/s
Wypt 62/63	31	XS2 - across
	32	XS2 - d/s
Wypt 65	33	XS3 - across (✓ distance - some extra pt. was taken)
	34	XS3 - d/s
Wypt 66	35	XS4 - across
	36/37	XS4 - d/s
Wypt 67	38	XS5 - across
	39	XS5 - d/s
Wypt 68	40	~~End~~ u/s end of site (looking u/s)
	41	Looking d/s
	42	d/s at BEH1
	43	Across at BEH1
	44	d/s at BEH1 2
	45	Across at BEH1 2

GPS notations: d/s = downstream end, u/s = upstream end, xs1 = cross-section (for 1-5), otherwise leave blank



Bankfull Elevation & Water Surface Slope Field Form

Bankfull Elevation

Station	Channel Margin	Bankfull Height	Bankfull Indictor (assign number)
81	(RR) / RL	0.9	9
19	(RR) / RL	1.3	9
261	(RR) / RL	0.9	9
563	(RR) / RL	0.9	1
	RR / RL		
	RR / RL		
	RR / RL		
	RR / RL		
	RR / RL		
	RR / RL		
	RR / RL		
	RR / RL		
	RR / RL		
	RR / RL		

Bankfull Indictor Pick List (pick one or more)

1 = top of point bar or other relatively flat surface
2 = change in vegetation type
3 = break in slope
4 = change in particle size distribution
5 = inundation feature
6 = staining of rocks
7 = exposed root hairs
8 = top of bank
9 = bottom of undercut
10 = debris in riparian vegetation

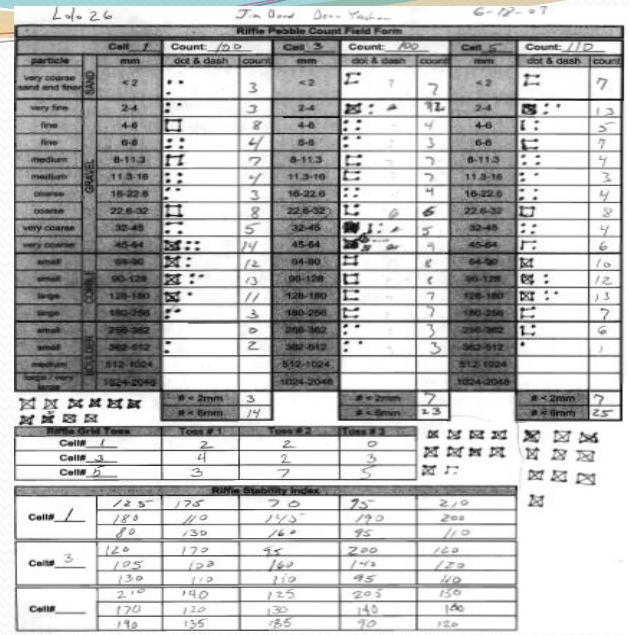
Field Determined Bankfull Elevation

Note: RR = river right streambank, RL = river left streambank, determined facing downstream

notes on bankfull indicator selection:

Tributary input at station:	RR / RL	Irrigation diversion or return flow at station:	RR / RL
Tributary input at station:	RR / RL	Irrigation diversion or return flow at station:	RR / RL
Tributary input at station:	RR / RL	Irrigation diversion or return flow at station:	RR / RL
Tributary input at station:	RR / RL	Irrigation diversion or return flow at station:	RR / RL

Cell	Slope (%)	Feature	
1	1	(riffle)	pool
2		riffle	pool
3		riffle	pool
4		riffle	pool
5		riffle	pool



Riffle Pebble Count Field Form

Lolo 26 — Jim Dunn, Dave Vaughan — 6-12-07

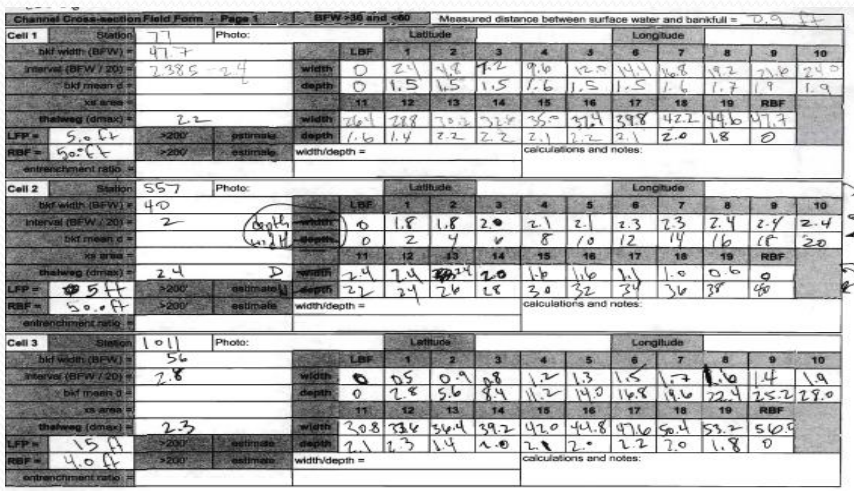
Cell 1	Count: 100	Cell 3	Count: 100	Cell 5	Count: 110
particle	mm	dot & dash	count	mm	dot & dash	count	mm	dot & dash	count
very coarse sand and fines (SAND)	<2		3	<2		7	<2		7
very fine (GRAVEL)	2-4		3	2-4		12	2-4		13
fine (GRAVEL)	4-6		8	4-6		4	4-6		5
fine (GRAVEL)	6-8		4	6-8		3	6-8		7
medium (GRAVEL)	8-11.3		7	8-11.3		7	8-11.3		4
medium (GRAVEL)	11.3-16		4	11.3-16		7	11.3-16		3
coarse (GRAVEL)	16-22.6		3	16-22.6		4	16-22.6		4
coarse (GRAVEL)	22.6-32		8	22.6-32		6	22.6-32		8
very coarse (GRAVEL)	32-45		5	32-45		5	32-45		4
very coarse (GRAVEL)	45-64		14	45-64		9	45-64		6
small (COBBLE)	64-90		12	64-90		8	64-90		10
small (COBBLE)	90-128		13	90-128		6	90-128		12
large (COBBLE)	128-180		11	128-180		7	128-180		13
large (COBBLE)	180-256		3	180-256		7	180-256		7
small (BOULDER)	256-362		6	256-362		3	256-362		6
small (BOULDER)	362-512		2	362-512		3	362-512		1
medium (BOULDER)	512-1024			512-1024			512-1024		
large / very large (BOULDER)	1024-2048			1024-2048			1024-2048		
	# < 2mm	3		# < 2mm	7		# < 2mm	7	
	# < 6mm	14		# < 6mm	23		# < 6mm	25	

Riffle Grid Toes

	Toes # 1	Toes # 2	Toes # 3
Cell# 1	2	2	0
Cell# 3	4	2	3
Cell# 5	3	7	5

Riffle Stability Index

Cell# 1	125	175	70	95	210
	180	110	145	190	200
	80	130	160	95	110
Cell# 3	120	170	95	200	120
	105	122	162	142	173
	130	110	119	95	140
Cell#	210	140	125	205	150
	170	120	130	140	160
	190	135	185	90	120



Channel Cross-section Field Form - Page 1 — BFW >36 and <60 — Measured distance between surface water and bankfull = 0.9 ft

Cell 1 — Station: 77 — Photo: — Latitude: — Longitude:

	LBF	1	2	3	4	5	6	7	8	9	10
bkf width (BFW) = 47.7											
interval (BFW / 20) = 2.385 ≈ 2.4	width	0	2.4	4.8	7.2	9.6	12.0	14.4	16.8	19.2	21.6	24.0
bkf mean d =	depth	0	1.5	1.5	1.5	1.6	1.5	1.5	1.6	1.7	1.9	1.9
xs area =		11	12	13	14	15	16	17	18	19	RBF	
thalweg (dmax) = 2.2	width	26.4	28.8	31.2	33.6	36.0	38.4	39.8	42.2	44.6	47.7	
LFP = 5.0 ft	>200'	estimate	depth	1.6	1.4	2.2	2.2	2.1	2.2	2.1	2.0	1.8	0
RBF = 5.0 ft	>200'	estimate	width/depth =										
entrenchment ratio =													

calculations and notes:

Cell 2 — Station: 557 — Photo: — Latitude: — Longitude:

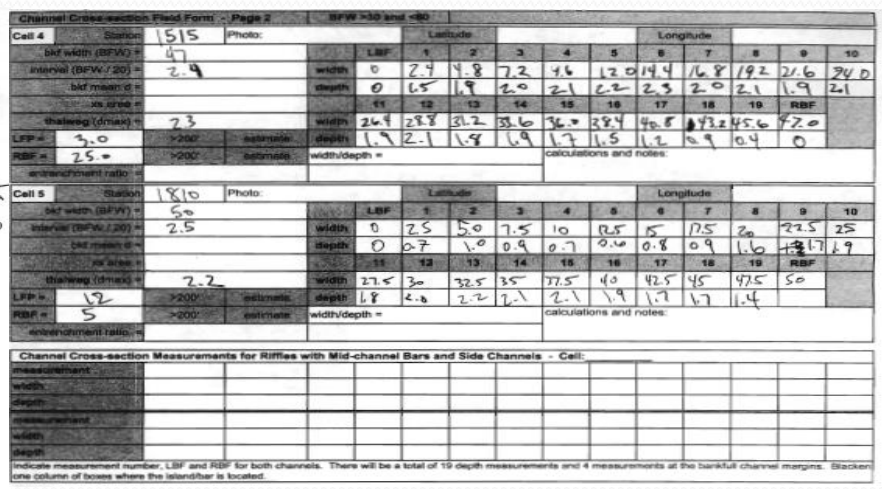
	LBF	1	2	3	4	5	6	7	8	9	10
bkf width (BFW) = 40											
interval (BFW / 20) = 2	width	0	1.8	1.8	2.0	2.1	2.1	2.3	2.3	2.4	2.4	2.4
bkf mean d =	depth	0	2	4	6	8	10	12	14	16	18	20
xs area =		11	12	13	14	15	16	17	18	19	RBF	
thalweg (dmax) = 2.4 D	width	24	24	24	20	16	16	11	10	0.6	0	
LFP = 5.0 ft	>200'	estimate	depth	22	24	26	28	30	32	34	36	38	40
RBF = 5.0 ft	>200'	estimate	width/depth =										
entrenchment ratio =													

calculations and notes:

Cell 3 — Station: 1011 — Photo: — Latitude: — Longitude:

	LBF	1	2	3	4	5	6	7	8	9	10
bkf width (BFW) = 56											
interval (BFW / 20) = 2.8	width	0	0.5	0.9	0.8	1.2	1.3	1.5	1.7	1.6	1.4	1.9
bkf mean d =	depth	0	2.8	5.6	8.4	11.2	14.0	16.8	19.6	22.4	25.2	28.0
xs area =		11	12	13	14	15	16	17	18	19	RBF	
thalweg (dmax) = 2.3	width	30.8	33.6	36.4	39.2	42.0	44.8	47.6	50.4	53.2	56.0	
LFP = 15 ft	>200'	estimate	depth	2.1	2.3	1.4	2.0	2.1	2.0	2.2	2.0	1.8	0
RBF = 40 ft	>200'	estimate	width/depth =										
entrenchment ratio =													

calculations and notes:



Channel Cross-section Field Form - Page 2 — BFW >30 and <80

Cell 4 — Station: 1515 — Photo: — Latitude: — Longitude:

	LBF	1	2	3	4	5	6	7	8	9	10
bkf width (BFW) = 47											
interval (BFW / 20) = 2.4	width	0	2.4	4.8	7.2	9.6	12.0	14.4	16.8	19.2	21.6	24.0
bkf mean d =	depth	0	1.5	1.9	2.0	2.1	2.2	2.3	2.0	2.1	1.9	2.1
xs area =		11	12	13	14	15	16	17	18	19	RBF	
thalweg (dmax) = 23	width	26.4	28.8	31.2	33.6	36.0	38.4	40.8	43.2	45.6	47.0	
LFP = 3.0	>200'	estimate	depth	1.9	2.1	1.8	1.9	1.7	1.5	1.2	0.9	0.4	0
RBF = 25.0	>200'	estimate	width/depth =										
entrenchment ratio =													

calculations and notes:

Cell 5 — Station: 1810 — Photo: — Latitude: — Longitude:

	LBF	1	2	3	4	5	6	7	8	9	10
bkf width (BFW) = 50											
interval (BFW / 20) = 2.5	width	0	2.5	5.0	7.5	10	12.5	15	17.5	20	22.5	25
bkf mean d =	depth	0	0.7	1.0	0.9	0.7	0.6	0.8	0.9	1.6	1.7	1.9
xs area =		11	12	13	14	15	16	17	18	19	RBF	
thalweg (dmax) = 2.2	width	27.5	30	32.5	35	37.5	40	42.5	45	47.5	50	
LFP = 12	>200'	estimate	depth	1.8	2.0	2.2	2.1	2.1	1.9	1.7	1.7	1.4	
RBF = 5	>200'	estimate	width/depth =										
entrenchment ratio =													

calculations and notes:

Channel Cross-section Measurements for Riffles with Mid-channel Bars and Side Channels - Cell:

measurement														
width														
depth														
measurement														
width														
depth														

Indicate measurement number, LBF and RBF for both channels. There will be a total of 19 depth measurements and 4 measurements at the bankfull channel margins. Blacken one column of boxes where the island/bar is located.

Streambank Erosion Field Form

Cell: 2 — Photo # 42,43 — Bank # 1

BEHI Parameters	Measurement	NBS Parameters	Measurement
Bank height (toe to top of bank)	4.3	Bankfull width	33
Bankfull height (toe)	2.5	Bankfull mean depth calculations:	1.9 2.7 2.2 2.4 2.4
Root depth	0.9		
Root density (in 10% increments)	40		
Bank angle	55		
Surface protection (% surface area)	10		
Material adjustments	0	Bankfull mean depth	
Stratification	0	Near bank max depth (deepest RB)	8.7

Bank material adjustments - cobble: subtract 10 pts (unless gravel/sand >50%), gravel: add 5-10 pts (depending on amount of sand), sand: add 10 pts if exposed to erosion, silt/clay: no adjustment

Stratification - add 5-10 pts when a more erosive layer is situated between two less erosive layers within the bankfull zone

	d/s station	u/s station	length
Length of eroding streambank:	572	745	
Mean height of eroding streambank:	4		

Bank composition (estimate percent): coarse gravel, cobbles, boulders (>6mm): 80; sand/clay(<2mm): 10; fine gravel (<6mm): 10

Hoof Shear Observed: Present / (Absent)

Browse of Woody Vegetation: (Light) Moderate Heavy N/A

Source of streambank instability (circle those that apply and estimate a percentage):

Transportation 90% u/s riprap — Silviculture

Riparian Grazing — Irrigation-shifts in stream energy

Cropland — Natural Sources (must estimate %): 10

Mining — Other:

Cell: 2 — Photo # 44,45 — Bank # 2

BEHI Parameters	Measurement	NBS Parameters	Measurement
Bank height (toe to top of bank)	5.7	Bankfull width	52
Bankfull height (toe)	1.9	Bankfull mean depth calculations:	1.8 1.8 1.9 1.8 3.1
Root depth	1.0		
Root density (in 10% increments)	30		
Bank angle	60		
Surface protection (% surface area)	10		
Material adjustments	0	Bankfull mean depth	
Stratification	0	Near bank max depth (deepest RB)	3.1

Bank material adjustments - cobble: subtract 10 pts (unless gravel/sand >50%), gravel: add 5-10 pts (depending on amount of sand), sand: add 10 pts if exposed to erosion, silt/clay: no adjustment

Stratification - add 5-10 pts when a more erosive layer is situated between two less erosive layers within the bankfull zone

	d/s station	u/s station	length
Length of eroding streambank:	441	489	
Mean height of eroding streambank:			

Bank composition (estimate percent): coarse gravel, cobbles, boulders (>6mm): 80; sand/clay(<2mm): 10; fine gravel (<6mm): 10

Hoof Shear Observed: Present / (Absent)

Browse of Woody Vegetation: (Light) Moderate Heavy N/A

Source of streambank instability (circle those that apply and estimate a percentage):

Transportation 90% u/s riprap — Silviculture

Riparian Grazing — Irrigation-shifts in stream energy

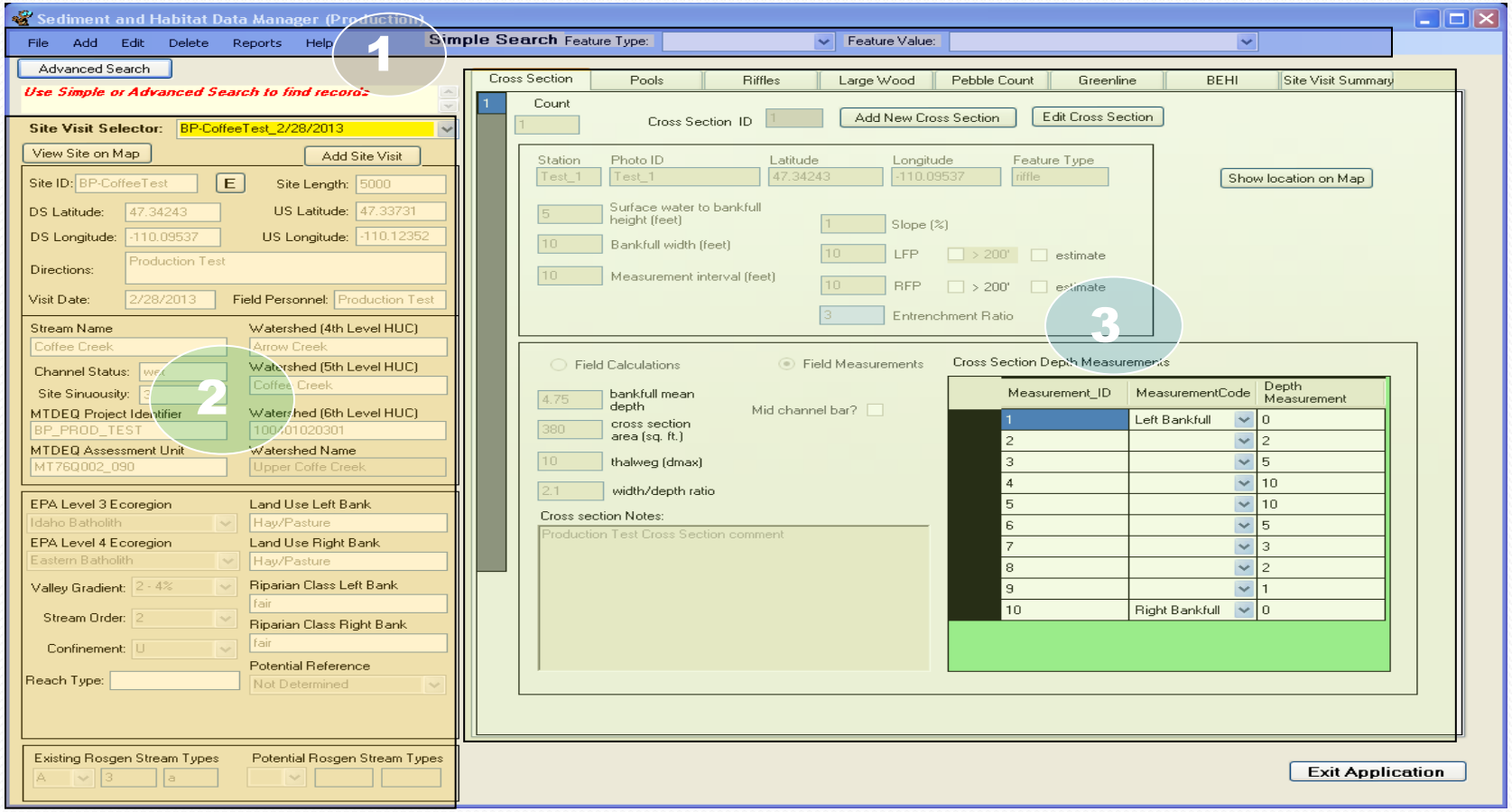
Cropland — Natural Sources (must estimate %): 10

Mining — Other:

SAMPLE FIELD FORM (between 15 and 30 pages for each assessment)

The Client Application (phase 1 - get the data in)

The sediment habitat data management tool is a simple, one-screen interface application that allows a user to search for data in a variety of ways using a variety of search criteria



1 – Menu Bar
2 – Site Visit Info
3 – Data View Panel
4 – Map view is available

Sediment and Habitat Data Manager (TEST)

File Add Edit Delete Reports Help

Simple Search Feature Type: MT DEQ Project ID Feature Value: BP-6000

Advanced Search

4 records found where DEQ Project = 'BP-6000'

Site Visit Selector: BP_Krick_1_10/25/2012

View Site on Map | Add Site Visit

Site ID: BP_Krick_1 E Site Length: 1000

DS Latitude: 44.5 US Latitude: 44.55

DS Longitude: -112.5 US Longitude: -112.55

Directions: Turn left at the sign that was removed by the snow plow two winters ago. Then turn right at the squirrel

Visit Date: 10/25/2012 Field Personnel: Elvis and Lou Cos

Stream Name: Big Porcupine Creek

Channel Status: wet

Site Sinuousity:

MTDEQ Project Identifier: BP-6000

MTDEQ Assessment Unit: MT55P001_010

Watershed (4th Level HUC): Big Porcupine Creek

Watershed (5th Level HUC): Upper Big Porcupine Creek

Watershed (6th Level HUC): 101000020205

Watershed Name: Big Porcupine Creek-Wild Horse

EPA Level 3 Ecoregion: Idaho Batholith

EPA Level 4 Ecoregion: High Idaho Batholith

Valley Gradient: > 10%

Stream Order: 7

Confinement: C

Reach Type: IB-10-7-C

Land Use Left Bank

Land Use Right Bank

Riparian Class Left Bank

Riparian Class Right Bank

Potential Reference: Potential

Existing Rosgen Stream Types

Potential Rosgen Stream Types

Cross Section | Pools | Riffles | Large Wood | Pebble Count | Greenline | BEHI | Site Visit Summary

1 2 3 4 5 6 7 8 9 10

Count: 10

Cross Section ID: 8

Add New Cross Section | Edit Cross Section

Station	Photo ID	Latitude	Longitude	Feature Type
8	8	44.8	-112.8	pool

Show location on Map

12 Surface water to bankfull height (feet)

100 Bankfull width (feet)

10 Measurement interval (feet)

0 Slope (%)

5 LFP ☑ > 200' ☐ estimate

5 RFP ☐ > 200' ☑ estimate

1.1 Entrenchment Ratio

○ Field Calculations ◉ Field Measurements

6.22 bankfull mean depth

560 cross section area (sq. ft.)

thalweg (dmax)

16.1 width/depth ratio

Mid channel bar? ☐

Cross section Notes:

Cross Section Depth Measurements

Measurement_ID	MeasurementCode	Depth Measurement
1	Left Bankfull	2
2		5
3		10
4		10
5		10
6		10
7		5
8		2
9		2
10	Right Bankfull	0

Exit Application

Sediment and Habitat Data Manager (TEST)

File Add Edit Delete Reports Help

Simple Search Feature Type: MT DEQ Project ID Feature Value: Madison_TPA_2014

Advanced Search

26 records found where DEQ Project = 'Madison_TPA_2014'

Site Visit Selector: ATLP04-02a_7/30/2014

View Site on Map | **Add Site Visit**

Site ID: ATLP04-02a **Edit**

DS Latitude: 44.68142 US Latitude: 44.68049

DS Longitude: -111.52835 US Longitude: -111.52831

MAS Site Length: 525 TMDL Site Length: 500

Directions: Take FR 230 past ranch, lake, to site

Visit Date: 7/30/2014 Field Personnel: Nixon, A., Apfelbec

Stream Name: Antelope Creek

Channel Status: wet

Site Sinuosity:

MTDEQ Project Identifier: Madison_TPA_2014

MTDEQ Assessment Unit: MT41F004_140

Watershed (4th Level HUC): Madison River

Watershed (5th Level HUC): Lake Creek

Watershed (6th Level HUC): 100200070501

Watershed Name: Antelope Creek

EPA Level 3 Ecoregion: Middle Rockies

EPA Level 4 Ecoregion: Dry Gneissic-Schistose-Volcanic

Valley Gradient: 2 - 4%

Stream Order: 2

Confinement: U

Reach Type: MR-2-2-U

Land Use Left Bank

Land Use Right Bank

Riparian Class Left Bank

Riparian Class Right Bank

Potential Reference

Existing Rosgen Stream Types

Potential Rosgen Stream Types

Cross Section | Pools | Riffles | Large Wood | Pebble Count | Greenline | BEHI | Site Visit Sum

2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

Count: 17 Pool ID: 12 **Add New Pool** **EditPool**

Pool Data

Downstream Station	Upstream	Pool Length	Max Pool Depth		Pool Tail Crest Depth		Pool Residual Depth
344	360	16	2.1	-	0.45	=	1.65

Pool Type: Scour Pool Size: Large Pool Formative Feature: Pool Type Cover:

Pool Comment:

Depositional Spawning Area Grid Toss

Spawning Gravel	Location	Estimate D50	Toss 1 # Count	Toss 1 # Obs	Toss 2 # Count	Toss 2 # Obs	Toss 3 # Count	Toss 3 # Obs
U	Pool Ta		5	49	1	49	14	49
			10.2 %		2 %		28.6 %	

Total Ratio: 13.67 %

Toss Comment:

Exit Application

Sediment and Habitat Data Manager (TEST)

File Add Edit Delete Reports Help

Simple Search Feature Type: MT DEQ Project ID Feature Value: Madison_TPA_2014

Advanced Search

26 records found where DEQ Project = 'Madison_TPA_2014'

Site Visit Selector: ATLP04-02a_7/30/2014

View Site on Map | **Add Site Visit**

Site ID: ATLP04-02a **Edit**

DS Latitude: 44.68142 US Latitude: 44.68049

DS Longitude: -111.52835 US Longitude: -111.52831

MAS Site Length: 525 TMDL Site Length: 500

Directions: Take FR 230 past ranch, lake, to site

Visit Date: 7/30/2014 Field Personnel: Nixon, A., Apfelbec

Stream Name: Antelope Creek

Channel Status: wet

Site Sinuousity:

MTDEQ Project Identifier: Madison_TPA_2014

MTDEQ Assessment Unit: MT41F004_140

Watershed (4th Level HUC): Madison River

Watershed (5th Level HUC): Lake Creek

Watershed (6th Level HUC): 100200070501

Watershed Name: Antelope Creek

EPA Level 3 Ecoregion: Middle Rockies

EPA Level 4 Ecoregion: Dry Gneissic-Schistose-Volcanic

Valley Gradient: 2 - 4%

Stream Order: 2

Confinement: U

Reach Type: MR-2-2-U

Land Use Left Bank

Land Use Right Bank

Riparian Class Left Bank

Riparian Class Right Bank

Potential Reference

Existing Rosgen Stream Types

Potential Rosgen Stream Types

Cross Section | Pools | Riffles | Large Wood | **Pebble Count** | Greenline | BEHI | Site Visit Sum

1 2 3 4

WPC ID: 1 Station: 30

Add New Pebble Count | Edit Pebble Count

		Wet	Dry	Particle	Wet Frequency %	Dry Frequency %	Cumulative Frequency %
SAND	sand and finer	11	9	< 2 mm	10.58	8.65	19.23
GRAVEL	very fine	7	1	2 - 4	6.73	0.96	26.92
	fine	6	0	4 - 6.35	5.77	0	32.69
	fine	4	2	6.35 - 8	3.85	1.92	38.46
	medium	3	1	8 - 11.3	2.88	0.96	42.31
	medium	8	0	11.3 - 16	7.69	0	50
	coarse	10	1	16 - 22.6	9.62	0.96	60.58
	coarse	16	0	22.6 - 32	15.38	0	75.96
	very coarse	10	0	32 - 45	9.62	0	85.58
	very coarse	11	0	45 - 64	10.58	0	96.15
COBBLE	small	3	0	64 - 90	2.88	0	99.04
	small	1	0	90 - 128	0.96	0	100
	large	0	0	128 - 180			
	large	0	0	180 - 256			
BOULDER	small	0	0	256 - 362			
	small	0	0	362 - 512			
	large	0	0	512 - 1024			
	large/very large	0	0	1024 - 2048			

Riffle Grid Toss

	Count		# Obs	%
#1		of		
#2		of		
#3		of		
		Average		

Median Particle Size

Riffle Stability Index

Summary Statistics

Total Count	104
# < 2mm	20
% < 2mm	19.23
# < 6.35mm	34
% < 6.35mm	32.69

D16	D50	D84
1.66	16	42.87

Exit Application

Sediment and Habitat Data Manager (TEST)

File Add Edit Delete Reports Help

Simple Search Feature Type: MT DEQ Project ID Feature Value: SELWAY-SED-2015

Advanced Search

3 records found where DEQ Project = 'SELWAY-SED-2015 '

Site Visit Selector: SECL05-08_8/26/2015

View Site on Map | Add Site Visit

Site ID: SECL05-08 Edit

DS Latitude: 45.08659 US Latitude: 45.0871

DS Longitude: -113.41966 US Longitude: -113.41882

MAS Site Length: 404 TMDL Site Length: 400

Directions:

Visit Date: 8/26/2015 Field Personnel: Paul Kusnierz, Eric

Stream Name: Selway Creek

Channel Status: wet

Site Sinuousity: 1.4

MTDEQ Project Identifier: SELWAY-SED-2015

MTDEQ Assessment Unit: MT41A003_110

Watershed (4th Level HUC): Red Rock River

Watershed (5th Level HUC): Bloody Dick Creek

Watershed (6th Level HUC): 100200011001

Watershed Name: Selway Creek

EPA Level 3 Ecoregion: Middle Rockies

EPA Level 4 Ecoregion: Forested Beaverhead Mountains

Valley Gradient: < 2%

Stream Order: 4

Confinement: U

Reach Type: MR-0-4-U

Land Use Left Bank: Riparian Grazing

Land Use Right Bank: Riparian Grazing

Riparian Class Left Bank: good

Riparian Class Right Bank: good

Potential Reference: Not Reference

Existing Rosgen Stream Types: E

Potential Rosgen Stream Types: E

Cross Section | Pools | Riffles | Large Wood | Pebble Count | Greenline | BEHI | Site Visit Sum

1 2 3 4 5

Bank ID 3 Similar to bank # Add New Bank Edit Bank

Observed Bank Condition: Vegetated **RR/RL:** RL **Survey Type:** Full Survey

BEHI	value	index
bank height	1.7	
bankfull height	1.3	
BH/BFH ratio	1.31	5
root depth	0.1	
RD/BH ratio	0.06	9
root density	30	
weighted root density	1.8	10
bank angle	25	2
surface protection	10	9
material adjustments		10
stratification		0
BEHI Index Total		45
BEHI Rating	very high	

Near Bank Stress

Method: Measured (Dnb/Dbkf)

bankfull mean depth values: 0.3 0.4 0.8 0.7 0.9

enter 5 measurements (feet)

bankfull mean depth: 0.62

near bank maximum depth: 0.7

near bank Maximum depth/bankfull mean depth: 1.13

NBS rating: low

Estimated NBS Rating: low

Estimated BEHI Rating:

Land Use Influences

- [x] Hoof shear observed?
- [ ] Browse of woody vegation

Bank Dimensions

downstream station: 120

upstream station: 146

additional bank feet: 0

bank length: 26

mean bank height: 1.7

Results

retreat rate method: Lamar

retreat rate: 0.529

volume (cu ft/yr): 23.3818

mass (tons/year): 1.128

Bank Composition %

coarse gravel, cobbles, boulders (>6mm)	0
fine gravel (> 2 < 6mm)	0
sand/clay (,2mm)	100
Total	100

Sources of Streambank Instability (%)

Transportation	0
Riparian Grazing	80
Cropland	0
Mining	0
Silviculture	0
Irrigation/Flow Manipulation	0
Residential/Urban Development	0
Historical	0
Other	0
Natural	20
Total	100

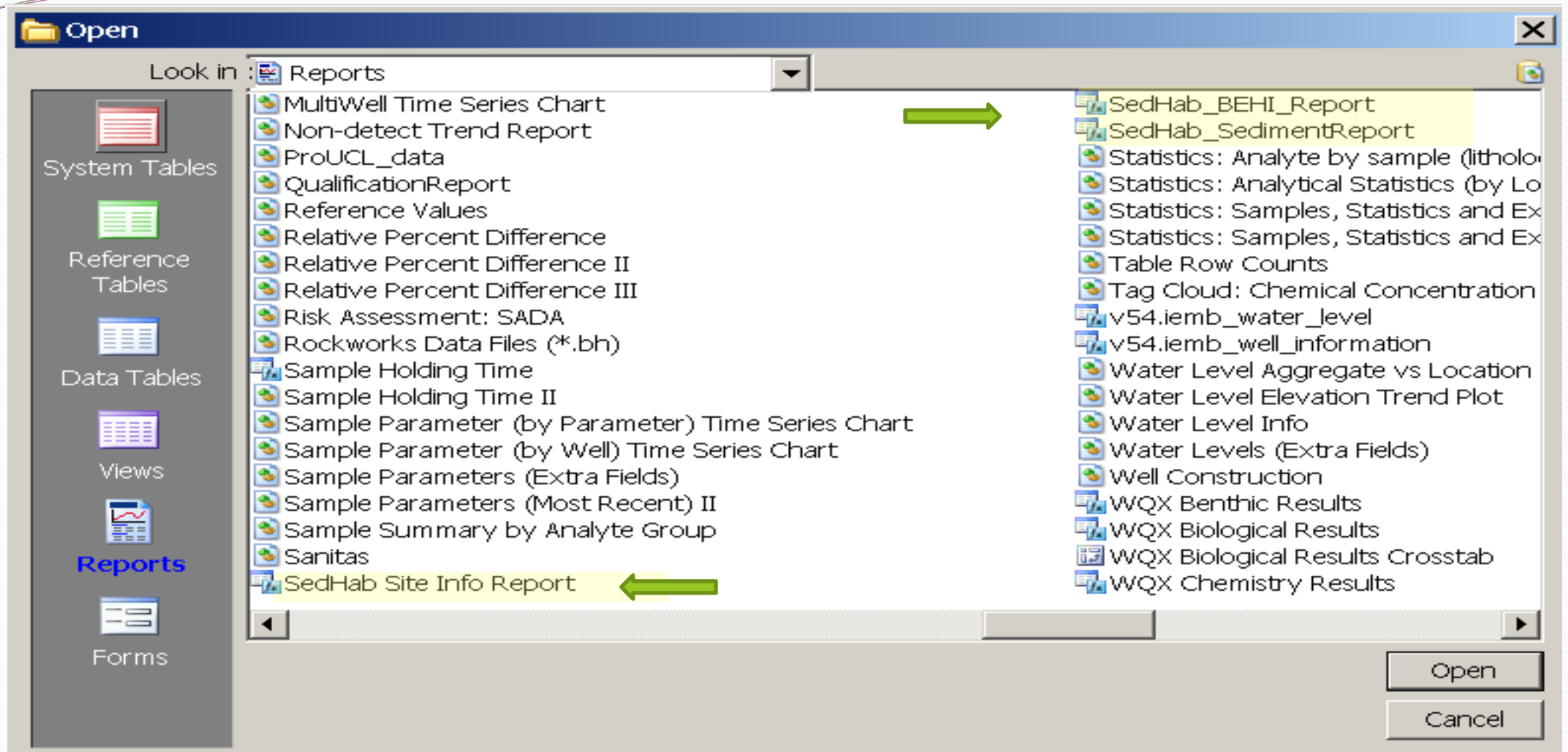
* Other/Historical description

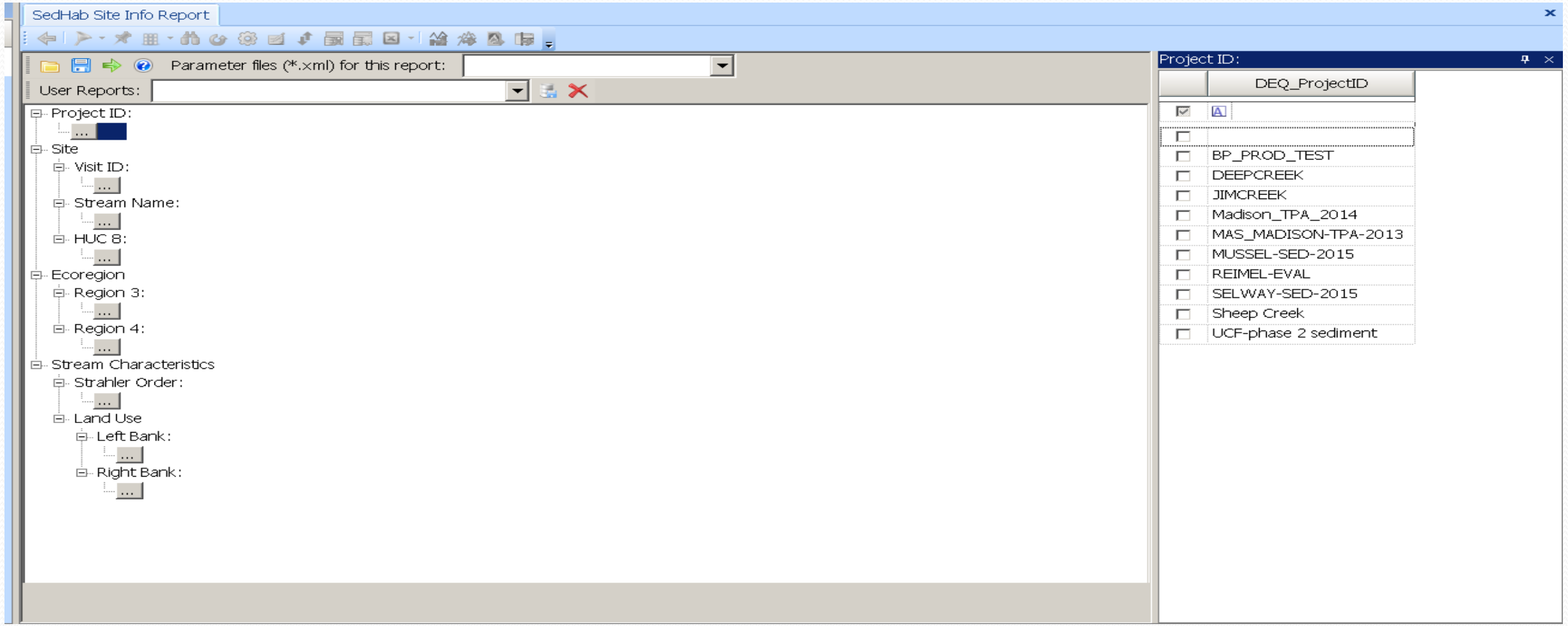
Bank Stability

Exit Application

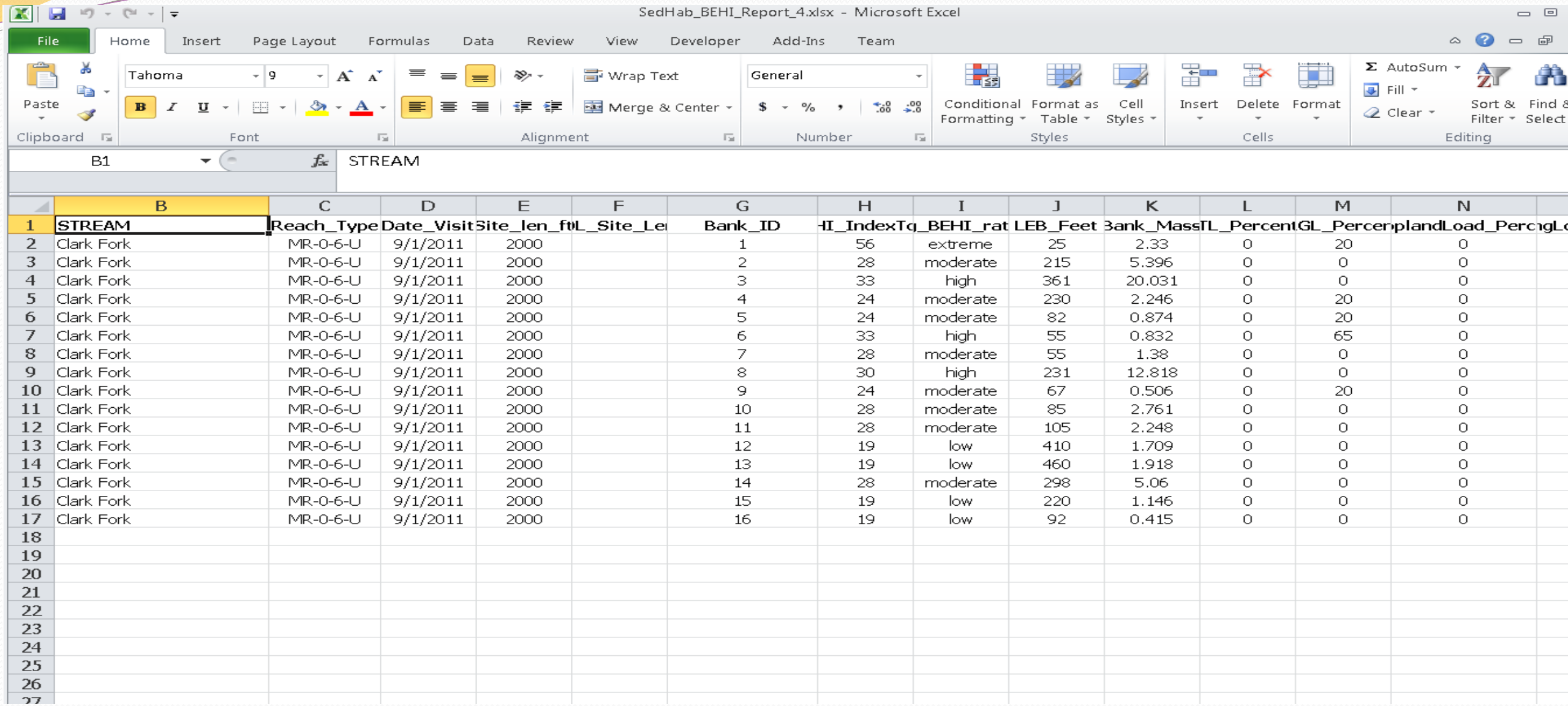
REPORTS

1) SedHab_SiteInfo_Report
2) SedHab_BEHI_Report
3) SedHab_Sediment_Report
4) More to follow


Open
Look in : Reports
System Tables
Reference Tables
Data Tables
Views
Reports
Forms
MultiWell Time Series Chart
Non-detect Trend Report
ProUCL_data
QualificationReport
Reference Values
Relative Percent Difference
Relative Percent Difference II
Relative Percent Difference III
Risk Assessment: SADA
Rockworks Data Files (*.bh)
Sample Holding Time
Sample Holding Time II
Sample Parameter (by Parameter) Time Series Chart
Sample Parameter (by Well) Time Series Chart
Sample Parameters (Extra Fields)
Sample Parameters (Most Recent) II
Sample Summary by Analyte Group
Sanitas
SedHab Site Info Report
SedHab_BEHI_Report
SedHab_SedimentReport
Statistics: Analyte by sample (litholo
Statistics: Analytical Statistics (by Lo
Statistics: Samples, Statistics and Ex
Statistics: Samples, Statistics and Ex
Table Row Counts
Tag Cloud: Chemical Concentration
v54.iemb_water_level
v54.iemb_well_information
Water Level Aggregate vs Location
Water Level Elevation Trend Plot
Water Level Info
Water Levels (Extra Fields)
Well Construction
WQX Benthic Results
WQX Biological Results
WQX Biological Results Crosstab
WQX Chemistry Results
Open
Cancel


SedHab Site Info Report
Parameter files (*.xml) for this report:
User Reports:
Project ID:
Site
Visit ID:
Stream Name:
HUC 8:
Ecoregion
Region 3:
Region 4:
Stream Characteristics
Strahler Order:
Land Use
Left Bank:
Right Bank:
Project ID:
DEQ_ProjectID
BP_PROD_TEST
DEEPCREEK
JIMCREEK
Madison_TPA_2014
MAS_MADISON-TPA-2013
MUSSEL-SED-2015
REIMEL-EVAL
SELWAY-SED-2015
Sheep Creek
UCF-phase 2 sediment

SED/HAB BEHI REPORT



	B	C	D	E	F	G	H	I	J	K	L	M	N
1	STREAM	Reach_Type	Date_Visit	Site_len_ft	L_Site_Le	Bank_ID	HI_IndexTo	_BEHI_rat	LEB_Feet	Bank_Mass	TL_Percent	GL_Percen	plandLoad_Perc
2	Clark Fork	MR-0-6-U	9/1/2011	2000		1	56	extreme	25	2.33	0	20	0
3	Clark Fork	MR-0-6-U	9/1/2011	2000		2	28	moderate	215	5.396	0	0	0
4	Clark Fork	MR-0-6-U	9/1/2011	2000		3	33	high	361	20.031	0	0	0
5	Clark Fork	MR-0-6-U	9/1/2011	2000		4	24	moderate	230	2.246	0	20	0
6	Clark Fork	MR-0-6-U	9/1/2011	2000		5	24	moderate	82	0.874	0	20	0
7	Clark Fork	MR-0-6-U	9/1/2011	2000		6	33	high	55	0.832	0	65	0
8	Clark Fork	MR-0-6-U	9/1/2011	2000		7	28	moderate	55	1.38	0	0	0
9	Clark Fork	MR-0-6-U	9/1/2011	2000		8	30	high	231	12.818	0	0	0
10	Clark Fork	MR-0-6-U	9/1/2011	2000		9	24	moderate	67	0.506	0	20	0
11	Clark Fork	MR-0-6-U	9/1/2011	2000		10	28	moderate	85	2.761	0	0	0
12	Clark Fork	MR-0-6-U	9/1/2011	2000		11	28	moderate	105	2.248	0	0	0
13	Clark Fork	MR-0-6-U	9/1/2011	2000		12	19	low	410	1.709	0	0	0
14	Clark Fork	MR-0-6-U	9/1/2011	2000		13	19	low	460	1.918	0	0	0
15	Clark Fork	MR-0-6-U	9/1/2011	2000		14	28	moderate	298	5.06	0	0	0
16	Clark Fork	MR-0-6-U	9/1/2011	2000		15	19	low	220	1.146	0	0	0
17	Clark Fork	MR-0-6-U	9/1/2011	2000		16	19	low	92	0.415	0	0	0
18													
19													
20													
21													
22													
23													
24													
25													
26													

Monitoring and Assessment BEHI Report

*(using MAS Site Length)

Stream Name:	Clark Fork
Reach ID:	CFR-17-2A
Visit Date:	9/7/2011
Reach Type:	MR-0-6-U
Reach Length (ft):	2000
Number of Banks:	16
Avg BEHI Index:	27.5
Avg BEHI Rating:	moderate
Length of Eroding Bank (ft):	2991
Percent of Reach Banks Eroding:	75%
Reach Sediment Load (Tons/Year):	61.67
Total Sediment Load per 1000 ft (Tons/Yr):	30.835
Reach Land Use Loads	
Transportation Load (Tons/Year):	0
Transportation Load (%):	0%
Riparian Grazing Load (Tons/Year):	5.58884375
Riparian Grazing Load (%):	9%
Cropland Load (Tons/Year):	0
Cropland Load (%):	0%
Mining Load (Tons/Year):	2.312625
Mining Load (%):	4%
Silviculture Load (Tons/Year):	0
Silviculture Load (%):	0%
Irrigation Load (Tons/Year):	0
Irrigation Load (%):	0%
Residential/Urban Load (Tons/Year):	0
Residential/Urban Load (%):	0%
Historical Load (Tons/Year):	14.83934375
Historical Load (%):	24%
Natural Load (Tons/Year):	38.9291875
Natural Load (%):	63%
Other Load (Tons/Year):	0
Other Load (%):	0%
Course Gravel > 6mm Load (Tons/Year):	1.9271875
Course Gravel > 6mm Load (Percent):	3%
Fine Gravel 6-2mm Load (Tons/Year):	2.6980625
Fine Gravel 6-2mm Load (Percent):	4%
Sand/Clay <2mm Load (Tons/Year):	57.04475
sand/Clay <2mm Load (Percent):	93%

Process

- How has the tool / process improved workflow?
  - Automated vs Manual
    - Tool analyzes internal data at this time.
    - The ability to look for similar streams as well as use macro calculations in reports provides an element of automated assessments.
    - Level of QC required, data entry has error checking and validations for certain fields.
- Currently a Montana DEQ tool, but can be implemented by others
  - Since development was in-house using State funds, we may consider this as Open Source. We (MT) would need to provide a proper repository.

Punch Line

- Get the data out!
  1) of the file cabinet
  2) For faster searching
  3) For analysis
  4) For public awareness