YUKON PLACER SECRETARIAT

Fish Habitat Management System for Yukon Placer Mining

Aquatic Health Monitoring Report (2009)

Prepared by

The Yukon Placer
Aquatic Health Working Group

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AQUATIC HEALTH MONITORING REPORT (2009)

The Fish Habitat Management System for Yukon Placer Mining replaced the Yukon Placer Authorization (YPA) in 15 Yukon watersheds on April 11, 2008. Founded on principles of adaptive management and incorporating a risk-based approach to decision-making, the system is intended to balance the objectives of a sustainable Yukon placer mining industry with the conservation and protection of fish and fish habitat supporting fisheries.

Adaptive management recognizes that the effectiveness of any management system is hampered by a degree of uncertainty and lack of knowledge. It seeks to improve the system by monitoring the effects of management actions, in order to learn from the results. The Adaptive Management Framework for Yukon placer mining is complemented by traditional knowledge and monitoring of water quality objectives, aquatic health, and economic health. Monitoring results should provide new information and a rational basis for making any adjustments required to achieve the two management objectives.

The aquatic health monitoring program is governed by the Aquatic Health Monitoring Protocol. The Protocol describes the locations, timing, frequency and methods employed during sampling, as well as the methods used to analyze sampling data. The Reference Condition Approach (RCA) is the method chosen for assessing the health of freshwater ecosystems in the Yukon. One RCA model was developed for bioassessment based upon benthic macroinvertebrates, and a second model was developed to assess the diversity of fish species.

The RCA model for invertebrates was revised in 2009 to include additional reference sites. It relies upon 224 sites collected over the period 2004 to 2009 by the University of Western Ontario, Fisheries and Oceans Canada, and the Yukon government, using the same standard protocol. The invertebrate data set was analyzed at the family level. The new model has five groups to which reference sites and test sites may belong, whereas the previous version had four. In some cases, sites sampled this year had been previously sampled and analyzed using an earlier version of the model. In order to properly compare sites and assess change, both samples must be processed using the latest version of the model.

There are two fundamental steps in the process of developing the predictive model. The first is to classify the reference sites based on their biological characteristics. This requires defining a number of community types based on the taxonomic composition of benthic macoinvertebrates. The second step is to determine a subset of habitat attributes that are associated with those community types. Following this step the number and type of organisms expected to occur at any given site can be determined from habitat attributes.

The first step resulted in five community groups being defined for reference sites in the Yukon River basin. There are 50 sites in Group 1, 56 sites in Group 2, 22 sites in Group 3, 83 sites in Group 4 and 13 sites in Group 5.

The following is a summary of the general characteristics of each group:

Group 1: These sites have an intermediate numerical abundance of organisms (200 organisms per sample) and high taxonomic richness (high number of different invertebrate families). Chironomids are the dominant family and mayflies (Baetidae) and stoneflies (Nemouridae) are the other major families. These sites are generally found in eastern Yukon at lower elevations (2000m). They tend to have catchments that have less alpine and more forested land cover. These sites tend to have substrate that is highly embedded and stream channels that are narrower and deeper.

Group 2: These sites have an intermediate abundance of organisms (300 organisms per sample) and high taxonomic richness. The community is dominated by mayflies (Baetidae and Heptageniidae) which represent more than 40% of the community. Chironomids, stoneflies (Nemouridas), and black flies (Simuliidae) are the other major families present. These sites are generally found in southwestern Yukon at higher elevations (2300m) with milder winter temperatures. These sites tend to have substrate that is lightly embedded (less than 25%) and stream channels that are relatively wide and shallow.

Group 3: These sites have a very low abundance of organisms (<50 organisms per sample) and low taxonomic richness. Chironomids are by far the most abundant family. These sites are generally found in northwestern Yukon at lower elevations (1900m). These sites tend to have stream channels that are narrower and deeper.

Group 4: These sites have a high abundance of organisms (2000 organisms per sample). Chironomids are again the most common family, but mayflies, stoneflies, and black flies are also common. These sites are generally found in northwestern Yukon at high altitudes (2250m). These sites tend to have stream channels that are relatively wide and shallow. The catchments above these sites tend to have a high density of streams.

Group 5: These sites have by far the highest abundance of organisms (12,000 organisms per sample). Chironomids are again the most common family, yet Baetid mayflies and black flies are also common. These sites are generally found in northwestern Yukon at high altitudes (2600m), They tend to have catchments with more alpine and less forested land cover. Being at high elevations they have coolest summer and winter temperatures, the most summer snowfall, and the least amount of January precipitation. These sites tend to have stream channels that are relatively wide and shallow.

Data from the same 224 reference sites was used to revise the RCA model for fish. The fish bioassessment is of interest, yet it should be noted that far more weight is assigned to the results of the invertebrate assessment. Fish may be present or absent during any short-term sampling event, while invertebrates have comparatively limited mobility and range during their aquatic stage. For this reason the presence or absence of invertebrates is a much more reliable indicator of aquatic health. Results from the fish bioassessment will not be included in adaptive management report, but are available upon request.

Forty sites were sampled under the aquatic health monitoring program in 2009. Twenty-five were sampled as potential reference sites and 15 were test sites. The new reference sites were chosen to improve the distribution of reference sites across the Yukon.

Of the test sites sampled in 2009, thirteen were new and two were re-assessments of sites that were sampled in previous years. The following table summarizes the test site results. Only results that differ from the mean of the group by at least one standard deviation have been considered in the analysis. More detailed information is found in the individual test site assessments, which are appended to this report.

REFERENCE CONDITION APPROACH (RCA) RESULTS FOR TEST SITES

Site Code (year of sampling, if not 2009)	**Group** (probability of belonging to group)	**Watershed**	**Watercourse**	**Site Condition** (based on RCA model results for Benthic macroinvertebrates)	**Likely reasons for Benthic macroinvertebrate Results**
YPS-090 July 10, 2006	Group 1 (44.2)	Indian River	Indian River at Water Resources Station	unstressed	The total number of families with a high probability of occurrence were observed in numbers that fall within the mean of Group 4 reference sites.
YPS-090.2	Group 1 (44.2%)	Indian River	Indian River	severely stressed	Four families were present that were not expected to be present, one sensitive taxon was absent that was expected to be present, and several taxa were significantly more abundant than expected.
YPS-153 July 10 2006	Group 3 (43.3%)	Yukon River North	Henderson Creek	potentially stressed	There were two taxa with greater than 50% probability of occurrence which were absent, including *Chironomidae* which has a 96% probability of occurrence. Relative abundance was higher than the group means for three taxa. There was one taxa present that does not occur in the group.
YPS-153.2	Group 3 (43.3%)	Yukon River North	Henderson Creek	unstressed	The total number of families and families with a high probability of occurrence were observed in numbers that fall within the mean of Group 4 reference sites.
YPS-375	Group 4 (91.5%)	Fortymile River	Maiden Creek	potentially stressed	Three families with a probability of occurrence greater than 50% were absent and four families were more abundant than expected.
YPS-379	Group 4 (37.3%)	Fortymile River	Bruin Creek	unstressed	The total number of families with a high probability of occurrence were observed in numbers that fall within the mean of Group 4 reference sites.

Site Code (year of sampling, if not 2009)	Group (probability of belonging to group)	Watershed	Watercourse	Site Condition (based on RCA model results for Benthic macroinvertebrates)	Likely reasons for Benthic macroinvertebrate Results
YPS-387	Group 4 (95.6%)	McQuesten River	Haggart Creek (Dublin Gulch)	potentially stressed	One family was present that was not expected to be present, Two families were less abundant than expected and one was far more abundant than expected.
YPS-388	Group 4 (94.4%)	McQuesten River	Moderate -moderate section of Haggart Creek	potentially stressed	Two families that were expected to be present were absent, a family that was not expected to be present was found, and three families were more abundant than expected.
YPS-389	Group 4 (94.7%)	McQuesten River	Seattle Creek	potentially stressed	Two families that were expected to be present were absent, a family that was not expected to be present was found, and one family was far more abundant than expected.
YPS-390	Group 4 (90.4%)	McQuesten River	South McQuesten River	potentially stressed	Five families were less abundant than expected and several families that were not expected to be present were observed, some in high numbers.
YPS-404	Group 4 (79.7%)	Nisutlin River	Sidney Creek	potentially stressed	Some families were found in numbers that exceed the mean of Group 4 reference sites, and some were found in numbers below the group mean. Two families that had a 49% and 55% probability of occurrence were not present during sampling.
YPS-407	Group 5 (98.2%)	Nisutlin River	Evelyn Creek	potentially stressed	Three families with the highest probability of being present had numbers lower then the mean of Group 5 reference sites. Four families that had a 31-38% probability of occurrence were not present.
YPS-411	Group 4 (91.6%)	Big Creek	Mechanic Creek	unstressed	All families with a high probability of occurrence were observed in numbers that fall within the mean of Group 4 reference sites.
YPS-412	Group 4 (81.9%)	Big Creek	Big Creek	unstressed	The total number of families with a high probability of occurrence were observed in numbers that fall within the mean of Group 4 reference sites.

Site Code (year of sampling, if not 2009)	Group (probability of belonging to group)	Watershed	Watercourse	Site Condition (based on RCA model results for Benthic macroinvertebrates)	Likely reasons for Benthic macroinvertebrate Results
YPS-413	Group 4 (82.9%)	Big Creek	Magman Ceek	unstressed	The total number of families with a high probability of occurrence were observed in numbers that fall within the mean of Group 4 reference sites.
YPS-414	Group 4 (80%)	Big Creek	Seymour Creek	unstressed	The total number of families with a high probability of occurrence were observed in numbers that fall within the mean of Group 4 reference sites.
YPS-417	Group 4 (98.8%)	Pelly River	Grew Creek	unstressed	The total number of families with a high probability of occurrence were observed in numbers that fall within the mean of Group 4 reference sites.

Note: YPS-090.2 and YPS-153.2 are re-assessments of sites sampled in 2006.

Site Assessment Reports

Site Metadata

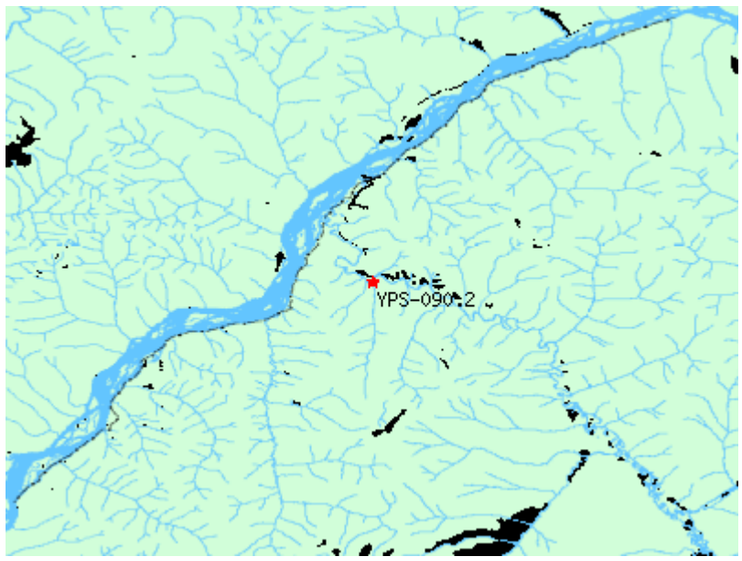
Site	YPS-090.2
Sample Date	July 29 2009
Latitude	N 63° 46' 2"
Longitude	W 139° 37' 45"
Altitude	1200
Feature Name	Indian River
Stream Order	6

Site Photograph

Up

Stream

Context Map



BEAST Prediction Results

Predictor Variables	Altitude,Landcover - Alpine,Landcover - Forest,Landcover - Unregen Forest,Landcover - Wetland,Longitude,Precip Rainfall JAN (mm),Precip Snowfall JUN (mm),Stream density (m stream/km2 catchment),Temp Max JAN (deg C)
Predicted Group Number	1

Group	**1**	**2**	**3**	**4**	**5**
Probability	44.2%	13.7%	38.0%	3.7%	0.4%

Habitat Attributes

Variable	Site	Reference Group Mean	Standard Deviation	Sample Size
Bedrock Geology - Metamorphic (%)	0	8.004	27.404	50
Bedrock Geology - Sedimentary (%)	89.65	66.587	45.756	50
Bedrock Geology - Sedimentary/Volcanic (%)	10.35	3.296	12.458	50
Bedrock Geology - Ultramafic (%)	0	0.282	1.466	50
Bedrock Geology - Unconsolidated (%)	0	13.433	33.661	50
Bedrock Geology - Volcanic (%)	0	4	19.795	50
Channel Depth - avg (cm)	19	40.925		50
Channel Depth - max (cm)	28		38.368	50
Drainage Area (km^2)	2213	114.927	213	50
General - Conductivity (uS/cm)	357	252.04	149.405	50
General - pH (pH)	8.1	7.552	0.841	50
Landcover - Alpine (%)	0.09	16.082	27.163	50
Landcover - Forest (%)	51.1	38.959	35.785	50
Landcover - Lake (%)	0.09	0.849	2.829	50
Landcover - Nonprod Forest (%)	5.55	26.423	29.167	50
Landcover - Unregen Forest (%)	19.59	5.879	12.171	50
Landcover - Wetland (%)	0.4	1.862	4.517	50
Perimeter - upstream drainage area (Km)	326.76	59.009	60.929	50
Precip Rainfall JAN (mm) (mm)	0	0.2	0.382	50
Precip Rainfall JUN (mm) (mm)	37	36.244	6.404	50
Precip Rainfall Total ANNUAL (mm) (mm)	184.3	183.194	29.197	50
Precip Snowfall JAN (mm) (mm)	19.8	20.708	5.462	50
Precip Snowfall JUN (mm) (mm)	0	0.286	0.457	50
Precip Snowfall Total ANNUAL (mm) (mm)	114.8	127.7	20.326	50
Precip Total ANNUAL (mm) (mm)	298.8	304.782	41.797	50
Precip Total JAN (mm) (mm)	19.8	19.446	5.427	50
Precip Total JUN (mm) (mm)	37.4	36.684	6.531	50
Stream density (m stream/km2 catchment) (m/km^2)	327	306.999	78.344	50
Stream length (m) in catchment (m)	723094	36698.5	74087.69	50
Substrate - dominant size category (Category(0-9))	7	4.94	1.942	50
Substrate - embeddedness category (Category(1-5))	3	3.66	1.118	50
Temp Max JAN (deg C) (Degrees Celsius)	-22.5	-20.26	3.969	50
Temp Max JUN (deg C) (Degrees Celsius)	20.5	18.956	1.461	50
Temp Mean JAN (deg C) (Degrees Celsius)	-27.9	-25.346	3.962	50
Temp Mean JUN (deg C) (Degrees Celsius)	20.5	11.934	1.133	50
Temp Min JAN(deg C) (Degrees Celsius)	-33.9	-30.954	4.102	50
Temp Min JUN (deg C) (Degrees Celsius)	5.4	4.812	0.952	50
Temperature - air (Degrees Celsius)	27			50
Velocity (Avg) (m/s)	0.52	0.38	0.251	50
Width - Wetted (m)	19.6	4.904	3.485	50

Bray-Curtis Analysis

Description	Value
Bray-Curtis Distance	0.81
Bray Curtis Reference Median	331.5

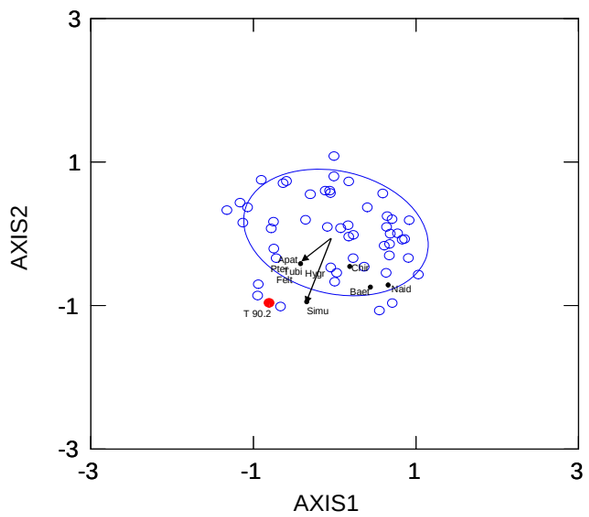
RIVPACS Analysis

Taxa	Probability Of Occurrence	2009 Total Abundance	Mean of Abundance for Reference Sites in Group 1	SD of Abundance for Reference Site in Group 1	Benthic Invertebrate Taxa Tolerance	
Chironomidae	0.97	891	139.8	60.373	6	Insensitive
Baetidae	0.63	9	20.06	29.551	4	Insensitive
Simuliidae	0.63	118	11.76	16.581	6	Insensitive
Nemouridae	0.59	-	13.2	24.083	2	Sensitive
Tipulidae	0.43	5	2.02	3.08	3	Insensitive
Heptageniidae	0.39	32	6.5	13.406	4	Insensitive
Sperchonidae	0.37	9	2.16	3.553	8	Tolerant
Naididae	0.36	-	7.22	12.425	10	Tolerant
Limnephilidae	0.35	14	2.36	4.525	4	Insensitive
Chloroperlidae	0.3	-	2.4	6.443	1	Sensitive
Ephemerellidae	0.27	41	2.34	7.372	1	Sensitive
Empididae	0.25	18	1.4	2.74	6	Insensitive
Ceratopogonidae	0.24	9	0.94	3.835	6	Insensitive

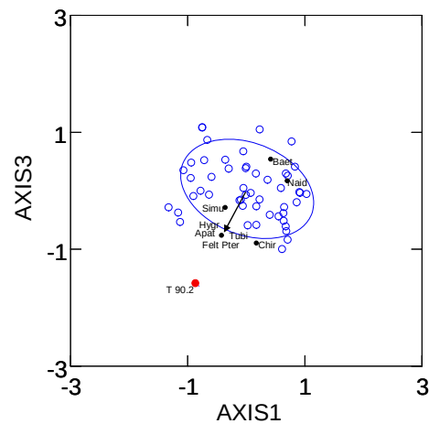
Lumbriculidae	0.26	86	2.92	6.639	8	Tolerant
Lebertiidae	0.19	9	0.58	2.417	8	Tolerant
Perlodidae	0.19	14	0.48	1.403	2	Sensitive
Ameletidae	0.21	5	0.7	1.515	0	Sensitive
Capniidae	0.19	-	2.96	7.538	1	Sensitive
Psychodidae	0.18	-	0.36	1.064	10	Tolerant
Rhyacophilidae	0.19	-	0.86	2.532	0	Sensitive
Dytiscidae	0.14	-	0.62	1.627	5	Insensitive
Pisidiidae	0.11	-	0.88	3.456	8	Tolerant
Brachycentridae	0.1	64	0.44	1.343	1	Sensitive

Site Assessment Graphs

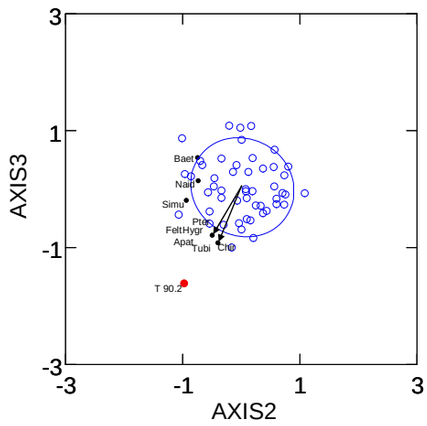
Gp 1



Gp 1



Gp 1



Site Assessment Vector Data

Assessment For The Test Site	
Vector 1 Vs Vector 2	Unstressed
Vector 1 Vs Vector 3	Severely Stressed
Vector 2 Vs Vector 3	Severely Stressed
Overall	Severely Stressed

Site Metrics

Metric Name	Test Site	Reference Group Mean	Standard Deviation	Sample Size
Total Abundance	1422.59	227.96	96.92	
Total No. of Taxa	21.0	9.78	4.117	50

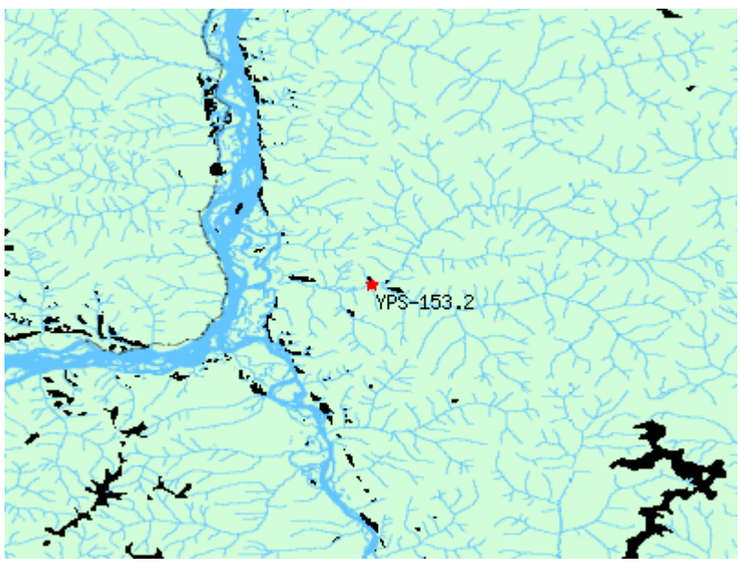
Site Metadata

Site	YPS-153.2
Sample Date	July 29 2009
Latitude	N 63° 22' 25"
Longitude	W 139° 20' 45"
Altitude	1301
Feature Name	Henderson Creek
Stream Order	5

Site Photograph

Up Stream

Context Map



BEAST Prediction Results

Predictor Variables	Altitude,Landcover - Alpine,Landcover - Forest,Landcover - Unregen Forest,Landcover - Wetland,Longitude,Precip Rainfall JAN (mm),Precip Snowfall JUN (mm),Stream density (m stream/km2 catchment),Temp Max JAN (deg C)
Predicted Group Number	3

Group	**1**	**2**	**3**	**4**	**5**
Probability	25.8%	18.1%	43.3%	10.9%	1.9%

Habitat Attributes

Variable	Site	Reference Group Mean	Standard Deviation	Sample Size
Bedrock Geology - Metamorphic (%)	0	18.182	39.477	22
Bedrock Geology - Sedimentary (%)	99.02	65.841	46.487	22
Bedrock Geology - Sedimentary/Volcanic (%)	0.08	2.341	6.662	22
Bedrock Geology - Unconsolidated (%)	0	4.901	18.987	22
Channel Depth - max (cm)	14	44.429	46.135	22
Drainage Area (km^2)	297	90.478	97.773	22
General - Conductivity (uS/cm)	194	308.395	191.122	22
General - pH (pH)	7.5	7.466	0.652	22
Landcover - Alpine (%)	16.97	20.196	33.232	22
Landcover - Forest (%)	0.79	29.136	35.311	22
Landcover - Lake (%)	0	0.804	2.782	22
Landcover - Nonprod Forest (%)	61.24	28.23	32.868	22
Landcover - Unregen Forest (%)	20.97	11.243	18.488	22
Landcover - Wetland (%)	0	4.57	13.452	22
Perimeter - upstream drainage area (Km)	97.98	53.873	33.301	22
Precip Rainfall JAN (mm) (mm)	0	0.241	0.467	22
Precip Rainfall JUN (mm) (mm)	37	36.614	4.796	22
Precip Rainfall Total ANNUAL (mm) (mm)	184.3	175.691	35.386	22
Precip Snowfall JAN (mm) (mm)	19.8	18.491	6.142	22
Precip Snowfall JUN (mm) (mm)	0	0.459	0.594	22
Precip Snowfall Total ANNUAL (mm) (mm)	114.8	124.618	19.724	22
Precip Total ANNUAL (mm) (mm)	298.8	294.614	47.351	22
Precip Total JAN (mm) (mm)	19.8	17.195	6.62	22
Precip Total JUN (mm) (mm)	37	37.25	4.719	22
Stream density (m stream/km2 catchment) (m/km^2)	295.6	284.354	70.483	22
Stream length (m) in catchment (m)	87928	27751.941	30857.245	22
Substrate - dominant size category (Category(0-9))	1	3.864	2.315	22
Substrate - embeddedness category (Category(1-5))	2	3.455	1.143	22
Temp Max JAN (deg C) (Degrees Celsius)	-22.5	-21.145	4.344	22
Temp Max JUN (deg C) (Degrees Celsius)	20.5	18.65	1.552	22
Temp Mean JAN (deg C) (Degrees Celsius)	-27.9	-26.191	4.132	22
Temp Mean JUN (deg C) (Degrees Celsius)	13	11.773	1.16	22
Temp Min JAN(deg C) (Degrees Celsius)	-33.9	-31.864	4.089	22
Temp Min JUN (deg C) (Degrees Celsius)	5.4	4.814	1.001	22
Velocity (Avg) (m/s)	0.45	0.35	0.231	22
Width - Wetted (m)	6.7	5.355	4.746	22

Bray-Curtis Analysis

Description	Value
Bray-Curtis Distance	0.36
Bray Curtis Reference Median	274.5

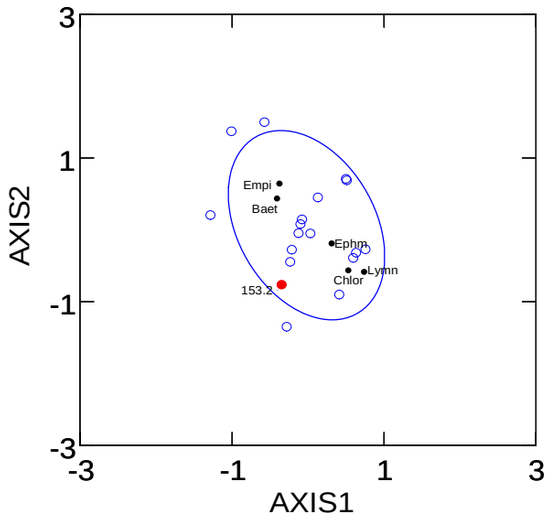
RIVPACS Analysis

Taxa	Probability Of Occurrence	2009 Total Abundance	Mean of Abundance for Reference Site in Group 3	SD of Abundance for Reference Sites in Group 3	Benthic Invertebrate Taxa Tolerance	
Chironomidae	0.96	42	14.286	11.892	6	Insensitive
Baetidae	0.63	68	2.864	7.649	4	Insensitive
Simuliidae	0.63	8	1.591	3.172	6	Insensitive
Nemouridae	0.59	8	1.227	2.562	2	Sensitive
Tipulidae	0.43	4	1.091	2.328	3	Insensitive
Heptageniidae	0.41	3	0.182	0.588	4	Insensitive
Sperchonidae	0.37	-	1.045	3.078	8	Tolerant
Naididae	0.34	-	2.591	6.17	10	Tolerant
Limnephilidae	0.33	-	0.591	1.709	4	Insensitive
Chloroperlidae	0.31	1	0.727	1.907	1	Sensitive
Ephemerellidae	0.29	1	0.727	1.579	1	Sensitive
Empididae	0.27	3	0	0	6	Insensitive
Ceratopogonidae	0.25	-	0.864	2.145	6	Insensitive
Lumbriculidae	0.25	-	1.682	4.156	8	Tolerant
Lebertiidae	0.23	-	0.227	0.528	8	Tolerant
Perlodidae	0.23	6	0.182	0.501	2	Sensitive
Ameletidae	0.21	-	0.045	0.213	0	Sensitive
Capniidae	0.21	-	0.182	0.664	1	Sensitive
Psychodidae	0.19	-	0.591	1.501	10	Tolerant
Rhyacophilidae	0.19	-	0.045	0.213	0	Sensitive

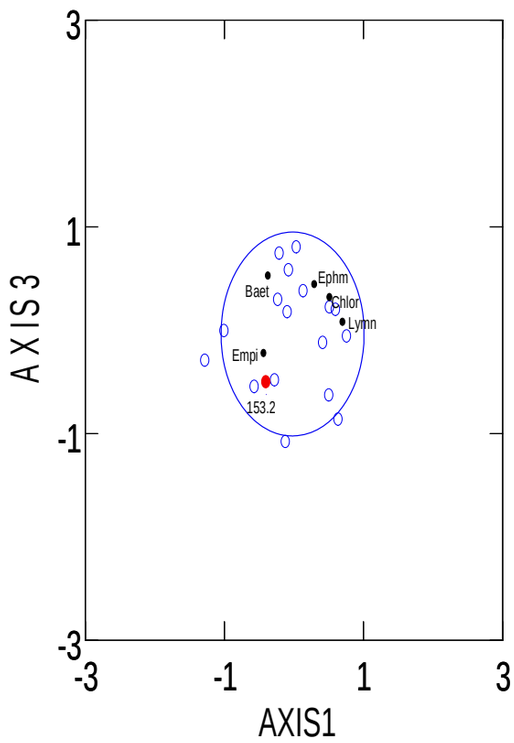
Dytiscidae	0.12	-	0.091	0.294	5	Insensitive
Pisidiidae	0.11	-	4	13.053	8	Tolerant
Brachycentridae	0.1	7	0.182	0.853	1	Sensitive
Leuctridae	0.1	-	0.091	0.294	0	Sensitive
Lymnaeidae	0.1	-	0.182	0.501	6	Insensitive

Site Assessment Graphs

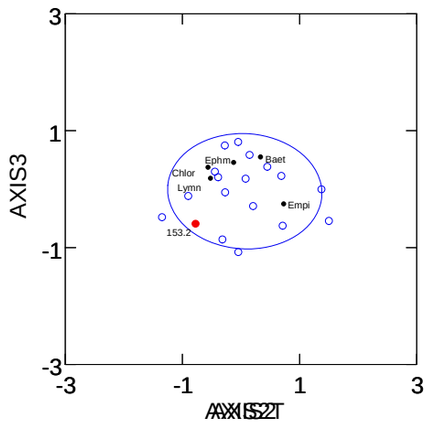
Gp 3



Gp 3



Gp 3



Site Assessment Vector Data

Assessment For The Test Site	
Vector 1 Vs Vector 2	Unstressed
Vector 1 Vs Vector 3	Unstressed
Vector 2 Vs Vector 3	Unstressed
Overall	Unstressed

Site Metrics

Metric Name	Test Site	Reference Group Mean	Standard Deviation	Sample Size
Total Abundance	152.0	44.227	43.526	
Total No. of Taxa	12.0	6.364	3.593	22

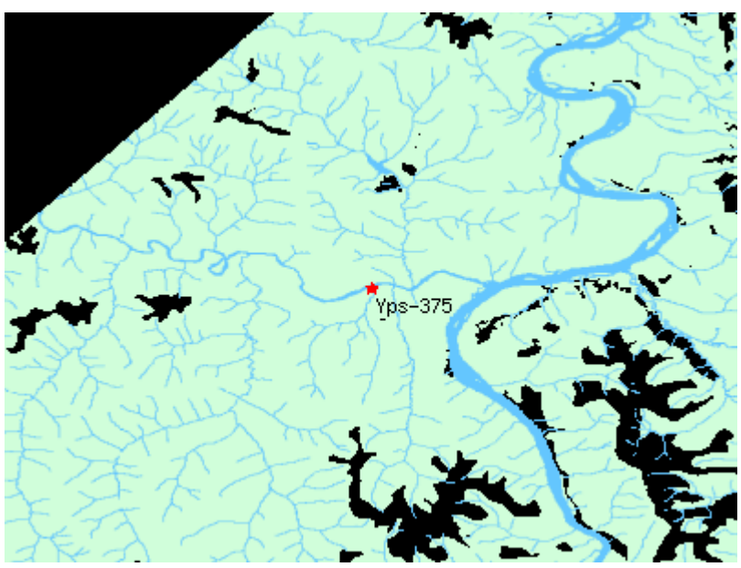
Site Metadata

Site	YPS-375
Sample Date	July 27 2009
Latitude	N 64° 23' 11"
Longitude	W 140° 38' 8"
Altitude	2982
Feature Name	Maiden Creek
Stream Order	3

Site Photograph

Up Stream

Context Map



BEAST Prediction Results

Predictor Variables	Altitude,Landcover - Alpine,Landcover - Forest,Landcover - Unregen Forest,Landcover - Wetland,Longitude,Precip Rainfall JAN (mm),Precip Snowfall JUN (mm),Stream density (m stream/km2 catchment),Temp Max JAN (deg C)
Predicted Group Number	4

Group	**1**	**2**	**3**	**4**	**5**
Probability	3.1%	0.9%	1.7%	91.5%	2.8%

Habitat Attributes

Variable	Site	Reference Group Mean	Standard Deviation	Sample Size
Bedrock Geology - Intrusive (%)	0	6.075	19.14	83
Bedrock Geology - Metamorphic (%)	94.45	12.5	28.727	83
Bedrock Geology - Sedimentary (%)	0.9	65.324	44.692	83
Bedrock Geology - Sedimentary/Volcanic (%)	0	3.054	10.333	83
Bedrock Geology - Ultramafic (%)	1.91	1.016	5.484	83
Bedrock Geology - Unconsolidated (%)	0	2.207	11.231	83
Bedrock Geology - Volcanic (%)	0.37	3.617	14.321	83
Channel Depth - max (cm)	13	31.984	28.413	83
Drainage Area (km^2)	40.91	131.838	230.495	83
General - Conductivity (uS/cm)	232	230.84	179.366	83
General - pH (pH)	6.3	7.662	0.59	83
Landcover - Alpine (%)	0	27.34	33	83
Landcover - Forest (%)	2.72	19.085	27.643	83
Landcover - Lake (%)	0	0.426	1.585	83
Landcover - Nonprod Forest (%)	97.28	29.604	32.428	83
Landcover - Unregen Forest (%)	0	1.71	6.039	83
Landcover - Wetland (%)	0	0.352	1.251	83
Perimeter - upstream drainage area (Km)	35.82	65.12	49.564	83
Precip Rainfall JAN (mm) (mm)	0.2	0.253	0.647	83
Precip Rainfall JUN (mm) (mm)	45.9	40.631	11.467	83
Precip Rainfall Total ANNUAL (mm) (mm)	209	197.402	64.931	83
Precip Snowfall JAN (mm) (mm)	21	18.955	9.044	83
Precip Snowfall JUN (mm) (mm)	0	0.778	1.143	83
Precip Snowfall Total ANNUAL (mm) (mm)	158.1	134.943	45.395	83
Precip Total ANNUAL (mm) (mm)	352.9	321.49	104.112	83
Precip Total JAN (mm) (mm)	19.3	17.705	8.964	83
Precip Total JUN (mm) (mm)	45.9	41.572	11.593	83
Stream density (m stream/km2 catchment) (m/km^2)	720.89	456.436	294.056	83
Stream length (m) in catchment (m)	29490.68	60684.256	110582.748	83
Substrate - dominant size category (Category(0-9))	5	4.723	2.171	83
Substrate - embeddedness category (Category(1-5))	4	3.831	0.881	83
Temp Max JAN (deg C) (Degrees Celsius)	-22.6	-21.486	3.258	83
Temp Max JUN (deg C) (Degrees Celsius)	21.2	18.137	2.769	83
Temp Mean JAN (deg C) (Degrees Celsius)	-27	-26.277	2.92	83
Temp Mean JUN (deg C) (Degrees Celsius)	14.6	11.572	2.238	83
Temp Min JAN(deg C) (Degrees Celsius)	-31.5	-31.694	2.875	83
Temp Min JUN (deg C) (Degrees Celsius)	7.9	5.118	1.669	83
Velocity (Avg) (m/s)	0.18	0.644	0.886	83
Width - Wetted (m)	3	6.78	5.88	83

Bray-Curtis Analysis

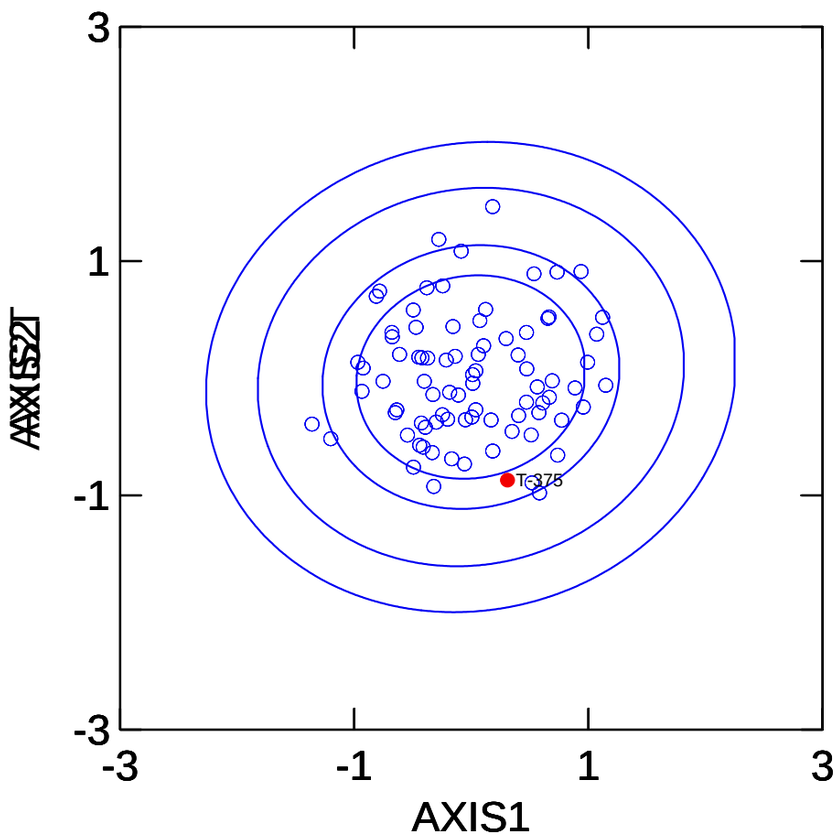
Description	Value
Bray-Curtis Distance	0.1
Bray Curtis Reference Median	2664.38

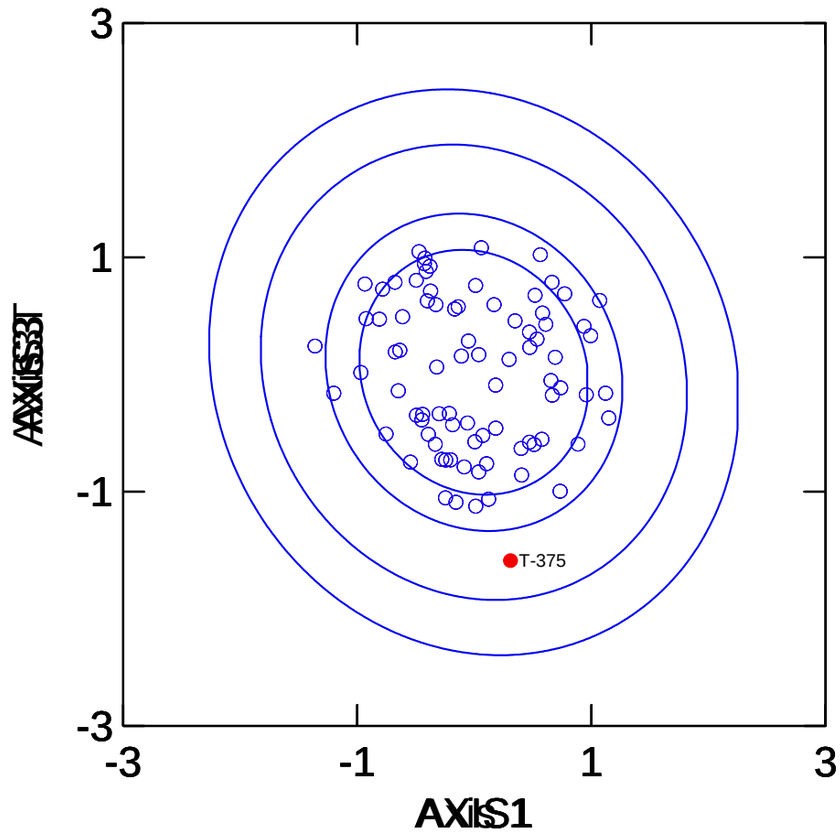
RIVPACS Analysis

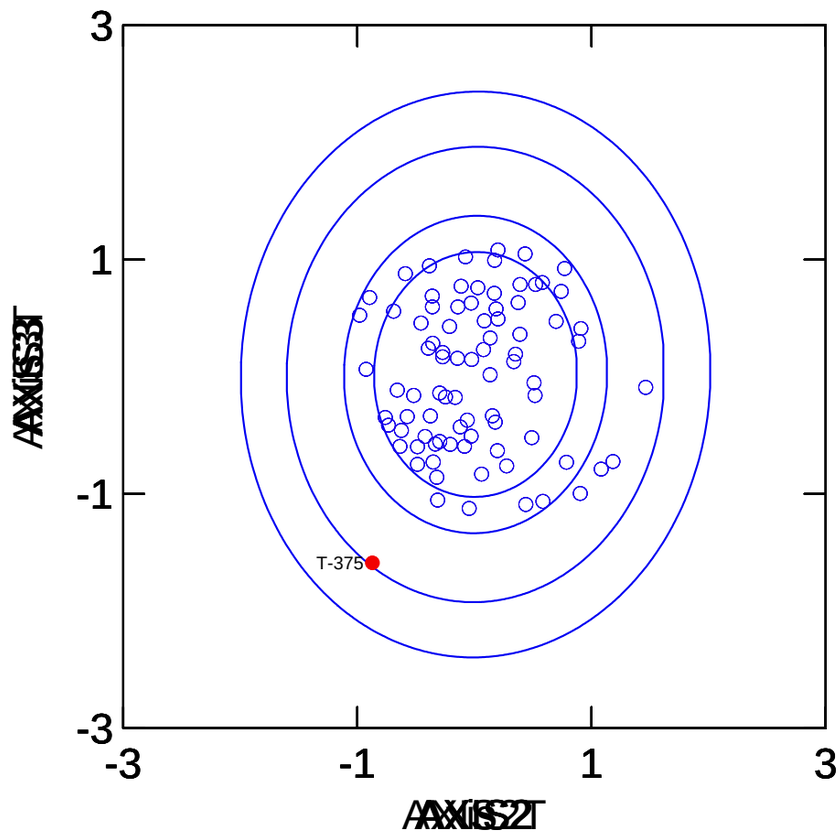
Taxa	Probability Of Occurrence	2009 Total Abundance	Mean of Abundance for Reference Sites in Group 4	SD of Abundance for Reference Sites in Group 4	Benthic Invertebrate Taxa Tolerance	
Chironomidae	1	123	802.805	729.921	6	Insensitive
Simuliidae	0.92	63	196.279	344.165	6	Insensitive
Baetidae	0.91	4	266.355	335.387	4	Insensitive
Nemouridae	0.82	56	199.788	481.869	2	Sensitive
Heptageniidae	0.71	3	125.1	224.978	4	Insensitive
Tipulidae	0.6	-	20.236	44.586	3	Insensitive
Sperchonidae	0.59	1	26.463	53.194	8	Tolerant
Empididae	0.57	-	15.69	23.306	6	Insensitive
Lebertiidae	0.51	-	25.081	56.375	8	Tolerant
Capniidae	0.47	76	38.278	128.73	1	Sensitive
Limnephilidae	0.43	-	12.781	42.161	4	Insensitive
Chloroperlidae	0.41	-	22.267	65.022	1	Sensitive
Perlodidae	0.38	-	10.64	21.321	2	Sensitive
Ameletidae	0.33	1	9.456	27.8	0	Sensitive

Ephemerellidae	0.33	1	45.387	181.354	1	Sensitive
Lumbriculidae	0.31	3	47.107	133.253	8	Tolerant
Ceratopogonidae	0.27	-	10.467	30.596	6	Insensitive
Hydrozetidae	0.27	1	2.975	7.957		
Psychodidae	0.23	-	4.936	15.808	10	Tolerant
Rhyacophilidae	0.23	-	5.978	17.547	0	Sensitive
Hygrobatidae	0.22	-	6.942	19.855	8	Tolerant
Naididae	0.22	-	14.354	45.061	10	Tolerant
Brachycentridae	0.18	-	12	67.79	1	Sensitive
Dytiscidae	0.17	-	4.342	21.087	5	Insensitive
Tubificidae	0.17	17	17.054	100.978	10	Tolerant
Glossosomatidae	0.15	-	2.562	7.672	0	Sensitive
Muscidae	0.11	-	0.884	3.454	6	Insensitive
Valvatidae	0.1	-	8.286	43.046	8	Tolerant

Site Assessment Graphs







Site Assessment Vector Data

Assessment For The Test Site	
Vector 1 Vs Vector 2	Potentially Stressed
Vector 1 Vs Vector 3	Unstressed
Vector 2 Vs Vector 3	Potentially Stressed
Overall	Potentially Stressed

Site Metrics

Metric Name	Test Site	Reference Group Mean	Standard Deviation	Sample Size
Total Abundance	352.0	2021.304	1341.27	
Total No. of Taxa	15.0	13.169	4.601	83

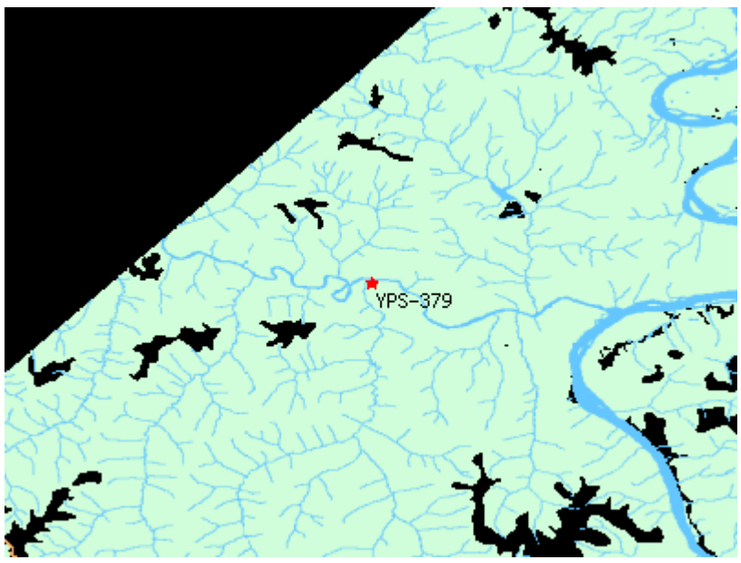
Site Metadata

Site	YPS-379
Sample Date	July 27 2009
Latitude	N 64° 21' 41"
Longitude	W 140° 46' 33"
Altitude	1118
Feature Name	Bruin Creek
Stream Order	4

Site Photograph

Up Stream

Context Map



BEAST Prediction Results

Predictor Variables	Altitude,Landcover - Alpine,Landcover - Forest,Landcover - Unregen Forest,Landcover - Wetland,Longitude,Precip Rainfall JAN (mm),Precip Snowfall JUN (mm),Stream density (m stream/km2 catchment),Temp Max JAN (deg C)
Predicted Group Number	4

Group	**1**	**2**	**3**	**4**	**5**
Probability	31.6%	8.8%	21.6%	37.3%	0.6%

Habitat Attributes

Variable	Site	Reference Group Mean	Standard Deviation	Sample Size
Bedrock Geology - Intrusive (%)	1	6.075	19.14	83
Bedrock Geology - Metamorphic (%)	95.71	12.5	28.727	83
Bedrock Geology - Sedimentary (%)	0.48	65.324	44.692	83
Bedrock Geology - Sedimentary/Volcanic (%)	0	3.054	10.333	83
Bedrock Geology - Ultramafic (%)	0.22	1.016	5.484	83
Bedrock Geology - Unconsolidated (%)	0	2.207	11.231	83
Bedrock Geology - Volcanic (%)	0.81	3.617	14.321	83
Channel Depth - max (cm)	53	31.984	28.413	83
Drainage Area (km^2)	298.52	131.838	230.495	83
General - Conductivity (uS/cm)	305	230.84	179.366	83
General - pH (pH)	7.7	7.662	0.59	83
Landcover - Alpine (%)	2.34	27.34	33	83
Landcover - Forest (%)	48.13	19.085	27.643	83
Landcover - Lake (%)	0	0.426	1.585	83
Landcover - Nonprod Forest (%)	36.22	29.604	32.428	83
Landcover - Unregen Forest (%)	13.32	1.71	6.039	83
Landcover - Wetland (%)	0	0.352	1.251	83
Perimeter - upstream drainage area (Km)	111	65.12	49.564	83
Precip Rainfall JAN (mm) (mm)	0.2	0.253	0.647	83
Precip Rainfall JUN (mm) (mm)	45.9	40.631	11.467	83
Precip Rainfall Total ANNUAL (mm) (mm)	209	197.402	64.931	83
Precip Snowfall JAN (mm) (mm)	21	18.955	9.044	83
Precip Snowfall JUN (mm) (mm)	0	0.778	1.143	83
Precip Snowfall Total ANNUAL (mm) (mm)	158.1	134.943	45.395	83
Precip Total ANNUAL (mm) (mm)	352.9	321.49	104.112	83
Precip Total JAN (mm) (mm)	19.3	17.705	8.964	83
Precip Total JUN (mm) (mm)	45.9	41.572	11.593	83
Solids - total suspended (TSS) (mg/L)	1.4			83
Stream density (m stream/km2 catchment) (m/km^2)	800.17	456.436	294.056	83
Stream length (m) in catchment (m)	238864	60684.256	110582.748	83
Substrate - dominant size category (Category(0-9))	5	4.723	2.171	83
Substrate - embeddedness category (Category(1-5))	5	3.831	0.881	83
Temp Max JAN (deg C) (Degrees Celsius)	-22.6	-21.486	3.258	83
Temp Max JUN (deg C) (Degrees Celsius)	21.2	18.137	2.769	83
Temp Mean JAN (deg C) (Degrees Celsius)	-27	-26.277	2.92	83
Temp Mean JUN (deg C) (Degrees Celsius)	14.6	11.572	2.238	83
Temp Min JAN(deg C) (Degrees Celsius)	-31.5	-31.694	2.875	83
Temp Min JUN (deg C) (Degrees Celsius)	7.9	5.118	1.669	83
Velocity (Avg) (m/s)	0.12	0.644	0.886	83
Width - Wetted (m)	13	6.78	5.88	83

Bray-Curtis Analysis

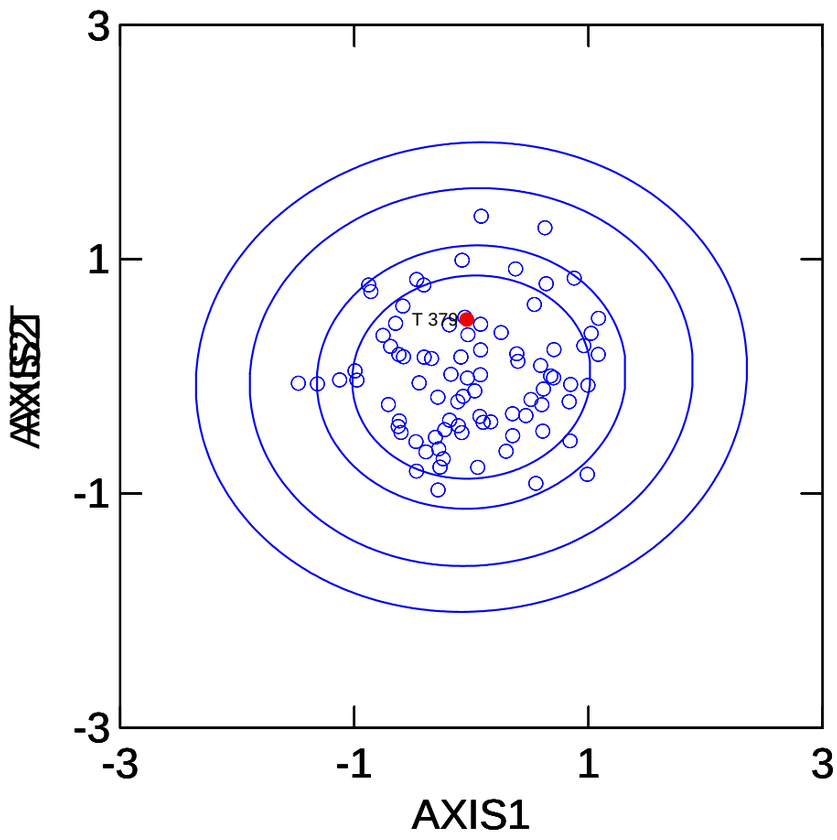
Description	Value
Bray-Curtis Distance	0.42
Bray Curtis Reference Median	2664.38

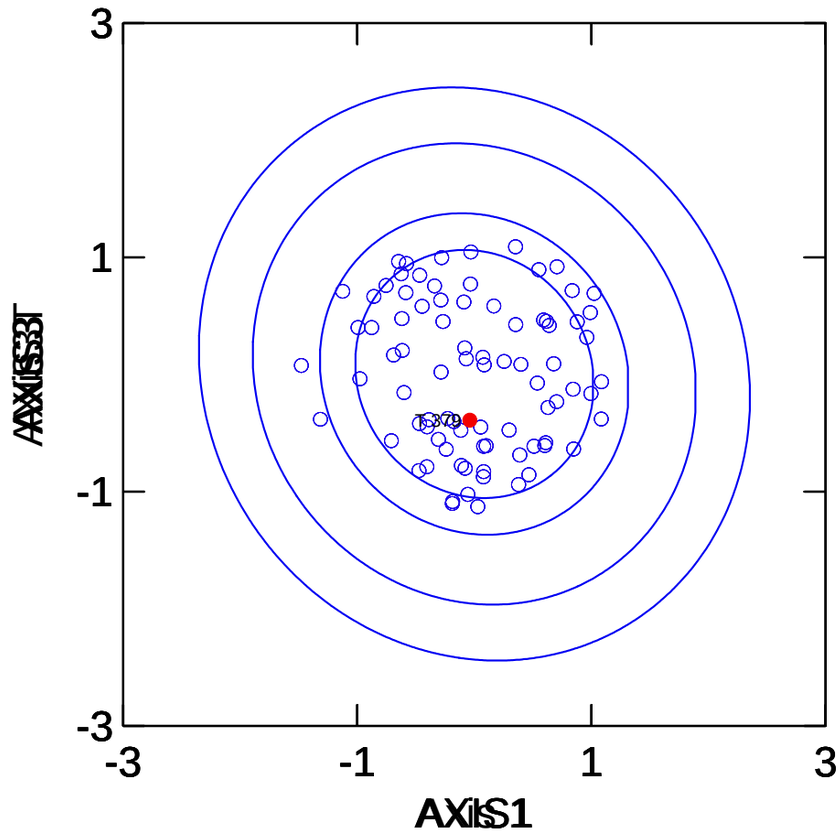
RIVPACS Analysis

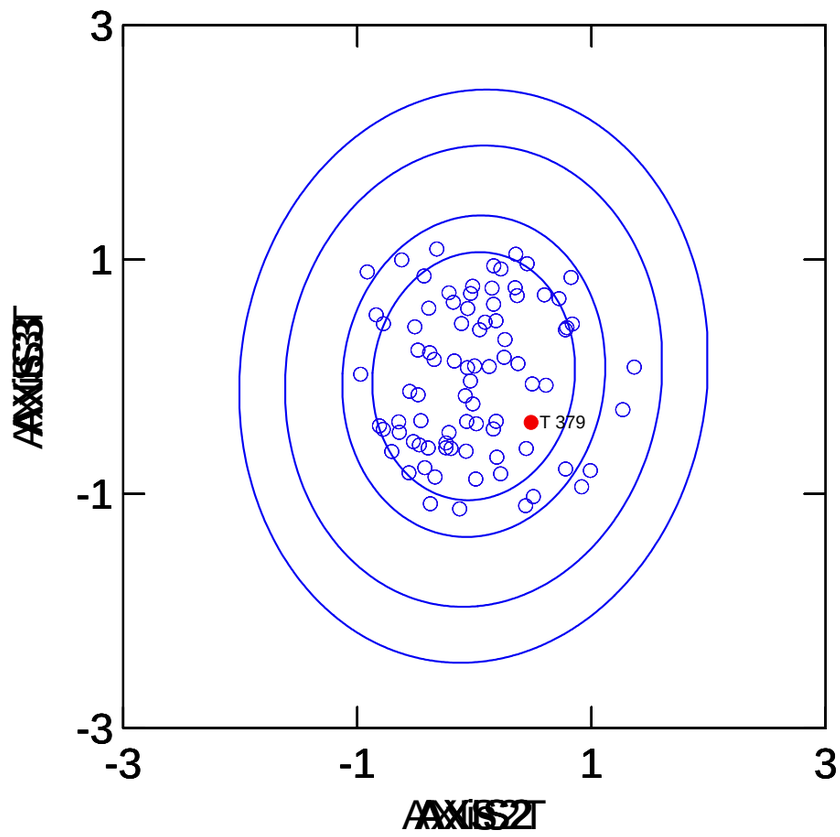
Taxa	Probability Of Occurrence	2009 Total Abundance	Mean of Abundance for Reference Sites in Group 4	SD of Abundance for Reference Sites in Group 4	Benthic Invertebrate Taxa Tolerance	
Chironomidae	0.98	424	802.805	729.921	6	Insensitive
Baetidae	0.75	272	266.355	335.387	4	Insensitive
Simuliidae	0.75	12	196.279	344.165	6	Insensitive
Nemouridae	0.68	36	199.788	481.869	2	Sensitive
Heptageniidae	0.52	96	125.1	224.978	4	Insensitive
Tipulidae	0.5	8	20.236	44.586	3	Insensitive
Sperchonidae	0.46	12	26.463	53.194	8	Tolerant
Limnephilidae	0.39	12	12.781	42.161	4	Insensitive
Empididae	0.38	20	15.69	23.306	6	Insensitive
Chloroperlidae	0.34	160	22.267	65.022	1	Sensitive
Lebertiidae	0.31	20	25.081	56.375	8	Tolerant
Naididae	0.31	-	14.354	45.061	10	Tolerant
Capniidae	0.3	16	38.278	128.73	1	Sensitive
Ephemerellidae	0.29	76	45.387	181.354	1	Sensitive
Lumbriculidae	0.28	104	47.107	133.253	8	Tolerant

Ameletidae	0.26	-	9.456	27.8	0	Sensitive
Perlodidae	0.26	-	10.64	21.321	2	Sensitive
Ceratopogonidae	0.25	20	10.467	30.596	6	Insensitive
Rhyacophilidae	0.21	-	5.978	17.547	0	Sensitive
Psychodidae	0.2	-	4.936	15.808	10	Tolerant
Dytiscidae	0.16	-	4.342	21.087	5	Insensitive
Brachycentridae	0.13	-	12	67.79	1	Sensitive
Hydrozetidae	0.12	-	2.975	7.957		
Glossosomatidae	0.1	8	2.562	7.672	0	Sensitive
Hygrobatidae	0.1	4	6.942	19.855	8	Tolerant
Pisidiidae	0.1	-	4.957	28.431	8	Tolerant

Site Assessment Graphs







Site Assessment Vector Data

Assessment For The Test Site	
Vector 1 Vs Vector 2	Unstressed
Vector 1 Vs Vector 3	Unstressed
Vector 2 Vs Vector 3	Unstressed
Overall	Unstressed

Site Metrics

Metric Name	Test Site	Reference Group Mean	Standard Deviation	Sample Size
Total Abundance	1376.0	2021.304	1341.27	
Total No. of Taxa	20.0	13.169	4.601	83

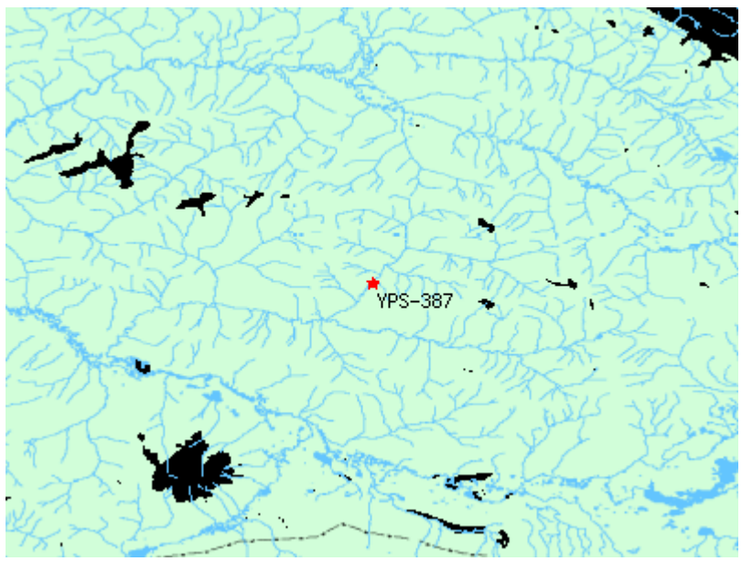
Site Metadata

Site	YPS-387
Sample Date	July 30 2009
Latitude	N 64° 1' 13"
Longitude	W 135° 51' 16"
Altitude	2469
Feature Name	Haggart Creek
Stream Order	4

Site Photograph

Up Stream

Context Map



BEAST Prediction Results

Predictor Variables	Altitude,Landcover - Alpine,Landcover - Forest,Landcover - Unregen Forest,Landcover - Wetland,Longitude,Precip Rainfall JAN (mm),Precip Snowfall JUN (mm),Stream density (m stream/km2 catchment),Temp Max JAN (deg C)
Predicted Group Number	4

Group	**1**	**2**	**3**	**4**	**5**
Probability	0.6%	1.4%	0.5%	95.6%	1.8%

Habitat Attributes

Variable	Site	Reference Group Mean	Standard Deviation	Sample Size
Bedrock Geology - Intrusive (%)	7.96	6.075	19.14	83
Bedrock Geology - Metamorphic (%)	0	12.5	28.727	83
Bedrock Geology - Sedimentary (%)	91.78	65.324	44.692	83
Bedrock Geology - Sedimentary/Volcanic (%)	0	3.054	10.333	83
Bedrock Geology - Ultramafic (%)	0	1.016	5.484	83
Bedrock Geology - Unconsolidated (%)	0	2.207	11.231	83
Bedrock Geology - Volcanic (%)	0.24	3.617	14.321	83
Channel Depth - max (cm)	22	31.984	28.413	83
Drainage Area (km^2)	86.09	131.838	230.495	83
General - Conductivity (uS/cm)	234	230.84	179.366	83
General - pH (pH)	7	7.662	0.59	83
Landcover - Alpine (%)	39.59	27.34	33	83
Landcover - Forest (%)	56.29	19.085	27.643	83
Landcover - Lake (%)	0	0.426	1.585	83
Landcover - Nonprod Forest (%)	0	29.604	32.428	83
Landcover - Unregen Forest (%)	0	1.71	6.039	83
Landcover - Wetland (%)	0	0.352	1.251	83
Perimeter - upstream drainage area (Km)	55.38	65.12	49.564	83
Precip Rainfall JAN (mm) (mm)	0.1	0.253	0.647	83
Precip Rainfall JUN (mm) (mm)	53.5	40.631	11.467	83
Precip Rainfall Total ANNUAL (mm) (mm)	226.3	197.402	64.931	83
Precip Snowfall JAN (mm) (mm)	20.3	18.955	9.044	83
Precip Snowfall JUN (mm) (mm)	0	0.778	1.143	83
Precip Snowfall Total ANNUAL (mm) (mm)	152.4	134.943	45.395	83
Precip Total ANNUAL (mm) (mm)	356.3	321.49	104.112	83
Precip Total JAN (mm) (mm)	18.3	17.705	8.964	83
Precip Total JUN (mm) (mm)	53.5	41.572	11.593	83
Stream density (m stream/km2 catchment) (m/km^2)	1176.34	456.436	294.056	83
Stream length (m) in catchment (m)	101269.1	60684.256	110582.75	83
Substrate - dominant size category (Category(0-9))	7	4.723	2.171	83
Substrate - embeddedness category (Category(1-5))	3	3.831	0.881	83
Temp Max JAN (deg C) (Degrees Celsius)	-23.2	-21.486	3.258	83
Temp Max JUN (deg C) (Degrees Celsius)	21.2	18.137	2.769	83
Temp Mean JAN (deg C) (Degrees Celsius)	-27.2	-26.277	2.92	83
Temp Mean JUN (deg C) (Degrees Celsius)	14.6	11.572	2.238	83
Temp Min JAN(deg C) (Degrees Celsius)	-31.5	-31.694	2.875	83
Temp Min JUN (deg C) (Degrees Celsius)	8	5.118	1.669	83
Velocity (Avg) (m/s)	0.41	0.644	0.886	83
Width - Wetted (m)	7	6.78	5.88	83

Bray-Curtis Analysis

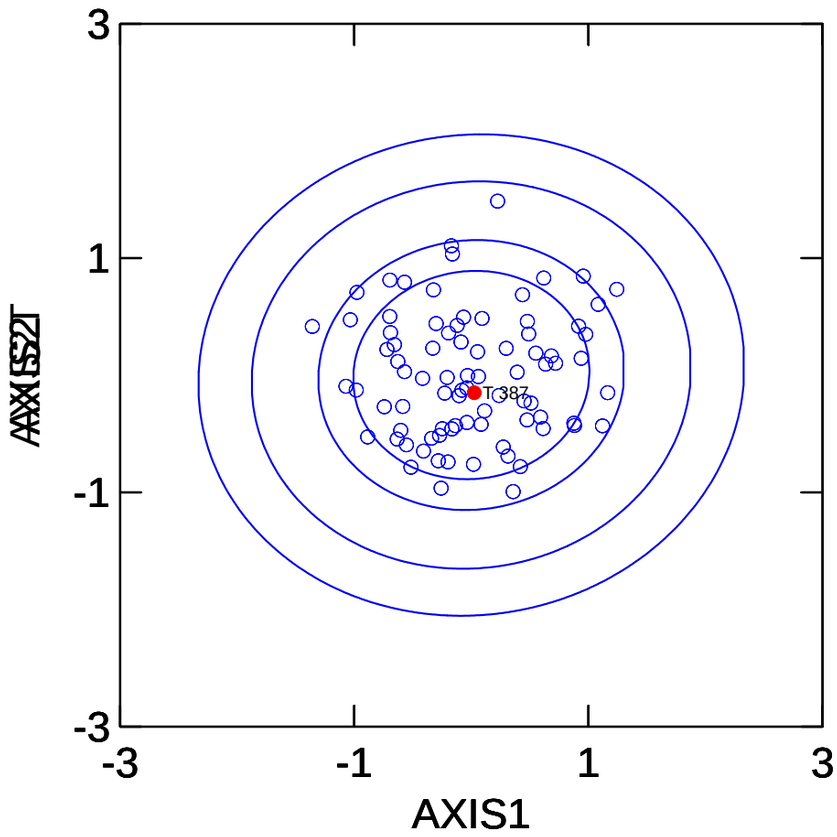
Description	Value
Bray-Curtis Distance	0.62
Bray Curtis Reference Median	2664.38

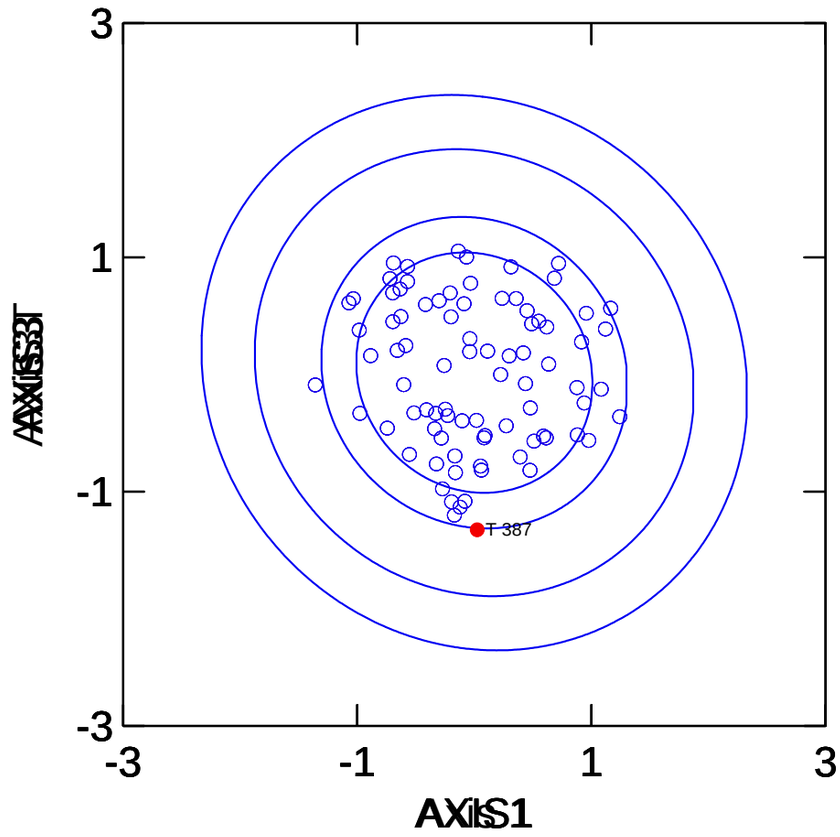
RIVPACS Analysis

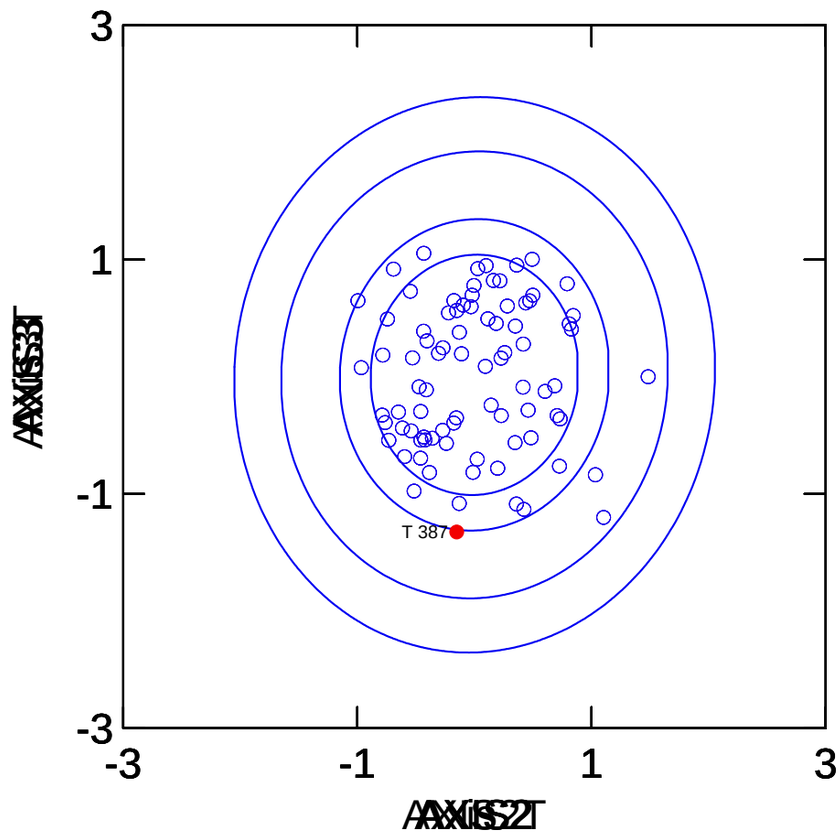
Taxa	Probability Of Occurrence	2009 Total Abundance	Mean of Abundance for Reference Sites in Group 4	SD of Abundance for Reference Sites in Group 4	Benthic Invertebrate Taxa Tolerance	
Chironomidae	1	178	802.805	729.921	6	Insensitive
Simuliidae	0.93	8	196.279	344.165	6	Insensitive
Baetidae	0.92	18	266.355	335.387	4	Insensitive
Nemouridae	0.83	63	199.788	481.869	2	Sensitive
Heptageniidae	0.72	263	125.1	224.978	4	Insensitive
Tipulidae	0.61	3	20.236	44.586	3	Insensitive
Sperchonidae	0.6	30	26.463	53.194	8	Tolerant
Empididae	0.58	40	15.69	23.306	6	Insensitive
Lebertiidae	0.53	15	25.081	56.375	8	Tolerant
Capniidae	0.48	3	38.278	128.73	1	Sensitive
Limnephilidae	0.43	-	12.781	42.161	4	Insensitive
Chloroperlidae	0.42	10	22.267	65.022	1	Sensitive
Perlodidae	0.39	3	10.64	21.321	2	Sensitive
Ephemerellidae	0.34	28	45.387	181.354	1	Sensitive
Ameletidae	0.33	3	9.456	27.8	0	Sensitive

Lumbriculidae	0.31	293	47.107	133.253	8	Tolerant
Ceratopogonidae	0.27	3	10.467	30.596	6	Insensitive
Hydrozetidae	0.27	-	2.975	7.957		
Rhyacophilidae	0.24	20	5.978	17.547	0	Sensitive
Hygrobatidae	0.23	-	6.942	19.855	8	Tolerant
Psychodidae	0.23	3	4.936	15.808	10	Tolerant
Naididae	0.22	-	14.354	45.061	10	Tolerant
Brachycentridae	0.18	-	12	67.79	1	Sensitive
Dytiscidae	0.18	-	4.342	21.087	5	Insensitive
Tubificidae	0.17	-	17.054	100.978	10	Tolerant
Glossosomatidae	0.15	3	2.562	7.672	0	Sensitive
Muscidae	0.12	-	0.884	3.454	6	Insensitive
Valvatidae	0.11	-	8.286	43.046	8	Tolerant
Leptophlebiidae	0.1	-	10.918	44.525	2	Sensitive

Site Assessment Graphs







Site Assessment Vector Data

Assessment For The Test Site	
Vector 1 Vs Vector 2	Unstressed
Vector 1 Vs Vector 3	Potentially Stressed
Vector 2 Vs Vector 3	Unstressed
Overall	Potentially Stressed

Site Metrics

Metric Name	Test Site	Reference Group Mean	Standard Deviation	Sample Size
Total Abundance	985.0	2021.304	1341.27	
Total No. of Taxa	21.0	13.169	4.601	83

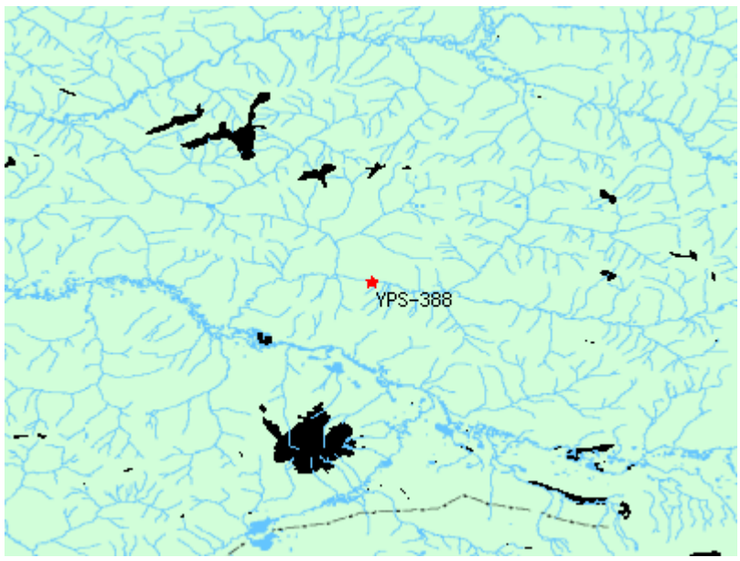
Site Metadata

Site	YPS-388
Sample Date	July 30 2009
Latitude	N 63° 58' 7"
Longitude	W 135° 56' 31"
Altitude	2223
Feature Name	Haggart Creek
Stream Order	5

Site Photograph

Up Stream

Context Map



BEAST Prediction Results

Predictor Variables	Altitude,Landcover - Alpine,Landcover - Forest,Landcover - Unregen Forest,Landcover - Wetland,Longitude,Precip Rainfall JAN (mm),Precip Snowfall JUN (mm),Stream density (m stream/km2 catchment),Temp Max JAN (deg C)
Predicted Group Number	4

Group	**1**	**2**	**3**	**4**	**5**
Probability	1.0%	2.1%	0.8%	94.4%	1.6%

Habitat Attributes

Variable	Site	Reference Group Mean	Standard Deviation	Sample Size
Bedrock Geology - Intrusive (%)	4.15	6.075	19.14	83
Bedrock Geology - Metamorphic (%)	0	12.5	28.727	83
Bedrock Geology - Sedimentary (%)	91.18	65.324	44.692	83
Bedrock Geology - Sedimentary/Volcanic (%)	4.48	3.054	10.333	83
Bedrock Geology - Ultramafic (%)	0	1.016	5.484	83
Bedrock Geology - Unconsolidated (%)	0	2.207	11.231	83
Bedrock Geology - Volcanic (%)	0.18	3.617	14.321	83
Channel Depth - max (cm)	28	31.984	28.413	83
Drainage Area (km^2)	231.72	131.838	230.495	83
General - Conductivity (uS/cm)	232	230.84	179.366	83
General - pH (pH)	7.5	7.662	0.59	83
Landcover - Alpine (%)	37.68	27.34	33	83
Landcover - Forest (%)	59.61	19.085	27.643	83
Landcover - Lake (%)	0	0.426	1.585	83
Landcover - Nonprod Forest (%)	0	29.604	32.428	83
Landcover - Unregen Forest (%)	0	1.71	6.039	83
Landcover - Wetland (%)	0.04	0.352	1.251	83
Perimeter - upstream drainage area (Km)	103.02	65.12	49.564	83
Precip Rainfall JAN (mm) (mm)	0.1	0.253	0.647	83
Precip Rainfall JUN (mm) (mm)	53.5	40.631	11.467	83
Precip Rainfall Total ANNUAL (mm) (mm)	226.3	197.402	64.931	83
Precip Snowfall JAN (mm) (mm)	20.3	18.955	9.044	83
Precip Snowfall JUN (mm) (mm)	0	0.778	1.143	83
Precip Snowfall Total ANNUAL (mm) (mm)	152.4	134.943	45.395	83
Precip Total ANNUAL (mm) (mm)	356.3	321.49	104.112	83
Precip Total JAN (mm) (mm)	18.3	17.705	8.964	83
Precip Total JUN (mm) (mm)	53.5	41.572	11.593	83
Stream density (m stream/km2 catchment) (m/km^2)	1143.19	456.436	294.056	83
Stream length (m) in catchment (m)	264903.5	60684.256	110582.748	83
Substrate - dominant size category (Category(0-9))	5	4.723	2.171	83
Substrate - embeddedness category (Category(1-5))	3	3.831	0.881	83
Temp Max JAN (deg C) (Degrees Celsius)	-23.2	-21.486	3.258	83
Temp Max JUN (deg C) (Degrees Celsius)	21.2	18.137	2.769	83
Temp Mean JAN (deg C) (Degrees Celsius)	-27.2	-26.277	2.92	83
Temp Mean JUN (deg C) (Degrees Celsius)	14.6	11.572	2.238	83
Temp Min JAN(deg C) (Degrees Celsius)	-31.5	-31.694	2.875	83
Temp Min JUN (deg C) (Degrees Celsius)	8	5.118	1.669	83
Temperature - air (Degrees Celsius)	23			83
Velocity (Avg) (m/s)	0.33	0.644	0.886	83
Width - Wetted (m)	11.8	6.78	5.88	83

Bray-Curtis Analysis

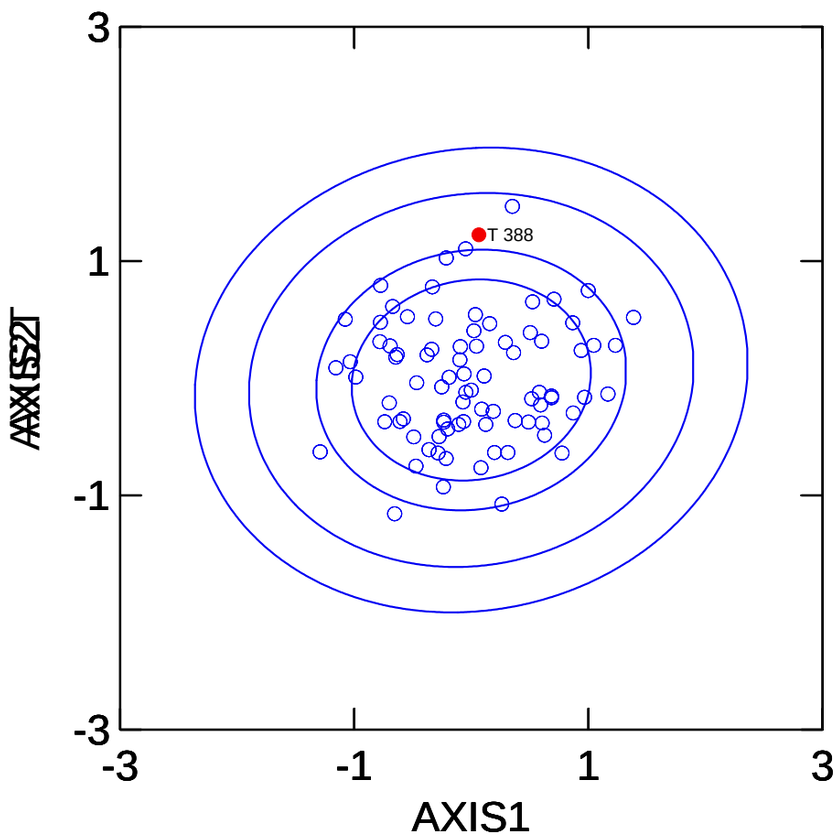
Description	Value
Bray-Curtis Distance	0.75
Bray Curtis Reference Median	2664.38

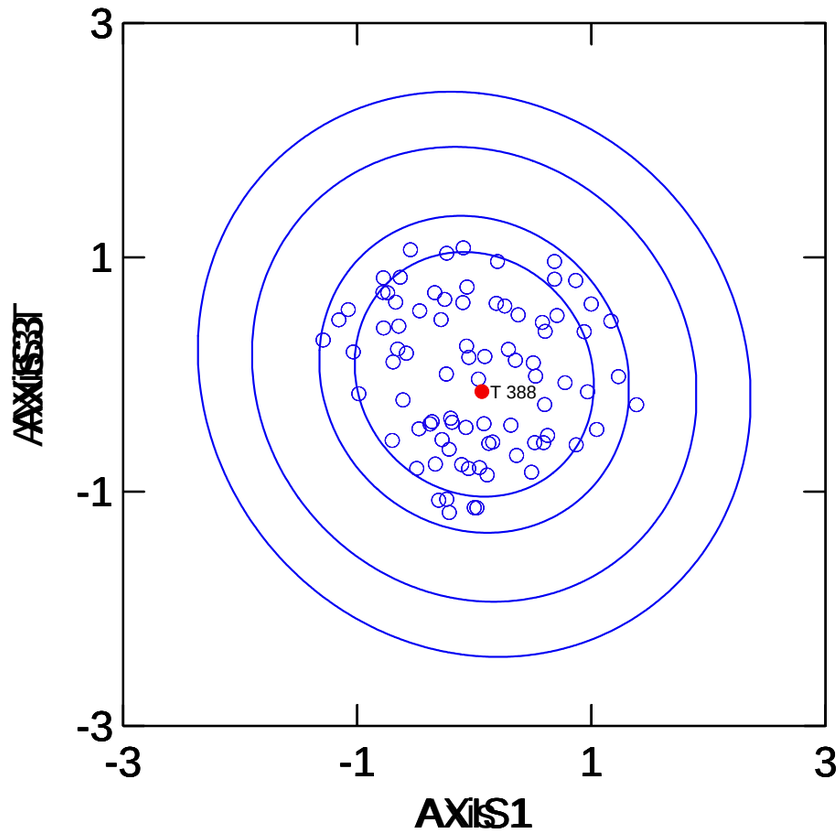
RIVPACS Analysis

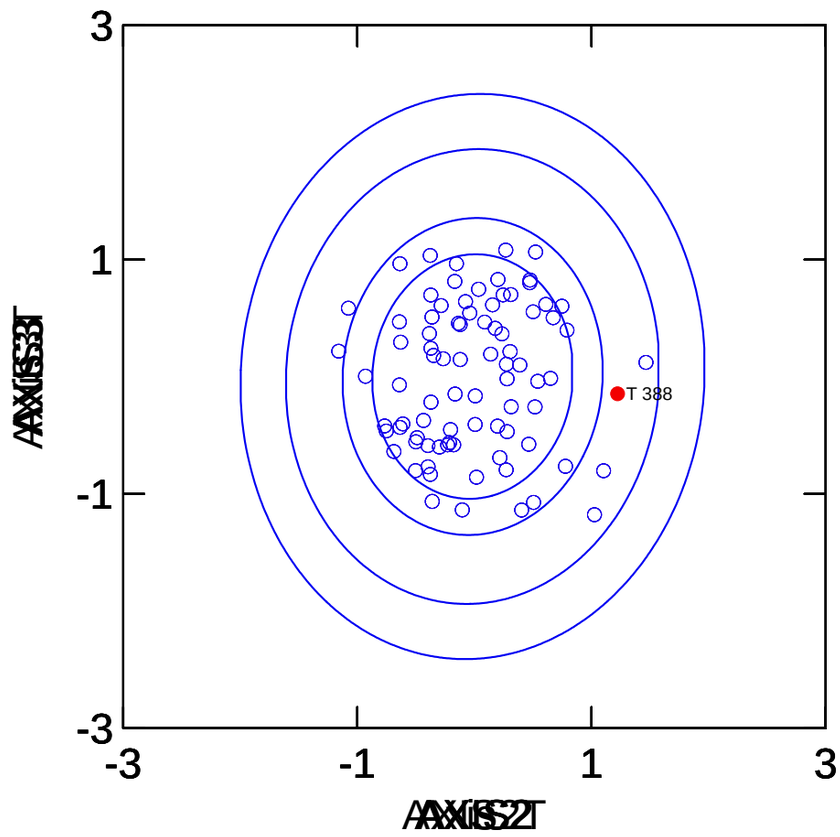
Taxa	Probability Of Occurrence	2009 Total Abundance	Mean of Abundance for Reference Sites in Group 4	SD of Abundance for Reference Sites in Group 4	Benthic Invertebrate Taxa Tolerance	
Chironomidae	1	104	802.805	729.921	6	Insensitive
Simuliidae	0.93	-	196.279	344.165	6	Insensitive
Baetidae	0.92	158	266.355	335.387	4	Insensitive
Nemouridae	0.83	73	199.788	481.869	2	Sensitive
Heptageniidae	0.72	354	125.1	224.978	4	Insensitive
Sperchonidae	0.6	119	26.463	53.194	8	Tolerant
Tipulidae	0.6	-	20.236	44.586	3	Insensitive
Empididae	0.58	19	15.69	23.306	6	Insensitive
Lebertiidae	0.53	27	25.081	56.375	8	Tolerant
Capniidae	0.47	92	38.278	128.73	1	Sensitive
Limnephilidae	0.43	-	12.781	42.161	4	Insensitive
Chloroperlidae	0.42	88	22.267	65.022	1	Sensitive
Perlodidae	0.39	-	10.64	21.321	2	Sensitive
Ephemerellidae	0.34	77	45.387	181.354	1	Sensitive

Ameletidae	0.33	23	9.456	27.8	0	Sensitive
Lumbriculidae	0.31	208	47.107	133.253	8	Tolerant
Ceratopogonidae	0.27	62	10.467	30.596	6	Insensitive
Hydrozetidae	0.27	-	2.975	7.957		
Rhyacophilidae	0.24	8	5.978	17.547	0	Sensitive
Hygrobatidae	0.23	27	6.942	19.855	8	Tolerant
Psychodidae	0.23	8	4.936	15.808	10	Tolerant
Naididae	0.22	-	14.354	45.061	10	Tolerant
Brachycentridae	0.18	-	12	67.79	1	Sensitive
Dytiscidae	0.17	-	4.342	21.087	5	Insensitive
Tubificidae	0.17	-	17.054	100.978	10	Tolerant
Glossosomatidae	0.15	-	2.562	7.672	0	Sensitive
Muscidae	0.11	-	0.884	3.454	6	Insensitive
Valvatidae	0.11	-	8.286	43.046	8	Tolerant

Site Assessment Graphs







Site Assessment Vector Data

Assessment For The Test Site	
Vector 1 Vs Vector 2	Potentially Stressed
Vector 1 Vs Vector 3	Unstressed
Vector 2 Vs Vector 3	Potentially Stressed
Overall	Potentially Stressed

Site Metrics

Metric Name	Test Site	Reference Group Mean	Standard Deviation	Sample Size
Total Abundance	1449.86	2021.304	1341.27	
Total No. of Taxa	17.0	13.169	4.601	83

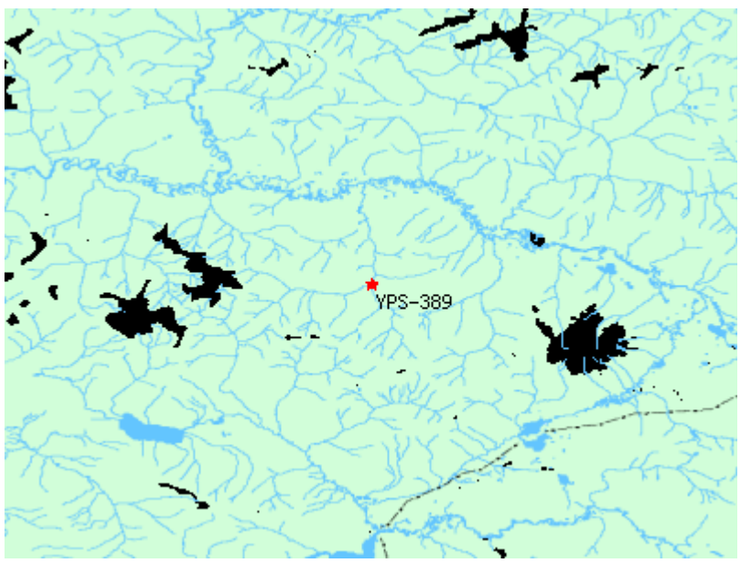
Site Metadata

Site	YPS-389
Sample Date	July 30 2009
Latitude	N 63° 49' 54"
Longitude	W 136° 5' 55"
Altitude	2401
Feature Name	Seattle Creek
Stream Order	4

Site Photograph

Up Stream

Context Map



BEAST Prediction Results

Predictor Variables	Altitude,Landcover - Alpine,Landcover - Forest,Landcover - Unregen Forest,Landcover - Wetland,Longitude,Precip Rainfall JAN (mm),Precip Snowfall JUN (mm),Stream density (m stream/km2 catchment),Temp Max JAN (deg C)
Predicted Group Number	4

Group	**1**	**2**	**3**	**4**	**5**
Probability	0.8%	1.7%	0.7%	94.7%	2.1%

Habitat Attributes

Variable	Site	Reference Group Mean	Standard Deviation	Sample Size
Bedrock Geology - Intrusive (%)	4.17	6.075	19.14	83
Bedrock Geology - Metamorphic (%)	0	12.5	28.727	83
Bedrock Geology - Sedimentary (%)	95.8	65.324	44.692	83
Bedrock Geology - Sedimentary/Volcanic (%)	0	3.054	10.333	83
Bedrock Geology - Ultramafic (%)	0	1.016	5.484	83
Bedrock Geology - Unconsolidated (%)	0	2.207	11.231	83
Bedrock Geology - Volcanic (%)	0	3.617	14.321	83
Channel Depth - avg (cm)	7			
Channel Depth - max (cm)	11	31.984	28.413	83
Drainage Area (km^2)	49.61	131.838	230.495	83
General - Conductivity (uS/cm)	271	230.84	179.366	83
General - pH (pH)	7.5	7.662	0.59	83
Landcover - Alpine (%)	34.72	27.34	33	83
Landcover - Forest (%)	41.68	19.085	27.643	83
Landcover - Lake (%)	0	0.426	1.585	83
Landcover - Nonprod Forest (%)	0	29.604	32.428	83
Landcover - Unregen Forest (%)	0	1.71	6.039	83
Landcover - Wetland (%)	0	0.352	1.251	83
Perimeter - upstream drainage area (Km)	42.96	65.12	49.564	83
Precip Rainfall JAN (mm) (mm)	0.1	0.253	0.647	83
Precip Rainfall JUN (mm) (mm)	53.5	40.631	11.467	83
Precip Rainfall Total ANNUAL (mm) (mm)	226.3	197.402	64.931	83
Precip Snowfall JAN (mm) (mm)	20.3	18.955	9.044	83
Precip Snowfall JUN (mm) (mm)	0	0.778	1.143	83
Precip Snowfall Total ANNUAL (mm) (mm)	152.4	134.943	45.395	83
Precip Total ANNUAL (mm) (mm)	356.3	321.49	104.112	83
Precip Total JAN (mm) (mm)	18.3	17.705	8.964	83
Precip Total JUN (mm) (mm)	53.5	41.572	11.593	83
Stream density (m stream/km2 catchment) (m/km^2)	1036.55	456.436	294.056	83
Stream length (m) in catchment (m)	51425.82	60684.256	110582.748	83
Substrate - dominant size category (Category(0-9))	7	4.723	2.171	83
Substrate - embeddedness category (Category(1-5))	5	3.831	0.881	83
Temp Max JAN (deg C) (Degrees Celsius)	-23.2	-21.486	3.258	83
Temp Max JUN (deg C) (Degrees Celsius)	21.2	18.137	2.769	83
Temp Mean JAN (deg C) (Degrees Celsius)	-27.2	-26.277	2.92	83
Temp Mean JUN (deg C) (Degrees Celsius)	14.6	11.572	2.238	83
Temp Min JAN(deg C) (Degrees Celsius)	-31.5	-31.694	2.875	83
Temp Min JUN (deg C) (Degrees Celsius)	8	5.118	1.669	83
Velocity (Avg) (m/s)	0.38	0.644	0.886	83
Width - Wetted (m)	6	6.78	5.88	83

Bray-Curtis Analysis

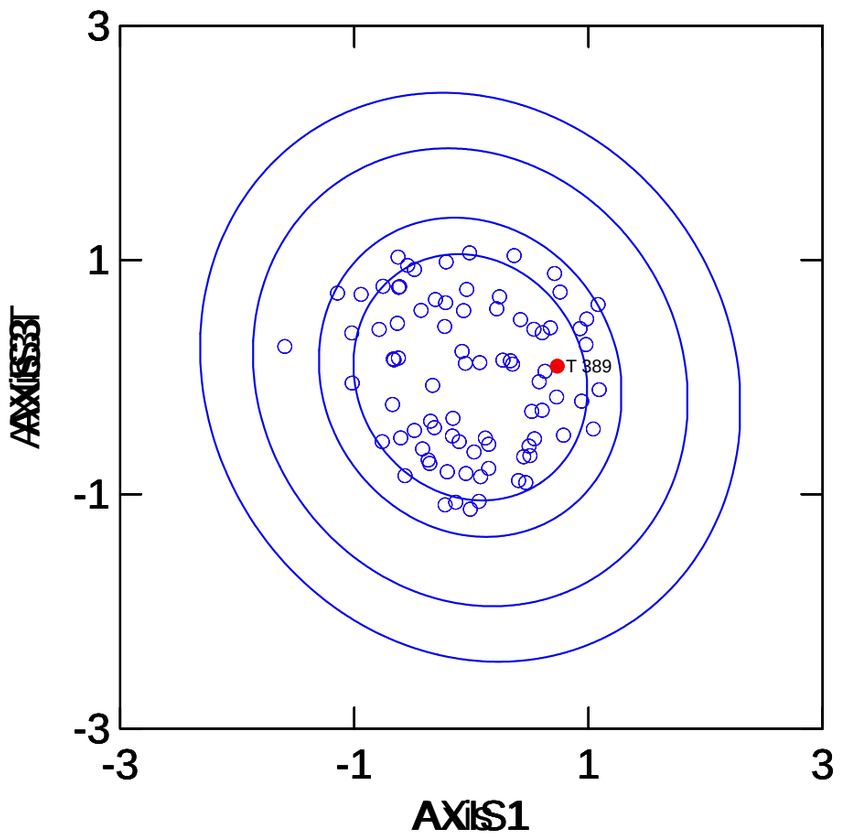
Description	Value
Bray-Curtis Distance	0.83
Bray Curtis Reference Median	2664.38

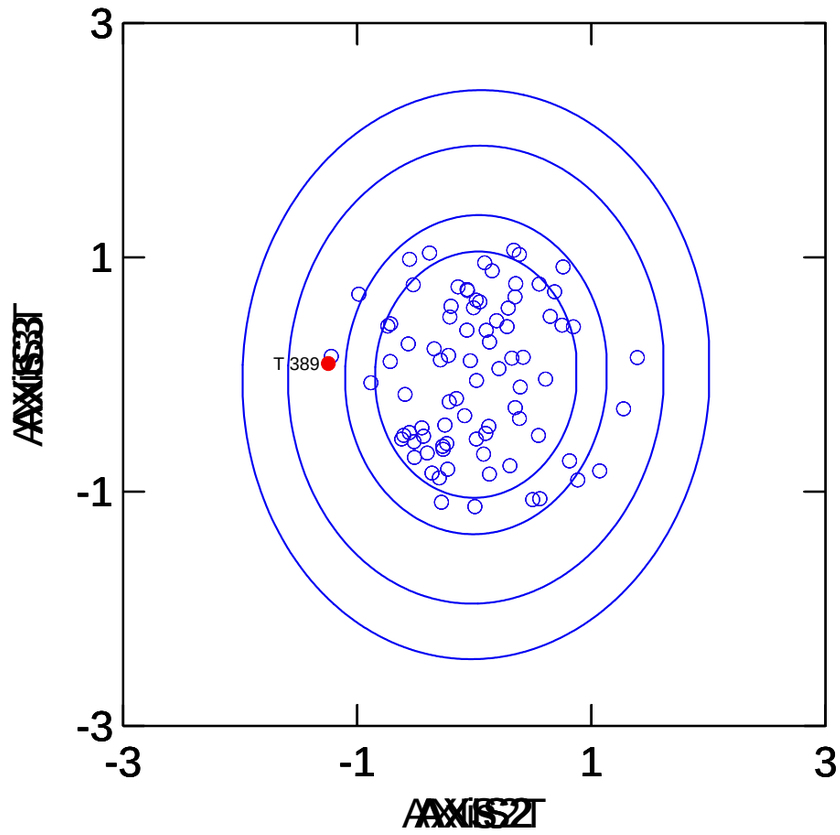
RIVPACS Analysis

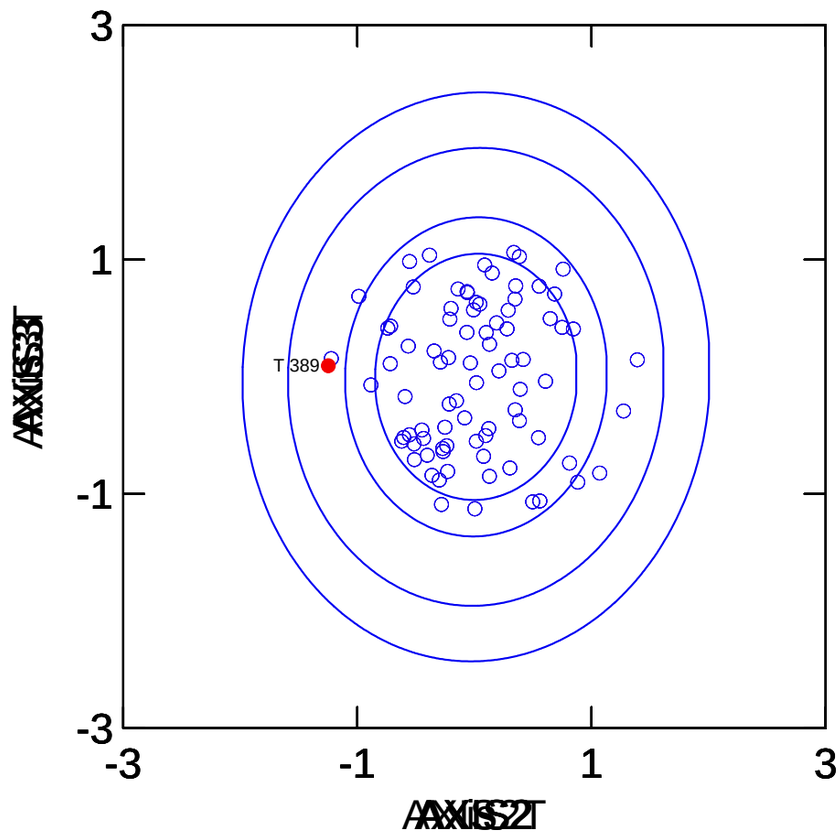
Taxa	Probability Of Occurrence	2009 Total Abundance	Mean of Abundance for Reference Sites in Group 4	SD of Abundance for Reference Sites in Group 4	Benthic Invertebrate Taxa Tolerance	
Chironomidae	1	105	802.805	729.921	6	Insensitive
Simuliidae	0.93	53	196.279	344.165	6	Insensitive
Baetidae	0.92	42	266.355	335.387	4	Insensitive
Nemouridae	0.83	463	199.788	481.869	2	Sensitive
Heptageniidae	0.72	321	125.1	224.978	4	Insensitive
Sperchonidae	0.6	-	26.463	53.194	8	Tolerant
Tipulidae	0.6	5	20.236	44.586	3	Insensitive
Empididae	0.58	216	15.69	23.306	6	Insensitive
Lebertiidae	0.53	-	25.081	56.375	8	Tolerant
Capniidae	0.48	126	38.278	128.73	1	Sensitive
Limnephilidae	0.43	-	12.781	42.161	4	Insensitive
Chloroperlidae	0.42	21	22.267	65.022	1	Sensitive
Perlodidae	0.39	16	10.64	21.321	2	Sensitive
Ephemerellidae	0.34	5	45.387	181.354	1	Sensitive

Ameletidae	0.33	11	9.456	27.8	0	Sensitive
Lumbriculidae	0.31	37	47.107	133.253	8	Tolerant
Ceratopogonidae	0.27	16	10.467	30.596	6	Insensitive
Hydrozetidae	0.27	-	2.975	7.957		
Rhyacophilidae	0.24	37	5.978	17.547	0	Sensitive
Hygrobatidae	0.23	-	6.942	19.855	8	Tolerant
Psychodidae	0.23	47	4.936	15.808	10	Tolerant
Naididae	0.22	-	14.354	45.061	10	Tolerant
Brachycentridae	0.18	-	12	67.79	1	Sensitive
Dytiscidae	0.17	-	4.342	21.087	5	Insensitive
Tubificidae	0.17	-	17.054	100.978	10	Tolerant
Glossosomatidae	0.15	11	2.562	7.672	0	Sensitive
Muscidae	0.11	-	0.884	3.454	6	Insensitive
Valvatidae	0.11	-	8.286	43.046	8	Tolerant

Site Assessment Graphs







Site Assessment Vector Data

Assessment For The Test Site	
Vector 1 Vs Vector 2	Unstressed
Vector 1 Vs Vector 3	Potentially Stressed
Vector 2 Vs Vector 3	Potentially Stressed
Overall	Potentially Stressed

Site Metrics

Metric Name	Test Site	Reference Group Mean	Standard Deviation	Sample Size
Total Abundance	1689.33	2021.304	1341.27	
Total No. of Taxa	19.0	13.169	4.601	83

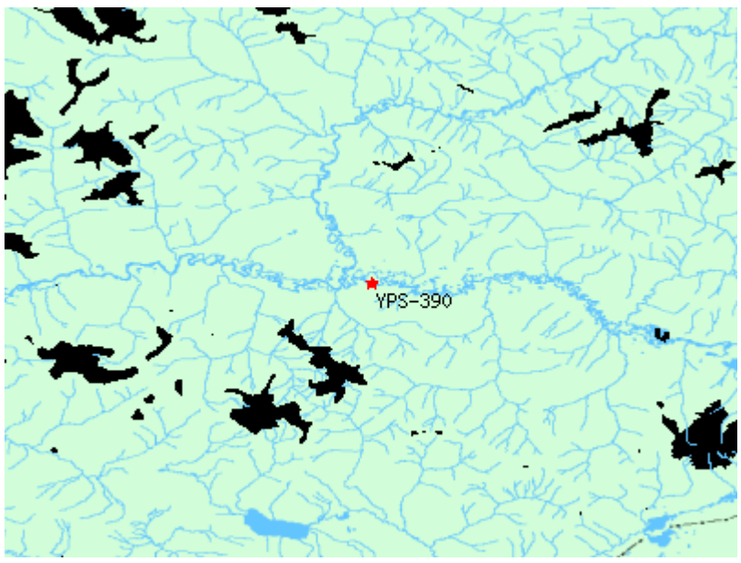
Site Metadata

Site	YPS-390
Sample Date	July 30 2009
Latitude	N 63° 50' 43"
Longitude	W 136° 18' 3"
Altitude	1938
Feature Name	South McQuesten River
Stream Order	5

Site Photograph

Up Stream

Context Map



BEAST Prediction Results

Predictor Variables	Altitude,Landcover - Alpine,Landcover - Forest,Landcover - Unregen Forest,Landcover - Wetland,Longitude,Precip Rainfall JAN (mm),Precip Snowfall JUN (mm),Stream density (m stream/km2 catchment),Temp Max JAN (deg C)
Predicted Group Number	4

Group	**1**	**2**	**3**	**4**	**5**
Probability	1.8%	4.1%	1.6%	90.4%	2.0%

Habitat Attributes

Variable	Site	Reference Group Mean	Standard Deviation	Sample Size
Bedrock Geology - Intrusive (%)	1.92	6.075	19.14	83
Bedrock Geology - Metamorphic (%)	0	12.5	28.727	83
Bedrock Geology - Sedimentary (%)	73.73	65.324	44.692	83
Bedrock Geology - Sedimentary/Volcanic (%)	20.69	3.054	10.333	83
Bedrock Geology - Ultramafic (%)	0	1.016	5.484	83
Bedrock Geology - Unconsolidated (%)	0	2.207	11.231	83
Bedrock Geology - Volcanic (%)	3.65	3.617	14.321	83
Channel Depth - max (cm)	78	31.984	28.413	83
Drainage Area (km^2)	1476.91	131.838	230.495	83
General - Conductivity (uS/cm)	310	230.84	179.366	83
General - pH (pH)	7.6	7.662	0.59	83
Landcover - Alpine (%)	41.23	27.34	33	83
Landcover - Forest (%)	49.77	19.085	27.643	83
Landcover - Lake (%)	1.69	0.426	1.585	83
Landcover - Nonprod Forest (%)	0	29.604	32.428	83
Landcover - Unregen Forest (%)	0	1.71	6.039	83
Landcover - Wetland (%)	0.78	0.352	1.251	83
Perimeter - upstream drainage area (Km)	311.14	65.12	49.564	83
Precip Rainfall JAN (mm) (mm)	0.1	0.253	0.647	83
Precip Rainfall JUN (mm) (mm)	53.5	40.631	11.467	83
Precip Rainfall Total ANNUAL (mm) (mm)	226.3	197.402	64.931	83
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Precip Snowfall Total ANNUAL (mm) (mm)	152.4	134.943	45.395	83
Precip Total ANNUAL (mm) (mm)	356.3	321.49	104.112	83
Precip Total JAN (mm) (mm)	18.3	17.705	8.964	83
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Stream density (m stream/km2 catchment) (m/km^2)	1036.98	456.436	294.056	83
Stream length (m) in catchment (m)	1531525	60684.256	110582.748	83
Substrate - dominant size category (Category(0-9))	5	4.723	2.171	83
Substrate - embeddedness category (Category(1-5))	4	3.831	0.881	83
Temp Max JAN (deg C) (Degrees Celsius)	-23.2	-21.486	3.258	83
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Temp Mean JAN (deg C) (Degrees Celsius)	-27.2	-26.277	2.92	83
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Temp Min JAN(deg C) (Degrees Celsius)	-31.5	-31.694	2.875	83
Temp Min JUN (deg C) (Degrees Celsius)	8	5.118	1.669	83
Velocity (Avg) (m/s)	0.4	0.644	0.886	83
Width - Wetted (m)	23.5	6.78	5.88	83

Bray-Curtis Analysis

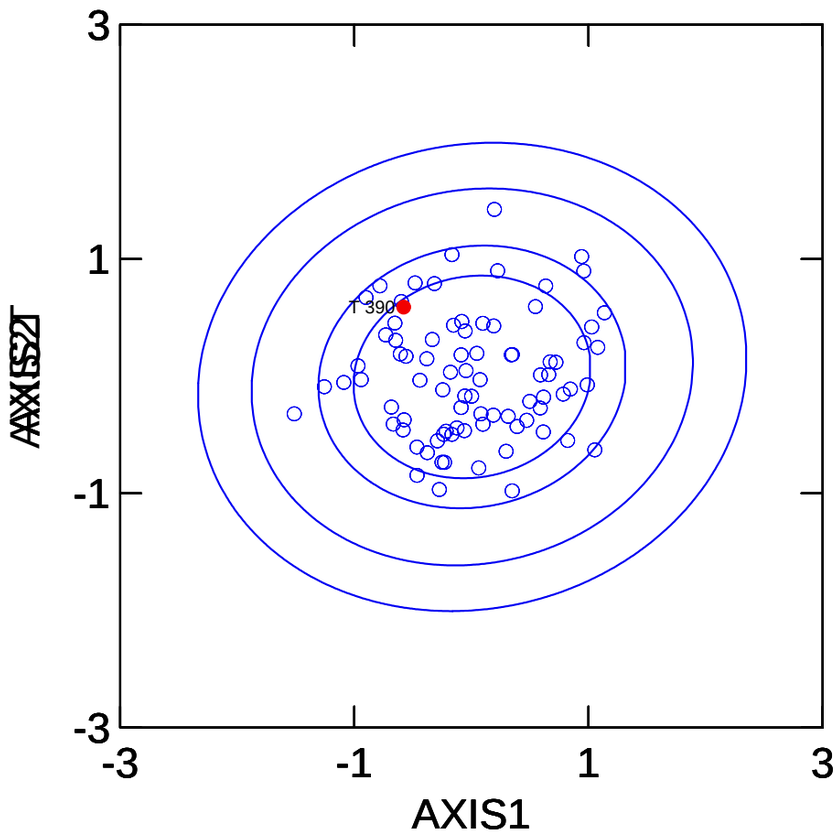
Description	Value
Bray-Curtis Distance	0.88
Bray Curtis Reference Median	2664.38

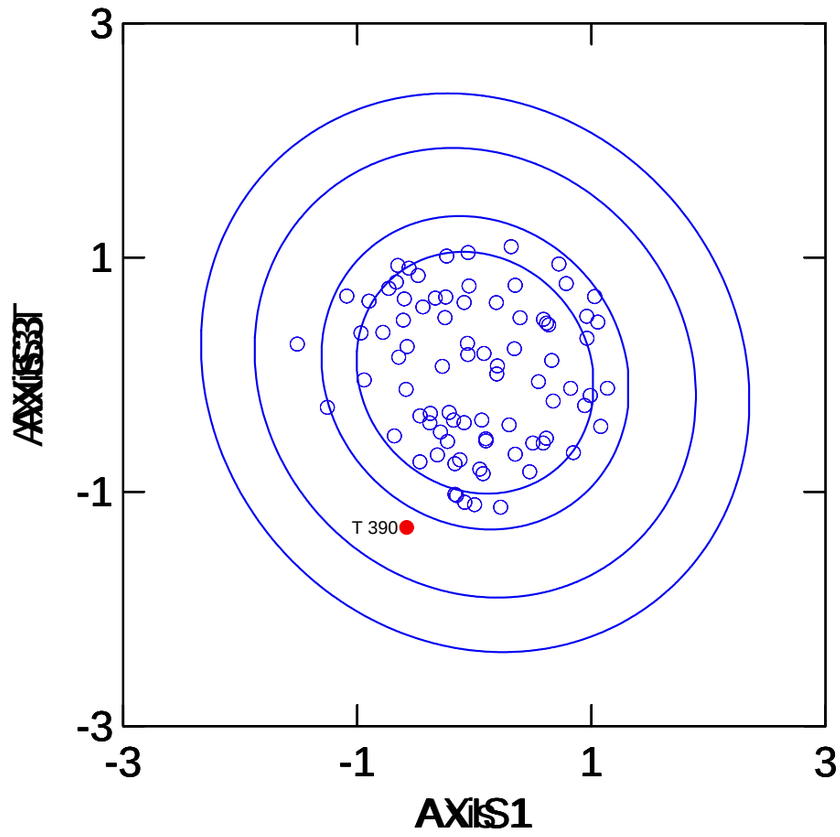
RIVPACS Analysis

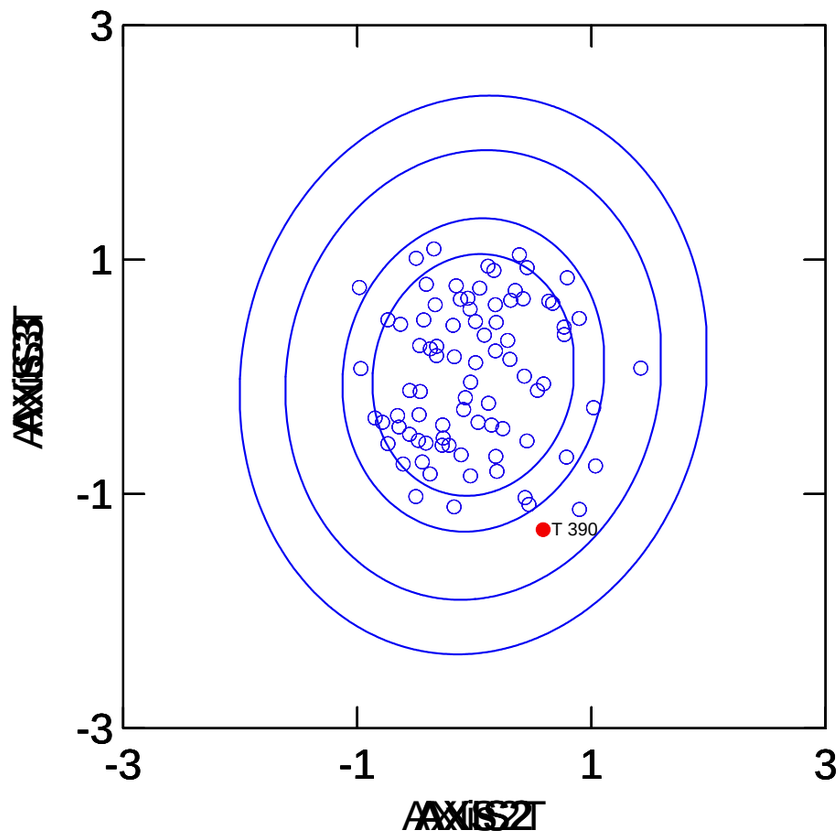
Taxa	Probability Of Occurrence	2009 Total Abundance	Mean of Abundance for Reference Sites in Group 4	SD of Abundance for Reference Sites in Group 4	Benthic Invertebrate Taxa Tolerance	
Chironomidae	1	45	802.805	729.921	6	Insensitive
Baetidae	0.92	19	266.355	335.387	4	Insensitive
Simuliidae	0.92	4	196.279	344.165	6	Insensitive
Nemouridae	0.82	12	199.788	481.869	2	Sensitive
Heptageniidae	0.72	26	125.1	224.978	4	Insensitive
Sperchonidae	0.59	20	26.463	53.194	8	Tolerant
Tipulidae	0.59	30	20.236	44.586	3	Insensitive
Empididae	0.57	5	15.69	23.306	6	Insensitive
Lebertiidae	0.51	40	25.081	56.375	8	Tolerant
Capniidae	0.46	-	38.278	128.73	1	Sensitive
Limnephilidae	0.43	-	12.781	42.161	4	Insensitive
Chloroperlidae	0.42	31	22.267	65.022	1	Sensitive
Perlodidae	0.38	9	10.64	21.321	2	Sensitive
Ephemerellidae	0.34	14	45.387	181.354	1	Sensitive

Ameletidae	0.33	9	9.456	27.8	0	Sensitive
Lumbriculidae	0.31	51	47.107	133.253	8	Tolerant
Ceratopogonidae	0.27	1	10.467	30.596	6	Insensitive
Hydrozetidae	0.26	-	2.975	7.957		
Rhyacophilidae	0.24	1	5.978	17.547	0	Sensitive
Naididae	0.23	-	14.354	45.061	10	Tolerant
Psychodidae	0.23	-	4.936	15.808	10	Tolerant
Hygrobatidae	0.22	47	6.942	19.855	8	Tolerant
Brachycentridae	0.17	9	12	67.79	1	Sensitive
Dytiscidae	0.17	-	4.342	21.087	5	Insensitive
Tubificidae	0.16	-	17.054	100.978	10	Tolerant
Glossosomatidae	0.15	-	2.562	7.672	0	Sensitive
Muscidae	0.11	-	0.884	3.454	6	Insensitive
Valvatidae	0.1	-	8.286	43.046	8	Tolerant

Site Assessment Graphs







Site Assessment Vector Data

Assessment For The Test Site	
Vector 1 Vs Vector 2	Potentially Stressed
Vector 1 Vs Vector 3	Potentially Stressed
Vector 2 Vs Vector 3	Unstressed
Overall	Potentially Stressed

Site Metrics

Metric Name	Test Site	Reference Group Mean	Standard Deviation	Sample Size
Total Abundance	394.0	2021.304	1341.27	
Total No. of Taxa	23.0	13.169	4.601	83

Site Assessment Report

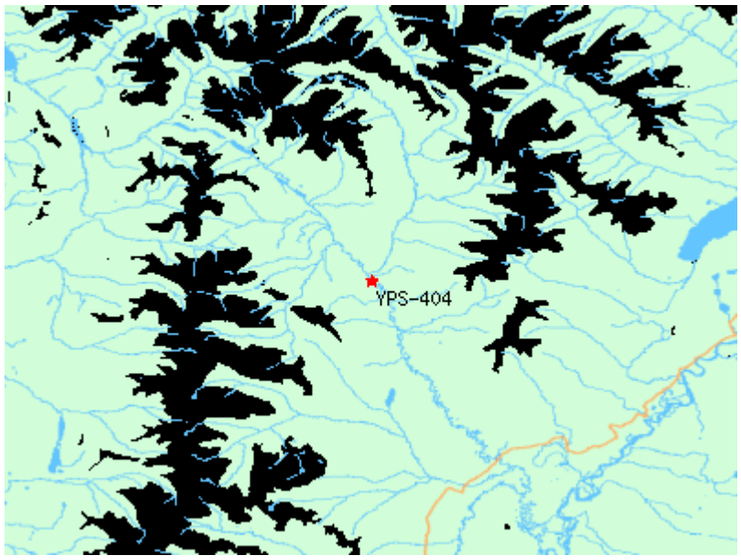
Site Metadata

Site	YPS-404
Sample Date	July 21 2009
Latitude	N 60° 51' 1"
Longitude	W 133° 18' 45"
Altitude	2656
Feature Name	Sidney Creek
Stream Order	5

Site Photograph

Up Stream

Context Map



BEAST Prediction Results

Predictor Variables	Altitude,Landcover - Alpine,Landcover - Forest,Landcover - Unregen Forest,Landcover - Wetland,Longitude,Precip Rainfall JAN (mm),Precip Snowfall JUN (mm),Stream density (m stream/km2 catchment),Temp Max JAN (deg C)
Predicted Group Number	4

Group	**1**	**2**	**3**	**4**	**5**
Probability	0.3%	1.3%	0.6%	79.7%	18.1%

Habitat Attributes

Variable	Site	Reference Group Mean	Standard Deviation	Sample Size
Channel Depth - avg (cm)	55	31.984	28.413	83
Drainage Area (km^2)	283.56	131.838	230.495	83
General - Conductivity (uS/cm)	74	230.84	179.366	83
General - pH (pH)	7.2	7.662	0.59	83
Landcover - Alpine (%)	32.17	27.34	33	83
Landcover - Forest (%)	2.01	19.085	27.643	83
Landcover - Lake (%)	0.25	0.426	1.585	83
Landcover - Unregen Forest (%)	0	1.71	6.039	83
Landcover - Wetland (%)	1.52	0.352	1.251	83
Precip Rainfall JAN (mm) (mm)	0	0.253	0.647	83
Precip Snowfall JUN (mm) (mm)	1.2	0.778	1.143	83
Solids - total suspended (TSS) (mg/L)	1.4	Not Available	Not Available	Not Available
Stream density (m stream/km2 catchment) (m/km^2)	691.89	456.436	294.056	83
Substrate - embeddedness category (Category(1-5))	4	3.831	0.881	83
Temp Max JAN (deg C) (Degrees Celsius)	-22.4	-21.486	3.258	83
Width - Wetted (m)	8.2	6.78	5.88	83

Bray-Curtis Analysis

Description	Value
Bray-Curtis Distance	0.63
Bray Curtis Reference Median	2664.38

RIVPACS Analysis

Taxa	Probability Of Occurrence	2009 Total Abundance	Mean of Abundance for Reference Sites in Group 4	SD of Abundance for Reference Sites in Group 4	Benthic Invertebrate Taxa Tolerance	
Chironomidae	1	244	802.805	729.921	6	Insensitive
Baetidae	0.94	222	266.355	335.387	4	Insensitive
Simuliidae	0.92	22	196.279	344.165	6	Insensitive
Nemouridae	0.83	178	199.788	481.869	2	Sensitive
Heptageniidae	0.74	1778	125.1	224.978	4	Insensitive
Tipulidae	0.57	44	20.236	44.586	3	Insensitive
Empididae	0.56	11	15.69	23.306	6	Insensitive
Sperchonidae	0.55	-	26.463	53.194	8	Tolerant
Capniidae	0.53	11	38.278	128.73	1	Sensitive
Lebertiidae	0.49	-	25.081	56.375	8	Tolerant
Perlodidae	0.43	122	10.64	21.321	2	Sensitive
Chloroperlidae	0.4	189	22.267	65.022	1	Sensitive
Limnephilidae	0.4	67	12.781	42.161	4	Insensitive
Ephemerellidae	0.32	556	45.387	181.354	1	Sensitive
Lumbriculidae	0.31	-	47.107	133.253	8	Tolerant
Ameletidae	0.3	189	9.456	27.8	0	Sensitive
Hydrozetidae	0.29	-	2.975	7.957		
Ceratopogonidae	0.23	56	10.467	30.596	6	Insensitive
Hygrobatidae	0.21	-	6.942	19.855	8	Tolerant
Naididae	0.21	-	14.354	45.061	10	Tolerant
Psychodidae	0.2	-	4.936	15.808	10	Tolerant
Rhyacophilidae	0.2	33	5.978	17.547	0	Sensitive
Brachycentridae	0.17	-	12	67.79	1	Sensitive
Dytiscidae	0.15	-	4.342	21.087	5	Insensitive
Tubificidae	0.14	-	17.054	100.978	10	Tolerant
Glossosomatidae	0.13	22	2.562	7.672	0	Sensitive
Gammaridae	0.11	-	15.022	67.781	4	Insensitive
Muscidae	0.1	-	0.884	3.454	6	Insensitive
Valvatidae	0.1	-	8.286	43.046	8	Tolerant

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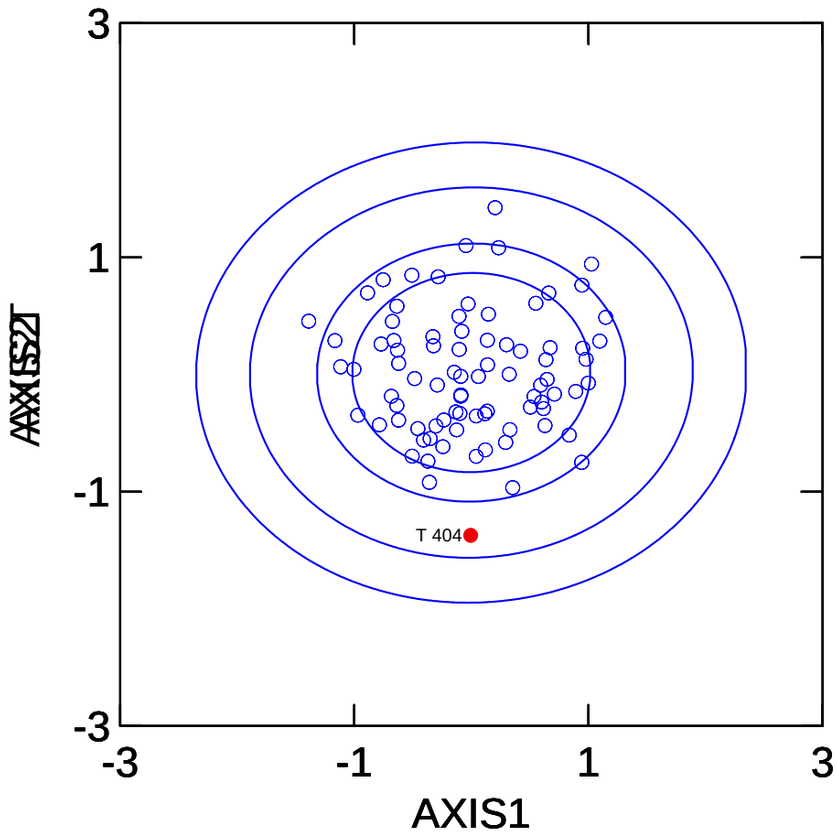
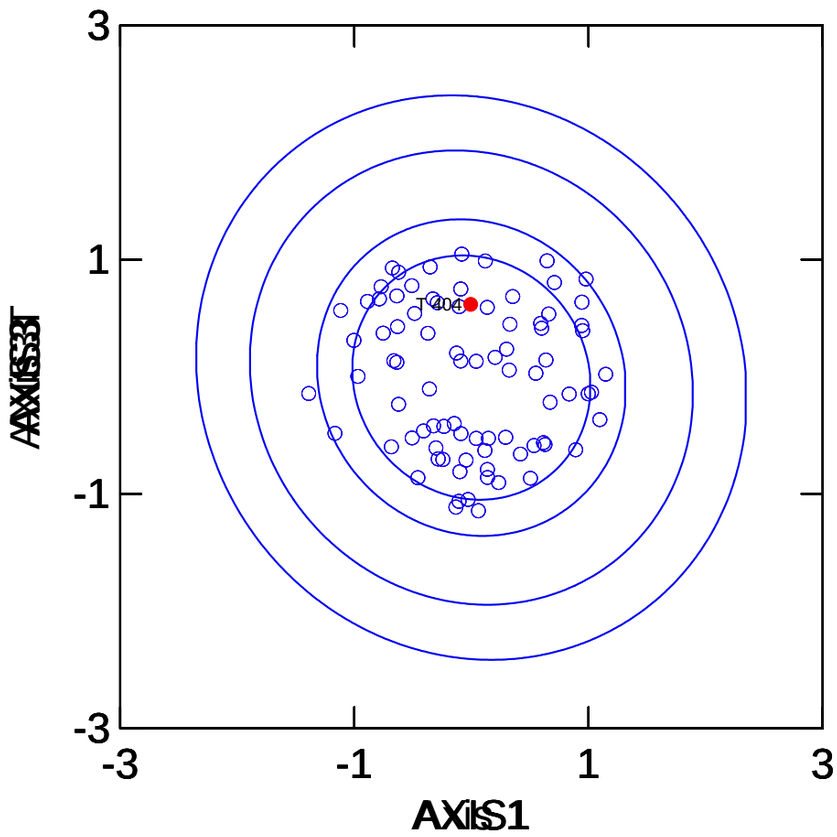
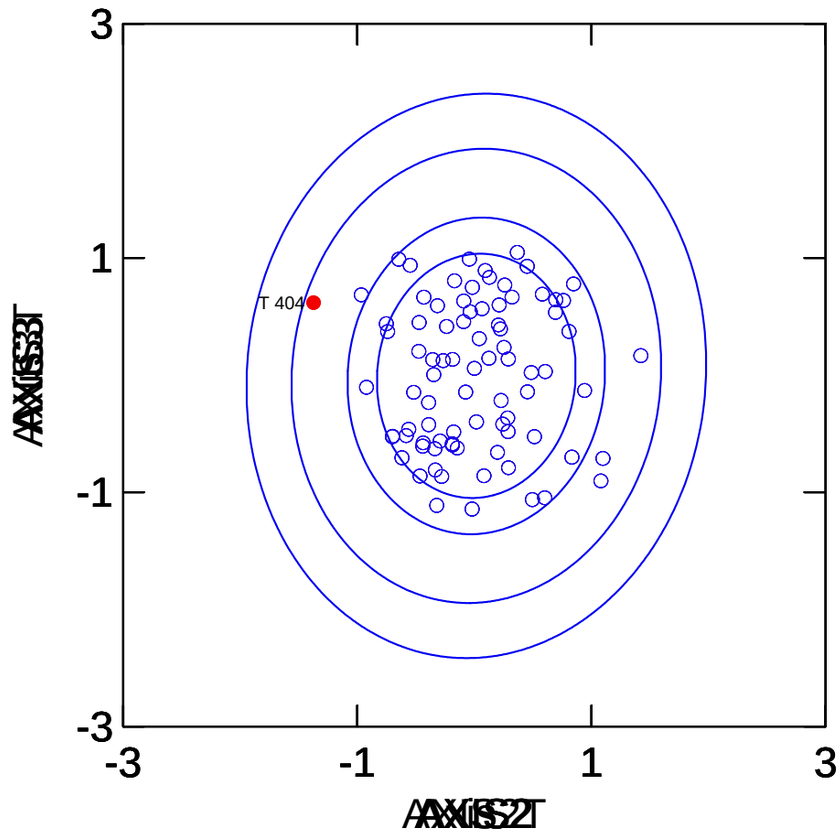
Site Assessment Graphs







Site Assessment Vector Data

Assessment For The Test Site	
Vector 1 Vs Vector 2	Potentially Stressed
Vector 1 Vs Vector 3	Unstressed
Vector 2 Vs Vector 3	Unstressed
Overall	Potentially Stressed

Site Metrics

Metric Name	Test Site	Reference Group Mean	Standard Deviation	Sample Size
Total Abundance	3744.31	2021.304	1341.27	
Total No. of Taxa	16.0	13.169	4.601	83

Site Assessment Report

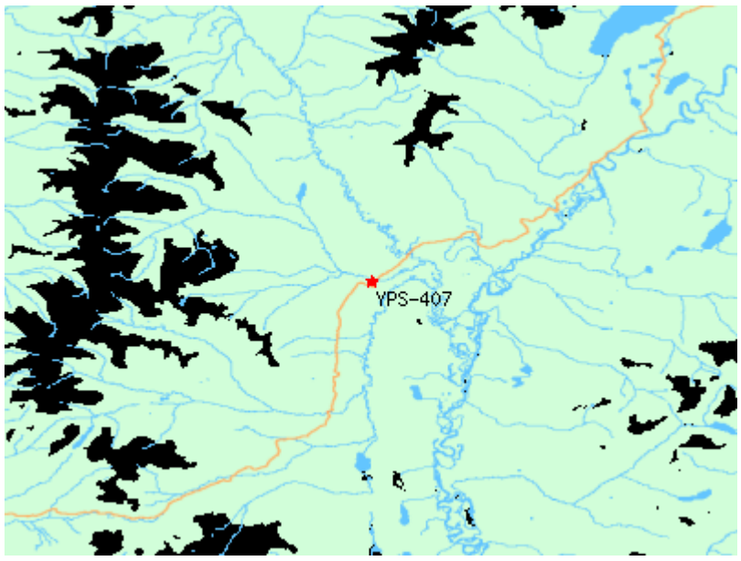
Site Metadata

Site	YPS-407
Sample Date	July 21 2009
Latitude	N 60° 45' 42"
Longitude	W 133° 4' 39"
Altitude	2616
Feature Name	Evelyn Creek
Stream Order	3

Site Photograph

Up Stream

Context Map



BEAST Prediction Results

Predictor Variables	Altitude,Landcover - Alpine,Landcover - Forest,Landcover - Unregen Forest,Landcover - Wetland,Longitude,Precip Rainfall JAN (mm),Precip Snowfall JUN (mm),Stream density (m stream/km2 catchment),Temp Max JAN (deg C)
Predicted Group Number	5

Group	**1**	**2**	**3**	**4**	**5**
Probability	0.3%	0.3%	0.1%	1.1%	98.2%

Habitat Attributes

Variable	Site	Reference Group Mean	Standard Deviation	Sample Size
Channel Depth - avg (cm)	33.2	21.878	13.951	13
Drainage Area (km^2)	153.57	172.645	331.957	13
General - Conductivity (uS/cm)	60	229.885	149.44	13
General - pH (pH)	7.2	7.808	0.476	13
Landcover - Alpine (%)	32.81	55.799	35.552	13
Landcover - Forest (%)	18.62	6.249	12.54	13
Landcover - Lake (%)	0.36	0.537	1.193	13
Landcover - Unregen Forest (%)	0	2.315	6.797	13
Landcover - Wetland (%)	0	0.542	1.348	13
Precip Rainfall JAN (mm) (mm)	0.5	0.085	0.248	13
Precip Snowfall JUN (mm) (mm)	5.3	1.646	1.598	13
Solids - total suspended (TSS) (mg/L)	1.1	Not Available	Not Available	N//A
Stream density (m stream/km2 catchment) (m/km^2)	557.53	359.112	140.864	13
Substrate - embeddedness category (Category(1-5))	4	3.923	0.641	13
Temp Max JAN (deg C) (Degrees Celsius)	-12.6	-21.769	2.624	13
Width - Wetted (m)	11.9	6.754	3.596	13

Bray-Curtis Analysis

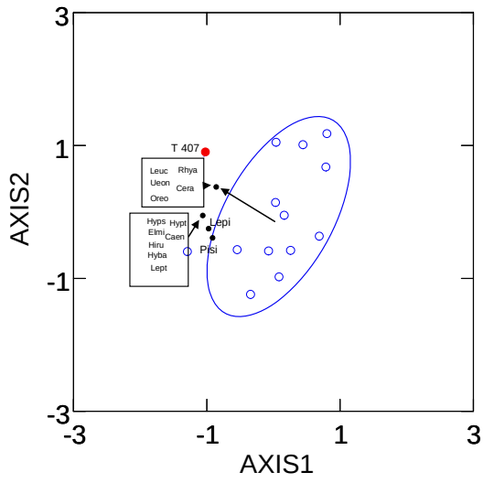
Description	Value
Bray-Curtis Distance	0.07
Bray Curtis Reference Median	16305.0

RIVPACS Analysis

Taxa	Probability Of Occurrence	2009 Total Abundance	Mean of Abundance for Reference Sites in Group 5	SD of Abundance for Reference sites in Group 5	Benthic Invertebrate Taxa Tolerance	
Baetidae	1	419	2999.231	2593.133	4	Insensitive
Chironomidae	1	229	5357.5	4690.74	6	Insensitive
Simuliidae	0.85	14	1776.923	2773.957	6	Insensitive
Heptageniidae	0.84	543	393.462	468.234	4	Insensitive
Nemouridae	0.84	71	262.692	344.829	2	Sensitive
Capniidae	0.76	5	256.923	294.176	1	Sensitive
Perlodidae	0.61	19	109.231	152.149	2	Sensitive
Empididae	0.46	5	22.692	33.016	6	Insensitive
Tipulidae	0.39	5	17.308	25.789	3	Insensitive
Hydrozetidae	0.38	-	15	21.602		
Chloroperlidae	0.31	-	41.923	92.838	1	Sensitive
Lebertiidae	0.31	-	19.231	32.522	8	Tolerant
Lumbriculidae	0.31	-	28.846	47.704	8	Tolerant
Sperchonidae	0.31	10	32.692	82.528	8	Tolerant
Ephemerellidae	0.23	114	42.308	111.048	1	Sensitive
Gammaridae	0.23	-	96.154	227.726	4	Insensitive
Limnephilidae	0.23	-	5.769	10.963	4	Insensitive
Ameletidae	0.16	38	12.692	35.509	0	Sensitive
Naididae	0.16	-	7.308	21.077	10	Tolerant
Brachycentridae	0.15	10	50	132.288	1	Sensitive
Lepidostomatidae	0.15	-	53.846	145.002	3	Insensitive
Planorbidae	0.15	-	32.692	110.578	7	Tolerant
Pisidiidae	0.15	-	103.846	263.361	8	Tolerant
Torrenticolidae	0.15	-	5.769	14.979		
Apataniidae	0.08	-	61.538	221.88	1	Sensitive
Aturidae	0.08	-	3.846	13.868		
Caenidae	0.08	-	1.923	6.934	7	Tolerant
Elmidae	0.08	-	46.154	166.41	4	Insensitive
Feltriidae	0.08	-	1.923	6.934		
Hirudinidae	0.08	-	1.923	6.934		
Hydrobiidae	0.08	-	44.231	159.476	8	Tolerant
Hydropsychidae	0.08	10	150	540.833	4	Insensitive

Site Assessment Graphs

Gp 5



Site Assessment Vector Data

Assessment For The Test Site	
Vector 1 Vs Vector 2	Potentially Stressed
Vector 1 Vs Vector 3	N/A
Vector 2 Vs Vector 3	N/A
Overall	Potentially Stressed

Site Metrics

Metric Name	Test Site	Reference Group Mean	Standard Deviation	Sample Size
Total Abundance	1561.8	12204.23	5222.37	
Total No. of Taxa	19.0	11.462	4.136	13

Site Assessment Report

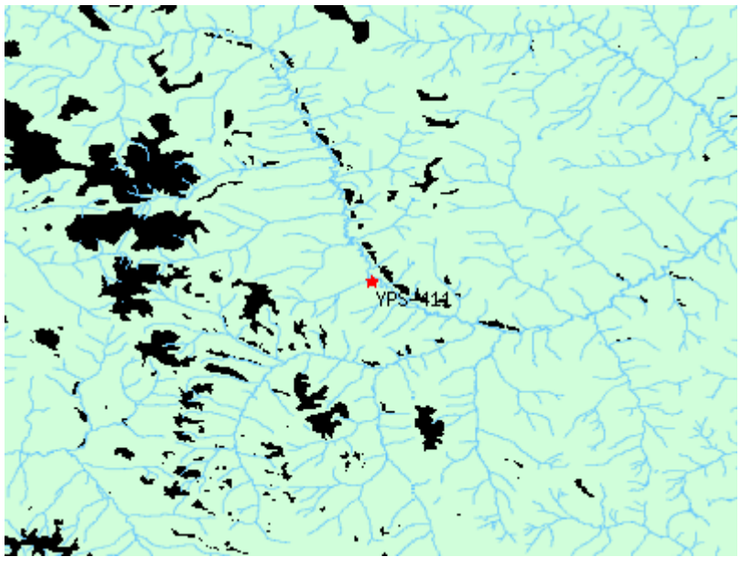
Site Metadata

Site	YPS-411
Sample Date	JulY 23 2009
Latitude	N 62° 20' 53"
Longitude	W 137° 18' 9"
Altitude	2265
Feature Name	Mechanic Creek
Stream Order	2

Site Photograph

Up Stream

Context Map



BEAST Prediction Results

Predictor Variables	Altitude,Landcover - Alpine,Landcover - Forest,Landcover - Unregen Forest,Landcover - Wetland,Longitude,Precip Rainfall JAN (mm),Precip Snowfall JUN (mm),Stream density (m stream/km2 catchment),Temp Max JAN (deg C)
Predicted Group Number	4

Group	**1**	**2**	**3**	**4**	**5**
Probability	0.0%	0.0%	0.1%	91.6%	8.3%

Habitat Attributes

Variable	Site	Reference Group Mean	Standard Deviation	Sample Size
Channel Depth - avg (cm)	11	31.984	28.413	83
Drainage Area (km^2)	15.34	131.838	230.495	83
General - Conductivity (uS/cm)	440	230.84	179.366	83
General - pH (pH)	7.8	7.662	0.59	83
Landcover - Alpine (%)	0	27.34	33	83
Landcover - Forest (%)	0	19.085	27.643	83
Landcover - Lake (%)	0	0.426	1.585	83
Landcover - Unregen Forest (%)	0	1.71	6.039	83
Landcover - Wetland (%)	0	0.352	1.251	83
Precip Rainfall JAN (mm) (mm)	0	0.253	0.647	83
Precip Snowfall JUN (mm) (mm)	1.9	0.778	1.143	83
Solids - total suspended (TSS) (mg/L)	24.9	Not Available	Not Available	Not Available
Stream density (m stream/km2 catchment) (m/km^2)	939.23	456.436	294.056	83
Substrate - embeddedness category (Category(1-5))	4	3.831	0.881	83
Temp Max JAN (deg C) (Degrees Celsius)	-26	-21.486	3.258	83
Width - Wetted (m)	2.2	6.78	5.88	83

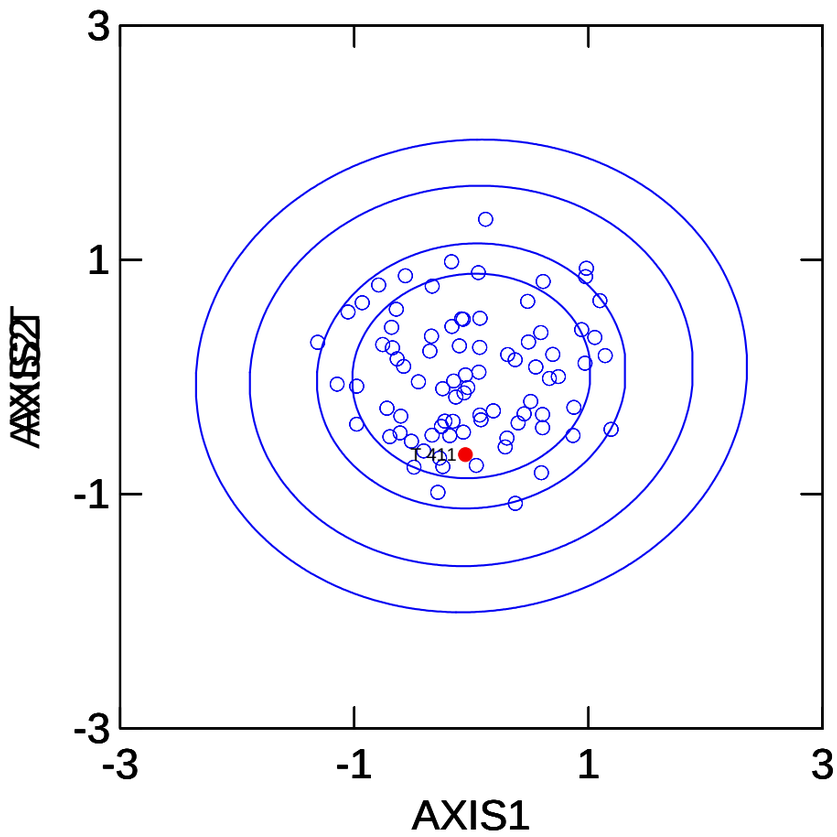
Bray-Curtis Analysis

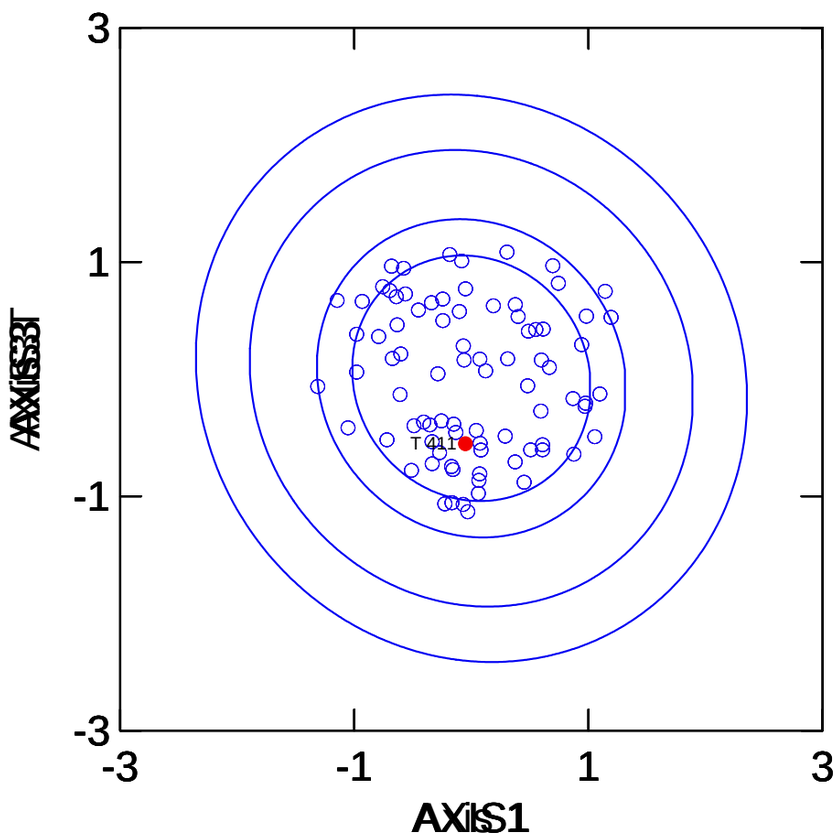
Description	Value
Bray-Curtis Distance	0.78
Bray Curtis Reference Median	2664.38

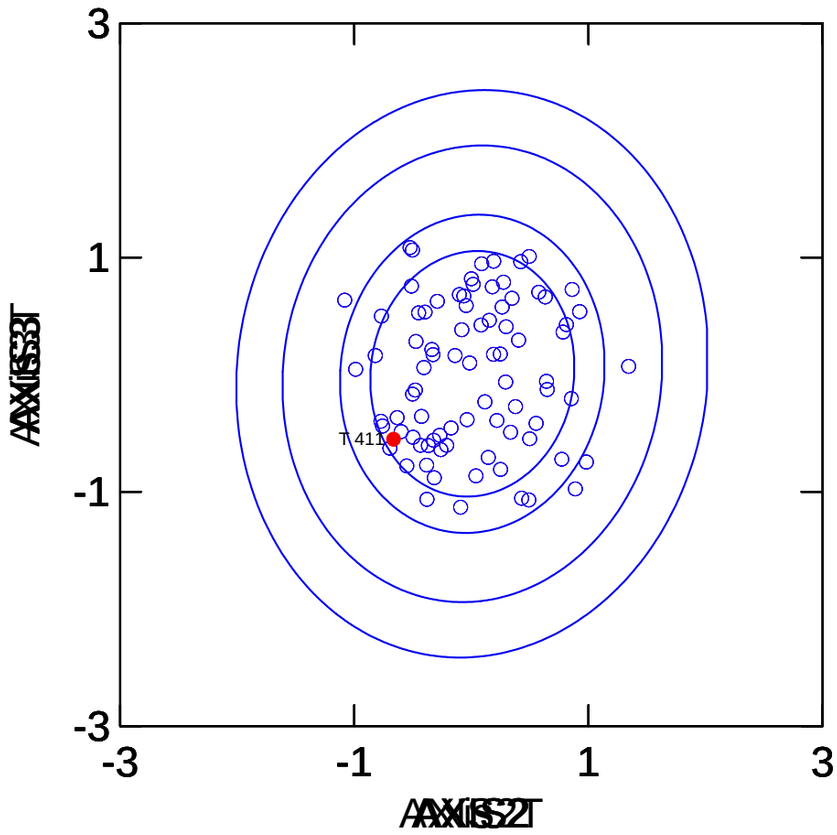
RIVPACS Analysis

Taxa	Probability Of Occurrence	2009 Total Abundance	Mean of Abundance for Reference Sites in Group 4	SD of Abundance for Reference Sites in Group 4	Benthic Invertebrate Taxa Tolerance	
Glossosomatidae	0.14	-	2.562	7.672	0	Sensitive
Muscidae	0.11	5	0.884	3.454	6	Insensitive
Valvatidae	0.11	-	8.286	43.046	8	Tolerant
Gammaridae	0.1	-	15.022	67.781	4	Insensitive
Leptophlebiidae	0.09	-	10.918	44.525	2	Sensitive
Leuctridae	0.08	-	1.033	4.639	0	Sensitive
Sphaeriidae	0.08	-			8	Tolerant
Hydropsychidae	0.07	-	1.374	6.206	4	Insensitive
Limnesiidae	0.07	-	1.265	7.078		
Feltriidae	0.06	-	0.536	2.685		
Physidae	0.06	-	2.39	13.964	8	Tolerant
Torrenticolidae	0.06	-	1.625	12.857		
Aturidae	0.05	-	0.411	1.914		
Hyalellidae	0.04	8	0.854	4.15	8	Tolerant
Hydroptilidae	0.04	-	1.022	6.379	4	Insensitive
Uenoidae	0.04	-	1.819	12.652	0	Sensitive
Apataniidae	0.03	-	0.748	4.947	1	Sensitive
Dixidae	0.03	-	0.689	4.738	1	Sensitive
Hydridae	0.03	-				
Lepidostomatidae	0.03	-	11.596	104.268	3	Insensitive
Lymnaeidae	0.03	-	1.02	7.439	6	Insensitive
Pionidae	0.03	-	0.231	1.547		
Leptoceridae	0.02	-	0.301	2.744	4	Insensitive
Oxidae	0.02	-	1.021	8.79		
Perlidae	0.02	-	0.098	0.79	1	Sensitive
Planorbidae	0.02	-	0.217	1.976	7	Tolerant
Stratiomyidae	0.02	-	0.099	0.658		
Taeniopterygidae	0.02	-	0.057	0.522	2	Sensitive
Caenidae	0.01	-	0	0	7	Tolerant
Corixidae	0.01	-	0.506	4.61		
Curculionidae	0.01	-	0.024	0.22		
Dolichopodidae	0.01	-	0.063	0.577		
Elmidae	0.01	-	0	0	4	Insensitive
Hirudinidae	0.01	-	0	0		

Site Assessment Graphs







Site Assessment Vector Data

Assessment For The Test Site	
Vector 1 Vs Vector 2	Unstressed
Vector 1 Vs Vector 3	Unstressed
Vector 2 Vs Vector 3	Unstressed
Overall	Unstressed

Site Metrics

Metric Name	Test Site	Reference Mean	Standard Deviation	Sample Size
Total Abundance	826.92	2021.304	1341.27	
Total No. of Taxa	14.0	13.169	4.601	83

Site Assessment Report

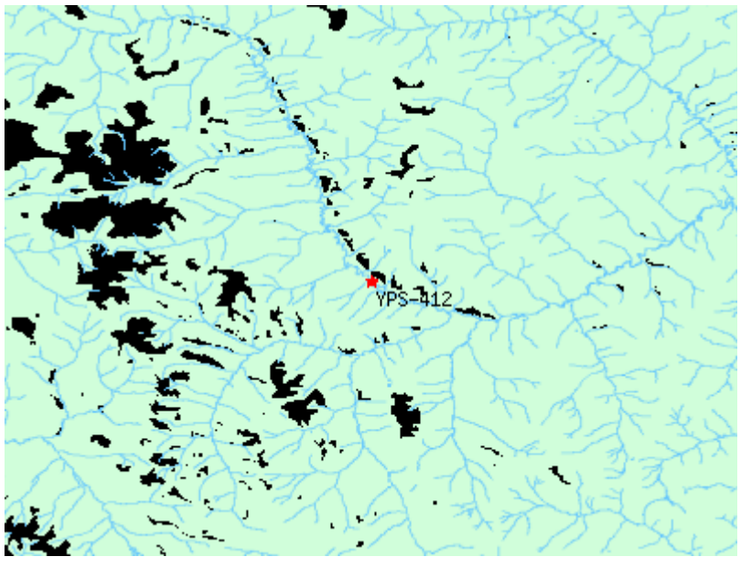
Site Metadata

Site	YPS-412
Sample Date	Jul 23 2009
Latitude	N 62° 20' 56"
Longitude	W 137° 16' 17"
Altitude	2232
Feature Name	Big Creek
Stream Order	4

Site Photograph

Up Stream

Context Map



BEAST Prediction Results

Predictor Variables	Altitude,Landcover - Alpine,Landcover - Forest,Landcover - Unregen Forest,Landcover - Wetland,Longitude,Precip Rainfall JAN (mm),Precip Snowfall JUN (mm),Stream density (m stream/km2 catchment),Temp Max JAN (deg C)
Predicted Group Number	4

Group	**1**	**2**	**3**	**4**	**5**
Probability	0.1%	0.1%	0.1%	81.9%	17.8%

Habitat Attributes

Variable	Site	Reference Group Mean	Standard Deviation	Sample Size
Channel Depth - avg (cm)	62.2	31.984	28.413	83
Drainage Area (km^2)	674.83	131.838	230.495	83
General - Conductivity (uS/cm)	119	230.84	179.366	83
General - pH (pH)	7.2	7.662	0.59	83
Landcover - Alpine (%)	16.28	27.34	33	83
Landcover - Forest (%)	6.19	19.085	27.643	83
Landcover - Lake (%)	0.02	0.426	1.585	83
Landcover - Unregen Forest (%)	0	1.71	6.039	83
Landcover - Wetland (%)	0	0.352	1.251	83
Precip Rainfall JAN (mm) (mm)	0	0.253	0.647	83
Precip Snowfall JUN (mm) (mm)	1.9	0.778	1.143	83
Solids - total suspended (TSS) (mg/L)	1	Not Available	Not Available	Not Available
Stream density (m stream/km2 catchment) (m/km^2)	816.97	456.436	294.056	83
Substrate - embeddedness category (Category(1-5))	4	3.831	0.881	83
Temp Max JAN (deg C) (Degrees Celsius)	-26	-21.486	3.258	83
Width - Wetted (m)	13.7	6.78	5.88	83

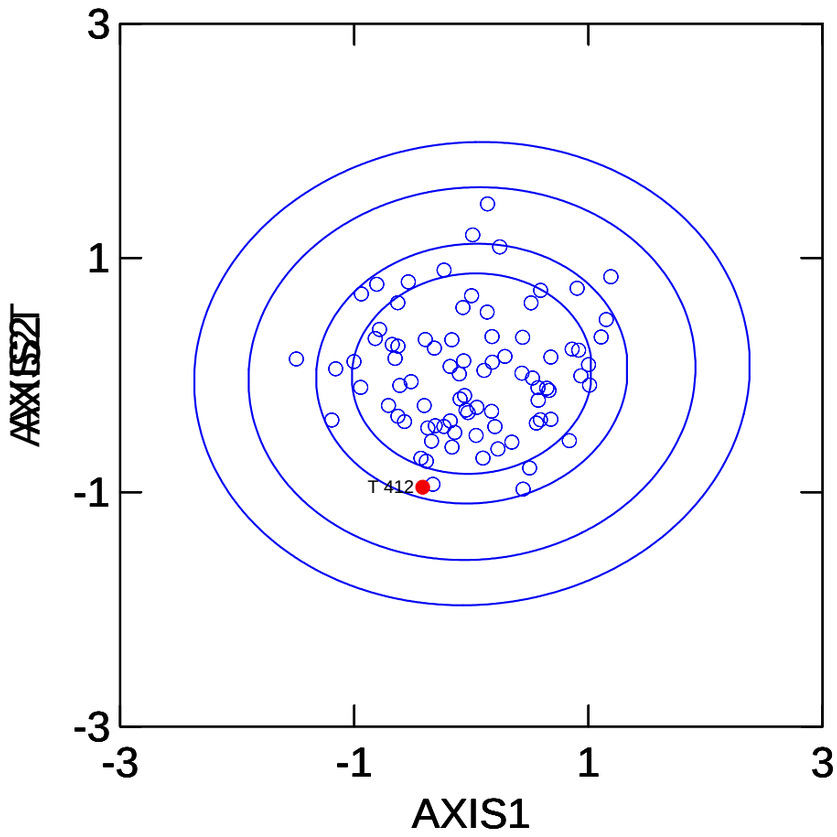
Bray-Curtis Analysis

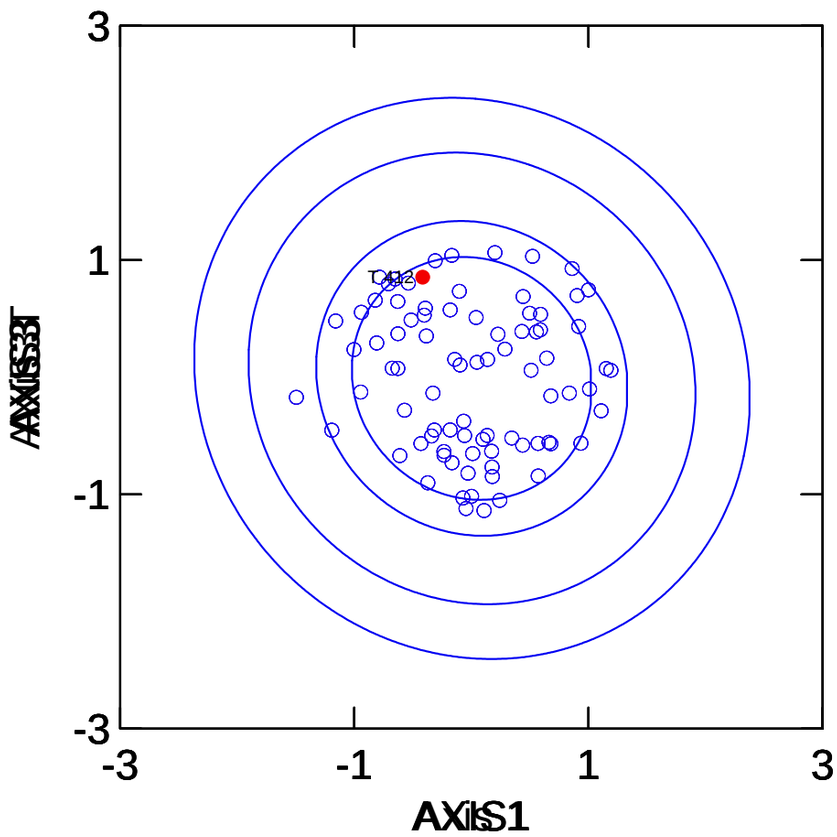
Description	Value
Bray-Curtis Distance	0.87
Bray Curtis Reference Median	2664.38

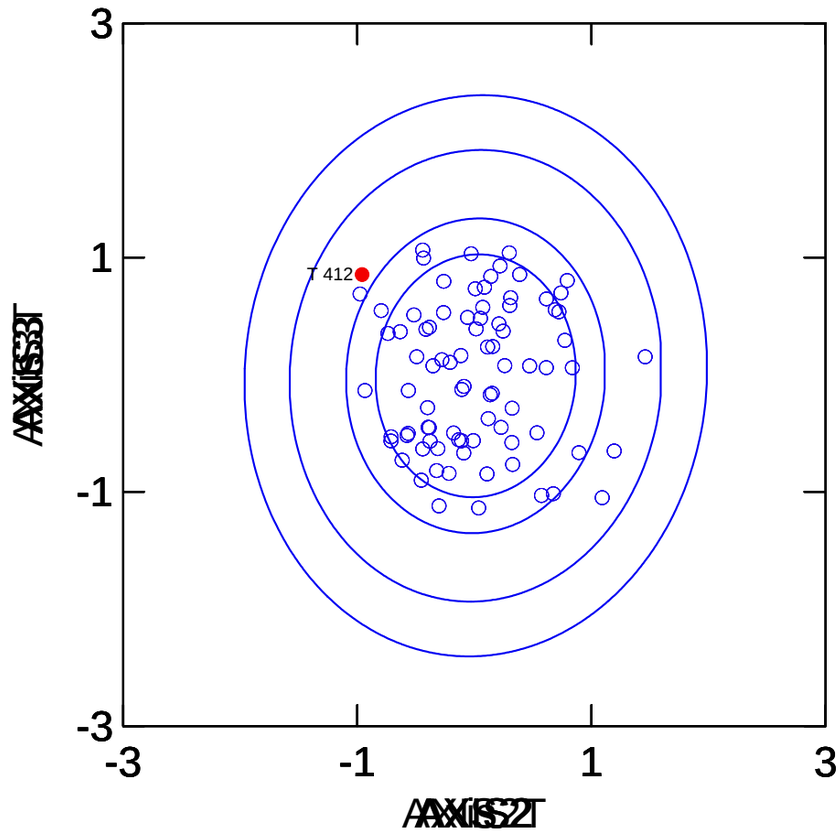
RIVPACS Analysis

Taxa	Probability Of Occurrence	2009 Total Abundance	Mean of Abundance for Reference Sites in Group 4	SD of Abundance for Reference Sites in Group 4	Benthic Invertebrate Taxa Tolerance	
Chironomidae	1	938	802.805	729.921	6	Insensitive
Baetidae	0.94	2125	266.355	335.387	4	Insensitive
Simuliidae	0.92	475	196.279	344.165	6	Insensitive
Nemouridae	0.83	-	199.788	481.869	2	Sensitive
Heptageniidae	0.74	500	125.1	224.978	4	Insensitive
Empididae	0.57	13	15.69	23.306	6	Insensitive
Tipulidae	0.57	-	20.236	44.586	3	Insensitive
Sperchonidae	0.56	25	26.463	53.194	8	Tolerant
Capniidae	0.53	-	38.278	128.73	1	Sensitive
Lebertiidae	0.5	113	25.081	56.375	8	Tolerant
Perlodidae	0.43	13	10.64	21.321	2	Sensitive
Chloroperlidae	0.4	150	22.267	65.022	1	Sensitive
Limnephilidae	0.4	25	12.781	42.161	4	Insensitive
Ephemerellidae	0.32	600	45.387	181.354	1	Sensitive
Lumbriculidae	0.31	-	47.107	133.253	8	Tolerant
Ameletidae	0.3	-	9.456	27.8	0	Sensitive
Hydrozetidae	0.3	-	2.975	7.957		
Ceratopogonidae	0.23	-	10.467	30.596	6	Insensitive
Hygrobatidae	0.21	-	6.942	19.855	8	Tolerant
Naididae	0.21	-	14.354	45.061	10	Tolerant
Psychodidae	0.2	-	4.936	15.808	10	Tolerant
Rhyacophilidae	0.2	-	5.978	17.547	0	Sensitive
Brachycentridae	0.18	-	12	67.79	1	Sensitive
Dytiscidae	0.15	-	4.342	21.087	5	Insensitive
Tubificidae	0.15	-	17.054	100.978	10	Tolerant
Glossosomatidae	0.13	-	2.562	7.672	0	Sensitive
Gammaridae	0.11	-	15.022	67.781	4	Insensitive
Muscidae	0.1	-	0.884	3.454	6	Insensitive
Valvatidae	0.1	-	8.286	43.046	8	Tolerant

Site Assessment Graphs







Site Assessment Vector Data

Assessment For The Test Site	
Vector 1 Vs Vector 2	Unstressed
Vector 1 Vs Vector 3	Unstressed
Vector 2 Vs Vector 3	Unstressed
Overall	Unstressed

Site Metrics

Metric Name	Test Site	Reference Group Mean	Standard Deviation	Sample Size
Total Abundance	4975.0	2021.304	1341.27	
Total No. of Taxa	11.0	13.169	4.601	83

Site Assessment Report

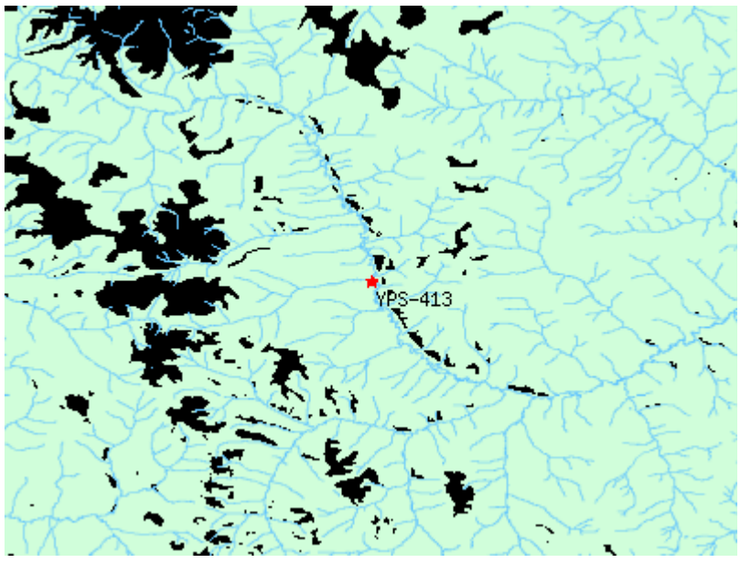
Site Metadata

Site	YPS-413
Sample Date	Jul 23 2009
Latitude	N 62° 22' 24"
Longitude	W 137° 23' 12"
Altitude	2311
Feature Name	Magman Creek
Stream Order	4

Site Photograph

Up Stream

Context Map



BEAST Prediction Results

Predictor Variables	Altitude,Landcover - Alpine,Landcover - Forest,Landcover - Unregen Forest,Landcover - Wetland,Longitude,Precip Rainfall JAN (mm),Precip Snowfall JUN (mm),Stream density (m stream/km2 catchment),Temp Max JAN (deg C)
Predicted Group Number	4

Group	**1**	**2**	**3**	**4**	**5**
Probability	0.1%	0.0%	0.1%	82.9%	16.8%

Habitat Attributes

Variable	Site	Reference Group Mean	Standard Deviation	Sample Size
Channel Depth - avg (cm)	27.4	31.984	28.413	83
Drainage Area (km^2)	40.93	131.838	230.495	83
General - Conductivity (uS/cm)	104	230.84	179.366	83
General - pH (pH)	7.2	7.662	0.59	83
Landcover - Alpine (%)	9.14	27.34	33	83
Landcover - Forest (%)	0	19.085	27.643	83
Landcover - Lake (%)	0	0.426	1.585	83
Landcover - Unregen Forest (%)	0	1.71	6.039	83
Landcover - Wetland (%)	0	0.352	1.251	83
Precip Rainfall JAN (mm) (mm)	0	0.253	0.647	83
Precip Snowfall JUN (mm) (mm)	1.9	0.778	1.143	83
Solids - total suspended (TSS) (mg/L)	0.2	Not Available	Not Available	Not Available
Stream density (m stream/km2 catchment) (m/km^2)	767.15	456.436	294.056	83
Substrate - embeddedness category (Category(1-5))	4	3.831	0.881	83
Temp Max JAN (deg C) (Degrees Celsius)	-26	-21.486	3.258	83
Width - Wetted (m)	2.5	6.78	5.88	83

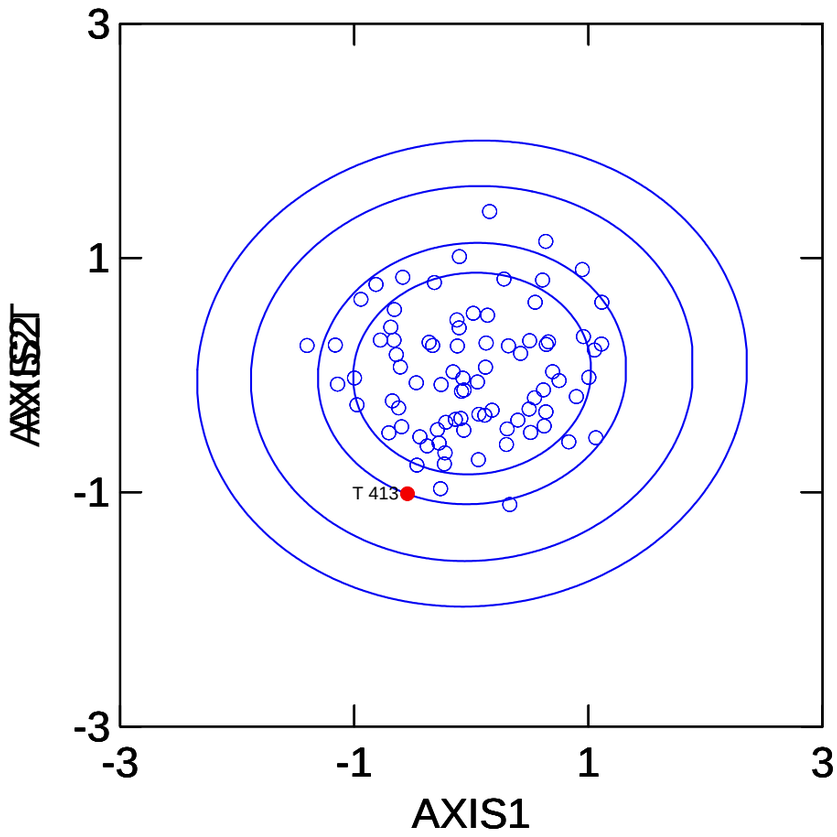
Bray-Curtis Analysis

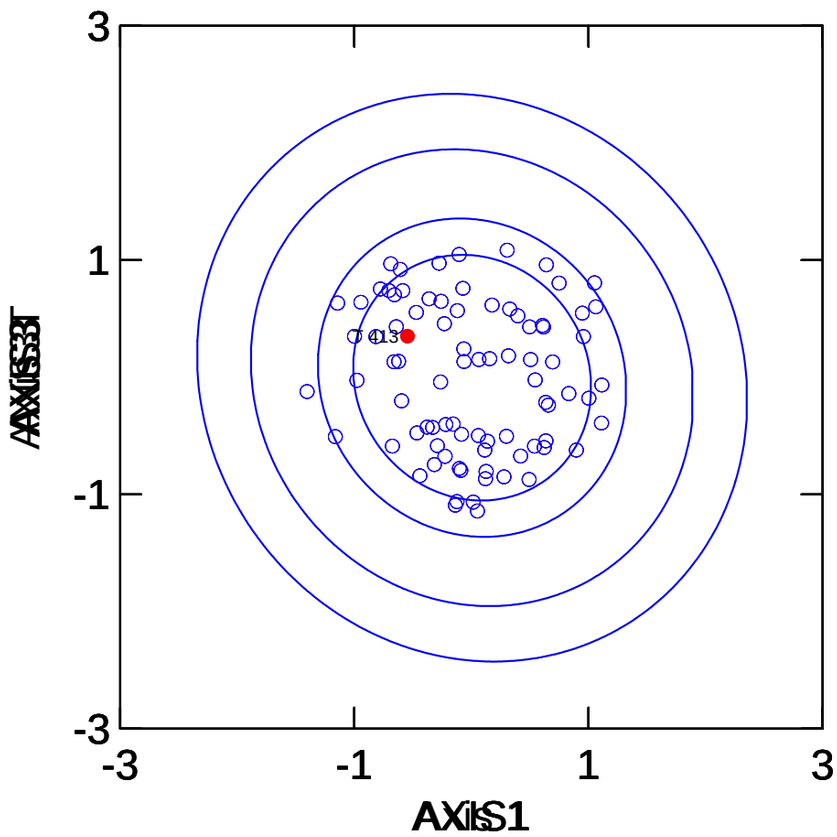
Description	Value
Bray-Curtis Distance	0.92
Bray Curtis Reference Median	2664.38

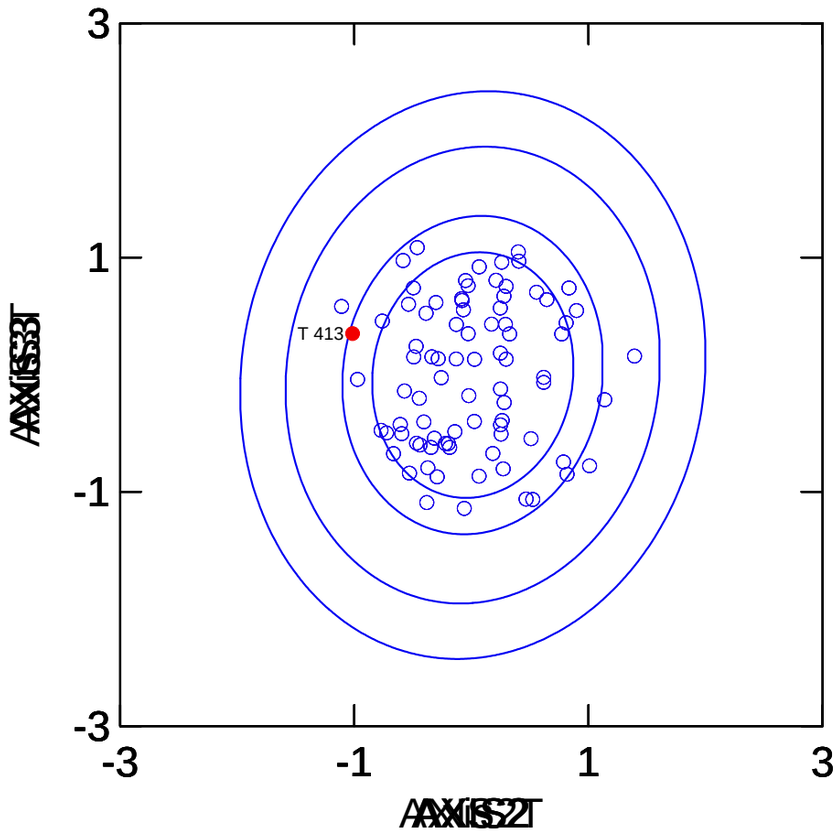
RIVPACS Analysis

Taxa	Probability Of Occurrence	2009 Total Abundance	Mean of Abundance for Reference Sites in Group 4	SD of Abundance for Reference Sites in Group 4	Banthic Invertebrate Taxa Tolerance	
Chironomidae	1	900	802.805	729.921	6	Insensitive
Baetidae	0.94	15	266.355	335.387	4	Insensitive
Simuliidae	0.92	23	196.279	344.165	6	Insensitive
Nemouridae	0.83	100	199.788	481.869	2	Sensitive
Heptageniidae	0.74	362	125.1	224.978	4	Insensitive
Tipulidae	0.58	-	20.236	44.586	3	Insensitive
Empididae	0.57	8	15.69	23.306	6	Insensitive
Sperchonidae	0.56	-	26.463	53.194	8	Tolerant
Capniidae	0.53	-	38.278	128.73	1	Sensitive
Lebertiidae	0.5	8	25.081	56.375	8	Tolerant
Perlodidae	0.42	8	10.64	21.321	2	Sensitive
Chloroperlidae	0.4	-	22.267	65.022	1	Sensitive
Limnephilidae	0.4	-	12.781	42.161	4	Insensitive
Ephemerellidae	0.32	15	45.387	181.354	1	Sensitive
Ameletidae	0.31	23	9.456	27.8	0	Sensitive
Lumbriculidae	0.31	208	47.107	133.253	8	Tolerant
Hydrozetidae	0.29	-	2.975	7.957		
Ceratopogonidae	0.23	-	10.467	30.596	6	Insensitive
Hygrobatidae	0.21	-	6.942	19.855	8	Tolerant
Naididae	0.21	-	14.354	45.061	10	Tolerant
Psychodidae	0.2	8	4.936	15.808	10	Tolerant
Rhyacophilidae	0.2	-	5.978	17.547	0	Sensitive
Brachycentridae	0.18	-	12	67.79	1	Sensitive
Dytiscidae	0.15	-	4.342	21.087	5	Insensitive
Tubificidae	0.15	915	17.054	100.978	10	Tolerant
Glossosomatidae	0.13	-	2.562	7.672	0	Sensitive
Gammaridae	0.11	-	15.022	67.781	4	Insensitive
Muscidae	0.1	-	0.884	3.454	6	Insensitive
Valvatidae	0.1	-	8.286	43.046	8	Tolerant

Site Assessment Graphs







Site Assessment Vector Data

Assessment For The Test Site	
Vector 1 Vs Vector 2	Potentially Stressed
Vector 1 Vs Vector 3	Unstressed
Vector 2 Vs Vector 3	Potentially Stressed
Overall	Potentially Stressed

Site Metrics

Metric Name	Test Site	Reference Group Mean	Standard Deviation	Sample Size
Total Abundance	2592.21	2021.304	1341.27	
Total No. of Taxa	13.0	13.169	4.601	83

Site Assessment Report

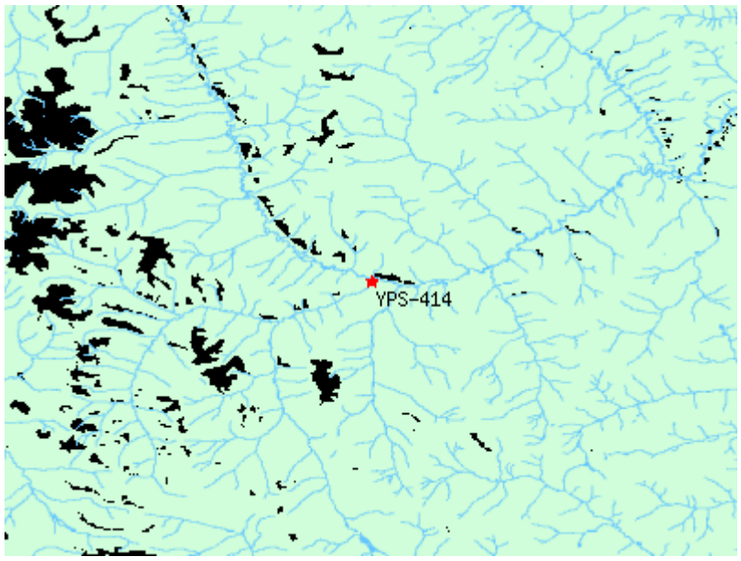
Site Metadata

Site	YPS-414
Sample Date	Jul 23 2009
Latitude	N 62° 21' 21"
Longitude	W 137° 10' 23"
Altitude	2074
Feature Name	Seymour Creek
Stream Order	5

Site Photograph

Up Stream

Context Map



BEAST Prediction Results

Predictor Variables	Altitude,Landcover - Alpine,Landcover - Forest,Landcover - Unregen Forest,Landcover - Wetland,Longitude,Precip Rainfall JAN (mm),Precip Snowfall JUN (mm),Stream density (m stream/km2 catchment),Temp Max JAN (deg C)
Predicted Group Number	4

Group	**1**	**2**	**3**	**4**	**5**
Probability	0.2%	0.1%	0.3%	80.0%	19.4%

Habitat Attributes

Variable	Site	Reference Group Mean	Standard Deviation	Sample Size
Channel Depth - avg (cm)	21.6	31.984	28.413	83
Drainage Area (km^2)	302.83	131.838	230.495	83
General - Conductivity (uS/cm)	169	230.84	179.366	83
General - pH (pH)	7.7	7.662	0.59	83
Landcover - Alpine (%)	18.39	27.34	33	83
Landcover - Forest (%)	27.17	19.085	27.643	83
Landcover - Lake (%)	0	0.426	1.585	83
Landcover - Unregen Forest (%)	0	1.71	6.039	83
Landcover - Wetland (%)	0.61	0.352	1.251	83
Precip Rainfall JAN (mm) (mm)	0	0.253	0.647	83
Precip Snowfall JUN (mm) (mm)	1.9	0.778	1.143	83
Solids - total suspended (TSS) (mg/L)	0.2	Not Available	Not Available	Not Available
Stream density (m stream/km2 catchment) (m/km^2)	799.34	456.436	294.056	83
Substrate - embeddedness category (Category(1-5))	4	3.831	0.881	83
Temp Max JAN (deg C) (Degrees Celsius)	-26	-21.486	3.258	83
Width - Wetted (m)	6.7	6.78	5.88	83
Channel Depth - avg (cm)	21.6	31.984	28.413	83

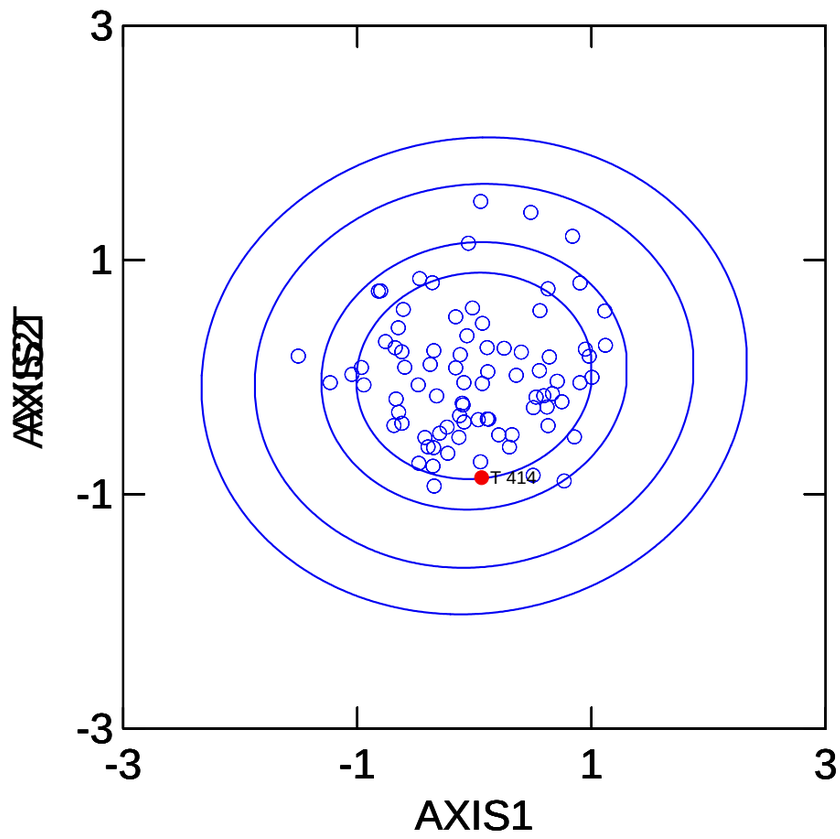
Bray-Curtis Analysis

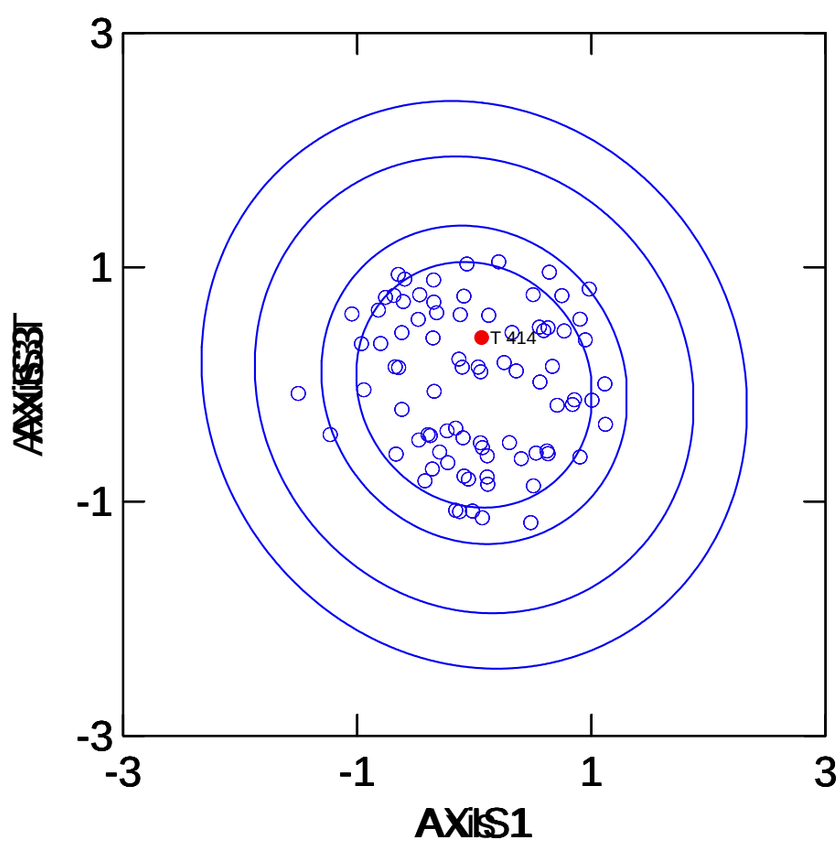
Description	Value
Bray-Curtis Distance	0.94
Bray Curtis Reference Median	2664.38

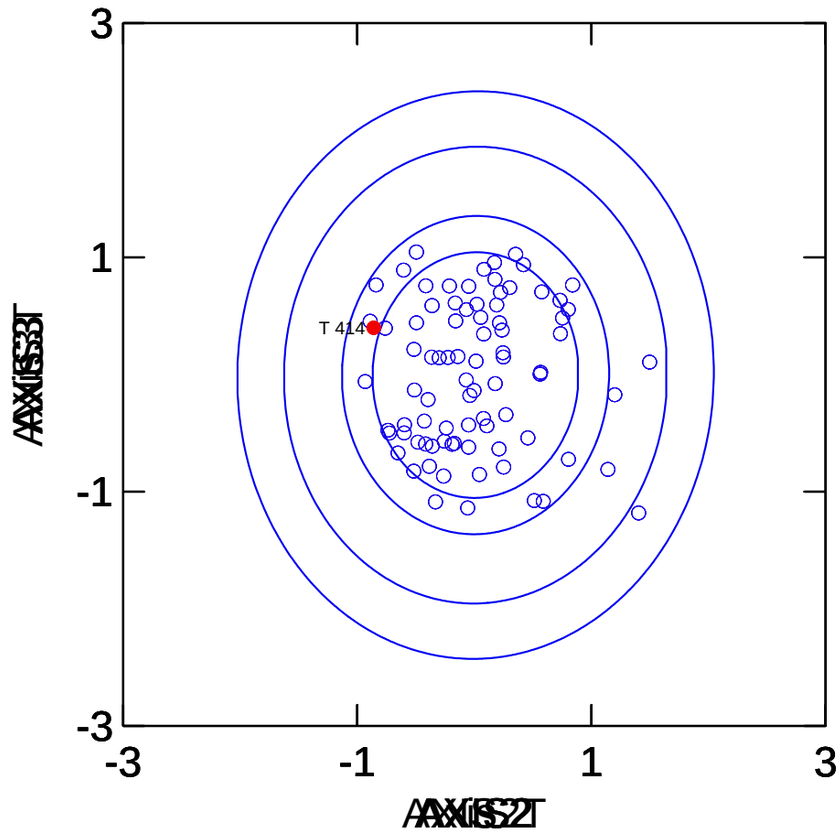
RIVPACS Analysis

Taxa	Probability Of Occurrence	2009 Total Abundance	Mean of Abundance for Reference Sites in Group 4	SD of Abundance for Reference Sites in Group 4	Benthic Invertibrate Taxa Tolerance	
Chironomidae	1	500	802.805	729.921	6	Insensitive
Baetidae	0.94	346	266.355	335.387	4	Insensitive
Simuliidae	0.92	100	196.279	344.165	6	Insensitive
Nemouridae	0.83	69	199.788	481.869	2	Sensitive
Heptageniidae	0.74	731	125.1	224.978	4	Insensitive
Tipulidae	0.57	15	20.236	44.586	3	Insensitive
Empididae	0.56	38	15.69	23.306	6	Insensitive
Sperchonidae	0.55	92	26.463	53.194	8	Tolerant
Capniidae	0.54	-	38.278	128.73	1	Sensitive
Lebertiidae	0.49	85	25.081	56.375	8	Tolerant
Perlodidae	0.43	31	10.64	21.321	2	Sensitive
Chloroperlidae	0.4	54	22.267	65.022	1	Sensitive
Limnephilidae	0.39	8	12.781	42.161	4	Insensitive
Ephemerellidae	0.32	115	45.387	181.354	1	Sensitive
Lumbriculidae	0.31	54	47.107	133.253	8	Tolerant
Ameletidae	0.3	8	9.456	27.8	0	Sensitive
Hydrozetidae	0.3	-	2.975	7.957		
Ceratopogonidae	0.22	-	10.467	30.596	6	Insensitive
Hygrobatidae	0.21	-	6.942	19.855	8	Tolerant
Naididae	0.21	-	14.354	45.061	10	Tolerant
Psychodidae	0.19	15	4.936	15.808	10	Tolerant
Rhyacophilidae	0.19	-	5.978	17.547	0	Sensitive
Brachycentridae	0.17	-	12	67.79	1	Sensitive
Dytiscidae	0.15	-	4.342	21.087	5	Insensitive
Tubificidae	0.14	138	17.054	100.978	10	Tolerant
Glossosomatidae	0.13	8	2.562	7.672	0	Sensitive
Gammaridae	0.11	-	15.022	67.781	4	Insensitive
Muscidae	0.1	15	0.884	3.454	6	Insensitive
Valvatidae	0.1	-	8.286	43.046	8	Tolerant

Site Assessment Graphs







Site Assessment Vector Data

Assessment For The Test Site	
Vector 1 Vs Vector 2	Potentially Stressed
Vector 1 Vs Vector 3	Unstressed
Vector 2 Vs Vector 3	Potentially Stressed
Overall	Potentially Stressed

Site Metrics

Metric Name	Test Site	Reference Group Mean	Standard Deviation	Sample Size
Total Abundance	2422.93	2021.304	1341.27	
Total No. of Taxa	19.0	13.169	4.601	83

Site Assessment Report

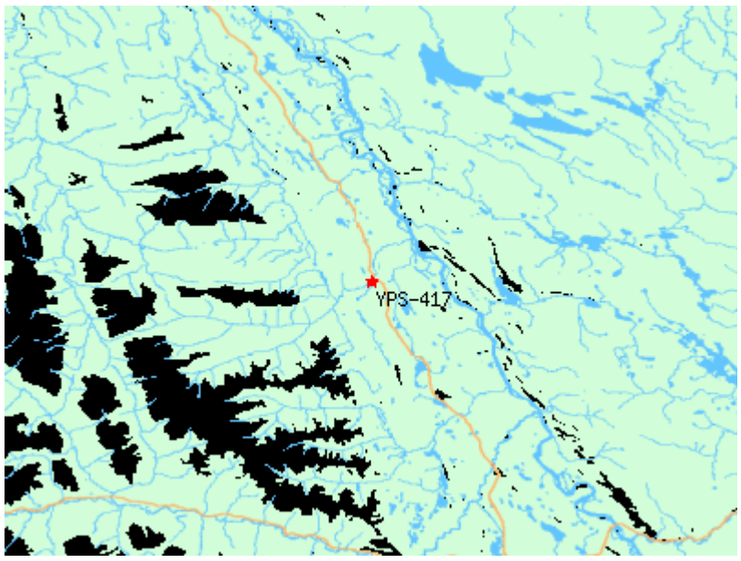
Site Metadata

Site	YPS-417
Sample Date	Aug 05 2009
Latitude	N 62° 3' 17"
Longitude	W 132° 51' 38"
Altitude	2457
Feature Name	Grew Creek
Stream Order	4

Site Photograph

Up Stream

Context Map



BEAST Prediction Results

Predictor Variables	Altitude,Landcover - Alpine,Landcover - Forest,Landcover - Unregen Forest,Landcover - Wetland,Longitude,Precip Rainfall JAN (mm),Precip Snowfall JUN (mm),Stream density (m stream/km2 catchment),Temp Max JAN (deg C)
Predicted Group Number	4

Group	**1**	**2**	**3**	**4**	**5**
Probability	0.4%	1.9%	0.5%	95.8%	1.3%

Habitat Attributes

Variable	Site	Reference Group Mean	Standard Deviation	Sample Size
Channel Depth - avg (cm)	10.3	31.984	28.413	83
Drainage Area (km^2)	85.3	131.838	230.495	83
General - Conductivity (uS/cm)	0.654	230.84	179.366	83
General - pH (pH)	8.6	7.662	0.59	83
Landcover - Alpine (%)	18.41	27.34	33	83
Landcover - Forest (%)	18.61	19.085	27.643	83
Landcover - Lake (%)	0.01	0.426	1.585	83
Landcover - Unregen Forest (%)	0	1.71	6.039	83
Landcover - Wetland (%)	0	0.352	1.251	83
Precip Rainfall JAN (mm) (mm)	0	0.253	0.647	83
Precip Snowfall JUN (mm) (mm)	-0.1	0.778	1.143	83
Solids - total suspended (TSS) (mg/L)	1.1	Not Available	Not Available	Not Available
Stream density (m stream/km2 catchment) (m/km^2)	862.9	456.436	294.056	83
Substrate - embeddedness category (Category(1-5))	4	3.831	0.881	83
Temp Max JAN (deg C) (Degrees Celsius)	-22.4	-21.486	3.258	83
Width - Wetted (m)	6	6.78	5.88	83

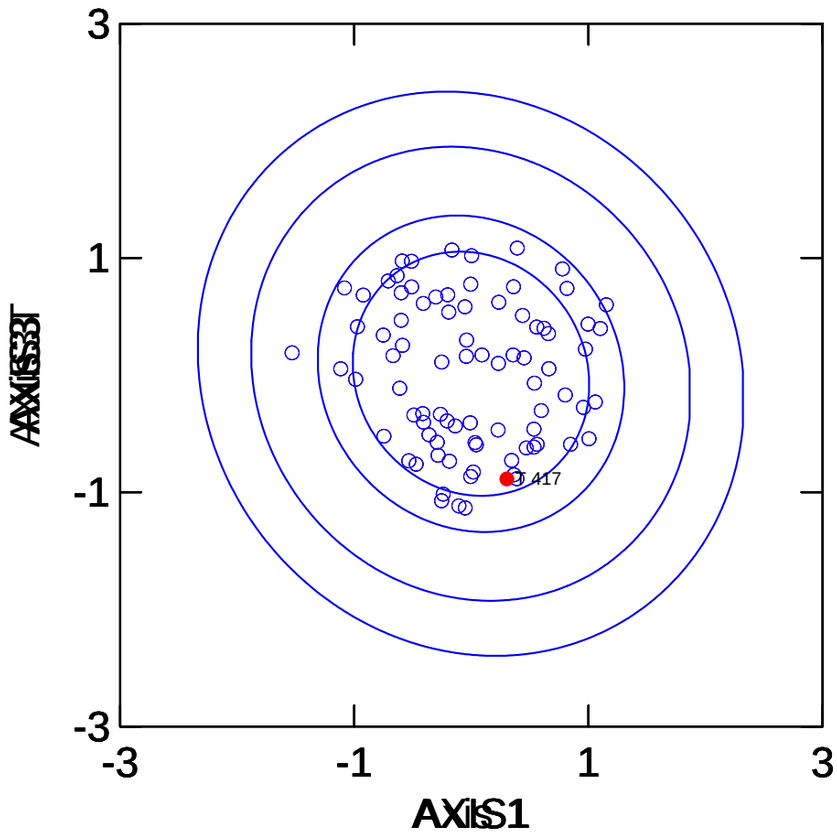
Bray-Curtis Analysis

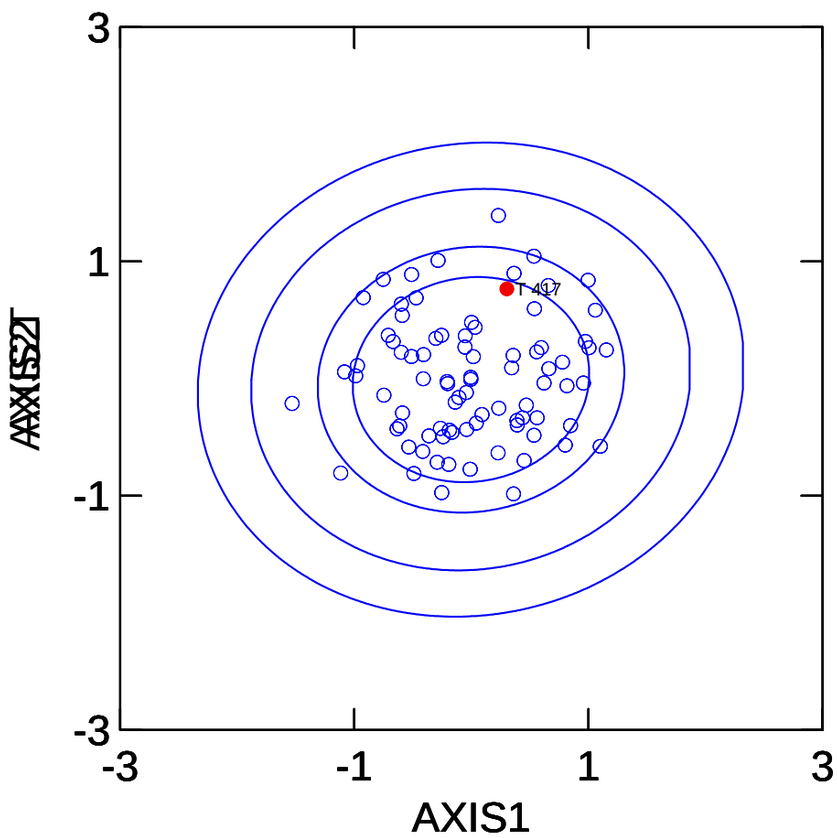
Description	Value
Bray-Curtis Distance	0.15
Bray Curtis Reference Median	2664.38

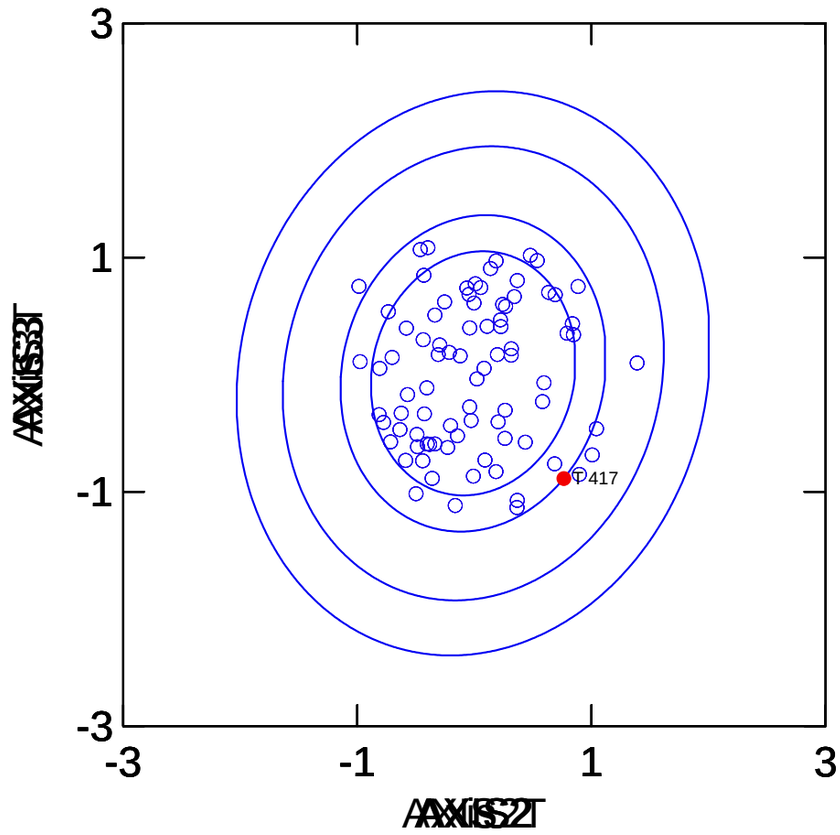
RIVPACS Analysis

Taxa	Probability Of Occurrence	2009 Total Abundance	Mean of Abundance for Reference Sites in Group 4	SD of Abundance for Reference Sites in Group 4	Benthic Invertebrate Taxa Tolerance	
Chironomidae	1	98	802.805	729.921	6	Insensitive
Simuliidae	0.93	17	196.279	344.165	6	Insensitive
Baetidae	0.92	94	266.355	335.387	4	Insensitive
Nemouridae	0.83	146	199.788	481.869	2	Sensitive
Heptageniidae	0.72	29	125.1	224.978	4	Insensitive
Tipulidae	0.61	-	20.236	44.586	3	Insensitive
Sperchonidae	0.6	-	26.463	53.194	8	Tolerant
Empididae	0.58	28	15.69	23.306	6	Insensitive
Lebertiidae	0.53	-	25.081	56.375	8	Tolerant
Capniidae	0.48	38	38.278	128.73	1	Sensitive
Limnephilidae	0.43	-	12.781	42.161	4	Insensitive
Chloroperlidae	0.42	15	22.267	65.022	1	Sensitive
Perlodidae	0.39	11	10.64	21.321	2	Sensitive
Ameletidae	0.34	13	9.456	27.8	0	Sensitive
Ephemerellidae	0.34	1	45.387	181.354	1	Sensitive
Lumbriculidae	0.31	-	47.107	133.253	8	Tolerant
Ceratopogonidae	0.27	-	10.467	30.596	6	Insensitive
Hydrozetidae	0.27	-	2.975	7.957		
Psychodidae	0.24	-	4.936	15.808	10	Tolerant
Rhyacophilidae	0.24	2	5.978	17.547	0	Sensitive
Hygrobatidae	0.23	-	6.942	19.855	8	Tolerant
Naididae	0.22	-	14.354	45.061	10	Tolerant
Brachycentridae	0.18	-	12	67.79	1	Sensitive
Dytiscidae	0.18	-	4.342	21.087	5	Insensitive
Tubificidae	0.17	-	17.054	100.978	10	Tolerant
Glossosomatidae	0.15	-	2.562	7.672	0	Sensitive
Muscidae	0.12	-	0.884	3.454	6	Insensitive
Valvatidae	0.11	-	8.286	43.046	8	Tolerant
Leptophlebiidae	0.09	-	10.918	44.525	2	Sensitive

Site Assessment Graphs







Site Assessment Vector Data

Assessment For The Test Site	
Vector 1 Vs Vector 2	Unstressed
Vector 1 Vs Vector 3	Unstressed
Vector 2 Vs Vector 3	Potentially Stressed
Overall	Potentially Stressed

Site Metrics

Metric Name	Test Site	Reference Group Mean	Standard Deviation	Sample Size
Total Abundance	508.0	2021.304	1341.27	
Total No. of Taxa	14.0	13.169	4.601	83