

VTANR REACH HABITAT ASSESSMENT ----- RIFFLE-POOL STREAM TYPE

(Also use this form for dune-ripple stream type.)

Stream Name: _____
 Location: _____
 Observers: _____
 Organization /Agency: _____
 USGS Map Name(s): _____
 Weather: _____
 Flow: base / low / avg. Storm within past 7 days: Y / N

Segment I.D: _____
 Date: _____
 Town: _____
 Elevation: _____ ft.
 Latitude (N/S): _____
 Longitude (E/W): _____
 Drainage Area: _____ sq. mi.
 Segment Length: _____ ft.

Habitat Parameter	Condition (Departure) Category																			
	Reference (None)					Good (Minor)					Fair (Major)					Poor (Severe)				
6.1 Woody Debris Cover LWD size rank variable only used if ≥ 10 pieces	<input type="checkbox"/> LWD pieces / mile > 100 <input type="checkbox"/> LWD size rank 3-6 $> 50\%$ <input type="checkbox"/> debris jams / mile > 5 <input type="checkbox"/> high woody debris recruitment potential <input type="checkbox"/> CPOM present in channel and margins					<input type="checkbox"/> $100 \geq$ LWD / mile > 50 <input type="checkbox"/> $50 \geq$ LWD rank 3-6 $> 25\%$ <input type="checkbox"/> $5 \geq$ jams / mile > 3 <input type="checkbox"/> moderate woody debris recruitment potential <input type="checkbox"/> CPOM limited in channel and present in margins					<input type="checkbox"/> $50 \geq$ LWD / mile > 25 <input type="checkbox"/> $25 \geq$ LWD rank 3-6 $> 10\%$ <input type="checkbox"/> $3 \geq$ jams / mile > 1 <input type="checkbox"/> low woody debris recruitment potential <input type="checkbox"/> CPOM limited in both channel and margins					<input type="checkbox"/> LWD / mile ≤ 25 <input type="checkbox"/> LWD size rank 3-6 $\leq 10\%$ <input type="checkbox"/> debris jams absent <input type="checkbox"/> no woody debris recruitment potential <input type="checkbox"/> CPOM absent				
	SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2
6.2 Bed Substrate Cover *fines: sand if $d_{50} \geq$ gravel, otherwise silt. (Dune-ripple stream type: Fining only.)	<input type="checkbox"/> riffle embeddedness $< 20\%$ margin embeddedness $< 40\%$ <input type="checkbox"/> fining* $< 10\%$ <input type="checkbox"/> Riffle stability index $< 70\%$ <input type="checkbox"/> sediment apparently stable & sorted <input type="checkbox"/> substrate free of dense algae growth					<input type="checkbox"/> $20 \leq emb_{riffle} < 40\%$ $40 \leq emb_{margin} < 60\%$ <input type="checkbox"/> $10 \leq fining^* < 20\%$ <input type="checkbox"/> $70 \leq RSI < 80\%$ <input type="checkbox"/> some evidence of sediment mobility & lack of sorting <input type="checkbox"/> small substrate patches covered by dense algae growth					<input type="checkbox"/> $40 \leq emb_{riffle} < 75\%$ $60 \leq emb_{margin} < 80\%$ <input type="checkbox"/> $20 \leq fining^* < 40\%$ <input type="checkbox"/> $80 \leq RSI < 90\%$ <input type="checkbox"/> major evidence of sediment mobility & lack of sorting <input type="checkbox"/> large substrate patches covered by dense algae growth					<input type="checkbox"/> riffle embeddedness $\geq 75\%$ margin embeddedness $\geq 80\%$ <input type="checkbox"/> fining* $\geq 40\%$ <input type="checkbox"/> $RSI \geq 90\%$ <input type="checkbox"/> sediments unstable, unsorted, soft underfoot <input type="checkbox"/> most of substrate covered by dense algae growth				
	SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2
6.3 Scour and Deposition Features (Dune-ripple stream type: Only evaluate pools and ripples.) <i>Depth-velocity combinations</i> fast-shallow fast-deep slow-shallow slow-deep (cutoffs: 1.0 fps, 1.5 ft)	<input type="checkbox"/> pools / mile > 40 <input type="checkbox"/> pool size rank 3-7 $> 50\%$ <input type="checkbox"/> good cover $> 75\%$ of total pool surface area <input type="checkbox"/> riffle (ripple) coverage $> 25\%$ reach area, distinctly formed and complete <input type="checkbox"/> $5 \leq$ riffle spacing ≤ 7 bankfull channel widths (w_{bkf}) <input type="checkbox"/> well-defined riffle-run-pool-glide pattern with all four depth-velocity combinations present <input type="checkbox"/> finer deposition located entirely in slack water below larger substrates/debris, and along margins					<input type="checkbox"/> $40 \geq$ pools / mile > 20 <input type="checkbox"/> $50 \geq$ pool rank 3-7 $> 25\%$ <input type="checkbox"/> $75 \geq$ good cover $> 50\%$ of total pool surface area <input type="checkbox"/> $25 \geq$ riffle coverage $> 10\%$ reach area, moderately well formed and complete <input type="checkbox"/> $3 \leq$ riffle spacing < 5 , or $7 <$ riffle spacing $\leq 10 \times w_{bkf}$ <input type="checkbox"/> well-defined riffle-run-pool-glide pattern with three depth-velocity combinations dominant <input type="checkbox"/> finer deposition located in slack water below larger substrates/debris, signs of mid-channel accumulation					<input type="checkbox"/> $20 \geq$ pools / mile > 10 <input type="checkbox"/> $25 \geq$ pool rank 3-7 $> 10\%$ <input type="checkbox"/> $50 \geq$ good cover $> 25\%$ of total pool surface area <input type="checkbox"/> $25 \geq$ riffle coverage $> 10\%$ reach area, poorly formed and incomplete <input type="checkbox"/> $1 \leq$ riffle spacing < 3 , or $10 <$ riffle spacing $\leq 12 \times w_{bkf}$ <input type="checkbox"/> moderately defined riffle-run-pool-glide pattern with two depth-velocity combinations dominant <input type="checkbox"/> very large depositional features below larger substrates/debris, abundant mid-channel accumulation					<input type="checkbox"/> pools / mile ≤ 10 <input type="checkbox"/> pool size rank 3-7 $\leq 10\%$ <input type="checkbox"/> good cover $\leq 25\%$ of total pool surface area <input type="checkbox"/> riffle (ripple) coverage $\leq 10\%$ reach area, or mostly indistinct <input type="checkbox"/> riffle spacing ≥ 12 bankfull channel widths <input type="checkbox"/> poorly defined riffle-run-pool-glide pattern with one depth-velocity combination dominant <input type="checkbox"/> finer deposition throughout channel, even filling pools, larger substrates almost buried or bed largely incised				
	SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2
6.4 Channel Morphology	<input type="checkbox"/> width/depth < 15 , natural <input type="checkbox"/> entrenchment ratio ≥ 1.4 , incision ratio < 1.2 , good floodplain access <input type="checkbox"/> no evidence of channel alteration					<input type="checkbox"/> $15 \leq w / d < 25$, widening <input type="checkbox"/> entrenchment ratio ≥ 1.4 , $1.2 \leq$ incision ratio < 1.4 , reduced floodplain access <input type="checkbox"/> evidence of minor historic channel alteration					<input type="checkbox"/> $25 \leq w / d < 40$, widening <input type="checkbox"/> entrenchment ratio ≥ 1.4 , $1.4 \leq$ incision ratio < 2.0 , limited floodplain access <input type="checkbox"/> major historic or minor recent channel alteration					<input type="checkbox"/> $w / d > 40$, over-widening <input type="checkbox"/> entrenchment ratio < 1.4 or incision ratio ≥ 2.0 , floodplain access unlikely <input type="checkbox"/> extensive historic or major recent channel alteration				
	SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2

Habitat Parameter	Condition (Departure) Category																			
	Reference (None)					Good (Minor)					Fair (Major)					Poor (Severe)				
6.5 Hydrologic Characteristics <input type="checkbox"/> wetted width / $W_{bkf} > 0.75$ <input type="checkbox"/> exposed substrate $< 20\%$ <input type="checkbox"/> adjacent springs, seeps, and wetlands extensive <input type="checkbox"/> no known flow alteration	<input type="checkbox"/> $0.75 \geq W_{wet} / W_{bkf} > 0.50$					<input type="checkbox"/> $0.50 \geq W_{wet} / W_{bkf} > 0.25$					<input type="checkbox"/> $W_{wet} / W_{bkf} \leq 0.25$									
	<input type="checkbox"/> $20 \leq \text{exp. substrate} < 40\%$					<input type="checkbox"/> $40 \leq \text{exp. substrate} < 60\%$					<input type="checkbox"/> exposed substrate $\geq 60\%$									
<input type="checkbox"/> adjacent springs, seeps, and wetlands present					<input type="checkbox"/> adjacent springs, seeps, and wetlands minimal					<input type="checkbox"/> adjacent springs, seeps, and wetlands absent or altered										
<input type="checkbox"/> minor flow alteration likely due to flow regulation and/or land use changes					<input type="checkbox"/> major flow alteration likely due to flow regulation and/or land use changes					<input type="checkbox"/> runoff characteristics completely altered due to flow regulation and storm water influence										
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
6.6 Connectivity Tend towards a higher/lower score for natural/man-made obstructions <input type="checkbox"/> no obstructions in reach that block longitudinal movement of aquatic species over all but the lowest flows <input type="checkbox"/> system obstructions absent <input type="checkbox"/> abundant low and high flow refuge	<input type="checkbox"/> one or two small low flow obstructions present in reach that block movement of aquatic species					<input type="checkbox"/> one or two small to medium bankfull obstructions present in reach that block movement of aquatic species					<input type="checkbox"/> more than two bankfull obstructions present in reach that block movement of aquatic species									
	<input type="checkbox"/> limited system obstructions					<input type="checkbox"/> system obstructions present					<input type="checkbox"/> many system obstructions									
<input type="checkbox"/> abundant refuge, with low or high flow refuge limited					<input type="checkbox"/> limited low and high flow refuge					<input type="checkbox"/> refuge absent										
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
6.7 River Banks Select different boxes for LB and RB if necessary Undercut size rank variable only used if ≥ 5 undercuts (score each bank)	<input type="checkbox"/> bank erosion $< 10\%$, typical of natural conditions, little or no bank revetments					<input type="checkbox"/> $10 \leq$ bank erosion $< 30\%$, infrequent small areas, some bank revetments					<input type="checkbox"/> $30 \leq$ bank erosion $< 60\%$, mod. unstable banks, and/or extensive bank revetments					<input type="checkbox"/> bank erosion $\geq 60\%$, banks unstable, extensive erosion, and failing bank revetments				
	<input type="checkbox"/> bank vegetation $> 90\%$ in tree, shrub and herb layers, diverse assemblages, plants create good cover and roots help stabilize bank					<input type="checkbox"/> $90 \geq$ bank vegetation $> 75\%$ in each layer, diverse assemblages, plants create good cover and roots help stabilize bank					<input type="checkbox"/> $75 \geq$ bank vegetation $> 50\%$, in two of three layers, reduced diversity, plants create limited cover and roots do not stabilize bank					<input type="checkbox"/> bank vegetation $\leq 50\%$ in two of three layers, limited diversity, plants create no cover and roots do not stabilize bank				
<input type="checkbox"/> bank canopy $> 90\%$					<input type="checkbox"/> $90 \geq$ bank canopy $> 75\%$					<input type="checkbox"/> $75 \geq$ bank canopy $> 50\%$					<input type="checkbox"/> bank canopy $\leq 50\%$					
<input type="checkbox"/> undercut banks / mile > 30					<input type="checkbox"/> $30 \geq$ undercuts / mile > 15					<input type="checkbox"/> $15 \geq$ undercuts / mile > 5					<input type="checkbox"/> undercuts / mile ≤ 5					
<input type="checkbox"/> undercut bank size rank 3-6 $> 50\%$					<input type="checkbox"/> $50 \geq$ undercut bank size rank 3-6 $> 25\%$					<input type="checkbox"/> $25 \geq$ undercut bank size rank 3-6 $> 10\%$					<input type="checkbox"/> undercut bank size rank 3-6 $\leq 10\%$					
<input type="checkbox"/> undercut banks with mostly stable boundaries, abundant overhanging vegetation, and consistent water adjacency					<input type="checkbox"/> undercuts with some unstable boundaries or reduced overhanging vegetation, and consistent water adjacency					<input type="checkbox"/> undercuts with some unstable boundaries or reduced overhanging vegetation, and reduced water adjacency					<input type="checkbox"/> undercuts with mostly unstable boundaries, no overhanging vegetation, and reduced water adjacency					
<input type="checkbox"/> no mass failures in valley					<input type="checkbox"/> 1 mass failure in valley					<input type="checkbox"/> 1 - 2 mass failures in valley					<input type="checkbox"/> ≥ 3 mass failures in valley					
SCORE (LB)	Left Bank		10	9	8	7	6	5	4	3	Right Bank		2	1						
SCORE (RB)	Right Bank		10	9	8	7	6	5	4	3	Left Bank		2	1						
6.8 Riparian Area Select different boxes for LB and RB if necessary (score each side of the channel)	<input type="checkbox"/> buffer width > 150 ft					<input type="checkbox"/> $150 \geq$ buffer width > 100 ft					<input type="checkbox"/> $100 \geq$ buffer width > 50 ft					<input type="checkbox"/> buffer width ≤ 50 ft				
	<input type="checkbox"/> rip. vegetation $> 75\%$ in tree, shrub and herb layers, diverse assemblages, no invasives, maximum channel canopy					<input type="checkbox"/> $75 \geq$ rip. veg. $> 50\%$ in each layer, one plant type absent, minimal invasives, maximum channel canopy					<input type="checkbox"/> $75 \geq$ rip. veg. $> 50\%$ in each layer, several types absent, altered patches, invasives present, reduced canopy					<input type="checkbox"/> rip. veg. $\leq 50\%$ in each layer, several types absent, large altered areas, invasives present, reduced canopy				
<input type="checkbox"/> river corridor development and infrastructure absent					<input type="checkbox"/> river corridor development and infrastructure minimal					<input type="checkbox"/> river corridor development and infrastructure common					<input type="checkbox"/> river corridor development and infrastructure abundant					
SCORE (LB)	Left Bank		10	9	8	7	6	5	4	3	Right Bank		2	1						
SCORE (RB)	Right Bank		10	9	8	7	6	5	4	3	Left Bank		2	1						

6.9 Score: front _____ + back _____ = total _____

Percentage: total score _____ x (100 / 160) = _____

Overall Physical Habitat Condition: _____

SHTD Existing Stream Habitat Type: _____

Score	Percentage	Condition (Departure)
136 – 160	85 – 100	Reference (None)
104 – 135	65 – 84	Good (Minor)
56 – 103	35 – 64	Fair (Major)
0 – 55	0 – 34	Poor (Severe)

VTANR REACH HABITAT ASSESSMENT ----- STEP-POOL STREAM TYPE

(Also use this form for cascade and bedrock stream types.)

Stream Name: _____
 Location: _____
 Observers: _____
 Organization /Agency: _____
 USGS Map Name(s): _____
 Weather: _____
 Flow: base / low / avg. Storm within past 7 days: Y / N

Segment I.D: _____
 Date: _____
 Town: _____
 Elevation: _____ ft.
 Latitude (N/S): _____
 Longitude (E/W): _____
 Drainage Area: _____ sq. mi.
 Segment Length: _____ ft.

Habitat Parameter	Condition (Departure) Category																			
	Reference (None)					Good (Minor)					Fair (Major)					Poor (Severe)				
6.1 Woody Debris Cover LWD size rank variable only used if ≥ 10 pieces	<input type="checkbox"/> LWD pieces / mile > 200 <input type="checkbox"/> LWD size rank 3-6 >75% <input type="checkbox"/> debris jams / mile > 25 <input type="checkbox"/> high woody debris recruitment potential <input type="checkbox"/> CPOM present in channel and margins					<input type="checkbox"/> 200 \geq LWD / mile > 100 <input type="checkbox"/> 75 \geq LWD rank 3-6 > 50% <input type="checkbox"/> 25 \geq jams / mile > 15 <input type="checkbox"/> moderate woody debris recruitment potential <input type="checkbox"/> CPOM limited in channel and present in margins					<input type="checkbox"/> 100 \geq LWD / mile > 50 <input type="checkbox"/> 50 \geq LWD rank 3-6 > 25% <input type="checkbox"/> 15 \geq jams / mile > 5 <input type="checkbox"/> low woody debris recruitment potential <input type="checkbox"/> CPOM limited in both channel and margins					<input type="checkbox"/> LWD / mile ≤ 50 <input type="checkbox"/> LWD size rank 3-6 $\leq 25\%$ <input type="checkbox"/> jams / mile ≤ 5 <input type="checkbox"/> no woody debris recruitment potential <input type="checkbox"/> CPOM absent				
	SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2
6.2 Bed Substrate Cover *fines: sand if $d_{50} \geq$ gravel, otherwise silt.	<input type="checkbox"/> pool embeddedness < 25% margin embeddedness < 40% <input type="checkbox"/> fining* < 10% <input type="checkbox"/> sediment apparently stable & sorted <input type="checkbox"/> substrate free of dense algae growth					<input type="checkbox"/> 25 \leq emb _{pool} < 50% 40 \leq emb _{margin} < 60% <input type="checkbox"/> 10 \leq fining* < 20% <input type="checkbox"/> some evidence of sediment mobility & lack of sorting <input type="checkbox"/> small substrate patches covered by dense algae growth					<input type="checkbox"/> 50 \leq emb _{pool} < 75% 60 \leq emb _{margin} < 80% <input type="checkbox"/> 20 \leq fining* < 40% <input type="checkbox"/> major evidence of sediment mobility & lack of sorting <input type="checkbox"/> large substrate patches covered by dense algae growth					<input type="checkbox"/> pool embeddedness $\geq 75\%$ margin embeddedness $\geq 80\%$ <input type="checkbox"/> fining* $\geq 40\%$ <input type="checkbox"/> sediments unstable, unsorted, soft underfoot <input type="checkbox"/> most of substrate covered by dense algae growth				
	SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2
6.3 Scour and Deposition Features <i>Depth-velocity combinations</i> fast-shallow fast-deep slow-shallow slow-deep (cutoffs: 1.0 fps, 1.5 ft)	<input type="checkbox"/> pools / mile > 70 <input type="checkbox"/> pool size rank 3-7 >50% <input type="checkbox"/> good cover > 75% of total pool surface area <input type="checkbox"/> steps are distinctly formed, complete and stable <input type="checkbox"/> 5 \leq step spacing ≤ 7 bankfull channel widths (w_{bkf}) <input type="checkbox"/> more than two depth-velocity combinations present <input type="checkbox"/> finer deposition located entirely in slack water below larger substrates/debris, and along margins					<input type="checkbox"/> 70 \geq pools / mile > 50 <input type="checkbox"/> 50 \geq pool rank 3-7 > 25% <input type="checkbox"/> 75 \geq good cover > 50% of total pool surface area <input type="checkbox"/> steps are moderately well formed, complete and stable <input type="checkbox"/> 3 \leq step spacing < 5, or 7 < step spacing $\leq 10 \times w_{bkf}$ <input type="checkbox"/> two depth-velocity combinations present <input type="checkbox"/> finer deposition located in slack water below larger substrates/debris, signs of mid-channel accumulation					<input type="checkbox"/> 50 \geq pools / mile > 30 <input type="checkbox"/> 25 \geq pool rank 3-7 > 10% <input type="checkbox"/> 50 \geq good cover > 25% of total pool surface area <input type="checkbox"/> steps are poorly formed, incomplete and unstable <input type="checkbox"/> 1 \leq step spacing < 3, or 10 < step spacing $\leq 15 \times w_{bkf}$ <input type="checkbox"/> one or two depth-velocity combinations present <input type="checkbox"/> very large depositional features below larger substrates/debris, abundant mid-channel accumulation					<input type="checkbox"/> pools / mile ≤ 30 <input type="checkbox"/> pool size rank 3-7 $\leq 10\%$ <input type="checkbox"/> good cover over $\leq 25\%$ of total pool surface area <input type="checkbox"/> steps are indistinct or absent, or very unstable <input type="checkbox"/> step spacing ≥ 15 bankfull channel widths <input type="checkbox"/> one depth-velocity combination present <input type="checkbox"/> finer deposition throughout channel, even filling pools, larger substrates almost buried or bed largely incised				
	SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2
6.4 Channel Morphology	<input type="checkbox"/> width/depth < 12, natural <input type="checkbox"/> entrenchment ratio ≥ 1.2 , incision ratio < 1.2, good floodplain access <input type="checkbox"/> no evidence of channel alteration					<input type="checkbox"/> 12 $\leq w / d < 15$, widening <input type="checkbox"/> entrenchment ratio ≥ 1.2 , 1.2 \leq incision ratio < 1.4, reduced floodplain access <input type="checkbox"/> evidence of minor historic channel alteration					<input type="checkbox"/> 15 $\leq w / d < 25$, widening <input type="checkbox"/> entrenchment ratio ≥ 1.2 , 1.4 \leq incision ratio < 2.0, limited floodplain access <input type="checkbox"/> major historic or minor recent alteration					<input type="checkbox"/> $w / d \geq 25$, over-widening <input type="checkbox"/> entrenchment ratio < 1.2 or incision ratio ≥ 2.0 , floodplain access unlikely <input type="checkbox"/> extensive historic or major recent alteration				
	SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2

Habitat Parameter	Condition (Departure) Category																					
	Reference (None)					Good (Minor)					Fair (Major)					Poor (Severe)						
6.5 Hydrologic Characteristics <input type="checkbox"/> wetted width / $W_{bkr} > 0.75$ <input type="checkbox"/> exposed substrate $< 10\%$ <input type="checkbox"/> adjacent springs, seeps, and wetlands extensive <input type="checkbox"/> no known flow alteration	<input type="checkbox"/> $0.75 \geq W_{wet} / W_{bkr} > 0.50$					<input type="checkbox"/> $0.50 \geq W_{wet} / W_{bkr} > 0.25$					<input type="checkbox"/> $W_{wet} / W_{bkr} \leq 0.25$											
	<input type="checkbox"/> $10 \leq \text{exp. substrate} < 30\%$					<input type="checkbox"/> $30 \leq \text{exp. substrate} < 50\%$					<input type="checkbox"/> exposed substrate $\geq 50\%$											
<input type="checkbox"/> adjacent springs, seeps, and wetlands present					<input type="checkbox"/> adjacent springs, seeps, and wetlands minimal					<input type="checkbox"/> adjacent springs, seeps, and wetlands absent or altered												
<input type="checkbox"/> minor flow alteration likely due to flow regulation and/or land use changes					<input type="checkbox"/> major flow alteration likely due to flow regulation and/or land use changes					<input type="checkbox"/> runoff characteristics completely altered due to flow regulation and storm water influence												
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1		
6.6 Connectivity Tend towards a higher/lower score for natural/man-made obstructions	<input type="checkbox"/> no obstructions in reach that block longitudinal movement of aquatic species over all but the lowest flows					<input type="checkbox"/> one or two small low flow obstructions present in reach that block movement of aquatic species					<input type="checkbox"/> one or two small to medium bankfull obstructions present in reach that block movement of aquatic species					<input type="checkbox"/> more than two bankfull obstructions present in reach that block movement of aquatic species						
	<input type="checkbox"/> system obstructions absent					<input type="checkbox"/> limited system obstructions					<input type="checkbox"/> system obstructions present					<input type="checkbox"/> many system obstructions						
<input type="checkbox"/> abundant low and high flow refuge					<input type="checkbox"/> abundant refuge, with low or high flow refuge limited					<input type="checkbox"/> limited low and high flow refuge					<input type="checkbox"/> refuge absent							
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1		
6.7 River Banks Select different boxes for LB and RB if necessary Undercut size rank variable only used if ≥ 5 undercuts (score each bank)	<input type="checkbox"/> bank erosion $< 10\%$, typical of natural conditions, little or no bank revetments					<input type="checkbox"/> $10 \leq$ bank erosion $< 20\%$, infrequent small areas, some bank revetments					<input type="checkbox"/> $20 <$ bank erosion $< 50\%$, mod. unstable banks, and/or extensive bank revetments					<input type="checkbox"/> bank erosion $\geq 50\%$, banks unstable, extensive erosion, and failing bank revetments						
	<input type="checkbox"/> bank vegetation $> 90\%$ in tree, shrub and herb layers, diverse assemblages, plants create good cover and roots help stabilize bank					<input type="checkbox"/> $90 \geq$ bank vegetation $> 75\%$ in each layer, diverse assemblages, plants create good cover and roots help stabilize bank					<input type="checkbox"/> $75 \geq$ bank vegetation $> 50\%$, in two of three layers, reduced diversity, plants create limited cover and roots do not stabilize bank					<input type="checkbox"/> bank vegetation $\leq 50\%$ in two of three layers, limited diversity, plants create no cover and roots do not stabilize bank						
<input type="checkbox"/> bank canopy $> 90\%$					<input type="checkbox"/> $90 >$ bank canopy $> 80\%$					<input type="checkbox"/> $80 \geq$ bank canopy $> 60\%$					<input type="checkbox"/> bank canopy $\leq 60\%$							
<input type="checkbox"/> undercut banks / mile > 15					<input type="checkbox"/> $15 \geq$ undercuts / mile > 10					<input type="checkbox"/> $10 \geq$ undercuts / mile > 5					<input type="checkbox"/> undercuts / mile ≤ 5							
<input type="checkbox"/> undercut bank size rank 3-6 $> 50\%$					<input type="checkbox"/> $50 \geq$ undercut bank size rank 3-6 $> 25\%$					<input type="checkbox"/> $25 \geq$ undercut bank size rank 3-6 $> 10\%$					<input type="checkbox"/> undercut bank size rank 3-6 $\leq 10\%$							
<input type="checkbox"/> undercut banks with mostly stable boundaries, abundant overhanging vegetation, and consistent water adjacency					<input type="checkbox"/> undercuts with some unstable boundaries or reduced overhanging vegetation, and consistent water adjacency					<input type="checkbox"/> undercuts with some unstable boundaries or reduced overhanging vegetation, and reduced water adjacency					<input type="checkbox"/> undercuts with mostly unstable boundaries, no overhanging vegetation, and reduced water adjacency							
<input type="checkbox"/> no mass failures in valley					<input type="checkbox"/> 1 mass failure in valley					<input type="checkbox"/> 1 - 2 mass failures in valley					<input type="checkbox"/> > 3 mass failures in valley							
SCORE (LB)	Left Bank	10	9	8	7	6	5	4	3	2	1	Right Bank	10	9	8	7	6	5	4	3	2	1
SCORE (RB)	Left Bank	10	9	8	7	6	5	4	3	2	1	Right Bank	10	9	8	7	6	5	4	3	2	1
6.8 Riparian Area Select different boxes for LB and RB if necessary (score each side of the channel)	<input type="checkbox"/> buffer width > 200 ft					<input type="checkbox"/> $200 \geq$ buffer width > 150 ft					<input type="checkbox"/> $150 \geq$ buffer width > 100 ft					<input type="checkbox"/> buffer width ≤ 100 ft						
	<input type="checkbox"/> rip. vegetation $> 90\%$ in tree, shrub and herb layers, diverse assemblages, no invasives, maximum channel canopy					<input type="checkbox"/> $90 \geq$ rip. veg. $> 75\%$ in each layer, one plant type absent, minimal invasives, maximum channel canopy					<input type="checkbox"/> $75 \geq$ rip. veg. $> 50\%$ in each layer, several types absent, altered patches, invasives present, reduced canopy					<input type="checkbox"/> rip. veg. $\leq 50\%$ in each layer, several types absent, large altered areas, invasives present, reduced canopy						
<input type="checkbox"/> river corridor development and infrastructure absent					<input type="checkbox"/> river corridor development and infrastructure minimal					<input type="checkbox"/> river corridor development and infrastructure common					<input type="checkbox"/> river corridor development and infrastructure abundant							
SCORE (LB)	Left Bank	10	9	8	7	6	5	4	3	2	1	Right Bank	10	9	8	7	6	5	4	3	2	1
SCORE (RB)	Left Bank	10	9	8	7	6	5	4	3	2	1	Right Bank	10	9	8	7	6	5	4	3	2	1

6.9 Score: front _____ + back _____ = total _____

Percentage: total score _____ x (100 / 160) = _____

Overall Physical Habitat Condition: _____

SHTD Existing Stream Habitat Type: _____

Score	Percentage	Condition (Departure)
136-160	85 - 100	Reference (None)
104 - 135	65 - 84	Good (Minor)
56 - 103	35 - 64	Fair (Major)
0 - 55	0 - 34	Poor (Severe)

Stream Name: _____
 Location: _____
 Observers: _____
 Organization /Agency: _____
 USGS Map Name(s): _____
 Weather: _____
 Flow: base / low / avg. Storm within past 7 days: Y / N

Segment I.D: _____
 Date: _____
 Town: _____
 Elevation: _____ ft.
 Latitude (N/S): _____
 Longitude (E/W): _____
 Drainage Area: _____ sq. mi.
 Segment Length: _____ ft.

Habitat Parameter	Condition (Departure) Category																			
	Reference (None)					Good (Minor)					Fair (Major)					Poor (Severe)				
6.1 Woody Debris Cover LWD size rank variable only used if ≥ 10 pieces	<input type="checkbox"/> LWD pieces / mile > 50 <input type="checkbox"/> LWD size rank 3-6 >50% <input type="checkbox"/> debris jams / mile > 5 <input type="checkbox"/> high woody debris recruitment potential <input type="checkbox"/> CPOM present in channel and margins					<input type="checkbox"/> $50 \geq$ LWD / mile > 25 <input type="checkbox"/> $50 \geq$ LWD rank 3-6 > 25% <input type="checkbox"/> $5 \geq$ jams / mile > 3 <input type="checkbox"/> moderate woody debris recruitment potential <input type="checkbox"/> CPOM limited in channel and present in margins					<input type="checkbox"/> $25 \geq$ LWD / mile > 10 <input type="checkbox"/> $25 \geq$ LWD rank 3-6 > 10% <input type="checkbox"/> $3 \geq$ jams / mile > 1 <input type="checkbox"/> low woody debris recruitment potential <input type="checkbox"/> CPOM limited in both channel and margins					<input type="checkbox"/> LWD / mile ≤ 10 <input type="checkbox"/> LWD size rank 3-6 $\leq 10\%$ <input type="checkbox"/> debris jams absent <input type="checkbox"/> no woody debris recruitment potential <input type="checkbox"/> CPOM absent				
	SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2
6.2 Bed Substrate Cover *fines: sand if $d_{50} \geq$ gravel, otherwise silt.	<input type="checkbox"/> run embeddedness < 20% margin embeddedness < 40% <input type="checkbox"/> fining* < 10% <input type="checkbox"/> sediment apparently stable & sorted <input type="checkbox"/> imbrication limited, or mostly with the short axis of particles overlapping in the direction of flow <input type="checkbox"/> substrate free of dense algae growth					<input type="checkbox"/> $20 \leq emb_{run} < 40\%$ $40 \leq emb_{margin} < 60\%$ <input type="checkbox"/> $10 \leq fining^* < 20\%$ <input type="checkbox"/> some evidence of sediment mobility & lack of sorting <input type="checkbox"/> imbrication moderate, mostly with the short axis of particles overlapping in the direction of flow <input type="checkbox"/> small substrate patches covered by dense algae growth					<input type="checkbox"/> $40 \leq emb_{run} < 75\%$ $60 \leq emb_{margin} < 80\%$ <input type="checkbox"/> $20 \leq fining^* < 40\%$ <input type="checkbox"/> major evidence of sediment mobility & lack of sorting <input type="checkbox"/> imbrication moderate, mostly with the long axis of particles overlapping in the direction of flow <input type="checkbox"/> large substrate patches covered by dense algae growth					<input type="checkbox"/> run embeddedness $\geq 75\%$ margin embeddedness $\geq 80\%$ <input type="checkbox"/> fining* $\geq 40\%$ <input type="checkbox"/> sediments unstable, unsorted, soft underfoot <input type="checkbox"/> imbrication extensive, mostly with the long axis of particles overlapping in the direction of flow <input type="checkbox"/> most of substrate covered by dense algae growth				
	SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2
6.3 Scour and Deposition Features <i>Depth-velocity combinations</i> fast-shallow fast-deep slow-shallow slow-deep (cutoffs: 1.0 fps, 1.5 ft)	<input type="checkbox"/> pool formation evident, with $\geq 50\%$ pool size rank 3-7 <input type="checkbox"/> widespread riffle formation <input type="checkbox"/> more than two depth-velocity combinations present <input type="checkbox"/> meandering thalweg clearly identifiable in cross section, with evidence of side and lateral bar formation <input type="checkbox"/> finer deposition located entirely in slack water below larger substrates/debris, and along margins					<input type="checkbox"/> pool formation evident, with <50% pool size rank 3-7 <input type="checkbox"/> moderate riffle formation <input type="checkbox"/> two depth-velocity combinations present <input type="checkbox"/> meandering thalweg moderately identifiable in cross section, with some evidence of bar formation <input type="checkbox"/> finer deposition located in slack water below larger substrates/debris, signs of mid-channel accumulation					<input type="checkbox"/> limited trace of pool formation <input type="checkbox"/> limited riffle formation <input type="checkbox"/> one or two depth-velocity combinations present <input type="checkbox"/> meandering thalweg barely identifiable in the cross section, with minimal evidence of bar formation <input type="checkbox"/> very large depositional features below larger substrates/debris, abundant mid-channel accumulation					<input type="checkbox"/> pool formation completely absent <input type="checkbox"/> no riffle formation <input type="checkbox"/> one depth-velocity combination present <input type="checkbox"/> meandering thalweg not identifiable in the cross section, with no evidence of bar formation <input type="checkbox"/> finer deposition throughout channel, even filling pools, larger substrates almost buried or bed largely incised				
	SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2
6.4 Channel Morphology	<input type="checkbox"/> width/depth < 15, natural <input type="checkbox"/> entrenchment ratio ≥ 1.4 , incision ratio < 1.2, good floodplain access <input type="checkbox"/> no evidence of channel alteration					<input type="checkbox"/> $15 \leq w / d < 25$, widening <input type="checkbox"/> entrenchment ratio ≥ 1.4 , $1.2 \leq$ incision ratio < 1.4, reduced floodplain access <input type="checkbox"/> evidence of minor historic channel alteration					<input type="checkbox"/> $25 \leq w / d < 40$, widening <input type="checkbox"/> entrenchment ratio ≥ 1.4 , $1.4 \leq$ incision ratio < 2.0, limited floodplain access <input type="checkbox"/> major historic or minor recent channel alteration					<input type="checkbox"/> $w / d \geq 40$, over-widening <input type="checkbox"/> entrenchment ratio < 1.4 or incision ratio ≥ 2.0 , floodplain access unlikely <input type="checkbox"/> extensive historic or major recent channel alteration				
	SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2

Habitat Parameter	Condition (Departure) Category																			
	Reference (None)					Good (Minor)					Fair (Major)					Poor (Severe)				
6.5 Hydrologic Characteristics <input type="checkbox"/> wetted width / $W_{bkf} > 0.75$ <input type="checkbox"/> exposed substrate < 20% <input type="checkbox"/> adjacent springs, seeps, and wetlands extensive <input type="checkbox"/> no known flow alteration						<input type="checkbox"/> $0.75 \geq W_{wet} / W_{bkf} > 0.50$ <input type="checkbox"/> $20 \leq \text{exp. substrate} < 40\%$ <input type="checkbox"/> adjacent springs, seeps, and wetlands present <input type="checkbox"/> minor flow alteration likely due to flow regulation and/or land use changes					<input type="checkbox"/> $0.50 \geq W_{wet} / W_{bkf} > 0.25$ <input type="checkbox"/> $40 \leq \text{exp. substrate} < 60\%$ <input type="checkbox"/> adjacent springs, seeps, and wetlands minimal <input type="checkbox"/> major flow alteration likely due to flow regulation and/or land use changes					<input type="checkbox"/> $W_{wet} / W_{bkf} \leq 0.25$ <input type="checkbox"/> exposed substrate $\geq 60\%$ <input type="checkbox"/> adjacent springs, seeps, and wetlands altered or absent <input type="checkbox"/> runoff characteristics completely altered due to flow regulation and storm water influence				
	SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2
6.6 Connectivity Tend towards a higher/lower score for natural/man-made obstructions <input type="checkbox"/> no obstructions in reach that block longitudinal movement of aquatic species over all but the lowest flows <input type="checkbox"/> system obstructions absent <input type="checkbox"/> abundant low and high flow refuge						<input type="checkbox"/> one or two small low flow obstructions present in reach that block movement of aquatic species <input type="checkbox"/> limited system obstructions <input type="checkbox"/> abundant refuge, with low or high flow refuge limited					<input type="checkbox"/> one or two small to medium bankfull obstructions present in reach that block movement of aquatic species <input type="checkbox"/> system obstructions present <input type="checkbox"/> limited low and high flow refuge					<input type="checkbox"/> more than two bankfull obstructions present in reach that block movement of aquatic species <input type="checkbox"/> many system obstructions <input type="checkbox"/> refuge absent				
	SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2
6.7 River Banks Select different boxes for LB and RB if necessary Undercut size rank variable only used if ≥ 5 undercuts (score each bank)	<input type="checkbox"/> bank erosion < 10%, typical of natural conditions, little or no bank revetments <input type="checkbox"/> bank vegetation > 90% in tree, shrub and herb layers, diverse assemblages, plants create good cover and roots help stabilize bank <input type="checkbox"/> bank canopy > 90% <input type="checkbox"/> undercut banks / mile > 20 <input type="checkbox"/> undercut bank size rank 3-6 > 50% <input type="checkbox"/> undercut banks with mostly stable boundaries, abundant overhanging vegetation, and consistent water adjacency <input type="checkbox"/> no mass failures in valley					<input type="checkbox"/> $10 \leq \text{bank erosion} < 30\%$, infrequent small areas, some bank revetments <input type="checkbox"/> $90 \geq \text{bank vegetation} > 75\%$ in each layer, diverse assemblages, plants create good cover and roots help stabilize bank <input type="checkbox"/> $90 \geq \text{bank canopy} > 75\%$ <input type="checkbox"/> $20 \geq \text{undercuts} / \text{mile} > 15$ <input type="checkbox"/> $50 \geq \text{undercut bank size rank } 3-6 > 25\%$ <input type="checkbox"/> undercuts with some unstable boundaries or reduced overhanging vegetation, and consistent water adjacency <input type="checkbox"/> 1 mass failure in valley					<input type="checkbox"/> $30 \leq \text{bank erosion} < 60\%$, mod. unstable banks, and/or extensive bank revetments <input type="checkbox"/> $75 \geq \text{bank vegetation} > 50\%$, in two of three layers, reduced diversity, plants create limited cover and roots do not stabilize bank <input type="checkbox"/> $75 \geq \text{bank canopy} > 50\%$ <input type="checkbox"/> $15 \geq \text{undercuts} / \text{mile} > 5$ <input type="checkbox"/> $25 \geq \text{undercut bank size rank } 3-6 > 10\%$ <input type="checkbox"/> undercuts with some unstable boundaries or reduced overhanging vegetation, and reduced water adjacency <input type="checkbox"/> 1 - 2 mass failures in valley					<input type="checkbox"/> bank erosion $\geq 60\%$, banks unstable, extensive erosion, and failing bank revetments <input type="checkbox"/> bank vegetation $\leq 50\%$ in two of three layers, limited diversity, plants create no cover and roots do not stabilize bank <input type="checkbox"/> bank canopy $\leq 50\%$ <input type="checkbox"/> undercuts / mile ≤ 5 <input type="checkbox"/> undercut bank size rank 3-6 $\leq 10\%$ <input type="checkbox"/> undercuts with mostly unstable boundaries, no overhanging vegetation, and reduced water adjacency <input type="checkbox"/> > 3 mass failures in valley				
	SCORE (LB)	Left Bank	10	9	8	7	6	5	4	3	2	1								
	SCORE (RB)	Right Bank	10	9	8	7	6	5	4	3	2	1								
	SCORE (LB)	Left Bank	10	9	8	7	6	5	4	3	2	1								
SCORE (RB)	Right Bank	10	9	8	7	6	5	4	3	2	1									
6.8 Riparian Area Select different boxes for LB and RB if necessary (score each side of the channel)	<input type="checkbox"/> buffer width > 150 ft <input type="checkbox"/> rip. vegetation > 75% in tree, shrub and herb layers, diverse assemblages, no invasives, maximum channel canopy <input type="checkbox"/> river corridor development and infrastructure absent					<input type="checkbox"/> $150 \geq \text{buffer width} > 100 \text{ ft}$ <input type="checkbox"/> $75 \geq \text{rip. veg.} > 50\%$ in each layer, one plant type absent, minimal invasives, maximum channel canopy <input type="checkbox"/> river corridor development and infrastructure minimal					<input type="checkbox"/> $100 \geq \text{buffer width} > 50 \text{ ft}$ <input type="checkbox"/> $75 \geq \text{rip. veg.} > 50\%$ in each layer, several types absent, altered patches, invasives present, reduced canopy <input type="checkbox"/> river corridor development and infrastructure common					<input type="checkbox"/> buffer width $\leq 50 \text{ ft}$ <input type="checkbox"/> rip. veg. $\leq 50\%$ in each layer, several types absent, large altered areas, invasives present, reduced canopy <input type="checkbox"/> river corridor development and infrastructure abundant				
	SCORE (LB)	Left Bank	10	9	8	7	6	5	4	3	2	1								
	SCORE (RB)	Right Bank	10	9	8	7	6	5	4	3	2	1								
	SCORE (RB)	Right Bank	10	9	8	7	6	5	4	3	2	1								

6.9 Score: front _____ + back _____ = total _____

Percentage: total score _____ x (100 / 160) = _____

Overall Physical Habitat Condition: _____

SHTD Existing Stream Habitat Type: _____

Score	Percentage	Condition (Departure)
136 – 160	85 – 100	Reference (None)
104 – 135	65 – 84	Good (Minor)
56 – 103	35 – 64	Fair (Major)
0 – 55	0 – 34	Poor (Severe)

VTANR REACH HABITAT ASSESSMENT ----- BRAIDED STREAM TYPE

(Also use this form for alluvial fans.)

Stream Name: _____
 Location: _____
 Observers: _____
 Organization /Agency: _____
 USGS Map Name(s): _____
 Weather: _____
 Flow: base / low / avg. Storm within past 7 days: Y / N

Segment I.D: _____
 Date: _____
 Town: _____
 Elevation: _____ ft.
 Latitude (N/S): _____
 Longitude (E/W): _____
 Drainage Area: _____ sq. mi.
 Segment Length: _____ ft.

Habitat Parameter	Condition (Departure) Category																			
	Reference (None)					Good (Minor)					Fair (Major)					Poor (Severe)				
6.1 Woody Debris Cover LWD size rank variable only used if ≥ 10 pieces	<input type="checkbox"/> LWD pieces / mile > 100 <input type="checkbox"/> LWD size rank 3-6 $> 50\%$ <input type="checkbox"/> debris jams / mile > 5 <input type="checkbox"/> high woody debris recruitment potential <input type="checkbox"/> CPOM present in channel and margins					<input type="checkbox"/> $100 \geq$ LWD / mile > 50 <input type="checkbox"/> $50 \geq$ LWD rank 3-6 $> 25\%$ <input type="checkbox"/> $5 \geq$ jams / mile > 3 <input type="checkbox"/> moderate woody debris recruitment potential <input type="checkbox"/> CPOM limited in channel and present in margins					<input type="checkbox"/> $50 \geq$ LWD / mile > 25 <input type="checkbox"/> $25 \geq$ LWD rank 3-6 $> 10\%$ <input type="checkbox"/> $3 \geq$ jams / mile > 1 <input type="checkbox"/> low woody debris recruitment potential <input type="checkbox"/> CPOM limited in both channel and margins					<input type="checkbox"/> LWD / mile ≤ 25 <input type="checkbox"/> LWD size rank 3-6 $\leq 10\%$ <input type="checkbox"/> debris jams absent <input type="checkbox"/> no woody debris recruitment potential <input type="checkbox"/> CPOM absent				
	SCORE					SCORE					SCORE					SCORE				
	20 19 18 17 16					15 14 13 12 11					10 9 8 7 6					5 4 3 2 1				
6.2 Bed Substrate Cover *fines: sand if $d_{50} \geq$ gravel, otherwise silt.	<input type="checkbox"/> riffle embeddedness $< 20\%$ margin embeddedness $< 40\%$ <input type="checkbox"/> fining* $< 10\%$ <input type="checkbox"/> Riffle stability index $< 70\%$ <input type="checkbox"/> sediment apparently stable & sorted <input type="checkbox"/> substrate free of dense algae growth					<input type="checkbox"/> $20 \leq emb_{riffle} < 40\%$ $40 \leq emb_{margin} < 60\%$ <input type="checkbox"/> $10 \leq fining^* < 20\%$ <input type="checkbox"/> $70 \leq RSI < 80\%$ <input type="checkbox"/> some evidence of sediment mobility & lack of sorting <input type="checkbox"/> small substrate patches covered by dense algae growth					<input type="checkbox"/> $40 \leq emb_{riffle} < 75\%$ $60 \leq emb_{margin} < 80\%$ <input type="checkbox"/> $20 \leq fining^* < 40\%$ <input type="checkbox"/> $80 \leq RSI < 90\%$ <input type="checkbox"/> major evidence of sediment mobility & lack of sorting <input type="checkbox"/> large substrate patches covered by dense algae growth					<input type="checkbox"/> riffle embeddedness $\geq 75\%$ margin embeddedness $\geq 80\%$ <input type="checkbox"/> fining* $\geq 40\%$ <input type="checkbox"/> RSI $\geq 90\%$ <input type="checkbox"/> sediments unstable, unsorted, soft underfoot <input type="checkbox"/> most of substrate covered by dense algae growth				
	SCORE					SCORE					SCORE					SCORE				
	20 19 18 17 16					15 14 13 12 11					10 9 8 7 6					5 4 3 2 1				
6.3 Scour and Deposition Features <i>Depth-velocity combinations</i> fast-shallow fast-deep slow-shallow slow-deep (cutoffs: 1.0 fps, 1.5 ft)	<input type="checkbox"/> pools / mile > 40 <input type="checkbox"/> pool size rank 3-7 $> 50\%$ <input type="checkbox"/> good cover $> 75\%$ of total pool surface area <input type="checkbox"/> riffle coverage $> 25\%$ reach area, distinctly formed and complete <input type="checkbox"/> $5 \leq$ riffle spacing ≤ 7 bankfull channel widths (w_{bkf}) <input type="checkbox"/> well-defined riffle-run-pool-glide pattern with all four depth-velocity combinations present <input type="checkbox"/> stable bars, vegetative cover on depositional features $\geq 50\%$, particles well-sorted					<input type="checkbox"/> $40 \geq$ pools / mile > 20 <input type="checkbox"/> $50 \geq$ pool rank 3-7 $> 25\%$ <input type="checkbox"/> $75 \geq$ good cover $> 50\%$ of total pool surface area <input type="checkbox"/> $25 \geq$ riffle coverage $> 10\%$ reach area, moderately well formed and complete <input type="checkbox"/> $3 \leq$ riffle spacing < 5 , or $7 <$ riffle spacing $\leq 10 \times w_{bkf}$ <input type="checkbox"/> well-defined riffle-run-pool-glide pattern with three depth-velocity combinations dominant <input type="checkbox"/> mostly stable bars, vegetative cover on depositional features 50-25%, particles moderately sorted					<input type="checkbox"/> $20 \geq$ pools / mile > 10 <input type="checkbox"/> $25 \geq$ pool rank 3-7 $> 10\%$ <input type="checkbox"/> $50 \geq$ good cover $> 25\%$ of total pool surface area <input type="checkbox"/> $25 \geq$ riffle coverage $> 10\%$ reach area, poorly formed and incomplete <input type="checkbox"/> $1 \leq$ riffle spacing < 3 , or $10 <$ riffle spacing $\leq 12 \times w_{bkf}$ <input type="checkbox"/> moderately defined riffle-run-pool-glide pattern with two depth-velocity combinations dominant <input type="checkbox"/> unstable bars present, vegetative cover on depositional features 25-10%, particles minimally sorted					<input type="checkbox"/> pools / mile ≤ 10 <input type="checkbox"/> pool size rank 3-7 $\leq 10\%$ <input type="checkbox"/> good cover $\leq 25\%$ of total pool surface area <input type="checkbox"/> riffle coverage $\leq 10\%$ reach area, or mostly indistinct or absent <input type="checkbox"/> riffle spacing ≥ 12 bankfull channel widths <input type="checkbox"/> poorly defined riffle-run-pool-glide pattern with one depth-velocity combination dominant <input type="checkbox"/> mostly unstable bars, vegetative cover on depositional features $< 10\%$, particles not sorted				
	SCORE					SCORE					SCORE					SCORE				
	20 19 18 17 16					15 14 13 12 11					10 9 8 7 6					5 4 3 2 1				
6.4 Channel Morphology	<input type="checkbox"/> width/depth < 30 , natural <input type="checkbox"/> entrenchment ratio ≥ 2.0 , incision ratio < 1.0 , good floodplain access <input type="checkbox"/> no evidence of channel alteration					<input type="checkbox"/> $30 \leq w/d < 40$, widening <input type="checkbox"/> entrenchment ratio ≥ 2.0 , $1.0 \leq$ incision ratio < 1.2 , reduced floodplain access <input type="checkbox"/> evidence of minor historic channel alteration					<input type="checkbox"/> $40 \leq w/d < 50$, widening <input type="checkbox"/> entrenchment ratio ≥ 2.0 , $1.2 \leq$ incision ratio < 1.4 , limited floodplain access <input type="checkbox"/> major historic or minor recent channel alteration					<input type="checkbox"/> $w/d \geq 50$, over-widening <input type="checkbox"/> entrenchment ratio < 2.0 or incision ratio ≥ 1.4 , floodplain access unlikely <input type="checkbox"/> extensive historic or major recent channel alteration				
	SCORE					SCORE					SCORE					SCORE				
	20 19 18 17 16					15 14 13 12 11					10 9 8 7 6					5 4 3 2 1				

Habitat Parameter	Condition (Departure) Category																			
	Reference (None)					Good (Minor)					Fair (Major)					Poor (Severe)				
6.5 Hydrologic Characteristics <input type="checkbox"/> wetted width / $W_{bkr} > 0.50$ <input type="checkbox"/> exposed substrate $< 50\%$ <input type="checkbox"/> adjacent springs, seeps, and wetlands extensive <input type="checkbox"/> no known flow alteration	<input type="checkbox"/> $0.50 \geq W_{wet} / W_{bkr} > 0.30$					<input type="checkbox"/> $0.30 \geq W_{wet} / W_{bkr} > 0.10$					<input type="checkbox"/> $W_{wet} / W_{bkr} \leq 0.10$									
	<input type="checkbox"/> $50 \leq \text{exp. substrate} < 60\%$					<input type="checkbox"/> $60 \leq \text{exp. substrate} < 70\%$					<input type="checkbox"/> exposed substrate $\geq 70\%$									
<input type="checkbox"/> adjacent springs, seeps, and wetlands present					<input type="checkbox"/> adjacent springs, seeps, and wetlands minimal					<input type="checkbox"/> adjacent springs, seeps, and wetlands absent or altered										
<input type="checkbox"/> minor flow alteration likely due to flow regulation and/or land use changes					<input type="checkbox"/> major flow alteration likely due to flow regulation and/or land use changes					<input type="checkbox"/> runoff characteristics completely altered due to flow regulation and storm water influence										
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
6.6 Connectivity Tend towards a higher/lower score for natural/man-made obstructions <input type="checkbox"/> no obstructions in reach that block longitudinal movement of aquatic species over all but the lowest flows <input type="checkbox"/> system obstructions absent <input type="checkbox"/> abundant low and high flow refuge	<input type="checkbox"/> one or two small low flow obstructions present in reach that block movement of aquatic species					<input type="checkbox"/> one or two small to medium bankfull obstructions present in reach that block movement of aquatic species					<input type="checkbox"/> more than two bankfull obstructions present in reach that block movement of aquatic species									
	<input type="checkbox"/> limited system obstructions					<input type="checkbox"/> system obstructions present					<input type="checkbox"/> many system obstructions									
<input type="checkbox"/> abundant refuge, with low or high flow refuge limited					<input type="checkbox"/> limited low and high flow refuge					<input type="checkbox"/> refuge absent										
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
6.7 River Banks Select different boxes for LB and RB if necessary Undercut size rank variable only used if ≥ 5 undercuts (score each bank)	<input type="checkbox"/> bank erosion $< 10\%$, typical of natural conditions, little or no bank revetments					<input type="checkbox"/> $10 \leq$ bank erosion $< 30\%$, infrequent small areas, some bank revetments					<input type="checkbox"/> $30 \leq$ bank erosion $< 60\%$, mod. unstable banks, and/or extensive bank revetments					<input type="checkbox"/> bank erosion $\geq 60\%$, banks unstable, extensive erosion, and failing bank revetments				
	<input type="checkbox"/> bank vegetation $> 90\%$ in tree, shrub and herb layers, diverse assemblages, plants create good cover and roots help stabilize bank					<input type="checkbox"/> $90 \geq$ bank vegetation $> 75\%$ in each layer, diverse assemblages, plants create good cover and roots help stabilize bank					<input type="checkbox"/> $75 \geq$ bank vegetation $> 50\%$, in two of three layers, reduced diversity, plants create limited cover and roots do not stabilize bank					<input type="checkbox"/> bank vegetation $\leq 50\%$ in two of three layers, limited diversity, plants create no cover and roots do not stabilize bank				
<input type="checkbox"/> bank canopy $> 90\%$					<input type="checkbox"/> $90 \geq$ bank canopy $> 75\%$					<input type="checkbox"/> $75 \geq$ bank canopy $> 50\%$					<input type="checkbox"/> bank canopy $\leq 50\%$					
<input type="checkbox"/> undercut banks / mile > 30					<input type="checkbox"/> $30 \geq$ undercuts / mile > 15					<input type="checkbox"/> $15 \geq$ undercuts / mile > 5					<input type="checkbox"/> undercuts / mile ≤ 5					
<input type="checkbox"/> undercut bank size rank 3-6 $> 50\%$					<input type="checkbox"/> $50 \geq$ undercut bank size rank 3-6 $> 25\%$					<input type="checkbox"/> $25 \geq$ undercut bank size rank 3-6 $> 10\%$					<input type="checkbox"/> undercut bank size rank 3-6 $\leq 10\%$					
<input type="checkbox"/> undercut banks with mostly stable boundaries, abundant overhanging vegetation, and consistent water adjacency					<input type="checkbox"/> undercuts with some unstable boundaries or reduced overhanging vegetation, and consistent water adjacency					<input type="checkbox"/> undercuts with some unstable boundaries or reduced overhanging vegetation, and reduced water adjacency					<input type="checkbox"/> undercuts with mostly unstable boundaries, no overhanging vegetation, and reduced water adjacency					
<input type="checkbox"/> no mass failures in valley					<input type="checkbox"/> 1 mass failure in valley					<input type="checkbox"/> 1 - 2 mass failures in valley					<input type="checkbox"/> > 3 mass failures in valley					
SCORE (LB)	Left Bank		10	9	8	7	6	5	4	3	Right Bank		2	1						
SCORE (RB)	Right Bank		10	9	8	7	6	5	4	3	Left Bank		2	1						
6.8 Riparian Area Select different boxes for LB and RB if necessary (score each side of the channel)	<input type="checkbox"/> buffer width > 150 ft					<input type="checkbox"/> $150 \geq$ buffer width > 100 ft					<input type="checkbox"/> $100 \geq$ buffer width > 50 ft					<input type="checkbox"/> buffer width ≤ 50 ft				
	<input type="checkbox"/> rip. vegetation $> 75\%$ in tree, shrub and herb layers, diverse assemblages, no invasives, maximum channel canopy					<input type="checkbox"/> $75 \geq$ rip. veg. $> 50\%$ in each layer, one plant type absent, minimal invasives, maximum channel canopy					<input type="checkbox"/> $75 \geq$ rip. veg. $> 50\%$ in each layer, several types absent, altered patches, invasives present, reduced canopy					<input type="checkbox"/> rip. veg. $\leq 50\%$ in each layer, several types absent, large altered areas, invasives present, reduced canopy				
<input type="checkbox"/> river corridor development and infrastructure absent					<input type="checkbox"/> river corridor development and infrastructure minimal					<input type="checkbox"/> river corridor development and infrastructure common					<input type="checkbox"/> river corridor development and infrastructure abundant					
SCORE (LB)	Left Bank		10	9	8	7	6	5	4	3	Right Bank		2	1						
SCORE (RB)	Right Bank		10	9	8	7	6	5	4	3	Left Bank		2	1						

6.9 Score: front _____ + back _____ = total _____

Percentage: total score _____ x (100 / 160) = _____

Overall Physical Habitat Condition: _____

SHTD Existing Stream Habitat Type: _____

Score	Percentage	Condition (Departure)
136 – 160	85 – 100	Reference (None)
104 – 135	65 – 84	Good (Minor)
56 – 103	35 – 64	Fair (Major)
0 – 55	0 – 34	Poor (Severe)