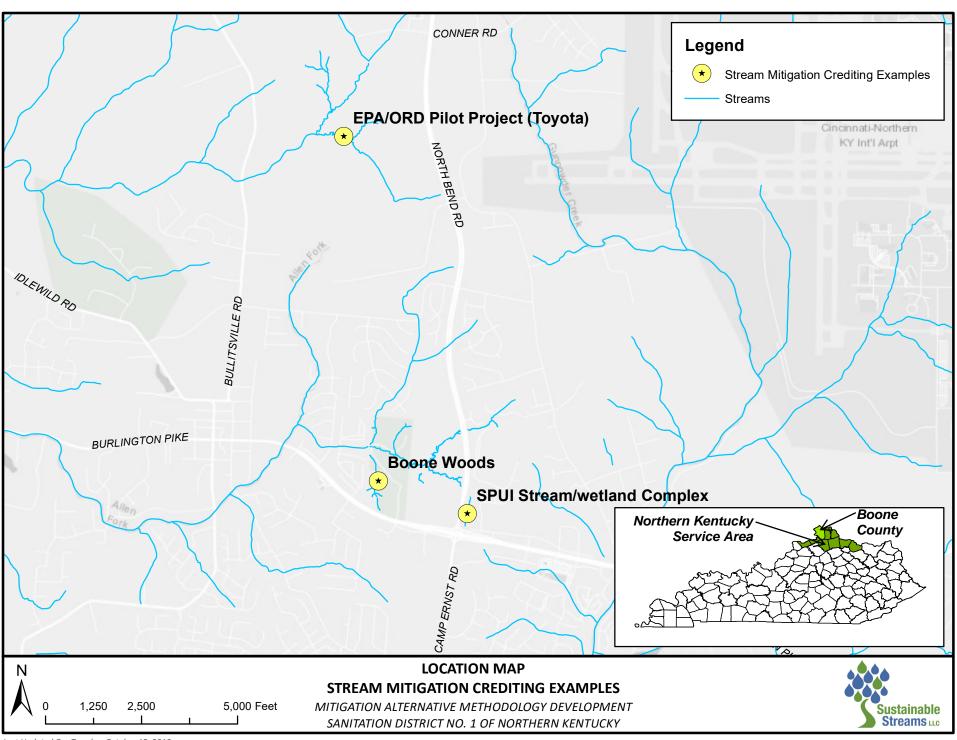
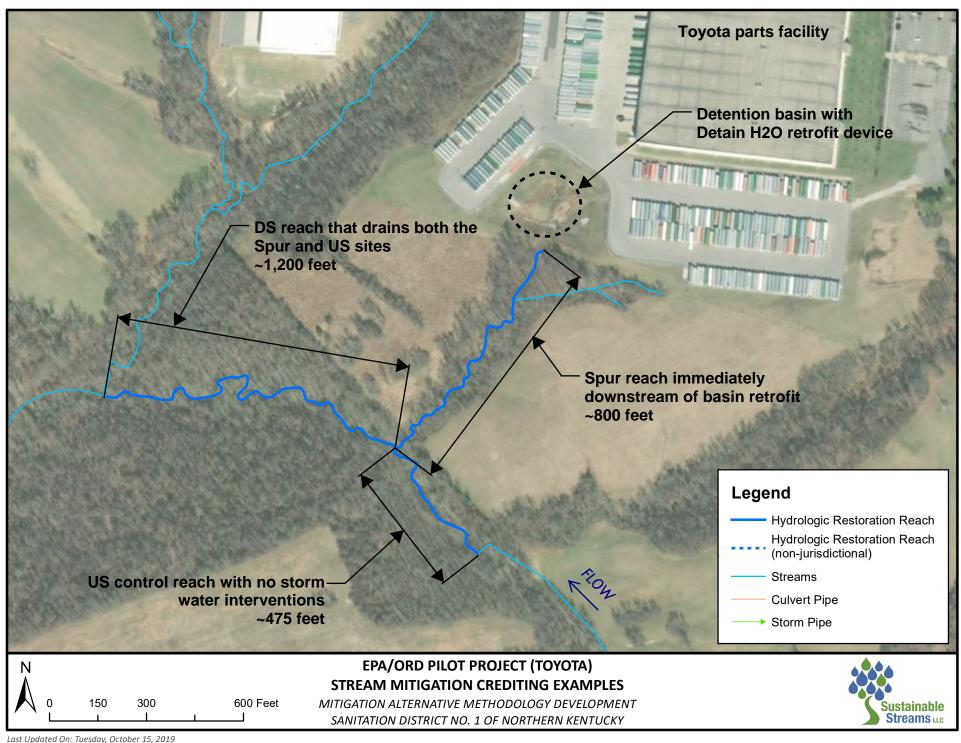
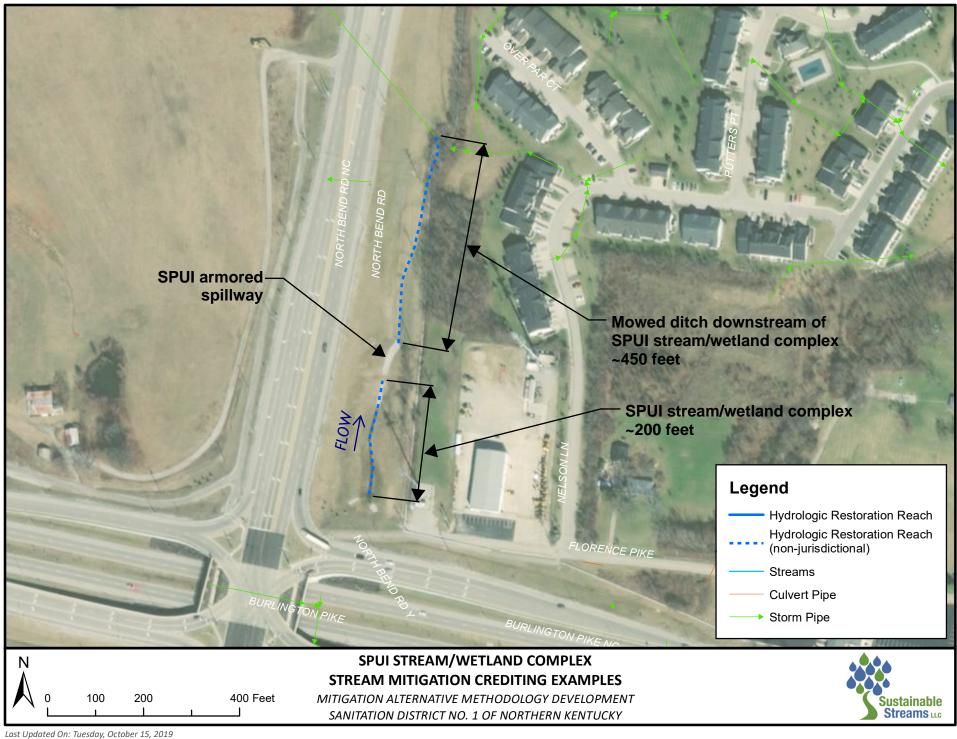
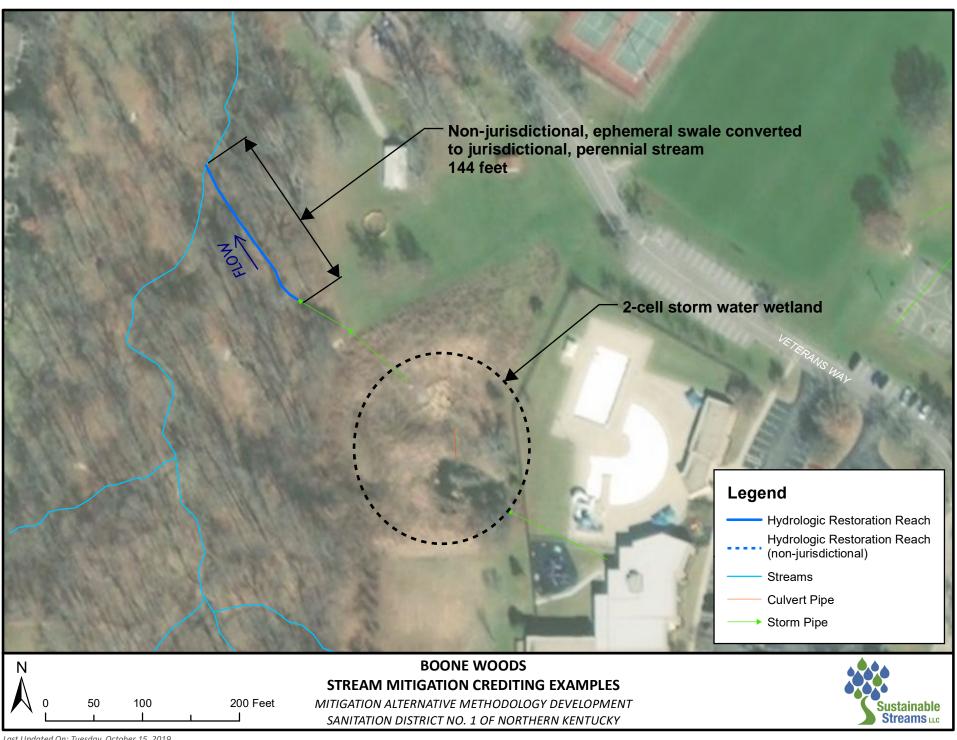
APPENDIX A

Project Location Maps









APPENDIX B

EPA/ORD Pilot Project (Toyota) Rapid Bioassessment Protocol Field Sheets

STRE	AM NAME: Spur							LOCA	ATION	N:	Wool	per Cı	reek V	Vatersh	ed, ı	near To	oyota	a parts	s facili	ty
STRE	AM WDTH (FT):		DE	PTH (FT):			F	PERE	NNIA	L		INTE	RMITTI	ENT			EPH	EMEF	RAL
STAT	ION #: N/A	RIVE	RMILE:	N/A				C	DUNT	Υ:	Boon	е				;	STA	TE: K	Υ	
LAT		LON	IG					RI	/ER E	BASIN	l : V	Voolpe	er Cre	ek Wate	ersh	ed				
CLIEN	NT:							PR	OJE	CT NC). E	PA/O	RD Pi	lot Proje	ect (i.e. Toy	yota	retrofi	t)	
INVE	STIGATORS/CREW: RJH																			
FOF	RM COMPLETED BY:		NLK		DA	TE:		12/2	21/20	13		SSESS		R SUR	۷E۱	/ : Pre-ı	retro	fit hab	itat	
	51.				TIM	ИE:						00000								
	Habitat Parameter				I				Co	nditio	n Cat	egory	7							
		0 1	Optim			40.70		ooptin			00.40		argina		_		-	Pod	-	
	Epifaunal Substrate/ Available Cover	favoral coloniz mix of logs, u or othe stage t potenti	er than 70% ble for epifacation and fisnags, sub indercut bailer stable has to allow full ital (i.e., logs tinew fall arent.	aunal ish cov mergeonks, co bitat ar coloniz s/snags	er; d bble nd at zation	well so potent mainte preser substr	uited for tial; ad enance nce of rate in II, but it onizat	or full of equate e of poperaddition addition the formation (ma	colonize habit habit pulational m of prepa	ation at for ons;	habita desira	ıt avail ıble; sı	ability	ole habit less thar e freque red.	1	Less th lack of substra	habit	at is o	bvious	;
	SCORE: 10	20	19 18	17	16	15	14	13	12	11	10	9	8		6	5	4	3	2	1 0
	2. Embeddedness	particle surrou Layerii	, cobble, ares are 0-25 anded by finding of cobble ty of niches	% e sedin e provid	nent.	particl	es are	ole, and 25-50 by fine	%		particl	es are	50- 7	d boulde 5% Sedime		Gravel, particle surrour	s are	more	than 7	5%
d in S	SCORE: 10	20	19 18	17	16	15	14	13	12	11	10	9	8		6	5	4	3	2	1 0
to be evalua	3. Velocity/Depth Regime	presen shallov fast-sh	r velocity/de it (slowdeep v, fastdeep allow). (Slo 3 m/s, deep	p, slow , ow	-	preser missin	nt (if fa ig, sco	e 4 regi est-sha re lowe er regin	llow is er thar		regime fastsh or slo	es pre allow w-shal	e 4 hat sent (if low score	•		Domina regime		,	,	
Parameters	SCORE: 10	20	19 18	17	16	15	14	13	12	11	10	9	8		6	5	4	3	2	1 0
ш.	4. Sediment Deposition	islands than 5°	r no enlarg s or point ba % of the bo d by sedim tion.	ars and ottom		format sand of of the	tion, m or fine botton	ncrease ostly fr sedime n affect n pools	rom gr ent; 5- ted; sl	avel, 30%	grave on old of the sedim obstru and b	l, sand l and n bottor ent de ictions ends; i	or fine new ba n affect posits , const modera	at trictions,	ent)%		ed ba)% of ntly; p subst	ar deve the boools a	elopme ottom o Imost	ent; more changing absent
	SCORE: 10	20	19 18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1 0
	5. Channel Flow Status	lower b	-	minima el subst	al rate	availa chann	ble cha el sub	75% of annel; strate i	or <25	osed.	availa substr expos	ble charates a ed.	re mos	and/or ri	iffle			ent as	standi	ng pools.
	SCORE: 3	20	19 18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1 0

											Cond		n Cat			,		_						
	Habitat Parameter			C	ptima	al			Sul	ooptim					largina	ıl				Poo	r			
	6. Channel Alteration	1	absen	nelizati t or mi al patte	nimal;	-	-	usually abutme channe (>20 yr	chann in are ents; e elizatio .) ma chann	elizatio	n prese ridge e of pas dredgin sent, b	st ig, ut	extens shoring both b	nelizat sive; e ng stru panks; n reac	ion may mbank ctures p and 40	y be mer ores	nts or sent on	Banks s cement reach c In strea or remo	; ove hanr m ha	er 80% nelized abitat g	of th and reatl	e stre disru	eam ipted.	
	SCORE:	15	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
	7. Frequency of Riffle (or bends)	es	frequent betwe width (genent habita where	en riffl of the rally 5 It is ke riffles ment o large,	io of d es divi stream to 7); y. In si are co f bould	istance ided by 1 < 7:1 variety treams ontinue	of sous,	infrequ riffles c	ent; d livided	of riffles istance d by the s betwee	betwee width o	of	bottor some betwe width	n cont habita en riff of the	riffle or ours pro at; dista les divid stream to 25.	ovid nce ded	de	Genera riffles; p betwee width of > 25.	oor n riffl	habitat les divi	; dist ded	tance	e e	
g rea	SCORE:	15	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Parameters to be evaluated in sampling reach	8. Bank Stability (sco each bank) Note: determine left o right side by facing downstream.	r	Banks erosio or min future affecte	on or ba nimal; l proble	ank fai ittle po	ilure al otentia	osent for	small a	over.	5-30%	on mos of bank	tly c in	of bar	nk in re on; hig	each ha h erosid	s ar	30- 60% reas of potential	Unstabl "raw" ar straight obvious 100% o scars.	eas sect ban	freque tions ar ik slouç	nt al nd be ghine	ong ends; g; 60-		
e eV	SCORE (LB):	4	Le	eft Bar	ık	10	9	8		7	6		5		4		3	2		1		()	
to b	SCORE (RB):	7	Ri	ght Ba	nk	10	9	8		7	6		5		4	T	3	2		1		()	
Parameter	9. Vegetative Protect (score each bank)		native trees, non- v vegeta	surface in zone veget under voody ative d ig or m	es and e cove ation, story s macro isruptioning almos	imme red by includi shrubs phytes on thro minim t all pla	ng , or s; ough aal or	surface vegeta plants i disrupt affectir potenti more th one-ha	es covition, the state of the s	ne strea vered by out one well- re vident by plant gr any grea ne poter ht rema	native class of present ut not owth at exten	f ted; t;	surfactivegeta obviou or clos comm	ces co ation; us; pa sely co non; le otentia	l plant s	y on f ba veg one	re soil etation e-half of	Less the bank su vegetat bank ve vegetat 5 centin stubble	irfaci ion; egeta ion h netei	es cove disrupti ation is nas bee rs or le	ered ion c very en re	by of stre high move	eam ; ed to	
	SCORE (LB):	5	Le	eft Bar	ık	10	9	8		7	6		5		4		3	2		1		()	
	SCORE (RB):	6	,	ght Ba		10	9	8		7	6		5		4		3	2		1		(
	10. Riparian Vegetati Zone Width (score ea bank riparian zone)	ch	Width meters parkin cuts, I not im	s; hum ig lots, awns,	an act roadb or cro	tivities eds, c ps) ha	(i.e., lear-	meters	; hum	irian zor an activ ne only	ities ha	ve	meter	s; hun	arian zo nan acti one a gr	ivitie	es have	Width of riparian zone <6 meter						
	SCORE (LB):	9	Le	eft Bar	ık	10	9	8		7	6		5		4		3	2		1		()	
	SCORE (RB):	9	Ri	ght Ba	nk	10	9	8		7	6		5		4	1	3	2		1	1	C)	
TOT	AL SCORE:		11	3																				

	:													-,							_
STRE	AM NAME: Spur							LOCA	ATIO	N:	Wool	per Cı	reek V	Vaters	hed,	near T	oyota	a part	s facil	ity	
STRE	AM WDTH (FT):		D	EPTH ((FT):			F	PERE	NNIA	L		INTE	RMIT	TEN	Г		EPH	IEME	RAL	
STAT	ION #: N/A	RIVI	ERMILE:	N/A				CC	DUNT	Υ:	Boon	е					STA	TE: ŀ	Υ		
LAT		LOI	NG					RIV	VER E	BASIN	1: V	Voolpe	er Cre	ek Wa	tersh	ned					
CLIEN	NT:							PR	OJE	CT NC). Е	PA/O	RD P	ilot Pro	ject	(i.e. To	yota	retrof	it)		
INVE	STIGATORS/CREW: RJH	l																			
FOF	RM COMPLETED BY:		NLK		DA	TE:		7/8	8/201	9		SSESS		OR SU	RVE	Y: Pos	t-retr	ofit ha	abitat		
	- · · ·				TII	ME:															
	Habitat Parameter									nditio	n Cat										
	1. Epifaunal Substrate/	Great	Option 70°		octrata	40.70		boptin		nitat:	20.40		argin	al ble hab	itat:	Less th	200 2	Poc		ahitat:	
	Available Cover	favora	ble for epi	faunal		well s	uited fo	or full c	coloniz	ation	habita	ıt avail	ability	less tha	an	lack of	habit	at is o	bviou	3;	
			zation and snags, su					equate of po				ıble; sı bed or			ently	substra	ate ur	nstable	e or la	cking.	ſ
		logs, ι	indercut ber stable h	anks, co	bble	prese	nce of		nal												ſ
		stage	to allow fu	II coloni	zation	newfa	II, but	not yet	prepa												
		-	ial (i.e., lo t new fall	-		for col high e		ion (ma scale).	,	e at											
		transie	∍nt.																		
	SCORE: 17	20	19 18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1 (_
	2. Embeddedness		I, cobble, a					ole, and						d bould		Gravel					\dashv
ıch		particl	es are 0-2 inded by fi	5%		particl	es are	25-50 by fine	%		particl	es are	50- 7			particle surrou	es are	more	than	75%	
ıg rea		Layeri	ng of cobb	ole provi	des	Surrou	mueu	by lifte	Seuiii	ient.	Surrou	mueu	by lifte	Seulli	ent.	Surrou	nueu	ру шк	e seuii	nent.	
mplir		divers	ity of niche	space.																	
be evaluated in sampling reach	SCORE: 14	20	19 18		16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1 0	1
uated	3. Velocity/Depth Regime		r velocity/ent (slowde					e 4 regi st-sha				of the es pre				Domin- regime					
eval		shallo	w, fastdee	p,		missir	ng, sco	re lowe	er thar		fastsh						(,			
ţ0			nallow). (S 3 m/s, dee		.5 m.).	missir	ig otne	er regin	nes).			w-snai issing,		low).							
eters																					
Parameters	SCORE: 10	20	19 18		16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1 0	
4	4. Sediment Deposition		or no enlar s or point l	•				ncreas						on of ne e sedim		Heavy increas				naterial ent; mo	
			% of the b					sediment				and n		rs; 30-{	50%	than 50 freque				•	•
		depos	•	none				n pools	,	igiit	sedim	ent de	posits	at		due to	subs				
												ıctıons ends; ı		trictions ate	5,	deposi	tion.				
											depos	ition o	f pools	s preva	lent.						
	SCORE: 15	20	19 18		16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1 0	ı
	5. Channel Flow Status		reaches b banks, and					75% of annel;		5% of				of the and/or	riffle	Very lit mostly				nel and ing poo	ls.
			nt of chanr					strate i			substr	ates a									
		<u> </u>	-	T 4-7	40	45	44	40	10	44	L.		c	7		-	1	2	_	4 .	_
	SCORE: 7	20	19 18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1 0	1

										IILL I			n Cat					_						
	Habitat Parameter			С	ptima	al			Sul	boptim					, largina	al				Poo	r			
	6. Channel Alteration	1	absen			-	-	usually abutme channe (>20 y	chanr / in are ents; e elization r.) ma chan	nelizatio eas of bevidence on, i.e., y be pre nelizatio	n prese oridge e of pa dredgi esent, b	ist ng, but	extens shoring both b	neliza sive; e ng stru panks; n reac	tion ma embank ictures and 40	y be mer pres	nts or sent on	Banks s cement reach c In strea or remo	; ove hanr m ha	er 80% nelized abitat g	of th and reat	e stre disru	eam ipted.	
	SCORE:	15	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
	7. Frequency of Riffle (or bends)	es	frequence between width (genence) habitat where placer	ent; raten rifflof the rally 5 at is ke riffles ment olarge,	of riffletio of dies divides divides to 7); y. In some confident of the co	istance ided by 1 < 7:1 variety treams ontinue	e y of s ous,	infrequ	ient; d divide	of riffles listance d by the s betwe	betwe width	of	bottor some betwe width	n cont habita en riff of the	riffle or dours pr at; dista fles divid stream to 25.	ovid nce ded	de	Genera riffles; p betwee width of > 25.	oor n riffl	habitat les divi	; dis ded	tance	e e	
g rea	SCORE:	15	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Parameters to be evaluated in sampling reach	8. Bank Stability (scceach bank) Note: determine left oright side by facing downstream.	r		on or ba nimal; l proble		ilure al otentia	bsent I for	small a healed	areas I over.	stable; i of erosi 5-30% reas of e	on mos	stly nk in	of bar	nk in ro on; hig	each ha h erosi	ıs aı	30- 60% reas of potential	Unstabl "raw" ar straight obvious 100% o scars.	reas sect ban	freque tions ar ik slouç	nt al nd b ghino	ong ends; g; 60-		
e eva	SCORE (LB):	8	Le	eft Bar	nk	10	9	8	,	7	6	;	5		4	Ī	3	2		1		()	
to b	SCORE (RB):	8	Ri	ght Ba	nk	10	9	8		7	6	i	5		4	T	3	2		1		()	
Parameter	9. Vegetative Protect (score each bank)		riparia native trees, non- v vegeta	surface in zone veget under voody ative d ig or m	es and e cove tation, story s macro isrupti nowing almos	imme red by includi shrubs phytes on thro minim t all pla	diate r ing , or s; ough hal or ants	surface vegeta plants disrupt affectin potenti more ti one-ha	es covation, the state of the s	ne stread vered by out one well- re vident b plant g any grea he pote ht rema	native class of preser ut not rowth at exten	e of nted; nt;	surfactivegeta obviou or clos comm	ces co ation; us; pa sely c non; le otentia	l plant	on f ba veg	re soil etation e-half of	Less thi bank su vegetat bank ve vegetat 5 centir stubble	irfaci ion; e geta ion h	es cove disrupti ation is nas bee rs or le	ered ion o very en re	by of stre high move	eam ; ed to	
	SCORE (LB):	8	Le	eft Bar	nk	10	9	8		7	6	i	5		4		3	2		1		()	
	SCORE (RB):	8		ght Ba		10	9	8		7	6	5	5		4		3	2		1		()	
	10. Riparian Vegetati Zone Width (score ea bank riparian zone)	ich	Width meters parkin cuts, I not im	s; hum ig lots, awns,	nan ac roadb or cro	tivities eds, c ps) ha	(i.e., lear-	meters	; hum	irian zoi ian activ ne only	ities h	ave	meter	s; hun	arian zo nan act one a gi	ivitie	es have	Width of riparian zone <6 meter						
	SCORE (LB):	9	Le	eft Bar	nk	10	9	8		7	6	;	5		4	T	3	2		1		()	
	SCORE (RB):	9	Ri	ght Ba	nk	10	9	8		7	6	i	5	T	4	1	3	2		1	1	()	
TOT	AL SCORE:		14	.3																				

STRE	AM NAME: Upst	ream (I	US) reach					LOC	ATION	N:	Wool	per Cı	reek V	Vaters	shed,	near T	oyot	a parts	s facil	ity	
STRE	AM WDTH (FT):		DE	PTH ((FT):			F	PERE	NNIA	L		INTE	RMIT	TEN	Т		EPH	EME	RAL	
STAT	ION #: N/A	RIVE	ERMILE:	N/A				C	DUNT	Υ:	Boon	е					STA	TE: K	Ϋ́		
LAT		LON	NG					RI	VER E	BASIN	l: V	Voolpe	er Cre	ek Wa	atersl	hed					
CLIE	NT:							PR	OJE	CT NC). E	PA/O	RD Pi	lot Pr	oject	(i.e. To	yota	retrofi	t)		
INVE	STIGATORS/CREW: RJI	1																			
FOI	RM COMPLETED BY:		NLK			TE:		8/2	6/201	13		REAS(OR SU	IRVE	Y: Pre-	retro	ofit hab	oitat		
									Co	nditio	n Cat	egory	,								
	Habitat Parameter		Optim					boptir	nal			М	argina					Pod	r		
	1. Epifaunal Substrate/ Available Cover	favoral coloniz mix of logs, u or othe stage t	er than 70% ble for epifa zation and t snags, sub andercut ba er stable ha to allow full ial (i.e., log t new fall a	aunal fish cov mergeonks, co bitat ar colonia s/snags	ver; d obble nd at zation	well si poteni mainto prese substr newfa for col	uited for tial; ad enance nce of rate in II, but lonizat	of state of full cequate of po addition the for not yet ion (masscale).	colonize habit pulational m of prepa	ration at for ons;	habita desira	% mix at avail able; su bed or	ability ubstrat	less the	nan	Less the lack of substra	habit		bviou	3;	,
	SCORE: 17	20	19 18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
impling reach	2. Embeddedness	particle surrou Layerii	l, cobble, and es are 0-25 anded by find and footble ity of niche	% e sedir e provi	nent.	partic	es are	ole, and 25-50 by fine	%		partic	el, cobb les are unded	50- 7	5%		Gravel particle surrou	es are	more	than	75%	
in Sa	SCORE: 18	20	19 18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
eters to be evaluated in sampling reach	3. Velocity/Depth Regime	preser shallov fast-sh	r velocity/dent (slowdee w, fastdeep nallow). (Slo 3 m/s, deep	p, slow , ow	-	prese missir missir	nt (if fa ng, sco	e 4 reg ast-sha are lower er regin	llow is er thar		regim fastsh or slo	2 of the es pre- nallow w-shal issing,	sent (if low	f		Domin regime		•			h
Parameters	SCORE: 10	20	19 18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<u>a</u>	4. Sediment Deposition	islands than 5	or no enlarg s or point ba % of the ba ed by sedim ition.	ars and ottom		forma sand of the	tion, m or fine bottor	ncreas nostly fi sedimi n affec n pools	rom gr ent; 5- ted; sl	avel, 30%	grave on old of the sedim obstru and b	rate de I, sand I and n botton ent de uctions ends; i sition o	or fine new ba n affect posits , const modera	e sedir rs; 30- eted; at triction ate	ment 50%	Heavy increas than 5 freque due to deposi	sed b 0% o ntly; p subs	ar deve f the bo pools a	elopm ottom ilmost	ent; i chan abse	more ging
	SCORE: 17	20	19 18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	5. Channel Flow Status	lower b	reaches ba banks, and of channe osed.	minima	al	availa	ble ch	75% of annel; strate	or <25		availa	rates a	annel,	and/o		Very li					
	SCORE: 12	20	19 18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

										IILL I			n Cat			,								
	Habitat Parameter			С	ptima	al			Sul	boptim					, largina	al				Poo	r			
	6. Channel Alteration	1	absen		inimal;	dredgi strear	-	usually abutmochanno (>20 y	chanr / in are ents; e elization r.) ma chan	nelizationeas of bevidence on, i.e., y be pre	n prese oridge e of pa dredgi esent, b	ist ng, but	extens shoring both b	neliza sive; e ng stru panks; n read	tion may embank actures p and 40	y be mer pres	nts or sent on	Banks s cement reach c In strea or remo	; ove hanr m ha	r 80% nelized abitat g	of th and reatl	e stre disru	eam ipted.	
	SCORE:	15	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
ch	7. Frequency of Riffle (or bends)	es	frequence between width (genence) habitat where placer	ent; raten rifflof the rally 5 at is ke riffles ment olarge,	tio of do stream to 7); y. In some or	es rela istance ided by n < 7:1 variety treams ontinue ders on	e y of s ous,	infrequ	ient; d divide	of riffles listance d by the s betwee	betwe width	of	bottor some betwe width	n con habita en riff of the	riffle or tours pr at; dista fles divid stream to 25.	ovid nce ded	le	Genera riffles; p betwee width of > 25.	oor n riffl	habitat es divi	; dis ded	tance	e e	
g rea	SCORE:	14	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Parameters to be evaluated in sampling reach	8. Bank Stability (scoeach bank) Note: determine left o right side by facing downstream.	r	Banks erosio or min future affecte	on or ba nimal; l proble	ank fa	ilure al otentia	bsent I for	small a	areas I over.	stable; ii of erosi 5-30% reas of e	on mos	stly nk in	of bar	nk in r on; hig		ıs ar		Unstabl "raw" an straight obvious 100% of scars.	reas sect ban	freque ions ar k slouç	nt al nd be ghine	ong ends; g; 60-		
e eV	SCORE (LB):	8	Le	eft Bar	nk	10	9	8		7	6	i	5		4		3	2		1		()	
tob	SCORE (RB):	7	Ri	ght Ba	nk	10	9	8		7	6	i	5		4		3	2		1		()	
Parameter	9. Vegetative Protect (score each bank)		riparia native trees, non- v vegeta	surface in zone veget under voody ative d ig or m	es and e cove tation, story s macro isrupti nowing almos	imme red by includi shrubs phytes on thro minim t all pla	diate r ing , or s; ough hal or ants	surface vegeta plants disrupt affection potent more to one-ha	es covation, the state of the s	ne strea vered by out one well- re vident b plant gr any grea he poter ht rema	native class of preser ut not rowth at exten	e of nted; nt;	surfactivegeta obviou or clos comm	ces co ation; us; pa sely c non; le otentia	l plant s	on f ba veg	re soil etation e-half of	Less th bank su vegetat bank ve vegetat 5 centir stubble	irfaci ion; e geta ion h	es cove disrupt ition is las bee rs or le	ered ion c very en re	by of stre high move	eam ; ed to	
	SCORE (LB):	8	Le	eft Bar	nk	10	9	8		7	6	i	5		4		3	2		1		()	
	SCORE (RB):	7		ght Ba		10	9	8		7	6		5		4		3	2		1		(
	10. Riparian Vegetati Zone Width (score ea bank riparian zone)	ch	Width meters parkin cuts, I not im	s; hum ig lots, awns,	nan ac roadb or cro	tivities eds, c ps) ha	(i.e., lear-	meters	; hum	irian zoi ian activ ne only	ities h	ave	meter	s; hur	arian zo nan acti one a gr	ivitie	es have	Width of riparian zone <6 meter						
	SCORE (LB):	9	Le	eft Bar	nk	10	9	8		7	6	;	5		4		3	2		1		()	
	SCORE (RB):	9	Ri	ght Ba	nk	10	9	8		7	6	i	5		4	1	3	2		1	İ	C)	
TOT	AL SCORE:		15	1										·							•			

LAT LONG RIVER BASIN: Woolper Creek Watershed CLIENT: PROJECT NO. EPA/ORD Pilot Project (i.e. Toyo INVESTIGATORS/CREW: RJH	EPHEMERAL STATE: KY ota retrofit)
LAT LONG RIVER BASIN: Woolper Creek Watershed CLIENT: PROJECT NO. EPA/ORD Pilot Project (i.e. Toyo INVESTIGATORS/CREW: RJH	
CLIENT: PROJECT NO. EPA/ORD Pilot Project (i.e. Toyo INVESTIGATORS/CREW: RJH	ota retrofit)
INVESTIGATORS/CREW: RJH	ota retrofit)
FORM COMPLETED NLK DATE: 7/8/2019 REASON FOR SURVEY: Post-ro	retrofit habitat
TIME:	
Condition Category Habitat Parameter	
Optimal Suboptimal Marginal	Poor
Available Cover favorable for epifaunal well suited for full colonization habitat availability less than lack of ha	an 20% stable habitat; nabitat is obvious;
colonization and fish cover; potential; adequate habitat for desirable; substrate frequently substrate maintenance of populations; disturbed or removed.	e unstable or lacking.
logs, undercut banks, cobble presence of additional or other stable habitat and at substrate in the form of	
stage to allow full colonization newfall, but not yet prepared	
potential (i.e., logs/snags that for colonization (may rate at are not new fall and not high end of scale).	
transient.	
333121 10 20 10 10 11 10 12 11 10 0 0	4 3 2 1 0 cobble, and boulder
particles are 0.25% particles are 50.75% particles are 50.75% particles	are more than 75%
surrounded by fine sediment. surrounded by fine sediment. Layering of cobble provides	ded by fine sediment.
diversity of niche space.	
surrounded by fine sediment. Layering of cobble provides diversity of niche space. SCORE: 16 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 3. Velocity/Depth Regime present (slowdeep, slow-shallow, fastdeep, shallow, fastdeep, shallow, fastdeep, score lower than if	4 3 2 1 0
3. Velocity/Depth Regime All four velocity/depth regimes Only 3 of the 4 regimes Only 2 of the 4 habitat Dominate	ted by 1 velocity/depth
present (slowdeep, slow- shallow, fastdeep, missing, score lower than if fastshallow	(usually slow-deep).
missing other regimes). or slow-shallow	
S V.S III/3, deep is v.S III./.	
SCORE: 10 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5	4 3 2 1 0
4. Geniment Deposition Little of no entargement of Come new increase in bar information of new increase in bar	leposits of fine material,
	ed bar development; more % of the bottom changing
1 1 ' ' 1 ' ' ' '	tly; pools almost absent ubstantial sediment
obstructions, constrictions, deposition	
and bends; moderate deposition of pools prevalent.	
SCORE: 16 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5	4 3 2 1 0
	e water in channel and
lower banks, and minimal amount of channel substrate amount of channel substrate is exposed. substrates are mostly	
is exposed. Is exposed. Is exposed.	
SCORE: 10 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5	4 3 2 1 0

						<u></u>					Condition					,	_									
	Habitat Parameter			C	ptima	al			Sul	boptim	al		N	largina	al				Poo	r						
	6. Channel Alteration			t or m	nimal;	dredgii strear	•	usually abutmochanno (>20 y	in are ents; e elization r.) mag chann	eas of bevidence on, i.e., y be pre	n present, ridge e of past dredging, esent, but n is not	extens shoring both b	sive; e ng stru panks m read	and 40	me pres	nts or sent on 80% of	cement reach c In strea	personal part of the stream is a ration of t								
	SCORE:	15	20	19	18	17	16	15	14	13	12 11	10	9	8	7	6	5	4	3	2	1	0				
ıch	7. Frequency of Riffle (or bends)		frequence between width (general habitan where	ent; raten rifflof the rally 5 at is ke riffles ment olarge,	io of des divistreant to 7); y. In some are confident from the food of the foo	es rela listance ided by n < 7:1 variety treams ontinuc ders or	of sous,	infrequ riffles (ient; d divided	d by the	between width of en 7 to 15.	bottor some betwe width	n con habita en riff of the	riffle or tours pr at; dista fles divi stream to 25.	ovio nce ded	de	riffles; p betwee	ooor l n riffl	habitat es divi	; dist	ance by th	e e				
g rea	SCORE:	14	20	19	18	17	16	15	14	13	12 11	10	9	8	7	6	5	4	3	2	1	0				
Parameters to be evaluated in sampling reach	8. Bank Stability (scoeach bank) Note: determine left oright side by facing downstream.	r	erosio or min	on or ba nimal; l proble	ank fa ittle po	ence of ilure all otential 5% of	osent for	small a	areas l over.	of erosi	nfrequent, on mostly of bank in erosion.	of bar	nk in r on; hig	each ha h erosi	is a	30- 60% reas of potential	"raw" ai straight obvious	reas t sect s ban	freque ions a k slou	nt alond beginning	ong ends; ; 60-					
e eva	SCORE (LB):	7	Le	eft Bar	ık	10	9	8		7	6	5		4		3	2		1		()				
tob	SCORE (RB):	4	Ri	ght Ba	nk	10	9	8		7	6	5		4		3	2		1		()				
Parameter	9. Vegetative Protect (score each bank)		bank s riparia native trees, non- v vegeta grazin not ev	surface in zone veget under voody ative d ig or m	es and e cove ation, story s macro isrupti iowing almos	the str I imme red by includi shrubs ophytes on thro minim t all pla aturally	ng , or s; ough aal or	surface vegeta plants disrupt affection potent more to one-ha	es covation, to is not tion even tion even tion even tion and the second tion and the second tion to the second tion tion to the second tion tion to the second tion tion tion to the second tion tion tion tion tion tion tion tion	well- re vident b plant grant any grea	r native class of presented ut not rowth at extent; ntial plant	surfactivegeta; obvious or close comm	ces co ation; us; pa sely c non; le otentia	ss than	oy ion if ba veg	are soil getation e-half of	bank su vegetat bank ve vegetat 5 centir	urface tion; o egeta tion h meter	es cover disrupt ation is las been as or le	ered ion o very en re	by f stre high nove	eam ; ed to				
	SCORE (LB):	7	Le	eft Bar	ık	10	9	8		7	6	5		4		3	2		1		()				
	SCORE (RB):	5		ght Ba		10	9	8		7	6	5		4		3	2		1)				
	10. Riparian Vegetati Zone Width (score ea bank riparian zone)	ch	meter: parkin	s; hum ig lots, awns,	an ac roadb or cro	one >1 tivities peds, c ps) ha	(i.e., lear-	meters	; hum	an activ	ne 12- 18 rities have minimally.	meter	s; hur	arian zo nan act one a g	iviti	es have	Width of little or to huma	no ri	parian	vege						
	SCORE (LB):	9	Le	eft Bar	ık	10	9	8		7	6	5		4	J	3	2		1		()				
	SCORE (RB):	9	Ri	ght Ba	nk	10	9	8		7	6	5		4	1	3	2		1	1	()				
TOT	AL SCORE:		13	7		-					-		•				•									

STRE	AM NAME: Down	nstrear	n (DS) re	ach				LOCA	ATION	N :	Wool	per Cı	reek V	Vatershe	d, ne	ar To	oyota	a parts	facilit	ty
STRE	AM WDTH (FT):		D	EPTH ((FT):			P	PERE	NNIA	L		INTE	RMITTE	NT			EPH	EMER	AL
STAT	ION #: N/A	RIVE	ERMILE:	N/A				C	DUNT	Υ:	Boon	е				,	STA	TE: K	Y	
LAT		LON	NG					RI	/ER E	BASIN	l: V	Voolpe	er Cre	ek Wate	rshe	t				
CLIEN	NT:							PR	OJE	CT NC). Е	PA/O	RD Pi	lot Proje	ct (i.e	. Toy	yota	retrofi	t)	
INVES	STIGATORS/CREW: RJH	l																		
FOF	RM COMPLETED BY:		NLK		DA	TE:		4/2	9/201	13		SSESS		OR SUR	/EY:	Pre-r	retro	fit hab	itat	
	51.				TII	ME:					ľ	00000								
	Habitat Daramatar					•			Co	nditio	n Cat	egory	1							
	Habitat Parameter		Optii			10 =0		ooptin			22.12		argina				-	Poo		
	1. Epifaunal Substrate/ Available Cover	favoral coloniz mix of logs, u or othe stage t	er than 70° ble for epi zation and snags, su indercut b er stable h to allow fu ial (i.e., lo t new fall a	faunal fish cov bmerge anks, co abitat a Il colonia gs/snag	/er; d obble nd at zation	well so potent mainte preser substr newfa	uited for tial; ad enance nce of rate in II, but	or full of equate e of pop addition the for not yet ion (ma	colonize habit habit pulational m of prepa	ation at for ons;	habita desira	t avail ble; sı	ability	ble habita less than e frequer red.	la	ck of	habit	at is ol	able ha bvious or lact	,
	SCORE: 10	20	19 18		16	15	14	13	12	11	10	9	8	7 (5	4	3	2	1 0
	2. Embeddedness	particle surrou Layerii	l, cobble, a es are 0-2 nded by fi ng of cobb ity of niche	5% ne sedir ole provi	ment. des	particl	es are	ole, and 25-50 by fine	%		particl	es are	50- 7	d boulder 5% Sedimer	pa	article	s are	more	d bould than 7 sedim	5%
l in s	SCORE: 11	20	19 18		16	15	14	13	12	11	10	9	8	7 (5	4	3	2	1 0
Parameters to be evaluated in sampling reach	3. Velocity/Depth Regime	preser shallov fast-sh	r velocity/ont (slowder w, fastdee nallow). (S 3 m/s, dee	ep, slow p, low	-	preser	nt (if fa ig, sco	st-sha re low	llow is er thar		regime fastsh	es pre allow w-shal		f				,	elocity/o ow-dee	
aram	SCORE: 10	20	19 18		16	15	14	13	12	11	10	9	8	7 (5	4	3	2	1 0
ď	4. Sediment Deposition	islands than 5	or no enlar s or point l % of the b ed by sedin ition.	oars and ottom		Some formal sand of of the depos	tion, m or fine botton	sedime n affect	rom gr ent; 5- ted; sl	avel, 30%	gravel on old of the sedim obstru and be	l, sand l and n bottor ent de ictions ends; i	or fine new ba n affect posits , const modera	at trictions,	nt in % th fre du	creas an 50 equen	ed ba 1% of ntly; p subst	ar deve the bo	ottom c	ent; more changing absent
	SCORE: 11	20	19 18		16	15	14	13	12	11	10	9	8	7 (3	5	4	3	2	1 0
	5. Channel Flow Status	lower b	reaches boanks, and of chanrosed.	d minim	al	availa	ble cha	75% of annel; strate i	or <25			ble charates a	annel,	of the and/or rif stly		•			channe standir	
	SCORE: 9	20	19 18	17	16	15	14	13	12	11	10	9	8	7 (6	5	4	3	2	1 0

											Conditio					,										
	Habitat Parameter			С	ptima	al			Sul	ooptim				/largina	al				Pod	r						
	6. Channel Alteration	1	absen		nimal;	dredgii strear	•	usually abutmochanno (>20 y	in are ents; e elization r.) mag chann	eas of bevidence on, i.e., y be pre	n present, ridge e of past dredging, esent, but n is not	extens shorin both b	sive; e g stru anks; n read	tion may embank uctures (; and 40 ch chan	me pres	nts or sent on 80% of	cement reach c In strea	nerally all flat water or shes; poor habitat; distance ween riffles divided by the lith of the stream is a ratio 5. 5								
	SCORE:	15	20	19	18	17	16	15	14	13	12 11	10	9	8	7	6	5	4	3	2	1	0				
ch	7. Frequency of Riffle (or bends)	es	frequence between width (genence) habitat where placer	ent; rate en riffl of the rally 5 at is ke e riffles ment o large,	io of des divistreant to 7); y. In some are confident from the food of the foo	es rela istance ided by n < 7:1 variety treams ontinuc ders or	of sous,	infrequ riffles (ient; d divided	d by the	between width of en 7 to 15.	botton some betwe width	n con habita en riff of the	riffle or tours pr at; dista fles divid stream to 25.	ovio nce ded	de [°]	riffles; p betwee	ooor l n riffl	habita es div	; dist ded l	ance by th	e e				
g rea	SCORE:	14	20	19	18	17	16	15	14	13	12 11	10	9	8	7	6	5	4	3	2	1	0				
Parameters to be evaluated in sampling reach	8. Bank Stability (scceach bank) Note: determine left oright side by facing downstream.		erosio or min	on or banimal; I proble	ank fa ittle po	ence of ilure all otential 5% of	osent for	small a	areas l over.	of erosio	nfrequent, on mostly of bank in erosion.	of ban	k in r n; hig	each ha gh erosid	ıs a		"raw" a straight obvious	reas t sect s ban	freque ions a k slou	nt ald nd be ghing	ong ends; ; 60-					
e eva	SCORE (LB):	3	Le	eft Bar	ık	10	9	8		7	6	5		4		3			1		()				
to b	SCORE (RB):	2	Rig	ght Ba	nk	10	9	8		7	6	5	1	4		3	2		1		()				
Parameter	9. Vegetative Protect (score each bank)	tion	bank s riparia native trees, non- v vegeta grazin not ev	surface an zone veget under woody ative d ag or m	es and e cove ation, story s macro isrupti iowing almos	the str imme red by includi shrubs ophytes on thro minim t all pla aturally	ng , or s; ough aal or	surface vegeta plants disrupt affection potent more to one-ha	es covation, to is not tion even tion even tion even tion and the second tion and the second tion to the second tion tion to the second tion tion to the second tion tion tion to the second tion tion tion tion tion tion tion tion	well- re vident bo plant go any grea	native class of presented ut not owth at extent; ntial plant	surfact vegeta obviou or clos comm	es co ation; is; pa sely c on; le tentia	al plant s	on f ba veg	are soil getation e-half of	bank su vegetat bank ve vegetat 5 centir	urface tion; o egeta tion h meter	es cov disrupt ition is las beens or le	ered ion o very en rei	by f stre high nove	eam ; ed to				
	SCORE (LB):	3	Le	eft Bar	ık	10	9	8		7	6	5		4		3	2		1		()				
	SCORE (RB):	3		ght Ba		10	9	8		7	6	5		4		3	2		1)				
	10. Riparian Vegetati Zone Width (score ea bank riparian zone)		meter: parkin cuts, I	s; hum ng lots,	an ac roadb or cro	one >1 tivities eds, c ps) ha	(i.e., lear-	meters	; hum	an activ	ne 12- 18 ities have minimally.	meters	s; hur	arian zo man acti one a gr	iviti	es have	Width of little or to huma	no ri	parian	vege						
	SCORE (LB):	9	Le	eft Bar	ık	10	9	8		7	6	5		4		3	2		1		()				
	SCORE (RB):	9	Ri	ght Ba	nk	10	9	8		7	6	5		4		3	2		1		()				
TOT	AL SCORE:		10	9																						

STRE	EAM NAME: Dow	nstrea	m (DS	s) rea	ich				LOC	ATION	N:	Wool	per C	reek V	Vaters	shed,	near To	oyot	a parts	s facil	ity	
STRE	EAM WDTH (FT):			DE	PTH ((FT):			F	PERE	NNIA	L		INTE	RMIT	TEN	Т		EPH	EME	RAL	
STAT	TION #: N/A	RIV	ERMII	LE:	N/A				C	TNUC	Υ:	Boon	е				;	STA	TE: k	Υ		
LAT		LO	NG						RI	VER E	BASIN	1 : V	Voolp	er Cre	ek Wa	atersl	hed					
CLIE	NT:								PR	OJE	CT NO). E	PA/O	RD P	ilot Pro	oject	(i.e. To	yota	retrofi	t)		
INVE	STIGATORS/CREW: RJI	ł																				
FO	RM COMPLETED BY:		NLK				ME:		7/8	8/201	9	1	REAS(OR SU	IRVE	Y: Post	-retr	ofit ha	bitat		
	Habitat Parameter						Ī				nditio	n Cat					1					
	1. Epifaunal Substrate/	Great		ptim	of sub	octrata	40.70		boptir of stat		nitat:	20.40		argin	al ble hal	nitat:	Less th	on 2	Poc		hita	4.
	Available Cover	favora coloni mix of logs, or oth stage poten	able for zation f snags underc er stab to allo tial (i.e ot new	epifa and f s, sub ut bai ole ha w full ., logs	aunal ish cov merge nks, co bitat ai colonia s/snag	ver; d obble nd at zation	well s poten mainto prese substo newfa for co	uited for tial; and enance of rate in all, but lonizate	or full of ful	colonize habit pulational m of t prepa	ation at for ons;	habita desira	at avail	ability ubstrat	less the	ian		habi	tat is o	bvious	s;	,
	SCORE: 15	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
ampling reach	2. Embeddedness	partic surrou Layer	les are unded ing of o	0-25 by fin	nd boul % e sedir e provi space.	nent. des	partic	les are	ole, and 25-50 by fine	%		partic	les are	50-7	d boul 5% Sedir		Gravel, particle surrour	s are	e more	than	75%	
l in S	SCORE: 15	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
eters to be evaluated in sampling reach	3. Velocity/Depth Regime	prese shallo fast-s	nt (slov w, fast hallow)	wdeep deep). (Slo		-	prese missir missir	nt (if fa	e 4 reg ast-sha are lower er regin	llow is er thar		regim fastsh or slo	2 of the es pre nallow w-shal issing,	sent (i low	f		Domina regime					th
Parameters	SCORE: 10	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<u>a</u>	4. Sediment Deposition	island than 5	s or po 5% of t ed by s	oint ba			forma sand of the	tion, m or fine bottor	ncreas nostly fi sedimen n affec n pools	rom gr ent; 5- ted; sl	avel, 30%	grave on old of the sedim obstru and b	I, sand d and r bottor nent de uctions ends;	or find new bath n affect posits , cons moder	rs; 30- cted; at triction	ment 50% s,	Heavy increas than 50 frequer due to deposit	ed b)% o ntly; subs	ar dev f the bo pools a	elopm ottom ilmost	ent; char abs	more nging
	SCORE: 17	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	5. Channel Flow Status	lower amou	banks	, and	ise of b minima el subs	al	availa	ble ch	75% of annel; strate	or <25			ible ch rates a	annel,			Very lit mostly					
	SCORE: 12	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

		•••	<u> </u>	11 /10	OLO	/IVILIA		LD DA	17.0		Condition				110,	TAGE								
	Habitat Parameter			C	ptima	al			Sul	ooptim				, largina	al				Poor	r				
	6. Channel Alteration	1	absen	nelizat	ion or inimal;	dredgi strear	•	usually abutme channe (>20 yı	chann in are ents; e elization r.) may chann	elization eas of b evidence on, i.e., y be pre	n present,	extens shorin both b	neliza sive; e g stru anks; n read	tion may embank actures p and 40	y be men pres	its or ent on 30% of	reach cl	; ove hann m ha	r 80% d nelized a abitat gr	of th and eatl	on or e stream disrupted. y altered			
	SCORE:	15	20	19	18	17	16	15	14	13	12 11	10	9	8	7	6	5	4	3	2	1 0			
ch	7. Frequency of Riffle (or bends)	es	frequence betwee width (general habitat where placer	ent; raten rifflof the rally 5 at is ken riffles ment olarge,	tio of dies divistreant to 7); y. In search of bould	variety treams ontinuo ders or	tively e y of ous,	infrequ riffles o	ent; d divided	d by the	between width of en 7 to 15.	botton some betwe width	n con habita en riff of the	riffle or tours pr at; dista fles divid stream to 25.	ovid nce ded	е	riffles; p betweer	oor I n riffl	habitat; es divid	dist ded				
y rea	SCORE:	14	20	19	18	17	16	15	14	13	12 11	10	9	8	7	6	5	4	3	2	1 0			
Parameters to be evaluated in sampling reach	8. Bank Stability (scoeach bank) Note: determine left oright side by facing downstream.		erosio or min	on or ba nimal; l proble	ank fa ittle po	ence of ilure all otential 5% of	bsent I for	small a healed	over.	of erosio	nfrequent, on mostly of bank in erosion.	of ban	ık in r n; hig	unstabl each ha h erosid ls.	is ar	eas of	6 Unstable; many eroded areas; "raw" areas frequent along							
e eV	SCORE (LB):	7	Le	eft Bar	nk	10	9	8		7	6	5		4		3	2		1		0			
to b	SCORE (RB):	8	Ri	ght Ba	nk	10	9	8		7	6	5		4		3	2		1		0			
Parameter	9. Vegetative Protect (score each bank)	tion	bank s riparia native trees, non- v vegeta grazin	surface in zone veget under voody ative d ig or m	es and e cove ation, story s macro isrupti nowing almos	the str imme red by includi shrubs ophytes on thro minim t all pla aturally	diate ing , or s; ough hal or ants	surface vegeta plants disrupt affectir potenti more tl one-ha	es covition, bis not cion eving full fall to a han	well- re vident bu plant gr any grea	native class of presented; ut not owth ut extent; ntial plant	surfactivegeta obvious or close comm	es co ation; us; pa sely c on; le	l plant s	on f bai vege one	re soil etation e-half of	bank su vegetati bank ve vegetati	rface ion; o geta ion h	es cove disruption ition is v as been rs or les	red on o very n re	by f stream			
	SCORE (LB):	7	Le	eft Bar	nk	10	9	8		7	6	5		4		3	2		1		0			
	SCORE (RB):	10	9	8		7	6	5		4		3	2		1		0							
	10. Riparian Vegetati Zone Width (score ea bank riparian zone)		•	s; hum ig lots, awns,	nan ac roadb or cro	tivities eds, c ps) ha	(i.e., lear-	meters	; hum	an activ	ne 12- 18 ities have minimally.	meter	s; hur	arian zo nan acti one a gr	ivitie	s have	Width of riparian zone <6 meters little or no riparian vegetation due to human activities.							
	SCORE (LB):	9	Le	eft Bar	nk	10	9	8		7	6	5		4	T	3	2		1		0			
	SCORE (RB):	9	Ri	ght Ba	nk	10	9	8		7	6	5		4	J	3	2		1	j	0			
TOT	AL SCORE:		14	6							_													