YOUNGS BAY
BENTHIC INVERTEBRATE STUDY

2009

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TABLE OF CONTENTS

Page

TABLE OF CONTENTS i

INTRODUCTION 1

METHODS 1

RESULTS 2

DISCUSSION 3

LIST OF FIGURES

Figure

1. Youngs Bay Net-Pen Sites 6
2. Tide Point/Bornstein Site Stations 7
3. Yacht Club Site Stations 8

LIST OF TABLES

Table

1. Tide Point Sedimentation Log Sheet 2009 9
2. Bornstein's Sedimentation Log Sheet 2009 10
3. Yacht Club Sedimentation Log Sheet 2009 11
4. 2009 Yacht Club Percent Grain Size Distribution and Total Organic Carbon 12
5. 2009 Tide Point/Bornstein Percent Grain Size Distribution and Total Organic Carbon 12
6. 2009 Average Densities of Youngs Bay Dominant Species 12
7. 2009 Yacht Club Invertebrate Diversity and Density 13
8. 2009 Tide Point/Bornstein Invertebrate Diversity and Density 14
9. Youngs Bay Benthic Invertebrate Densities Per Station, 2003-09 15
10. Yacht Club Most Dominant Benthic Invertebrate Species Per Station, 2005-09 15
11. Tide Pt./Bornstein Most Dominant Benthic Invertebrate Species Per Station, 2005-09 15
12. Tide Point/Bornstein Wilcoxon Test Analysis, Impact Station 3 17
13. Tide Point/Bornstein Wilcoxon Test Analysis, Impact Station 5 22
14. Tide Point/Bornstein Wilcoxon Test Analysis, Perimeter Station 15 27
15. Tide Point/Bornstein Wilcoxon Test Analysis, Perimeter Station 18 32
16. Yacht Club Wilcoxon Test Analysis, Impact Station 1 37
17. Yacht Club Wilcoxon Test Analysis, Perimeter Station 12 42

INTRODUCTION

This is the eighth report under the National Pollutant Discharge Elimination System (NPDES) permit (#101767) Clatsop County Fisheries salmon net-pen sites in Youngs Bay (Figure 1). This is the sixth year that the Tide Point and Bornstein sites are being combined into one site due to their close proximity to each other (approximately 200 feet).

This report will include benthic invertebrate, core sampling data and analysis taken from the Tide Point/Bornstein and Yacht Club net-pen sites in Youngs Bay. Clatsop County Fisheries (CCF) personnel were responsible for taking the benthic and core samples. Columbia Analytical Services in Kelso, Washington completed grain size distribution and total organic carbon testing of the sediment. Susan Weeks of Oikos, Inc. in Corvallis, Oregon completed the benthic invertebrate sorting and identification. All benthic and core samples were taken in June of 2009. Under the new permit, the next sampling period will be in 2011, as long as the fish production level remains the same.

METHODS

This was the fifth year that a homemade sampler was used in collecting the benthic data. The sampler was attached to a rope that was lowered into the water until it hit bottom. The rope was then pulled up and down several times along with the upper lead weights to help drive the sampler into the sediment. The sampler was then pulled out of the water. The 3-inch diameter aluminum tube was then loosened and a ring near the top of the sampler, which is attached to a small chain and rubber ball, was pulled to release the water pressure that was helping hold the sediment sample in the sampler. The sampler was pulled away from the aluminum tube while the tube was being held down firmly in a plastic tub. The bottom of the tube was then quickly lifted up while putting a hand under the bottom of the sediment sample. A plunger, which fits firmly inside the aluminum tube, gently pushed the sediment to the top of the tube. The sediment core was then pushed five centimeters beyond the top of the tube. The sediment core was then cut by a plastic scraper into the plastic tub along with the water from above the sediment core.

Each benthic replicate was deposited into a labeled small plastic bucket until all replicates were collected from each site. Each replicate was then rinsed through a 0.5-millimeter mesh screen with a small submersible water pump. The remaining debris and invertebrates were then rinsed into a labeled small plastic container. A buffered formalin solution was added to each replicate container. After one week, each replicate was rinsed and preserved in a Kahle's solution (protein stain) and ethanol until analyzed. The benthic invertebrates from each replicate were sorted and identified to the lowest possible taxonomic classification; usually species.

The sediment samples were taken with a 1 1/2-inch diameter aluminum core sampler approximately 5-cm deep for grain size distribution and total organic carbon content. This sampler was lowered into the water until it hit bottom. The sampler was then

brought straight up and out of the water. The sediment was pushed out from the bottom by a plunger that fit firmly inside the aluminum tube. The sediment was cut into a small, labeled plastic container. Each container was placed in a cooler with frozen gel packs to keep cool until analyzed.

The Tide Point/Bornstein site consisted of two impact stations (one at each net-pen area), two perimeter stations (one at each net-pen area), and three reference stations (Figure 2). There were three benthic and two sediment grabs taken at each impact, perimeter and reference station.

The Yacht Club site consisted of one impact station, one perimeter station and three reference stations (Figure 3). There were three benthic and two sediment grabs taken at each impact, perimeter and reference station.

A sedimentation log was established at the two Youngs Bay sites (Tables 1-3). One grab was taken under each net pen with a 1 1/2-inch core sampler. Each tube of sediment was analyzed for presence of sulfur odor, black surface layer and benthic invertebrates. Each grab was deposited back into the water after the observations were completed.

RESULTS

Tables 1-3 show the results of the Tide Point, Bornstein and Yacht Club sedimentation observations under each net pen. No hydrogen sulfide odor or black surface layer was present. All samples revealed living organisms present.

Table 4 shows the New Zealand mudsnail *Potamopyrgus antipodarum*, was the most dominant species in three out of the five stations at the Yacht Club site. The largest concentration of a species occurred at reference station 11 with the New Zealand mudsnail *P. antipodarum* at 38,316 per square meter. The grain size distribution varied at the Yacht Club stations with the highest percent sand of 64.9 at the reference station 10 and the lowest at reference station 11 with 42.5 percent. The highest percent silt/clay was found at reference station 11 at 57.2, while the lowest occurred at the reference station 10 with 29.0 percent. The total organic carbon (TOC) was the lowest at reference station 9 at 1.06 percent, while the highest occurred at the impact station at 2.04 percent.

Table 5 shows the aquatic earthworm Oligochaeta as being the most dominant benthic invertebrate species in three out of the seven stations with the New Zealand mudsnail *P. antipodarum* and the amphipod *Americorophium salmonis* were each dominant at 2 stations at the Tide Point/Bornstein net-pen site. The highest concentration of a species occurred at the reference station 6 with the amphipod *A. salmonis* at 92,210 per square meter. The grain size distribution varied at each station. The highest percent gravel of 41.0 was at reference station 6, while the lowest of 0.0 was at impact station 3, reference stations 7 and 8 and perimeter station 18. The highest percent sand of 78.6 was at perimeter station 18, and the lowest percent sand of 29.4 was at reference

station 8. The highest percent silt/clay of 76.2 was at reference station 8, while the lowest percent silt/clay of 14.3 was at perimeter station 18. The total organic carbon (TOC) was the highest at impact station 5 at 4.55 percent, while the lowest was at perimeter station 18 at 0.93 percent.

Table 6 shows the average densities of the five most dominant species per impact, perimeter and reference stations in the Youngs Bay system for 2009. The New Zealand mudsnail *P. antipodarum* had the highest average density of 22,556 per meter squared for the impact stations and 27,869 per meter squared for the perimeter stations. The amphipod *A. salmonis,* however, had the highest average density of 23,969 per meter squared for the reference stations. The 2009 highest overall average density for the Youngs Bay system was the New Zealand mudsnail *P. antipodarum* with 22,138 per meter squared.

Tables 7 and 8 show species diversity trends at the two net-pen sites. The impact station at the Yacht Club site averaged 12 species; the three reference stations averaged 9 species, while the perimeter station averaged 10 species. The two impact stations at the Tide Point/Bornstein site averaged 10 species, while the reference stations averaged 9 and perimeter stations averaged 9.5 species.

Table 9 shows the average densities of the five most common benthic invertebrate species over the last five sampling periods in Youngs Bay. The top two benthic invertebrate species over the last five sampling periods have been the New Zealand mud snail *P. antipodarum* and the amphipod *A. salmonis.* The pattern seems to indicate year-to-year natural fluctuations in densities between the two benthic invertebrates. The fluctuations in their populations seem to be gradual from one sampling period to the next.

Tables 10 and 11 show the average densities the most dominant benthic invertebrates per impact, perimeter, and reference stations at both the Yacht Club and Tide Pt./Bornstein net-pen sites over the past three sampling periods.

DISCUSSION

The overall differences in species abundance and diversity in Youngs Bay can be attributed to many factors. The location of each site, tidal flows, daily movements of certain benthic invertebrates, lunar phases, amount of natural debris and sediment within the water column, the extra nutrient load of fish waste (both natural and net pen) and exotic species all influence species abundance and diversity within the Youngs Bay system.

This year's (2009) sampling results showed the New Zealand mudsnail *P. antipodarum* being the overall dominant benthic invertebrate in the Youngs Bay system. The New Zealand mudsnail was dominant in five out of the twelve total stations. The aquatic earthworm Oligochaeta was dominant at four stations, while the amphipod *A. salmonis* was dominant at three stations.

The New Zealand mud snail has shown to be the most dominant benthic invertebrate species in the Youngs Bay system in the last five out of six years. This species of invertebrates are adaptable to a wide variety of environmental conditions. They have been known to be eaten by fish and survive to reproduce after going through the fish's digestive system. These characteristics alone are reasons why this invertebrate species have been prolific in the Youngs Bay system. Clatsop County Fisheries staff continues to notice the mud snails attached to the net-pen poles and nets hanging in the water. The overall high densities of this species have seen a decline in the past five years. Possible reasons could be the dispersal of the snails throughout the Youngs Bay system. Evidence of this dispersal comes from the staff with this species of snails observed on net-pen poles and nets temporarily installed for salmon broodstock holding from mid-August to mid-November approximately five miles upstream from the Tide Point/Bornstein site. Dispersal to Youngs Bay tributaries (Lewis & Clark, Walluski and upper Youngs River) of the New Zealand mud snail has not yet been confirmed but is suspected. This dispersal, along with possible temporary consumption by other species of fish such as sturgeon, peamouth chubs, suckers and carp (all primarily bottom feeders), could have an affect on the overall densities of this exotic species within the net-pen areas. The snails could be consumed in one area and deposited as excrement in another area by any or all of these species of fish.

The statistical analysis using the Wilcoxin test shows the Tide Point/Bornstein site as having no significant differences in species diversity and abundances between the impact station 3 and reference stations (Tables 12-15). The species diversity between the impact station 3 and reference stations in this year's sampling was not significantly different. Impact station 5 also showed no significant differences in species diversity and abundance to the reference stations. Again, the species diversity between the reference stations and the impact station was very similar. The past five out of six years the species diversity has been significantly dominant at the impact station. Last sampling year (2007) was the first year where the diversity of benthic invertebrates was stronger at the reference stations. This year, the impact stations have a slightly higher diversity at 10 species per impact station than the reference stations, which average 9 species per reference stations. The reasons are not certain, but speculation might be the natural migration of these species around this area of the Youngs Bay system. This will continue to be monitored during the next sampling period. The Wilcoxin test also shows that there are no significant differences in species abundance and diversity between the reference stations and perimeter station 15 at this site. There were also no significant differences in species diversity and abundances between the reference stations and perimeter station 18.

Although the Yacht Club site overall shows some slight differences in species diversity and abundance between the impact and reference stations, the Wilcoxin test shows that there is no statistically significant differences (Tables 16-17). The average species diversity at the impact station was 12, while the average species diversity at the reference stations was 9. There were also no significant differences in species isolation comparisons between the impact and reference stations. The Wilcoxin test also shows

that there were no significant differences in species diversity, abundance and species isolation comparisons between the reference stations and the perimeter station 12. There are also no significant differences in species isolation comparisons between the impact and reference stations.

There does seem to be some correlation between the New Zealand mudsnail and the amphipod *A. salmonis*. Over the past four sampling periods, the mudsnail and amphipod have been trading off as the most dominant species in the Youngs Bay system. Both are bottom dwelling invertebrates. When one species is dominant the other species seem to be less abundant. This relationship will continue to be monitored as subsequent samplings are made.

Overall, the impact of the salmon net pens in Youngs Bay seem to stay within the allowable mixing zone of 50 feet surrounding each array of net pens. Species diversity and abundance seems to be slightly greater at the impact sites at the Yacht Club site while this year, the species diversity and abundance were nearly the same between the impact and reference stations at the Tide Point/Bornstein site. Nutrients from fish food and waste, along with a diversity of structures under and around the net pen, are possible reasons for this occurrence at the Yacht Club site. The fact that the 16 net pens at the Tide Pt section were not used for fish rearing during the 2008-09 rearing period, might be a possible reason for the more evenly dispersal in species diversity and abundance in and around this site. The next sampling will occur in the year 2011, unless fish production increases. If this occurs then the samplings will continue annually.

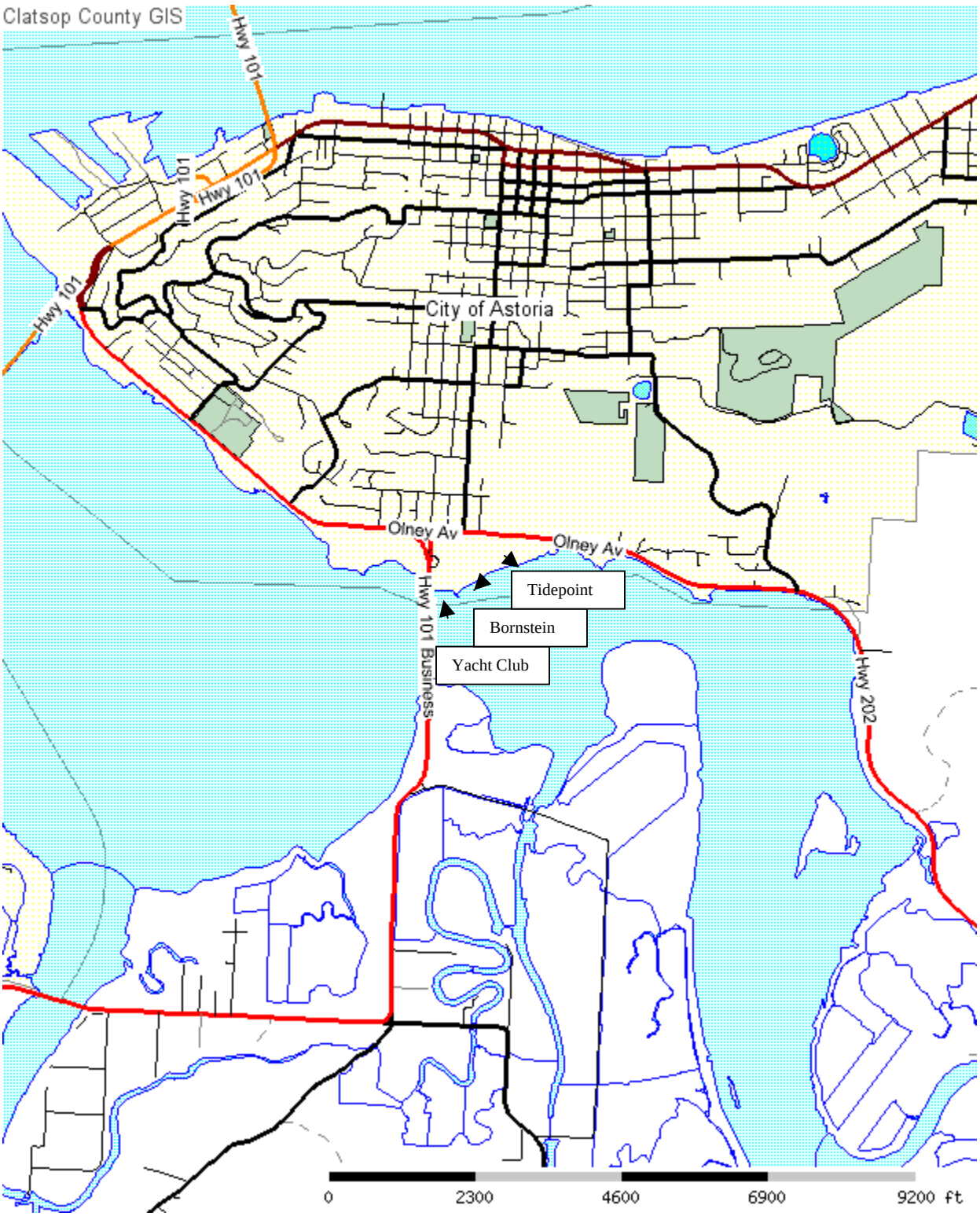

Figure 1. Youngs Bay Net-Pen Sites

YOUNGS BAY - TIDE POINT AND BORNSTEIN SITES

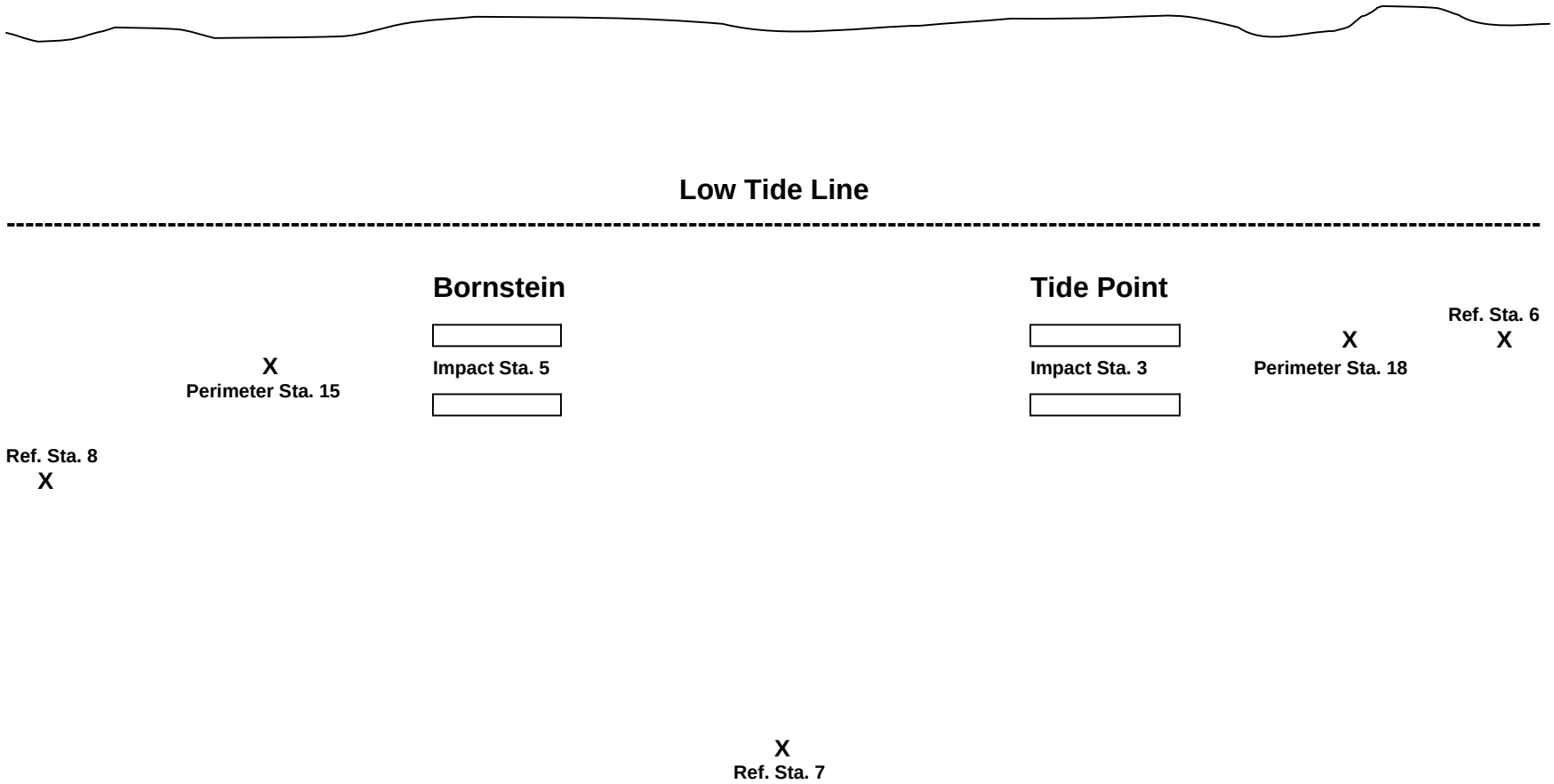

Figure 2. Tide Point/Bornstein Site Stations.

YOUNGS BAY - YACHT CLUB SITE

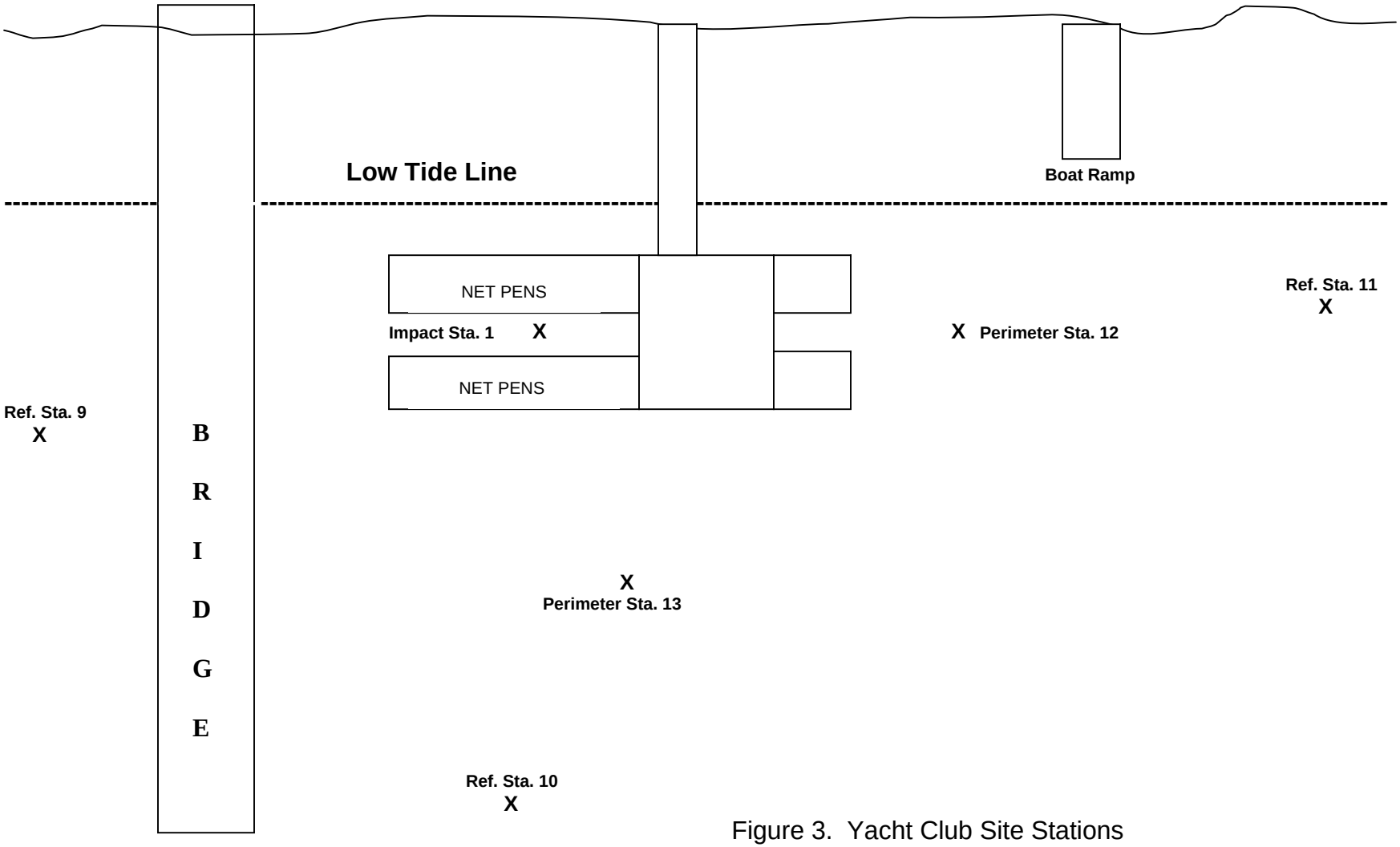

Figure 3. Yacht Club Site Stations

Table 1. Tide Point Sedimentation Log Sheet 2009.

Pen #	H_2S odor	Black Surface Layer	Living Organisms Present	Depth of Oxidized Layer	Comments
1	No	No	Yes	1-2 cm	Lt gray soft top; gray clay bottom
2	No	No	Yes	1-2 cm	Lt gray top; black detritus; wood chunks
3	No	No	Yes	1-2 cm	Lt brown top with clams; black clay bottom
4	No	No	Yes	1-2 cm	Lt brown soft top with detritus; black clay bottom
5	No	No	Yes	2 cm	Lt brown soft top; firm gray/black clay bottom
6	No	No	Yes	1-2 cm	Lt brown soft top; dark gray clay bottom
7	No	No	Yes	2 cm	Lt brown soft top; woody debris; dark gray clay bot.
8	No	No	Yes	1 cm	Lt brown soft top with gravel; gray clay bottom
9	No	No	Yes	1-2 cm	Lt brown soft top; sand; clams; gray/black clay bot.
10	No	No	Yes	2 cm	Lt brown soft top; juvenile clams; gray clay bottom
11	No	No	Yes	1-2 cm	Lt brown soft top with gravel; gray/black bottom
12	No	No	Yes	2 cm	Lt brown soft top; wood chunks; black clay bottom
13	No	No	Yes	1-2 cm	Lt brown soft top; gravel; wood; black clay bottom
14	No	No	Yes	1-2 cm	Lt brown soft top; black clay bottom
15	No	No	Yes	2 cm	Lt brown soft top; soft gray/black clay with detritus
16	No	No	Yes	1-2 cm	Lt brown soft top; gray clay bottom

Table 2. Bornstein's Sedimentation Log Sheet 2009.

Pen #	H_2S	Black Surface Layer	Living Organisms Present	Depth of Oxidized Layer	Comments
1	No	No	Yes	2 cm	Gravel top layer; lt gray clay bottom 11/2 "
2	No	No	Yes	2-3 cm	Lt. Brown soft layer; black detritous layer; gray clay
3	No	No	Yes	<1 cm	Lt. Brown top layer; woodchunks; clams; dark clay
4	No	No	Yes	2 cm	Lt. Brown top layer; gray clay with gravel
5	No	No	Yes	<1 cm	Lt. Brown sandy top; gray sandy clay bottom
6	No	No	Yes	2-3 cm	Lt. Brown soft top; black clay bottom with detritous
7	No	No	Yes	2-3 cm	Lt. Brown soft top; soft gray & black bottom
8	No	No	Yes	2-3 cm	Lt. Brown soft top; gray/black clay bottom
9	No	No	Yes	1-2 cm	Lt. Brown soft top; gravel; sand; woodchunks
10	No	No	Yes	2-3 cm	Lt brown top with gravel & sand; black clay bottom
11	No	No	Yes	1-2 cm	Lt brown top with gravel & sand; gray clay bottom
12	No	No	Yes	1-2 cm	Lt soft brown top with woodchunks; gray clay
13	No	No	Yes	<1 cm	Lt soft brown top; woodchunks; gray clay
14	No	No	Yes	1-2 cm	Lt soft brown top; woodchunks; gray clay
15	No	No	Yes	<1 cm	Lt soft brown top; woodchunks; gray clay
16	No	No	Yes	2 cm	Lt soft brown top; gray/black clay bottom

Table 3. Yacht Club Sedimentation Log Sheet 2009.

Pen #	H_2S odor	Black Surface Layer	Living Organisms Present	Depth of Oxidized Layer	Comments
1	No	No	Yes	2 cm	Lt brown sandy top; detritus; black clay bottom
2	No	No	Yes	2 cm	Lt brown sandy top; gray/black clay bottom
3	No	No	Yes	1-2 cm	Lt brown sandy top; gray/black clay bottom
4	No	No	Yes	1-2 cm	Lt brown sandy top; gray sandy clay bottom
5	No	No	Yes	1-2 cm	Lt brown sandy top; gray/black clay bottom
6	No	No	Yes	2 cm	Lt brown sandy/detritus top; gray/black clay bottom
7	No	No	Yes	<1 cm	Lt brown thin top; wood pieces; dark gray clay bot.
8	No	No	Yes	1 cm	Lt brown thin sandy top; sandy gray clay bottom
9	No	No	Yes	1-2 cm	Lt brown sandy top; dark sandy gray clay bottom
10	No	No	Yes	2 cm	Lt brown sandy top; sandy gray clay bottom
11	No	No	Yes	2 cm	Lt brown sandy top; dark sandy gray clay bottom
12	No	No	Yes	1-2 cm	Lt brown top; sandy gray/black clay bottom
13	No	No	Yes	<1 cm	Thin lt brown top; detritus; black clay bottom
14	No	No	Yes	1-2 cm	Thin lt brown sandy top; gray/black clay bottom
15	No	No	Yes	<1 cm	Thin lt brown sandy top; sandy gray clay bottom
16	No	No	Yes	<1 cm	Thin lt brown sandy top; sandy gray clay bottom
17	No	No	Yes	1-2 cm	Lt brown woody detritus top; sandy black clay bot.
18	No	No	Yes	1-2 cm	Lt brown sandy detritus top; sandy black clay bottom
19	No	No	Yes	1 cm	Lt brown detritus top; sandy black clay bottom
20	No	No	Yes	1-2 cm	Lt brown detritus top; black bottom
21	No	No	Yes	2 cm	Lt brown detritus; black clay bottom
22	No	No	Yes	2 cm	Lt brown sandy top; gray clay bottom
23	No	No	Yes	1 cm	Lt brown top; black detritus; clay bottom
24	No	No	Yes	1 cm	Lt brown top; woody pieces; soft black bottom
25	No	No	Yes	1-2 cm	Lt brown top; woody pieces; soft black bottom
26	No	No	Yes	1 cm	Lt brown top; black detritus; clay bottom
27	No	No	Yes	2 cm	Lt brown sandy top; black detritus; clay bottom
28	No	No	Yes	2 cm	Lt brown sandy top; black detritus; clay bottom
29	No	No	Yes	1-2 cm	Lt brown sandy top; black detritus; clay bottom
30	No	No	Yes	1-2 cm	Lt brown top; black sandy bottom
31	No	No	Yes	2 cm	Lt gray clay top; black clay bottom
32	No	No	Yes	<1 cm	Lt brown top; black detritus; clay bottom

Table 4. 2009 Yacht Club Percent Grain Size Distribution and Total Organic Carbon.

STATION	%Gravel	%Sand	%Silt/Clay	%TOC	Most Dominant Species	Density #/sq.meter
YC01I	0.25	61.3	34.9	2.04	Oligochaeta	31,880
YC09R	6.5	54.8	37.9	1.06	Americorophium salmonis	15,819
YC10R	5.8	64.9	29	1.66	Potamopyrgus antipodarum	1,203
YC11R	0	42.5	57.2	1.28	Potamopyrgus antipodarum	38,316
YC12P	0	50.2	49.6	1.36	Potamopyrgus antipodarum	35,970

Table 5. 2009 Tide Point./Bornstein Percent Grain Size Distribution and Total Organic Carbon.

STATION	%Gravel	%Sand	%Silt/Clay	%TOC	Most Dominant Species	Density #/sq.meter
TP03I	0	52.7	47.3	2.16	Oligochaeta	8,060
BO05I	8.5	43	40.7	4.55	Potamopyrgus antipodarum	47,879
TP06R	41.0	41	17.9	1.91	Americorophium salmonis	92,210
TB07R	0	51.7	46.2	1.07	Oligochaeta	15,459
BO08R	0.0	29.4	76.2	1.90	Oligochaeta	9,203
BO15P	0	39.6	24.5	1.49	Potamopyrgus antipodarum	21,594
TP18P	4.4	78.6	14.3	0.93	Americorophium salmonis	36,631

Table 6. 2009 Average Densities of Youngs Bay Dominant Species.

SPECIES	IMPACT	REFERENCE	PERIMETER	OVERALL
Potamopyrgus antipodarum	22,556	15,990	27,869	22,138
Americorophium salmonis	20,210	23,969	20,310	21,496
Oligochaeta	18,646	6,887	9,463	11,665
Eogammarus confervicolus	2,987	1,513	1,363	1,954
Hobsonia florida	1444	752	681	959

Table 7. 2009 Yacht Club invertebrate diversity and density.

	Impact-1	Ref-9	Ref-10	Ref-11	Per-12
TAXON	**#/Sq.M**	**#/Sq.M**	**#/Sq.M**	**#/Sq.M**	**#/Sq.M**
Americorophium salmonis	19368	15819	120	34286	12511
Coulana canadensis	842	0	421	180	1744
Chironomiidae larvae	60	0	60	0	0
Corbicula fluminea	60	0	0	0	60
Cumacea	421	0	241	541	782
Decapoda	0	0	0	0	0
Entomobryidae	0	0	60	0	0
Eogammarus confervicolis	6737	0	60	5955	2827
Gnorismosphaeroma insulare	0	0	0	60	0
Heliidae larvae	0	0	0	0	0
Hobsonia florida	1444	662	0	2346	1263
Idotea sp	0	60	0	0	0
Macoma bathica	60	60	0	60	0
Nematoda	1023	0	60	662	241
Nereis limnicola	662	361	0	602	722
Oligochaeta	31880	60	842	10707	10406
Potamopyrgus antipodarum	15519	8000	1203	38316	35970
Total/Sq.M	**78075**	**25022**	**3068**	**93714**	**66526**
Number of Species	**12**	**7**	**9**	**11**	**10**
1st Species % of Population	**24.8**	**63.2**	**3.9**	**36.6**	**2.6**
1st + 2nd % of Population	**25.9**	**63.2**	**17.6**	**37.2**	**21.4**
1st+ 2nd + 3rd % of Population	**26.0**	**63.2**	**25.5**	**37.4**	**22.6**

Table 8. 2009 Tide Point/Bornstein invertebrate diversity and density.

	Impact-3	Impact-5	Ref-6	Ref-7	Ref-8	Per-15	Per-18
TAXON	**#/Sq.M**	**#/Sq.M**	**#/Sq.M**	**#/Sq.M**	**#/Sq.M**	**#/Sq.M**	**#/Sq.M**
Americorophium salmonis	662	40601	92210	962	421	11789	36631
Coulana canadensis	0	180	60	361	0	60	602
Chironomiidae larvae	0	120	120	180	0	0	0
Corbicula fluminea	0	0	60	0	0	0	60
Cumacea	421	301	60	1263	1744	481	241
Decapoda	0	0	60	0	0	0	0
Entomobryidae	60	0	0	0	0	0	0
Eogammarus confervicolis	60	2165	3008	0	60	662	602
Gnorismosphaeroma insulare	0	241	0	0	0	0	0
Heliidae larvae	0	0	0	60	0	0	0
Hobsonia florida	1444	1444	1504	0	0	60	722
Idotea sp	0	0	0	0	0	0	0
Macoma bathica	0	60	0	0	0	0	0
Nematoda	0	361	241	602	0	301	120
Nereis limnicola	180	361	180	1444	60	120	301
Oligochaeta	8060	16000	5053	15459	9203	10406	7579
Potamopyrgus antipodarum	4271	47879	40541	4211	3669	21594	26045
Total/Sq.M	**15158**	**109714**	**143097**	**24541**	**15158**	**45473**	**72902**
Number of Species	**8**	**12**	**12**	**9**	**6**	**9**	**10**
1st Species % of Population	**4.4**	**37.0**	**64.4**	**3.9**	**0.0**	**0.1**	**50.2**
1st + 2nd % of Population	**4.4**	**37.1**	**64.5**	**9.1**	**2.8**	**1.2**	**50.2**
1st+ 2nd + 3rd % of Population	**4.4**	**37.1**	**64.5**	**10.5**	**14.3**	**27.1**	**51.1**

Table 9. Youngs Bay Benthic Invertebrate Densities Per Station, 2003-09.

Species	2003	2004	2005	2007			2009
Potamopyrgus antipodarum	17443	18452	24941	26721			20601
Americorophium salmonis	37109	21280	15377	20854			22115
Oligochaeta	9677	11056	13160	12969			10471
Hobsonia florida	3322	8958	12929	2698			907
Eogammarus confervicolis	326	278	2483	1971			1844

Table 10. Yacht Club Most Dominant Benthic Invertebrate Species Per Station, 2005-09.

	2005		2007				2009	
Station	Species	Density	Species	Density			Species	Density
YC01I	P. antipodarum	39218	Oligochaeta	83969			Oligochaeta	31880
YC 09R	Oligochaeta	19007	A. salmonis	21955			A. salmonis	15819
YC10R	H. florida	12812	A. salmonis	73323			P. antipodarum	1203
YC11R	H. florida	20271	A. salmonis	27428			P. antipodarum	38316
YC12P	P. antipodarum	31458	P. antipodarum	38158			P. antipodarum	35970

Table 11. Tide Pt./Bornstein Most Dominant Benthic Invertebrate Species Per Station, 2005-09.

	2005		2007				2009	
Station	Species	Density	Species	Density			Species	Density
TP03I	P. antipodarum	53955	P. antipodarum	11429			Oligochaeta	8060
BO05I	A. salmonis	43789	P. antipodarum	84390			P. antipodarum	47879
TP06R	P. antipodarum	7639	P. antipodarum	19068			A. salmonis	92210
TB07R	P. antipodarum	25203	A. salmonis	7158			Oligochaeta	15459
BO08R	Oligochaeta	10827	A. salmonis	12872			Oligochaeta	9203
BO15P	Oligochaeta	14677	P. antipodarum	34286			P. antipodarum	21594
TP18P	P. antipodarum	55759	P. antipodarum	41323			A. salmonis	36631

Table 12. Tide Point/Bornstein Wilcoxin Test Analysis, Impact Station 3.

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 3 in the Number of Animals/Sample

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 3				
Number of Animals/Sample	1075	1221	83	134	175	99	88	136	28	90	100	62	" =0.05	
Excel Rank	11	12	3	8	10	6	4	9	1	5	7	2	$8	Tabular Value
Matches	1	1	1	1	1	1	1	1	1	1	1	1	T=14	
Wilcoxon Rank	11	12	3	8	10	6	4	9	1	5	7	2	T'=25	
				T=	64					T=	14			**Do Not Reject Null Hypothesis**
				N=9						N=3				

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 3 in the Number of Species/Sample

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 3				
Number of Species/Sample	7	11	5	9	7	6	5	4	4	7	6	4	" =0.05	
Excel Rank	8	12	4	11	8	6	4	1	1	8	6	1	$8	Tabular Value
Matches	3	1	2	1	3	2	2	3	3	3	2	3	T=17.5	
Wilcoxon Rank	9	12	4.5	11	9	6.5	4.5	2	2	9	6.5	2	T'=21.5	
				T=	60.5					T=	17.5			**Do Not Reject Null Hypothesis**
				N=9						N=3				

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 3 in the Dominant Species % of Sample

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 3				
Dominant Species % of Sample	72	61.1	15.7	6.72	4	0	0	0	0	8.89	3	0	" =0.05	
Excel Rank	12	11	10	8	7	1	1	1	1	9	6	1	$8	Tabular Value
Matches	1	1	1	1	1	5	5	5	5	1	1	5	T=18	
Wilcoxon Rank	12	11	10	8	7	3	3	3	3	9	6	3	T'=21	
				T=	60					T=	18			**Do Not Reject Null Hypothesis**
				N=9						N=3				

The dominant species may not be the same for every station

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 3 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 3				
Americorophium salmonis	774	746	13	9	7	0	6	0	1	8	3	0	" =0.05	
Excel Rank	12	11	10	9	7	1	6	1	4	8	5	1	$8	Tabular Value
Matches	1	1	1	1	1	3	1	3	1	1	1	3	T=15	
Wilcoxon Rank	12	11	10	9	7	2	6	2	4	8	5	2	T'=24	
				T=	63					T=	15			**Do Not Reject Null Hypothesis**
				N=9						N=3				

Table 12. (continued) Tide Point/Bornstein Wilcoxin Test Analysis, Impact Station 3.

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 3 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 3				
Coulana canadensis	0	1	0	3	3	0	0	0	0	0	0	0	" =0.05	
Excel Rank	1	10	1	11	11	1	1	1	1	1	1	1	$8	Tabular Value
Matches	9	1	9	2	2	9	9	9	9	9	9	9	T=15	
Wilcoxon Rank	5	10	5	11.5	11.5	5	5	5	5	5	5	5	T'=24	
				T=	63					T=	15			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 3 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 3				
Chironomiidae larvae	0	0	2	2	0	1	0	0	0	0	0	0	" =0.05	
Excel Rank	1	1	11	11	1	10	1	1	1	1	1	1	$8	Tabular Value
Matches	9	9	2	2	9	1	9	9	9	9	9	9	T=15	
Wilcoxon Rank	5	5	11.5	11.5	5	10	5	5	5	5	5	5	T'=24	
				T=	63					T=	15			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 3 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 3				
Corbicula fluminea	0	1	0	0	0	0	0	0	0	0	0	0	" =0.05	
Excel Rank	1	12	1	1	1	1	1	1	1	1	1	1	$8	Tabular Value
Matches	11	1	11	11	11	11	11	11	11	11	11	11	T=18	
Wilcoxon Rank	6	12	6	6	6	6	6	6	6	6	6	6	T'=21	
				T=	60					T=	18			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 3 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 3				
Cumacea	0	1	0	4	7	10	17	8	4	3	4	0	" =0.05	
Excel Rank	1	4	1	6	9	11	12	10	6	5	6	1	$8	Tabular Value
Matches	3	1	3	3	1	1	1	1	3	1	3	3	T=14	
Wilcoxon Rank	2	4	2	7	9	11	12	10	7	5	7	2	T'=25	
				T=	64					T=	14			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Table 12. (continued) Tide Point/Bornstein Wilcoxin Test Analysis, Impact Station 3.

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 3 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 3				
Decapoda	0	1	0	0	0	0	0	0	0	0	0	0	" =0.05	
Excel Rank	1	12	1	1	1	1	1	1	1	1	1	1	$8	Tabular Value
Matches	11	1	11	11	11	11	11	11	11	11	11	11	T=18	
Wilcoxon Rank	6	12	6	6	6	6	6	6	6	6	6	6	T'=21	
				T=	60					T=	18			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 3 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 3				
Entomobryidae	0	0	0	0	0	0	0	0	0	1	0	0	" =0.05	
Excel Rank	1	1	1	1	1	1	1	1	1	12	1	1	$8	Tabular Value
Matches	11	11	11	11	11	11	11	11	11	1	11	11	T=24	
Wilcoxon Rank	6	6	6	6	6	6	6	6	6	12	6	6	T'=15	
				T=	54					T=	24			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 3 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 3				
Eogammarus confervicolis	28	22	0	0	0	0	1	0	0	0	0	1	" =0.05	
Excel Rank	12	11	1	1	1	1	9	1	1	1	1	9	$8	Tabular Value
Matches	1	1	8	8	8	8	2	8	8	8	8	2	T=18.5	
Wilcoxon Rank	12	11	4.5	4.5	4.5	4.5	9.5	4.5	4.5	4.5	4.5	9.5	T'=20.5	
				T=	59.5					T=	18.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 3 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 3				
Gnorismosphaeroma insulare	0	0	0	0	0	0	0	0	0	0	0	0	" =0.05	
Excel Rank	1	1	1	1	1	1	1	1	1	1	1	1	$8	Tabular Value
Matches	12	12	12	12	12	12	12	12	12	12	12	12	T=19.5	
Wilcoxon Rank	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	T'=19.5	
				T=	58.5					T=	19.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Table 12. (continued) Tide Point/Bornstein Wilcoxin Test Analysis, Impact Station 3.

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 3 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 3				
Heliidae larvae	0	0	0	1	0	0	0	0	0	0	0	0	" =0.05	
Excel Rank	1	1	1	12	1	1	1	1	1	1	1	1	$8	Tabular Value
Matches	11	11	11	1	11	11	11	11	11	11	11	11	T=18	
Wilcoxon Rank	6	6	6	12	6	6	6	6	6	6	6	6	T'=21	
				T=	60					T=	18			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 3 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 3				
Hobsonia florida	14	8	3	0	0	0	0	0	0	11	6	7	" =0.05	
Excel Rank	12	10	7	1	1	1	1	1	1	11	8	9	$8	Tabular Value
Matches	1	1	1	6	6	6	6	6	6	1	1	1	T=28	
Wilcoxon Rank	12	10	7	3.5	3.5	3.5	3.5	3.5	3.5	11	8	9	T'=11	
				T=	50					T=	28			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 3 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 3				
Idotea sp	0	0	0	0	0	0	0	0	0	0	0	0	" =0.05	
Excel Rank	1	1	1	1	1	1	1	1	1	1	1	1	$8	Tabular Value
Matches	12	12	12	12	12	12	12	12	12	12	12	12	T=19.5	
Wilcoxon Rank	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	T'=19.5	
				T=	58.5					T=	19.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 3 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 3				
Macoma bathica	0	0	0	0	0	0	0	0	0	0	0	0	" =0.05	
Excel Rank	1	1	1	1	1	1	1	1	1	1	1	1	$8	Tabular Value
Matches	12	12	12	12	12	12	12	12	12	12	12	12	T=19.5	
Wilcoxon Rank	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	T'=19.5	
				T=	58.5					T=	19.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Table 12. (continued) Tide Point/Bornstein Wilcoxin Test Analysis, Impact Station 3.

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 3 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 3				
Nematoda	2	2	0	3	5	2	0	0	0	0	0	0	" =0.05	
Excel Rank	8	8	1	11	12	8	1	1	1	1	1	1	$8	Tabular Value
Matches	3	3	7	1	1	3	7	7	7	7	7	7	T=12	
Wilcoxon Rank	9	9	4	11	12	9	4	4	4	4	4	4	T'=27	
				T=	66					T=	12			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 3 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 3				
Nereis limnicola	1	2	0	5	11	8	0	1	0	2	1	0	" =0.05	
Excel Rank	5	8	1	10	12	11	1	5	1	8	5	1	$8	Tabular Value
Matches	3	2	4	1	1	1	4	3	4	2	3	4	T=17	
Wilcoxon Rank	6	8.5	2.5	10	12	11	2.5	6	2.5	8.5	6	2.5	T'=22	
				T=	61					T=	17			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 3 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 3				
Oligochaeta	11	9	64	87	113	57	34	107	12	48	52	34	" =0.05	
Excel Rank	2	1	9	10	12	8	4	11	3	6	7	4	$8	Tabular Value
Matches	1	1	1	1	1	1	2	1	1	1	1	2	T=17.5	
Wilcoxon Rank	2	1	9	10	12	8	4.5	11	3	6	7	4.5	T'=21.5	
				T=	60.5					T=	17.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 3 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 3				
Potamopyrgus antipodarum	245	428	1	20	29	21	30	20	11	17	34	20	" =0.05	
Excel Rank	11	12	1	4	8	7	9	4	2	3	10	4	$8	Tabular Value
Matches	1	1	1	3	1	1	1	3	1	1	1	3	T=18	
Wilcoxon Rank	11	12	1	5	8	7	9	5	2	3	10	5	T'=21	
				T=	60					T=	18			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Table 13. Tide Point/Bornstein Wilcoxin Test Analysis, Impact Station 5.

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 5 in the Number of Animals/Sample

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 5				
Number of Animals/Sample	1075	1221	83	134	175	99	88	136	28	295	573	956	" =0.05	
Excel Rank	11	12	2	5	7	4	3	6	1	8	9	10	$8	Tabular Value
Matches	1	1	1	1	1	1	1	1	1	1	1	1	T=27	
Wilcoxon Rank	11	12	2	5	7	4	3	6	1	8	9	10	T'=12	
				T=	51					T=	27			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 5 in the Number of Species/Sample

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 5				
Number of Species/Sample	7	11	5	9	7	6	5	4	4	10	8	9	" =0.05	
Excel Rank	6	12	3	9	6	5	3	1	1	11	8	9	$8	Tabular Value
Matches	2	1	2	2	2	1	2	2	2	1	1	2	T=28.5	
Wilcoxon Rank	6.5	12	3.5	9.5	6.5	5	3.5	1.5	1.5	11	8	9.5	T'=10.5	
				T=	49.5					T=	28.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 5 in the Dominant Species % of Sample

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 5				
Dominant Species % of Sample	72	61.1	15.7	6.72	4	0	0	0	0	27.5	37.2	39.9	" =0.05	
Excel Rank	12	11	7	6	5	1	1	1	1	8	9	10	$8	Tabular Value
Matches	1	1	1	1	1	4	4	4	4	1	1	1	T=27	
Wilcoxon Rank	12	11	7	6	5	2.5	2.5	2.5	2.5	8	9	10	T'=12	
				T=	51					T=	27			**Do Not Reject Null Hypothesis**
					N=9						N=3			

The dominant species may not be the same for every station

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 5 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 5				
Americorophium salmonis	774	746	13	9	7	0	6	0	1	81	213	381	" =0.05	
Excel Rank	12	11	7	6	5	1	4	1	3	8	9	10	$8	Tabular Value
Matches	1	1	1	1	1	2	1	2	1	1	1	1	T=27	
Wilcoxon Rank	12	11	7	6	5	1.5	4	1.5	3	8	9	10	T'=12	
				T=	51					T=	27			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Table 13. (continued) Tide Point/Bornstein Wilcoxin Test Analysis, Impact Station 5.

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 5 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 5				
Coulana canadensis	0	1	0	3	3	0	0	0	0	3	0	0	" =0.05	
Excel Rank	1	9	1	10	10	1	1	1	1	10	1	1	$8	Tabular Value
Matches	8	1	8	3	3	8	8	8	8	3	8	8	T=20	
Wilcoxon Rank	4.5	9	4.5	11	11	4.5	4.5	4.5	4.5	11	4.5	4.5	T'=19	
				T=	58					T=	20			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 5 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 5				
Chironomiidae larvae	0	0	2	2	0	1	0	0	0	1	0	1	" =0.05	
Excel Rank	1	1	11	11	1	8	1	1	1	8	1	8	$8	Tabular Value
Matches	7	7	2	2	7	3	7	7	7	3	7	3	T=22	
Wilcoxon Rank	4	4	11.5	11.5	4	9	4	4	4	9	4	9	T'=17	
				T=	56					T=	22			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 5 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 5				
Corbicula fluminea	0	1	0	0	0	0	0	0	0	0	0	0	" =0.05	
Excel Rank	1	12	1	1	1	1	1	1	1	1	1	1	$8	Tabular Value
Matches	11	1	11	11	11	11	11	11	11	11	11	11	T=18	
Wilcoxon Rank	6	12	6	6	6	6	6	6	6	6	6	6	T'=21	
				T=	60					T=	18			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 5 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 5				
Cumacea	0	1	0	4	7	10	17	8	4	5	0	0	" =0.05	
Excel Rank	1	5	1	6	9	11	12	10	6	8	1	1	$8	Tabular Value
Matches	4	1	4	2	1	1	1	1	2	1	4	4	T=13	
Wilcoxon Rank	2.5	5	2.5	6.5	9	11	12	10	6.5	8	2.5	2.5	T'=26	
				T=	65					T=	13			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Table 13. (continued) Tide Point/Bornstein Wilcoxin Test Analysis, Impact Station 5.

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 5 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 5				
Decapoda	0	1	0	0	0	0	0	0	0	0	0	0	" =0.05	
Excel Rank	1	12	1	1	1	1	1	1	1	1	1	1	$8	Tabular Value
Matches	11	1	11	11	11	11	11	11	11	11	11	11	T=18	
Wilcoxon Rank	6	12	6	6	6	6	6	6	6	6	6	6	T'=21	
				T= 60						T= 18				**Do Not Reject Null Hypothesis**
				N=9						N=3				

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 5 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 5				
Entomobryidae	0	0	0	0	0	0	0	0	0	0	0	0	" =0.05	
Excel Rank	1	1	1	1	1	1	1	1	1	1	1	1	$8	Tabular Value
Matches	12	12	12	12	12	12	12	12	12	12	12	12	T=19.5	
Wilcoxon Rank	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	T'=19.5	
				T= 58.5						T= 19.5				**Do Not Reject Null Hypothesis**
				N=9						N=3				

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 5 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 5				
Eogammarus confervicolis	28	22	0	0	0	0	1	0	0	1	21	14	" =0.05	
Excel Rank	12	11	1	1	1	1	7	1	1	7	10	9	$8	Tabular Value
Matches	1	1	6	6	6	6	2	6	6	2	1	1	T=26.5	
Wilcoxon Rank	12	11	3.5	3.5	3.5	3.5	7.5	3.5	3.5	7.5	10	9	T'=12.5	
				T= 51.5						T= 26.5				**Do Not Reject Null Hypothesis**
				N=9						N=3				

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 5 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 5				
Gnorismosphaeroma insulare	0	0	0	0	0	0	0	0	0	0	2	2	" =0.05	
Excel Rank	1	1	1	1	1	1	1	1	1	1	11	11	$8	Tabular Value
Matches	10	10	10	10	10	10	10	10	10	10	2	2	T=28.5	
Wilcoxon Rank	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	11.5	11.5	T'=10.5	
				T= 49.5						T= 28.5				**Do Not Reject Null Hypothesis**
				N=9						N=3				

Table 13. (continued) Tide Point/Bornstein Wilcoxin Test Analysis, Impact Station 5.

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 5 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 5				
Heliidae larvae	0	0	0	1	0	0	0	0	0	0	0	0	" =0.05	
Excel Rank	1	1	1	12	1	1	1	1	1	1	1	1	$8	Tabular Value
Matches	11	11	11	1	11	11	11	11	11	11	11	11	T=18	
Wilcoxon Rank	6	6	6	12	6	6	6	6	6	6	6	6	T'=21	
				T=	60					T=	18			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 5 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 5				
Hobsonia florida	14	8	3	0	0	0	0	0	0	5	8	11	" =0.05	
Excel Rank	12	9	7	1	1	1	1	1	1	8	9	11	$8	Tabular Value
Matches	1	2	1	6	6	6	6	6	6	1	2	1	T=28.5	
Wilcoxon Rank	12	9.5	7	3.5	3.5	3.5	3.5	3.5	3.5	8	9.5	11	T'=10.5	
				T=	49.5					T=	28.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 5 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 5				
Idotea sp	0	0	0	0	0	0	0	0	0	0	0	0	" =0.05	
Excel Rank	1	1	1	1	1	1	1	1	1	1	1	1	$8	Tabular Value
Matches	12	12	12	12	12	12	12	12	12	12	12	12	T=19.5	
Wilcoxon Rank	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	T'=19.5	
				T=	58.5					T=	19.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 5 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 5				
Macoma bathica	0	0	0	0	0	0	0	0	0	0	0	1	" =0.05	
Excel Rank	1	1	1	1	1	1	1	1	1	1	1	12	$8	Tabular Value
Matches	11	11	11	11	11	11	11	11	11	11	11	1	T=24	
Wilcoxon Rank	6	6	6	6	6	6	6	6	6	6	6	12	T'=15	
				T=	54					T=	24			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Table 13. (continued) Tide Point/Bornstein Wilcoxin Test Analysis, Impact Station 5.

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 5 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 5				
Nematoda	2	2	0	3	5	2	0	0	0	2	4	0	" =0.05	
Excel Rank	6	6	1	10	12	6	1	1	1	6	11	1	$8	Tabular Value
Matches	4	4	5	1	1	4	5	5	5	4	1	5	T=21.5	
Wilcoxon Rank	7.5	7.5	3	10	12	7.5	3	3	3	7.5	11	3	T'=17.5	
				T= 56.5						T= 21.5				**Do Not Reject Null Hypothesis**
				N=9						N=3				

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 5 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 5				
Nereis limnicola	1	2	0	5	11	8	0	1	0	4	1	1	" =0.05	
Excel Rank	4	8	1	10	12	11	1	4	1	9	4	4	$8	Tabular Value
Matches	4	1	3	1	1	1	3	4	3	1	4	4	T=20	
Wilcoxon Rank	5.5	8	2	10	12	11	2	5.5	2	9	5.5	5.5	T'=19	
				T= 58						T= 20				**Do Not Reject Null Hypothesis**
				N=9						N=3				

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 5 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 5				
Oligochaeta	11	9	64	87	113	57	34	107	12	113	131	22	" =0.05	
Excel Rank	2	1	7	8	10	6	5	9	3	10	12	4	$8	Tabular Value
Matches	1	1	1	1	2	1	1	1	1	2	1	1	T=26.5	
Wilcoxon Rank	2	1	7	8	10.5	6	5	9	3	10.5	12	4	T'=12.5	
				T= 51.5						T= 26.5				**Do Not Reject Null Hypothesis**
				N=9						N=3				

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 5 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Impact Sta. 5				
Potamopyrgus antipodarum	245	428	1	20	29	21	30	20	11	80	193	523	" =0.05	
Excel Rank	10	11	1	3	6	5	7	3	2	8	9	12	$8	Tabular Value
Matches	1	1	1	2	1	1	1	2	1	1	1	1	T=29	
Wilcoxon Rank	10	11	1	3.5	6	5	7	3.5	2	8	9	12	T'=10	
				T= 49						T= 29				**Do Not Reject Null Hypothesis**
				N=9						N=3				

Table 14. Tide Point/Bornstein Wilcoxin Test Analysis, Perimeter Station 15.

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 15 in the Number of Animals/Sample

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 15				
Number of Animals/Sample	1075	1221	83	134	175	99	88	136	28	230	273	253	" =0.05	
Excel Rank	11	12	2	5	7	4	3	6	1	8	10	9	$8	Tabular Value
Matches	1	1	1	1	1	1	1	1	1	1	1	1	T=27	
Wilcoxon Rank	11	12	2	5	7	4	3	6	1	8	10	9	T'=12	
				T=	51					T=	27			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 15 in the Number of Species/Sample

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 15				
Number of Species/Sample	7	11	5	9	7	6	5	4	4	6	7	7	" =0.05	
Excel Rank	7	12	3	11	7	5	3	1	1	5	7	7	$8	Tabular Value
Matches	4	1	2	1	4	2	2	2	2	2	4	4	T=22.5	
Wilcoxon Rank	8.5	12	3.5	11	8.5	5.5	3.5	1.5	1.5	5.5	8.5	8.5	T'=16.5	
				T=	55.5					T=	22.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 15 in the Dominant Species % of Sample

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 15				
Dominant Species % of Sample	72	61.1	15.7	6.72	4	0	0	0	0	0	0.37	0	" =0.05	
Excel Rank	12	11	10	9	8	1	1	1	1	1	7	1	$8	Tabular Value
Matches	1	1	1	1	1	6	6	6	6	6	1	6	T=14	
Wilcoxon Rank	12	11	10	9	8	3.5	3.5	3.5	3.5	3.5	7	3.5	T'=25	
				T=	64					T=	14			**Do Not Reject Null Hypothesis**
					N=9						N=3			

The dominant species may not be the same for every station

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 15 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 15				
Americorophium salmonis	774	746	13	9	7	0	6	0	1	69	50	77	" =0.05	
Excel Rank	12	11	7	6	5	1	4	1	3	9	8	10	$8	Tabular Value
Matches	1	1	1	1	1	2	1	2	1	1	1	1	T=27	
Wilcoxon Rank	12	11	7	6	5	1.5	4	1.5	3	9	8	10	T'=12	
				T=	51					T=	27			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Table 14. (continued) Tide Point/Bornstein Wilcoxin Test Analysis, Perimeter Station 15.

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 15 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 15				
Coulana canadensis	0	1	0	3	3	0	0	0	0	0	1	0	" =0.05	
Excel Rank	1	9	1	11	11	1	1	1	1	1	9	1	$8	Tabular Value
Matches	8	2	8	2	2	8	8	8	8	8	2	8	T=18.5	
Wilcoxon Rank	4.5	9.5	4.5	11.5	11.5	4.5	4.5	4.5	4.5	4.5	9.5	4.5	T'=20.5	
				T=	59.5					T=	18.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 15 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 15				
Chironomiidae larvae	0	0	2	2	0	1	0	0	0	0	0	0	" =0.05	
Excel Rank	1	1	11	11	1	10	1	1	1	1	1	1	$8	Tabular Value
Matches	9	9	2	2	9	1	9	9	9	9	9	9	T=15	
Wilcoxon Rank	5	5	11.5	11.5	5	10	5	5	5	5	5	5	T'=24	
				T=	63					T=	15			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 15 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 15				
Corbicula fluminea	0	1	0	0	0	0	0	0	0	0	0	0	" =0.05	
Excel Rank	1	12	1	1	1	1	1	1	1	1	1	1	$8	Tabular Value
Matches	11	1	11	11	11	11	11	11	11	11	11	11	T=18	
Wilcoxon Rank	6	12	6	6	6	6	6	6	6	6	6	6	T'=21	
				T=	60					T=	18			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 15 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 15				
Cumacea	0	1	0	4	7	10	17	8	4	1	5	2	" =0.05	
Excel Rank	1	3	1	6	9	11	12	10	6	3	8	5	$8	Tabular Value
Matches	2	2	2	2	1	1	1	1	2	2	1	1	T=16.5	
Wilcoxon Rank	1.5	3.5	1.5	6.5	9	11	12	10	6.5	3.5	8	5	T'=22.5	
				T=	61.5					T=	16.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Table 14. (continued) Tide Point/Bornstein Wilcoxin Test Analysis, Perimeter Station 15.

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 15 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 15				
Decapoda	0	1	0	0	0	0	0	0	0	0	0	0	" =0.05	
Excel Rank	1	12	1	1	1	1	1	1	1	1	1	1	$8	Tabular Value
Matches	11	1	11	11	11	11	11	11	11	11	11	11	T=18	
Wilcoxon Rank	6	12	6	6	6	6	6	6	6	6	6	6	T'=21	
				T=	60					T=	18			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 15 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 15				
Entomobryidae	0	0	0	0	0	0	0	0	0	0	0	0	" =0.05	
Excel Rank	1	1	1	1	1	1	1	1	1	1	1	1	$8	Tabular Value
Matches	12	12	12	12	12	12	12	12	12	12	12	12	T=19.5	
Wilcoxon Rank	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	T'=19.5	
				T=	58.5					T=	19.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 15 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 15				
Eogammarus confervicolis	28	22	0	0	0	0	1	0	0	1	2	8	" =0.05	
Excel Rank	12	11	1	1	1	1	7	1	1	7	9	10	$8	Tabular Value
Matches	1	1	6	6	6	6	2	6	6	2	1	1	T=26.5	
Wilcoxon Rank	12	11	3.5	3.5	3.5	3.5	7.5	3.5	3.5	7.5	9	10	T'=12.5	
				T=	51.5					T=	26.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 15 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 15				
Gnorismosphaeroma insulare	0	0	0	0	0	0	0	0	0	0	0	0	" =0.05	
Excel Rank	1	1	1	1	1	1	1	1	1	1	1	1	$8	Tabular Value
Matches	12	12	12	12	12	12	12	12	12	12	12	12	T=19.5	
Wilcoxon Rank	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	T'=19.5	
				T=	58.5					T=	19.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Table 14. (continued) Tide Point/Bornstein Wilcoxin Test Analysis, Perimeter Station 15.

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 15 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 15				
Heliidae larvae	0	0	0	1	0	0	0	0	0	0	0	0	" =0.05	
Excel Rank	1	1	1	12	1	1	1	1	1	1	1	1	$8	Tabular Value
Matches	11	11	11	1	11	11	11	11	11	11	11	11	T=18	
Wilcoxon Rank	6	6	6	12	6	6	6	6	6	6	6	6	T'=21	
				T=	60					T=	18			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 15 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 15				
Hobsonia florida	14	8	3	0	0	0	0	0	0	0	0	1	" =0.05	
Excel Rank	12	11	10	1	1	1	1	1	1	1	1	9	$8	Tabular Value
Matches	1	1	1	8	8	8	8	8	8	8	8	1	T=18	
Wilcoxon Rank	12	11	10	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	9	T'=21	
				T=	60					T=	18			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 15 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 15				
Idotea sp	0	0	0	0	0	0	0	0	0	0	0	0	" =0.05	
Excel Rank	1	1	1	1	1	1	1	1	1	1	1	1	$8	Tabular Value
Matches	12	12	12	12	12	12	12	12	12	12	12	12	T=19.5	
Wilcoxon Rank	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	T'=19.5	
				T=	58.5					T=	19.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 15 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 15				
Macoma bathica	0	0	0	0	0	0	0	0	0	0	0	0	" =0.05	
Excel Rank	1	1	1	1	1	1	1	1	1	1	1	1	$8	Tabular Value
Matches	12	12	12	12	12	12	12	12	12	12	12	12	T=19.5	
Wilcoxon Rank	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	T'=19.5	
				T=	58.5					T=	19.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Table 14. (continued) Tide Point/Bornstein Wilcoxin Test Analysis, Perimeter Station 15.

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 15 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 15				
Nematoda	2	2	0	3	5	2	0	0	0	0	1	4	" =0.05	
Excel Rank	7	7	1	10	12	7	1	1	1	1	6	11	$8	Tabular Value
Matches	3	3	5	1	1	3	5	5	5	5	1	1	T=20	
Wilcoxon Rank	8	8	3	10	12	8	3	3	3	3	6	11	T'=19	
				T=	58					T=	20			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 15 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 15				
Nereis limnicola	1	2	0	5	11	8	0	1	0	2	0	0	" =0.05	
Excel Rank	6	8	1	10	12	11	1	6	1	8	1	1	$8	Tabular Value
Matches	2	2	5	1	1	1	5	2	5	2	5	5	T=14.5	
Wilcoxon Rank	6.5	8.5	3	10	12	11	3	6.5	3	8.5	3	3	T'=24.5	
				T=	63.5					T=	14.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 15 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 15				
Oligochaeta	11	9	64	87	113	57	34	107	12	29	55	89	" =0.05	
Excel Rank	2	1	8	9	12	7	5	11	3	4	6	10	$8	Tabular Value
Matches	1	1	1	1	1	1	1	1	1	1	1	1	T=20	
Wilcoxon Rank	2	1	8	9	12	7	5	11	3	4	6	10	T'=19	
				T=	58					T=	20			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 15 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 15				
Potamopyrgus antipodarum	245	428	1	20	29	21	30	20	11	128	159	72	" =0.05	
Excel Rank	11	12	1	3	6	5	7	3	2	9	10	8	$8	Tabular Value
Matches	1	1	1	2	1	1	1	2	1	1	1	1	T=27	
Wilcoxon Rank	11	12	1	3.5	6	5	7	3.5	2	9	10	8	T'=12	
				T=	51					T=	27			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Table 15. Tide Point/Bornstein Wilcoxin Test Analysis, Perimeter Station 18.

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 18 in the Number of Animals/Sample

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 18				
Number of Animals/Sample	1075	1221	83	134	175	99	88	136	28	219	366	627	" =0.05	
Excel Rank	11	12	2	5	7	4	3	6	1	8	9	10	$8	Tabular Value
Matches	1	1	1	1	1	1	1	1	1	1	1	1	T=27	
Wilcoxon Rank	11	12	2	5	7	4	3	6	1	8	9	10	T'=12	
				T=	51					T=	27			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 18 in the Number of Species/Sample

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 18				
Number of Species/Sample	7	11	5	9	7	6	5	4	4	5	8	9	" =0.05	
Excel Rank	7	12	3	10	7	6	3	1	1	3	9	10	$8	Tabular Value
Matches	2	1	3	2	2	1	3	2	2	3	1	2	T=23.5	
Wilcoxon Rank	7.5	12	4	10.5	7.5	6	4	1.5	1.5	4	9	10.5	T'=15.5	
				T=	54.5					T=	23.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 18 in the Dominant Species % of Sample

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 18				
Dominant Species % of Sample	72	61.1	15.7	6.72	4	0	0	0	0	39.7	39.9	60	" =0.05	
Excel Rank	12	11	7	6	5	1	1	1	1	8	9	10	$8	Tabular Value
Matches	1	1	1	1	1	4	4	4	4	1	1	1	T=27	
Wilcoxon Rank	12	11	7	6	5	2.5	2.5	2.5	2.5	8	9	10	T'=12	
				T=	51					T=	27			**Do Not Reject Null Hypothesis**
					N=9						N=3			

The dominant species may not be the same for every station

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 18 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 18				
Americorophium salmonis	774	746	13	9	7	0	6	0	1	87	146	376	" =0.05	
Excel Rank	12	11	7	6	5	1	4	1	3	8	9	10	$8	Tabular Value
Matches	1	1	1	1	1	2	1	2	1	1	1	1	T=27	
Wilcoxon Rank	12	11	7	6	5	1.5	4	1.5	3	8	9	10	T'=12	
				T=	51					T=	27			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Table 15. (continued) Tide Point/Bornstein Wilcoxin Test Analysis, Perimeter Station 18.

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 18 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 18				
Coulana canadensis	0	1	0	3	3	0	0	0	0	3	2	5	" =0.05	
Excel Rank	1	7	1	9	9	1	1	1	1	9	8	12	$8	Tabular Value
Matches	6	1	6	3	3	6	6	6	6	3	1	1	T=30	
Wilcoxon Rank	3.5	7	3.5	10	10	3.5	3.5	3.5	3.5	10	8	12	T'=9	
				T=	48					T=	30			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 18 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 18				
Chironomiidae larvae	0	0	2	2	0	1	0	0	0	0	0	0	" =0.05	
Excel Rank	1	1	11	11	1	10	1	1	1	1	1	1	$8	Tabular Value
Matches	9	9	2	2	9	1	9	9	9	9	9	9	T=15	
Wilcoxon Rank	5	5	11.5	11.5	5	10	5	5	5	5	5	5	T'=24	
				T=	63					T=	15			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 18 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 18				
Corbicula fluminea	0	1	0	0	0	0	0	0	0	0	0	1	" =0.05	
Excel Rank	1	11	1	1	1	1	1	1	1	1	1	11	$8	Tabular Value
Matches	10	2	10	10	10	10	10	10	10	10	10	2	T=22.5	
Wilcoxon Rank	5.5	11.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	11.5	T'=16.5	
				T=	55.5					T=	22.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 18 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 18				
Cumacea	0	1	0	4	7	10	17	8	4	0	3	1	" =0.05	
Excel Rank	1	4	1	7	9	11	12	10	7	1	6	4	$8	Tabular Value
Matches	3	2	3	2	1	1	1	1	2	3	1	2	T=12.5	
Wilcoxon Rank	2	4.5	2	7.5	9	11	12	10	7.5	2	6	4.5	T'=26.5	
				T=	65.5					T=	12.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Table 15. (continued) Tide Point/Bornstein Wilcoxin Test Analysis, Perimeter Station 18.

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 18 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 18				
Decapoda	0	1	0	0	0	0	0	0	0	0	0	0	" =0.05	
Excel Rank	1	12	1	1	1	1	1	1	1	1	1	1	$8	Tabular Value
Matches	11	1	11	11	11	11	11	11	11	11	11	11	T=18	
Wilcoxon Rank	6	12	6	6	6	6	6	6	6	6	6	6	T'=21	
				T=	60					T=	18			**Do Not Reject Null Hypothesis**
				N=9						N=3				

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 18 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 18				
Entomobryidae	0	0	0	0	0	0	0	0	0	0	0	0	" =0.05	
Excel Rank	1	1	1	1	1	1	1	1	1	1	1	1	$8	Tabular Value
Matches	12	12	12	12	12	12	12	12	12	12	12	12	T=19.5	
Wilcoxon Rank	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	T'=19.5	
				T=	58.5					T=	19.5			**Do Not Reject Null Hypothesis**
				N=9						N=3				

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 18 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 18				
Eogammarus confervicolis	28	22	0	0	0	0	1	0	0	0	0	10	" =0.05	
Excel Rank	12	11	1	1	1	1	9	1	1	1	1	10	$8	Tabular Value
Matches	1	1	8	8	8	8	1	8	8	8	8	1	T=19	
Wilcoxon Rank	12	11	4.5	4.5	4.5	4.5	9	4.5	4.5	4.5	4.5	10	T'=20	
				T=	59					T=	19			**Do Not Reject Null Hypothesis**
				N=9						N=3				

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 18 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 18				
Gnorismosphaeroma insulare	0	0	0	0	0	0	0	0	0	0	0	0	" =0.05	
Excel Rank	1	1	1	1	1	1	1	1	1	1	1	1	$8	Tabular Value
Matches	12	12	12	12	12	12	12	12	12	12	12	12	T=19.5	
Wilcoxon Rank	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	T'=19.5	
				T=	58.5					T=	19.5			**Do Not Reject Null Hypothesis**
				N=9						N=3				

Table 15. (continued) Tide Point/Bornstein Wilcoxin Test Analysis, Perimeter Station 18.

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 18 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 18					
Heliidae larvae	0	0	0	1	0	0	0	0	0	0	0	0	"	=0.05	
Excel Rank	1	1	1	12	1	1	1	1	1	1	1	1		$8	Tabular Value
Matches	11	11	11	1	11	11	11	11	11	11	11	11		T=18	
Wilcoxon Rank	6	6	6	12	6	6	6	6	6	6	6	6		T'=21	
				T=	60					T=	18				**Do Not Reject Null Hypothesis**
					N=9						N=3				

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 18 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 18					
Hobsonia florida	14	8	3	0	0	0	0	0	0	0	3	9	"	=0.05	
Excel Rank	12	10	8	1	1	1	1	1	1	1	8	11		$8	Tabular Value
Matches	1	1	2	7	7	7	7	7	7	7	2	1		T=23.5	
Wilcoxon Rank	12	10	8.5	4	4	4	4	4	4	4	8.5	11		T'=15.5	
				T=	54.5					T=	23.5				**Do Not Reject Null Hypothesis**
					N=9						N=3				

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 18 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 18					
Idotea sp	0	0	0	0	0	0	0	0	0	0	0	0	"	=0.05	
Excel Rank	1	1	1	1	1	1	1	1	1	1	1	1		$8	Tabular Value
Matches	12	12	12	12	12	12	12	12	12	12	12	12		T=19.5	
Wilcoxon Rank	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		T'=19.5	
				T=	58.5					T=	19.5				**Do Not Reject Null Hypothesis**
					N=9						N=3				

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 18 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 18					
Macoma bathica	0	0	0	0	0	0	0	0	0	0	0	0	"	=0.05	
Excel Rank	1	1	1	1	1	1	1	1	1	1	1	1		$8	Tabular Value
Matches	12	12	12	12	12	12	12	12	12	12	12	12		T=19.5	
Wilcoxon Rank	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		T'=19.5	
				T=	58.5					T=	19.5				**Do Not Reject Null Hypothesis**
					N=9						N=3				

Table 15. (continued) Tide Point/Bornstein Wilcoxin Test Analysis, Perimeter Station 18.

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 18 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 18				
Nematoda	2	2	0	3	5	2	0	0	0	0	2	0	" =0.05	
Excel Rank	7	7	1	11	12	7	1	1	1	1	7	1	$8	Tabular Value
Matches	4	4	6	1	1	4	6	6	6	6	4	6	T=15.5	
Wilcoxon Rank	8.5	8.5	3.5	11	12	8.5	3.5	3.5	3.5	3.5	8.5	3.5	T'=23.5	
				T=	62.5					T=	15.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 18 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 18				
Nereis limnicola	1	2	0	5	11	8	0	1	0	2	2	1	" =0.05	
Excel Rank	4	7	1	10	12	11	1	4	1	7	7	4	$8	Tabular Value
Matches	3	3	3	1	1	1	3	3	3	3	3	3	T=21	
Wilcoxon Rank	5	8	2	10	12	11	2	5	2	8	8	5	T'=18	
				T=	57					T=	21			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 18 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 18				
Oligochaeta	11	9	64	87	113	57	34	107	12	22	18	86	" =0.05	
Excel Rank	2	1	8	10	12	7	6	11	3	5	4	9	$8	Tabular Value
Matches	1	1	1	1	1	1	1	1	1	1	1	1	T=18	
Wilcoxon Rank	2	1	8	10	12	7	6	11	3	5	4	9	T'=21	
				T=	60					T=	18			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 18 in the Species indicated

Station Designation	Ref. Sta. 6			Ref. Sta. 7			Ref. Sta. 8			Perimeter Sta. 18				
Potamopyrgus antipodarum	245	428	1	20	29	21	30	20	11	105	190	138	" =0.05	
Excel Rank	11	12	1	3	6	5	7	3	2	8	10	9	$8	Tabular Value
Matches	1	1	1	2	1	1	1	2	1	1	1	1	T=27	
Wilcoxon Rank	11	12	1	3.5	6	5	7	3.5	2	8	10	9	T'=12	
				T=	51					T=	27			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Table 16. Yacht Club Wilcoxin Test Analysis, Impact Station 1.

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 1 in the Number of Animals/Sample

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Impact Sta. 1				
Number of Animals/Sample	149	164	103	23	18	10	510	851	197	112	330	856	" =0.05	
Excel Rank	6	7	4	3	2	1	10	11	8	5	9	12	$8	Tabular Value
Matches	1	1	1	1	1	1	1	1	1	1	1	1	T=26	
Wilcoxon Rank	6	7	4	3	2	1	10	11	8	5	9	12	T'=13	
				T=	52					T=	26			**Do Not Reject Null Hypothesis**
				N=9						N=3				

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 1 in the Number of Species/Sample

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Impact Sta. 1				
Number of Species/Sample	4	5	5	5	4	4	9	11	9	8	9	10	" =0.05	
Excel Rank	1	4	4	4	1	1	8	12	8	7	8	11	$8	Tabular Value
Matches	3	3	3	3	3	3	3	1	3	1	3	1	T=27	
Wilcoxon Rank	2	5	5	5	2	2	9	12	9	7	9	11	T'=12	
				T=	51					T=	27			**Do Not Reject Null Hypothesis**
				N=9						N=3				

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 1 in the Dominant Species % of Sample

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Impact Sta. 1				
Dominant Species % of Sample	63.8	70.1	51.5	0	11.1	0	33.9	37.6	39.1	1.79	1.52	36.8	" =0.05	
Excel Rank	11	12	10	1	5	1	6	8	9	4	3	7	$8	Tabular Value
Matches	1	1	1	2	1	2	1	1	1	1	1	1	T=14	
Wilcoxon Rank	11	12	10	1.5	5	1.5	6	8	9	4	3	7	T'=25	
				T=	64					T=	14			**Do Not Reject Null Hypothesis**
				N=9						N=3				

The dominant species may not be the same for every station

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 1 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Impact Sta. 1				
Americorophium salmonis	95	115	53	0	2	0	173	320	77	2	5	315	" =0.05	
Excel Rank	8	9	6	1	3	1	10	12	7	3	5	11	$8	Tabular Value
Matches	1	1	1	2	2	2	1	1	1	2	1	1	T=19.5	
Wilcoxon Rank	8	9	6	1.5	3.5	1.5	10	12	7	3.5	5	11	T'=19.5	
				T=	58.5					T=	19.5			**Do Not Reject Null Hypothesis**
				N=9						N=3				

Table 16. (continued) Yacht Club Wilcoxin Test Analysis, Impact Station 1.

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 1 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Impact Sta. 1				
Coulana canadensis	0	0	0	0	6	1	1	1	1	9	1	4	" =0.05	
Excel Rank	1	1	1	1	11	5	5	5	5	12	5	10	$8	Tabular Value
Matches	4	4	4	4	1	5	5	5	5	1	5	1	T=29	
Wilcoxon Rank	2.5	2.5	2.5	2.5	11	7	7	7	7	12	7	10	T'=10	
				T=	49					T=	29			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 1 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Impact Sta. 1				
Chironomiidae larvae	0	0	0	0	0	1	0	0	0	1	0	0	" =0.05	
Excel Rank	1	1	1	1	1	11	1	1	1	11	1	1	$8	Tabular Value
Matches	10	10	10	10	10	2	10	10	10	2	10	10	T=22.5	
Wilcoxon Rank	5.5	5.5	5.5	5.5	5.5	11.5	5.5	5.5	5.5	11.5	5.5	5.5	T'=16.5	
				T=	55.5					T=	22.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 1 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Impact Sta. 1				
Corbicula fluminea	0	0	0	0	0	0	0	0	0	0	0	1	" =0.05	
Excel Rank	1	1	1	1	1	1	1	1	1	1	1	12	$8	Tabular Value
Matches	11	11	11	11	11	11	11	11	11	11	11	1	T=24	
Wilcoxon Rank	6	6	6	6	6	6	6	6	6	6	6	12	T'=15	
				T=	54					T=	24			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 1 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Impact Sta. 1				
Cumacea	0	0	0	0	0	4	1	1	7	4	3	0	" =0.05	
Excel Rank	1	1	1	1	1	10	7	7	12	10	9	1	$8	Tabular Value
Matches	6	6	6	6	6	2	2	2	1	2	1	6	T=23	
Wilcoxon Rank	3.5	3.5	3.5	3.5	3.5	10.5	7.5	7.5	12	10.5	9	3.5	T'=16	
				T=	55					T=	23			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Table 16. (continued) Yacht Club Wilcoxin Test Analysis, Impact Station 1.

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 1 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Impact Sta. 1				
Decapoda	0	0	0	0	0	0	0	0	0	0	0	0	" =0.05	
Excel Rank	1	1	1	1	1	1	1	1	1	1	1	1	$8	Tabular Value
Matches	12	12	12	12	12	12	12	12	12	12	12	12	T=19.5	
Wilcoxon Rank	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	T'=19.5	
				T=	58.5					T=	19.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 1 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Impact Sta. 1				
Entomobryidae	0	0	0	1	0	0	0	0	0	0	0	0	" =0.05	
Excel Rank	1	1	1	12	1	1	1	1	1	1	1	1	$8	Tabular Value
Matches	11	11	11	1	11	11	11	11	11	11	11	11	T=18	
Wilcoxon Rank	6	6	6	12	6	6	6	6	6	6	6	6	T'=21	
				T=	60					T=	18			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 1 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Impact Sta. 1				
Eogammarus confervicolis	0	0	0	1	0	0	44	47	8	0	3	109	" =0.05	
Excel Rank	1	1	1	7	1	1	10	11	9	1	8	12	$8	Tabular Value
Matches	6	6	6	1	6	6	1	1	1	6	1	1	T=23.5	
Wilcoxon Rank	3.5	3.5	3.5	7	3.5	3.5	10	11	9	3.5	8	12	T'=15.5	
				T=	54.5					T=	23.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 1 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Impact Sta. 1				
Gnorismosphaeroma insulare	0	0	0	0	0	0	0	1	0	0	0	0	" =0.05	
Excel Rank	1	1	1	1	1	1	1	12	1	1	1	1	$8	Tabular Value
Matches	11	11	11	11	11	11	11	1	11	11	11	11	T=18	
Wilcoxon Rank	6	6	6	6	6	6	6	12	6	6	6	6	T'=21	
				T=	60					T=	18			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Table 16. (continued) Yacht Club Wilcoxin Test Analysis, Impact Station 1.

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 1 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Impact Sta. 1				
Heliidae larvae	0	0	0	0	0	0	0	0	0	0	0	0	" =0.05	
Excel Rank	1	1	1	1	1	1	1	1	1	1	1	1	$8	Tabular Value
Matches	12	12	12	12	12	12	12	12	12	12	12	12	T=19.5	
Wilcoxon Rank	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	T'=19.5	
				T=	58.5					T=	19.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 1 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Impact Sta. 1				
Hobsonia florida	3	2	6	0	0	0	19	18	2	2	15	7	" =0.05	
Excel Rank	7	4	8	1	1	1	12	11	4	4	10	9	$8	Tabular Value
Matches	1	3	1	3	3	3	1	1	3	3	1	1	T=24	
Wilcoxon Rank	7	5	8	2	2	2	12	11	5	5	10	9	T'=15	
				T=	54					T=	24			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 1 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Impact Sta. 1				
Idotea sp	0	0	1	0	0	0	0	0	0	0	0	0	" =0.05	
Excel Rank	1	1	12	1	1	1	1	1	1	1	1	1	$8	Tabular Value
Matches	11	11	1	11	11	11	11	11	11	11	11	11	T=18	
Wilcoxon Rank	6	6	12	6	6	6	6	6	6	6	6	6	T'=21	
				T=	60					T=	18			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 1 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Impact Sta. 1				
Macoma bathica	0	1	0	0	0	0	0	1	0	0	0	1	" =0.05	
Excel Rank	1	10	1	1	1	1	1	10	1	1	1	10	$8	Tabular Value
Matches	9	3	9	9	9	9	9	3	9	9	9	3	T=21	
Wilcoxon Rank	5	11	5	5	5	5	5	11	5	5	5	11	T'=18	
				T=	57					T=	21			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Table 16. (continued) Yacht Club Wilcoxin Test Analysis, Impact Station 1.

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 1 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Impact Sta. 1				
Nematoda	0	0	0	1	0	0	2	6	3	0	3	14	" =0.05	
Excel Rank	1	1	1	7	1	1	8	11	9	1	9	12	$8	Tabular Value
Matches	6	6	6	1	6	6	1	1	2	6	2	1	T=25	
Wilcoxon Rank	3.5	3.5	3.5	7	3.5	3.5	8	11	9.5	3.5	9.5	12	T'=14	
				T=	53					T=	25			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 1 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Impact Sta. 1				
Nereis limnicola	0	3	3	0	0	0	5	3	2	2	3	6	" =0.05	
Excel Rank	1	7	7	1	1	1	11	7	5	5	7	12	$8	Tabular Value
Matches	4	4	4	4	4	4	1	4	2	2	4	1	T=26	
Wilcoxon Rank	2.5	8.5	8.5	2.5	2.5	2.5	11	8.5	5.5	5.5	8.5	12	T'=13	
				T=	52					T=	26			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 1 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Impact Sta. 1				
Oligochaeta	1	0	0	8	6	0	39	84	55	68	266	196	" =0.05	
Excel Rank	4	1	1	6	5	1	7	10	8	9	12	11	$8	Tabular Value
Matches	1	3	3	1	1	3	1	1	1	1	1	1	T=32	
Wilcoxon Rank	4	2	2	6	5	2	7	10	8	9	12	11	T'=7	
				T=	46					T=	32			**Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Impact Station 1 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Impact Sta. 1				
Potamopyrgus antipodarum	50	43	40	12	4	4	226	369	42	24	31	203	" =0.05	
Excel Rank	9	8	6	3	1	1	11	12	7	4	5	10	$8	Tabular Value
Matches	1	1	1	1	2	2	1	1	1	1	1	1	T=19	
Wilcoxon Rank	9	8	6	3	1.5	1.5	11	12	7	4	5	10	T'=20	
				T=	59					T=	19			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Table 17. Yacht Club Wilcoxin Test Analysis, Perimeter Station 12.

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 12 in the Number of Animals/Sample

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Per. Sta. 12				
Number of Animals/Sample	149	164	103	23	18	10	510	851	197	258	342	506	" =0.05	
Excel Rank	5	6	4	3	2	1	11	12	7	8	9	10	$8	Tabular Value
Matches	1	1	1	1	1	1	1	1	1	1	1	1	T=27	
Wilcoxon Rank	5	6	4	3	2	1	11	12	7	8	9	10	T'=12	
				T=	51					T=	27			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 12 in the Number of Species/Sample

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Per. Sta. 12				
Number of Species/Sample	4	5	5	5	4	4	9	11	9	9	9	8	" =0.05	
Excel Rank	1	4	4	4	1	1	8	12	8	8	8	7	$8	Tabular Value
Matches	3	3	3	3	3	3	4	1	4	4	4	1	T=26	
Wilcoxon Rank	2	5	5	5	2	2	9.5	12	9.5	9.5	9.5	7	T'=13	
				T=	52					T=	26			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 12 in the Dominant Species % of Sample

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Per. Sta. 12				
Dominant Species % of Sample	63.8	70.1	51.5	0	11.1	0	33.9	37.6	39.1	3.88	3.8	1.19	" =0.05	
Excel Rank	11	12	10	1	6	1	7	8	9	5	4	3	$8	Tabular Value
Matches	1	1	1	2	1	2	1	1	1	1	1	1	T=12	
Wilcoxon Rank	11	12	10	1.5	6	1.5	7	8	9	5	4	3	T'=27	
				T=	66					T=	12			**Do Not Reject Null Hypothesis**
					N=9						N=3			

The dominant species may not be the same for every station

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 12 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Per. Sta. 12				
Americorophium salmonis	95	115	53	0	2	0	173	320	77	77	39	39	" =0.05	
Excel Rank	9	10	6	1	3	1	11	12	7	7	4	4	$8	Tabular Value
Matches	1	1	1	2	1	2	1	1	2	2	2	2	T=16.5	
Wilcoxon Rank	9	10	6	1.5	3	1.5	11	12	7.5	7.5	4.5	4.5	T'=22.5	
				T=	61.5					T=	16.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Table 17. (continued) Yacht Club Wilcoxin Test Analysis, Perimeter Station 12.

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 12 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Per. Sta. 12				
Coulana canadensis	0	0	0	0	6	1	1	1	1	10	13	6	" =0.05	
Excel Rank	1	1	1	1	9	5	5	5	5	11	12	9	$8	Tabular Value
Matches	4	4	4	4	2	4	4	4	4	1	1	2	T=32.5	
Wilcoxon Rank	2.5	2.5	2.5	2.5	9.5	6.5	6.5	6.5	6.5	11	12	9.5	T'=6.5	
				T=	45.5					T=	32.5			**Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 12 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Per. Sta. 12				
Chironomiidae larvae	0	0	0	0	0	1	0	0	0	0	0	0	" =0.05	
Excel Rank	1	1	1	1	1	12	1	1	1	1	1	1	$8	Tabular Value
Matches	11	11	11	11	11	1	11	11	11	11	11	11	T=18	
Wilcoxon Rank	6	6	6	6	6	12	6	6	6	6	6	6	T'=21	
				T=	60					T=	18			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 12 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Per. Sta. 12				
Corbicula fluminea	0	0	0	0	0	0	0	0	0	0	1	0	" =0.05	
Excel Rank	1	1	1	1	1	1	1	1	1	1	12	1	$8	Tabular Value
Matches	11	11	11	11	11	11	11	11	11	11	1	11	T=24	
Wilcoxon Rank	6	6	6	6	6	6	6	6	6	6	12	6	T'=15	
				T=	54					T=	24			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 12 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Per. Sta. 12				
Cumacea	0	0	0	0	0	4	1	1	7	7	2	4	" =0.05	
Excel Rank	1	1	1	1	1	9	6	6	11	11	8	9	$8	Tabular Value
Matches	5	5	5	5	5	2	2	2	2	2	1	2	T=29	
Wilcoxon Rank	3	3	3	3	3	9.5	6.5	6.5	11.5	11.5	8	9.5	T'=10	
				T=	49					T=	29			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Table 17. (continued) Yacht Club Wilcoxin Test Analysis, Perimeter Station 12.

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 12 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Per. Sta. 12				
Decapoda	0	0	0	0	0	0	0	0	0	0	0	0	" =0.05	
Excel Rank	1	1	1	1	1	1	1	1	1	1	1	1	$8	Tabular Value
Matches	12	12	12	12	12	12	12	12	12	12	12	12	T=19.5	
Wilcoxon Rank	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	T'=19.5	
				T=	58.5					T=	19.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 12 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Per. Sta. 12				
Entomobryidae	0	0	0	1	0	0	0	0	0	0	0	0	" =0.05	
Excel Rank	1	1	1	12	1	1	1	1	1	1	1	1	$8	Tabular Value
Matches	11	11	11	1	11	11	11	11	11	11	11	11	T=18	
Wilcoxon Rank	6	6	6	12	6	6	6	6	6	6	6	6	T'=21	
				T=	60					T=	18			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 12 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Per. Sta. 12				
Eogammarus confervicolis	0	0	0	1	0	0	44	47	8	7	32	8	" =0.05	
Excel Rank	1	1	1	6	1	1	11	12	8	7	10	8	$8	Tabular Value
Matches	5	5	5	1	5	5	1	1	2	1	1	2	T=25.5	
Wilcoxon Rank	3	3	3	6	3	3	11	12	8.5	7	10	8.5	T'=13.5	
				T=	52.5					T=	25.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 12 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Per. Sta. 12				
Gnorismosphaeroma insulare	0	0	0	0	0	0	0	1	0	0	0	0	" =0.05	
Excel Rank	1	1	1	1	1	1	1	12	1	1	1	1	$8	Tabular Value
Matches	11	11	11	11	11	11	11	1	11	11	11	11	T=18	
Wilcoxon Rank	6	6	6	6	6	6	6	12	6	6	6	6	T'=21	
				T=	60					T=	18			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Table 17. (continued) Yacht Club Wilcoxin Test Analysis, Perimeter Station 12.

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 12 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Per. Sta. 12				
Heliidae larvae	0	0	0	0	0	0	0	0	0	0	0	0	" =0.05	
Excel Rank	1	1	1	1	1	1	1	1	1	1	1	1	$8	Tabular Value
Matches	12	12	12	12	12	12	12	12	12	12	12	12	T=19.5	
Wilcoxon Rank	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	T'=19.5	
				T=	58.5					T=	19.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 12 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Per. Sta. 12				
Hobsonia florida	3	2	6	0	0	0	19	18	2	3	9	9	" =0.05	
Excel Rank	6	4	8	1	1	1	12	11	4	6	9	9	$8	Tabular Value
Matches	2	2	1	3	3	3	1	1	2	2	2	2	T=25.5	
Wilcoxon Rank	6.5	4.5	8	2	2	2	12	11	4.5	6.5	9.5	9.5	T'=13.5	
				T=	52.5					T=	25.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 12 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Per. Sta. 12				
Idotea sp	0	0	1	0	0	0	0	0	0	0	0	0	" =0.05	
Excel Rank	1	1	12	1	1	1	1	1	1	1	1	1	$8	Tabular Value
Matches	11	11	1	11	11	11	11	11	11	11	11	11	T=18	
Wilcoxon Rank	6	6	12	6	6	6	6	6	6	6	6	6	T'=21	
				T=	60					T=	18			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 12 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Per. Sta. 12				
Macoma bathica	0	1	0	0	0	0	0	1	0	0	0	0	" =0.05	
Excel Rank	1	11	1	1	1	1	1	11	1	1	1	1	$8	Tabular Value
Matches	10	2	10	10	10	10	10	2	10	10	10	10	T=16.5	
Wilcoxon Rank	5.5	11.5	5.5	5.5	5.5	5.5	5.5	11.5	5.5	5.5	5.5	5.5	T'=22.5	
				T=	61.5					T=	16.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Table 17. (continued) Yacht Club Wilcoxin Test Analysis, Perimeter Station 12.

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 12 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Per. Sta. 12				
Nematoda	0	0	0	1	0	0	2	6	3	4	0	0	" =0.05	
Excel Rank	1	1	1	8	1	1	9	12	10	11	1	1	$8	Tabular Value
Matches	7	7	7	1	7	7	1	1	1	1	7	7	T=19	
Wilcoxon Rank	4	4	4	8	4	4	9	12	10	11	4	4	T'=20	
				T=	59					T=	19			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 12 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Per. Sta. 12				
Nereis limnicola	0	3	3	0	0	0	5	3	2	6	4	2	" =0.05	
Excel Rank	1	7	7	1	1	1	11	7	5	12	10	5	$8	Tabular Value
Matches	4	3	3	4	4	4	1	3	2	1	1	2	T=27.5	
Wilcoxon Rank	2.5	8	8	2.5	2.5	2.5	11	8	5.5	12	10	5.5	T'=11.5	
				T=	50.5					T=	27.5			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 12 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Per. Sta. 12				
Oligochaeta	1	0	0	8	6	0	39	84	55	59	53	61	" =0.05	
Excel Rank	4	1	1	6	5	1	7	12	9	10	8	11	$8	Tabular Value
Matches	1	3	3	1	1	3	1	1	1	1	1	1	T=29	
Wilcoxon Rank	4	2	2	6	5	2	7	12	9	10	8	11	T'=10	
				T=	49					T=	29			**Do Not Reject Null Hypothesis**
					N=9						N=3			

Null Hypothesis: There is no difference between the Reference Stations and Perimeter Station 12 in the Species indicated

Station Designation	Ref. Sta. 9			Ref. Sta. 10			Ref. Sta. 11			Per. Sta. 12				
Potamopyrgus antipodarum	50	43	40	12	4	4	226	369	42	85	189	324	" =0.05	
Excel Rank	7	6	4	3	1	1	10	12	5	8	9	11	$8	Tabular Value
Matches	1	1	1	1	2	2	1	1	1	1	1	1	T=28	
Wilcoxon Rank	7	6	4	3	1.5	1.5	10	12	5	8	9	11	T'=11	
				T=	50					T=	28			**Do Not Reject Null Hypothesis**
					N=9						N=3			