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APPENDIX A High Gradient Bioassessment Stream Data Sheets

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High Gradient Bioassessment Stream Visit Sheet

STDEAMN	ME: SKY-				LOCATION:	10 A. 11			
Marsha The	the base of				COUNTY: B	State Ville		PROGRAM	G141890.0
STATION #:	TORS: CDI	<	A TEXT TO THE			1.8.9	TIME	Start: 12:4	
	where we have a second of the	a traile			DATE: 10/15	5/15	(24hr)	Finish:	
			A TANKED AND	Rea		1914 - S. S.	CANOL	Y COVER:	STREAM
	Station 38.88495		Downstrea	im	Upstrear -	<u>n</u>	G Fully Exp	osed (0-25%)	TYPE:
	4.72972					Partially Shaded (50-75%)		%) DEphemeral	
LONG				LOCAL	WATEROUPDE				
Has there bee	NUW F		urs ry rain		WATERSHED F e Mining	Const		Forest	ig Land Use):
a scouring rai in the last 14			ty rain mittent showers	Deep I		Comr		Pasture	/Grazing
days?		Clean	r/sunny	Land I	Disposal	Row		Urban 2	Runoff/Storm Sewers
The second second second			dy	K Reside	ential	RIP	ARIAN VEG	ETATION	
Stream Width	h 120) ft	HYDRAULI		STREAM FLOW	Domi	nate Type:		CHIANNEY
Maximum De Reach Length	n <u>15.</u>	£ ft 2 m	STRUCTUR		Dry Pooled	Gr	ees Herbace asses X Shrub	S	CHANNEL ALTERATIONS
	m/Pool Sequen		Bridge Abutn	ients	Low		er of strata 2 Shrub Taxa	_Dom.	Dredging Channelization
			Waterfalls] High] Normal	PLAT	TANUS OCC		(KFull Partial)
Pet vi and die	0 Run 1	Pool	Other:	and a		ACE	RNEGUND	Carl & State	
P-CHEM			ment Used:					te Calibrated:	
Temp(°C)	D.O.	. (mg/l)	%Satu			100 - The - 52	Cond	T	urb
					ollection Verific				
Algae Fish		-	HC Other		Visual Assessm	ent	Lead C	1	
Habitat		and the second	ate Other:	e: BPEF	Seine_		and the second	ollector:	
Invertebrates								ollector:	
		Links 155	Cobble Snags	Veg	Banks Sar	nd M		Other)
Tissue:	1100 100 2012		lected S				Lead C	ollector:	Store IN Cast Rea
Water Chem	Acid/A		ulk 🗌 Nutrients 🗌	Metals	Low Hg	13.2	Lead C	ollector:	
	A CONTRACT OF A CONTRACT.		Pesticides 🗌 Ortho	P D Othe	r:	and the second	S. 5192-4		and the states white
Duplicate S	amples Take	n:							
		,	Section 1	8-8-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1					A State of the
			5	Substrat	e Characteriz	ation			
Substrate	Est. P.C.	Riffle_	0 %	R	in <u>0</u> %	I	Pool 100	%	Reach Total
Silt/Clay (<().06 mm)			1.34					20
Sand (0.06 -	- 2 mm)								15
Gravel (2-64	mm)								15
Cobble (64 -	- 256 mm)								35
Boulders (>2	256 mm)							1. 1. 1.	15
Bedrock									0
NOTES	COMMEN	TS:		A Star		- and the second se		tati Nileye	
50' REA	CH				SIT	E NO	T SAMPI	LED:	
						and owne	r denial] Dry	Too deep/Impounded
					等部分 回怨				
						Site not for	und/Secluded	Unsafe	

Other (indicate under comments)

CONFIDENTIAL PROPRIETARY TRADE SECRET RBP High Gradient Habitat

Habitat		Condition	Category				
Parameter	Optimal	Suboptimal	Marginal	Poor			
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0			
1.Epifaunal Substrate/ Available Cover Score 12	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.			
2.Embeddedness Score 11	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.			
3.Velocity/ Depth Regime Score 17	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast- shallow). (Sow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	present (if fast-shallow is regimes present (if fast- missing, score lower than if shallow or slow-shallow are				
4. Sediment Deposition Score 17	Little or no enlargement of islands or point bars and less than 5% (<20% for low- gradient streams) of the bottom affected by sediment deposition.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.					
5.Channel Flow Status Score 20	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.			
6.Channel Alteration Score 2	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.			
7.Frequency of Riffles (or bends) Score ³	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.			
Left/Right Bank	10 9	8 7 6	5 4 3	2 1 0			
8.Bank Stability LB 9 RB 9	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.			
9. Vegetative Protection LB 6 RB 6	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble				
10. Riparian Vegetative Zone Width LB 3 RB 3	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.			

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High Gradient Bioassessment Stream Visit Sheet

LAT 38.884 LONG -84.736	CDK, IG vs GPS			COUNTY: BO	ONE	1	PROGRAM: PROJECT:	G141890.0
INVESTIGATORS: Verify Site LAT/LON Si LAT 38.884 LONG -84.736	IG vs GPS 🔲			and the second second	West Strength of	Later in Particular	20.4	
Si LAT 38.884 LONG -84.736		VES CINO PINU				TIME S	and the second of the second second second second second	
LAT 38.884 LONG -84.736		IES LINO MIN/	A	DATE: 10/10	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	(24hr)	Finish:	
LAT 38.884 LONG -84.736	ation	Downstrea		ach Upstrear			COVER:	STREAM
LONG -84.736		-	<u>am</u>	-		Fully Expo	sed (0-25%) xposed (25-50	(%) X Perennial
	19	-		-		Partially SI	haded (50-75%	6) DEphemera
WEATHER Has there been a scouring rain in the last 14 days? Yes No	Heav Stead Intern Clear Clour ATURES	y rain ly rain nittent showers /sunny dy	☐ Surfa ☐ Deep ☐ Oil W	Vells Disposal	Const	ruction nercial trial	Forest Pasture Silvicul Urban F	Grazing
Stream Width Maximum Depth Reach Length Riffle/Run/Pool 1 (No. Sampled in 2	Reach)	HYDRAULI STRUCTUR Dams Bridge Abutn Island Waterfalls Other:	ES nents	STREAM FLOW Dry Pooled Stow High Normal	INUMB Tree/S SAL	hate Type: ees Herbaceo asses S Shrubs er of strata 2 shrub Taxa X NIGRA, TANUS	Acres in	CHANNEL ALTERATIONS Dredging Channelization (CFull Partial)
Р-СНЕМ	Instru	ment Used:				Date	Calibrated:	
Temp(°C)	_ D.O. (mg/l)	%Sati	uration	pH(S.U	l.)	Cond	Ti	urb
		a salara	Sample C	Collection Verific	ation		Sec. As an	
Algae Sar	nple: 🗌 QualM	HC Other	Section 1	Visual Assessm	ent	Lead Co	llector:	
Fish 🔲	BPEF Seine Other Time: BPEF Seine Lead Collector:							
Habitat 🔲	RBP 🔲 Substra	te 🗌 Other:				Lead Co	llector:	
and the second second second	1m ² Qual		s Ve	o Banks Sar	nd M	Lead Co		1
Tissue: No	.of Samples col	lected S	D:	g. Banks Sar	11112	Lead Co	ALC: NOT	
Water Chem	Acid/Alk 🛛 Bu	Ilk I Nutrients I Pesticides I Ortho	Metals			Lead Co		
Duplicate Samples				te Characteriz	ation			
Substrate 🛛 Est. 🗖	P.C. Riffle		1	un 5 %		ool 25 %	6	Reach Total
Silt/Clay (<0.06 mm	All and a state of	<u>//0</u> /8		<u></u>		001_20_/	0	10
Sand (0.06 – 2 mm)								5
Gravel (2-64 mm)								10
Cobble (64 – 256 m	um)							75
Boulders (>256 mm	1)							0
Bedrock								0

Site not found/Secluded

Other (indicate under comments)

Unsafe

Habitat		RBP High Gradient Condition		and the company of the loss			
Parameter	Optimal	Suboptimal	Marginal	Poor			
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0			
1.Epifaunal Substrate/ Available Cover Score	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.			
2.Embeddedness Score 13	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.			
3.Velocity/ Depth Regime Score 7	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast- shallow). (Sow is < 0.3 m/s, deep is < 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast- shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow- deep).			
4. Sediment Deposition Score	Little or no enlargement of islands or point bars and less than 5% (<20% for low- gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	the bottom affected; rediment (80% for low-gradient) of the				
5.Channel Flow Status Score 7	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.			
6.Channel Alteration Score	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.			
7.Frequency of Riffles (or bends) Score	Occurrence of riffles relatively frequent, ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.			
Left/Right Bank	10 9	8 7 6	5 4 3	2 1 0			
8.Bank Stability LB 8 RB 8	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.			
9. Vegetative Protection LB 6 RB 6	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.			
10. Riparian Vegetative Zone Width LB 5 RB 5	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.			
Tot	al Score	NOTES/COMMENTS:		Charles and the second second			
		50' REACH					

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High Gradient Bioassessment Stream Visit Sheet

STREAM NAM	E: SKY-			LOCATION:	BIGBO	NE,		
STATION #:	N/A			COUNTY: BO	DONE	And the second	PROGRAM PROJECT:	I: G141890.0
INVESTIGAT	CDK	State A State		- DATE: 10/15		TIME	Start: 2:00	
Verify Site LAT	/LONG vs GPS	YES NO N/	A	DATE: 10/10	/ 10	(24hr)	Finish:	
	Charles	Description		ach			PY COVER:	
LAT 38	Station 8.88831	Downstrea	am	Upstrear -	<u>n</u>	Partially Exposed (25-50%) Per Partially Shaded (50-75%) Eph		
1	4.7551							5%) DEphemeral
WEATHER	Now Past 24 ho		LOCAL	WATERSHED F	FATURE	ES (Predomi	nant Surroundi	
Has there been	Heav	y rain	Surfa	ce Mining	Const	ruction	Forest	
a scouring rain in the last 14	Stead	ly rain mittent showers	Deep	Mining Vells	Comr		Silvice	e/Grazing
days?	🛛 🕅 Clea	r/sunny	Land	Disposal	Row			Runoff/Storm Sewers
LE STALONAL ENT	Clou	dy	Resid	ential	RIP	ARIAN VEG	FTATION	
Stream Width	<u>50</u> ft	HYDRAUL	and the second se	STREAM FLOW	Domi	nate Type:		
Maximum Dept Reach Length	h <u>2</u> ft <u>15.2</u> m	STRUCTUR Dams	ES	Dry	X In	ees Herbac		CHANNEL ALTERATIONS
	Pool Sequence	K Bridge Abutn	nente l'	X Pooled	Numb	er of strata		Dredging
	oled in Reach)	U Island Waterfalls		🗖 High		Shrub Taxa TANUS		Channelization
<u>1</u> Riffle C	Run <u>1</u> Pool	Other:		Normal		CIDENTALIS	6,	
P-CHEM	Instru	ment Used:		and the second		Da	ate Calibrated:	
Temp(°C)	D.O. (mg/l)	%Sat	uration	pH(S.U	.)	Cond		Turb
a su des			Sample C	Collection Verific	ation			
Algae	Sample: 🗍 QualM	IHC Other	1.00	Visual Assessm	ent	Lead (Collector:	
Fish	BPEF Seine	Other Tim	e: BPEF	Seine		Lead (Collector:	
Habitat	RBP Substr	ate Other:	5			Lead (Collector:	
Invertebrates	1m ² Qual						Collector:	
	20 Jab (#Jabs: 0			g. Banks Sar	ndN		Other)
Tissue:	No. of Samples col		-				Collector:	
Water Chem	Acid/Alk B					Lead (Collector:	
Duplicate San	The second s			te Characteriz	ation			
Substrate KEs	it. P.C. Riffle_			un_0_%		Pool 25	%	Reach Total
Silt/Clay (<0.0	6 mm)			and a start of the		影响品		20
Sand (0.06 – 2	mm)							10
Gravel (2-64 n	nm)							20
Cobble (64 – 2	56 mm)							35
Boulders (>25	6 mm)							15
Bedrock								0
NOTES/C	OMMENTS: H			LEAST DE LA SA	E NO	T SAMP er denial		Too deep/Impounded
					Site not for	und/Secluded	Unsafe	

Other (indicate under comments)

Habitat		Condition	Category				
Parameter	Optimal	Suboptimal	Marginal	Poor			
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0			
1.Epifaunal Substrate/ Available Cover Score 8	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.			
2.Embeddedness Score 13	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.			
3.Velocity/ Depth Regime Score 13	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast- shallow). (Sow is < 0.3 m/s, deep is < 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast- shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow- deep).			
4. Sediment Deposition Score 10	Little or no enlargement of islands or point bars and less than 5% (<20% for low- gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.			
5.Channel Flow Status Score 5	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.			
6.Channel Alteration Score 3	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.			
7.Frequency of Riffles (or bends) Score 4	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.			
Left/Right Bank	10 9	8 7 6	5 4 3	2 1 0			
8.Bank Stability LB 6 RB 6	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.			
9. Vegetative Protection LB	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.			
10. Riparian Vegetative Zone Width LB 6 RB 6	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.			
Tot	al Score	NOTES/COMMENTS:					
		50' REACH					
		in the state of the					

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High Gradient Bioassessment Stream Visit Sheet

STREAM NAM	TE: SKY-C	DK-01	10		LOCATION:	BIGBO	NE, KY	14	
STATION #:	N/A	5.0			COUNTY: BC		Allehalt	PROGRAM	G141890.03
INVESTIGAT	ORS: CDI	K, RFL		1		영생 방법	TIME		
and the second s		PS C	YES NO N/	A	DATE: 10/15/	15	(24hr)	Finish:	
	Station		Downstre		each Upstrear			Y COVER:	
LAT 38	.887878		-	<u>au</u>		274.25	Fully Exp	osed (0-25%) Exposed (25-5	0%) TYPE:
	84.756212							Shaded (50-75 ded (75-100%	%) DEphemeral
WEATHER	Now Pa	ast 24 ho	.1	LOCAL	L WATERSHED F	FATURI	ES (Predomin	ant Surroundi	ng I and I ise)
Has there been		Heav	vy rain	and the second se	ace Mining	Concerning of the second second	truction	Forest	
a scouring rain in the last 14			dy rain mittent showers	Dee Oil	p Mining			Pasture Silvicu	
days?			r/sunny		d Disposal	Row			Runoff/Storm Sewers
Yes X No] Clou	ıdy	X Resi	dential	REAL			
INSTREA Stream Width	M FEATUR	ES) ft	HYDRAUL	IC		Domi	ARIAN VEGI nate Type:	ETATION	
Maximum Dep	th 1	5 ft	STRUCTUR	and the second se	STREAM FLOW	D Ti	ees Herbace	ous	CHANNEL
Reach Length	15.2 /Pool Sequen		Dams Da Bridge Abutr	nents	D Pooled		rasses X Shrub per of strata	Dom	ALTERATIONS
	pled in Reach		Island		Low High	Tree/	Shrub Taxa		X Channelization
0 Riffle	<u>1_Run_1</u>	_Pool	U Waterfalls		X Normal		SACUS SP., LANS		(Full Partial)
P-CHEM		Instru	iment Used:	and the s		T PR	Da	te Calibrated:	
Temp(°C)	D.O.	(mg/l)_	%Sat	uration	pH(S.U	.)(Cond		Surb
		04.2		Sample	Collection Verific	ation	14. M2/9		
Algae	Sample:	QualM	IHC Other		Visual Assessm	ent	Lead C	ollector:	
Fish	BPEF [Seine	Other Tim	e: BPEF	Seine	1.100	Lead C	ollector:	1999年1月1日
Habitat	Contraction of the second second		rate 🗌 Other:				Lead C	ollector:	
Invertebrates		9 9 1 1 1 1 1 A 4	BATTAN CONTRACTOR			Children of the		ollector:	
					eg. BanksSar	<u>d</u> N		• • • • • • • • • • • • • • • • • • • •	<u> </u>
Tissue:		-	llected S					ollector:	
Water Chem			ulk 🗌 Nutrients 🗌 Pesticides 🛄 Orthe				Lead C	ollector:	
Duplicate Sa		-	resticides 🗋 Ortik						
				Substra	te Characteriz	ation			
Substrate 🔀 E	st. 🗆 P.C.	Riffle_	0 %	I	Run <u>75</u> %		Pool 15	%	Reach Total
Silt/Clay (<0.	06 mm)	いた。							30
Sand (0.06 – 2	2 mm)			8		10 States			30
Gravel (2-64 i	nm)								30
Cobble (64 – 2	256 mm)								10
Boulders (>25	6 mm)				10月1日日 1日日 1日日 - 1月日 1日日 - 1月日				0
Bedrock	11-51								0

Land owner denial

Site not found/Secluded

Other (indicate under comments)

Dry Dry

Unsafe

Too deep/Impounded

Habitat		Condition	Category				
Parameter	Optimal	Suboptimal	Marginal	Poor			
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0			
I. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.			
Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.			
Score 2 3.Velocity/ Depth Regime Score 2	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast- shallow). (Sow is < 0.3 m/s, deep is < 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast- shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow- deep).			
4. Sediment Deposition Score 12	Little or no enlargement of islands or point bars and less than 5% (<20% for low- gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.				
5.Channel Flow Status Score 16	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Very little water in channel and mostly present as standing pools.				
6.Channel Alteration Score 7	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.			
7.Frequency of Riffles (or bends) Score 9	Occurrence of riffles relatively frequent, ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7), variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	infrequent; distance between riffles divided by the width of riffles divided by the width of				
Left/Right Bank	10 9	8 7 6	5 4 3	2 1 0			
8.Bank Stability LB 7 RB 7	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.			
9. Vegetative Protection 4 LB RB 4	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation, disruption of stream bank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.			
10. Riparian Vegetative Zone Width LB <u>3</u> RB 3	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.			

80

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High Gradient Bioassessment Stream Visit Sheet

the second s		-		And the second second second				
STREAM NAME: SKY-			11 - 14 14	LOCATION:	BIGBO			
STATION #: N/A		an the		COUNTY: BO	DONE	P	ROGRAM: ROJECT:	G141890.0
INVESTIGATORS: CD	К,			DATE:10/15/	115	TIME S	tart: 2:30	
Verify Site LAT/LONG vs	GPS 🗆	YES DNO 🖄 N/A			10	(24hr) F	inish:	
Station		Downstrea	Rea	ch Upstrear	n	CANOPY	COVER::	STREAM TYPE:
LAT 38.88909				-		X Partially Ex	posed (25-50	%) Perennial
LONG -84.7489	- Walt	-						
Has there been a scouring rain in the last 14 days? Yes No INSTREAM FEATULY Stream Width	Stead Intern Clear Clour RES ft ft 2 m nce	y rain ly rain mittent showers r/sunny	Surfac Deep 1 Oil W Land 1 Reside	Mining ells Disposal ential STREAM FLOW Dry Pooled Low High	Const Com Indus Row RIP Domi Tr Gr Numb Tree/S	truction nercial trial	Forest Pasture/ Silvicul Urban F	Grazing
0 Riffle 0 Run	0 Pool	Cother: CULV	ER [[]	Normal		IGRA, CUPRESSU	JS SP.,	
P-CHEM	Instru	ment Used:			FOPOL		Calibrated:	
Temp(°C) D.C). (mg/i)	%Satu	uration	pH(S.U	l.)	Cond	Ti	ить
	al-		Sample C	ollection Verific	ation			AND STRUCTURE OF THE
Algae Sample:	QualM	HC 🗌 Other		Visual Assessm	ient	Lead Col	lector:	
	Seine		BPEF	Seine		Lead Col		1- Maria Barana
	and the second second	ate 🗋 Other:				Lead Col		
· 结果 新生产的 计算机 法 二、结果的 小小生产	Qual] Other: Cobble Snags	Ver	Ranks Sar	nd M	Lead Col facrophytes		1
		lected. Sp		<u>, Duins Un</u>	<u>. </u>	Lead Col		
Water Chem Acid/	Alk 🗌 Bu	alk 🗌 Nutrients 🗌	Metals	Low Hg		Lead Col	lector:	
		Pesticides 🗌 Ortho	P 🗌 Othe	E.	4.6.		10 200	
Duplicate Samples Tak	en:							
					14.14			All The All States
	T State			e Characteriz			i di	a address of the sea
Substrate 🖾 Est. 🗆 P.C.	Riffle_	<u>0</u> %	Rı	in_0_%		Pool 0 %		Reach Total
Silt/Clay (<0.06 mm)								30
Sand (0.06 – 2 mm)	and the		96.0					25
Gravel (2-64 mm)								30
Cobble (64 – 256 mm)								15
Boulders (>256 mm)								0
Bedrock								0
NOTES/COMMEN	TS:		19-16-14					
50' REACH				SIT	E NO	T SAMPL	ED:	
					and owne	er denial	Dry 🗆	foo deep/Impounded
					Site not for	und/Secluded	Unsafe	
1								
					Juner (Indi	icate under comm	ients)	IN ASSAULT HE REAL

Habitat		Condition	Category			
Parameter	Optimal	Suboptimal	Marginal	Poor		
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0		
Epifaunal Substrate/ Available Cover Score 6	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.		
Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.		
Score N/A	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast- shallow). (Sow is < 0.3 m/s, deep is < 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast- shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow- deep).		
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low- gradient streams) of the bottom affected by sediment deposition.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected, sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.			
5.Channel Flow Status Score N/A	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.		
Score 7	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments, evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.		
7.Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.		
Left/Right Bank	10 9	8 7 6	5 4 3	2 1 0		
Bank Stability B 7 B 7	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.		
9. Vegetative Protection 5 LB 	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	il vegetation; disruption of stream bank vegetation; disruption of stream bank vegetation is very		
10. Riparian Vegetative Zone Width LB 6 RB 5	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.		
To	tal Score	NOTES/COMMENTS:				

 $(\mathbf{i}) = \mathbf{i} = (1 - \mathbf{i})^{-1} \mathbf{i} = (1 - \mathbf{i})^{-1} \mathbf{i} = (1 - \mathbf{i})^{-1} \mathbf{i} = (1 - 1)^{-1} \mathbf{i} =$

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High Gradient Bioassessment Stream Visit Sheet

STREAM NAM	Sano alla contra	ingn Gruuter		LOCATION:	lo ili dinir	10-11-1			
Contract Exception	N/A			COUNTY: BO	CALL OF		PROGRA	M:	1890 0
STATION #:	DRS: CDK,	-		The Paul New	This and	TIME	Start: 3:		
				DATE: 10/15	15	(24hr)	Finish:		
veniy one bitti			Rea			CANO	PY COVEL	2	STREAM
	Station	Downstrea	am	Upstream	n	Fully Exposed (0-25%) Partially Exposed (25-50%) Prenn		TYPE:	
A	37939							Ephemeral	
LONG -84.7	70139				化产品	Fully Sh	aded (75-10	0%)	
WEATHER Has there been	Now Past 24 ho		The second s	WATERSHED F	a second s			and the second se	nd Use):
a scouring rain	Stead	ry rain ty rain	Deep	ce Mining Mining	Const		For Pas	ture/Gra	zing
in the last 14 days?		mittent showers	OilW	ells Disposal				riculture	ff/Storm Sewers
Yes No	Clean	r/sunny dy	X Resid		Row	Crops		an Runo	11/Storm Sewers
INSTREAM Stream Width	1 FEATURES 9 ft				A STATE OF THE OWNER	ARIAN VEG	ETATION		
Maximum Dept	h 0.33 ft	HYDRAULI	FC	STREAM FLOW	Tr	nate Type: eesXI Herbac			CHANNEL
Reach Length	15.2 m Pool Sequence	Dams Bridge Abutn	2422	Pooled		asses X Shru			LTERATIONS Dredging
	led in Reach)	Island	100 201	Low High	Tree/S	Shrub Taxa	2.121.54	K	Channelization
2 Riffle 1 Run 0 Pool S Other:CULVER				(NIGRA, S			Full APartial)		
P-CHEM		ment Used:			<u> </u>		ate Calibrate	調算す	
	D.O. (mg/l)		uration	pH(S.U	l.)			-	
		the states	ALL STREET	ollection Verific					
Algae	Sample: QualM			Visual Assessm		Lead	Collector:	(112) (112)	Call a real of
Fish	BPEF Seine Other Time: BPEF Seine Lead Collector:								
Habitat	RBP Substr	RBP Substrate Other: Lead Collector:							
Invertebrates							Collector:		
	20 Jab (#Jabs: 0			g. BanksSar	ndN			<u> </u>	
Tissue:	No. of Samples col						Collector:		
Water Chem	Acid/Alk Bu					Lead (Collector:		
Duplicate Sam									
					業があ			3	
		5	Substrat	e Characteriz	ation	13.1			Mar Alle
Substrate 🖾 Es	t. P.C. Riffle_	75_%	R	un <u>25</u> %	1	PoolO	%	Re	ach Total
Silt/Clay (<0.0	6 mm)			N statter					25
Sand (0.06 - 2	mm)								15
Gravel (2-64 m	ım)								20
Cobble (64 – 2.	56 mm)			日間語り					35
Boulders (>256	imm)					Sec. Se			0
Bedrock								iel su	0
NOTES/CO	OMMENTS:				-				
50' REAC	Н			SIT	E NO	Г ЗАМР	LED:		The second
Sector of					and owne			□T00 0	leep/Impounded
							Section 27		
					one not for	und/Secluded	Uns	ate	

Other (indicate under comments)

Habitat		Condition	Category				
Parameter	Optimal	Suboptimal	Marginal	Poor			
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0			
1.Epifaunal Substrate/ Available Cover Score 6	Greater than 70% of substrate favorable for epifaunal colonization and fish cover, mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.			
2.Embeddedness Score 7	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.			
3.Velocity/ Depth Regime Score 6	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast- shallow). (Sow is < 0.3 m/s, deep is < 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast- shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow- deep).			
4. Sediment Deposition Score 14	Little or no enlargement of islands or point bars and less than 5% (<20% for low- gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.			
5.Channel Flow Status Score 9	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.			
6.Channel Alteration Score 9	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.			
7.Frequency of Riffles (or bends) Score 10	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.			
Left/Right Bank	10 9	8 7 6	5 4 3	2 1 0			
8.Bank Stability LB 8 RB 8	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.			
9. Vegetative Protection 4 LBRB 4	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.			
10. Riparian Vegetative Zone Width LB 3 RB 3	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	meters; human activities have impacted zone only				
	10	NOTES/COMMENTS.	An Entered Mit May 220 (1919 - 1976)	The Party of the State of the Party of the			
Tot	tal Score	NOTES/COMMENTS:					

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High Gradient Bioassessment Stream Visit Sheet

0101	- Ingli G	Iddient Bio		A STATE TO THE				
STREAM NAME: SKY-			LOCATION	LOCATION: BIGBONE,				
STATION #: N/A			COUNTY:	COUNTY: BOONE		PROJECT: G141890.0		
INVESTIGATORS: CDK			DATE: 10/	15/15	· (24hr)	Start: 4:15 P	М	
Verify Site LAT/LONG vs G	PS YES NO		each		(2441)	Finish:		
Station	Do	wnstream	Upstr	am		Y COVER:: sed (0-25%)	STREAM TYPE:	
LAT 38.89736		- 1.14 F		- 🗌 Pau		xposed (25-50% haded (50-75%)) C Perennial	
LONG -84.66256					Fully Shad			
Has there been a scouring rain in the last 14 days?	Steady rain Intermittent sho Clear/sunny Cloudy	wers	L WATERSHEI face Mining p Mining Wells d Disposal idential	FEATURI	truction mercial strial	Forest Pasture/G Silvicultu	razing	
INSTREAM FEATURE Stream Width 14 Maximum Depth 25 Reach Length 15.2 Riffle/Run/Pool Sequence (No. Sampled in Reach) 2 Riffle 1 Run 1	4 ft HYD 2 ft STRU 2 m Dams 5 M Bridg 0 Island 0 Water	e Abutments falls	STREAM FLC	W Domi D Tr D Gi Numi Tree/ PLA	ARIAN VEGE nate Type: ees Herbaceo rasses Shrubs ber of strata 2 Shrub Taxa TANUS IDENTALIS,	Dom.	CHANNEL ALTERATIONS Dredging Channelization Full SPartial)	
Р-СНЕМ	Instrument Used				Date	Calibrated:		
Temp(°C) D.O.	(mg/l)	_ %Saturation_	pH(S.U.)	Cond	Tur	p	
学生的问题 的教育中学	推進加強的推	Sample	Collection Veri	fication	NET RATE			
Algae Sample: QualMHC Other Visual Assessment Lead Collector:								
Fish BPEF	Seine Other	Time: BPEF	Sei	ne	Lead Co	llector:	1.11年1月1日	
	Substrate Othe	er:			Lead Co	llector:		
AND INCOMENTATION OF A DESCRIPTION OF A	Qual 🚺 Other:				Lead Co			
	(#Jabs: Cobble		eg. Banks	SandN)	
	nples collected				Lead Co Lead Co			
	ides 🗌 Pesticides [Lead CO			
Duplicate Samples Taker	n:							
	是 [] 法 [] 学校的	Substra	ate Character	ization				
Substrate KEst. DP.C.	Riffle 15 %	and all they	Run <u>50</u> %	land l	Pool35 %	6 1	Reach Total	
Silt/Clay (<0.06 mm)					$(\tau_{i}) \in \mathcal{T}_{i} \rightarrow \mathcal{T}_{i}$			
Sand (0.06 – 2 mm)	44						2	
Gravel (2-64 mm)								
Cobble (64 – 256 mm)								
Boulders (>256 mm)							10	
Bedrock								
NOTES/COMMENT 50' REACH	rs:			ITE NO	T SAMPL	San Treat I The	o deep/Impounded	

Site not found/Secluded

Other (indicate under comments)

Unsafe

Habitat		Condition	Category			
Parameter	Optimal	Suboptimal	Marginal	Poor		
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0		
1.Epifaunal Substrate/ Available Cover Score	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.		
2.Embeddedness	Gravel, cobble, and boulder	0 1 11 11 11	Gravel, cobble, and boulder			
Score 14	particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.			
3.Velocity/ Depth Regime Score 13	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast- shallow). (Sow is < 0.3 m/s, deep is < 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Dominated by 1 velocity/ depth regime (usually slow- deep).			
4. Sediment Deposition Score 15	Little or no enlargement of islands or point bars and less than 5% (<20% for low- gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.		
5.Channel Flow Status Score 16	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.		
6.Channel Alteration Score 5	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.		
7.Frequency of Riffles (or bends) Score	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.		
Left/Right Bank	10 9	8 7 6	5 4 3	2 1 0		
8.Bank Stability LB 7 RB 7	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.		
9. Vegetative Protection 4 LB RB 4	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.		
10. Riparian Vegetative Zone Width LB 3 RB 3	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.		
Tot	tal Score	NOTES/COMMENTS: 50' REACH				

W. W. C. Statistics

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High Gradient Bioassessment Stream Visit Sheet

CARAN COLOR	W-		it Diod.	The second state spectrum	- Distanci	State of the		
STREAM NAME: SK				LOCATION: BIGBONE,				
STATION #: N/A				COUNTY: BOONE			PROGRAM: PROJECT: G141890.0	
INVESTIGATORS:				DATE: 10/10	DATE: 10/16/15 TIME Start: 8:50 AM		AM .	
Verify Site LAT/LONG	vs GPS	YES INO MN/A	Rea	ch			Finish:	
Stat	ion	Downstrea		Upstrea	103	Fully Ex	PY COVER:: posed (0-25%)	TYPE:
LAT 38.888	32		2.20			Partially Exposed (25-50%) Pere Partially Shaded (50-75%) Eph		
LONG -84.685	38						aded (75-100%	
WEATHER Now Has there been a scouring rain in the last 14 Image: Constraint of the last 14 days? Image: Constraint of the last 14 Yes I No Image: Constraint of the last 14	Heav Stead Intern Clear	y rain ly rain nittent showers /sunny	the second s	ells Disposal	FEATURE Const Com Indus Row	truction nercial trial	Forest	e/Grazing
INSTREAM FEA Stream Width Maximum Depth Reach Length Riffle/Run/Pool Se (No. Sampled in F 0 Riffle 1 Run	12 ft 0.83 ft 15.2 m quence teach)	HYDRAULI STRUCTURI Dams Bridge Abutrr Island Waterfalls Other:	ES nents	STREAM FLOV Dry Pooled Low High Normal	W Domin Domin Tre Gr Numb Tree/S PER	ARIAN VEG nate Type: ees Herbac asses Shru er of strata Shrub Taxa SICARIA GISETA	eous bs	CHANNEL ALTERATIONS Dredging Channelization (DFull MPartial)
P-CHEM	Instru	ment Used:				Di	ate Calibrated:	
Temp(°C)	D.O. (mg/l)	%Satu	uration	pH(S.	U.)	Cond	1	Г u rb
	Company and and		Sample C	ollection Verif	ication		The second	
Algae Samp	le: 🗌 QualM	HC 🗌 Other		Visual Assess	ment	Lead	Collector:	
	EF Seine		: BPEF	Seine		Lead (Collector:	
	BP Substra	and the second s			1		Collector:	
The section of the se	n ² Qual	Other: Cobble Snags	Var	Deales St	and b	1. A.	Collector:	S. C. S. B. S. M.
And the second second second	A TAL THE PROPERTY AND	lected SI		. Danks Si			Collector:	
Water Chem	cid/Alk 🔲 Bu	Ilk 🗌 Nutrients 🗍	Metals 🗌	A REAL PROPERTY AND A			Collector:	
Duplicate Samples 7	`aken:		Substrat	e Characteri	zation			
Substrate 🖾 Est. 🗆 P.	C. Riffle_		R			Pool_ 70	%	Reach Total
Silt/Clay (<0.06 mm)								60
Sand (0.06 - 2 mm)				an setter				5
Gravel (2-64 mm)								10
Cobble (64 – 256 mm)							15
Boulders (>256 mm)								10
Bedrock								0
NOTES/COMM 50' REACH	ENTS:				Land owne			Too deep/Impounded

Comparison and state of the

Other (indicate under comments)

Habitat		Condition	Category			
Parameter	Optimal	Suboptimal	Marginal	Poor		
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0		
1.Epifaunal Substrate/ Available Cover Score 6	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.		
2.Embeddedness Score 11	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.		
3.Velocity/ Depth Regime Score 7	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast- shallow). (Sow is < 0.3 m/s, deep is < 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast- shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow- deep).		
4. Sediment Deposition Score 5	Little or no enlargement of islands or point bars and less than 5% (<20% for low- gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.		
5.Channel Flow Status Score 13	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.		
6.Channel Alteration Score 5	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments, evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.		
7.Frequency of Riffles (or bends) Score 5	Occurrence of riffles relatively frequent, ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.		
Left/Right Bank	10 9	8 7 6	5 4 3	2 1 0		
8.Bank Stability LB 2 RB 3	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.		
9. Vegetative Protection 2 LB RB 2	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.		
10. Riparian Vegetative Zone Width LB 2 RB 2	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.		
Tot	tal Score	NOTES/COMMENTS:				
			AVY GRAZING WITHIN			

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High Gradient Bioassessment Stream Visit Sheet

				1				
STREAM NAME: SKY-		·注意: 在长井		LOCATION:	BIGBON	NE,		
STATION #: N/A	Marth			COUNTY: B	OONE		PROGRAM PROJECT:	G141890.0
INVESTIGATORS: CD	К,			DATE: 10/16	6/15	TIME Start: 9:30 AM		
Verify Site LAT/LONG vs	GPS 🗖	YES □NO ŽN/A			(24hr) Finish:			
Station		Downstrea		ach Upstrea	Upstream Kanopy			STREAM TYPE:
LAT 38.89908				-		Partially Exposed (25-50%) Partially Shaded (50-75%) Ephemera		
LONG -84.6531						Fully Shad		
Has there been a scouring rain in the last 14 days? Yes X No INSTREAM FEATUR Stream Width	Stead Interr Clear Cloud RES 60 ft	y rain y rain nittent showers /sunny ty HYDRAULI	C Surface Deep Oil W Land Resid	/ells Disposal	Const Comr Indus Row	truction nercial trial Crops ARIAN VEGI nate Type:	Forest Pasture Silvicu Urban TATION	e/Grazing Ilture Runoff/Storm Sewers
Maximum Depth Reach Length Riffle/Run/Pool Sequer (No. Sampled in Reac RiffleRun	nce h)	STRUCTURI Dams Bridge Abutm Island Waterfalls Other:	ents	Dry Pooled Low High Normal	I Tr Gr Numb Tree/S SET/	ees Herbace asses Shrub: eer of strata 1 Shrub Taxa ARIA PUMIL AXICUM OFF	i _ Dom. A,	CHANNEL ALTERATIONS Dredging Channelization (KIFull Partial)
P-CHEM	Instru	ment Used:					e Calibrated:	
Temp(°C) D.C	. (mg/l)	%Satu	iration	pH(S.U	J.)	Cond	T	`urb
Alexa Samular	70			Collection Verifie	the state of the	1		And the second second
The second second second second	QualM	HC Other	E: BPEF	Visual Assessn		Lead Co		
		te Other:	. Brer_	Seine		Lead Co		
Invertebrates 1m ²	Qual	Other:				Lead Co	ollector:	
		obble Snags		g. Banks Sa	nd N	facrophytes		
	mples coll	lected Sp Ik INutrients I				Lead Co		
	CONTRACTOR	esticides 🔲 Ortho	all the state of t			Leau Ci		
Duplicate Samples Take	en:							
					11. 37			
			Substrat	te Characteriz	ation	細いないな		
Substrate 🖾 Est. 🗆 P.C.	Riffle_	65 %	R	un <u>25</u> %	1	Pool 10	10	Reach Total
Silt/Clay (<0.06 mm)								20
Sand (0.06 – 2 mm)								10
Gravel (2-64 mm)								25
Cobble (64 – 256 mm)								35
Boulders (>256 mm)								10
Bedrock								0
NOTES/COMMEN	TS:						Sales Mare	
50' REACH				SIT	E NO	T SAMPI	ED:	
	- 11-				Land owne	er denial	Dry 🔲	Too deep/Impounded
					Site not for	und/Secluded	Unsafe	d.
				Other (indicate under comments)				

Habitat		Condition	Category		
Parameter	Optimal	Suboptimal	Marginal	Poor	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
1.Epifaunal Substrate/ Available Cover Score 5	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.	
Score 7	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.	
8.Velocity/ Depth Regime Score 9	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast- shallow). (Sow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Dominated by 1 velocity/ depth regime (usually slow- deep).		
4. Sediment Deposition Score 6	Little or no enlargement of islands or point bars and less than 5% (<20% for low- gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.		
5.Channel Flow Status Score 9	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.	
6.Channel Alteration Score 3	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.	
7.Frequency of Riffles (or bends) Score 12	Occurrence of riffles relatively frequent, ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.	
Left/Right Bank	10 9	8 7 6	5 4 3	2 1 0	
8.Bank Stability LB 8 RB 8	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.	
9. Vegetative Protection 4 LBRB RB 4	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
10. Riparian Vegetative Zone Width LB 4 RB 4	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	
Te	tal Score	NOTES/COMMENTS:		Education States and the	
10					

(8) (204) (91) (8) (1) (8) (8) (8) (8)

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High Gradient Bioassessment Stream Visit Sheet

STREAM	NAME: SKY-		的方法的	146 16 Y	LOCATION:	BIGBON	NE,		
STATION	#: N/A				COUNTY: BO	DONE		PROGRAM PROJECT:	G141890.0
INVESTI	GATORS: CDI	К,				DATE: 10/16/15 TIN		TIME Start: 10:00	
Verify Site	LAT/LONG vs (GPS 🗖	YES DNO MN/A	4	DATE: TU/TO	DATE: 10/16/15 (24hr) Finish:			
	Station		Downstrea		ach Unstruer		CANOI	Y COVER:	STREAM
LAT	38.89832		Downstrea	100	Upstream -	Fully Exposed (0-25%)			0%) TYPE:
LONG	-84.65085		-		-		Partially Shaded (50-75%) Fully Shaded (75-100%) Intern		
WEATH	2 IER Now P	ast 24 ho		LOCAL	WATERSHED F	FATURE	ES (Predomin	ant Surroundi	ng I and I ise):
Has there	been] Heav	y rain	Surfa	ce Mining	Const Com		Forest	
a scouring in the last			ly rain mittent showers	Deep		Com Indus		Pasture Silvicu	e/Grazing
days?		Clean	/sunny	Land	Disposal	Row		Urban	Runoff/Storm Sewers
	REAM FEATUR	Clou	dy	🔀 Resid	lential	BID	ARIAN VEG	FTATION	
Stream Wi	idth	<u>30</u> ft	HYDRAULI		STREAM FLOW	Domi	nate Type:		
Maximum Reach Len				ES	Dry		ees Herbace		CHANNEL
Riffle	/Run/Pool Sequer	nce	Dams Bridge Abutm	nents	Pooled Low	Numb	er of strata 2		Dredging
	Sampled in Reac		U Island Waterfalls	2.3	🗖 High		Shrub Taxa	TALIS.	Channelization
0 Riff	fle <u>1</u> Run	1 Pool	Other:	4.4.4	Normal Normal	SOLID	AGO CANADEN	ISIS,	
P-CHEM		Instru	ment Used:			GLEDI	TSIA TRIACANT Da	THOS te Calibrated:	
Temp(°C) D.O. (mg/l) %Saturation pH(S.U.) Cond. Turb.									
110000				Sample C	Collection Verific	ation			
Algae Sample: QualMHC Other Visual Assessment Lead Collector:									
Fish BPEF Seine Other Time: BPEF Seine Lead Collector:									
Habitat	🗆 RBP [Substra	ate Other:				Lead C	Collector:	
Invertebra	ates 🔲 1 m ²	Qual	Other:					ollector:	
1. D. A. 12	🗌 20 Jab	(#Jabs: C	Cobble Snags	Ve	g. Banks Sar	ndN	facrophytes	Other	<u></u>
Tissue:			lectedS		<u>1913 (1913)</u>		Lead C	Collector:	
Water Che	All and the states		alk 🗌 Nutrients 🗌		and the second second		Lead C	collector:	
D P A	Long the state	the second s	Pesticides 🗌 Ortho	P Oth	er:				
Duplicate	e Samples Tako	en:							
						and S			
		24. 15	Lill Contract Distances	Substrat	te Characteriz	ation	in some in		
	Est. P.C.	Riffle_	0_%	R	un <u> 15 %</u>	1	Pool 85	%	Reach Total
Silt/Clay	(<0.06 mm)								15
Sand (0.0	6 – 2 mm)	S AN							10
Gravel (2-	-64 mm)								5
Cobble (6	4 – 256 mm)								35
Boulders	(>256 mm)								0
Bedrock									35
NOTE	S/COMMEN	TS:	and a second second						
50' RI	EACH				SIT	E NO	T SAMPI	LED:	
						Land owne	er denial		Too deep/Impounded
				t					
						Site not for	und/Secluded	Unsafe	The Carlos and

Other (indicate under comments)

Habitat		Condition	Category	The second s		
Parameter	Optimal	Suboptimal	Marginal	Poor		
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0		
1.Epifaunal Substrate/ Available Cover Score 6	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.		
2.Embeddedness Score 16	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	rticles are 25-50% particles are 50-75%			
3.Velocity/ Depth Regime Score 4	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast- shallow). (Sow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast- shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow- deep).		
4. Sediment Deposition Score 16	Little or no enlargement of islands or point bars and less than 5% (<20% for low- gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.		
5.Channel Flow Status Score 16	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.		
6.Channel Alteration Score 4	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.		
7.Frequency of Riffles (or bends) Score 3	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	equent; ratio of distance stween riffles divided by idth of the stream <7:1 enerally 5 to 7); variety of abitat is key. In streams here riffles are continuous, acement of boulders or other rge, natural obstruction is		Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.		
Left/Right Bank	10 9	8 7 6	5 4 3	2 1 0		
8.Bank Stability LB 3 RB 3	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.		
9. Vegetative Protection 4 LB RB 4	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.		
10. Riparian Vegetative Zone Width LB 2 RB 2	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.		
To	tal Score	NOTES/COMMENTS:	相当時に日の時間にある	Stand Street Property		

The second second second second

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CONFIDENTIAL PROPRIETARY TRADE SECRET

High Gradient Bioassessment Stream Visit Sheet

STREAM	NAME: SKY-				LOCATION:	BIGBON	NE,	E. Maria	
STATION					COUNTY: BC	DONE		PROGRAM: PROJECT: G141890.0	
COLUMN TWO IS NOT THE OWNER.	GATORS: CD	К,			DATE: 10/16/15		TIME		
Verify Site	LAT/LONG vs	GPS 🗖	YES NO N/A	N	DATE: 10/10	10	(24hr)	Finish:	
	Station		Downstrea	Rea	ich Upstrean			PY COVER::	
LAT	38.89519	and a	- Downstrea		-)	Fully Ex	posed (0-25%) Exposed (25-5	0%) TYPE:
LONG	-84.64805		5.999 - 999			10.024).	Partially	Shaded (50-75 aded (75-100%	%) Ephemeral
WEATH	ER Now	Past 24 ho	urs	LOCAL	WATERSHED F	EATURE	ES (Predomi	nant Surroundi	ng Land Use):
Has there a scouring	been] Heav	y rain		ce Mining	Const		Forest	
in the last	14 🗄	Stead	ly rain mittent showers r/sunny	Deep		Comr Indus		Pasture Silvicu	e/Grazing
days?	IXI (Clean Clou		Land Kand	Disposal	Row	Crops		Runoff/Storm Sewers
and the state	REAM FEATUR	RES	uy	Kesiu		RIP	ARIAN VEG	ETATION	
Stream W	idth	12 ft	HYDRAULI		STREAM FLOW	Domi	nate Type:	and the second second	
Maximum Reach Ler		0.5 ft		ES I	Dry		ees Herbac asses Shrui		CHANNEL
Riffle	/Run/Pool Seque	nce	Dams Bridge Abutm	nents	Pooled Low	Numb	er of strata 1		Dredging
(No.	Sampled in Reac	h)	U Island Waterfalls		🗖 High		Shrub Taxa KINUS		Channelization
1_Riff	fle <u>1</u> Run	1 Pool	Other:		Normal Normal	and the second second second	RICANA		
P-CHEM	1.1.1	Instru	ment Used:		No No No		Da	ate Calibrated:	
Temp(°C)	D.C). (mg/l)	%Satu	uration	pH(S.U	.)(Cond	1	Րաrb
	a series	「山口の唐		Sample C	ollection Verific	ation	Cellent init		
Algae	Sample:	Qual M	IHC Other		Visual Assessm	ent	Lead (Collector:	
Fish	BPEF	Seine 🗌	Other Time	e: BPEF_	Seine		Lead (Collector:	2012月1日2月1日
Habitat	RBP	Substra	ate 🗌 Other:	and de			Lead (Collector:	
Invertebra		Qual						Collector:	
			Cobble Snags		g. Banks San	IdN	lacrophytes	Other	
Tissue:			lected S		A CARLES AND			Collector:	
Water Ch			alk 🗋 Nutrients 🗖				Lead (Collector:	
Duplicate	E Samples Tak	· · · · · · · · · · · · · · · · · · ·	Pesticides 🗌 Ortho	P Othe	er:				
Dupilcate	e Sampies Tak	сп.							
				Substrat	e Characteriz	ation	Sec. 1	Set they	
	Est. P.C.	Riffle_	25 %	R	un <u> </u>	I	Pool 15	%	Reach Total
Silt/Clay	(<0.06 mm)				北京 电子				
Sand (0.0	6 – 2 mm)								10
Gravel (2-	-64 mm)								
Cobble (6	4 – 256 mm)								
Boulders	(>256 mm)								15
Bedrock									
NOTE	ES/COMMEN	TS:		2. 34		-		1	- Alipina Bestaria
50' RI	EACH				SIT	'E NO'	T SAMP	LED:	
							3. N. 20-1		Tesdand
						and owne	er denial L		Too deep/Impounded
						Site not for	und/Secluded	Unsafe	

Other (indicate under comments)

1. A. A. T. A.

CONFIDENTIAL PROPRIETARY TRADE SECRET RBP High Gradient Habitat

Habitat	(A)	Condition	Category	
Parameter	Optimal	Suboptimal	Marginal	Poor
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
1.Epifaunal Substrate/ Available Cover Score 9	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
2.Embeddedness	Gravel, cobble, and boulder			
_{Score} 12	particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
3.Velocity/	All four velocity/depth	Only 3 of the 4 regimes	Only 2 of the 4 habitat	Deminsted by Lucied
Depth Regime Score 9	regimes present (slow-deep, slow-shallow, fast-deep, fast- shallow). (Sow is < 0.3 m/s, deep is > 0.5 m.)	present (if fast-shallow is missing, score lower than if missing other regimes).	regimes present (if fast- shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow- deep).
A. Sediment			Moderate deposition of new	
Score 12	Little or no enlargement of islands or point bars and less than 5% (<20% for low- gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
5.Channel	Water reaches base of both	Weter Ciles Office Cit	W 611- 64 844 - 511	17 19.1
Flow Status Score 9	lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
6.Channel Alteration Score 6	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
7.Frequency of	Occurrence of riffles relatively		E E DAS AND REAT AND	
Riffles (or bends) Score 10	frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
Left/Right Bank	10 9	8 7 6	5 4 3	2 1 0
8.Bank	10 9		· · · ·	
Stability LB 3 RB 5	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.
9. Vegetative Protection 4 LB RB 4	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
10. Riparian Vegetative Zone Width LB 3 RB 3	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
Tot	al Score	NOTES/COMMENTS:	And and the state of the second	兴行的 运输。他们的内容
		50' REACH USED.		
	89	The Inner States of States		

 $\mathbf{H}(\mathbf{M}) = \mathbf{H}(\mathbf{M}) + \mathbf{H}(\mathbf{M}) + \mathbf{H}(\mathbf{M}) + \mathbf{H}(\mathbf{M}) + \mathbf{H}(\mathbf{M})$

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Unsafe

Site not found/Secluded

 $\mathbf{n}(\mathbf{u}^{(i)}) = (\mathbf{u}^{(i)}) =$

Other (indicate under comments)

CONFIDENTIAL PROPRIETARY TRADE SECRET

High Gradient Bioassessment Stream Visit Sheet

STREAM NAME: SKY-			LOCATION:	BIGBON	NE,	in San Line		
STATION #: N/A			COUNTY: BOONE PROGRA			ROGRAM: ROJECT: G	41890.0	
INVESTIGATORS: CDK,				And the second state of th		tart: 11:00		
Verify Site LAT/LONG vs GPS				(24hr) Finish:				
Station	Downstrea	Rea	ch Upstrear	n	CANOPY Fully Expos	COVER::	STREAM TYPE:	
LAT 38.88984				品語の設置	Partially Exposed (25-50%) Perennial Partially Shaded (50-75%) Ephemeral			
LONG -84.64017		Nets			Fully Shade		Intermittent	
WEATHER Now Past 24 hours LOCAL WATERSHED FEATUREES (Predominant Surrounding Land Use): Has there been Heavy rain Surface Mining Forest a scouring rain Steady rain Deep Mining Construction Forest Intermittent showers Intermittent showers Oil Wells Industrial Silviculture Yes No Clear/sunny Cloudy Residential Wrban Runoff/Storm Sew						razing		
INSTREAM FEATURES Stream Width 14 Maximum Depth 0.11 Reach Length 15.2 Riffle/Run/Pool Sequence (No. Sampled in Reach) 0 Riffle 1 Run 1	ft HYDRAULI 6 ft STRUCTURI m Dams Bridge Abutm Island Waterfalls	ES Dents	TREAM FLOW Dry Pooled Low High Normal	Domin Domin Tre Gr Numb Tree/S TYPI NIGF	ARIAN VEGET hate Type: pess Herbaceou asses S Shrubs er of strata 2 Shrub Taxa HA LATIFOLIA KA, SOLIDAGO ADENSIS	Dom.	CHANNEL ALTERATIONS Dredging Channelization Full Partial)	
and the second se	Instrument Used:	1.5. 590.				Calibrated:		
Temp(°C) D.O. (mg/l) %Saturation pH(S.U.) Cond. Turb.								
Sample Collection Verification								
	Algae Sample: QualMHC Other Visual Assessment Lead Collector: Fish BPEF Seine Other Time: BPEF Seine Lead Collector:							
	Substrate Other:	C. DFEF	Seine		Lead Col Lead Col			
TATE TO SALE AND THE REAL PORT	Qual 🚺 Other: Jabs: Cobble Snags	Vor	Ponko Sar	d N	Lead Col			
	les collected S		, Duriks Ou	<u></u>	Lead Col		· · ·	
Water Chem Acid/Alk	Bulk Nutrients	Metals 🗌			Lead Col	lector:		
Duplicate Samples Taken:								
	5	Substrate	e Characteriz	ation	a standard			
Substrate 🖾 Est. 🗆 P.C. 🛛 R	kiffle 0 %	Ru	m <u>75</u> %	I	ool 25 %	I	Reach Total	
Silt/Clay (<0.06 mm)							60	
Sand (0.06 - 2 mm)							10	
Gravel (2-64 mm)							15	
Cobble (64 – 256 mm)							15	
Boulders (>256 mm)							0	
Bedrock					and use		0	
NOTES/COMMENTS 50' REACH	3			E NO	F SAMPL r denial		o deep/Impounded	

Habitat		Condition	Category			
Parameter	Optimal	Suboptimal	Marginai	Poor		
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0		
1.Epifaunal Substrate/ Available Cover Score 13	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat, lack of habitat is obvious, substrate unstable or lacking.		
2.Embeddednes Score 4	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.		
3.Velocity/ Depth Regime Score 6	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast- shallow). (Sow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast- shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow- deep).		
4. Sediment Deposition Score 4	Little or no enlargement of islands or point bars and less than 5% (<20% for low- gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.		
5.Channel Flow Status Score 8	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Very little water in channel and mostly present as standin pools.				
6.Channel Alteration Score 7	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments, evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.		
7.Frequency o Riffles (or bends) Score 4	f Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.		
Left/Right Bank		8 7 6	5 4 3	2 1 0		
8.Bank Stability LB 7 RB 7	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.		
9. Vegetative Protection 7 LB	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.		
10. Riparian Vegetative Zone Width LB 5 RB 5	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.		
T	otal Score	NOTES/COMMENTS:	1 Section Contractor			
1 1 2		50' REACH USED.				

or the more state of the state

 $(-\mathbf{x}_1, \mathbf{x}_2, \mathbf{x}_3, \mathbf{x}_4, \mathbf{$

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High Gradient Bioassessment Stream Visit Sheet

STREAM NA	ME. SKY-	Val. P			LOCATION:	BIGBO	NE,		
STATION #:					COUNTY: BC			PROGRAM	G141890.0
the second second second second	TORS: CDK	25				TIME Starts 11:45			and the second
Verify Site LAT/LONG vs GPS YES NO N/A				A	DATE: 10/16	/15	(24hr)	Finish:	
				Rea			CANO	PY COVER:	STREAM
	Station				Upstream -	<u>n</u>	K Fully Exp	posed (0-25%) Exposed (25-5	TYPE:
and the second s	38.89012				Alight Little Vices		Partially	Shaded (50-75	%) DEphemeral
LONG	-84.62415		-				Fully Sha	aded (75-100%) Intermittent
WEATHER Has there bee	NOW Fas	at 24 ho		a state of the second second	WATERSHED F	EATURE Const		hant Surroundin	ng Land Use):
a scouring rai	m H H	Stead	y rain Iy rain	Deep		Com	nercial	Pasture	/Grazing
in the last 14 days?		Inter	mittent showers	Oil W	ells Disposal	Indus		Silvicu	Iture Runoff/Storm Sewers
Yes No		Clou		Resid			Сторз		Ruion/Storin Sewers
INSTREA Stream Width	AM FEATURE		HYDRAUL	IC	是特别型	Domi	ARIAN VEG	ETATION	
Maximum De	epth 0.2		STRUCTUR	FC	STREAM FLOW	Tr	ees Herbac		CHANNEL
Reach Length	n <u>15.2</u> In/Pool Sequence		Dams Bridge Abutn	ante	Pooled		asses Shrul er of strata 1		ALTERATIONS Dredging
	mpled in Reach)		☐ Island ☐ Waterfalls		Low High	Tree/S	Shrub Taxa		Channelization
<u>1</u> Riffle	1 Run 1	Pool		VER	Normal		IUM MAC		
P-CHEM		Instru	ment Used:			1.500	Da	te Calibrated:	
Temp(°C)	D.O. (mg/l)	%Sat	uration	pH(S .U	.)	Cond	ТТ	`urb
11 (a.a.)				Sample C	ollection Verific	ation	N=15-39-4		
Algae	Sample:	QualM	HC Other		Visual Assessm	ent	Lead C	Collector:	の知道最終品質的
Fish	BPEF C			e: BPEF	Seine		Lead (Collector:	
Habitat			ate Other:				Lead (Collector:	
Invertebrates	States and states and	COUNTS.	PERMIT AND A DEVELOPMENT					Collector:	
-			CobbleSnage	and the second	g. BanksSan	IdN	State of the second		
Tissue:			lected S					Collector:	
Water Chem	Cont. C. Martine Martine Martine	1.1.1	Pesticides 🔲 Ortho				Lead (conector.	
Duplicate Sa	amples Taken		csucides 🗋 Office						
								·	
an dent inn The Art Line				Substrat	e Characteriz	ation			
Substrate 🔀	Est. DP.C.	Riffle_		1	un <u> </u>	-	Pool 15	%	Reach Total
Silt/Clay (<0).06 mm)	-46							35
Sand (0.06 –	- 2 mm)	in an a							15
Gravel (2-64	mm)	NE PAR							15
Cobble (64 -	- 256 mm)			i Filia	A Shitter				35
Boulders (>2	256 mm)		ALL STREET						0
Bedrock									0
NOTES/	COMMENT	S:				-			and the second
50' REA	CH				SIT	E NO	T SAMP	LED:	
						and owne	r denial		Too deep/Impounded
						Site not for	und/Secluded	Unsafe	

Other (indicate under comments)

Habitat		Condition	Category	
Parameter	Optimal	Suboptimal	Marginal	Poor
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
1.Epifaunal Substrate/ Available Cover Score 4	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
.Embeddedness	Gravel, cobble, and boulder			
Score 4	particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
3.Velocity/	All four velocity/depth	Only 3 of the 4 regimes	Only 2 of the 4 habitat	Device the table
Depth Regime	regimes present (slow-deep, slow-shallow, fast-deep, fast- shallow). (Sow is < 0.3 m/s, deep is > 0.5 m.)	present (if fast-shallow is missing, score lower than if missing other regimes).	regimes present (if fast- shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow- deep).
Sediment			Moderate deposition of new	Hanny descrite of Care
Score 4	Little or no enlargement of islands or point bars and less than 5% (<20% for low- gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
5.Channel Flow Status Score 7	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
6.Channel Alteration Score 5	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement, over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
7.Frequency of	Occurrence of riffles relatively			
(or bends)	frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
Left/Right Bank	10 9	8 7 6	5 4 3	2 1 0
8.Bank		Res of the second second	MILE THE SHARE STREET	Unstable: many eroded areas:
Stability LB 5 RB 5	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.
9. Vegetative Protection 5 LB RB 5	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
10. Riparian Vegetative Zone Width	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear- cuts, lawns, or crops) have not	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
LB 3 RB 3	impacted zone.			
ив з	tal Score	NOTES/COMMENTS:		

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CONFIDENTIAL PROPRIETARY TRADE SECRET

High Gradient Bioassessment Stream Visit Sheet

					-		1		
STREAM NAME: SKY-			LOCATION: BIGBONE,						
STATION #: N/A				COUNTY: BOONE PROGRAM: PROJECT: G141890.0					
INVESTIGATORS: CD	К,			DATE: 10/16		TIME Start: 11:30			
Verify Site LAT/LONG vs	GPS 🗖	YES DNO KN/A				(24hr) F	inish:		
Station		Downstrea		ach Upstrean	Upstream CANOPY COVER: Upstream Ď Fully Exposed (0-25%)				
LAT 38.89016	т 38.89016 -					Partially Ex	posed (25-50%)	TYPE:	
LONG -84.62363	and a second					Fully Shade		Intermittent	
Has there been a scouring rain in the last 14 days? Yes No INSTREAM FEATUR Stream Width Maximum Depth	Stead Interr Clear Cloud UES ft .08 ft .2 m nce	y rain y rain nittent showers /sunny	Surfa Deep Oil W Land Resid	/ells Disposal lential STREAM FLOW Dry Pooled S Low	Const Comr Indus Row Domin Domin Tree/S	ruction nercial trial Crops ARIAN VEGE1 nate Type: ees Herbaceou asses Shrubs er of strata 1 brub Taxa	A Dom.	zing	
1 Riffle O Run	a de la com	Waterfalls		High Normal	LON	CERA SP., FR RICANA, SOL	RAXINUS	Full Partial)	
Р-СНЕМ	and the lit	nent Used:				Date	Calibrated:		
Temp(°C) D.C). (mg/l)	%Satu	ration	pH(S.U	.)	Cond	Turb.		
	A 1229	S	Sample C	Collection Verific	ation		1.1.2.1.2		
Algae Sample:	QualM	HC Other		Visual Assessm	ent	Lead Col	lector:		
	Seine		BPEF	Seine		Lead Col			
	Qual	te Other:				Lead Col			
Manager and the second second	The Contracts	cobble Snags	Ve	g. Banks San	ndN	lacrophytes	States and the state		
Tissue: No. of Sa	mples coll	ected Sp	:			Lead Col	lector:		
		ilk 🔲 Nutrients 🗌	0 1000 0	Contraction of the state of the		Lead Col	lector:		
Duplicate Samples Tak		esticides 🗌 Ortho	P 🗌 Oth	er:	Ares 1				
- aprilation complete a series			1						
		S	ubstrat	te Characteriz	ation				
Substrate 🖾 Est. 🗖 P.C.	Riffle_	100 %	1	un_0_%		ool <u>0</u> %	R	each Total	
Silt/Clay (<0.06 mm)			11			品动作器		25	
Sand (0.06 – 2 mm)						and the second	(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	0	
Gravel (2-64 mm)			1948.00 19719					25	
Cobble (64 – 256 mm)								50	
Boulders (>256 mm)			電明					0	
Bedrock								0	
NOTES/COMMEN 50' REACH	TS:				and owne	F SAMPL r denial	Dry Too	deep/Impounded	

RBP	High	Gradient	Hab	itat	

		Condition	Category			
Parameter	Optimal	Suboptimal	Marginal	Poor		
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0		
1.Epifaunal Substrate/ Available Cover Score	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.		
2.Embeddedness Score 8	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.		
3.Velocity/ Depth Regime Score 3	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast- shallow). (Sow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast- shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow- deep).		
4. Sediment Deposition Score 3	Little or no enlargement of islands or point bars and less than 5% (<20% for low- gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of . the bottom affected, sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.		
5.Channel Flow Status Score 2	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.		
6.Channel Alteration Score 3	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.		
7.Frequency of Riffles (or bends) Score 2	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.		
Left/Right Bank	10 9	8 7 6	5 4 3	2 1 0		
8.Bank Stability LB 7 RB 7	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.		
9. Vegetative Protection 3 LB RB 3	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.		
10. Riparian Vegetative Zone Width LB 2 RB 2	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.		
	tal Score	NOTES/COMMENTS:	The second of the State of the	State of the State of the		
10						
	49	50' REACH USED.				

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APPENDIX B Descriptions of Soils Found Within the Project Study Area

Soil Unit Symbol	Soil Unit Name	% in 20-Foot Corridor	Acres	Hydric
AsB	Ashton silt loam, 2 to 6 percent slopes (occasionally flooded)	0.08%	0.02	No
Во	Boonesboro silt loam (0 to 4 percent slopes, occasionally flooded)	0.91%	0.22	No
BrC	Brashear silty clay loam, 6 to 12 percent slopes	0.74%	0.18	No
BsD3	Brashear silty clay, 12 to 20 percent slopes, severely eroded	1.44%	0.35	No
CyF	Cynthiana flaggy silty clay loam, 20 to 50 percent slopes	1.42%	0.35	No
EdE2	Eden silty clay loam, 20 to 35 percent slopes, eroded	10.28%	2.53	No
Eg	Egam silty clay loam, (woolper 0 to 4 percent slopes)	1.54%	0.38	No
FcC	Faywood silty clay loam, 6 to 12 percent slopes	2.68%	0.66	No
FcD	Faywood silty clay loam, 12 to 20 percent slopes	15.57%	3.83	No
FdD3	Faywood silty clay, 12 to 20 percent slopes, severely eroded	6.00%	1.47	No
JeB	Jessup silt loam, 2 to 6 percent slopes	1.08%	0.27	No
JeC	Jessup silt loam, 6 to 12 percent slopes	1.17%	0.29	No
LkB	Licking silt loam, 2 to 6 percent slopes	1.06%	0.26	No
LIC	Licking silty clay loam, 6 to 12 percent slopes	2.78%	0.68	No
LID	Licking silty clay loam, 12 to 20 percent slopes	2.22%	0.55	No
Ln	Lindside silt loam (0 to 3 percent slopes, occasionally flooded)	0.58%	0.14	No
Nk	Newark silt loam (0 to 2 percent slopes, occasionally flooded)	0.01%	0.00	No
NIB	Nicholson silt loam, 2 to 6 percent slopes	6.24%	1.53	No
NIC	Nicholson silt loam, 6 to 12 percent slopes	1.73%	0.43	No
No	Nolin silt loam (0 to 2 percent slopes, occasionally flooded)	30.50%	7.50	Yes
RsB	Rossmoyne silt loam, 0 to 6 percent slopes	6.11%	1.50	No
RsC	Rossmoyne silt loam, 6 to 12 percent slopes	4.07%	1.00	No
W	Water	0.23%	0.06	No
WoC	Woolper silty clay loam, 6 to 12 percent slopes	1.57%	0.39	No

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Table 1

Impact Summary for Waterbody Crossings

Waterbody ID	Waterbody Name	Flow Regime	Top of Bank Width (feet)	Average OHWM Width (feet)	Quality Rating (RBP)	Length within 30' Construction Workspace (linear feet) ¹	Crossing Method / Comments	TNW Connection	Latitude	Longitude
S001	UNT to Big Bone Creek	Intermittent	4	3.5	Poor	28	Open Cut	Ohio River	38.888648	-84.751589
S003	UNT to Big Bone Creek	Intermittent	6	3	Poor	27	Open Cut	Ohio River	38.888194	-84.742755
S004	UNT to Big Bone Creek	Intermittent	8	4	Poor	28	Open Cut	Ohio River	38.887106	-84.740995
S005	UNT to Big Bone Creek	Intermittent	5	4	Poor	28	Open Cut	Ohio River	38.886221	-84.739258
S006	UNT to Big Bone Creek	Ephemeral	2	1	-	37	Open Cut	Ohio River	38.886054	-84.738946
S008	UNT to Big Bone Creek	Intermittent	4	3	Poor	33	Open Cut	Ohio River	38.883806	-84.734229
S009	UNT to Big Bone Creek	Intermittent	3	2	Poor	18	Open Cut	Ohio River	38.883848	-84.732743
S010	UNT to Big Bone Creek	Ephemeral roadside drainage	2	1	Poor	0	HDD Bore in conjunction with Big Bone Creek	Ohio River	38.88485	-84.729948
S011	UNT to Big Bone Creek	Ephemeral	4	3	S	91	Open Cut	Ohio River	38.88538	-84.728482
S012	UNT to Big Bone Creek	Intermittent	2.5	2	Poor	10	Open Cut	Ohio River	38.885814	-84.723852
S013	UNT to Big Bone Creek	Ephemeral	4	3	-	8	Open Cut	Ohio River	38.885824	-84.725235
S016	UNT to Big Bone Creek	Ephemeral	3	2		50	Open Cut	Ohio River	38.88448	-84.716437
S017	UNT to Big Bone Creek	Perennial	10	8	Poor	32	Open Cut	Ohio River	38.884484	-84.716351
S018	UNT to Big Bone Creek	Ephemeral	3	2	1997 1977	5	Open Cut	Ohio River	38.883974	-84.71394
S019	UNT to Big Bone Creek	Ephemeral	2	1.	100 Mar 1	8	Open Cut	Ohio River	38.883721	-84.712932
S020	UNT to Big Bone Creek	Ephemeral	2	1.00		30	Open Cut	Ohio River	38.883149	-84.710867
S021	UNT to Big Bone Creek	Ephemeral	3	2		30	Open Cut	Ohio River	38.883099	-84.71069
S022	UNT to Big Bone Creek	Ephemeral	2	1	The Interplace	15	Open Cut	Ohio River	38.8837	-84.712677
S023	UNT to Beaver Branch	Perennial	4	3	22-11-	35	Open Cut	Ohio River	38.880417	-84.704449
Carlos La Carlos					and the second	new second dealers three	Open Cut	Ohio River	LOGICO CELCO	ero-sum/oversed
S024 S025	UNT to Beaver Branch	Ephemeral roadside drainage	2	3	Poor	138 166	Open Cut; pipeline will not be installed paralell to stream within the stream's jurisdictional area; much of stream is near edge of work space.	Ohio River	38.879475 38.879072	-84.70174 -84.70048
0000	LINE Is Down Down							Ohia Diver	00 070007	04 000770
S026	UNT to Beaver Branch	Ephemeral	1.5	1	-	11	Open Cut	Ohio River	38.878827	-84.699772
S027	UNT to Beaver Branch	Ephemeral	1.5	1		15	Open Cut	Ohio River	38.878877	-84.699924
S028	UNT to Beaver Branch	Perennial	15	9	Poor	31	Open Cut	Ohio River	38.879076	-84.699109
S029	UNT to Beaver Branch	Ephemeral	3	2	•	2	Open Cut	Ohio River	38.879131	-84.698998
S030	UNT to Beaver Branch	Ephemeral	2	1	-	29	Open Cut	Ohio River	38.879131	-84.699113
S031	UNT to Beaver Branch	Intermittent	6	. 5	Poor	105	Open Cut	Ohio River	38.885909	-84.692433
S032	UNT to Mud Lick Creek	Ephemeral	3	2		25	Open Cut	Ohio River	38.887165	-84.689459
S033	UNT to Mud Lick Creek	Intermittent	7	6	Poor	8	Open Cut	Ohio River	38.893733	-84.673369
S035	UNT to Mud Lick Creek	Ephemeral	2	1		17	Open Cut	Ohio River	38.900786	-84.650065
S036	UNT to Mud Lick Creek	Ephemeral	2	1	-	34	Open Cut	Ohio River	38.900811	-84.650081
S037	UNT to Mud Lick Creek	Intermittent	3	2	Poor	31	Open Cut	Ohio River	38.904096	-84.645433
5038	UNT to Mud Lick Creek	Ephemeral roadside (a portion)	3	1.5	-	82	Open Cut	Ohio River	38.888835	-84.630148
S041	UNT to Mud Lick Creek	Ephemeral	2	1		1	Open Cut	Ohio River	38.888275	-84.614664
5044	UNT to Mud Lick Creek	Perennial	3	2	Poor	65	Open Cut	Ohio River	38.889085	-84.615166
\$045	UNT to Mud Lick Creek	Ephemeral	2	1	-	34	Open Cut	Ohio River	38.888522	-84.615012
S046	UNT to Mud Lick Creek	Intermittent	2	1	Poor	33	Open Cut	Ohio River	38.888731	-84.615091
SKY-CDK-001	UNT to Big Bone Creek	Ephemeral	3	1.5		34	Open Cut	Ohio River	38.883047	-84.710558
SKY-CDK-004	UNT to Big Bone Creek	Ephemeral	3.5	3		40	Open Cut	Ohio River	38.883661	-84.712715
SKY-CDK-005	UNT to Big Bone Creek	Ephemeral roadside drainage	5	4		51	Open Cut	Ohio River	38.884474	-84.71623

Impact Summary for Waterbody Crossings

Waterbody ID	Waterbody Name	Flow Regime	Top of Bank Width (feet)	Average OHWM Width (feet)	Quality Rating (RBP)	Length within 30' Construction Workspace (linear feet) ¹	Crossing Method / Comments	TNW Connection	Latitude	Longitude
SKY-CDK-006	Big Bone Creek (KY OSRW) ²	Perennial	120	50	Fair	0	HDD Bore	Ohio River	38.884966	-84.729662
SKY=CDK-007	UNT to Big Bone Creek	Perennial	10	8	Poor	36	Open Cut	Ohio River	38.884692	-84.736427
SKY-CDK-008	Gum Branch	Perennial	50	20	Poor	0	. HDD Bore	Ohio River	38.888249	-84.755236
SKY-CDK-009	UNT to Gum Branch	Ephemeral roadside drainage	3	0.33		296	Open cut. Pipeline will not be installed paralell to stream within the stream's jurisdictional area. Pipeline trench will be within the road or along edge of pavement.	Ohio River	38.887815	-84.756859
SKY-CDK-010	UNT to Gum Branch	Perennial	10	5	Poor	26	Open Cut	Ohio River	38.887871	-84.75621
SKY-CDK-011	UNT to Big Bone Creek	Intermittent ·	9	7	Poor	27	Open Cut	Ohio River	38.888879	-84.748893
SKY-CDK-012	Beaver Branch	Perennial	9	7	Poor	72	Open Cut	Ohio River	38.879352	-84.701436
SKY-CDK-013	UNT to Mud Lick Creek	Perennial	14	• 13	Poor	30	Open Cut	Ohio River	38.897422	-84.662598
SKY-CDK-014	UNT to Mud Lick Creek	Perennial	6	5	Poor	13	Open Cut	Ohio River	38.893772	-84.673271
SKY-CDK-015	UNT to Beaver Branch	Intermittent	3.5	3	Poor	58	Open Cut	Ohio River	38.879312	-84.698893
SKY-CDK-016	UNT to Mud Lick Creek	Perennial	11	10	Poor	0	HDD Bore	Ohio River	38.888883	-84.685416
SKY-CDK-017	Mud Lick Creek	Perennial	14	10	Poor	30	Open Cut	Ohio River	38.899227	-84.653121
SKY-CDK-018	UNT to Mud Lick Creek	Perennial	20	10	Poor	143	Open Cut	Ohio River	38.898454	-84.650902
SKY-CDK-019	UNT to Mud Lick Creek	Ephemeral	4	3	11.5	33	Open Cut	Ohio River	38.906236	-84.642276
SKY-CDK-020	UNT to Mud Lick Creek	Perennial	7	6	Poor	46	Open Cut	Ohio River	38.895255	-84.648025
SKY-CDK-021	UNT to Mud Lick Creek	Ephemeral	4	3	50000	33	Open Cut	Ohio River	38.891389	-84.643068
SKY-CDK-022	UNT to Mud Lick Creek	Perennial	10	8	Poor	35	Open Cut	Ohio River	38.889876	-84.640097
SKY-CDK-023	UNT to Mud Lick Creek	Ephemeral	2	1.44	-	30	Open Cut	Ohio River	38.887824	-84.632885
SKY-CDK-024	UNT to Mud Lick Creek	Intermittent	8	• 6	Poor	32	Open Cut	Ohio River	38.8896	-84.62685
SKY-CDK-025	UNT to Mud Lick Creek	Ephemeral	5	4	1 2 2 2 2 2 1	36	Open Cut	Ohio River	38.889815	-84.625822
SKY-CDK-026	UNT to Mud Lick Creek	Perennial	7	6	Poor	31	Open Cut	Ohio River	38.89017	-84.624154
SKY-CDK-027	UNT to Mud Lick Creek	Perennial	10	5	Poor	43	Open Cut	Ohio River	38.890222	-84.623559
Total						2,515		-		

¹ Includes planned areas that will be impacted by construction assuming a 30-foot wide corridor for work space. Additional work space, access, and staging areas not yet identified.

² OSRW - Designated by KDOW as Outstanding State Water Resource

Note: Without the jurisdictional roadside drainages, approximatly 2,063 LF of stream is located within the planned construction right-of-way. Not all stream reaches will be temporary impacted as many are located near the edge of the right-of-way.

Table 1

Table 2

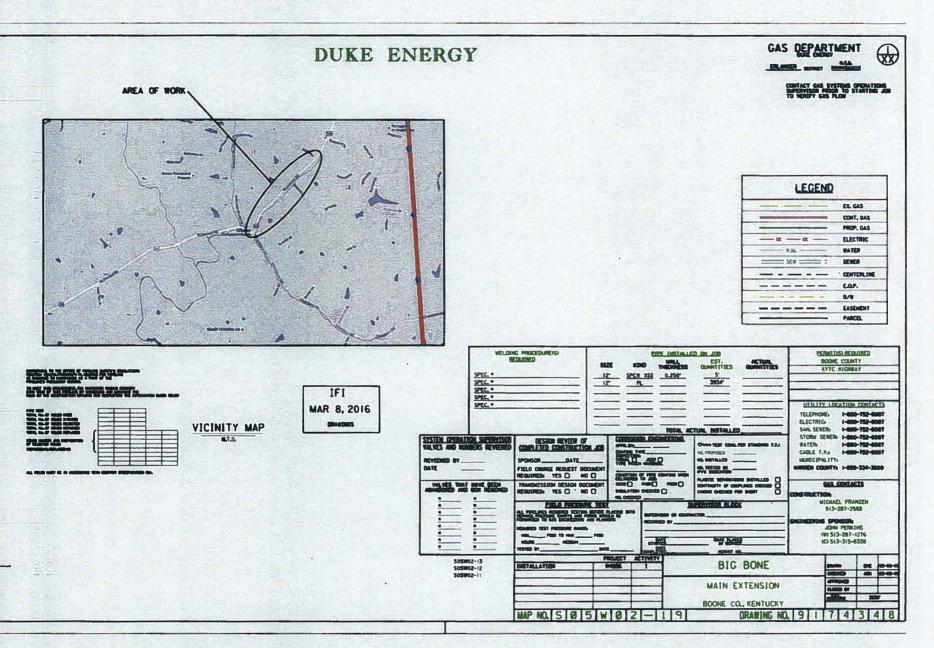
Impact Summary for Wetland Crossings

					Wetland Impacts ^c		
Wetland ID	Cowardin Classification ^a	Latitude	Longitude	Length of Crossing at Centerline (feet) ^b	Construction	Operation	
W004	PEM	38.885708	-84.726986	0	0.003	0.00	
W005	PEM	38.885822	-84.724037	0	0.004	0.00	
W006	PEM	38.885752	-84.722876	0	0.006	0.00	
W007	PEM	38.878859	-84.699792	0	0.031	0.00	
W008	PEM	38.879244	-84.698957	81	0.055	0.00	
W009	PSS	38.889845	-84.640052	69	0.045	0.045	
W010	PEM	38.889389	-84.62865	0	0.016	0.00	
W011	PEM	38.889431	-84.627939	7	0.032	0.00	
W013	PEM	38.889094	-84.615142	44	0.029	0.00	
Totals	and the second			202	0.22	0.05	

a PEM - Palustrine Emergent; PSS - Palustrine Scrub Shrub; PFO - Palustrine Forested

b A length of crossing at centerline equal to zero indicates that a wetland is not crossed by the Project centerline, but is within the construction right-of-way (workspace).

c Construction acreage of wetland impacts is based on a 30-foot wide construction corridor. There is no operational impact to PEM wetlands, because there is no planned change in the pre- and post-construction vegetation cover type.



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	CONSTRUCTION NOTES	GAS DEPARTMENT
	CONSTRUCTION NOTES .	
۱.	TARGET START DATE:03-01-17	
	TARGET FINISH DATE: 11-30-17	
2.	THE WINNING BIDDER MUST INSTALL THE MAIN IN ACCORDANCE WITH THE SPECIFIED BID INSTALLATION METHOD UNLESS AN ALTERNATIVE METHOD IS SUBMITTED TO AND APPROVED BY THE DUKE ENERGY DESIGN ENGINEER. ANY CHANGES IN INSTALLATION METHOD SHALL NOT INCREASE THE COST OF THE PROJECT TO DUKE. NOR SHALL PAYMENT BE MADE FOR RESTORATION NOT PERFORMED.	
3.	RESTRICTED HOURS, TRAFFIC CONTROL OR OTHER RESTRICTIONS IMPOSED BY THE PERMITTING AGENCY ARE THE SOLE RESPONSIBILITY OF THE BIDDERS AND NO EXTRAS WILL BE PAID BY DUKE ENERGY.	
4.	EXTRA DEPTH WILL BE PAID FOR DIRECT BURY INSTALLATIONS WHEN EXCAVATIONS ARE GREATER THAN 5-FEET TOTAL DEPTH AND DEPTH IS GREATER THAN 2-FEET OVER THE PLANNED EXCAVATION DEPTH.	
5.	ROCK EXCAVATION WILL BE PAID PER GD-150. THE DUKE ENERGY INSPECTOR AND THE CONTRACTOR MUST AGREE ON THE ACTUAL AMOUNT OF ROCK BEFORE BACKFILLING THE TRENCH IN DIRECT BURY INSTALLATIONS. NO ROCK EXCAVATION WILL BE PAID FOR DIRECTIONAL DRILLING INSTALLATIONS.	
6.	TIE-IN WORK WILL BE GIVEN TO THE WINNING CONTRACTOR AT THE DISCRETION OF DUKE ENERGY. DUKE ENERGY RETAINS THE RIGHT TO HAVE DUKE ENERGY CREWS PERFORM TIE-IN WORK.	
7.	ALL WORK MUST BE DONE IN ACCORDANCE WITH THE "SPECIFICATIONS FOR THE 2010 GAS MAIN REPLACEMENT, RELOCATION, AND EXTENSION PROJECTS' AND THE MOST CURRENT VERSION OF GD-150.	
8.	TIE-IN MAINS MUST BE ADEQUATELY EXPOSED FOR PROPER LINE-UP.	
9.	OFFSETS WILL BE PAID IF TWO (2) UNPLANNED ELBOWS ARE USED FOR THE AVOIDANCE OF AN UNFORESEEN OBSTACLE IN EITHER THE HORIZONTAL OR VERTICAL DIRECTION.	
10.	OUT OF BALANCED BIDS WILL BE REJECTED AND NOT CONSIDERED BY DUKE ENERGY.	
11.		-
		-
		MARCH 8, 2

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CONFIDENTIAL PROPRIETARY TRADE SECRET

MARCH 8, 2016 # GAS DEPARTMENT OLANOR ASTREET HERE L

PAGES 318 THROUGH 323 EXHIBIT 2(c) PUBLIC

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