

Appendix to

A GIS-based Study

on the Geomorphic Responses to

Natural Floods and Land Use/Cover Change

in the Brodhead Watershed:

2007-2011

**Appendix A:
National Flood Insurance Claims in the Delaware River
basin (by municipality) September 2004 Event - Ivan**

**Appendix B.
Creation of a GIS-based statistical model for
projecting bank failure sites**

**Appendix C.
Spreadsheets: Data for Model 1 (73 Waypoints)**

**Appendix D.
Spreadsheets: Data for Model 2 (300 Waypoints,
randomly selected in dark red color)**

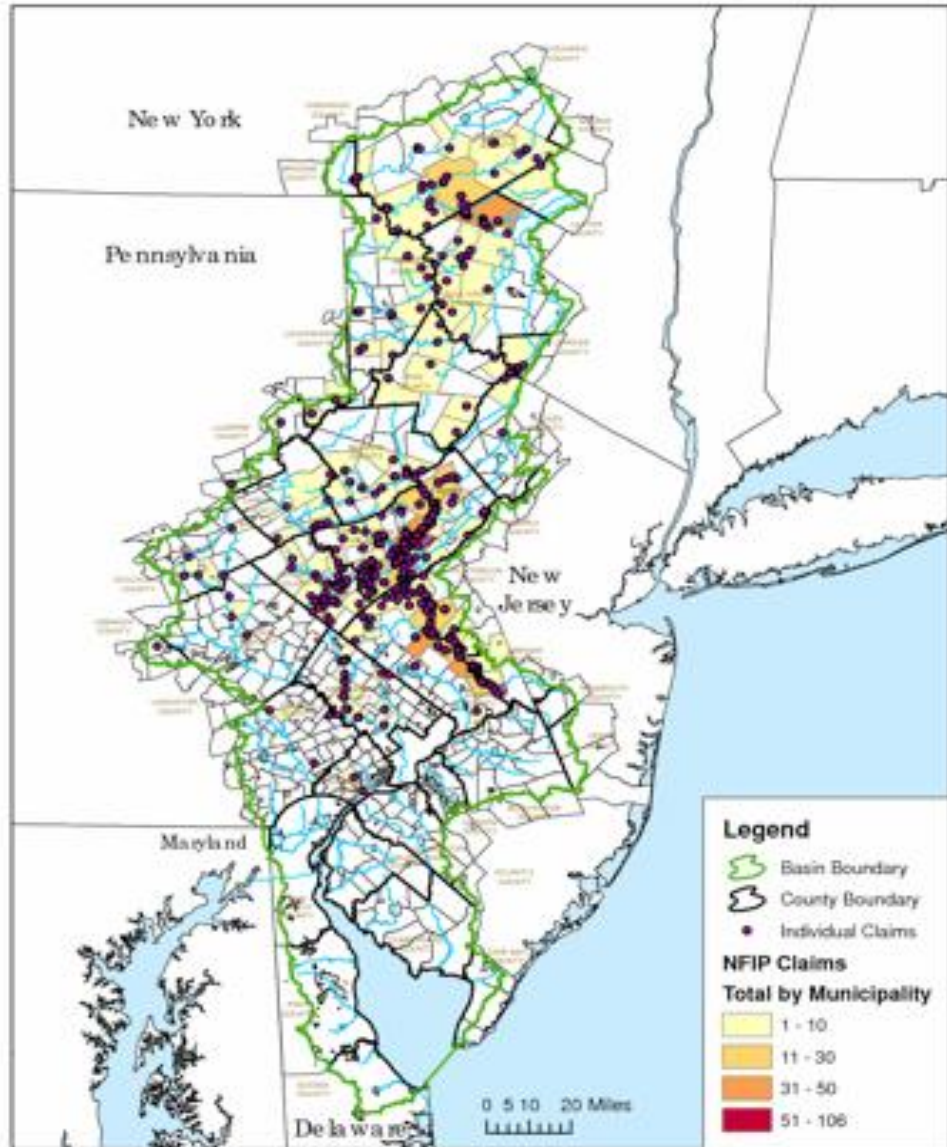
**Appendix E.
Spreadsheet: Data for verification of prediction with
model 2(50 waypoints, blue color in Appendix D.)**

**Appendix F.
Bank Stability Field Instrument**

**Appendix G.
BWA Invasive Plant Inventory Data Sheet**

APPENDIX A

National Flood Insurance Claims in the Delaware River Basin (by Municipality) September 2004 Event - Ivan



Source: Federal Emergency Management Agency (FEMA). Claims represented include all National Flood Insurance Program (NFIP) closed claims as of 02/28/07 for dates of loss listed 9/17/04 - 9/20/04.

Prepared by Delaware River Basin Commission Staff, April 2007.

APPENDIX B
Creation of a GIS-based statistical model for projecting bank failure sites

By Shixiong Hu, Department of Geography, East Stroudsburg University of PA,
shu@po-box.esu.edu

The software and data described in Stage 2 were used to develop models that could be used to predict the likelihood of bank failure for creeks and streams in the watershed.

Step 1: The Stream Sinuosity (designated as variable X1) data were collected in the field. There are 350 sites with estimate data. The higher value X1 means more unstable bank.

Step 2: Terrain Stability Index (designated as variable X2) layer was obtained from SINMAP software based on DEM, soil, and land cover data. Using the waypoint layer from field survey and “extract value to point” tool in Arc Toolbox, the 350 Terrain Stability Index values were derived for the 350 sites. The lower value X2 means more unstable bank.

Step 3: Topographic Index (designated as variable X3) also called potential for wetness index, which is calculated by $\ln(a/\tan B)$, where, a – contributing upslope area/per unit, contour line; B – local slope angle. Topographic Index was calculated by combining TauDEM software and Arc GIS Spatial Analyst Extension. Then, 365 values of X3 were extracted. The higher value X3 means more unstable bank.

Step 4: Stream bed slope (designated as variable X4) layer was calculated by LandSerf and SINMAP software based on DEM. The values for 350 waypoints were extracted with Arc toolbox. The stream bed slope will be used as a substitute of flow velocity. The higher value X4 means more unstable bank.

Step 5: Terrain Saturation Index (designated as variable X5) layer was calculated by SINMAP software. 350 values were extracted from this layer. The higher value X5 means more unstable bank.

Step 6: The ratio of (silt + clay)/sand (designated as variable X6): 73 soil samples were collected from the field and the soil textures were analyzed in the laboratory. The lower value X6 means more unstable bank.

Step 7: All data for these variables were compiled in a spread sheet and all the bank stability index (Y) data collected in the field were used as dependent variables and the variables of X1-6 derived from steps 1-6 were used as independent variables. The SYSTAT statistic software was used to establish a predictive model for potential bank failure sites. The higher value Y means a more unstable bank. The linear models were tested; none showed sufficiently strong relationships to rely on for a predictive model.

Two non-linear models were developed and tested:

Model 1: Using the data of 73 waypoints, all SIX Independent Variables waypoints (Appendix C) were included to develop the model. The result is:

$$\ln Y = 0.657 \ln X_1 + 1.876 \ln X_3 + 0.196 \ln X_5 - 0.015 \ln X_6$$

DEP VAR: Y N: 73
 MULTIPLE R: 0.997 SQUARED MULTIPLE R: 0.995
 ADJUSTED SQUARED MULTIPLE R: 0.995
 STANDARD ERROR OF ESTIMATE: 0.333

VARIABLE	COEFFICIENT	STD ERROR	STD COEFF	TOLERANCE	T	P(2 TAIL)
X1	0.657	0.359	0.037	0.183	1.829	0.072
X3	1.876	0.076	0.927	0.052	24.630	0.000
X5	0.196	0.142	0.045	0.071	1.387	0.170
X6	-0.015	0.021	-0.009	0.508	-0.707	0.482

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	1483.0723	4	370.768	3346.763	0.000
RESIDUAL	7.644	69	0.111		

Model 2: Non-linear model: FIVE Independent Variables (no bank material data) for 300 waypoints (randomly selected from the total 350 waypoints, in dark red color in Appendix D), variable X2 and X4 were out in the stepwise regression. The result is:

$$\ln Y = 1.137 \ln X_1 + 1.829 \ln X_3 + 0.157 \ln X_5$$

DEP VAR: Y N: 300
 MULTIPLE R: 0.996 SQUARED MULTIPLE R: 0.993
 ADJUSTED SQUARED MULTIPLE R: .993
 STANDARD ERROR OF ESTIMATE: 0.385

VARIABLE	COEFFICIENT	STD ERROR	STD COEFF	TOLERANCE	T	P(2TAIL)
X1	1.137	0.270	0.055	0.141	4.205	0.000
X2	1.829	0.037	0.911	0.073	49.837	0.000
X3	0.157	0.060	0.036	0.129	2.625	0.009

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	6044.148	3	2014.716	13505.110	0.000
RESIDUAL	44.111	297	0.149		

Step 8: Verification: use the remaining 50 waypoints (in blue color in Appendix D) to verify the prediction. The error(%) = (Measured value – predicted value)/measured value * 100 = 15%. The average accuracy of predictions with model 2 for the 50 waypoints is 85% (see the bottom of Appendix E).

Appendix C: Data for model 1 (73 waypoints)

ID	Bank_Stab_Index	Stream sinuosity	Terrain Stability Index	Topographic Index	Stream slope	Terrain Saturation Index	Clay+silt/sand
	Ln Y	Ln X1	Ln X2	Ln X3	Ln X4	Ln X5	Ln X6
CRN04	4.634728988	0.336472237	2.302585093	2.32973572	-3.895054292	1.098612289	2.319821883
CRN07	4.219507705	0.182321557	2.302585093	2.124951209	-4.672847495	1.098612289	3.297503012
CRN09	4.430816799	0.09531018	2.302585093	2.464654899	-4.654496994	1.098612289	3.164754131
CRN12	4.406719247	0.182321557	2.302585093	2.313287448	-5.321457036	1.098612289	3.008807636
CRN14	4.605170186	0.048790164	2.302585093	2.25516134	-4.561071007	1.098612289	3.411562875
CRN16	4.48863637	0.09531018	2.234685726	2.231057381	-3.786209192	1.098612289	3.156148676
CRN18	4.48863637	0.048790164	2.302585093	2.449188129	-4.463072712	1.098612289	3.514227008
CRN20	4.317488114	0.262364264	2.302585093	2.27802143	-4.098445359	1.098612289	3.708686494
DH22	4.59511985	0.262364264	1.279867519	2.251340284	-2.511867777	1.098612289	0.283768173
DH28	4.828313737	0.336472237	1.082644391	2.177546111	-2.312874346	1.098612289	0.051825068
Msh003	4.343805422	0.182321557	2.302585093	2.091927567	-5.376419458	0.758810307	1.955864723
Msh009	4.007333185	0.09531018	2.302585093	2.17404122	-4.779739073	1.098612289	3.347089824
Msh012	4.189654742	0.405465108	2.302585093	2.400419539	-5.683118454	1.098612289	3.934628824
Msh015	4.382026635	0.182321557	2.068525671	1.904861173	-3.523955359	0.314568382	3.614467658
PACRL63	4.779123493	0.262364264	2.302585093	2.018781521	-4.152790322	1.098612289	-4.59511985
PACRU01	4.8978398	0.336472237	2.302585093	2.278843078	-5.501959807	1.098612289	1.74291554
PACRU09	4.304065093	0.182321557	2.302585093	2.140868611	-4.413558582	1.098612289	1.627661651
PACRU12	4.465908119	0.262364264	2.302585093	2.472916107	-4.60228934	1.098612289	-4.054339228
PACRU16	4.510859507	0.405465108	2.263376724	2.190251639	-3.516309961	1.098612289	0.588919809
PACRU17	4.49980967	0.262364264	1.005116621	2.240015356	-2.232341471	1.098612289	2.542791544
PACRU18	4.574710979	0.336472237	2.018886837	2.086015142	-3.193903251	1.098612289	-4.332755586
PATA02	4.820281566	0.336472237	1.538094675	2.23607421	-2.773560394	1.098612289	-3.47609869
PATA03	4.836281907	0.336472237	2.302585093	2.182041846	-4.344791738	1.098612289	0.020408872
PATA08	4.615120517	0.470003629	2.302585093	2.294799969	-2.797625954	1.098612289	1.613729765
PAYA07	4.521788577	0.405465108	1.833591772	2.137231195	-3.068124273	0.480625208	0.719673935
PAYA08	4.49980967	0.470003629	1.921077207	2.099248007	-3.144443673	1.098612289	1.136210702
PAYA12	4.615120517	0.470003629	1.290419076	2.306034775	-2.529842344	1.098612289	1.317877361
Poc04	4.820281566	0.182321557	2.288023795	2.207954033	-2.606490183	0.042413706	-2.586689344
Poc10	4.454347296	0.182321557	2.302585093	2.407004595	-4.352683001	0.671642744	1.436842574
Poc13	4.543294782	0.262364264	2.186572512	2.469723032	-3.576513017	1.072725683	0.484476553
Poc16	4.418840608	0.182321557	2.302585093	2.116003989	-2.031475107	-0.475794959	1.402823663
Poc19	4.477336814	0.262364264	2.12277655	2.142649301	-3.649298806	1.098612289	0.009950331
Poc22	4.48863637	0.182321557	1.265806358	2.12671269	-4.206657188	1.098612289	2.504663248
Poc25	4.382026635	0.182321557	2.302585093	2.2594477	-4.288829959	1.098612289	1.827895176
Poc31	4.189654742	0.182321557	1.699468074	2.311521315	-5.85020807	1.098612289	-1.450010176

Poc34	4.48863637	0.262364264	1.882266555	2.235938333	-4.655465032	1.098612289	2.098017927
Poc37	4.48863637	0.182321557	2.302585093	2.310707364	-7.564069209	1.098612289	2.417624643
POC40	4.317488114	0.262364264	2.302585093	2.171974573	-3.308841288	1.015004324	0.304660409
POC43	4.477336814	0.262364264	2.302585093	2.420108442	-5.799222363	1.098612289	1.968859082
Poc46	4.430816799	0.262364264	2.302585093	2.070183102	-4.044338566	1.098612289	0.799756916
Poc49	4.644390899	0.405465108	2.279935868	2.002563651	-4.320310844	1.098612289	2.911797822
Poc52	4.521788577	0.182321557	2.302585093	2.190243103	-4.722793359	1.098612289	2.587651808
Poc55	4.406719247	0.262364264	1.867953821	1.987685973	-4.813333996	1.098612289	2.644400174
Poc58	4.304065093	0.182321557	2.302585093	1.896429286	-5.909199081	1.098612289	0.26438651
Poc61	4.33073334	0.182321557	1.219394192	2.110559931	-5.191261888	0.631357816	1.98430258
Poc64	4.49980967	0.182321557	2.302585093	2.401714113	-3.968113578	1.098612289	2.33075597
Poc67	4.33073334	0.182321557	2.302585093	2.327385814	-1.708990935	0.693147181	1.16704945
Poc70	4.382026635	0.262364264	2.302585093	2.013844994	-3.201116706	1.098612289	-1.045968555
Poc73	4.430816799	0.262364264	2.302585093	2.250249643	-3.873714246	1.098612289	2.315007613
Poc79	4.48863637	0.182321557	2.302585093	2.482014348	-2.41750381	0.942601792	1.450010176
Poc82	4.59511985	0.262364264	2.302585093	1.811139847	-4.356677067	1.098612289	2.855511893
Poc85	4.454347296	0.262364264	2.302585093	2.147331835	-4.052976157	1.098612289	3.14968724
SWC02	4.787491743	0.405465108	2.282215108	2.36874569	-5.369282897	0.835834362	-2.197224577
SWCL02	4.672828834	0.09531018	2.302585093	2.08499614	-7.194517774	1.098612289	0.719673935
SWCL06	4.418840608	0.262364264	1.751629433	2.267405558	-3.910576552	1.098612289	0.316871452
UPBROD03	4.59511985	0.048790164	1.829981958	2.233579006	-5.094818311	1.098612289	3.778417324
UPBROD06	4.59511985	0.048790164	2.302585093	2.508604558	-6.01772639	1.098612289	3.604891655
UPBROD09	4.574710979	0.048790164	2.302585093	2.150683681	-3.598594607	1.015440654	3.176920323
UPBROD12	4.553876892	0.048790164	2.302585093	2.001430269	-3.957749193	1.098612289	3.778417324
UPBROD15	4.477336814	0.182321557	2.302585093	2.49054174	-3.089416336	1.098612289	2.995732274
UPBROD18	4.682131227	0.048790164	2.302585093	2.244942499	-3.228320284	1.098612289	2.846799176
UPBROD21	4.553876892	0.262364264	2.302585093	2.332639239	-2.284193657	1.098612289	3.176920323
UPBROD24	4.564348191	0.048790164	2.302585093	2.176562842	-4.2528246	1.098612289	3.005679634
UPBROD27	4.49980967	0.405465108	2.302585093	2.251430223	-4.661140717	0.717343036	3.161578578
UPBROD30	4.605170186	0.182321557	2.302585093	2.476536925	-4.40697528	1.098612289	3.511738262
UPBROD33	4.615120517	0.048790164	2.302585093	2.408551781	-3.966287024	1.098612289	2.821757971
UPBROD36	4.543294782	0.262364264	2.121645332	2.190243153	-4.837165297	1.098612289	1.977616436
UPBROD39	4.574710979	0.262364264	2.302585093	2.259454072	-5.6981265	1.098612289	3.153816025
UPBROD42	4.634728988	0.048790164	2.302585093	2.34168426	-4.095295214	1.098612289	2.628962305
UPBROD45	4.532599493	0.262364264	2.302585093	2.150692562	-5.894080156	1.098612289	3.516411194
UPBROD48	4.564348191	0.262364264	1.23525245	2.443293959	-2.950581868	0.270588132	3.509787676
UPBROD51	4.700480366	0.048790164	2.084800989	2.084290268	-4.449649588	1.098612289	3.417723171
UPBROD54	4.682131227	0.336472237	2.302585093	2.150683715	-5.376542727	1.098612289	2.83237806

Appendix C: Data for model 1 (73 waypoints)

ID	Bank_Stab_Index	Stream sinuosity	Terrain Stability Index	Topographic Index	Stream slope	Terrain Saturation Index	Clay+silt/sand
	Ln Y	Ln X1	Ln X2	Ln X3	Ln X4	Ln X5	Ln X6
CRN04	4.634728988	0.336472237	2.302585093	2.32973572	-3.895054292	1.098612289	2.319821883
CRN07	4.219507705	0.182321557	2.302585093	2.124951209	-4.672847495	1.098612289	3.297503012
CRN09	4.430816799	0.09531018	2.302585093	2.464654899	-4.654496994	1.098612289	3.164754131
CRN12	4.406719247	0.182321557	2.302585093	2.313287448	-5.321457036	1.098612289	3.008807636
CRN14	4.605170186	0.048790164	2.302585093	2.25516134	-4.561071007	1.098612289	3.411562875
CRN16	4.48863637	0.09531018	2.234685726	2.231057381	-3.786209192	1.098612289	3.156148676
CRN18	4.48863637	0.048790164	2.302585093	2.449188129	-4.463072712	1.098612289	3.514227008
CRN20	4.317488114	0.262364264	2.302585093	2.27802143	-4.098445359	1.098612289	3.708686494
DH22	4.59511985	0.262364264	1.279867519	2.251340284	-2.511867777	1.098612289	0.283768173
DH28	4.828313737	0.336472237	1.082644391	2.177546111	-2.312874346	1.098612289	0.051825068
Msh003	4.343805422	0.182321557	2.302585093	2.091927567	-5.376419458	0.758810307	1.955864723
Msh009	4.007333185	0.09531018	2.302585093	2.17404122	-4.779739073	1.098612289	3.347089824
Msh012	4.189654742	0.405465108	2.302585093	2.400419539	-5.683118454	1.098612289	3.934628824
Msh015	4.382026635	0.182321557	2.068525671	1.904861173	-3.523955359	0.314568382	3.614467658
PACRL63	4.779123493	0.262364264	2.302585093	2.018781521	-4.152790322	1.098612289	-4.59511985
PACRU01	4.8978398	0.336472237	2.302585093	2.278843078	-5.501959807	1.098612289	1.74291554
PACRU09	4.304065093	0.182321557	2.302585093	2.140868611	-4.413558582	1.098612289	1.627661651
PACRU12	4.465908119	0.262364264	2.302585093	2.472916107	-4.60228934	1.098612289	-4.054339228
PACRU16	4.510859507	0.405465108	2.263376724	2.190251639	-3.516309961	1.098612289	0.588919809
PACRU17	4.49980967	0.262364264	1.005116621	2.240015356	-2.232341471	1.098612289	2.542791544
PACRU18	4.574710979	0.336472237	2.018886837	2.086015142	-3.193903251	1.098612289	-4.332755586
PATA02	4.820281566	0.336472237	1.538094675	2.23607421	-2.773560394	1.098612289	-3.47609869
PATA03	4.836281907	0.336472237	2.302585093	2.182041846	-4.344791738	1.098612289	0.020408872
PATA08	4.615120517	0.470003629	2.302585093	2.294799969	-2.797625954	1.098612289	1.613729765
PAYA07	4.521788577	0.405465108	1.833591772	2.137231195	-3.068124273	0.480625208	0.719673935
PAYA08	4.49980967	0.470003629	1.921077207	2.099248007	-3.144443673	1.098612289	1.136210702
PAYA12	4.615120517	0.470003629	1.290419076	2.306034775	-2.529842344	1.098612289	1.317877361
Poc04	4.820281566	0.182321557	2.288023795	2.207954033	-2.606490183	0.042413706	-2.586689344
Poc10	4.454347296	0.182321557	2.302585093	2.407004595	-4.352683001	0.671642744	1.436842574
Poc13	4.543294782	0.262364264	2.186572512	2.469723032	-3.576513017	1.072725683	0.484476553
Poc16	4.418840608	0.182321557	2.302585093	2.116003989	-2.031475107	-0.475794959	1.402823663
Poc19	4.477336814	0.262364264	2.12277655	2.142649301	-3.649298806	1.098612289	0.009950331
Poc22	4.48863637	0.182321557	1.265806358	2.12671269	-4.206657188	1.098612289	2.504663248
Poc25	4.382026635	0.182321557	2.302585093	2.2594477	-4.288829959	1.098612289	1.827895176
Poc31	4.189654742	0.182321557	1.699468074	2.311521315	-5.85020807	1.098612289	-1.450010176

Poc34	4.48863637	0.262364264	1.882266555	2.235938333	-4.655465032	1.098612289	2.098017927
Poc37	4.48863637	0.182321557	2.302585093	2.310707364	-7.564069209	1.098612289	2.417624643
POC40	4.317488114	0.262364264	2.302585093	2.171974573	-3.308841288	1.015004324	0.304660409
POC43	4.477336814	0.262364264	2.302585093	2.420108442	-5.799222363	1.098612289	1.968859082
Poc46	4.430816799	0.262364264	2.302585093	2.070183102	-4.044338566	1.098612289	0.799756916
Poc49	4.644390899	0.405465108	2.279935868	2.002563651	-4.320310844	1.098612289	2.911797822
Poc52	4.521788577	0.182321557	2.302585093	2.190243103	-4.722793359	1.098612289	2.587651808
Poc55	4.406719247	0.262364264	1.867953821	1.987685973	-4.813333996	1.098612289	2.644400174
Poc58	4.304065093	0.182321557	2.302585093	1.896429286	-5.909199081	1.098612289	0.26438651
Poc61	4.33073334	0.182321557	1.219394192	2.110559931	-5.191261888	0.631357816	1.98430258
Poc64	4.49980967	0.182321557	2.302585093	2.401714113	-3.968113578	1.098612289	2.33075597
Poc67	4.33073334	0.182321557	2.302585093	2.327385814	-1.708990935	0.693147181	1.16704945
Poc70	4.382026635	0.262364264	2.302585093	2.013844994	-3.201116706	1.098612289	-1.045968555
Poc73	4.430816799	0.262364264	2.302585093	2.250249643	-3.873714246	1.098612289	2.315007613
Poc79	4.48863637	0.182321557	2.302585093	2.482014348	-2.41750381	0.942601792	1.450010176
Poc82	4.59511985	0.262364264	2.302585093	1.811139847	-4.356677067	1.098612289	2.855511893
Poc85	4.454347296	0.262364264	2.302585093	2.147331835	-4.052976157	1.098612289	3.14968724
SWC02	4.787491743	0.405465108	2.282215108	2.36874569	-5.369282897	0.835834362	-2.197224577
SWCL02	4.672828834	0.09531018	2.302585093	2.08499614	-7.194517774	1.098612289	0.719673935
SWCL06	4.418840608	0.262364264	1.751629433	2.267405558	-3.910576552	1.098612289	0.316871452
UPBROD03	4.59511985	0.048790164	1.829981958	2.233579006	-5.094818311	1.098612289	3.778417324
UPBROD06	4.59511985	0.048790164	2.302585093	2.508604558	-6.01772639	1.098612289	3.604891655
UPBROD09	4.574710979	0.048790164	2.302585093	2.150683681	-3.598594607	1.015440654	3.176920323
UPBROD12	4.553876892	0.048790164	2.302585093	2.001430269	-3.957749193	1.098612289	3.778417324
UPBROD15	4.477336814	0.182321557	2.302585093	2.49054174	-3.089416336	1.098612289	2.995732274
UPBROD18	4.682131227	0.048790164	2.302585093	2.244942499	-3.228320284	1.098612289	2.846799176
UPBROD21	4.553876892	0.262364264	2.302585093	2.332639239	-2.284193657	1.098612289	3.176920323
UPBROD24	4.564348191	0.048790164	2.302585093	2.176562842	-4.2528246	1.098612289	3.005679634
UPBROD27	4.49980967	0.405465108	2.302585093	2.251430223	-4.661140717	0.717343036	3.161578578
UPBROD30	4.605170186	0.182321557	2.302585093	2.476536925	-4.40697528	1.098612289	3.511738262
UPBROD33	4.615120517	0.048790164	2.302585093	2.408551781	-3.966287024	1.098612289	2.821757971
UPBROD36	4.543294782	0.262364264	2.121645332	2.190243153	-4.837165297	1.098612289	1.977616436
UPBROD39	4.574710979	0.262364264	2.302585093	2.259454072	-5.6981265	1.098612289	3.153816025
UPBROD42	4.634728988	0.048790164	2.302585093	2.34168426	-4.095295214	1.098612289	2.628962305
UPBROD45	4.532599493	0.262364264	2.302585093	2.150692562	-5.894080156	1.098612289	3.516411194
UPBROD48	4.564348191	0.262364264	1.23525245	2.443293959	-2.950581868	0.270588132	3.509787676
UPBROD51	4.700480366	0.048790164	2.084800989	2.084290268	-4.449649588	1.098612289	3.417723171
UPBROD54	4.682131227	0.336472237	2.302585093	2.150683715	-5.376542727	1.098612289	2.83237806

Appendix D: Data for model 2 (300 waypoints, randomly selected, in dark red color)

ID	Bank_Stab_Index	Stream sinuosity	Terrain Stability Index	Topographic Index	Stream slope	Terrain Saturation Index
	Ln Y	Ln X1	Ln X2	Ln X3	Ln X4	Ln X5
CRN01	4.382026635	0.182321557	2.302585093	2.568089566	-4.437014324	1.098612289
CRN02	4.394449155	0.336472237	1.428599287	2.474878239	-2.656465232	1.098612289
CRN03	4.672828834	0.405465108	1.76752694	2.086894796	-2.978822847	1.090940106
CRN04	4.634728988	0.336472237	2.302585093	2.32973572	-3.895054292	1.098612289
CRN05	4.418840608	0.048790164	2.278527004	2.287395681	-4.005777795	1.098612289
CRN06	4.59511985	0.262364264	2.247996903	2.108866746	-3.527226359	1.098612289
CRN07	4.219507705	0.182321557	2.302585093	2.124951209	-4.672847495	1.098612289
CRN08	4.584967479	0.09531018	2.302585093	2.352389815	-4.201894807	1.098612289
CRN09	4.430816799	0.09531018	2.302585093	2.464654899	-4.654496994	1.098612289
CRN10	4.234106505	0.009950331	2.302585093	2.066447052	-4.754587088	0.818609102
CRN11	4.59511985	0.262364264	2.302585093	2.368936345	-5.554219158	1.098612289
CRN12	4.406719247	0.182321557	2.302585093	2.313287448	-5.321457036	1.098612289
CRN13	4.043051268	0.182321557	2.272427751	2.164222779	-3.458393643	1.098612289
CRN14	4.605170186	0.048790164	2.302585093	2.25516134	-4.561071007	1.098612289
CRN15	4.290459441	0.262364264	2.291783635	2.191402221	-3.774575043	0.830979057
CRN16	4.48863637	0.09531018	2.234685726	2.231057381	-3.786209192	1.098612289
CRN17	4.394449155	0.09531018	2.101288135	2.266749429	-3.337692864	1.098612289
CRN18	4.48863637	0.048790164	2.302585093	2.449188129	-4.463072712	1.098612289
CRN19	4.442651256	0.09531018	2.302585093	2.307084215	-4.769559098	1.098612289
CRN20	4.317488114	0.262364264	2.302585093	2.27802143	-4.098445359	1.098612289
CRN21	4.477336814	0.182321557	2.302585093	2.269316055	-3.598081256	1.098612289
DH21	4.672828834	0.336472237	2.302585093	2.219812646	-4.289192244	1.098612289
DH22	4.59511985	0.262364264	1.279867519	2.251340284	-2.511867777	1.098612289
DH23	4.779123493	0.336472237	1.825097858	2.497806882	-2.917115937	0.807111097
DH24	4.795790546	0.336472237	2.302585093	2.213726009	-3.92916713	1.098612289
DH25	4.584967479	0.336472237	2.302585093	2.318470912	-4.272179718	1.098612289
DH26	4.852030264	0.470003629	2.052232044	1.996186408	-3.294685359	0.261612105
DH27	4.584967479	0.336472237	1.745186462	2.377346123	-2.938677687	1.098612289
DH28	4.828313737	0.336472237	1.082644391	2.177546111	-2.312874346	1.098612289
DH29	4.86753445	0.262364264	0.631630989	2.108459445	-1.825105851	1.098612289
DH30	4.682131227	0.470003629	0.663767004	2.01226027	-1.881453613	0.746642814
DH32	4.663439094	0.336472237	0.68196258	1.969321651	-2.108800571	-0.231475264
DH33	4.584967479	0.336472237	1.341981559	2.052322443	-1.990777837	0.84046088
DH34	4.49980967	0.336472237	1.308271099	2.255191539	-2.549054975	1.098612289
DH35	4.369447852	0.405465108	1.984646797	2.191939892	-3.36780632	1.098612289
DH36	4.48863637	0.262364264	2.018905835	2.253692575	-3.244080306	1.098612289
DH37	4.418840608	0.336472237	2.302585093	2.360366105	-4.573816878	1.098612289
DH38	4.521788577	0.405465108	2.302585093	2.30477795	-4.46779108	1.098612289
DHC01	4.406719247	0.262364264	1.592173378	2.030562944	-2.796257511	0.487273929
DHC02	4.59511985	0.182321557	1.816443646	2.043287639	-3.058055437	0.846680676

DHC03	4.564348191	0.182321557	2.236049849	2.399744557	-3.557740321	1.098612289
DHC04	4.553876892	0.336472237	1.974491061	2.328505749	-3.211312995	1.098612289
DHC05	4.663439094	0.262364264	1.568552178	1.896428284	-2.80173679	-0.813163887
DHC06	4.65396035	0.182321557	2.302585093	2.477999097	-3.668991732	1.098612289
DHC07	4.727387819	0.182321557	0.786400533	2.210134171	-2.017437505	1.098612289
DHC08	4.564348191	0.262364264	1.911762806	2.206086683	-3.151783692	1.098612289
DHC09	4.521788577	0.182321557	2.302585093	1.756074777	-3.71378709	1.098612289
FHR05	4.564348191	0.262364264	1.515507205	2.203939795	-2.753305445	1.098612289
FHR06	4.691347882	0.182321557	1.857297225	2.20250309	-3.058062249	1.098612289
FHR07	4.465908119	0.262364264	2.28088879	2.320799134	-3.726087985	1.098612289
FHR08	4.553876892	0.182321557	1.806416865	2.155733281	-2.981530991	1.098612289
FHR09	4.442651256	0.262364264	2.302585093	2.09913557	-5.11253846	1.005729798
FHR10	4.521788577	0.182321557	2.302585093	2.278735159	-3.93980333	1.098612289
FHR11	4.521788577	0.182321557	2.302585093	2.377758269	-5.080027174	1.098612289
FHR12	4.644390899	0.182321557	2.206209979	2.316590918	-3.446121529	1.098612289
FHR13	4.532599493	0.405465108	2.301167692	2.236217201	-3.871897413	1.098612289
FHR14	4.510859507	0.182321557	2.297868941	2.407324908	-3.668859203	1.098612289
MCMB160	4.406719247	0.405465108	2.302585093	2.079622128	-4.697251484	0.798728841
MCMB161	4.543294782	0.405465108	2.271993817	2.1669663	-4.498049121	1.098612289
MCMB162	4.356708827	0.182321557	2.302585093	2.150683681	-5.148241836	1.098612289
MCMB163	4.343805422	0.182321557	2.302585093	2.443051657	-4.535135857	1.098612289
MCMB164	4.394449155	0.262364264	2.302585093	2.228280209	-5.793269641	1.098612289
MCMB165	4.290459441	0.182321557	2.302585093	2.45208331	-6.974996115	1.098612289
MCMB166	4.406719247	0.336472237	2.302585093	2.109507695	-3.766267322	1.002673369
MCMB167	4.454347296	0.405465108	2.302585093	2.190243103	-5.478145235	1.098612289
MCMB168	4.49980967	0.262364264	2.302585093	2.264724775	-4.357928931	1.098612289
MCMB169	4.521788577	0.182321557	2.302585093	2.388150115	-5.446706012	1.098612289
MCMB170	4.33073334	0.262364264	2.260879109	2.194370293	-3.930381496	1.098612289
MCMB171	4.442651256	0.405465108	1.45384231	1.974730677	-2.162625605	-0.682075736
MCMB172	4.430816799	0.182321557	2.302585093	2.380165054	-3.972818142	1.098612289
MCMB173	4.406719247	0.048790164	2.302585093	2.068349096	-4.833392864	0.764099646
MCMB174	4.574710979	0.182321557	2.302585093	2.372104241	-4.819402312	1.098612289
MCMB175	4.442651256	0.182321557	2.302585093	2.49127602	-4.803644296	1.098612289
MCMB176	4.532599493	0.182321557	2.302585093	2.229927048	-4.564368992	1.098612289
MCMB177	4.48863637	0.182321557	2.129341508	2.210773416	-3.366937124	1.098612289
MCMB178	4.48863637	0.182321557	1.659492576	2.230073075	-3.084331383	1.098612289
MCMB179	4.574710979	0.182321557	1.948017454	2.3143557	-3.140300116	1.098612289
MCMB180	4.418840608	0.182321557	2.302585093	2.129910761	-4.255459537	1.053796974
MCMB181	4.276666119	0.262364264	2.302585093	2.263190147	-4.58491766	1.098612289
MCMB182	4.343805422	0.336472237	2.162131517	2.165658421	-3.391579978	1.098612289
MCMB183	4.262679877	0.182321557	2.302585093	2.079619147	-4.229754747	0.372585634
MCMB184	4.33073334	0.262364264	2.302585093	2.258947329	-4.600151799	1.098612289
MCMB185	4.317488114	0.182321557	2.302585093	2.531233067	-5.169779923	1.098612289

MCMB186	4.290459441	0.336472237	2.302585093	2.181376859	-5.973746444	1.098612289
MCMB194	4.158883083	0.262364264	2.302585093	2.379679393	-5.942483925	1.098612289
MCMB196	3.931825633	0.336472237	2.302585093	2.2082667	-5.508051231	1.098612289
MCMB197	3.951243719	0.405465108	2.302585093	2.167213433	-4.264511013	0.851179844
MCMB198	4.276666119	0.336472237	1.468825078	2.146386065	-2.696418067	1.098612289
MCMB199	4.143134726	0.262364264	2.302585093	2.292157031	-4.071667834	1.098612289
Msh001	4.406719247	0.182321557	2.302585093	2.06727126	-3.648941306	0.562196911
Msh002	4.418840608	0.262364264	2.288769391	2.321552514	-3.567903654	1.098612289
Msh003	4.343805422	0.182321557	2.302585093	2.091927567	-5.376419458	0.758810307
Msh004	4.343805422	0.262364264	2.294429963	2.529425644	-3.622435375	1.098612289
Msh005	4.234106505	0.262364264	2.302585093	2.479961359	-6.132235799	1.098612289
Msh006	4.234106505	0.262364264	2.191570501	2.44628094	-3.951277999	1.098612289
Msh007	4.304065093	0.09531018	2.250859841	2.217758951	-4.693388473	1.098612289
Msh008	4.382026635	0.09531018	2.302585093	2.668912381	-5.49678294	1.098612289
Msh009	4.007333185	0.09531018	2.302585093	2.17404122	-4.779739073	1.098612289
Msh010	4.356708827	0.09531018	2.302585093	2.247557474	-5.463288713	1.098612289
Msh011	4.406719247	0.182321557	2.302585093	2.324135698	-4.589296837	1.098612289
Msh012	4.189654742	0.405465108	2.302585093	2.400419539	-5.683118454	1.098612289
Msh013	4.234106505	0.262364264	0.926751705	2.332453168	-2.164880221	1.098612289
Msh014	4.234106505	0.262364264	2.286986891	2.35034568	-3.767113465	1.098612289
Msh015	4.382026635	0.182321557	2.068525671	1.904861173	-3.523955359	0.314568382
Msh016	4.110873864	0.262364264	2.302585093	2.02528525	-4.409948857	0.162912752
PACRL02	4.59511985	0.182321557	2.302585093	2.18253296	-4.775417728	1.070242046
PACRL03	4.564348191	0.182321557	2.302585093	2.255225137	-4.001510172	1.098612289
PACRL04	4.430816799	0.182321557	2.302585093	2.149404338	-3.947442951	1.098612289
PACRL05	4.543294782	0.182321557	2.302585093	2.292046202	-3.87389616	1.098612289
PACRL06	4.262679877	0.182321557	2.299992414	2.436593559	-3.661492329	1.098612289
PACRL07	4.553876892	0.182321557	2.302585093	2.306283944	-5.589367772	1.098612289
PACRL08	4.634728988	0.182321557	2.302585093	1.789976576	-4.40697528	1.098612289
PACRL09	4.48863637	0.182321557	2.302585093	2.290749933	-6.581780809	1.098612289
PACRL10	4.584967479	0.182321557	1.977446898	2.47670729	-3.212889777	1.098612289
PACRL11	4.615120517	0.182321557	2.302585093	2.210603213	-4.291248893	1.098612289
PACRL12	4.605170186	0.182321557	2.302585093	2.500388535	-5.022526718	1.098612289
PACRL13	4.691347882	0.182321557	2.259946826	2.237805047	-3.94516519	1.098612289
PACRL14	4.634728988	0.182321557	2.302585093	2.221408475	-6.244284108	1.098612289
PACRL15	4.59511985	0.182321557	2.302585093	2.149404338	-6.564052106	1.098612289
PACRL16	4.543294782	0.182321557	2.302585093	2.355174825	-4.628818619	1.098612289
PACRL17	4.615120517	0.182321557	2.295769757	2.001913132	-3.285989392	0.758852951
PACRL18	4.624972813	0.182321557	2.302585093	2.112983684	-4.051441982	1.098612289
PACRL19	4.564348191	0.182321557	2.302585093	2.146367557	-4.644778334	1.098612289
PACRL20	4.65396035	0.182321557	2.174331063	1.993048746	-3.588256141	1.098612289
PACRL21	4.727387819	0.336472237	1.919452775	2.247325089	-3.193408878	-0.297421696
PACRL22	4.615120517	0.182321557	1.155116865	2.205097977	-2.3602837	0.551065752

PACRL23	4.564348191	0.262364264	2.302585093	2.04535737	-3.865259656	1.098612289
PACRL24	4.454347296	0.262364264	0.87776509	2.164932431	-2.099091341	1.098612289
PACRL25	4.465908119	0.262364264	2.217526805	2.190251639	-3.581602616	1.098612289
PACRL26	4.454347296	0.262364264	2.302585093	2.204235516	-4.360859449	0.994134876
PACRL50	4.574710979	0.336472237	1.999319606	2.285606072	-3.231925857	1.098612289
PACRL52	4.574710979	0.336472237	2.302585093	2.407710195	-4.189453802	1.098612289
PACRL53	4.574710979	0.262364264	2.047656972	1.929733416	-3.276216049	1.098612289
PACRL54	4.454347296	0.262364264	2.302585093	2.219169877	-3.89966913	-1.134117287
PACRL55	4.663439094	0.405465108	2.302585093	2.432845253	-4.540553543	1.098612289
PACRL60	4.430816799	0.336472237	2.302585093	2.126553148	-5.472699326	1.098612289
PACRL61	4.672828834	0.336472237	2.302585093	2.105577868	-5.608277768	1.098612289
PACRL62	4.615120517	0.336472237	2.302585093	2.485276607	-5.289284288	1.098612289
PACRL63	4.779123493	0.262364264	2.302585093	2.018781521	-4.152790322	1.098612289
PACRL64	4.744932128	0.336472237	2.302585093	2.43330492	-4.615870228	1.098612289
PACRL65	4.804021045	0.336472237	2.2991339	1.800132309	-3.611472957	1.098612289
PACRU01	4.8978398	0.336472237	2.302585093	2.278843078	-5.501959807	1.098612289
PACRU02	4.49980967	0.336472237	2.302585093	2.167500567	-3.77450009	0.898593259
PACRU03	4.394449155	0.336472237	2.302585093	2.442883769	-3.877107701	1.098612289
PACRU04	4.262679877	0.262364264	2.302585093	2.273868489	-4.521457912	1.098612289
PACRU05	4.605170186	0.262364264	2.273924038	2.426842199	-3.145133616	1.025302466
PACRU06	4.369447852	0.262364264	2.302585093	2.267298966	-4.665421378	1.098612289
PACRU07	4.615120517	0.262364264	2.302585093	2.236078593	-4.119520842	1.081626476
PACRU08	4.709530201	0.262364264	0.89301727	2.113944172	-2.109382368	1.098612289
PACRU09	4.304065093	0.182321557	2.302585093	2.140868611	-4.413558582	1.098612289
PACRU10	4.605170186	0.336472237	1.444338154	2.224270166	-2.61659047	0.870945397
PACRU11	4.779123493	0.262364264	2.302585093	2.178226179	-5.057335469	1.098612289
PACRU12	4.465908119	0.262364264	2.302585093	2.472916107	-4.60228934	1.098612289
PACRU13	4.521788577	0.336472237	2.02554848	2.246311275	-3.287710762	1.098612289
PACRU14	4.454347296	0.336472237	2.302585093	2.275717317	-5.681620867	1.098612289
PACRU15	4.49980967	0.336472237	2.302585093	2.094185686	-4.606198715	1.098612289
PACRU16	4.510859507	0.405465108	2.263376724	2.190251639	-3.516309961	1.098612289
PACRU17	4.49980967	0.262364264	1.005116621	2.240015356	-2.232341471	1.098612289
PACRU18	4.574710979	0.336472237	2.018886837	2.086015142	-3.193903251	1.098612289
PACRU19	4.615120517	0.336472237	1.837409876	1.946255388	-3.079331297	1.098612289
PATA01	4.727387819	0.470003629	2.253789012	2.049046759	-3.520177221	1.098612289
PATA02	4.820281566	0.336472237	1.538094675	2.23607421	-2.773560394	1.098612289
PATA03	4.836281907	0.336472237	2.302585093	2.182041846	-4.344791738	1.098612289
PATA04	4.700480366	0.405465108	1.57413509	2.16797094	-2.811498879	-1.368342269
PATA05	4.682131227	0.262364264	2.302585093	2.378198797	-5.044005435	1.098612289
PATA06	4.605170186	0.262364264	2.302585093	2.131193084	-3.656207058	1.074129681
PATA07	4.663439094	0.405465108	1.695347721	2.217717011	-2.937877791	1.098612289
PATA08	4.615120517	0.470003629	2.302585093	2.294799969	-2.797625954	1.098612289
PATA09	4.553876892	0.262364264	2.302585093	2.431772794	-2.875894107	1.098612289

PATA10	4.442651256	0.182321557	1.801690749	2.291127686	-3.030267405	1.098612289
PAYA06	4.477336814	0.336472237	2.302585093	2.228280209	-4.041231754	1.098612289
PAYA07	4.521788577	0.405465108	1.833591772	2.137231195	-3.068124273	0.480625208
PAYA08	4.49980967	0.470003629	1.921077207	2.099248007	-3.144443673	1.098612289
PAYA09	4.430816799	0.405465108	1.816549632	2.298974456	-3.052420727	1.098612289
PAYA10	4.465908119	0.336472237	2.302585093	2.467904936	-4.540553543	1.098612289
PAYA11	4.477336814	0.405465108	1.754175587	2.084496095	-2.98542854	1.098612289
PAYA12	4.615120517	0.470003629	1.290419076	2.306034775	-2.529842344	1.098612289
PAYA13	4.442651256	0.336472237	1.606500386	2.461032559	-2.846664892	0.767911848
Poc01	4.564348191	0.182321557	2.302585093	2.251797118	-3.677044168	0.900534719
Poc02	4.521788577	0.182321557	2.302585093	2.232641775	-3.558124211	0.489600304
Poc03	4.510859507	0.182321557	1.975498716	2.050872814	-3.511035909	-0.04069419
Poc04	4.820281566	0.182321557	2.288023795	2.207954033	-2.606490183	0.042413706
Poc05	4.744932128	0.336472237	2.302585093	2.046099833	-2.719892141	-0.12330273
Poc06	4.574710979	0.182321557	2.302585093	2.2814829	-4.269270256	0.69416757
Poc07	4.65396035	0.182321557	2.298057207	1.864055853	-4.054312063	1.08886247
Poc08	4.510859507	0.182321557	0.740901461	2.367190965	-4.487015664	1.005095506
Poc09	4.663439094	0.182321557	2.302585093	2.124475613	-4.400114844	0.903698817
Poc10	4.454347296	0.182321557	2.302585093	2.407004595	-4.352683001	0.671642744
Poc11	4.605170186	0.182321557	1.899810421	2.218078843	-3.738754807	0.255570485
Poc12	4.418840608	0.182321557	2.302585093	2.23196615	-4.551742222	0.804266355
Poc13	4.543294782	0.262364264	2.186572512	2.469723032	-3.576513017	1.072725683
Poc14	4.477336814	0.182321557	2.302585093	2.286499436	-2.698134524	-0.484390757
Poc15	4.442651256	0.182321557	2.068557306	2.045487611	-1.947097514	-0.726675919
Poc16	4.418840608	0.182321557	2.302585093	2.116003989	-2.031475107	-0.475794959
Poc17	4.820281566	0.405465108	2.076526624	2.136221533	-3.960577422	0.94675578
Poc18	4.700480366	0.336472237	2.302585093	2.23598418	-5.583062423	1.098612289
Poc19	4.477336814	0.262364264	2.12277655	2.142649301	-3.649298806	1.098612289
Poc20	4.418840608	0.182321557	2.237618929	2.030841058	-4.84440628	1.098612289
Poc21	4.477336814	0.182321557	1.521864923	2.382914712	-4.289192244	0.94554294
Poc22	4.48863637	0.182321557	1.265806358	2.12671269	-4.206657188	1.098612289
Poc23	4.356708827	0.182321557	1.031315503	2.186294124	-3.630373216	1.098612289
Poc24	4.430816799	0.182321557	2.302585093	2.616264135	-3.329304439	-0.72724382
Poc25	4.382026635	0.182321557	2.302585093	2.2594477	-4.288829959	1.098612289
Poc26	4.430816799	0.405465108	2.095852041	2.094971433	-5.076477064	1.098612289
Poc27	4.382026635	0.182321557	2.302585093	2.504878786	-5.081386675	1.098612289
Poc28	4.682131227	0.336472237	2.21058272	2.406959491	-3.958257538	1.098612289
Poc29	4.465908119	0.182321557	2.302585093	2.211384043	-6.519131188	1.098612289
Poc30	4.406719247	0.182321557	1.614199412	2.401730522	-2.850228932	1.098612289
Poc31	4.189654742	0.182321557	1.699468074	2.311521315	-5.85020807	1.098612289
Poc32	4.369447852	0.182321557	2.122450931	2.513488202	-2.83694823	1.098612289
Poc33	4.406719247	0.182321557	1.429914713	2.573220024	-2.701785416	1.098612289
Poc34	4.48863637	0.262364264	1.882266555	2.235938333	-4.655465032	1.098612289

Poc35	4.304065093	0.182321557	2.302585093	2.314793119	-4.21637729	1.098612289
Poc36	4.406719247	0.405465108	2.302585093	2.035586331	-7.968696131	1.098612289
Poc37	4.48863637	0.182321557	2.302585093	2.310707364	-7.564069209	1.098612289
Poc38	4.276666119	0.182321557	2.302585093	2.24435122	-3.05401711	-0.01608859
Poc39	4.290459441	0.182321557	2.302585093	2.460326225	-4.986653178	1.098612289
POC40	4.317488114	0.262364264	2.302585093	2.171974573	-3.308841288	1.015004324
POC41	4.48863637	0.405465108	2.302585093	2.415652744	-5.380953601	1.098612289
POC42	4.615120517	0.182321557	2.302585093	2.278780477	-4.694657352	1.098612289
POC43	4.477336814	0.262364264	2.302585093	2.420108442	-5.799222363	1.098612289
POC44	4.430816799	0.262364264	2.302585093	2.150686013	-3.829240976	1.098612289
POC45	4.510859507	0.182321557	2.302585093	2.076630334	-4.720487888	1.098612289
Poc46	4.430816799	0.262364264	2.302585093	2.070183102	-4.044338566	1.098612289
Poc47	4.510859507	0.405465108	2.302585093	1.906170569	-5.695582189	1.098612289
Poc48	4.753590191	0.405465108	2.302585093	1.968904871	-5.602999118	1.098612289
Poc49	4.644390899	0.405465108	2.279935868	2.002563651	-4.320310844	1.098612289
Poc50	4.574710979	0.182321557	2.302585093	2.031288042	-6.201820213	1.098612289
Poc51	4.430816799	0.182321557	2.087117219	2.123252686	-5.902219999	1.098612289
Poc52	4.521788577	0.182321557	2.302585093	2.190243103	-4.722793359	1.098612289
Poc53	4.700480366	0.336472237	0.752460929	2.356498149	-4.472096648	1.098612289
Poc54	4.33073334	0.182321557	0.960986988	2.013848845	-5.571221177	1.098612289
Poc55	4.406719247	0.262364264	1.867953821	1.987685973	-4.813333996	1.098612289
Poc56	4.406719247	0.182321557	1.907982207	2.037894631	-5.240839337	1.098612289
Poc57	4.356708827	0.182321557	1.459018744	2.261928429	-6.057523156	0.96990582
Poc58	4.304065093	0.182321557	2.302585093	1.896429286	-5.909199081	1.098612289
Poc59	4.290459441	0.182321557	2.27039586	1.839651521	-5.044118657	1.098612289
Poc60	4.356708827	0.182321557	2.295778207	1.938487675	-4.029544388	1.098612289
Poc61	4.33073334	0.182321557	1.219394192	2.110559931	-5.191261888	0.631357816
Poc62	4.49980967	0.182321557	2.302585093	2.08456192	-5.312043135	1.098612289
Poc63	4.262679877	0.182321557	2.302585093	2.312413271	-5.081452686	1.098612289
Poc64	4.49980967	0.182321557	2.302585093	2.401714113	-3.968113578	1.098612289
Poc65	4.33073334	0.182321557	2.299067963	2.062128481	-2.472707562	1.098612289
Poc66	4.465908119	0.262364264	2.302585093	2.29458648	-3.417876915	1.098612289
Poc67	4.33073334	0.182321557	2.302585093	2.327385814	-1.708990935	0.693147181
Poc68	4.465908119	0.405465108	1.410970783	1.965617786	-3.580286967	1.098612289
Poc69	4.454347296	0.262364264	0.703468517	2.407434146	-3.882410807	1.098612289
Poc70	4.382026635	0.262364264	2.302585093	2.013844994	-3.201116706	1.098612289
Poc71	4.510859507	0.405465108	2.302585093	2.062711751	-3.066869156	1.098612289
Poc72	4.442651256	0.336472237	2.302585093	2.476440592	-4.688914904	1.098612289
Poc73	4.430816799	0.262364264	2.302585093	2.250249643	-3.873714246	1.098612289
Poc74	4.356708827	0.262364264	1.922614642	2.223287309	-4.593604329	1.098612289
Poc75	4.369447852	0.262364264	2.302585093	2.62781885	-3.747991021	1.098612289
Poc76	4.454347296	0.182321557	2.302585093	2.135045345	-2.639365817	1.098612289
Poc77	4.356708827	0.262364264	2.302585093	2.377062369	-2.692846811	0.12466265

Poc78	4.418840608	0.182321557	2.297102197	2.471033607	-2.373558245	1.098612289
Poc79	4.48863637	0.182321557	2.302585093	2.482014348	-2.41750381	0.942601792
Poc80	4.317488114	0.182321557	2.302585093	2.398799727	-4.243178501	1.098612289
Poc81	4.356708827	0.182321557	2.100439386	2.367460473	-3.315942772	0.741533039
Poc82	4.59511985	0.262364264	2.302585093	1.811139847	-4.356677067	1.098612289
Poc83	4.369447852	0.182321557	2.302585093	2.190243153	-3.98593815	0.641555242
Poc84	4.317488114	0.182321557	2.280358667	2.185133572	-4.506538257	1.098612289
Poc85	4.454347296	0.262364264	2.302585093	2.147331835	-4.052976157	1.098612289
SWC01	4.736198448	0.182321557	1.748064421	2.407522593	-2.582344103	0.991493985
SWC02	4.787491743	0.405465108	2.282215108	2.36874569	-5.369282897	0.835834362
SWC07	4.65396035	0.182321557	1.886014618	2.388463483	-3.947088683	1.098612289
SWC08	4.753590191	0.182321557	2.302585093	2.403209135	-3.556617217	0.693147181
SWC09	4.727387819	0.182321557	2.302585093	2.156012577	-1.906502059	1.098612289
SWC10	4.543294782	0.182321557	2.302585093	2.552221735	-4.23159555	1.098612289
SWC11	4.543294782	0.182321557	2.302585093	2.354581451	-4.725900435	1.098612289
SWC12	4.543294782	0.182321557	2.294561293	2.656952775	-3.134499521	0.534631018
SWC13	4.605170186	0.182321557	2.194898193	2.572882382	-4.880847274	1.03343812
SWC14	4.691347882	0.182321557	2.085318067	2.550503428	-3.284673538	-0.990316515
SWC15	4.718498871	0.182321557	1.694451765	2.138478101	-4.213092288	1.098612289
SWC17	4.343805422	0.262364264	2.302585093	2.264675943	-4.604710292	1.098612289
SWC18	4.605170186	0.182321557	2.302585093	2.373618131	-3.415536903	1.098612289
SWC19	4.736198448	0.182321557	2.302585093	2.170493746	-4.465766569	1.098612289
SWC20	4.584967479	0.182321557	2.302585093	2.028203446	-3.33539363	1.098612289
SWC28	4.33073334	0.336472237	2.23126787	2.603933633	-3.613337568	1.098612289
SWC29	4.584967479	0.182321557	2.296336017	2.260404024	-2.759030808	1.098612289
SWC30	4.700480366	0.182321557	2.302585093	2.302238086	-2.50272966	1.098612289
SWC31	4.532599493	0.182321557	2.273720769	2.29887424	-2.258508975	1.098612289
SWC32	4.59511985	0.182321557	1.836100808	2.217324412	-3.765570452	1.098612289
SWC33	4.510859507	0.182321557	1.346371163	1.828962443	-3.703328947	1.098612289
SWC34	4.605170186	0.182321557	1.129104164	2.069384009	-3.335741719	1.098612289
SWC35	4.48863637	0.182321557	2.302585093	2.493790286	-4.324353376	0.808931224
SWCBF01	4.543294782	0.336472237	2.302585093	2.251385856	-3.535588916	1.098612289
SWCINR01	4.672828834	0.182321557	2.126705981	2.08043442	-2.672279133	0.882767784
SWCINR02	4.532599493	0.182321557	2.210896449	2.453416251	-3.04097151	1.098612289
SWCL01	4.584967479	0.262364264	2.302585093	1.921751351	-4.860031468	1.098612289
SWCL02	4.672828834	0.09531018	2.302585093	2.08499614	-7.194517774	1.098612289
SWCL03	4.624972813	0.262364264	2.302585093	2.066328692	-5.025223182	1.098612289
SWCL04	4.564348191	0.182321557	2.302585093	2.074218425	-4.995363504	0.98944549
SWCL05	4.672828834	0.336472237	2.302585093	2.068888364	-3.690251595	1.098612289
SWCL06	4.418840608	0.262364264	1.751629433	2.267405558	-3.910576552	1.098612289
UPBROD01	4.574710979	0.048790164	2.302585093	1.994537579	-6.652283947	1.098612289
UPBROD02	4.615120517	0.182321557	1.775924722	1.993340341	-5.387804533	1.098612289
UPBROD03	4.59511985	0.048790164	1.829981958	2.233579006	-5.094818311	1.098612289

UPBROD47	4.564348191	0.048790164	1.655725685	2.228280205	-3.634306803	1.098612289
UPBROD48	4.564348191	0.262364264	1.23525245	2.443293959	-2.950581868	0.270588132
UPBROD49	4.663439094	0.405465108	1.191639267	2.379204502	-3.221758225	1.098612289
UPBROD50	4.510859507	0.048790164	2.302585093	2.150317719	-4.394032821	1.098612289
UPBROD51	4.700480366	0.048790164	2.084800989	2.084290268	-4.449649588	1.098612289
UPBROD52	4.543294782	0.048790164	2.302585093	2.052332059	-3.055599695	1.098612289
UPBROD53	4.418840608	0.048790164	2.302585093	2.109507695	-4.593035115	1.098612289
UPBROD54	4.682131227	0.336472237	2.302585093	2.150683715	-5.376542727	1.098612289
UPBROD55	4.521788577	0.262364264	2.302585093	2.289146717	-4.657373368	1.098612289

Appendix E: Data for verification of prediction with model 2 (50 waypoints, blue color in Appendix D)

ID	Bank_Stab_Index Measured Value	Bank_Stab_Index Ln Y (measured)	Stream sinuosity Ln X1	Terrain Stability Index Ln X2	Topographic Index Ln X3	Stream slope Ln X4	Terrain Saturation Index Ln X5	Bank_Stab_Index Ln Y (predicted)	Bank_Stab_Index Predicted value	Error %	
CRN03	107	4.672828834	0.405465108	1.76752694	2.086894796	-2.978822847	1.090940106	4.449222006	85.56035267	20.03705358	
CRN04	103	4.634728988	0.336472237	2.302585093	2.32973572	-3.895054292	1.098612289	4.816137695	123.4872232	-19.89050794	
DH25	98	4.584967479	0.336472237	2.302585093	2.318470912	-4.272179718	1.098612289	4.79553436	120.9690055	-23.43776068	
DH26	128	4.852030264	0.470003629	2.052232044	1.996186408	-3.294685359	0.261612105	4.226492168	68.47660595	46.5026516	
DH30	108	4.682131227	0.470003629	0.663767004	2.01226027	-1.881453613	0.746642814	4.332041082	76.09945342	29.53754313	
DH35	79	4.369447852	0.405465108	1.984646797	2.191939892	-3.36780632	1.098612289	4.64255402	103.80914	-31.40397464	
DH37	83	4.418840608	0.336472237	2.302585093	2.360366105	-4.573816878	1.098612289	4.872160668	130.6028015	-57.35277295	
DH38	92	4.521788577	0.405465108	2.302585093	2.30477795	-4.46779108	1.098612289	4.848934828	127.6043968	-38.70043126	
FHR13	93	4.532599493	0.405465108	2.301167692	2.236217201	-3.871897413	1.098612289	4.723537219	112.5657189	-21.03840737	
MCMB160	82	4.406719247	0.405465108	2.302585093	2.079622128	-4.697251484	0.798728841	4.390043128	80.64389691	1.653784261	
MCMB161	94	4.543294782	0.405465108	2.271993817	2.16696663	-4.498049121	1.098612289	4.596877321	99.17414257	-5.504406984	
MCMB167	86	4.454347296	0.405465108	2.302585093	2.190243103	-5.478145235	1.098612289	4.639450593	103.4874753	-20.33427357	
MCMB171	85	4.442651256	0.405465108	1.45384231	1.974730677	-2.162625605	-0.682075736	3.965710346	52.75773235	37.93207959	
MCMB197	52	3.951243719	0.405465108	2.302585093	2.167213433	-4.264511013	0.851179844	4.558482433	95.4385355	-83.53564518	
Msh012	95	4.189654742	0.405465108	2.302585093	2.400419539	-5.683118454	1.098612289	5.023863294	151.9973815	-59.99724365	
PACRL52	97	4.574710979	0.336472237	2.302585093	2.407710195	-4.189453802	1.098612289	4.958753009	142.4160935	-46.82071495	
PACRL55	106	4.663439094	0.405465108	2.302585093	2.432845253	-4.540553543	1.098612289	5.083169926	161.2845064	-52.1551947	
PACRL62	101	4.615120517	0.336472237	2.302585093	2.485276607	-5.289284288	1.098612289	5.100621977	164.1239569	-62.4989672	
PACRL64	115	4.744932128	0.336472237	2.302585093	2.43330492	-4.615870228	1.098612289	5.005565761	149.2414943	-29.77521246	
PACRU01	134	4.8978398	0.336472237	2.302585093	2.278843078	-5.501959807	1.098612289	4.723055051	112.5114564	16.03622654	
PACRU03	81	4.394449155	0.336472237	2.302585093	2.442883769	-3.877107701	1.098612289	5.023085475	151.8792011	-87.50518655	
PACRU14	86	4.454347296	0.336472237	2.302585093	2.275717317	-5.681620867	1.098612289	4.717338036	111.8700618	-30.08146725	
PACRU16	91	4.510859507	0.405465108	2.263376724	2.190251639	-3.516309961	1.098612289	4.639466206	103.489091	-13.72427579	
PATA01	113	4.727387819	0.470003629	2.253789012	2.049046759	-3.520177221	1.098612289	4.454582777	86.02025376	23.87588163	
PATA04	110	4.700480366	0.405465108	1.57413509	2.16797094	-2.811498879	-1.368342269	4.21140294	67.45110332	38.68081516	
PATA07	106	4.663439094	0.405465108	1.695347721	2.217717011	-2.937877791	1.098612289	4.689700371	108.8205691	-2.660914263	
PATA08	101	4.615120517	0.470003629	2.302585093	2.294799969	-2.797625954	1.098612289	4.9040654	134.8368326	-33.50181443	
PAYA07	92	4.521788577	0.405465108	1.833591772	2.137231195	-3.068124273	0.480625208	4.445467841	85.23974712	7.348100959	
PAYA08	90	4.49980967	0.470003629	1.921077207	2.099248007	-3.144443673	1.098612289	4.546400861	94.29242531	-4.769361454	
PAYA09	84	4.430816799	0.405465108	1.816549632	2.298974456	-3.052420727	1.098612289	4.838320238	126.25270917	-50.3060615	
PAYA10	87	4.465908119	0.336472237	2.302585093	2.467904936	-4.540553543	1.098612289	5.068849191	158.9912534	-82.74856715	
PAYA11	88	4.477336814	0.405465108	1.754175587	2.084496095	-2.98542854	1.098612289	4.446039314	85.28847332	3.081280317	
PAYA12	101	4.615120517	0.470003629	1.290419076	2.306034775	-2.529842344	1.098612289	4.924613859	137.6361844	-36.27344994	
Poc17	124	4.820281566	0.405465108	2.076526624	2.136221533	-3.960577422	0.94675578	4.516803669	91.54252964	26.17537932	
Poc26	84	4.430816799	0.405465108	2.095852041	2.094971433	-5.076477064	1.098612289	4.465198707	86.9383031	-3.497979878	
Poc36	82	4.406719247	0.405465108	2.302585093	2.035586331	-7.968696131	1.098612289	4.356583356	77.99021388	4.889983073	
POC41	89	4.48863637	0.405465108	2.302585093	2.415652744	-5.380953601	1.098612289	5.051724826	156.2918084	-75.60877346	
Poc47	91	4.510859507	0.405465108	2.302585093	1.906170569	-5.695582189	1.098612289	4.119881927	61.55197421	32.3604679	
Poc48	116	4.753590191	0.405465108	2.302585093	1.968904871	-5.602999118	1.098612289	4.234622966	69.03564504	40.48651289	
Poc49	104	4.644390899	0.405465108	2.279935868	2.002563651	-4.320310844	1.098612289	4.296184874	73.4191554	29.40465827	
Poc68	87	4.465908119	0.405465108	1.410970783	1.965617786	-3.580286967	1.098612289	4.228610888	68.62184248	21.12431899	
Poc71	91	4.510859507	0.405465108	2.302585093	2.062711751	-3.066869156	1.098612289	4.40619575	81.95708443	9.937269862	
Poc72	85	4.442651256	0.336472237	2.302585093	2.476440592	-4.688914904	1.098612289	5.084460905	161.4928558	-89.99159504	
SWC02	120	4.787491743	0.405465108	2.282215108	2.36874569	-5.369282897	0.835834362	4.92467569	137.6446948	-14.70391236	
SWCBF01	94	4.543294782	0.336472237	2.302585093	2.251385856	-3.535588916	1.098612289	4.672835794	107.0007446	-13.83057938	
UPBROD07	99	4.59511985	0.405465108	2.302585093	1.974676404	-7.036475407	1.098612289	4.245179101	69.76825457	29.52701559	
UPBROD16	102	4.624972813	0.405465108	2.302585093	2.230844695	-3.185584918	1.098612289	4.713710905	111.4650295	-9.279440658	
UPBROD27	90	4.49980967	0.405465108	2.302585093	2.251430223	-4.661140717	0.717343036	4.691502562	109.0168614	-21.12984598	
UPBROD32	113	4.727387819	0.405465108	2.302585093	2.398802152	-5.479072151	0.700518312	4.95840434	142.3664461	-25.98800536	
UPBROD49	106	4.663439094	0.405465108	1.191639267	2.379204502	-3.221758225	1.098612289	4.985060991	146.2124924	-37.93631357	
								Maximum error	46.5026516	Average	-16.0699814
								Minimum error	-89.99159504	Accuracy	83.9300186

Appendix F - Bank Stability Field Instrument							
Date:			Weather:				
Location name:							
River:			Segment				
Readings	Lati.	Logi.	Elev:		±		
BANK STABILITY ASSESSMENT (Henshaw and Booth, 2000)							
STABLE / SLIGHTLY UNSTABLE / MODERATELY UNSTABLE							
COMPLETELY UNSTABLE / ARMORED BANKS							
Pfanckuch-Rosgen Channel Stability Evaluation							
Category:	Excellent	Good	Fair	Poor			

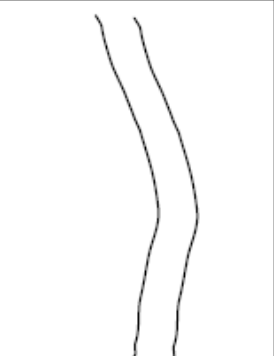
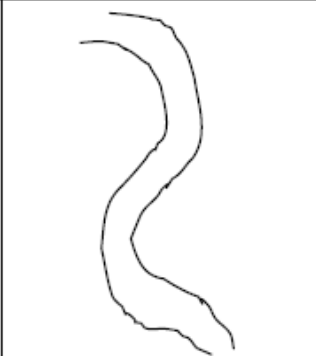
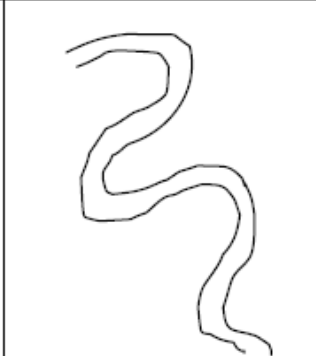
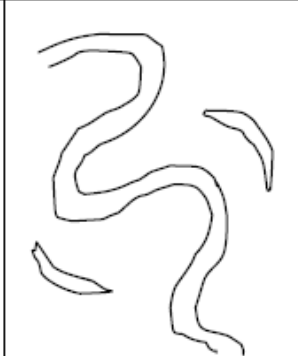
Observers:

Comments:

Table 2.2 Sediment size classes.

Size Class	Millimeters	Inches	Relative Size
1-Bedrock	> 4096	> 160	Bigger than a Volkswagen Bug
2-Boulder	256 – 4096	10.1 - 160	Basketball to Volkswagen Bug
3-Cobble	64 – 256	2.5 - 10.1	Tennis ball to basketball
4-Coarse Gravel	16 – 64	0.63 – 2.5	Marble to tennis ball
4-Fine Gravel	2-16	0.08 – 0.63	Pepper corn to marble
5-Sand or Smaller	< 2.00	< 0.08	Smaller than a pepper corn

Menu

Low (< 1.2)	Moderate (1.2-1.5)	High (> 1.5)	Oxbows (>1.5)
			

Appendix G. BWA Invasive Plant Inventory Data Sheet

Recorder: _____ Bank: L R Date: _____ Quad Map Number: _____ GPS used to track route? Y N

Point #: _____	Point #: _____	Point #: _____	Point #: _____	Point #: _____	Point #: _____	Point #: _____
GPS Pt # : _____	GPS Pt # : _____	GPS Pt # : _____	GPS Pt # : _____	GPS Pt # : _____	GPS Pt # : _____	GPS Pt # : _____
Lat _____	Lat _____	Lat _____	Lat _____	Lat _____	Lat _____	Lat _____
Log. _____	Log. _____	Log. _____	Log. _____	Log. _____	Log. _____	Log. _____
Elev _____ ±	Elev _____ ±	Elev _____ ±	Elev _____ ±	Elev _____ ±	Elev _____ ±	Elev _____ ±

Closed canopy	0	Closed canopy	0	Closed canopy	0	Closed canopy	0	Closed canopy	0	Closed canopy	0	Closed canopy	0
Open canopy	0	Open canopy	0	Open canopy	0	Open canopy	0	Open canopy	0	Open canopy	0	Open canopy	0
Shrubland	0	Shrubland	0	Shrubland	0	Shrubland	0	Shrubland	0	Shrubland	0	Shrubland	0
Open grassland	0	Open grassland	0	Open grassland	0	Open grassland	0	Open grassland	0	Open grassland	0	Open grassland	0
Bare ground	0	Bare ground	0	Bare ground	0	Bare ground	0	Bare ground	0	Bare ground	0	Bare ground	0
moist	0	moist	0	moist	0	moist	0	moist	0	moist	0	moist	0
dry	0	dry	0	dry	0	dry	0	dry	0	dry	0	dry	0
wet	0	wet	0	wet	0	wet	0	wet	0	wet	0	wet	0
	veg frt flw dns*		veg frt flw dns*		veg frt flw dns*		veg frt flw dns*		veg frt flw dns*		veg frt flw dns*		veg frt flw dns*
Phragmites	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Garlic Mus	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Barberry	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Knotweed	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Stiltgrass	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Multi Rose	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Lsestrife	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Knapweed	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
No Hits - <input type="checkbox"/>	No Hits - <input type="checkbox"/>	No Hits - <input type="checkbox"/>	No Hits - <input type="checkbox"/>	No Hits - <input type="checkbox"/>	No Hits - <input type="checkbox"/>	No Hits - <input type="checkbox"/>	No Hits - <input type="checkbox"/>	No Hits - <input type="checkbox"/>	No Hits - <input type="checkbox"/>	No Hits - <input type="checkbox"/>	No Hits - <input type="checkbox"/>	No Hits - <input type="checkbox"/>	
Specimen? - <input type="checkbox"/>	Specimen? - <input type="checkbox"/>	Specimen? - <input type="checkbox"/>	Specimen? - <input type="checkbox"/>	Specimen? - <input type="checkbox"/>	Specimen? - <input type="checkbox"/>	Specimen? - <input type="checkbox"/>	Specimen? - <input type="checkbox"/>	Specimen? - <input type="checkbox"/>	Specimen? - <input type="checkbox"/>	Specimen? - <input type="checkbox"/>	Specimen? - <input type="checkbox"/>	Specimen? - <input type="checkbox"/>	
Comments:	Comments:	Comments:	Comments:	Comments:	Comments:	Comments:	Comments:	Comments:	Comments:	Comments:	Comments:	Comments:	

* Dns: Density

1= single or a few plants (rare)
2= scattered plants or patches, easily counted

3=patch, moderate #'s
4= dense or continuous