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Proposal of Scale down for the Water Quality Monitoring Stations during High Spots Removal at Sub-zone Z2B1, Z2B2 and Z2C1

Client : China International Water & Electric Corporation

Project: Providing Sufficient Water Depth for Kwai Tsing Container Basin and its Approach Channel – CV/2013/04

Report No.: 0394/13/ED/0370G

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1. INTRODUCTION

1.1 In order to provide sufficient depth of container basin and approach channel to Kwai Tsing Container Terminal (KTCT) for the safe navigation of Ultra Large Container Ships (ULCS), Environmental Permit (EP) No. EP-426/2011/A, was approved to commission the dredging works of approximately 4.0 million cubic metres of sediment from the seabed of Kwai Tsing Container Basin, as well as portions of Northern Fairway and Western Fairway (hereafter referred to as the "Project"). The project proponent was the Civil Engineering & Development Department, HKSAR (CEDD). China International Water & Electric Corporation Limited (CIWE) was appointed as the main Contractor for the aforesaid dredging works under CEDD Contract No. CV/2013/04 (hereafter referred to as the "Contract")

1.2 The dredging works was commenced on 23 April 2014. All dredging works under this Contract of the construction phase, included removal of hard materials in sub-zones Z2B1, Z2B2, Z2C1, Z2A1, Z2A2, Z2A3 and Z4A and the dredging works in Hotspot area and its buffer area in sub-zones Z2B1 and Z2B2 was substantially completed on 21 November 2017. The environmental monitoring and audit (EM&A) works of this Project was carried out in accordance with the EM&A Manual requirements in the Environmental Permit (EP) No. EP-426/2011/A, EM&A Manual (AEIAR-156/2010) and EM&A TIN (EPD Letter Ref: (34) in Ax(1) to EP2/N3/C/57Pt.7)). A final EM&A report was prepared in December 2017 and the EM&A programme for the Construction Phase was substantially completed in December 2017.

1.3 However, according to the Contractor, a hydrographic survey was conducted by the Marine Department during late 2017 and early 2018. The survey result showed that approximately 5200 m^3 (in-situ volume) of high spots was discovered at Z2B1, Z2B2 and Z2C1. There may also be some other high spots discovered in "Portion B" (i.e. sub-zones Z5A, Z5B, Z5C, Z6A, Z6B, Z6C, Z6D, Z7 and Z8 stated in the EP-426/2011/A), which the location area and the volumes are still under review. Due to the aforementioned defect, CEDD appointed CIWE to resume the dredging programme for this Contract. This proposal covers construction phase dredging works for high spots removal in Portion A only.

2. PURPOSE OF THIS PROPOSAL

2.1 According to the Contractor, the scale of the upcoming dredging works of high spots at Z2B1, Z2B2 and Z2C1 will be approximately 5200 m^3 (in-situ volume) in total, which is far below than the dredging scale which was mentioned in the EP, in which daily maximum dredging rate is 400 m^3/ day, 950 m^3/ day and 850 m^3/ day at Z2B1, Z2B2 and Z2C1 respectively in dry season and 800 m^3/ day, 1450 m^3/ day and 1550 m^3/ day respectively in wet season. In addition, based on the survey conducted in the approved EIA report and the previous survey done by the Contractor, the profile of sediment will be expected to be consisted of hard material, i.e. hard alluvium and rock, as such the formation rate of the sediment plume will be expected lower than the EIA prediction.

2.2 In accordance with Section 2.1.4 of the EM&A Manual, ET Leader shall propose updated monitoring locations and seek approval from the IEC and EPD in any case that the status and locations of water sensitive receivers and the marine activities may change. Based on the above reasons, Fugro Technical Services Limited (FTS) is appointed to propose a further reduction of some of the water quality monitoring stations after

resuming the marine construction works at Z2B1, Z2B2 and Z2C1 for this Contract. The predicted high spots locations and its expected volume are given in **Figure 1**.

2.3 This proposal will cover the prediction of water quality impact after resuming the marine construction works at Z2B1, Z2B2 and Z2C1 for this Contract, the proposed water quality monitoring programme, includes the changes of water monitoring stations and the rationales for the changes.

3. METHODOLOGY OF REVIEW

3.1 As aforementioned dredging works of high spots are only carried out at Subzones at Z2B1, Z2B2 and Z2C1. Sensitive receivers with farther distance from Z2B1, Z2B2 and Z2C1 would be expected to have less Project impact. With such assumption, the impact on SR2 and SR3 will be reviewed in this proposal. Though SR5 (Ma Wan, Fish Culture Zone**)** is the farthest existing sensitive receiver from Z2B1, Z2B2 and Z2C1, it will not be covered in this review study. The detailed information of the reviewed impact monitoring stations is summarized in **Table 3.1**. The locations of the reviewed impact monitoring stations are shown in **Figure 2**.

Table 3.1 Locations of Reviewed Impact Monitoring Stations

Water Monitoring Station		Easting	Northing
SR2	Casam, Gazetted Beach	825723.225	825334.784
SR3	Approach, Gazetted Beach	826960.152	825260.726

3.2 The review of this proposal is based on comparison of the past data in routine impact water quality monitoring which dredging works were involved at Z2B1, Z2B2 and Z2C1 (including the monitoring data of dredging works in Hotspot area and its buffer area, i.e. Sub-zones Z2B1 and Z2B2 stated in the EP-426/2011/A) (hereinafter referred to as “Data with Dredging”) with those data that no dredging works were carried out at any zones under the Project (hereinafter referred to as “Data with No Dredging”). Dates of monitoring data used for analysis are shown in **Table 3.2**. Data including dissolved oxygen (surface & middle) (DO (S&M)), dissolved oxygen (bottom) (DO (B)), turbidity, total suspended solids (SS), ammoniacal nitrogen (NH3-N) (In-situ) and (Lab), unionized ammonia (UIA) (In-situ) and (Lab) in SR2 and SR3 were compared separately in two seasons: dry season and wet season.

Table 3.2 Period of Monitoring Data Used for Analysis

Mode of Monitoring Data	Impact Station for Analysis	Parameter for Analysis	Season^	Dates of Data Used for Analysis	No. of Date of Data
#With Dredging	SR2 & SR3	DO (S&M), DO (B), Turbidity, SS, NH3-N (In-situ), NH3-N (Lab), UIA (In-situ), UIA (Lab)	Dry	2015: 21 Nov, 24 Dec 2016: 9 Jan 2017: 25 Feb, 4 Nov, 21 Nov	6

Mode of Monitoring Data	Impact Station for Analysis	Parameter for Analysis	Season^	Dates of Data Used for Analysis	No. of Date of Data
			Wet	2015: 2 Jun, 3 Sep, 12 Sep, 26 Sep, 6 Oct 2016: 16 Apr, 4 Jun, 18 Jun, 2 Jul, 9 Jul, 12 Jul 2017: 20 Apr, 29 Apr, 6 May, 11 May, 25 May, 15 Jun, 17 Jun, 29 Jun, 1 Jul, 11 Jul, 18 Jul, 20 Jul, 1 Aug, 3 Aug, 10 Aug, 7 Sep, 21 Sep, 23 Sep, 28 Sep, 12 Oct, 19 Oct, 21 Oct, 26 Oct, 28 Oct, 31 Oct	36
With No Dredging	SR2 & SR3	DO (S&M), DO (B), Turbidity, SS, NH3-N (In-situ), NH3-N (Lab), UIA (In-situ), UIA (Lab)	Dry	2015: 26 Dec, 29 Dec, 31 Dec 2016: 12 Jan, 14 Jan, 26 Mar, 29 Mar, 24 Dec, 27 Dec, 31 Dec 2017: 3 Jan, 7 Jan, 10 Jan, 14 Jan, 17 Jan, 19 Jan, 21 Jan, 23 Jan, 25 Jan, 27 Jan, 31 Jan, 2 Feb, 4 Feb, 7 Feb, 9 Feb, 11 Feb, 14 Feb, 16 Feb, 18 Feb, 21 Feb, 23 Feb, 28 Feb, 2 Mar, 4 Mar, 7 Mar, 9 Mar, 11 Mar, 14 Mar, 16 Mar, 18 Mar, 21 Mar, 23 Mar, 25 Mar, 28 Mar, 30 Mar, 2 Nov, 7 Nov, 9 Nov, 11 Nov, 14 Nov, 16 Nov, 18 Nov	52
			Wet	2015: 4 Jun, 11 Jun, 14 Jul, 16 Jul, 18 Jul, 25 Jul, 1 Sep 2016: 2 Apr, 14 Apr, 3 May, 7 May, 2 Jun, 14 Jul, 16 Jul, 19 Jul, 21 Jul, 23 Jul, 26 Jul, 28 Jul, 30 Jul, 4 Aug, 6 Aug, 9 Aug, 11 Aug, 13 Aug, 16 Aug, 20 Aug 2017: 1 Apr, 4 Apr, 6 Apr, 8 Apr, 11 Apr, 13 Apr, 18 Apr, 22 Apr, 25 Apr, 27 Apr, 2 May, 4 May, 9 May, 13 May, 16 May, 18 May, 20 May, 23 May, 27 May, 30 May, 1 Jun, 3 Jun, 6 Jun, 8 Jun, 10 Jun, 20 Jun, 22 Jun, 24 Jun, 27 Jun, 4 Jul, 6 Jul, 8 Jul, 15 Jul, 18 Jul, 20 Jul, 22 Jul, 25 Jul, 27 Jul, 29 Jul, 5 Aug, 15 Aug, 17 Aug, 19 Aug, 22 Aug, 24 Aug, 26 Aug, 29 Aug, 31 Aug, 2 Sep, 5 Sep, 9 Sep, 12 Sep, 14 Sep, 16 Sep, 19 Sep, 30 Sep, 3 Oct, 5 Oct, 7 Oct, 14 Oct, 17 Oct, 24 Oct,	89

Remark:
Data with dredging refer to monitoring data which dredging works were involved at Z2B1, Z2B2 and Z2C1;
^ In accordance with the definition in EP-426/2011/A, Wet Seasons refer to April to October, Dry Seasons refer to November to March.

3.3 The average value of DO (S&M) and DO (B), turbidity, SS, NH3-N (In-situ) and (Lab), UIA (In-situ) and (Lab) are compared. To assess the impact of dredging involved at Z2B1, Z2B2 and Z2C1, average value of "Data with Dredging" which greater than (or smaller than for DO) those "Data with No Dredging", are further analysed by using Statistical Software "Pro UCL" (Version 4.0). Goodness-of-fit Test is used to test the

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normality of the dataset. T-test or Wilcoxon-Mann-Whitney (WMW) Test is used to compare whether there is a significant difference between the “Data with Dredging” and “Data with No Dredging”. Details of statistical analysis setting are shown in Table 3.3 below:

Table 3.3 Details of Statistical Analysis

	Analysis Test Methods			
	Goodness-of-fit Test		**T-test (for dataset fits normal distribution)**	**Wilcoxon-Mann-Whitney (WMW) Test (for dataset does not fit normal distribution)**
	Shapiro Wilk Test (for sample size ≤ 50)	**Lilliefors Test (for sample size > 50)**		
Test purpose	To test whether the dataset fits a normal distribution and to determine whether T-test (parametric) or Wilcoxon-Mann-Whitney Test (non-parametric) is used	To test whether the dataset fits a normal distribution and to determine whether T-test (parametric) or Wilcoxon-Mann-Whitney Test (non-parametric) is used	To compare whether there is a significant difference between the “Data with Dredging” and “Data with No Dredging”	To compare whether there is a significant difference between the “Data with Dredging” and “Data with No Dredging”
Variables	For parameters with sample size ≤ 50	For parameters with sample size > 50	For parameters that fit normal distribution	For parameters that do not fit normal distribution
Cases	Data with Dredging & Data with No Dredging	Data with Dredging & Data with No Dredging	Data with Dredging vs Data with No Dredging	Data with Dredging vs Data with No Dredging
Confidence coefficient	95%	95%	95%	95%
Null hypothesis (H_0)	Data are not normally distributed	Data are normally distributed	Mean/Median of “Data with Dredging” less than or equal to Mean/Median of “Data with No Dredging”	Mean/Median of “Data with Dredging” less than or equal to Mean/Median of “Data with No Dredging”
Output results	Shapiro Wilk Test Statistic	Lilliefors Test Statistic	P-Value	P-Value
Conclusion	Reject H_0: - If Shapiro Wilk Test Statistic > Shapiro Wilk Critical Value (i.e. Dataset fits normal distribution if H_0 is rejected)	Reject H_0: - If Lilliefors Test Statistic > Lilliefors Critical Value (i.e. Dataset fits normal distribution if H_0 is not rejected)	Reject H_0: - If P-Value < 0.05 (i.e. Impact is significant if H_0 is rejected)	Reject H_0: - If P-Value < 0.05 (i.e. Impact is significant if H_0 is rejected)

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4. RESULTS OF ANALYSIS

4.1 Results of comparison of the historical data in routine impact water quality monitoring which dredging works were involved at Z2B1, Z2B2 and Z2C1 with those data that no dredging works carried out are summarized in **Table 4.1 to Table 4.10**. Detailed results of statistical analysis are presented in **Annex A**.

Table 4.1 Data Comparison between Dredging and No Dredging (DO (S&M))

Monitoring Station	Tide Mode	Average DO (S&M) mg/L					
		Dry Season			Wet Season		
		No Dredging Work	#With Dredging Works	*Impact significant (p<0.05)	No Dredging Work	#With Dredging Works	*Impact significant (p<0.05)
SR2	Mid-Flood	6.95	6.71	No	6.00	5.83	No
	Mid-Ebb	6.97	6.69	No	5.98	5.79	No
SR3	Mid-Flood	6.89	6.64	No	6.05	5.86	No
	Mid-Ebb	6.90	6.57	No	5.99	5.80	No

Remark:
Data with dredging refer to monitoring data which dredging works were involved at Z2B1, Z2B2 and Z2C1;
*Statistical analysis was only conducted for average value of data with dredging is smaller than those data with no dredging. “No” significant impact refers to p>0.05 from the statistical analysis results.

Table 4.2 Data Comparison between Dredging and No Dredging (DO (B))

Monitoring Station	Tide Mode	Average DO (B) mg/L					
		Dry Season			Wet Season		
		No Dredging Work	#With Dredging Works	*Impact significant (p<0.05)	No Dredging Work	#With Dredging Works	*Impact significant (p<0.05)
SR2	Mid-Flood	6.86	6.55	No	5.71	5.55	No
	Mid-Ebb	6.88	6.54	No	5.69	5.51	No
SR3	Mid-Flood	6.83	6.47	No	5.71	5.57	No
	Mid-Ebb	6.81	6.44	No	5.69	5.55	No

Remark:
Data with dredging refer to monitoring data which dredging works were involved at Z2B1, Z2B2 and Z2C1;
*Statistical analysis was only conducted for average value of data with dredging is smaller than those data with no dredging. “No” significant impact refers to p>0.05 from the statistical analysis results.

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Table 4.3 Data Comparison between Dredging and No Dredging (Turbidity)

Monitoring Station	Tide Mode	Average Turbidity NTU					
		Dry Season			Wet Season		
		No Dredging Work	#With Dredging Works	*Impact significant (p<0.05)	No Dredging Work	#With Dredging Works	*Impact significant (p<0.05)
SR2	Mid-Flood	1.9	2.8	No	2.4	3.0	No
	Mid-Ebb	1.8	3.0	No	2.3	2.9	No
SR3	Mid-Flood	2.1	3.0	No	2.5	3.0	No
	Mid-Ebb	2.0	3.0	No	2.4	2.9	No

Remark:
Data with dredging refer to monitoring data which dredging works were involved at Z2B1, Z2B2 and Z2C1;
*Statistical analysis was only conducted for average value of data with dredging is greater than those data with no dredging. “No” significant impact refers to p>0.05 from the statistical analysis results.

Table 4.4 Data Comparison between Dredging and No Dredging (SS)

Monitoring Station	Tide Mode	Average SS mg/L					
		Dry Season			Wet Season		
		No Dredging Work	#With Dredging Works	*Impact significant (p<0.05)	No Dredging Work	#With Dredging Works	*Impact significant (p<0.05)
SR2	Mid-Flood	5.4	5.0	NA	4.5	4.6	No
	Mid-Ebb	5.4	5.6	No	4.6	4.3	NA
SR3	Mid-Flood	6.3	5.3	NA	4.6	5.1	No
	Mid-Ebb	6.1	6.5	No	4.6	5.0	No

Remark:
Data with dredging refer to monitoring data which dredging works were involved at Z2B1, Z2B2 and Z2C1;
* Statistical analysis was only conducted for average value of data with dredging is greater than those data with no dredging. “NA” refers to Not Applicable, meaning the average value of data with dredging is smaller or equal to those data with no dredging. “No” significant impact refers to p>0.05 from the statistical analysis results.

Table 4.5 Data Comparison between Dredging and No Dredging (NH3-N (In-situ))

Monitoring Station	Tide Mode	Average NH3-N (In-situ) mg/L					
		Dry Season			Wet Season		
		No Dredging Work	#With Dredging Works	*Impact significant (p<0.05)	No Dredging Work	#With Dredging Works	*Impact significant (p<0.05)
SR2	Mid-Flood	0.13	0.09	NA	0.08	0.07	NA
	Mid-Ebb	0.13	0.09	NA	0.08	0.06	NA
SR3	Mid-Flood	0.14	0.09	NA	0.09	0.07	NA
	Mid-Ebb	0.14	0.11	NA	0.09	0.08	NA

Remark:
Data with dredging refer to monitoring data which dredging works were involved at Z2B1, Z2B2 and Z2C1;
* Statistical analysis was only conducted for average value of data with dredging is greater than those data with no dredging. NA” refers to Not Applicable, meaning the average value of data with dredging is smaller or equal to those data with no dredging.

Table 4.6 Data Comparison between Dredging and No Dredging (NH3-N (Lab))

Monitoring Station	Tide Mode	Average NH3-N (Lab) mg/L					
		Dry Season			Wet Season		
		No Dredging Work	#With Dredging Works	*Impact significant (p<0.05)	No Dredging Work	#With Dredging Works	*Impact significant (p<0.05)
SR2	Mid-Flood	0.13	0.09	NA	0.08	0.06	NA
	Mid-Ebb	0.13	0.09	NA	0.08	0.06	NA
SR3	Mid-Flood	0.14	0.10	NA	0.08	0.07	NA
	Mid-Ebb	0.14	0.11	NA	0.08	0.08	NA

Remark:
Data with dredging refer to monitoring data which dredging works were involved at Z2B1, Z2B2 and Z2C1;
* Statistical analysis was only conducted for average value of data with dredging is greater than those data with no dredging. NA" refers to Not Applicable, meaning the average value of data with dredging is smaller or equal to those data with no dredging.

Table 4.7 Data Comparison between Dredging and No Dredging (UIA (In-situ))

Monitoring Station	Tide Mode	Average UIA (In-situ) mg/L					
		Dry Season			Wet Season		
		No Dredging Work	#With Dredging Works	*Impact significant (p<0.05)	No Dredging Work	#With Dredging Works	*Impact significant (p<0.05)
SR2	Mid-Flood	0.006	0.004	NA	0.003	0.003	NA
	Mid-Ebb	0.006	0.003	NA	0.004	0.003	NA
SR3	Mid-Flood	0.006	0.004	NA	0.004	0.003	NA
	Mid-Ebb	0.006	0.004	NA	0.004	0.003	NA

Remark:
Data with dredging refer to monitoring data which dredging works were involved at Z2B1, Z2B2 and Z2C1;
* Statistical analysis was only conducted for average value of data with dredging is greater than those data with no dredging. NA" refers to Not Applicable, meaning the average value of data with dredging is smaller or equal to those data with no dredging.

Table 4.8 Data Comparison between Dredging and No Dredging (UIA (Lab))

Monitoring Station	Tide Mode	Average UIA (Lab) mg/L					
		Dry Season			Wet Season		
		No Dredging Work	#With Dredging Works	*Impact significant (p<0.05)	No Dredging Work	#With Dredging Works	*Impact significant (p<0.05)
SR2	Mid-Flood	0.006	0.003	NA	0.003	0.002	NA
	Mid-Ebb	0.006	0.004	NA	0.003	0.002	NA
SR3	Mid-Flood	0.006	0.004	NA	0.004	0.002	NA
	Mid-Ebb	0.006	0.004	NA	0.004	0.003	NA

Remark:
Data with dredging refer to monitoring data which dredging works were involved at Z2B1, Z2B2 and Z2C1;
* Statistical analysis was only conducted for average value of data with dredging is greater than those data with no dredging. NA" refers to Not Applicable, meaning the average value of data with dredging is smaller or equal to those data with no dredging.

4.2 Base on the results of data comparison, no deterioration of NH3-N (in-situ) and (Lab), UIA (in-situ) and (Lab) were found at SR2 and SR3 due to the dredging works involved at Z2B1, Z2B2 and Z2C1.

4.3 Results of data comparison shown that during dredging works were involved at Z2B1, Z2B2 and Z2C1, DO (S&M) and DO (B) were slightly smaller at SR2 and SR3; while turbidity at SR2 and SR3 and some of the SS at SR2 and SR3 were slightly higher, than those with no dredging works were carried out. However, base on the statistical analysis

of SR2 and SR3, no significant impact (i.e. p>0.05) was shown due to the dredging works involved at Z2B1, Z2B2 and Z2C1.

4.4 Based on the analysis of the results, it is concluded that no project impact was found in SR2 and SR3 during dredging at Z2B1, Z2B2 and Z2C1 (including the dredging works in Hotspot area and its buffer area, i.e. Sub-zones Z2B1 and Z2B2 stated in the EP-426/2011/A). Therefore, SR2 and SR3 are proposed to be removed during dredging works for high spots removal at Z2B1, Z2B2 and Z2C1 only.

5. PROPOSED WATER QUALITY MONITORING PROGRAMME

5.1 The proposed remaining water quality monitoring stations for routine water monitoring and 24-hours water quality monitoring are presented in **Table 5.1** and **Table 5.2**. The locations of the remaining water quality monitoring stations are illustrated **Figure 2**.

Table 5.1 Proposed Water Quality Monitoring Stations for Routine Water Quality Monitoring

Water Monitoring Station		Easting	Northing
SR4	Tsuen Wan, WSD Flushing Water Intake	829270.482	825382.994
SR5	Ma Wan, Fish Culture Zone	823758.839	823575.934
SR12	Tsing Yi, WSD Flushing Water Intake	829599.152	823262.269
SR13	EMSD Cooling Water Intake for Kwai Chung Hospital	831397.450	822002.433
G2	Gradient Station	825979.792	824683.158
C1A	Control Station	820626.195	822834.323
C2A	Control Station	830423.070	819431.722

Table 5.2 Proposed Water Quality Monitoring Stations for 24-hours Water Quality Monitoring

Water Monitoring Station		Easting	Northing
SR4	Tsuen Wan, WSD Flushing Water Intake	829270.482	825382.994
SR5	Ma Wan, Fish Culture Zone	823758.839	823575.934
SR12	Tsing Yi, WSD Flushing Water Intake	829599.152	823262.269
SR13	EMSD Cooling Water Intake for Kwai Chung Hospital	831397.450	822002.433

5.2 The monitoring parameters and frequency for both in-situ measurement and laboratory analysis for the remaining monitoring stations will be kept as the same as the previous programme. The monitoring parameters and frequency for both in-situ measurement and laboratory analysis for the remaining monitoring stations are summarized in **Table 5.3**. Parameters for each remaining monitoring station are specified in **Table 5.4**.

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Table 5.3 Monitoring Parameters and Frequency

Parameters	Monitoring Frequency
In-situ Measurement Turbidity (in NTU), pH, Dissolved Oxygen (in mg/L and %), Temperature (in °C), Salinity (in ppt), [1]Ammonia-N (in mg/L-N and UIA); [2]TIN: Ammonia-N (in mg/L), Nitrite (in mg/L), Nitrate (in mg/L) Laboratory Analysis [1]Ammonia-N (in mg/L-N and UIA), Suspended Solids (SS), [2]BOD_5, [2]*E.coli*, [2]Synthetic Detergent; [2]TIN: Ammonia-N (in mg/L), Nitrite (in mg/L), Nitrate (in mg/L)	3 days per week, at mid-flood and mid-ebb tides (except detergent which shall be taken one day per month, at mid-flood and mid-ebb) 36 hours interval was allowed between subsequent sets of measurement.

Notes:
1. Ammonia measurements and samples were taken at SR4, SR12, C1A and C2A only;
   UIA: In-situ unionized ammonia was calculated from in-situ measurement of NH_3-N, temperature, pH and salinity; Laboratory determined unionized ammonia was calculated from analysed NH_3-N from water samples and in-situ measurement of temperature, pH and salinity;
2. Total Inorganic Nitrogen (TIN) measurements and samples were taken at SR5, G2, C1A, C2A only; and
3. BOD_5, *E.coli* and Synthetic Detergent samples were taken at SR4, SR12, C1A, C2A only.

Table 5.4 Water Quality Monitoring Parameters

ID	In-situ Measurement							Laboratory Analysis					
	pH	Temperature	Salinity	Turbidity	Dissolved Oxygen / Dissolved Oxygen%	NH_3-N / UIA	TIN (NH_3-N, NO_2 & NO_3)	Suspended Solids	BOD_5	*E. coli*	NH_3-N / UIA	Synthetic Detergent	TIN (NH_3-N, NO_2 & NO_3)
SR4	O	O	O	O	O	O		O	O	O	O	O	
SR5	O	O	O	O	O		O	O					O
SR12	O	O	O	O	O	O		O	O	O	O	O	
SR13	O	O	O	O	O			O					
G2	O	O	O	O	O		O	O					O
C1A	O	O	O	O	O	O	O	O	O	O	O	O	O
C2A	O	O	O	O	O	O	O	O	O	O	O	O	O

Notes:
1. UIA: In-situ unionized ammonia was calculated from in-situ measurement of NH_3-N, temperature, pH and salinity; laboratory determined unionized ammonia was calculated from analysed NH_3-N from water samples taken and in-situ measurement of temperature, pH and salinity.

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5.3 24-hours water quality monitoring at SR4 (Tsuen Wan, WSD Flushing Water Intake), SR5 (Ma Wan, Fish Culture Zone**),** SR12 (Tsing Yi WSD Flushing Water Intake) and SR13 (EMSD Cooling Water Intake for Kwai Chung Hospital) will be kept as the same as the previous programme, in which dissolved oxygen, temperature and turbidity data are taken at 5 minutes interval, while ammonia data are analyzed at every 20 minutes.

6. OTHERS EM&A REQUIREMENT

6.1 Others EM&A requirement included environmental site inspection and audit, event and plan, and all necessary mitigation measures as specified in the EP and EM&A Manual should also be implemented during upcoming construction works.

7. THE EM&A PROGRAMME AFTER COMPLETION OF HIGH SPOTS DREDGING AT Z2B1, Z2B2 AND Z2C1

7.1 As mentioned in Section 1.3 of this proposal, there may also be some other high spots discovered in “Portion B” (i.e. sub-zones Z5A, Z5B, Z5C, Z6A, Z6B, Z6C, Z6D, Z7 and Z8 stated in the EP-426/2011/A). Since they are not covered in the previous proposal, further review shall be required if high spots dredging is needed for those area, otherwise the full set of water quality monitoring shall be adopted as stipulated in the Section 2.1.6 and Section 2.1.10 of the EM&A manual except for SR1 which had been verified on site that the flushing water intake point did not exist as referred to the previous proposal.

7.2 The post-construction monitoring has to be re-conducted in accordance with Section 2.1.7 of the EM&A manual after all the works of this Contract are certified to be completed.

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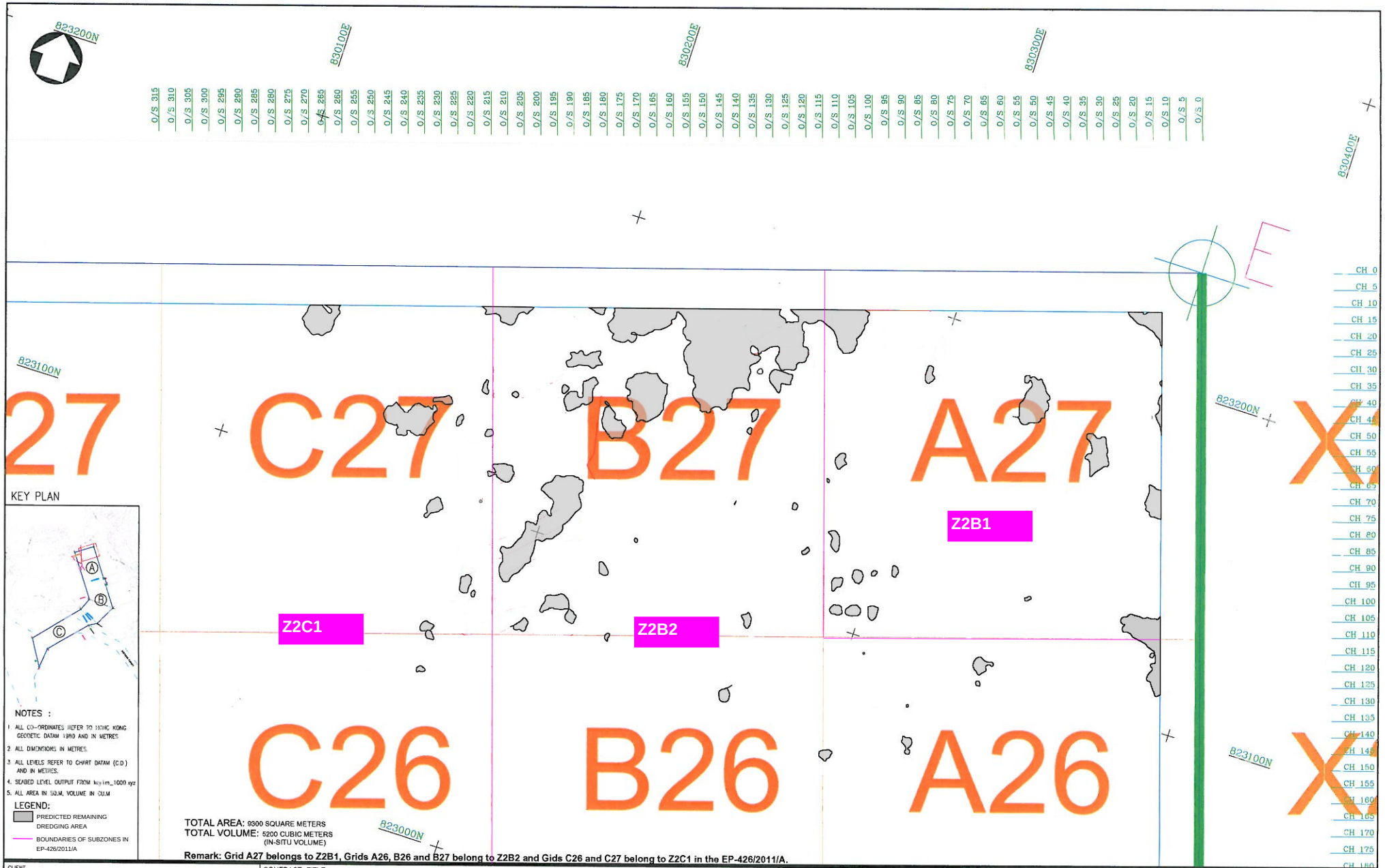
Figure 1

Predicted High Spots Location and Expected Volume



TOTAL AREA: 9300 SQUARE METERS
TOTAL VOLUME: 5200 CUBIC METERS (IN-SITU VOLUME)

Remark: Grid A27 belongs to Z2B1, Grids A26, B26 and B27 belong to Z2B2 and Gids C26 and C27 belong to Z2C1 in the EP-426/2011/A.

CLIENT: CEDD CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	CONTRACT TITLE: CONTRACT NO.CV/2013/04 DREDGING WORKS IN KWAI TSING CONTAINER BASIN AND ITS APPROACH CHANNEL	SCALE	1 : 500 (A1)	CAD REF	CV-2013-04_section A_AR026,27_20180827_diff.dwg	A/C APPR
		SURVEY DATE: ISSUE DATE:		A/C DWG NO	Sheet 1 of 1	
CONTRACTOR: 中國水利電力對外公司 CHINA INTERNATIONAL WATER & ELECTRIC CORP.	SKETCH TITLE: DIFF. BETWEEN CURRENT SEABED LEVEL AND −17.1mCD (HIGH SPOTS AREA & VOLUME)	DRAWN			SKETCH NO	REV —
		CHECKED				

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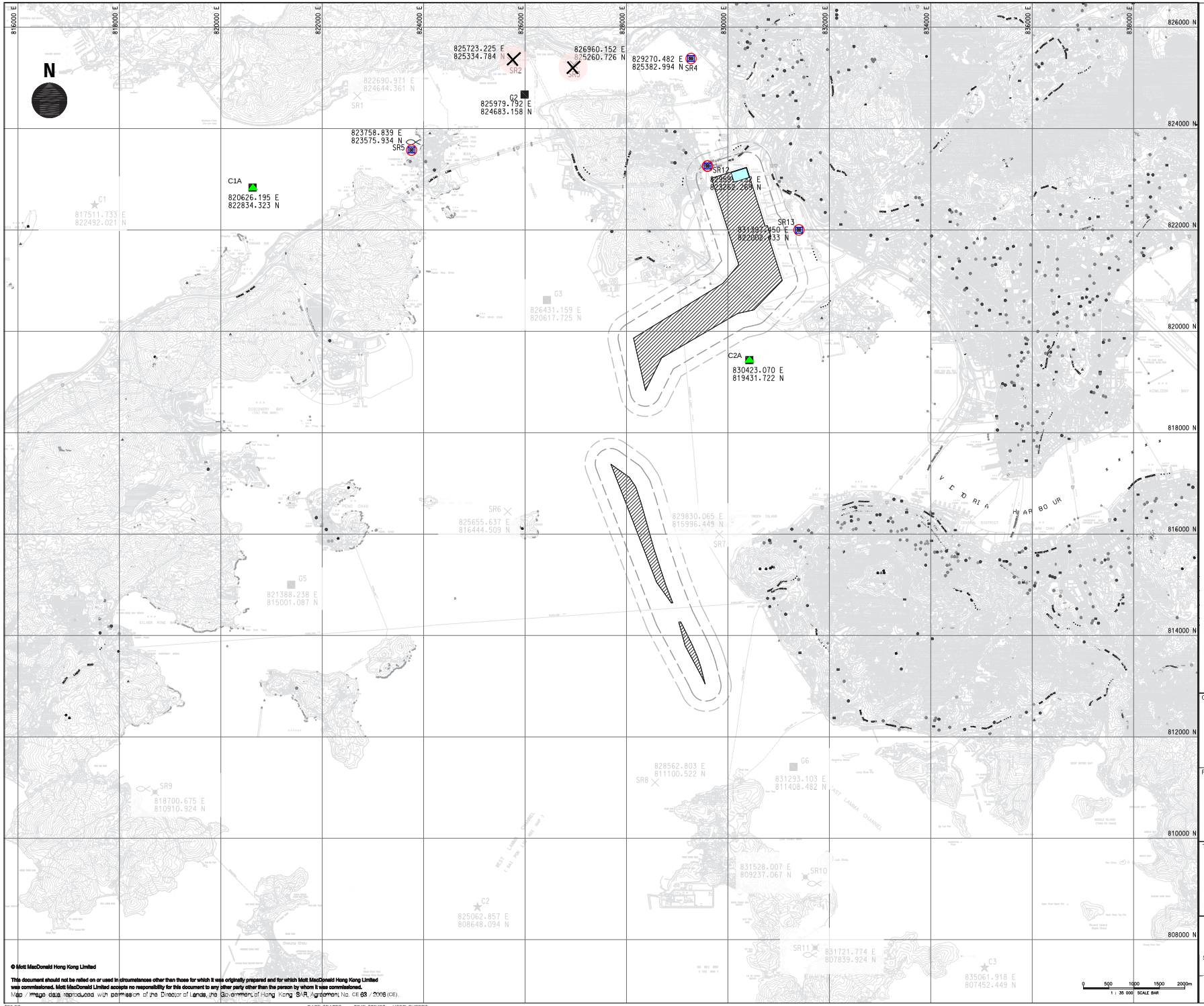
Figure 2

Locations of Water Quality Monitoring Stations



NOTES:

1. ALL COORDINATES ARE IN HONG KONG METRIC GRID (1980).
2. THE CONTRACTOR SHALL REFER TO RELEVANT SECTION(S) AND APPENDICES OF THE PARTICULAR SPECIFICATION REGARDING THE WATER QUALITY MONITORING.

LEGEND:

- SITE BOUNDARY UNDER EP-426/2011A
- CURRENT SCOPE OF DREDGING WORK BOUNDARY
- REMAINING MONITORING STATION
- REMAINING 24 HOUR MONITORING STATION
- REMAINING CONTROL STATION
- REMAINING GRADIENT STATION
- PROPOSED REMOVED MONITORING STATION

Client

THE GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION
CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

Project

CONTRACT NO. : CV/2013/04
DREDGING WORKS IN KWAI TSING CONTAINER BASIN AND ITS APPROACH CHANNEL

Title

PROVISIONAL LOCATION OF WATER QUALITY MONITORING STATIONS

Scale at A1	Status	Rev
1:35000	TEN	2

$FILES DATE:$DATES TIME:$TIME$ USER:$USER$

Figure 2 - Location of Water Quality Monitoring Stations

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Annex A

Statistical Analysis of Reviewed Impact Monitoring Stations

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Dissolved Oxygen (Surface & Middle)

SR2 - Dry Season DO (S and M) at Mid-Flood (mg/L)

No Dredging Work				With Dredging Works	
Date	DO(S&M) mg/L	Date	DO(S&M) mg/L	Date	DO(S&M) mg/L
26-Dec-2015	7.04	11-Nov-2017	6.33	21-Nov-2015	6.22
29-Dec-2015	7.01	14-Nov-2017	6.12	24-Dec-2015	6.85
31-Dec-2015	7.10	16-Nov-2017	6.02	9-Jan-2016	7.33
12-Jan-2016	7.37	18-Nov-2017	6.02	25-Feb-2017	7.55
14-Jan-2016	7.93			4-Nov-2017	6.08
26-Mar-2016	7.39			21-Nov-2017	6.24
29-Mar-2016	7.51				
24-Dec-2016	7.42				
27-Dec-2016	7.17				
31-Dec-2016	7.51				
3-Jan-2017	7.76				
7-Jan-2017	7.33				
10-Jan-2017	7.34				
14-Jan-2017	6.14				
17-Jan-2017	6.69				
19-Jan-2017	6.65				
21-Jan-2017	6.33				
23-Jan-2017	6.71				
25-Jan-2017	6.55				
27-Jan-2017	6.51				
31-Jan-2017	6.75				
2-Feb-2017	6.80				
4-Feb-2017	6.71				
7-Feb-2017	7.02				
9-Feb-2017	7.09				
11-Feb-2017	7.42				
14-Feb-2017	7.30				
16-Feb-2017	7.33				
18-Feb-2017	7.40				
21-Feb-2017	7.45				
23-Feb-2017	7.58				
28-Feb-2017	7.49				
2-Mar-2017	7.71				
4-Mar-2017	7.37				
7-Mar-2017	7.00				
9-Mar-2017	7.36				
11-Mar-2017	6.93				
14-Mar-2017	6.87				
16-Mar-2017	6.89				
18-Mar-2017	6.94				
21-Mar-2017	7.07				
23-Mar-2017	6.72				
25-Mar-2017	6.83				
28-Mar-2017	6.91				
30-Mar-2017	6.58				
2-Nov-2017	6.17				
7-Nov-2017	5.96				
9-Nov-2017	6.00				

No Dredging Work		With Dredging Works	
Raw Statistics		Raw Statistics	
Number of Valid Observations	52	Number of Valid Observations	6
Number of Distinct Observations	48	Number of Distinct Observations	6
Minimum	5.96	Minimum	6.08
Maximum	7.925	Maximum	7.553
Mean of Raw Data	6.951	Mean of Raw Data	6.71
Standard Deviation of Raw Data	0.506	Standard Deviation of Raw Data	0.628
Kstar	177.7	Kstar	69.66
Mean of Log Transformed Data	1.936	Mean of Log Transformed Data	1.9
Standard Deviation of Log Transformed Data	0.074	Standard Deviation of Log Transformed Data	0.0926
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.983	Correlation Coefficient R	0.947
Approximate Shapiro Wilk Test Statistic	0.95	Shapiro Wilk Test Statistic	0.872
Approximate Shapiro Wilk P Value	4.90E-02	Shapiro Wilk Critical (0.95) Value	0.788
Lilliefors Test Statistic	0.12	Approximate Shapiro Wilk P Value	N/A
Lilliefors Critical (0.95) Value	0.123	Lilliefors Test Statistic	0.276
		Lilliefors Critical (0.95) Value	0.362
Data appear Normal at (0.05) Significance Level		Data appear Normal at (0.05) Significance Level	

t-Test Site vs Background Comparison for Full Data Sets without NDs

User Selected Options	
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: With Dredging Works
Background Data: No Dredging Work

Raw Statistics

	Site	Background
Number of Valid Observations	6	52
Number of Distinct Observations	6	48
Minimum	6.08	5.96
Maximum	7.553	7.925
Mean	6.71	6.951
Median	6.543	7.004
SD	0.628	0.506
SE of Mean	0.256	0.0701

Site vs Background Two-Sample t-Test

H0: Mu of Site - Mu of Background <= 0

Method	DF	t-Test Value	Critical t (0.050)	P-Value
Pooled (Equal Variance)	56	-1.079	1.673	0.857
Satterthwaite (Unequal Variance)	5.8	-0.906	1.943	0.8

Pooled SD 0.518
Conclusion with Alpha = 0.050
* Student t (Pooled) Test: Do Not Reject H0, Conclude Site <= Background
* Satterthwaite Test: Do Not Reject H0, Conclude Site <= Background

SR2 - Wet Season DO (S and M) at Mid-Flood (mg/L)

No Dredging Work				With Dredging Works	
Date	DO(S&M) mg/L	Date	DO(S&M) mg/L	Date	DO(S&M) mg/L
4-Jun-2015	4.85	3-Jun-2017	6.41	2-Jun-2015	6.63
11-Jun-2015	5.83	6-Jun-2017	7.67	3-Sep-2015	4.84
14-Jul-2015	5.91	8-Jun-2017	7.75	12-Sep-2015	6.74
16-Jul-2015	5.48	10-Jun-2017	6.58	26-Sep-2015	6.45
18-Jul-2015	4.70	20-Jun-2017	5.79	6-Oct-2015	6.12
25-Jul-2015	5.87	22-Jun-2017	5.55	16-Apr-2016	6.84
1-Sep-2015	4.70	24-Jun-2017	5.37	4-Jun-2016	7.25
2-Apr-2016	9.88	27-Jun-2017	5.41	18-Jun-2016	6.03
14-Apr-2016	6.98	4-Jul-2017	6.28	2-Jul-2016	7.14
3-May-2016	7.45	6-Jul-2017	6.78	9-Jul-2016	4.79
7-May-2016	6.24	8-Jul-2017	6.48	12-Jul-2016	4.37
2-Jun-2016	7.75	15-Jul-2017	6.18	20-Apr-2017	7.31
14-Jul-2016	5.05	18-Jul-2017	6.17	29-Apr-2017	5.91
16-Jul-2016	5.93	20-Jul-2017	6.43	6-May-2017	6.09
19-Jul-2016	7.92	22-Jul-2017	6.28	11-May-2017	5.84
21-Jul-2016	5.36	25-Jul-2017	6.47	25-May-2017	5.72
23-Jul-2016	4.15	27-Jul-2017	4.72	15-Jun-2017	5.12
26-Jul-2016	4.99	29-Jul-2017	4.41	17-Jun-2017	4.92
28-Jul-2016	7.36	5-Aug-2017	4.93	29-Jun-2017	5.38
30-Jul-2016	8.94	15-Aug-2017	5.30	1-Jul-2017	5.68
4-Aug-2016	4.27	17-Aug-2017	6.89	11-Jul-2017	5.34
6-Aug-2016	4.30	19-Aug-2017	6.90	18-Jul-2017	6.17
9-Aug-2016	5.25	22-Aug-2017	5.49	20-Jul-2017	6.43
11-Aug-2016	4.69	24-Aug-2017	6.90	1-Aug-2017	5.39
13-Aug-2016	5.34	26-Aug-2017	4.98	3-Aug-2017	5.50
16-Aug-2016	5.57	29-Aug-2017	5.90	10-Aug-2017	4.73
20-Aug-2016	4.69	31-Aug-2017	6.53	7-Sep-2017	4.93
1-Apr-2017	7.06	2-Sep-2017	7.14	21-Sep-2017	4.86
4-Apr-2017	6.87	5-Sep-2017	5.65	23-Sep-2017	6.91
6-Apr-2017	7.88	9-Sep-2017	4.91	28-Sep-2017	5.82
8-Apr-2017	6.84	12-Sep-2017	4.70	12-Oct-2017	5.84
11-Apr-2017	6.66	14-Sep-2017	5.31	19-Oct-2017	5.56
13-Apr-2017	6.49	16-Sep-2017	5.88	21-Oct-2017	5.49
18-Apr-2017	7.09	19-Sep-2017	5.73	26-Oct-2017	5.84
22-Apr-2017	6.77	30-Sep-2017	6.00	28-Oct-2017	5.84
25-Apr-2017	5.81	3-Oct-2017	6.27	31-Oct-2017	5.96
27-Apr-2017	5.60	5-Oct-2017	4.84		
2-May-2017	6.02	7-Oct-2017	5.15		
4-May-2017	5.71	14-Oct-2017	5.70		
9-May-2017	6.49	17-Oct-2017	5.87		
13-May-2017	6.49	24-Oct-2017	5.54		
16-May-2017	5.69				
18-May-2017	6.20				
20-May-2017	5.96				
23-May-2017	5.39				
27-May-2017	5.42				
30-May-2017	5.35				
1-Jun-2017	6.03				

No Dredging Work		With Dredging Works	
Raw Statistics		Raw Statistics	
Number of Valid Observations	89	Number of Valid Observations	36
Number of Distinct Observations	87	Number of Distinct Observations	34
Minimum	4.15	Minimum	4.365
Maximum	9.88	Maximum	7.305
Mean of Raw Data	6.004	Mean of Raw Data	5.825
Standard Deviation of Raw Data	1.029	Standard Deviation of Raw Data	0.758
Kstar	35.03	Kstar	55.77
Mean of Log Transformed Data	1.779	Mean of Log Transformed Data	1.754
Standard Deviation of Log Transformed Data	0.166	Standard Deviation of Log Transformed Data	0.13
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.978	Correlation Coefficient R	0.99
Approximate Shapiro Wilk Test Statistic	0.958	Shapiro Wilk Test Statistic	0.968
Approximate Shapiro Wilk P Value	2.46E-02	Shapiro Wilk Critical (0.95) Value	0.935
Lilliefors Test Statistic	0.0741	Approximate Shapiro Wilk P Value	4.64E-01
Lilliefors Critical (0.95) Value	0.0939	Lilliefors Test Statistic	0.0758
		Lilliefors Critical (0.95) Value	0.148
Data appear Normal at (0.05) Significance Level		Data appear Normal at (0.05) Significance Level	

t-Test Site vs Background Comparison for Full Data Sets without NDs

User Selected Options	
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: With Dredging Works
Background Data: No Dredging Work

Raw Statistics

	Site	Background
Number of Valid Observations	36	89
Number of Distinct Observations	34	87
Minimum	4.365	4.15
Maximum	7.305	9.88
Mean	5.825	6.004
Median	5.835	5.88
SD	0.758	1.029
SE of Mean	0.126	0.109

Site vs Background Two-Sample t-Test

H0: Mu of Site - Mu of Background <= 0

Method	DF	t-Test Value	Critical t (0.050)	P-Value
Pooled (Equal Variance)	123	-0.942	1.657	0.826
Satterthwaite (Unequal Variance)	87.4	-1.071	1.663	0.856

Pooled SD 0.960
Conclusion with Alpha = 0.050
* Student t (Pooled) Test: Do Not Reject H0, Conclude Site <= Background
* Satterthwaite Test: Do Not Reject H0, Conclude Site <= Background

SR2 - Dry Season DO (S and M) at Mid-Ebb (mg/L)

No Dredging Work				With Dredging Works	
Date	DO(S&M) mg/L	Date	DO(S&M) mg/L	Date	DO(S&M) mg/L
26-Dec-2015	6.98	11-Nov-2017	6.33	21-Nov-2015	6.17
29-Dec-2015	7.04	14-Nov-2017	6.05	24-Dec-2015	6.68
31-Dec-2015	6.96	16-Nov-2017	6.05	9-Jan-2016	7.39
12-Jan-2016	7.61	18-Nov-2017	5.90	25-Feb-2017	7.53
14-Jan-2016	7.89			4-Nov-2017	6.15
26-Mar-2016	7.10			21-Nov-2017	6.20
29-Mar-2016	7.66				
24-Dec-2016	7.41				
27-Dec-2016	7.11				
31-Dec-2016	7.56				
3-Jan-2017	7.69				
7-Jan-2017	7.35				
10-Jan-2017	7.37				
14-Jan-2017	6.24				
17-Jan-2017	6.79				
19-Jan-2017	6.57				
21-Jan-2017	6.63				
23-Jan-2017	6.72				
25-Jan-2017	6.74				
27-Jan-2017	6.83				
31-Jan-2017	6.76				
2-Feb-2017	6.79				
4-Feb-2017	6.80				
7-Feb-2017	6.90				
9-Feb-2017	7.08				
11-Feb-2017	7.26				
14-Feb-2017	7.28				
16-Feb-2017	7.33				
18-Feb-2017	7.41				
21-Feb-2017	7.46				
23-Feb-2017	7.59				
28-Feb-2017	7.40				
2-Mar-2017	7.69				
4-Mar-2017	7.38				
7-Mar-2017	6.72				
9-Mar-2017	7.54				
11-Mar-2017	6.94				
14-Mar-2017	6.83				
16-Mar-2017	6.89				
18-Mar-2017	6.91				
21-Mar-2017	7.94				
23-Mar-2017	6.50				
25-Mar-2017	6.86				
28-Mar-2017	6.91				
30-Mar-2017	6.64				
2-Nov-2017	6.19				
7-Nov-2017	5.98				
9-Nov-2017	6.01				

No Dredging Work		With Dredging Works	
Raw Statistics		Raw Statistics	
Number of Valid Observations	52	Number of Valid Observations	6
Number of Distinct Observations	50	Number of Distinct Observations	6
Minimum	5.903	Minimum	6.145
Maximum	7.935	Maximum	7.533
Mean of Raw Data	6.971	Mean of Raw Data	6.685
Standard Deviation of Raw Data	0.518	Standard Deviation of Raw Data	0.634
Kstar	170.7	Kstar	68.32
Mean of Log Transformed Data	1.939	Mean of Log Transformed Data	1.896
Standard Deviation of Log Transformed Data	0.0755	Standard Deviation of Log Transformed Data	0.0933
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.987	Correlation Coefficient R	0.916
Approximate Shapiro Wilk Test Statistic	0.958	Shapiro Wilk Test Statistic	0.81
Approximate Shapiro Wilk P Value	1.13E-01	Shapiro Wilk Critical (0.95) Value	0.788
Lilliefors Test Statistic	0.0836	Approximate Shapiro Wilk P Value	N/A
Lilliefors Critical (0.95) Value	0.123	Lilliefors Test Statistic	0.28
		Lilliefors Critical (0.95) Value	0.362
Data appear Normal at (0.05) Significance Level		Data appear Normal at (0.05) Significance Level	

t-Test Site vs Background Comparison for Full Data Sets without NDs

User Selected Options	
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: With Dredging Works
Background Data: No Dredging Work

Raw Statistics

	Site	Background
Number of Valid Observations	6	52
Number of Distinct Observations	6	50
Minimum	6.145	5.903
Maximum	7.533	7.935
Mean	6.685	6.971
Median	6.435	6.921
SD	0.634	0.518
SE of Mean	0.259	0.0718

Site vs Background Two-Sample t-Test

H0: Mu of Site - Mu of Background <= 0

Method	DF	t-Test Value	Critical t (0.050)	P-Value
Pooled (Equal Variance)	56	-1.253	1.673	0.892
Satterthwaite (Unequal Variance)	5.8	-1.064	1.943	0.835

Pooled SD 0.529
Conclusion with Alpha = 0.050
* Student t (Pooled) Test: Do Not Reject H0, Conclude Site <= Background
* Satterthwaite Test: Do Not Reject H0, Conclude Site <= Background

SR2 - Wet Season DO (S and M) at Mid-Ebb (mg/L)

No Dredging Work				With Dredging Works	
Date	DO(S&M) mg/L	Date	DO(S&M) mg/L	Date	DO(S&M) mg/L
4-Jun-2015	4.70	3-Jun-2017	6.49	2-Jun-2015	6.65
11-Jun-2015	5.04	6-Jun-2017	7.47	3-Sep-2015	5.11
14-Jul-2015	5.92	8-Jun-2017	6.44	12-Sep-2015	6.57
16-Jul-2015	5.37	10-Jun-2017	7.69	26-Sep-2015	6.39
18-Jul-2015	4.90	20-Jun-2017	5.87	6-Oct-2015	6.19
25-Jul-2015	5.77	22-Jun-2017	5.49	16-Apr-2016	6.77
1-Sep-2015	4.70	24-Jun-2017	5.34	4-Jun-2016	7.42
2-Apr-2016	10.38	27-Jun-2017	5.43	18-Jun-2016	6.03
14-Apr-2016	6.73	4-Jul-2017	6.28	2-Jul-2016	6.34
3-May-2016	7.31	6-Jul-2017	6.06	9-Jul-2016	4.51
7-May-2016	6.28	8-Jul-2017	6.49	12-Jul-2016	4.37
2-Jun-2016	7.27	15-Jul-2017	6.18	20-Apr-2017	7.29
14-Jul-2016	5.17	18-Jul-2017	6.25	29-Apr-2017	5.91
16-Jul-2016	5.93	20-Jul-2017	6.49	6-May-2017	5.97
19-Jul-2016	7.55	22-Jul-2017	6.19	11-May-2017	5.80
21-Jul-2016	5.36	25-Jul-2017	6.34	25-May-2017	5.72
23-Jul-2016	5.41	27-Jul-2017	4.69	15-Jun-2017	5.02
26-Jul-2016	6.66	29-Jul-2017	4.18	17-Jun-2017	4.89
28-Jul-2016	6.64	5-Aug-2017	5.02	29-Jun-2017	5.14
30-Jul-2016	7.77	15-Aug-2017	4.86	1-Jul-2017	5.81
4-Aug-2016	4.56	17-Aug-2017	6.91	11-Jul-2017	5.29
6-Aug-2016	4.44	19-Aug-2017	6.88	18-Jul-2017	6.25
9-Aug-2016	4.70	22-Aug-2017	5.62	20-Jul-2017	6.49
11-Aug-2016	4.68	24-Aug-2017	6.90	1-Aug-2017	5.43
13-Aug-2016	5.32	26-Aug-2017	5.11	3-Aug-2017	5.63
16-Aug-2016	5.55	29-Aug-2017	5.86	10-Aug-2017	4.72
20-Aug-2016	4.71	31-Aug-2017	6.01	7-Sep-2017	4.82
1-Apr-2017	7.10	2-Sep-2017	6.98	21-Sep-2017	4.84
4-Apr-2017	6.94	5-Sep-2017	5.64	23-Sep-2017	6.89
6-Apr-2017	7.89	9-Sep-2017	4.82	28-Sep-2017	5.70
8-Apr-2017	6.89	12-Sep-2017	4.71	12-Oct-2017	5.77
11-Apr-2017	7.31	14-Sep-2017	5.37	19-Oct-2017	5.56
13-Apr-2017	6.51	16-Sep-2017	5.90	21-Oct-2017	5.52
18-Apr-2017	7.10	19-Sep-2017	5.77	26-Oct-2017	5.87
22-Apr-2017	6.80	30-Sep-2017	6.08	28-Oct-2017	5.92
25-Apr-2017	5.86	3-Oct-2017	6.24	31-Oct-2017	5.95
27-Apr-2017	5.59	5-Oct-2017	4.81		
2-May-2017	6.16	7-Oct-2017	4.84		
4-May-2017	5.72	14-Oct-2017	5.69		
9-May-2017	6.50	17-Oct-2017	5.79		
13-May-2017	6.99	24-Oct-2017	5.55		
16-May-2017	5.27				
18-May-2017	6.16				
20-May-2017	6.37				
23-May-2017	5.39				
27-May-2017	5.44				
30-May-2017	5.27				
1-Jun-2017	5.92				

No Dredging Work		With Dredging Works	
Raw Statistics		Raw Statistics	
Number of Valid Observations	89	Number of Valid Observations	36
Number of Distinct Observations	88	Number of Distinct Observations	36
Minimum	4.175	Minimum	4.365
Maximum	10.38	Maximum	7.415
Mean of Raw Data	5.984	Mean of Raw Data	5.792
Standard Deviation of Raw Data	0.992	Standard Deviation of Raw Data	0.749
Kstar	37.75	Kstar	56.07
Mean of Log Transformed Data	1.776	Mean of Log Transformed Data	1.748
Standard Deviation of Log Transformed Data	0.16	Standard Deviation of Log Transformed Data	0.13
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.968	Correlation Coefficient R	0.995
Approximate Shapiro Wilk Test Statistic	0.95	Shapiro Wilk Test Statistic	0.981
Approximate Shapiro Wilk P Value	5.21E-03	Shapiro Wilk Critical (0.95) Value	0.935
Lilliefors Test Statistic	0.0629	Approximate Shapiro Wilk P Value	8.25E-01
Lilliefors Critical (0.95) Value	0.0939	Lilliefors Test Statistic	0.0725
		Lilliefors Critical (0.95) Value	0.148
Data appear Normal at (0.05) Significance Level		Data appear Normal at (0.05) Significance Level	

t-Test Site vs Background Comparison for Full Data Sets without NDs

User Selected Options	
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: With Dredging Works
Background Data: No Dredging Work

Raw Statistics

	Site	Background
Number of Valid Observations	36	89
Number of Distinct Observations	36	88
Minimum	4.365	4.175
Maximum	7.415	10.38
Mean	5.792	5.984
Median	5.8	5.9
SD	0.749	0.992
SE of Mean	0.125	0.105

Site vs Background Two-Sample t-Test

H0: Mu of Site - Mu of Background <= 0

Method	DF	t-Test Value	Critical t (0.050)	P-Value
Pooled (Equal Variance)	123	-1.046	1.657	0.851
Satterthwaite (Unequal Variance)	85.3	-1.177	1.663	0.879

Pooled SD 0.929
Conclusion with Alpha = 0.050
* Student t (Pooled) Test: Do Not Reject H0, Conclude Site <= Background
* Satterthwaite Test: Do Not Reject H0, Conclude Site <= Background

SR3 - Dry Season DO (S and M) at Mid-Flood (mg/L)

No Dredging Work				With Dredging Works	
Date	DO(S&M) mg/L	Date	DO(S&M) mg/L	Date	DO(S&M) mg/L
26-Dec-2015	6.94	11-Nov-2017	6.39	21-Nov-2015	6.36
29-Dec-2015	6.87	14-Nov-2017	6.05	24-Dec-2015	6.86
31-Dec-2015	6.81	16-Nov-2017	5.98	9-Jan-2016	7.16
12-Jan-2016	7.40	18-Nov-2017	6.27	25-Feb-2017	7.25
14-Jan-2016	7.65			4-Nov-2017	6.03
26-Mar-2016	7.45			21-Nov-2017	6.17
29-Mar-2016	7.52				
24-Dec-2016	7.26				
27-Dec-2016	7.14				
31-Dec-2016	7.45				
3-Jan-2017	7.88				
7-Jan-2017	7.36				
10-Jan-2017	7.48				
14-Jan-2017	6.04				
17-Jan-2017	6.64				
19-Jan-2017	6.38				
21-Jan-2017	6.11				
23-Jan-2017	6.25				
25-Jan-2017	6.80				
27-Jan-2017	6.63				
31-Jan-2017	6.63				
2-Feb-2017	6.71				
4-Feb-2017	6.75				
7-Feb-2017	6.91				
9-Feb-2017	6.82				
11-Feb-2017	7.31				
14-Feb-2017	7.19				
16-Feb-2017	7.20				
18-Feb-2017	7.30				
21-Feb-2017	7.28				
23-Feb-2017	7.64				
28-Feb-2017	7.53				
2-Mar-2017	7.48				
4-Mar-2017	7.28				
7-Mar-2017	7.02				
9-Mar-2017	7.14				
11-Mar-2017	6.76				
14-Mar-2017	6.85				
16-Mar-2017	6.76				
18-Mar-2017	6.88				
21-Mar-2017	7.12				
23-Mar-2017	6.72				
25-Mar-2017	6.97				
28-Mar-2017	6.83				
30-Mar-2017	6.79				
2-Nov-2017	6.18				
7-Nov-2017	5.80				
9-Nov-2017	5.90				

No Dredging Work		With Dredging Works	
Raw Statistics		Raw Statistics	
Number of Valid Observations	52	Number of Valid Observations	6
Number of Distinct Observations	51	Number of Distinct Observations	6
Minimum	5.795	Minimum	6.025
Maximum	7.875	Maximum	7.255
Mean of Raw Data	6.893	Mean of Raw Data	6.636
Standard Deviation of Raw Data	0.507	Standard Deviation of Raw Data	0.525
Kstar	173.7	Kstar	96.09
Mean of Log Transformed Data	1.928	Mean of Log Transformed Data	1.89
Standard Deviation of Log Transformed Data	0.0749	Standard Deviation of Log Transformed Data	0.0791
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.986	Correlation Coefficient R	0.963
Approximate Shapiro Wilk Test Statistic	0.959	Shapiro Wilk Test Statistic	0.9
Approximate Shapiro Wilk P Value	1.32E-01	Shapiro Wilk Critical (0.95) Value	0.788
Lilliefors Test Statistic	0.089	Approximate Shapiro Wilk P Value	N/A
Lilliefors Critical (0.95) Value	0.123	Lilliefors Test Statistic	0.204
		Lilliefors Critical (0.95) Value	0.362
Data appear Normal at (0.05) Significance Level		Data appear Normal at (0.05) Significance Level	

t-Test Site vs Background Comparison for Full Data Sets without NDs

User Selected Options	
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: With Dredging Works
Background Data: No Dredging Work

Raw Statistics

	Site	Background
Number of Valid Observations	6	52
Number of Distinct Observations	6	51
Minimum	6.025	5.795
Maximum	7.255	7.875
Mean	6.636	6.893
Median	6.608	6.875
SD	0.525	0.507
SE of Mean	0.214	0.0703

Site vs Background Two-Sample t-Test

H0: Mu of Site - Mu of Background <= 0

Method	DF	t-Test Value	Critical t (0.050)	P-Value
Pooled (Equal Variance)	56	-1.171	1.673	0.877
Satterthwaite (Unequal Variance)	6.1	-1.139	1.943	0.851

Pooled SD 0.509
Conclusion with Alpha = 0.050
* Student t (Pooled) Test: Do Not Reject H0, Conclude Site <= Background
* Satterthwaite Test: Do Not Reject H0, Conclude Site <= Background

SR3 - Wet Season DO (S and M) at Mid-Flood (mg/L)

No Dredging Work				With Dredging Works	
Date	DO(S&M) mg/L	Date	DO(S&M) mg/L	Date	DO(S&M) mg/L
4-Jun-2015	4.97	3-Jun-2017	6.41	2-Jun-2015	6.63
11-Jun-2015	5.93	6-Jun-2017	7.56	3-Sep-2015	4.82
14-Jul-2015	8.47	8-Jun-2017	7.66	12-Sep-2015	6.66
16-Jul-2015	5.41	10-Jun-2017	6.76	26-Sep-2015	6.45
18-Jul-2015	5.01	20-Jun-2017	5.76	6-Oct-2015	6.28
25-Jul-2015	6.02	22-Jun-2017	6.17	16-Apr-2016	6.89
1-Sep-2015	4.70	24-Jun-2017	5.42	4-Jun-2016	7.13
2-Apr-2016	9.60	27-Jun-2017	5.76	18-Jun-2016	5.87
14-Apr-2016	6.77	4-Jul-2017	6.07	2-Jul-2016	6.00
3-May-2016	7.26	6-Jul-2017	5.85	9-Jul-2016	5.07
7-May-2016	6.28	8-Jul-2017	5.94	12-Jul-2016	4.83
2-Jun-2016	7.76	15-Jul-2017	6.72	20-Apr-2017	7.82
14-Jul-2016	5.04	18-Jul-2017	5.96	29-Apr-2017	5.87
16-Jul-2016	6.41	20-Jul-2017	6.50	6-May-2017	5.98
19-Jul-2016	7.52	22-Jul-2017	6.76	11-May-2017	5.84
21-Jul-2016	5.07	25-Jul-2017	6.44	25-May-2017	5.79
23-Jul-2016	4.83	27-Jul-2017	4.69	15-Jun-2017	5.30
26-Jul-2016	5.34	29-Jul-2017	4.42	17-Jun-2017	5.24
28-Jul-2016	7.28	5-Aug-2017	4.78	29-Jun-2017	5.55
30-Jul-2016	8.69	15-Aug-2017	5.61	1-Jul-2017	6.35
4-Aug-2016	4.46	17-Aug-2017	6.81	11-Jul-2017	5.83
6-Aug-2016	4.57	19-Aug-2017	7.12	18-Jul-2017	5.96
9-Aug-2016	5.34	22-Aug-2017	5.67	20-Jul-2017	6.50
11-Aug-2016	4.73	24-Aug-2017	6.82	1-Aug-2017	5.62
13-Aug-2016	5.45	26-Aug-2017	5.06	3-Aug-2017	5.77
16-Aug-2016	5.43	29-Aug-2017	5.70	10-Aug-2017	4.68
20-Aug-2016	4.69	31-Aug-2017	5.92	7-Sep-2017	5.02
1-Apr-2017	7.13	2-Sep-2017	6.66	21-Sep-2017	4.86
4-Apr-2017	6.79	5-Sep-2017	5.67	23-Sep-2017	6.82
6-Apr-2017	7.93	9-Sep-2017	5.02	28-Sep-2017	5.76
8-Apr-2017	6.88	12-Sep-2017	4.80	12-Oct-2017	5.66
11-Apr-2017	7.08	14-Sep-2017	5.33	19-Oct-2017	5.54
13-Apr-2017	6.39	16-Sep-2017	5.63	21-Oct-2017	5.37
18-Apr-2017	7.17	19-Sep-2017	5.91	26-Oct-2017	5.54
22-Apr-2017	6.97	30-Sep-2017	5.93	28-Oct-2017	5.90
25-Apr-2017	5.78	3-Oct-2017	6.21	31-Oct-2017	5.82
27-Apr-2017	5.78	5-Oct-2017	5.06		
2-May-2017	6.27	7-Oct-2017	5.04		
4-May-2017	5.28	14-Oct-2017	5.67		
9-May-2017	6.59	17-Oct-2017	5.75		
13-May-2017	6.02	24-Oct-2017	5.49		
16-May-2017	5.72				
18-May-2017	6.26				
20-May-2017	5.72				
23-May-2017	6.07				
27-May-2017	5.59				
30-May-2017	5.36				
1-Jun-2017	6.23				

No Dredging Work		With Dredging Works	
Raw Statistics		Raw Statistics	
Number of Valid Observations	89	Number of Valid Observations	36
Number of Distinct Observations	88	Number of Distinct Observations	36
Minimum	4.42	Minimum	4.68
Maximum	9.595	Maximum	7.82
Mean of Raw Data	6.049	Mean of Raw Data	5.86
Standard Deviation of Raw Data	0.996	Standard Deviation of Raw Data	0.7
Kstar	38.12	Kstar	67.8
Mean of Log Transformed Data	1.787	Mean of Log Transformed Data	1.761
Standard Deviation of Log Transformed Data	0.159	Standard Deviation of Log Transformed Data	0.118
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.977	Correlation Coefficient R	0.982
Approximate Shapiro Wilk Test Statistic	0.951	Shapiro Wilk Test Statistic	0.964
Approximate Shapiro Wilk P Value	6.71E-03	Shapiro Wilk Critical (0.95) Value	0.935
Lilliefors Test Statistic	0.0883	Approximate Shapiro Wilk P Value	3.55E-01
Lilliefors Critical (0.95) Value	0.0939	Lilliefors Test Statistic	0.143
		Lilliefors Critical (0.95) Value	0.148
Data appear Normal at (0.05) Significance Level		Data appear Normal at (0.05) Significance Level	

t-Test Site vs Background Comparison for Full Data Sets without NDs

User Selected Options	
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: With Dredging Works
Background Data: No Dredging Work

Raw Statistics

	Site	Background
Number of Valid Observations	36	89
Number of Distinct Observations	36	88
Minimum	4.68	4.42
Maximum	7.82	9.595
Mean	5.86	6.049
Median	5.823	5.915
SD	0.7	0.996
SE of Mean	0.117	0.106

Site vs Background Two-Sample t-Test

H0: Mu of Site - Mu of Background <= 0

Method	DF	t-Test Value	Critical t (0.050)	P-Value
Pooled (Equal Variance)	123	-1.039	1.657	0.85
Satterthwaite (Unequal Variance)	91.4	-1.202	1.662	0.884

Pooled SD 0.921
Conclusion with Alpha = 0.050
* Student t (Pooled) Test: Do Not Reject H0, Conclude Site <= Background
* Satterthwaite Test: Do Not Reject H0, Conclude Site <= Background

SR3 - Dry Season DO (S and M) at Mid-Ebb (mg/L)

No Dredging Work				With Dredging Works	
Date	DO(S&M) mg/L	Date	DO(S&M) mg/L	Date	DO(S&M) mg/L
26-Dec-2015	7.00	11-Nov-2017	6.40	21-Nov-2015	6.06
29-Dec-2015	7.01	14-Nov-2017	6.16	24-Dec-2015	6.87
31-Dec-2015	6.71	16-Nov-2017	6.01	9-Jan-2016	7.36
12-Jan-2016	7.35	18-Nov-2017	6.08	25-Feb-2017	7.26
14-Jan-2016	8.03			4-Nov-2017	6.08
26-Mar-2016	7.38			21-Nov-2017	5.81
29-Mar-2016	7.72				
24-Dec-2016	7.28				
27-Dec-2016	7.08				
31-Dec-2016	7.51				
3-Jan-2017	7.84				
7-Jan-2017	7.38				
10-Jan-2017	7.33				
14-Jan-2017	6.30				
17-Jan-2017	6.81				
19-Jan-2017	6.37				
21-Jan-2017	6.25				
23-Jan-2017	6.23				
25-Jan-2017	6.48				
27-Jan-2017	6.60				
31-Jan-2017	6.44				
2-Feb-2017	6.47				
4-Feb-2017	6.67				
7-Feb-2017	6.89				
9-Feb-2017	6.79				
11-Feb-2017	7.37				
14-Feb-2017	7.11				
16-Feb-2017	7.20				
18-Feb-2017	7.30				
21-Feb-2017	7.29				
23-Feb-2017	7.67				
28-Feb-2017	7.68				
2-Mar-2017	7.52				
4-Mar-2017	7.27				
7-Mar-2017	6.71				
9-Mar-2017	7.17				
11-Mar-2017	6.75				
14-Mar-2017	7.03				
16-Mar-2017	6.87				
18-Mar-2017	6.86				
21-Mar-2017	7.02				
23-Mar-2017	6.71				
25-Mar-2017	6.95				
28-Mar-2017	6.95				
30-Mar-2017	6.78				
2-Nov-2017	6.23				
7-Nov-2017	5.80				
9-Nov-2017	5.91				

No Dredging Work		With Dredging Works	
Raw Statistics		Raw Statistics	
Number of Valid Observations	52	Number of Valid Observations	6
Number of Distinct Observations	50	Number of Distinct Observations	6
Minimum	5.795	Minimum	5.805
Maximum	8.025	Maximum	7.36
Mean of Raw Data	6.896	Mean of Raw Data	6.57
Standard Deviation of Raw Data	0.525	Standard Deviation of Raw Data	0.674
Kstar	164.4	Kstar	57.18
Mean of Log Transformed Data	1.928	Mean of Log Transformed Data	1.878
Standard Deviation of Log Transformed Data	0.0767	Standard Deviation of Log Transformed Data	0.103
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.996	Correlation Coefficient R	0.947
Approximate Shapiro Wilk Test Statistic	0.98	Shapiro Wilk Test Statistic	0.869
Approximate Shapiro Wilk P Value	7.27E-01	Shapiro Wilk Critical (0.95) Value	0.788
Lilliefors Test Statistic	0.0698	Approximate Shapiro Wilk P Value	N/A
Lilliefors Critical (0.95) Value	0.123	Lilliefors Test Statistic	0.266
		Lilliefors Critical (0.95) Value	0.362
Data appear Normal at (0.05) Significance Level		Data appear Normal at (0.05) Significance Level	

t-Test Site vs Background Comparison for Full Data Sets without NDs

User Selected Options	
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: With Dredging Works
Background Data: No Dredging Work

Raw Statistics

	Site	Background
Number of Valid Observations	6	52
Number of Distinct Observations	6	50
Minimum	5.805	5.795
Maximum	7.36	8.025
Mean	6.57	6.896
Median	6.473	6.915
SD	0.674	0.525
SE of Mean	0.275	0.0727

Site vs Background Two-Sample t-Test

H0: Mu of Site - Mu of Background <= 0

Method	DF	t-Test Value	Critical t (0.050)	P-Value
Pooled (Equal Variance)	56	-1.399	1.673	0.916
Satterthwaite (Unequal Variance)	5.7	-1.143	1.943	0.851

Pooled SD 0.540
Conclusion with Alpha = 0.050
* Student t (Pooled) Test: Do Not Reject H0, Conclude Site <= Background
* Satterthwaite Test: Do Not Reject H0, Conclude Site <= Background

SR3 - Wet Season DO (S and M) at Mid-Ebb (mg/L)

No Dredging Work				With Dredging Works	
Date	DO(S&M) mg/L	Date	DO(S&M) mg/L	Date	DO(S&M) mg/L
4-Jun-2015	5.12	3-Jun-2017	6.46	2-Jun-2015	6.39
11-Jun-2015	5.93	6-Jun-2017	7.37	3-Sep-2015	4.76
14-Jul-2015	5.91	8-Jun-2017	7.65	12-Sep-2015	6.55
16-Jul-2015	5.48	10-Jun-2017	7.64	26-Sep-2015	6.34
18-Jul-2015	4.72	20-Jun-2017	5.67	6-Oct-2015	6.26
25-Jul-2015	6.08	22-Jun-2017	5.62	16-Apr-2016	6.75
1-Sep-2015	4.69	24-Jun-2017	5.42	4-Jun-2016	7.55
2-Apr-2016	9.80	27-Jun-2017	5.44	18-Jun-2016	5.88
14-Apr-2016	6.79	4-Jul-2017	6.01	2-Jul-2016	5.92
3-May-2016	6.84	6-Jul-2017	6.03	9-Jul-2016	5.05
7-May-2016	6.28	8-Jul-2017	5.86	12-Jul-2016	4.62
2-Jun-2016	6.90	15-Jul-2017	6.73	20-Apr-2017	7.81
14-Jul-2016	4.93	18-Jul-2017	6.29	29-Apr-2017	5.83
16-Jul-2016	6.41	20-Jul-2017	6.06	6-May-2017	5.94
19-Jul-2016	7.59	22-Jul-2017	6.90	11-May-2017	5.80
21-Jul-2016	5.43	25-Jul-2017	6.39	25-May-2017	5.75
23-Jul-2016	5.44	27-Jul-2017	4.72	15-Jun-2017	4.69
26-Jul-2016	5.64	29-Jul-2017	4.26	17-Jun-2017	4.78
28-Jul-2016	6.66	5-Aug-2017	4.83	29-Jun-2017	5.24
30-Jul-2016	7.63	15-Aug-2017	5.57	1-Jul-2017	6.33
4-Aug-2016	4.73	17-Aug-2017	6.82	11-Jul-2017	5.53
6-Aug-2016	4.06	19-Aug-2017	7.31	18-Jul-2017	6.29
9-Aug-2016	5.11	22-Aug-2017	5.80	20-Jul-2017	6.06
11-Aug-2016	4.82	24-Aug-2017	6.82	1-Aug-2017	5.32
13-Aug-2016	5.25	26-Aug-2017	5.20	3-Aug-2017	5.86
16-Aug-2016	5.21	29-Aug-2017	5.50	10-Aug-2017	4.69
20-Aug-2016	4.70	31-Aug-2017	5.93	7-Sep-2017	4.89
1-Apr-2017	7.02	2-Sep-2017	6.69	21-Sep-2017	4.81
4-Apr-2017	6.98	5-Sep-2017	5.66	23-Sep-2017	6.81
6-Apr-2017	7.98	9-Sep-2017	4.93	28-Sep-2017	5.74
8-Apr-2017	6.90	12-Sep-2017	4.70	12-Oct-2017	5.74
11-Apr-2017	7.10	14-Sep-2017	5.37	19-Oct-2017	5.61
13-Apr-2017	6.41	16-Sep-2017	5.60	21-Oct-2017	5.37
18-Apr-2017	7.13	19-Sep-2017	5.60	26-Oct-2017	5.54
22-Apr-2017	6.98	30-Sep-2017	5.95	28-Oct-2017	6.00
25-Apr-2017	5.87	3-Oct-2017	6.22	31-Oct-2017	6.15
27-Apr-2017	5.76	5-Oct-2017	4.74		
2-May-2017	6.24	7-Oct-2017	5.00		
4-May-2017	5.87	14-Oct-2017	5.66		
9-May-2017	6.37	17-Oct-2017	5.75		
13-May-2017	6.99	24-Oct-2017	5.48		
16-May-2017	5.52				
18-May-2017	6.17				
20-May-2017	5.84				
23-May-2017	5.53				
27-May-2017	5.50				
30-May-2017	5.44				
1-Jun-2017	6.20				

No Dredging Work		With Dredging Works	
Raw Statistics		Raw Statistics	
Number of Valid Observations	89	Number of Valid Observations	36
Number of Distinct Observations	87	Number of Distinct Observations	35
Minimum	4.058	Minimum	4.62
Maximum	9.8	Maximum	7.805
Mean of Raw Data	5.994	Mean of Raw Data	5.795
Standard Deviation of Raw Data	0.95	Standard Deviation of Raw Data	0.765
Kstar	40.61	Kstar	55.27
Mean of Log Transformed Data	1.779	Mean of Log Transformed Data	1.749
Standard Deviation of Log Transformed Data	0.155	Standard Deviation of Log Transformed Data	0.13
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.977	Correlation Coefficient R	0.978
Approximate Shapiro Wilk Test Statistic	0.965	Shapiro Wilk Test Statistic	0.951
Approximate Shapiro Wilk P Value	7.39E-02	Shapiro Wilk Critical (0.95) Value	0.935
Lilliefors Test Statistic	0.0802	Approximate Shapiro Wilk P Value	1.44E-01
Lilliefors Critical (0.95) Value	0.0939	Lilliefors Test Statistic	0.0799
		Lilliefors Critical (0.95) Value	0.148
Data appear Normal at (0.05) Significance Level		Data appear Normal at (0.05) Significance Level	

t-Test Site vs Background Comparison for Full Data Sets without NDs

User Selected Options	
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: With Dredging Works
Background Data: No Dredging Work

Raw Statistics

	Site	Background
Number of Valid Observations	36	89
Number of Distinct Observations	35	87
Minimum	4.62	4.058
Maximum	7.805	9.8
Mean	5.795	5.994
Median	5.814	5.865
SD	0.765	0.95
SE of Mean	0.128	0.101

Site vs Background Two-Sample t-Test

H0: Mu of Site - Mu of Background <= 0

Method	DF	t-Test Value	Critical t (0.050)	P-Value
Pooled (Equal Variance)	123	-1.117	1.657	0.867
Satterthwaite (Unequal Variance)	79.9	-1.224	1.664	0.888

Pooled SD 0.901
Conclusion with Alpha = 0.050
* Student t (Pooled) Test: Do Not Reject H0, Conclude Site <= Background
* Satterthwaite Test: Do Not Reject H0, Conclude Site <= Background

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Dissolved Oxygen (Bottom)

SR2 - Dry Season DO (B) at Mid-Flood (mg/L)

No Dredging Work				With Dredging Works	
Date	DO(B) mg/L	Date	DO(B) mg/L	Date	DO(B) mg/L
26-Dec-2015	6.73	11-Nov-2017	6.32	21-Nov-2015	5.86
29-Dec-2015	6.80	14-Nov-2017	6.02	24-Dec-2015	6.61
31-Dec-2015	6.95	16-Nov-2017	5.98	9-Jan-2016	7.19
12-Jan-2016	7.30	18-Nov-2017	5.53	25-Feb-2017	7.45
14-Jan-2016	7.74			4-Nov-2017	6.08
26-Mar-2016	6.99			21-Nov-2017	6.13
29-Mar-2016	7.31				
24-Dec-2016	7.40				
27-Dec-2016	7.15				
31-Dec-2016	7.41				
3-Jan-2017	7.72				
7-Jan-2017	7.35				
10-Jan-2017	7.36				
14-Jan-2017	6.13				
17-Jan-2017	6.76				
19-Jan-2017	6.57				
21-Jan-2017	6.30				
23-Jan-2017	6.55				
25-Jan-2017	6.54				
27-Jan-2017	6.31				
31-Jan-2017	6.63				
2-Feb-2017	6.58				
4-Feb-2017	6.69				
7-Feb-2017	6.80				
9-Feb-2017	6.86				
11-Feb-2017	7.14				
14-Feb-2017	7.21				
16-Feb-2017	7.28				
18-Feb-2017	7.29				
21-Feb-2017	7.46				
23-Feb-2017	7.51				
28-Feb-2017	7.37				
2-Mar-2017	7.71				
4-Mar-2017	7.36				
7-Mar-2017	6.93				
9-Mar-2017	7.45				
11-Mar-2017	6.87				
14-Mar-2017	6.81				
16-Mar-2017	6.81				
18-Mar-2017	6.86				
21-Mar-2017	6.93				
23-Mar-2017	6.75				
25-Mar-2017	6.83				
28-Mar-2017	6.79				
30-Mar-2017	6.65				
2-Nov-2017	6.14				
7-Nov-2017	5.97				
9-Nov-2017	5.99				

No Dredging Work		With Dredging Works	
Raw Statistics		Raw Statistics	
Number of Valid Observations	52	Number of Valid Observations	6
Number of Distinct Observations	52	Number of Distinct Observations	6
Minimum	5.53	Minimum	5.86
Maximum	7.735	Maximum	7.45
Mean of Raw Data	6.861	Mean of Raw Data	6.553
Standard Deviation of Raw Data	0.512	Standard Deviation of Raw Data	0.648
Kstar	168.3	Kstar	62.54
Mean of Log Transformed Data	1.923	Mean of Log Transformed Data	1.876
Standard Deviation of Log Transformed Data	0.0762	Standard Deviation of Log Transformed Data	0.0977
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.985	Correlation Coefficient R	0.96
Approximate Shapiro Wilk Test Statistic	0.96	Shapiro Wilk Test Statistic	0.902
Approximate Shapiro Wilk P Value	1.47E-01	Shapiro Wilk Critical (0.95) Value	0.788
Lilliefors Test Statistic	0.0984	Approximate Shapiro Wilk P Value	N/A
Lilliefors Critical (0.95) Value	0.123	Lilliefors Test Statistic	0.245
		Lilliefors Critical (0.95) Value	0.362
Data appear Normal at (0.05) Significance Level		Data appear Normal at (0.05) Significance Level	

t-Test Site vs Background Comparison for Full Data Sets without NDs

User Selected Options	
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: With Dredging Works
Background Data: No Dredging Work

Raw Statistics

	Site	Background
Number of Valid Observations	6	52
Number of Distinct Observations	6	52
Minimum	5.86	5.53
Maximum	7.45	7.735
Mean	6.553	6.861
Median	6.368	6.84
SD	0.648	0.512
SE of Mean	0.265	0.071

Site vs Background Two-Sample t-Test

H0: Mu of Site - Mu of Background <= 0

Method	DF	t-Test Value	Critical t (0.050)	P-Value
Pooled (Equal Variance)	56	-1.362	1.673	0.911
Satterthwaite (Unequal Variance)	5.7	-1.126	1.943	0.847

Pooled SD 0.525
Conclusion with Alpha = 0.050
* Student t (Pooled) Test: Do Not Reject H0, Conclude Site <= Background
* Satterthwaite Test: Do Not Reject H0, Conclude Site <= Background

SR2 - Wet Season DO (B) at Mid-Flood (mg/L)

No Dredging Work				With Dredging Works	
Date	DO(B) mg/L	Date	DO(B) mg/L	Date	DO(B) mg/L
4-Jun-2015	4.16	3-Jun-2017	6.32	2-Jun-2015	6.36
11-Jun-2015	5.58	6-Jun-2017	7.89	3-Sep-2015	4.21
14-Jul-2015	5.80	8-Jun-2017	7.83	12-Sep-2015	6.68
16-Jul-2015	5.14	10-Jun-2017	6.52	26-Sep-2015	6.39
18-Jul-2015	4.16	20-Jun-2017	5.63	6-Oct-2015	5.77
25-Jul-2015	5.48	22-Jun-2017	5.51	16-Apr-2016	6.72
1-Sep-2015	4.21	24-Jun-2017	5.20	4-Jun-2016	7.24
2-Apr-2016	8.64	27-Jun-2017	5.09	18-Jun-2016	5.90
14-Apr-2016	6.79	4-Jul-2017	6.24	2-Jul-2016	7.07
3-May-2016	7.45	6-Jul-2017	5.00	9-Jul-2016	4.32
7-May-2016	6.25	8-Jul-2017	6.69	12-Jul-2016	3.53
2-Jun-2016	7.60	15-Jul-2017	6.20	20-Apr-2017	6.94
14-Jul-2016	4.16	18-Jul-2017	6.34	29-Apr-2017	5.76
16-Jul-2016	5.89	20-Jul-2017	6.25	6-May-2017	5.91
19-Jul-2016	7.71	22-Jul-2017	6.20	11-May-2017	5.60
21-Jul-2016	3.96	25-Jul-2017	6.31	25-May-2017	5.65
23-Jul-2016	3.60	27-Jul-2017	4.15	15-Jun-2017	4.28
26-Jul-2016	3.54	29-Jul-2017	3.73	17-Jun-2017	4.74
28-Jul-2016	6.80	5-Aug-2017	4.43	29-Jun-2017	5.07
30-Jul-2016	8.10	15-Aug-2017	4.20	1-Jul-2017	4.66
4-Aug-2016	4.19	17-Aug-2017	6.96	11-Jul-2017	5.22
6-Aug-2016	3.96	19-Aug-2017	6.68	18-Jul-2017	6.34
9-Aug-2016	4.27	22-Aug-2017	5.25	20-Jul-2017	6.25
11-Aug-2016	4.18	24-Aug-2017	6.64	1-Aug-2017	5.22
13-Aug-2016	4.19	26-Aug-2017	4.51	3-Aug-2017	4.78
16-Aug-2016	5.49	29-Aug-2017	5.28	10-Aug-2017	4.16
20-Aug-2016	4.34	31-Aug-2017	5.55	7-Sep-2017	4.73
1-Apr-2017	7.10	2-Sep-2017	7.29	21-Sep-2017	4.74
4-Apr-2017	6.81	5-Sep-2017	5.59	23-Sep-2017	6.66
6-Apr-2017	7.82	9-Sep-2017	4.59	28-Sep-2017	5.11
8-Apr-2017	6.90	12-Sep-2017	4.28	12-Oct-2017	5.32
11-Apr-2017	6.59	14-Sep-2017	5.05	19-Oct-2017	5.55
13-Apr-2017	6.44	16-Sep-2017	5.89	21-Oct-2017	5.61
18-Apr-2017	7.02	19-Sep-2017	5.32	26-Oct-2017	5.69
22-Apr-2017	6.76	30-Sep-2017	5.71	28-Oct-2017	5.71
25-Apr-2017	5.65	3-Oct-2017	6.25	31-Oct-2017	5.98
27-Apr-2017	5.44	5-Oct-2017	4.56		
2-May-2017	5.77	7-Oct-2017	4.97		
4-May-2017	5.69	14-Oct-2017	5.66		
9-May-2017	6.44	17-Oct-2017	5.82		
13-May-2017	6.70	24-Oct-2017	5.51		
16-May-2017	5.29				
18-May-2017	6.38				
20-May-2017	5.80				
23-May-2017	5.35				
27-May-2017	5.34				
30-May-2017	5.05				
1-Jun-2017	5.68				

No Dredging Work		With Dredging Works	
Raw Statistics		Raw Statistics	
Number of Valid Observations	89	Number of Valid Observations	36
Number of Distinct Observations	83	Number of Distinct Observations	35
Minimum	3.54	Minimum	3.53
Maximum	8.64	Maximum	7.24
Mean of Raw Data	5.714	Mean of Raw Data	5.55
Standard Deviation of Raw Data	1.159	Standard Deviation of Raw Data	0.911
Kstar	23.32	Kstar	33.62
Mean of Log Transformed Data	1.722	Mean of Log Transformed Data	1.7
Standard Deviation of Log Transformed Data	0.207	Standard Deviation of Log Transformed Data	0.17
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.991	Correlation Coefficient R	0.994
Approximate Shapiro Wilk Test Statistic	0.966	Shapiro Wilk Test Statistic	0.978
Approximate Shapiro Wilk P Value	9.24E-02	Shapiro Wilk Critical (0.95) Value	0.935
Lilliefors Test Statistic	0.0739	Approximate Shapiro Wilk P Value	7.61E-01
Lilliefors Critical (0.95) Value	0.0939	Lilliefors Test Statistic	0.0835
		Lilliefors Critical (0.95) Value	0.148
Data appear Normal at (0.05) Significance Level		Data appear Normal at (0.05) Significance Level	

t-Test Site vs Background Comparison for Full Data Sets without NDs

User Selected Options	
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: With Dredging Works
Background Data: No Dredging Work

Raw Statistics

	Site	Background
Number of Valid Observations	36	89
Number of Distinct Observations	35	83
Minimum	3.53	3.54
Maximum	7.24	8.64
Mean	5.55	5.714
Median	5.629	5.655
SD	0.911	1.159
SE of Mean	0.152	0.123

Site vs Background Two-Sample t-Test

H0: Mu of Site - Mu of Background <= 0

Method	DF	t-Test Value	Critical t (0.050)	P-Value
Pooled (Equal Variance)	123	-0.759	1.657	0.775
Satterthwaite (Unequal Variance)	81.9	-0.84	1.664	0.798

Pooled SD 1.094
Conclusion with Alpha = 0.050
* Student t (Pooled) Test: Do Not Reject H0, Conclude Site <= Background
* Satterthwaite Test: Do Not Reject H0, Conclude Site <= Background

SR2 - Dry Season DO (B) at Mid-Ebb (mg/L)

No Dredging Work				With Dredging Works	
Date	DO(B) mg/L	Date	DO(B) mg/L	Date	DO(B) mg/L
26-Dec-2015	6.69	11-Nov-2017	6.32	21-Nov-2015	6.02
29-Dec-2015	6.90	14-Nov-2017	6.00	24-Dec-2015	6.34
31-Dec-2015	6.80	16-Nov-2017	5.94	9-Jan-2016	7.23
12-Jan-2016	7.52	18-Nov-2017	5.47	25-Feb-2017	7.46
14-Jan-2016	7.77			4-Nov-2017	6.08
26-Mar-2016	7.21			21-Nov-2017	6.10
29-Mar-2016	7.39				
24-Dec-2016	7.44				
27-Dec-2016	7.08				
31-Dec-2016	7.46				
3-Jan-2017	7.67				
7-Jan-2017	7.36				
10-Jan-2017	7.35				
14-Jan-2017	6.23				
17-Jan-2017	6.66				
19-Jan-2017	6.43				
21-Jan-2017	6.50				
23-Jan-2017	6.60				
25-Jan-2017	6.58				
27-Jan-2017	6.78				
31-Jan-2017	6.60				
2-Feb-2017	6.60				
4-Feb-2017	6.73				
7-Feb-2017	6.74				
9-Feb-2017	6.86				
11-Feb-2017	7.16				
14-Feb-2017	7.20				
16-Feb-2017	7.27				
18-Feb-2017	7.29				
21-Feb-2017	7.42				
23-Feb-2017	7.50				
28-Feb-2017	7.35				
2-Mar-2017	7.73				
4-Mar-2017	7.46				
7-Mar-2017	6.76				
9-Mar-2017	7.70				
11-Mar-2017	6.89				
14-Mar-2017	6.79				
16-Mar-2017	6.83				
18-Mar-2017	6.86				
21-Mar-2017	6.92				
23-Mar-2017	6.74				
25-Mar-2017	6.85				
28-Mar-2017	6.78				
30-Mar-2017	6.72				
2-Nov-2017	6.14				
7-Nov-2017	5.98				
9-Nov-2017	5.99				

No Dredging Work		With Dredging Works	
Raw Statistics		Raw Statistics	
Number of Valid Observations	52	Number of Valid Observations	6
Number of Distinct Observations	48	Number of Distinct Observations	6
Minimum	5.465	Minimum	6.02
Maximum	7.765	Maximum	7.455
Mean of Raw Data	6.882	Mean of Raw Data	6.537
Standard Deviation of Raw Data	0.522	Standard Deviation of Raw Data	0.638
Kstar	162.5	Kstar	65.41
Mean of Log Transformed Data	1.926	Mean of Log Transformed Data	1.874
Standard Deviation of Log Transformed Data	0.0775	Standard Deviation of Log Transformed Data	0.0951
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.984	Correlation Coefficient R	0.9
Approximate Shapiro Wilk Test Statistic	0.96	Shapiro Wilk Test Statistic	0.789
Approximate Shapiro Wilk P Value	1.37E-01	Shapiro Wilk Critical (0.95) Value	0.788
Lilliefors Test Statistic	0.089	Approximate Shapiro Wilk P Value	N/A
Lilliefors Critical (0.95) Value	0.123	Lilliefors Test Statistic	0.288
		Lilliefors Critical (0.95) Value	0.362
Data appear Normal at (0.05) Significance Level		Data appear Normal at (0.05) Significance Level	

t-Test Site vs Background Comparison for Full Data Sets without NDs

User Selected Options	
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: With Dredging Works
Background Data: No Dredging Work

Raw Statistics

	Site	Background
Number of Valid Observations	6	52
Number of Distinct Observations	6	48
Minimum	6.02	5.465
Maximum	7.455	7.765
Mean	6.537	6.882
Median	6.218	6.835
SD	0.638	0.522
SE of Mean	0.26	0.0724

Site vs Background Two-Sample t-Test

H0: Mu of Site - Mu of Background <= 0

Method	DF	t-Test Value	Critical t (0.050)	P-Value
Pooled (Equal Variance)	56	-1.503	1.673	0.931
Satterthwaite (Unequal Variance)	5.8	-1.279	1.943	0.875

Pooled SD 0.534
Conclusion with Alpha = 0.050
* Student t (Pooled) Test: Do Not Reject H0, Conclude Site <= Background
* Satterthwaite Test: Do Not Reject H0, Conclude Site <= Background

SR2 - Wet Season DO (B) at Mid-Ebb (mg/L)

No Dredging Work				With Dredging Works	
Date	DO(B) mg/L	Date	DO(B) mg/L	Date	DO(B) mg/L
4-Jun-2015	4.17	3-Jun-2017	6.39	2-Jun-2015	6.41
11-Jun-2015	4.75	6-Jun-2017	7.62	3-Sep-2015	4.17
14-Jul-2015	5.83	8-Jun-2017	7.89	12-Sep-2015	6.49
16-Jul-2015	5.20	10-Jun-2017	7.60	26-Sep-2015	6.37
18-Jul-2015	4.24	20-Jun-2017	5.64	6-Oct-2015	5.98
25-Jul-2015	5.03	22-Jun-2017	5.34	16-Apr-2016	6.75
1-Sep-2015	4.23	24-Jun-2017	5.19	4-Jun-2016	7.32
2-Apr-2016	8.51	27-Jun-2017	5.12	18-Jun-2016	5.81
14-Apr-2016	6.77	4-Jul-2017	6.25	2-Jul-2016	6.14
3-May-2016	6.90	6-Jul-2017	5.20	9-Jul-2016	3.76
7-May-2016	6.18	8-Jul-2017	6.72	12-Jul-2016	3.77
2-Jun-2016	7.02	15-Jul-2017	6.16	20-Apr-2017	6.95
14-Jul-2016	4.60	18-Jul-2017	6.26	29-Apr-2017	5.78
16-Jul-2016	5.85	20-Jul-2017	6.32	6-May-2017	5.72
19-Jul-2016	7.12	22-Jul-2017	6.04	11-May-2017	5.58
21-Jul-2016	3.95	25-Jul-2017	6.26	25-May-2017	5.66
23-Jul-2016	3.60	27-Jul-2017	4.17	15-Jun-2017	4.29
26-Jul-2016	3.79	29-Jul-2017	3.71	17-Jun-2017	4.20
28-Jul-2016	6.12	5-Aug-2017	4.39	29-Jun-2017	4.95
30-Jul-2016	7.73	15-Aug-2017	4.15	1-Jul-2017	4.64
4-Aug-2016	4.36	17-Aug-2017	6.66	11-Jul-2017	5.22
6-Aug-2016	3.95	19-Aug-2017	6.65	18-Jul-2017	6.26
9-Aug-2016	4.40	22-Aug-2017	5.17	20-Jul-2017	6.32
11-Aug-2016	4.16	24-Aug-2017	6.65	1-Aug-2017	5.22
13-Aug-2016	4.15	26-Aug-2017	4.81	3-Aug-2017	4.95
16-Aug-2016	5.30	29-Aug-2017	5.35	10-Aug-2017	4.15
20-Aug-2016	4.37	31-Aug-2017	5.95	7-Sep-2017	4.72
1-Apr-2017	7.07	2-Sep-2017	6.81	21-Sep-2017	4.77
4-Apr-2017	6.81	5-Sep-2017	5.60	23-Sep-2017	6.65
6-Apr-2017	7.84	9-Sep-2017	4.42	28-Sep-2017	5.26
8-Apr-2017	6.85	12-Sep-2017	4.22	12-Oct-2017	5.32
11-Apr-2017	7.20	14-Sep-2017	5.18	19-Oct-2017	5.55
13-Apr-2017	6.60	16-Sep-2017	5.84	21-Oct-2017	5.60
18-Apr-2017	7.01	19-Sep-2017	5.71	26-Oct-2017	5.66
22-Apr-2017	6.77	30-Sep-2017	5.74	28-Oct-2017	5.88
25-Apr-2017	5.68	3-Oct-2017	6.25	31-Oct-2017	5.99
27-Apr-2017	5.43	5-Oct-2017	4.57		
2-May-2017	5.92	7-Oct-2017	4.54		
4-May-2017	5.69	14-Oct-2017	5.60		
9-May-2017	6.45	17-Oct-2017	5.78		
13-May-2017	6.89	24-Oct-2017	5.51		
16-May-2017	5.20				
18-May-2017	5.90				
20-May-2017	6.20				
23-May-2017	5.35				
27-May-2017	5.36				
30-May-2017	5.20				
1-Jun-2017	5.74				

No Dredging Work		With Dredging Works	
Raw Statistics		Raw Statistics	
Number of Valid Observations	89	Number of Valid Observations	36
Number of Distinct Observations	79	Number of Distinct Observations	33
Minimum	3.6	Minimum	3.76
Maximum	8.51	Maximum	7.32
Mean of Raw Data	5.693	Mean of Raw Data	5.505
Standard Deviation of Raw Data	1.117	Standard Deviation of Raw Data	0.909
Kstar	24.87	Kstar	32.95
Mean of Log Transformed Data	1.72	Mean of Log Transformed Data	1.692
Standard Deviation of Log Transformed Data	0.201	Standard Deviation of Log Transformed Data	0.172
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.992	Correlation Coefficient R	0.992
Approximate Shapiro Wilk Test Statistic	0.967	Shapiro Wilk Test Statistic	0.972
Approximate Shapiro Wilk P Value	1.14E-01	Shapiro Wilk Critical (0.95) Value	0.935
Lilliefors Test Statistic	0.076	Approximate Shapiro Wilk P Value	5.81E-01
Lilliefors Critical (0.95) Value	0.0939	Lilliefors Test Statistic	0.101
		Lilliefors Critical (0.95) Value	0.148
Data appear Normal at (0.05) Significance Level		Data appear Normal at (0.05) Significance Level	

t-Test Site vs Background Comparison for Full Data Sets without NDs

User Selected Options	
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: With Dredging Works
Background Data: No Dredging Work

Raw Statistics

	Site	Background
Number of Valid Observations	36	89
Number of Distinct Observations	33	79
Minimum	3.76	3.6
Maximum	7.32	8.51
Mean	5.505	5.693
Median	5.625	5.71
SD	0.909	1.117
SE of Mean	0.151	0.118

Site vs Background Two-Sample t-Test

H0: Mu of Site - Mu of Background <= 0

Method	DF	t-Test Value	Critical t (0.050)	P-Value
Pooled (Equal Variance)	123	-0.897	1.657	0.814
Satterthwaite (Unequal Variance)	79.1	-0.978	1.664	0.834

Pooled SD 1.062
Conclusion with Alpha = 0.050
* Student t (Pooled) Test: Do Not Reject H0, Conclude Site <= Background
* Satterthwaite Test: Do Not Reject H0, Conclude Site <= Background

SR3 - Dry Season DO (B) at Mid-Flood (mg/L)

No Dredging Work				With Dredging Works	
Date	DO(B) mg/L	Date	DO(B) mg/L	Date	DO(B) mg/L
26-Dec-2015	6.62	11-Nov-2017	6.37	21-Nov-2015	6.04
29-Dec-2015	6.79	14-Nov-2017	6.05	24-Dec-2015	6.48
31-Dec-2015	6.77	16-Nov-2017	5.96	9-Jan-2016	7.05
12-Jan-2016	7.24	18-Nov-2017	6.04	25-Feb-2017	7.13
14-Jan-2016	7.62			4-Nov-2017	6.07
26-Mar-2016	7.03			21-Nov-2017	6.04
29-Mar-2016	7.31				
24-Dec-2016	7.28				
27-Dec-2016	7.10				
31-Dec-2016	7.36				
3-Jan-2017	7.80				
7-Jan-2017	7.38				
10-Jan-2017	7.46				
14-Jan-2017	6.92				
17-Jan-2017	6.70				
19-Jan-2017	6.32				
21-Jan-2017	6.13				
23-Jan-2017	6.16				
25-Jan-2017	6.69				
27-Jan-2017	6.52				
31-Jan-2017	6.52				
2-Feb-2017	6.55				
4-Feb-2017	6.67				
7-Feb-2017	6.75				
9-Feb-2017	6.68				
11-Feb-2017	7.05				
14-Feb-2017	7.10				
16-Feb-2017	7.11				
18-Feb-2017	7.17				
21-Feb-2017	7.24				
23-Feb-2017	7.64				
28-Feb-2017	7.37				
2-Mar-2017	7.43				
4-Mar-2017	7.24				
7-Mar-2017	6.93				
9-Mar-2017	7.23				
11-Mar-2017	6.67				
14-Mar-2017	6.73				
16-Mar-2017	6.76				
18-Mar-2017	6.82				
21-Mar-2017	7.04				
23-Mar-2017	6.67				
25-Mar-2017	6.91				
28-Mar-2017	6.76				
30-Mar-2017	6.83				
2-Nov-2017	6.14				
7-Nov-2017	5.80				
9-Nov-2017	5.82				

No Dredging Work		With Dredging Works	
Raw Statistics		Raw Statistics	
Number of Valid Observations	52	Number of Valid Observations	6
Number of Distinct Observations	48	Number of Distinct Observations	5
Minimum	5.795	Minimum	6.04
Maximum	7.8	Maximum	7.125
Mean of Raw Data	6.83	Mean of Raw Data	6.468
Standard Deviation of Raw Data	0.483	Standard Deviation of Raw Data	0.509
Kstar	188.4	Kstar	98.79
Mean of Log Transformed Data	1.919	Mean of Log Transformed Data	1.864
Standard Deviation of Log Transformed Data	0.0718	Standard Deviation of Log Transformed Data	0.0777
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.99	Correlation Coefficient R	0.911
Approximate Shapiro Wilk Test Statistic	0.967	Shapiro Wilk Test Statistic	0.799
Approximate Shapiro Wilk P Value	2.69E-01	Shapiro Wilk Critical (0.95) Value	0.788
Lilliefors Test Statistic	0.101	Approximate Shapiro Wilk P Value	N/A
Lilliefors Critical (0.95) Value	0.123	Lilliefors Test Statistic	0.283
		Lilliefors Critical (0.95) Value	0.362
Data appear Normal at (0.05) Significance Level		Data appear Normal at (0.05) Significance Level	

t-Test Site vs Background Comparison for Full Data Sets without NDs

User Selected Options	
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: With Dredging Works
Background Data: No Dredging Work

Raw Statistics

	Site	Background
Number of Valid Observations	6	52
Number of Distinct Observations	5	48
Minimum	6.04	5.795
Maximum	7.125	7.8
Mean	6.468	6.83
Median	6.275	6.803
SD	0.509	0.483
SE of Mean	0.208	0.067

Site vs Background Two-Sample t-Test

H0: Mu of Site - Mu of Background <= 0

Method	DF	t-Test Value	Critical t (0.050)	P-Value
Pooled (Equal Variance)	56	-1.729	1.673	0.955
Satterthwaite (Unequal Variance)	6.1	-1.658	1.943	0.926

Pooled SD 0.485
Conclusion with Alpha = 0.050
* Student t (Pooled) Test: Do Not Reject H0, Conclude Site <= Background
* Satterthwaite Test: Do Not Reject H0, Conclude Site <= Background

SR3 - Wet Season DO (B) at Mid-Flood (mg/L)

No Dredging Work				With Dredging Works	
Date	DO(B) mg/L	Date	DO(B) mg/L	Date	DO(B) mg/L
4-Jun-2015	4.15	3-Jun-2017	6.36	2-Jun-2015	6.59
11-Jun-2015	5.70	6-Jun-2017	7.33	3-Sep-2015	4.53
14-Jul-2015	5.85	8-Jun-2017	7.60	12-Sep-2015	6.64
16-Jul-2015	5.18	10-Jun-2017	6.04	26-Sep-2015	6.41
18-Jul-2015	4.18	20-Jun-2017	5.58	6-Oct-2015	6.07
25-Jul-2015	5.07	22-Jun-2017	6.05	16-Apr-2016	6.77
1-Sep-2015	4.34	24-Jun-2017	5.34	4-Jun-2016	7.02
2-Apr-2016	8.36	27-Jun-2017	5.15	18-Jun-2016	5.62
14-Apr-2016	6.61	4-Jul-2017	6.00	2-Jul-2016	6.47
3-May-2016	7.21	6-Jul-2017	5.62	9-Jul-2016	4.15
7-May-2016	6.15	8-Jul-2017	5.73	12-Jul-2016	3.26
2-Jun-2016	7.61	15-Jul-2017	6.72	20-Apr-2017	7.55
14-Jul-2016	4.12	18-Jul-2017	5.75	29-Apr-2017	5.77
16-Jul-2016	6.08	20-Jul-2017	6.35	6-May-2017	5.78
19-Jul-2016	7.21	22-Jul-2017	6.22	11-May-2017	5.60
21-Jul-2016	3.67	25-Jul-2017	6.19	25-May-2017	5.71
23-Jul-2016	3.69	27-Jul-2017	4.18	15-Jun-2017	4.61
26-Jul-2016	4.45	29-Jul-2017	4.03	17-Jun-2017	4.74
28-Jul-2016	6.59	5-Aug-2017	4.23	29-Jun-2017	4.88
30-Jul-2016	8.11	15-Aug-2017	4.82	1-Jul-2017	5.86
4-Aug-2016	4.16	17-Aug-2017	6.82	11-Jul-2017	4.62
6-Aug-2016	4.03	19-Aug-2017	6.81	18-Jul-2017	5.75
9-Aug-2016	4.57	22-Aug-2017	5.17	20-Jul-2017	6.35
11-Aug-2016	4.21	24-Aug-2017	6.71	1-Aug-2017	5.51
13-Aug-2016	4.30	26-Aug-2017	4.52	3-Aug-2017	4.92
16-Aug-2016	5.35	29-Aug-2017	5.31	10-Aug-2017	4.27
20-Aug-2016	4.32	31-Aug-2017	5.52	7-Sep-2017	4.63
1-Apr-2017	7.16	2-Sep-2017	6.50	21-Sep-2017	4.60
4-Apr-2017	6.73	5-Sep-2017	5.53	23-Sep-2017	6.72
6-Apr-2017	7.91	9-Sep-2017	4.83	28-Sep-2017	5.64
8-Apr-2017	6.82	12-Sep-2017	4.31	12-Oct-2017	5.52
11-Apr-2017	6.99	14-Sep-2017	5.27	19-Oct-2017	5.50
13-Apr-2017	6.39	16-Sep-2017	5.62	21-Oct-2017	5.42
18-Apr-2017	7.14	19-Sep-2017	5.43	26-Oct-2017	5.45
22-Apr-2017	6.97	30-Sep-2017	5.14	28-Oct-2017	5.80
25-Apr-2017	5.67	3-Oct-2017	6.13	31-Oct-2017	5.85
27-Apr-2017	5.30	5-Oct-2017	4.54		
2-May-2017	5.87	7-Oct-2017	4.90		
4-May-2017	5.33	14-Oct-2017	5.63		
9-May-2017	6.57	17-Oct-2017	5.75		
13-May-2017	6.77	24-Oct-2017	5.46		
16-May-2017	5.46				
18-May-2017	6.36				
20-May-2017	5.74				
23-May-2017	5.95				
27-May-2017	5.25				
30-May-2017	5.33				
1-Jun-2017	6.17				

No Dredging Work		With Dredging Works	
Raw Statistics		Raw Statistics	
Number of Valid Observations	89	Number of Valid Observations	36
Number of Distinct Observations	84	Number of Distinct Observations	36
Minimum	3.67	Minimum	3.26
Maximum	8.36	Maximum	7.55
Mean of Raw Data	5.71	Mean of Raw Data	5.569
Standard Deviation of Raw Data	1.081	Standard Deviation of Raw Data	0.912
Kstar	26.85	Kstar	33.19
Mean of Log Transformed Data	1.724	Mean of Log Transformed Data	1.703
Standard Deviation of Log Transformed Data	0.193	Standard Deviation of Log Transformed Data	0.172
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.993	Correlation Coefficient R	0.988
Approximate Shapiro Wilk Test Statistic	0.968	Shapiro Wilk Test Statistic	0.979
Approximate Shapiro Wilk P Value	1.24E-01	Shapiro Wilk Critical (0.95) Value	0.935
Lilliefors Test Statistic	0.0677	Approximate Shapiro Wilk P Value	7.76E-01
Lilliefors Critical (0.95) Value	0.0939	Lilliefors Test Statistic	0.127
		Lilliefors Critical (0.95) Value	0.148
Data appear Normal at (0.05) Significance Level		Data appear Normal at (0.05) Significance Level	

t-Test Site vs Background Comparison for Full Data Sets without NDs

User Selected Options	
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: With Dredging Works
Background Data: No Dredging Work

Raw Statistics

	Site	Background
Number of Valid Observations	36	89
Number of Distinct Observations	36	84
Minimum	3.26	3.67
Maximum	7.55	8.36
Mean	5.569	5.71
Median	5.628	5.67
SD	0.912	1.081
SE of Mean	0.152	0.115

Site vs Background Two-Sample t-Test

H0: Mu of Site - Mu of Background <= 0

Method	DF	t-Test Value	Critical t (0.050)	P-Value
Pooled (Equal Variance)	123	-0.687	1.657	0.753
Satterthwaite (Unequal Variance)	76.2	-0.738	1.665	0.769

Pooled SD 1.035
Conclusion with Alpha = 0.050
* Student t (Pooled) Test: Do Not Reject H0, Conclude Site <= Background
* Satterthwaite Test: Do Not Reject H0, Conclude Site <= Background

SR3 - Dry Season DO (B) at Mid-Ebb (mg/L)

No Dredging Work				With Dredging Works	
Date	DO(B) mg/L	Date	DO(B) mg/L	Date	DO(B) mg/L
26-Dec-2015	6.59	11-Nov-2017	6.39	21-Nov-2015	5.99
29-Dec-2015	6.89	14-Nov-2017	6.07	24-Dec-2015	6.55
31-Dec-2015	6.49	16-Nov-2017	5.97	9-Jan-2016	7.15
12-Jan-2016	7.35	18-Nov-2017	5.59	25-Feb-2017	7.12
14-Jan-2016	7.86			4-Nov-2017	6.08
26-Mar-2016	7.70			21-Nov-2017	5.76
29-Mar-2016	7.44				
24-Dec-2016	7.27				
27-Dec-2016	7.01				
31-Dec-2016	7.37				
3-Jan-2017	7.78				
7-Jan-2017	7.35				
10-Jan-2017	7.34				
14-Jan-2017	6.11				
17-Jan-2017	6.51				
19-Jan-2017	6.23				
21-Jan-2017	6.22				
23-Jan-2017	6.29				
25-Jan-2017	6.39				
27-Jan-2017	6.69				
31-Jan-2017	6.52				
2-Feb-2017	6.25				
4-Feb-2017	6.72				
7-Feb-2017	6.66				
9-Feb-2017	6.62				
11-Feb-2017	7.06				
14-Feb-2017	7.11				
16-Feb-2017	7.12				
18-Feb-2017	7.13				
21-Feb-2017	7.26				
23-Feb-2017	7.64				
28-Feb-2017	7.46				
2-Mar-2017	7.48				
4-Mar-2017	7.24				
7-Mar-2017	6.67				
9-Mar-2017	7.24				
11-Mar-2017	6.69				
14-Mar-2017	6.91				
16-Mar-2017	6.85				
18-Mar-2017	6.83				
21-Mar-2017	6.85				
23-Mar-2017	6.58				
25-Mar-2017	6.87				
28-Mar-2017	6.87				
30-Mar-2017	6.81				
2-Nov-2017	6.25				
7-Nov-2017	5.81				
9-Nov-2017	5.81				

No Dredging Work		With Dredging Works	
Raw Statistics		Raw Statistics	
Number of Valid Observations	52	Number of Valid Observations	6
Number of Distinct Observations	49	Number of Distinct Observations	6
Minimum	5.585	Minimum	5.755
Maximum	7.855	Maximum	7.15
Mean of Raw Data	6.809	Mean of Raw Data	6.441
Standard Deviation of Raw Data	0.54	Standard Deviation of Raw Data	0.597
Kstar	150.9	Kstar	70.63
Mean of Log Transformed Data	1.915	Mean of Log Transformed Data	1.859
Standard Deviation of Log Transformed Data	0.0802	Standard Deviation of Log Transformed Data	0.0921
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.996	Correlation Coefficient R	0.955
Approximate Shapiro Wilk Test Statistic	0.979	Shapiro Wilk Test Statistic	0.885
Approximate Shapiro Wilk P Value	6.67E-01	Shapiro Wilk Critical (0.95) Value	0.788
Lilliefors Test Statistic	0.0734	Approximate Shapiro Wilk P Value	N/A
Lilliefors Critical (0.95) Value	0.123	Lilliefors Test Statistic	0.227
		Lilliefors Critical (0.95) Value	0.362
Data appear Normal at (0.05) Significance Level		Data appear Normal at (0.05) Significance Level	

t-Test Site vs Background Comparison for Full Data Sets without NDs

User Selected Options	
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: With Dredging Works
Background Data: No Dredging Work

Raw Statistics

	Site	Background
Number of Valid Observations	6	52
Number of Distinct Observations	6	49
Minimum	5.755	5.585
Maximum	7.15	7.855
Mean	6.441	6.809
Median	6.315	6.835
SD	0.597	0.54
SE of Mean	0.244	0.0748

Site vs Background Two-Sample t-Test

H0: Mu of Site - Mu of Background <= 0

Method	DF	t-Test Value	Critical t (0.050)	P-Value
Pooled (Equal Variance)	56	-1.568	1.673	0.939
Satterthwaite (Unequal Variance)	6	-1.446	1.943	0.901

Pooled SD 0.545
Conclusion with Alpha = 0.050
* Student t (Pooled) Test: Do Not Reject H0, Conclude Site <= Background
* Satterthwaite Test: Do Not Reject H0, Conclude Site <= Background

SR3 - Wet Season DO (B) at Mid-Ebb (mg/L)

No Dredging Work				With Dredging Works	
Date	DO(B) mg/L	Date	DO(B) mg/L	Date	DO(B) mg/L
4-Jun-2015	4.28	3-Jun-2017	6.37	2-Jun-2015	6.34
11-Jun-2015	5.12	6-Jun-2017	7.29	3-Sep-2015	4.52
14-Jul-2015	5.81	8-Jun-2017	7.61	12-Sep-2015	6.45
16-Jul-2015	5.23	10-Jun-2017	7.60	26-Sep-2015	6.30
18-Jul-2015	4.19	20-Jun-2017	5.49	6-Oct-2015	6.15
25-Jul-2015	5.55	22-Jun-2017	5.43	16-Apr-2016	6.60
1-Sep-2015	4.31	24-Jun-2017	5.35	4-Jun-2016	7.07
2-Apr-2016	8.57	27-Jun-2017	5.41	18-Jun-2016	5.65
14-Apr-2016	6.74	4-Jul-2017	5.97	2-Jul-2016	5.68
3-May-2016	6.69	6-Jul-2017	5.85	9-Jul-2016	4.35
7-May-2016	6.17	8-Jul-2017	5.69	12-Jul-2016	3.56
2-Jun-2016	6.73	15-Jul-2017	6.73	20-Apr-2017	7.56
14-Jul-2016	4.35	18-Jul-2017	6.15	29-Apr-2017	5.74
16-Jul-2016	6.10	20-Jul-2017	6.08	6-May-2017	5.81
19-Jul-2016	7.32	22-Jul-2017	6.65	11-May-2017	5.58
21-Jul-2016	4.01	25-Jul-2017	6.27	25-May-2017	5.64
23-Jul-2016	3.79	27-Jul-2017	4.15	15-Jun-2017	4.13
26-Jul-2016	4.14	29-Jul-2017	3.95	17-Jun-2017	4.19
28-Jul-2016	6.00	5-Aug-2017	4.19	29-Jun-2017	4.83
30-Jul-2016	7.05	15-Aug-2017	4.36	1-Jul-2017	5.99
4-Aug-2016	4.48	17-Aug-2017	6.72	11-Jul-2017	4.78
6-Aug-2016	3.90	19-Aug-2017	7.17	18-Jul-2017	6.15
9-Aug-2016	4.33	22-Aug-2017	5.13	20-Jul-2017	6.08
11-Aug-2016	4.32	24-Aug-2017	6.69	1-Aug-2017	5.30
13-Aug-2016	4.45	26-Aug-2017	4.90	3-Aug-2017	5.51
16-Aug-2016	4.97	29-Aug-2017	5.30	10-Aug-2017	4.28
20-Aug-2016	4.44	31-Aug-2017	5.56	7-Sep-2017	4.63
1-Apr-2017	6.91	2-Sep-2017	6.56	21-Sep-2017	4.58
4-Apr-2017	6.88	5-Sep-2017	5.56	23-Sep-2017	6.69
6-Apr-2017	7.96	9-Sep-2017	4.82	28-Sep-2017	5.68
8-Apr-2017	6.83	12-Sep-2017	4.25	12-Oct-2017	5.35
11-Apr-2017	6.97	14-Sep-2017	5.28	19-Oct-2017	5.58
13-Apr-2017	6.44	16-Sep-2017	5.68	21-Oct-2017	5.42
18-Apr-2017	7.14	19-Sep-2017	5.58	26-Oct-2017	5.45
22-Apr-2017	7.03	30-Sep-2017	4.67	28-Oct-2017	5.92
25-Apr-2017	5.68	3-Oct-2017	6.14	31-Oct-2017	6.16
27-Apr-2017	5.49	5-Oct-2017	4.45		
2-May-2017	5.78	7-Oct-2017	4.82		
4-May-2017	5.90	14-Oct-2017	5.63		
9-May-2017	6.14	17-Oct-2017	5.72		
13-May-2017	6.88	24-Oct-2017	5.48		
16-May-2017	5.03				
18-May-2017	5.82				
20-May-2017	5.77				
23-May-2017	5.41				
27-May-2017	5.32				
30-May-2017	5.40				
1-Jun-2017	5.87				

No Dredging Work		With Dredging Works	
Raw Statistics		Raw Statistics	
Number of Valid Observations	89	Number of Valid Observations	36
Number of Distinct Observations	83	Number of Distinct Observations	34
Minimum	3.79	Minimum	3.56
Maximum	8.57	Maximum	7.56
Mean of Raw Data	5.687	Mean of Raw Data	5.545
Standard Deviation of Raw Data	1.063	Standard Deviation of Raw Data	0.888
Kstar	27.71	Kstar	35.14
Mean of Log Transformed Data	1.721	Mean of Log Transformed Data	1.7
Standard Deviation of Log Transformed Data	0.19	Standard Deviation of Log Transformed Data	0.167
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.99	Correlation Coefficient R	0.989
Approximate Shapiro Wilk Test Statistic	0.965	Shapiro Wilk Test Statistic	0.978
Approximate Shapiro Wilk P Value	7.83E-02	Shapiro Wilk Critical (0.95) Value	0.935
Lilliefors Test Statistic	0.0855	Approximate Shapiro Wilk P Value	7.64E-01
Lilliefors Critical (0.95) Value	0.0939	Lilliefors Test Statistic	0.114
		Lilliefors Critical (0.95) Value	0.148
Data appear Normal at (0.05) Significance Level		Data appear Normal at (0.05) Significance Level	

t-Test Site vs Background Comparison for Full Data Sets without NDs

User Selected Options	
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: With Dredging Works
Background Data: No Dredging Work

Raw Statistics

	Site	Background
Number of Valid Observations	36	89
Number of Distinct Observations	34	83
Minimum	3.56	3.79
Maximum	7.56	8.57
Mean	5.545	5.687
Median	5.643	5.675
SD	0.888	1.063
SE of Mean	0.148	0.113

Site vs Background Two-Sample t-Test

H0: Mu of Site - Mu of Background <= 0

Method	DF	t-Test Value	Critical t (0.050)	P-Value
Pooled (Equal Variance)	123	-0.71	1.657	0.761
Satterthwaite (Unequal Variance)	77.1	-0.767	1.665	0.777

Pooled SD 1.016
Conclusion with Alpha = 0.050
* Student t (Pooled) Test: Do Not Reject H0, Conclude Site <= Background
* Satterthwaite Test: Do Not Reject H0, Conclude Site <= Background

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Turbidity

SR2 - Dry Season Turbidity at Mid-Flood (NTU)

No Dredging Work				With Dredging Works	
Date	Turbidity NTU	Date	Turbidity NTU	Date	Turbidity NTU
26-Dec-2015	2.9	11-Nov-2017	3.4	21-Nov-2015	1.6
29-Dec-2015	2.7	14-Nov-2017	6.1	24-Dec-2015	2.3
31-Dec-2015	1.7	16-Nov-2017	4.6	9-Jan-2016	0.5
12-Jan-2016	0.7	18-Nov-2017	3.8	25-Feb-2017	2.1
14-Jan-2016	0.5			4-Nov-2017	5.4
26-Mar-2016	2.0			21-Nov-2017	4.7
29-Mar-2016	1.5				
24-Dec-2016	0.8				
27-Dec-2016	1.6				
31-Dec-2016	2.0				
3-Jan-2017	2.2				
7-Jan-2017	1.7				
10-Jan-2017	1.7				
14-Jan-2017	4.1				
17-Jan-2017	3.0				
19-Jan-2017	1.4				
21-Jan-2017	1.0				
23-Jan-2017	1.3				
25-Jan-2017	1.8				
27-Jan-2017	3.1				
31-Jan-2017	3.1				
2-Feb-2017	3.3				
4-Feb-2017	2.0				
7-Feb-2017	1.6				
9-Feb-2017	2.4				
11-Feb-2017	3.1				
14-Feb-2017	2.4				
16-Feb-2017	1.2				
18-Feb-2017	0.7				
21-Feb-2017	0.9				
23-Feb-2017	0.7				
28-Feb-2017	0.3				
2-Mar-2017	1.9				
4-Mar-2017	0.8				
7-Mar-2017	0.8				
9-Mar-2017	1.0				
11-Mar-2017	0.3				
14-Mar-2017	0.7				
16-Mar-2017	0.4				
18-Mar-2017	1.1				
21-Mar-2017	0.7				
23-Mar-2017	0.1				
25-Mar-2017	0.3				
28-Mar-2017	1.3				
30-Mar-2017	0.5				
2-Nov-2017	5.3				
7-Nov-2017	2.0				
9-Nov-2017	2.1				

No Dredging Work		With Dredging Works	
Raw Statistics		Raw Statistics	
Number of Valid Observations	52	Number of Valid Observations	6
Number of Distinct Observations	51	Number of Distinct Observations	6
Minimum	0.1	Minimum	0.467
Maximum	6.117	Maximum	5.433
Mean of Raw Data	1.854	Mean of Raw Data	2.767
Standard Deviation of Raw Data	1.328	Standard Deviation of Raw Data	1.902
Kstar	1.788	Kstar	1.136
Mean of Log Transformed Data	0.329	Mean of Log Transformed Data	0.754
Standard Deviation of Log Transformed Data	0.843	Standard Deviation of Log Transformed Data	0.882
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.954	Correlation Coefficient R	0.964
Approximate Shapiro Wilk Test Statistic	0.907	Shapiro Wilk Test Statistic	0.921
Approximate Shapiro Wilk P Value	4.26E-04	Shapiro Wilk Critical (0.95) Value	0.788
Lilliefors Test Statistic	0.119	Approximate Shapiro Wilk P Value	N/A
Lilliefors Critical (0.95) Value	0.123	Lilliefors Test Statistic	0.257
		Lilliefors Critical (0.95) Value	0.362
Data appear Normal at (0.05) Significance Level		Data appear Normal at (0.05) Significance Level	

t-Test Site vs Background Comparison for Full Data Sets without NDs

User Selected Options	
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: With Dredging Works
Background Data: No Dredging Work

Raw Statistics

	Site	Background
Number of Valid Observations	6	52
Number of Distinct Observations	6	51
Minimum	0.467	0.1
Maximum	5.433	6.117
Mean	2.767	1.854
Median	2.208	1.633
SD	1.902	1.328
SE of Mean	0.777	0.184

Site vs Background Two-Sample t-Test

H0: Mu of Site - Mu of Background <= 0

Method	DF	t-Test Value	Critical t (0.050)	P-Value
Pooled (Equal Variance)	56	1.524	1.673	0.067
Satterthwaite (Unequal Variance)	5.6	1.143	1.943	0.15

Pooled SD 1.389
Conclusion with Alpha = 0.050
* Student t (Pooled) Test: Do Not Reject H0, Conclude Site <= Background
* Satterthwaite Test: Do Not Reject H0, Conclude Site <= Background

SR2 - Wet Season Turbidity at Mid-Flood (NTU)

No Dredging Work				With Dredging Works	
Date	Turbidity NTU	Date	Turbidity NTU	Date	Turbidity NTU
4-Jun-2015	2.4	3-Jun-2017	0.4	2-Jun-2015	3.9
11-Jun-2015	0.4	6-Jun-2017	1.6	3-Sep-2015	2.0
14-Jul-2015	2.7	8-Jun-2017	1.5	12-Sep-2015	4.6
16-Jul-2015	4.6	10-Jun-2017	0.8	26-Sep-2015	4.2
18-Jul-2015	3.0	20-Jun-2017	1.7	6-Oct-2015	2.4
25-Jul-2015	2.3	22-Jun-2017	1.3	16-Apr-2016	0.6
1-Sep-2015	5.1	24-Jun-2017	1.1	4-Jun-2016	0.8
2-Apr-2016	1.0	27-Jun-2017	1.4	18-Jun-2016	1.7
14-Apr-2016	0.9	4-Jul-2017	0.5	2-Jul-2016	0.5
3-May-2016	1.3	6-Jul-2017	0.6	9-Jul-2016	2.4
7-May-2016	4.5	8-Jul-2017	1.3	12-Jul-2016	1.0
2-Jun-2016	0.4	15-Jul-2017	1.6	20-Apr-2017	0.8
14-Jul-2016	0.7	18-Jul-2017	1.1	29-Apr-2017	2.8
16-Jul-2016	3.3	20-Jul-2017	1.0	6-May-2017	1.5
19-Jul-2016	3.2	22-Jul-2017	2.2	11-May-2017	1.4
21-Jul-2016	1.5	25-Jul-2017	1.3	25-May-2017	2.8
23-Jul-2016	0.8	27-Jul-2017	3.4	15-Jun-2017	2.3
26-Jul-2016	1.3	29-Jul-2017	3.1	17-Jun-2017	0.8
28-Jul-2016	1.0	5-Aug-2017	1.2	29-Jun-2017	1.2
30-Jul-2016	4.0	15-Aug-2017	1.5	1-Jul-2017	2.0
4-Aug-2016	3.5	17-Aug-2017	0.7	11-Jul-2017	1.0
6-Aug-2016	1.2	19-Aug-2017	1.1	18-Jul-2017	1.1
9-Aug-2016	1.4	22-Aug-2017	1.8	20-Jul-2017	1.0
11-Aug-2016	1.9	24-Aug-2017	0.7	1-Aug-2017	1.5
13-Aug-2016	0.9	26-Aug-2017	1.3	3-Aug-2017	2.1
16-Aug-2016	2.8	29-Aug-2017	10.1	10-Aug-2017	0.4
20-Aug-2016	1.4	31-Aug-2017	1.6	7-Sep-2017	9.0
1-Apr-2017	0.8	2-Sep-2017	8.5	21-Sep-2017	10.3
4-Apr-2017	0.6	5-Sep-2017	12.4	23-Sep-2017	0.7
6-Apr-2017	0.4	9-Sep-2017	9.9	28-Sep-2017	9.7
8-Apr-2017	1.0	12-Sep-2017	5.9	12-Oct-2017	9.0
11-Apr-2017	1.2	14-Sep-2017	7.3	19-Oct-2017	10.5
13-Apr-2017	1.7	16-Sep-2017	1.8	21-Oct-2017	4.0
18-Apr-2017	1.2	19-Sep-2017	10.2	26-Oct-2017	1.9
22-Apr-2017	0.9	30-Sep-2017	8.5	28-Oct-2017	2.5
25-Apr-2017	4.6	3-Oct-2017	1.2	31-Oct-2017	2.0
27-Apr-2017	3.9	5-Oct-2017	1.4		
2-May-2017	2.4	7-Oct-2017	4.1		
4-May-2017	2.5	14-Oct-2017	7.0		
9-May-2017	1.6	17-Oct-2017	1.3		
13-May-2017	2.6	24-Oct-2017	2.0		
16-May-2017	0.4				
18-May-2017	0.5				
20-May-2017	0.5				
23-May-2017	0.7				
27-May-2017	0.8				
30-May-2017	0.6				
1-Jun-2017	1.2				

No Dredging Work		With Dredging Works	
Raw Statistics		Raw Statistics	
Number of Valid Observations	89	Number of Valid Observations	36
Number of Distinct Observations	81	Number of Distinct Observations	34
Minimum	0.367	Minimum	0.433
Maximum	12.43	Maximum	10.48
Mean of Raw Data	2.409	Mean of Raw Data	2.96
Standard Deviation of Raw Data	2.508	Standard Deviation of Raw Data	2.959
Kstar	1.4	Kstar	1.312
Mean of Log Transformed Data	0.494	Mean of Log Transformed Data	0.691
Standard Deviation of Log Transformed Data	0.846	Standard Deviation of Log Transformed Data	0.88
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.843	Correlation Coefficient R	0.856
Approximate Shapiro Wilk Test Statistic	0.713	Shapiro Wilk Test Statistic	0.724
Approximate Shapiro Wilk P Value	0.00E+00	Shapiro Wilk Critical (0.95) Value	0.935
Lilliefors Test Statistic	0.234	Approximate Shapiro Wilk P Value	4.19E-08
Lilliefors Critical (0.95) Value	0.0939	Lilliefors Test Statistic	0.267
		Lilliefors Critical (0.95) Value	0.148
Data not Normal at (0.05) Significance Level		Data not Normal at (0.05) Significance Level	

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: With Dredging Works
Background Data: No Dredging Work

Raw Statistics

	Site	Background
Number of Valid Observations	36	89
Number of Distinct Observations	34	81
Minimum	0.433	0.367
Maximum	10.48	12.43
Mean	2.96	2.409
Median	1.994	1.433
SD	2.959	2.508
SE of Mean	0.493	0.266

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	2486
WMW Test U-Stat	1.183
WMW Critical Value (0.050)	1.645
P-Value	0.118

Conclusion with Alpha = 0.05
Do Not Reject H0, Conclude Site <= Background
P-Value >= alpha (0.05)

SR2 - Dry Season Turbidity at Mid-Ebb (NTU)

No Dredging Work				With Dredging Works	
Date	Turbidity NTU	Date	Turbidity NTU	Date	Turbidity NTU
26-Dec-2015	3.6	11-Nov-2017	3.4	21-Nov-2015	2.2
29-Dec-2015	1.3	14-Nov-2017	5.7	24-Dec-2015	2.1
31-Dec-2015	1.2	16-Nov-2017	4.5	9-Jan-2016	0.2
12-Jan-2016	0.3	18-Nov-2017	5.1	25-Feb-2017	2.1
14-Jan-2016	0.3			4-Nov-2017	6.6
26-Mar-2016	2.1			21-Nov-2017	5.1
29-Mar-2016	1.3				
24-Dec-2016	0.8				
27-Dec-2016	1.9				
31-Dec-2016	2.3				
3-Jan-2017	2.5				
7-Jan-2017	1.8				
10-Jan-2017	1.6				
14-Jan-2017	3.0				
17-Jan-2017	2.6				
19-Jan-2017	1.9				
21-Jan-2017	1.0				
23-Jan-2017	1.4				
25-Jan-2017	1.4				
27-Jan-2017	2.0				
31-Jan-2017	3.2				
2-Feb-2017	3.3				
4-Feb-2017	1.8				
7-Feb-2017	1.4				
9-Feb-2017	2.3				
11-Feb-2017	2.6				
14-Feb-2017	2.4				
16-Feb-2017	1.2				
18-Feb-2017	0.7				
21-Feb-2017	0.6				
23-Feb-2017	0.7				
28-Feb-2017	0.4				
2-Mar-2017	2.0				
4-Mar-2017	0.9				
7-Mar-2017	0.9				
9-Mar-2017	0.9				
11-Mar-2017	0.4				
14-Mar-2017	0.8				
16-Mar-2017	0.5				
18-Mar-2017	0.6				
21-Mar-2017	0.9				
23-Mar-2017	0.3				
25-Mar-2017	0.5				
28-Mar-2017	1.4				
30-Mar-2017	0.6				
2-Nov-2017	5.8				
7-Nov-2017	2.0				
9-Nov-2017	2.1				

No Dredging Work		With Dredging Works	
Raw Statistics		Raw Statistics	
Number of Valid Observations	52	Number of Valid Observations	6
Number of Distinct Observations	49	Number of Distinct Observations	6
Minimum	0.267	Minimum	0.233
Maximum	5.8	Maximum	6.567
Mean of Raw Data	1.81	Mean of Raw Data	3.044
Standard Deviation of Raw Data	1.347	Standard Deviation of Raw Data	2.324
Kstar	1.873	Kstar	0.818
Mean of Log Transformed Data	0.319	Mean of Log Transformed Data	0.719
Standard Deviation of Log Transformed Data	0.779	Standard Deviation of Log Transformed Data	1.176
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.936	Correlation Coefficient R	0.947
Approximate Shapiro Wilk Test Statistic	0.867	Shapiro Wilk Test Statistic	0.9
Approximate Shapiro Wilk P Value	4.46E-06	Shapiro Wilk Critical (0.95) Value	0.788
Lilliefors Test Statistic	0.129	Approximate Shapiro Wilk P Value	N/A
Lilliefors Critical (0.95) Value	0.123	Lilliefors Test Statistic	0.309
		Lilliefors Critical (0.95) Value	0.362
Data not Normal at (0.05) Significance Level		Data appear Normal at (0.05) Significance Level	

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: With Dredging Works
Background Data: No Dredging Work

Raw Statistics

	Site	Background
Number of Valid Observations	6	52
Number of Distinct Observations	6	49
Minimum	0.233	0.267
Maximum	6.567	5.8
Mean	3.044	1.81
Median	2.167	1.417
SD	2.324	1.347
SE of Mean	0.949	0.187

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	231
WMW Test U-Stat	1.366
WMW Critical Value (0.050)	1.645
P-Value	0.086

Conclusion with Alpha = 0.05
Do Not Reject H0, Conclude Site <= Background
P-Value >= alpha (0.05)

SR2 - Wet Season Turbidity at Mid-Ebb (NTU)

No Dredging Work				With Dredging Works	
Date	Turbidity NTU	Date	Turbidity NTU	Date	Turbidity NTU
4-Jun-2015	0.9	3-Jun-2017	0.4	2-Jun-2015	4.1
11-Jun-2015	0.8	6-Jun-2017	1.4	3-Sep-2015	1.1
14-Jul-2015	3.6	8-Jun-2017	1.6	12-Sep-2015	4.6
16-Jul-2015	3.6	10-Jun-2017	0.3	26-Sep-2015	3.7
18-Jul-2015	2.3	20-Jun-2017	1.4	6-Oct-2015	2.8
25-Jul-2015	2.9	22-Jun-2017	1.3	16-Apr-2016	0.7
1-Sep-2015	4.2	24-Jun-2017	1.0	4-Jun-2016	1.0
2-Apr-2016	0.6	27-Jun-2017	1.2	18-Jun-2016	2.3
14-Apr-2016	0.9	4-Jul-2017	0.5	2-Jul-2016	0.7
3-May-2016	0.9	6-Jul-2017	0.7	9-Jul-2016	2.4
7-May-2016	5.5	8-Jul-2017	1.4	12-Jul-2016	0.6
2-Jun-2016	0.2	15-Jul-2017	1.6	20-Apr-2017	0.7
14-Jul-2016	0.8	18-Jul-2017	2.1	29-Apr-2017	2.9
16-Jul-2016	4.0	20-Jul-2017	0.9	6-May-2017	1.3
19-Jul-2016	3.4	22-Jul-2017	2.0	11-May-2017	1.5
21-Jul-2016	1.4	25-Jul-2017	0.9	25-May-2017	2.8
23-Jul-2016	0.3	27-Jul-2017	3.7	15-Jun-2017	2.4
26-Jul-2016	0.8	29-Jul-2017	2.6	17-Jun-2017	0.5
28-Jul-2016	1.6	5-Aug-2017	1.3	29-Jun-2017	1.3
30-Jul-2016	1.7	15-Aug-2017	1.4	1-Jul-2017	2.0
4-Aug-2016	5.3	17-Aug-2017	0.7	11-Jul-2017	0.9
6-Aug-2016	0.8	19-Aug-2017	1.0	18-Jul-2017	2.1
9-Aug-2016	1.6	22-Aug-2017	1.8	20-Jul-2017	0.9
11-Aug-2016	2.9	24-Aug-2017	0.7	1-Aug-2017	1.3
13-Aug-2016	0.4	26-Aug-2017	1.6	3-Aug-2017	2.1
16-Aug-2016	2.3	29-Aug-2017	10.2	10-Aug-2017	0.4
20-Aug-2016	1.5	31-Aug-2017	1.3	7-Sep-2017	9.3
1-Apr-2017	0.7	2-Sep-2017	8.2	21-Sep-2017	10.2
4-Apr-2017	0.9	5-Sep-2017	12.3	23-Sep-2017	0.7
6-Apr-2017	0.3	9-Sep-2017	10.4	28-Sep-2017	9.2
8-Apr-2017	0.8	12-Sep-2017	5.9	12-Oct-2017	9.1
11-Apr-2017	0.8	14-Sep-2017	7.3	19-Oct-2017	10.4
13-Apr-2017	2.1	16-Sep-2017	1.8	21-Oct-2017	4.0
18-Apr-2017	1.4	19-Sep-2017	10.1	26-Oct-2017	1.9
22-Apr-2017	1.2	30-Sep-2017	8.4	28-Oct-2017	2.0
25-Apr-2017	4.5	3-Oct-2017	1.2	31-Oct-2017	2.0
27-Apr-2017	3.7	5-Oct-2017	0.7		
2-May-2017	1.8	7-Oct-2017	4.3		
4-May-2017	1.1	14-Oct-2017	7.1		
9-May-2017	1.8	17-Oct-2017	0.9		
13-May-2017	1.4	24-Oct-2017	2.0		
16-May-2017	0.7				
18-May-2017	0.5				
20-May-2017	0.8				
23-May-2017	0.7				
27-May-2017	0.9				
30-May-2017	1.5				
1-Jun-2017	1.2				

No Dredging Work		With Dredging Works	
Raw Statistics		Raw Statistics	
Number of Valid Observations	89	Number of Valid Observations	36
Number of Distinct Observations	77	Number of Distinct Observations	35
Minimum	0.2	Minimum	0.417
Maximum	12.28	Maximum	10.37
Mean of Raw Data	2.347	Mean of Raw Data	2.939
Standard Deviation of Raw Data	2.543	Standard Deviation of Raw Data	2.926
Kstar	1.292	Kstar	1.297
Mean of Log Transformed Data	0.432	Mean of Log Transformed Data	0.678
Standard Deviation of Log Transformed Data	0.89	Standard Deviation of Log Transformed Data	0.891
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.839	Correlation Coefficient R	0.859
Approximate Shapiro Wilk Test Statistic	0.706	Shapiro Wilk Test Statistic	0.73
Approximate Shapiro Wilk P Value	0.00E+00	Shapiro Wilk Critical (0.95) Value	0.935
Lilliefors Test Statistic	0.263	Approximate Shapiro Wilk P Value	5.69E-08
Lilliefors Critical (0.95) Value	0.0939	Lilliefors Test Statistic	0.258
		Lilliefors Critical (0.95) Value	0.148
Data not Normal at (0.05) Significance Level		Data not Normal at (0.05) Significance Level	

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: With Dredging Works
Background Data: No Dredging Work

Raw Statistics

	Site	Background
Number of Valid Observations	36	89
Number of Distinct Observations	35	77
Minimum	0.417	0.2
Maximum	10.37	12.28
Mean	2.939	2.347
Median	2.041	1.417
SD	2.926	2.543
SE of Mean	0.488	0.27

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	2531
WMW Test U-Stat	1.431
WMW Critical Value (0.050)	1.645
P-Value	0.0762

Conclusion with Alpha = 0.05
Do Not Reject H0, Conclude Site <= Background
P-Value >= alpha (0.05)

SR3 - Dry Season Turbidity at Mid-Flood (NTU)

No Dredging Work				With Dredging Works	
Date	Turbidity NTU	Date	Turbidity NTU	Date	Turbidity NTU
26-Dec-2015	3.2	11-Nov-2017	3.8	21-Nov-2015	1.6
29-Dec-2015	2.2	14-Nov-2017	5.3	24-Dec-2015	2.2
31-Dec-2015	1.6	16-Nov-2017	4.7	9-Jan-2016	0.4
12-Jan-2016	0.5	18-Nov-2017	2.8	25-Feb-2017	2.9
14-Jan-2016	0.5			4-Nov-2017	4.5
26-Mar-2016	2.8			21-Nov-2017	6.2
29-Mar-2016	1.1				
24-Dec-2016	1.1				
27-Dec-2016	1.4				
31-Dec-2016	1.4				
3-Jan-2017	2.6				
7-Jan-2017	1.7				
10-Jan-2017	1.2				
14-Jan-2017	3.4				
17-Jan-2017	2.0				
19-Jan-2017	1.8				
21-Jan-2017	1.3				
23-Jan-2017	1.8				
25-Jan-2017	1.8				
27-Jan-2017	3.2				
31-Jan-2017	3.3				
2-Feb-2017	3.7				
4-Feb-2017	2.7				
7-Feb-2017	2.2				
9-Feb-2017	3.4				
11-Feb-2017	5.2				
14-Feb-2017	4.0				
16-Feb-2017	1.9				
18-Feb-2017	1.1				
21-Feb-2017	0.7				
23-Feb-2017	0.5				
28-Feb-2017	2.9				
2-Mar-2017	2.2				
4-Mar-2017	0.9				
7-Mar-2017	0.8				
9-Mar-2017	0.8				
11-Mar-2017	0.9				
14-Mar-2017	1.6				
16-Mar-2017	1.7				
18-Mar-2017	0.3				
21-Mar-2017	1.2				
23-Mar-2017	0.3				
25-Mar-2017	1.0				
28-Mar-2017	2.1				
30-Mar-2017	0.6				
2-Nov-2017	6.6				
7-Nov-2017	1.8				
9-Nov-2017	1.7				

No Dredging Work		With Dredging Works	
Raw Statistics		Raw Statistics	
Number of Valid Observations	52	Number of Valid Observations	6
Number of Distinct Observations	49	Number of Distinct Observations	6
Minimum	0.317	Minimum	0.4
Maximum	6.583	Maximum	6.183
Mean of Raw Data	2.098	Mean of Raw Data	2.972
Standard Deviation of Raw Data	1.386	Standard Deviation of Raw Data	2.081
Kstar	2.261	Kstar	1.03
Mean of Log Transformed Data	0.517	Mean of Log Transformed Data	0.793
Standard Deviation of Log Transformed Data	0.71	Standard Deviation of Log Transformed Data	0.965
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.954	Correlation Coefficient R	0.986
Approximate Shapiro Wilk Test Statistic	0.907	Shapiro Wilk Test Statistic	0.971
Approximate Shapiro Wilk P Value	3.91E-04	Shapiro Wilk Critical (0.95) Value	0.788
Lilliefors Test Statistic	0.144	Approximate Shapiro Wilk P Value	N/A
Lilliefors Critical (0.95) Value	0.123	Lilliefors Test Statistic	0.177
		Lilliefors Critical (0.95) Value	0.362
Data not Normal at (0.05) Significance Level		Data appear Normal at (0.05) Significance Level	

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: With Dredging Works
Background Data: No Dredging Work

Raw Statistics

	Site	Background
Number of Valid Observations	6	52
Number of Distinct Observations	6	49
Minimum	0.4	0.317
Maximum	6.183	6.583
Mean	2.972	2.098
Median	2.558	1.767
SD	2.081	1.386
SE of Mean	0.85	0.192

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	218
WMW Test U-Stat	1.034
WMW Critical Value (0.050)	1.645
P-Value	0.151

Conclusion with Alpha = 0.05
Do Not Reject H0, Conclude Site <= Background
P-Value >= alpha (0.05)

SR3 - Wet Season Turbidity at Mid-Flood (NTU)

No Dredging Work				With Dredging Works	
Date	Turbidity NTU	Date	Turbidity NTU	Date	Turbidity NTU
4-Jun-2015	2.0	3-Jun-2017	0.3	2-Jun-2015	3.3
11-Jun-2015	0.1	6-Jun-2017	1.4	3-Sep-2015	1.5
14-Jul-2015	2.2	8-Jun-2017	1.5	12-Sep-2015	3.4
16-Jul-2015	3.2	10-Jun-2017	0.6	26-Sep-2015	3.2
18-Jul-2015	3.8	20-Jun-2017	1.7	6-Oct-2015	3.6
25-Jul-2015	3.4	22-Jun-2017	2.0	16-Apr-2016	2.6
1-Sep-2015	2.0	24-Jun-2017	1.6	4-Jun-2016	1.3
2-Apr-2016	1.0	27-Jun-2017	3.8	18-Jun-2016	2.3
14-Apr-2016	2.4	4-Jul-2017	0.6	2-Jul-2016	1.2
3-May-2016	2.4	6-Jul-2017	1.5	9-Jul-2016	2.0
7-May-2016	4.9	8-Jul-2017	1.8	12-Jul-2016	1.3
2-Jun-2016	0.5	15-Jul-2017	1.5	20-Apr-2017	1.1
14-Jul-2016	0.7	18-Jul-2017	0.3	29-Apr-2017	2.6
16-Jul-2016	2.4	20-Jul-2017	0.6	6-May-2017	1.2
19-Jul-2016	3.5	22-Jul-2017	1.1	11-May-2017	1.4
21-Jul-2016	2.0	25-Jul-2017	1.2	25-May-2017	2.6
23-Jul-2016	1.3	27-Jul-2017	3.3	15-Jun-2017	1.9
26-Jul-2016	1.0	29-Jul-2017	3.0	17-Jun-2017	0.7
28-Jul-2016	2.0	5-Aug-2017	1.4	29-Jun-2017	2.0
30-Jul-2016	3.9	15-Aug-2017	2.0	1-Jul-2017	0.7
4-Aug-2016	1.9	17-Aug-2017	1.2	11-Jul-2017	0.6
6-Aug-2016	1.3	19-Aug-2017	3.0	18-Jul-2017	0.3
9-Aug-2016	1.9	22-Aug-2017	2.5	20-Jul-2017	0.6
11-Aug-2016	3.5	24-Aug-2017	1.4	1-Aug-2017	1.6
13-Aug-2016	0.7	26-Aug-2017	1.7	3-Aug-2017	2.1
16-Aug-2016	3.3	29-Aug-2017	10.6	10-Aug-2017	1.6
20-Aug-2016	1.1	31-Aug-2017	1.3	7-Sep-2017	10.1
1-Apr-2017	1.4	2-Sep-2017	9.3	21-Sep-2017	12.4
4-Apr-2017	0.6	5-Sep-2017	11.9	23-Sep-2017	1.4
6-Apr-2017	0.5	9-Sep-2017	9.0	28-Sep-2017	8.0
8-Apr-2017	0.6	12-Sep-2017	9.4	12-Oct-2017	8.6
11-Apr-2017	0.7	14-Sep-2017	7.9	19-Oct-2017	8.5
13-Apr-2017	2.1	16-Sep-2017	2.6	21-Oct-2017	4.7
18-Apr-2017	1.7	19-Sep-2017	7.9	26-Oct-2017	2.0
22-Apr-2017	1.9	30-Sep-2017	8.1	28-Oct-2017	2.1
25-Apr-2017	4.4	3-Oct-2017	1.6	31-Oct-2017	2.2
27-Apr-2017	3.1	5-Oct-2017	0.8		
2-May-2017	1.9	7-Oct-2017	3.7		
4-May-2017	0.5	14-Oct-2017	6.5		
9-May-2017	1.4	17-Oct-2017	1.2		
13-May-2017	0.9	24-Oct-2017	2.3		
16-May-2017	0.2				
18-May-2017	0.8				
20-May-2017	0.5				
23-May-2017	0.5				
27-May-2017	0.8				
30-May-2017	1.7				
1-Jun-2017	0.8				

No Dredging Work		With Dredging Works	
Raw Statistics		Raw Statistics	
Number of Valid Observations	89	Number of Valid Observations	36
Number of Distinct Observations	73	Number of Distinct Observations	34
Minimum	0.133	Minimum	0.3
Maximum	11.85	Maximum	12.42
Mean of Raw Data	2.472	Mean of Raw Data	2.96
Standard Deviation of Raw Data	2.467	Standard Deviation of Raw Data	2.892
Kstar	1.372	Kstar	1.448
Mean of Log Transformed Data	0.511	Mean of Log Transformed Data	0.732
Standard Deviation of Log Transformed Data	0.905	Standard Deviation of Log Transformed Data	0.835
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.858	Correlation Coefficient R	0.849
Approximate Shapiro Wilk Test Statistic	0.737	Shapiro Wilk Test Statistic	0.726
Approximate Shapiro Wilk P Value	0.00E+00	Shapiro Wilk Critical (0.95) Value	0.935
Lilliefors Test Statistic	0.223	Approximate Shapiro Wilk P Value	4.63E-08
Lilliefors Critical (0.95) Value	0.0939	Lilliefors Test Statistic	0.267
		Lilliefors Critical (0.95) Value	0.148
Data not Normal at (0.05) Significance Level		Data not Normal at (0.05) Significance Level	

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: With Dredging Works
Background Data: No Dredging Work

Raw Statistics

	Site	Background
Number of Valid Observations	36	89
Number of Distinct Observations	34	73
Minimum	0.3	0.133
Maximum	12.42	11.85
Mean	2.96	2.472
Median	1.975	1.7
SD	2.892	2.467
SE of Mean	0.482	0.262

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	2481
WMW Test U-Stat	1.156
WMW Critical Value (0.050)	1.645
P-Value	0.124

Conclusion with Alpha = 0.05
Do Not Reject H0, Conclude Site <= Background
P-Value >= alpha (0.05)

SR3 - Dry Season Turbidity at Mid-Ebb (NTU)

No Dredging Work				With Dredging Works	
Date	Turbidity NTU	Date	Turbidity NTU	Date	Turbidity NTU
26-Dec-2015	4.1	11-Nov-2017	3.8	21-Nov-2015	1.4
29-Dec-2015	2.0	14-Nov-2017	5.2	24-Dec-2015	2.1
31-Dec-2015	1.6	16-Nov-2017	4.7	9-Jan-2016	0.9
12-Jan-2016	0.6	18-Nov-2017	4.4	25-Feb-2017	2.6
14-Jan-2016	0.5			4-Nov-2017	5.3
26-Mar-2016	2.3			21-Nov-2017	5.7
29-Mar-2016	0.9				
24-Dec-2016	1.1				
27-Dec-2016	2.4				
31-Dec-2016	2.4				
3-Jan-2017	2.5				
7-Jan-2017	1.7				
10-Jan-2017	1.8				
14-Jan-2017	2.4				
17-Jan-2017	3.0				
19-Jan-2017	3.2				
21-Jan-2017	1.6				
23-Jan-2017	1.7				
25-Jan-2017	1.9				
27-Jan-2017	2.2				
31-Jan-2017	3.4				
2-Feb-2017	4.5				
4-Feb-2017	3.0				
7-Feb-2017	1.7				
9-Feb-2017	3.4				
11-Feb-2017	5.0				
14-Feb-2017	2.9				
16-Feb-2017	2.0				
18-Feb-2017	1.0				
21-Feb-2017	0.8				
23-Feb-2017	0.5				
28-Feb-2017	1.0				
2-Mar-2017	2.5				
4-Mar-2017	0.9				
7-Mar-2017	1.0				
9-Mar-2017	0.7				
11-Mar-2017	1.0				
14-Mar-2017	0.3				
16-Mar-2017	0.5				
18-Mar-2017	0.4				
21-Mar-2017	0.8				
23-Mar-2017	0.2				
25-Mar-2017	0.9				
28-Mar-2017	0.6				
30-Mar-2017	0.8				
2-Nov-2017	2.4				
7-Nov-2017	2.1				
9-Nov-2017	2.2				

No Dredging Work		With Dredging Works	
Raw Statistics		Raw Statistics	
Number of Valid Observations	52	Number of Valid Observations	6
Number of Distinct Observations	50	Number of Distinct Observations	6
Minimum	0.233	Minimum	0.933
Maximum	5.15	Maximum	5.667
Mean of Raw Data	2.003	Mean of Raw Data	2.986
Standard Deviation of Raw Data	1.329	Standard Deviation of Raw Data	2.002
Kstar	1.983	Kstar	1.416
Mean of Log Transformed Data	0.437	Mean of Log Transformed Data	0.89
Standard Deviation of Log Transformed Data	0.783	Standard Deviation of Log Transformed Data	0.716
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.966	Correlation Coefficient R	0.944
Approximate Shapiro Wilk Test Statistic	0.915	Shapiro Wilk Test Statistic	0.868
Approximate Shapiro Wilk P Value	9.90E-04	Shapiro Wilk Critical (0.95) Value	0.788
Lilliefors Test Statistic	0.144	Approximate Shapiro Wilk P Value	N/A
Lilliefors Critical (0.95) Value	0.123	Lilliefors Test Statistic	0.243
		Lilliefors Critical (0.95) Value	0.362
Data not Normal at (0.05) Significance Level		Data appear Normal at (0.05) Significance Level	

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: With Dredging Works
Background Data: No Dredging Work

Raw Statistics

	Site	Background
Number of Valid Observations	6	52
Number of Distinct Observations	6	50
Minimum	0.933	0.233
Maximum	5.667	5.15
Mean	2.986	2.003
Median	2.333	1.817
SD	2.002	1.329
SE of Mean	0.817	0.184

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	226.5
WMW Test U-Stat	1.251
WMW Critical Value (0.050)	1.645
P-Value	0.105

Conclusion with Alpha = 0.05
Do Not Reject H0, Conclude Site <= Background
P-Value >= alpha (0.05)

SR3 - Wet Season Turbidity at Mid-Ebb (NTU)

No Dredging Work				With Dredging Works	
Date	Turbidity NTU	Date	Turbidity NTU	Date	Turbidity NTU
4-Jun-2015	1.2	3-Jun-2017	0.2	2-Jun-2015	3.1
11-Jun-2015	0.7	6-Jun-2017	1.6	3-Sep-2015	1.5
14-Jul-2015	2.4	8-Jun-2017	1.6	12-Sep-2015	2.9
16-Jul-2015	4.0	10-Jun-2017	0.5	26-Sep-2015	5.2
18-Jul-2015	2.9	20-Jun-2017	2.1	6-Oct-2015	1.8
25-Jul-2015	2.8	22-Jun-2017	1.7	16-Apr-2016	0.6
1-Sep-2015	7.1	24-Jun-2017	1.5	4-Jun-2016	0.8
2-Apr-2016	0.8	27-Jun-2017	1.2	18-Jun-2016	2.8
14-Apr-2016	1.8	4-Jul-2017	0.5	2-Jul-2016	0.5
3-May-2016	1.0	6-Jul-2017	1.4	9-Jul-2016	1.8
7-May-2016	5.6	8-Jul-2017	1.6	12-Jul-2016	1.1
2-Jun-2016	0.2	15-Jul-2017	1.6	20-Apr-2017	1.1
14-Jul-2016	0.5	18-Jul-2017	0.2	29-Apr-2017	2.6
16-Jul-2016	3.4	20-Jul-2017	0.9	6-May-2017	1.0
19-Jul-2016	2.7	22-Jul-2017	1.2	11-May-2017	1.5
21-Jul-2016	1.0	25-Jul-2017	0.7	25-May-2017	2.2
23-Jul-2016	1.4	27-Jul-2017	3.5	15-Jun-2017	2.8
26-Jul-2016	1.3	29-Jul-2017	3.8	17-Jun-2017	0.9
28-Jul-2016	0.8	5-Aug-2017	1.5	29-Jun-2017	2.2
30-Jul-2016	1.7	15-Aug-2017	1.6	1-Jul-2017	0.8
4-Aug-2016	5.0	17-Aug-2017	1.4	11-Jul-2017	0.7
6-Aug-2016	1.0	19-Aug-2017	1.9	18-Jul-2017	0.2
9-Aug-2016	1.4	22-Aug-2017	2.6	20-Jul-2017	0.9
11-Aug-2016	1.7	24-Aug-2017	1.2	1-Aug-2017	1.3
13-Aug-2016	0.4	26-Aug-2017	2.0	3-Aug-2017	1.2
16-Aug-2016	1.2	29-Aug-2017	10.6	10-Aug-2017	0.7
20-Aug-2016	2.1	31-Aug-2017	1.6	7-Sep-2017	10.6
1-Apr-2017	1.0	2-Sep-2017	9.1	21-Sep-2017	12.7
4-Apr-2017	0.7	5-Sep-2017	11.8	23-Sep-2017	1.2
6-Apr-2017	0.4	9-Sep-2017	9.3	28-Sep-2017	6.4
8-Apr-2017	0.5	12-Sep-2017	9.0	12-Oct-2017	8.3
11-Apr-2017	0.6	14-Sep-2017	7.9	19-Oct-2017	13.8
13-Apr-2017	1.6	16-Sep-2017	2.5	21-Oct-2017	4.8
18-Apr-2017	1.5	19-Sep-2017	10.5	26-Oct-2017	2.0
22-Apr-2017	1.4	30-Sep-2017	6.2	28-Oct-2017	1.5
25-Apr-2017	4.3	3-Oct-2017	1.4	31-Oct-2017	1.5
27-Apr-2017	3.3	5-Oct-2017	1.0		
2-May-2017	2.2	7-Oct-2017	3.5		
4-May-2017	0.4	14-Oct-2017	6.9		
9-May-2017	1.4	17-Oct-2017	1.5		
13-May-2017	0.7	24-Oct-2017	2.0		
16-May-2017	1.6				
18-May-2017	0.6				
20-May-2017	0.4				
23-May-2017	0.2				
27-May-2017	0.5				
30-May-2017	2.0				
1-Jun-2017	1.2				

No Dredging Work		With Dredging Works	
Raw Statistics		Raw Statistics	
Number of Valid Observations	89	Number of Valid Observations	36
Number of Distinct Observations	73	Number of Distinct Observations	35
Minimum	0.2	Minimum	0.2
Maximum	11.75	Maximum	13.77
Mean of Raw Data	2.413	Mean of Raw Data	2.916
Standard Deviation of Raw Data	2.587	Standard Deviation of Raw Data	3.38
Kstar	1.245	Kstar	1.117
Mean of Log Transformed Data	0.442	Mean of Log Transformed Data	0.598
Standard Deviation of Log Transformed Data	0.939	Standard Deviation of Log Transformed Data	0.951
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.845	Correlation Coefficient R	0.826
Approximate Shapiro Wilk Test Statistic	0.711	Shapiro Wilk Test Statistic	0.686
Approximate Shapiro Wilk P Value	0.00E+00	Shapiro Wilk Critical (0.95) Value	0.935
Lilliefors Test Statistic	0.257	Approximate Shapiro Wilk P Value	5.37E-09
Lilliefors Critical (0.95) Value	0.0939	Lilliefors Test Statistic	0.28
		Lilliefors Critical (0.95) Value	0.148
Data not Normal at (0.05) Significance Level		Data not Normal at (0.05) Significance Level	

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: With Dredging Works
Background Data: No Dredging Work

Raw Statistics

	Site	Background
Number of Valid Observations	36	89
Number of Distinct Observations	35	73
Minimum	0.2	0.2
Maximum	13.77	11.75
Mean	2.916	2.413
Median	1.538	1.517
SD	3.38	2.587
SE of Mean	0.563	0.274

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	2377
WMW Test U-Stat	0.592
WMW Critical Value (0.050)	1.645
P-Value	0.277

Conclusion with Alpha = 0.05
Do Not Reject H0, Conclude Site <= Background
P-Value >= alpha (0.05)

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Total Suspended Solids

SR2 - Wet Season SS at Mid-Flood (mg/L)

No Dredging Work				With Dredging Works	
Date	SS mg/L	Date	SS mg/L	Date	SS mg/L
4-Jun-2015	1.8	3-Jun-2017	2.3	2-Jun-2015	5.3
11-Jun-2015	2.7	6-Jun-2017	2.2	3-Sep-2015	6.8
14-Jul-2015	2.7	8-Jun-2017	3.2	12-Sep-2015	9.0
16-Jul-2015	5.2	10-Jun-2017	4.8	26-Sep-2015	9.7
18-Jul-2015	3.8	20-Jun-2017	3.5	6-Oct-2015	3.5
25-Jul-2015	1.7	22-Jun-2017	2.7	16-Apr-2016	1.2
1-Sep-2015	5.2	24-Jun-2017	5.3	4-Jun-2016	4.0
2-Apr-2016	5.7	27-Jun-2017	6.3	18-Jun-2016	2.7
14-Apr-2016	3.3	4-Jul-2017	3.7	2-Jul-2016	3.7
3-May-2016	3.8	6-Jul-2017	2.8	9-Jul-2016	2.0
7-May-2016	9.0	8-Jul-2017	4.5	12-Jul-2016	5.0
2-Jun-2016	3.0	15-Jul-2017	3.3	20-Apr-2017	2.2
14-Jul-2016	3.0	18-Jul-2017	2.8	29-Apr-2017	7.0
16-Jul-2016	3.5	20-Jul-2017	4.8	6-May-2017	4.7
19-Jul-2016	5.7	22-Jul-2017	2.2	11-May-2017	3.0
21-Jul-2016	5.5	25-Jul-2017	3.3	25-May-2017	1.0
23-Jul-2016	5.7	27-Jul-2017	6.3	15-Jun-2017	2.0
26-Jul-2016	6.3	29-Jul-2017	4.5	17-Jun-2017	1.7
28-Jul-2016	3.5	5-Aug-2017	4.5	29-Jun-2017	6.8
30-Jul-2016	6.0	15-Aug-2017	4.3	1-Jul-2017	3.3
4-Aug-2016	1.5	17-Aug-2017	2.2	11-Jul-2017	4.3
6-Aug-2016	5.8	19-Aug-2017	6.2	18-Jul-2017	2.8
9-Aug-2016	2.8	22-Aug-2017	6.8	20-Jul-2017	4.8
11-Aug-2016	2.7	24-Aug-2017	9.2	1-Aug-2017	5.2
13-Aug-2016	2.5	26-Aug-2017	5.0	3-Aug-2017	3.0
16-Aug-2016	5.2	29-Aug-2017	5.8	10-Aug-2017	3.8
20-Aug-2016	2.0	31-Aug-2017	1.7	7-Sep-2017	5.3
1-Apr-2017	3.8	2-Sep-2017	3.3	21-Sep-2017	6.0
4-Apr-2017	6.8	5-Sep-2017	7.7	23-Sep-2017	3.8
6-Apr-2017	4.2	9-Sep-2017	6.7	28-Sep-2017	5.8
8-Apr-2017	5.8	12-Sep-2017	4.7	12-Oct-2017	4.5
11-Apr-2017	2.3	14-Sep-2017	1.3	19-Oct-2017	9.8
13-Apr-2017	5.3	16-Sep-2017	4.2	21-Oct-2017	7.7
18-Apr-2017	5.2	19-Sep-2017	8.8	26-Oct-2017	3.5
22-Apr-2017	3.7	30-Sep-2017	4.8	28-Oct-2017	5.3
25-Apr-2017	10.3	3-Oct-2017	4.5	31-Oct-2017	3.5
27-Apr-2017	10.3	5-Oct-2017	5.8		
2-May-2017	2.8	7-Oct-2017	6.5		
4-May-2017	2.2	14-Oct-2017	8.3		
9-May-2017	3.7	17-Oct-2017	10.3		
13-May-2017	5.5	24-Oct-2017	9.2		
16-May-2017	1.2				
18-May-2017	6.3				
20-May-2017	3.2				
23-May-2017	3.3				
27-May-2017	1.0				
30-May-2017	2.0				
1-Jun-2017	3.0				

No Dredging Work		With Dredging Works	
Raw Statistics		Raw Statistics	
Number of Valid Observations	89	Number of Valid Observations	36
Number of Distinct Observations	41	Number of Distinct Observations	28
Minimum	1	Minimum	1
Maximum	10.33	Maximum	9.833
Mean of Raw Data	4.517	Mean of Raw Data	4.551
Standard Deviation of Raw Data	2.2	Standard Deviation of Raw Data	2.24
Kstar	4.122	Kstar	3.691
Mean of Log Transformed Data	1.386	Mean of Log Transformed Data	1.385
Standard Deviation of Log Transformed Data	0.513	Standard Deviation of Log Transformed Data	0.545
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.972	Correlation Coefficient R	0.978
Approximate Shapiro Wilk Test Statistic	0.928	Shapiro Wilk Test Statistic	0.947
Approximate Shapiro Wilk P Value	5.30E-05	Shapiro Wilk Critical (0.95) Value	0.935
Lilliefors Test Statistic	0.105	Approximate Shapiro Wilk P Value	1.09E-01
Lilliefors Critical (0.95) Value	0.0939	Lilliefors Test Statistic	0.113
		Lilliefors Critical (0.95) Value	0.148
Data not Normal at (0.05) Significance Level		Data appear Normal at (0.05) Significance Level	

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: With Dredging Works
Background Data: No Dredging Work

Raw Statistics

	Site	Background
Number of Valid Observations	36	89
Number of Distinct Observations	28	41
Minimum	1	1
Maximum	9.833	10.33
Mean	4.551	4.517
Median	4.167	4.167
SD	2.24	2.2
SE of Mean	0.373	0.233

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	2294
WMW Test U-Stat	0.139
WMW Critical Value (0.050)	1.645
P-Value	0.445

Conclusion with Alpha = 0.05
Do Not Reject H0, Conclude Site <= Background
P-Value >= alpha (0.05)

SR2 - Dry Season SS at Mid-Ebb (mg/L)

No Dredging Work				With Dredging Works	
Date	SS mg/L	Date	SS mg/L	Date	SS mg/L
26-Dec-2015	3.5	11-Nov-2017	9.2	21-Nov-2015	5.5
29-Dec-2015	5.5	14-Nov-2017	8.0	24-Dec-2015	5.0
31-Dec-2015	6.2	16-Nov-2017	10.2	9-Jan-2016	1.8
12-Jan-2016	5.3	18-Nov-2017	5.3	25-Feb-2017	6.5
14-Jan-2016	3.3			4-Nov-2017	8.7
26-Mar-2016	3.7			21-Nov-2017	6.2
29-Mar-2016	3.2				
24-Dec-2016	3.7				
27-Dec-2016	4.5				
31-Dec-2016	6.7				
3-Jan-2017	10.3				
7-Jan-2017	7.7				
10-Jan-2017	5.2				
14-Jan-2017	4.7				
17-Jan-2017	6.8				
19-Jan-2017	6.3				
21-Jan-2017	5.0				
23-Jan-2017	5.3				
25-Jan-2017	6.7				
27-Jan-2017	6.0				
31-Jan-2017	9.2				
2-Feb-2017	4.5				
4-Feb-2017	4.3				
7-Feb-2017	6.2				
9-Feb-2017	7.3				
11-Feb-2017	3.5				
14-Feb-2017	7.5				
16-Feb-2017	5.0				
18-Feb-2017	1.2				
21-Feb-2017	1.7				
23-Feb-2017	2.2				
28-Feb-2017	3.2				
2-Mar-2017	4.2				
4-Mar-2017	3.2				
7-Mar-2017	6.8				
9-Mar-2017	3.3				
11-Mar-2017	3.7				
14-Mar-2017	6.3				
16-Mar-2017	3.7				
18-Mar-2017	4.8				
21-Mar-2017	2.2				
23-Mar-2017	3.0				
25-Mar-2017	6.3				
28-Mar-2017	5.0				
30-Mar-2017	8.3				
2-Nov-2017	4.0				
7-Nov-2017	11.0				
9-Nov-2017	8.5				

No Dredging Work		With Dredging Works	
Raw Statistics		Raw Statistics	
Number of Valid Observations	52	Number of Valid Observations	6
Number of Distinct Observations	33	Number of Distinct Observations	6
Minimum	1.167	Minimum	1.833
Maximum	11	Maximum	8.667
Mean of Raw Data	5.426	Mean of Raw Data	5.611
Standard Deviation of Raw Data	2.281	Standard Deviation of Raw Data	2.24
Kstar	5.072	Kstar	2.788
Mean of Log Transformed Data	1.595	Mean of Log Transformed Data	1.628
Standard Deviation of Log Transformed Data	0.465	Standard Deviation of Log Transformed Data	0.535
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.987	Correlation Coefficient R	0.961
Approximate Shapiro Wilk Test Statistic	0.963	Shapiro Wilk Test Statistic	0.947
Approximate Shapiro Wilk P Value	2.01E-01	Shapiro Wilk Critical (0.95) Value	0.788
Lilliefors Test Statistic	0.0932	Approximate Shapiro Wilk P Value	N/A
Lilliefors Critical (0.95) Value	0.123	Lilliefors Test Statistic	0.226
		Lilliefors Critical (0.95) Value	0.362
Data appear Normal at (0.05) Significance Level		Data appear Normal at (0.05) Significance Level	

t-Test Site vs Background Comparison for Full Data Sets without NDs

User Selected Options	
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: With Dredging Works
Background Data: No Dredging Work

Raw Statistics

	Site	Background
Number of Valid Observations	6	52
Number of Distinct Observations	6	33
Minimum	1.833	1.167
Maximum	8.667	11
Mean	5.611	5.426
Median	5.833	5.083
SD	2.24	2.281
SE of Mean	0.915	0.316

Site vs Background Two-Sample t-Test

H0: Mu of Site - Mu of Background <= 0

Method	DF	t-Test Value	Critical t (0.050)	P-Value
Pooled (Equal Variance)	56	0.188	1.673	0.426
Satterthwaite (Unequal Variance)	6.3	0.191	1.943	0.427

Pooled SD 2.278
Conclusion with Alpha = 0.050
* Student t (Pooled) Test: Do Not Reject H0, Conclude Site <= Background
* Satterthwaite Test: Do Not Reject H0, Conclude Site <= Background

SR3 - Wet Season SS at Mid-Flood (mg/L)

No Dredging Work				With Dredging Works	
Date	SS mg/L	Date	SS mg/L	Date	SS mg/L
4-Jun-2015	1.3	3-Jun-2017	3.5	2-Jun-2015	4.0
11-Jun-2015	2.3	6-Jun-2017	3.2	3-Sep-2015	5.0
14-Jul-2015	3.3	8-Jun-2017	3.0	12-Sep-2015	7.5
16-Jul-2015	4.3	10-Jun-2017	6.2	26-Sep-2015	6.5
18-Jul-2015	3.7	20-Jun-2017	3.2	6-Oct-2015	5.5
25-Jul-2015	2.0	22-Jun-2017	2.8	16-Apr-2016	1.5
1-Sep-2015	4.5	24-Jun-2017	7.2	4-Jun-2016	4.7
2-Apr-2016	4.7	27-Jun-2017	6.5	18-Jun-2016	3.0
14-Apr-2016	3.7	4-Jul-2017	3.0	2-Jul-2016	4.2
3-May-2016	3.8	6-Jul-2017	3.7	9-Jul-2016	2.5
7-May-2016	12.3	8-Jul-2017	4.8	12-Jul-2016	3.3
2-Jun-2016	3.8	15-Jul-2017	3.2	20-Apr-2017	2.0
14-Jul-2016	2.3	18-Jul-2017	3.0	29-Apr-2017	7.2
16-Jul-2016	3.7	20-Jul-2017	8.8	6-May-2017	4.8
19-Jul-2016	6.0	22-Jul-2017	3.3	11-May-2017	3.0
21-Jul-2016	7.7	25-Jul-2017	3.8	25-May-2017	1.3
23-Jul-2016	4.2	27-Jul-2017	5.0	15-Jun-2017	3.0
26-Jul-2016	6.2	29-Jul-2017	4.3	17-Jun-2017	2.3
28-Jul-2016	4.5	5-Aug-2017	4.3	29-Jun-2017	8.8
30-Jul-2016	6.7	15-Aug-2017	4.8	1-Jul-2017	3.2
4-Aug-2016	1.5	17-Aug-2017	3.0	11-Jul-2017	3.7
6-Aug-2016	5.0	19-Aug-2017	4.3	18-Jul-2017	3.0
9-Aug-2016	3.5	22-Aug-2017	7.5	20-Jul-2017	8.8
11-Aug-2016	2.2	24-Aug-2017	10.3	1-Aug-2017	7.0
13-Aug-2016	2.0	26-Aug-2017	6.0	3-Aug-2017	4.3
16-Aug-2016	5.5	29-Aug-2017	6.8	10-Aug-2017	3.7
20-Aug-2016	2.5	31-Aug-2017	2.8	7-Sep-2017	16.3
1-Apr-2017	6.2	2-Sep-2017	4.7	21-Sep-2017	8.5
4-Apr-2017	9.0	5-Sep-2017	8.7	23-Sep-2017	4.2
6-Apr-2017	3.8	9-Sep-2017	3.7	28-Sep-2017	3.5
8-Apr-2017	4.8	12-Sep-2017	1.5	12-Oct-2017	5.5
11-Apr-2017	1.5	14-Sep-2017	1.3	19-Oct-2017	7.7
13-Apr-2017	5.3	16-Sep-2017	4.5	21-Oct-2017	9.3
18-Apr-2017	4.5	19-Sep-2017	6.8	26-Oct-2017	5.0
22-Apr-2017	4.0	30-Sep-2017	3.2	28-Oct-2017	4.5
25-Apr-2017	7.8	3-Oct-2017	7.3	31-Oct-2017	5.0
27-Apr-2017	6.2	5-Oct-2017	4.8		
2-May-2017	4.3	7-Oct-2017	6.8		
4-May-2017	2.8	14-Oct-2017	7.0		
9-May-2017	4.5	17-Oct-2017	12.7		
13-May-2017	5.0	24-Oct-2017	7.3		
16-May-2017	1.3				
18-May-2017	3.3				
20-May-2017	4.8				
23-May-2017	3.0				
27-May-2017	1.7				
30-May-2017	2.8				
1-Jun-2017	2.8				

No Dredging Work		With Dredging Works	
Raw Statistics		Raw Statistics	
Number of Valid Observations	89	Number of Valid Observations	36
Number of Distinct Observations	40	Number of Distinct Observations	27
Minimum	1.333	Minimum	1.333
Maximum	12.67	Maximum	16.33
Mean of Raw Data	4.625	Mean of Raw Data	5.093
Standard Deviation of Raw Data	2.288	Standard Deviation of Raw Data	2.891
Kstar	4.26	Kstar	3.517
Mean of Log Transformed Data	1.414	Mean of Log Transformed Data	1.491
Standard Deviation of Log Transformed Data	0.499	Standard Deviation of Log Transformed Data	0.531
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.958	Correlation Coefficient R	0.918
Approximate Shapiro Wilk Test Statistic	0.913	Shapiro Wilk Test Statistic	0.86
Approximate Shapiro Wilk P Value	1.75E-06	Shapiro Wilk Critical (0.95) Value	0.935
Lilliefors Test Statistic	0.143	Approximate Shapiro Wilk P Value	1.91E-04
Lilliefors Critical (0.95) Value	0.0939	Lilliefors Test Statistic	0.179
		Lilliefors Critical (0.95) Value	0.148
Data not Normal at (0.05) Significance Level		Data not Normal at (0.05) Significance Level	

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: With Dredging Works
Background Data: No Dredging Work

Raw Statistics

	Site	Background
Number of Valid Observations	36	89
Number of Distinct Observations	27	40
Minimum	1.333	1.333
Maximum	16.33	12.67
Mean	5.093	4.625
Median	4.417	4.333
SD	2.891	2.288
SE of Mean	0.482	0.243

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	2401
WMW Test U-Stat	0.722
WMW Critical Value (0.050)	1.645
P-Value	0.235

Conclusion with Alpha = 0.05
Do Not Reject H0, Conclude Site <= Background
P-Value >= alpha (0.05)

SR3 - Dry Season SS at Mid-Ebb (mg/L)

No Dredging Work				With Dredging Works	
Date	SS mg/L	Date	SS mg/L	Date	SS mg/L
26-Dec-2015	4.8	11-Nov-2017	6.2	21-Nov-2015	3.6
29-Dec-2015	3.5	14-Nov-2017	7.7	24-Dec-2015	6.2
31-Dec-2015	7.8	16-Nov-2017	8.3	9-Jan-2016	2.2
12-Jan-2016	3.8	18-Nov-2017	7.7	25-Feb-2017	10.5
14-Jan-2016	3.7			4-Nov-2017	9.5
26-Mar-2016	3.5			21-Nov-2017	7.2
29-Mar-2016	2.2				
24-Dec-2016	4.8				
27-Dec-2016	5.5				
31-Dec-2016	7.3				
3-Jan-2017	9.0				
7-Jan-2017	5.3				
10-Jan-2017	7.0				
14-Jan-2017	7.8				
17-Jan-2017	10.2				
19-Jan-2017	8.5				
21-Jan-2017	4.2				
23-Jan-2017	7.5				
25-Jan-2017	7.8				
27-Jan-2017	6.0				
31-Jan-2017	11.3				
2-Feb-2017	6.5				
4-Feb-2017	6.2				
7-Feb-2017	6.3				
9-Feb-2017	10.0				
11-Feb-2017	6.8				
14-Feb-2017	8.5				
16-Feb-2017	5.2				
18-Feb-2017	1.2				
21-Feb-2017	3.3				
23-Feb-2017	5.0				
28-Feb-2017	2.8				
2-Mar-2017	7.0				
4-Mar-2017	5.5				
7-Mar-2017	8.7				
9-Mar-2017	4.2				
11-Mar-2017	4.8				
14-Mar-2017	7.2				
16-Mar-2017	5.5				
18-Mar-2017	4.7				
21-Mar-2017	1.7				
23-Mar-2017	2.7				
25-Mar-2017	6.0				
28-Mar-2017	4.3				
30-Mar-2017	4.5				
2-Nov-2017	4.2				
7-Nov-2017	11.3				
9-Nov-2017	11.3				

No Dredging Work		With Dredging Works	
Raw Statistics		Raw Statistics	
Number of Valid Observations	52	Number of Valid Observations	6
Number of Distinct Observations	36	Number of Distinct Observations	6
Minimum	1.167	Minimum	2.167
Maximum	11.33	Maximum	10.5
Mean of Raw Data	6.093	Mean of Raw Data	6.517
Standard Deviation of Raw Data	2.458	Standard Deviation of Raw Data	3.248
Kstar	5.106	Kstar	2.064
Mean of Log Transformed Data	1.712	Mean of Log Transformed Data	1.741
Standard Deviation of Log Transformed Data	0.473	Standard Deviation of Log Transformed Data	0.607
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.993	Correlation Coefficient R	0.987
Approximate Shapiro Wilk Test Statistic	0.972	Shapiro Wilk Test Statistic	0.956
Approximate Shapiro Wilk P Value	4.24E-01	Shapiro Wilk Critical (0.95) Value	0.788
Lilliefors Test Statistic	0.0761	Approximate Shapiro Wilk P Value	N/A
Lilliefors Critical (0.95) Value	0.123	Lilliefors Test Statistic	0.154
		Lilliefors Critical (0.95) Value	0.362
Data appear Normal at (0.05) Significance Level		Data appear Normal at (0.05) Significance Level	

t-Test Site vs Background Comparison for Full Data Sets without NDs

User Selected Options	
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: With Dredging Works
Background Data: No Dredging Work

Raw Statistics

	Site	Background
Number of Valid Observations	6	52
Number of Distinct Observations	6	36
Minimum	2.167	1.167
Maximum	10.5	11.33
Mean	6.517	6.093
Median	6.667	6
SD	3.248	2.458
SE of Mean	1.326	0.341

Site vs Background Two-Sample t-Test

H0: Mu of Site - Mu of Background <= 0

Method	DF	t-Test Value	Critical t (0.050)	P-Value
Pooled (Equal Variance)	56	0.387	1.673	0.35
Satterthwaite (Unequal Variance)	5.7	0.31	1.943	0.384

Pooled SD 2.538
Conclusion with Alpha = 0.050
* Student t (Pooled) Test: Do Not Reject H0, Conclude Site <= Background
* Satterthwaite Test: Do Not Reject H0, Conclude Site <= Background

SR3 - Wet Season SS at Mid-Ebb (mg/L)

No Dredging Work				With Dredging Works	
Date	SS mg/L	Date	SS mg/L	Date	SS mg/L
4-Jun-2015	1.7	3-Jun-2017	3.3	2-Jun-2015	5.3
11-Jun-2015	1.2	6-Jun-2017	2.8	3-Sep-2015	5.3
14-Jul-2015	3.5	8-Jun-2017	2.8	12-Sep-2015	6.8
16-Jul-2015	3.5	10-Jun-2017	5.8	26-Sep-2015	7.2
18-Jul-2015	5.2	20-Jun-2017	2.8	6-Oct-2015	5.7
25-Jul-2015	2.2	22-Jun-2017	3.7	16-Apr-2016	1.2
1-Sep-2015	6.7	24-Jun-2017	3.3	4-Jun-2016	7.8
2-Apr-2016	4.0	27-Jun-2017	6.0	18-Jun-2016	3.5
14-Apr-2016	7.5	4-Jul-2017	3.8	2-Jul-2016	3.8
3-May-2016	5.5	6-Jul-2017	2.5	9-Jul-2016	2.0
7-May-2016	9.5	8-Jul-2017	3.3	12-Jul-2016	5.3
2-Jun-2016	2.8	15-Jul-2017	3.3	20-Apr-2017	3.3
14-Jul-2016	3.5	18-Jul-2017	1.0	29-Apr-2017	8.0
16-Jul-2016	3.3	20-Jul-2017	4.5	6-May-2017	3.7
19-Jul-2016	6.7	22-Jul-2017	3.3	11-May-2017	2.7
21-Jul-2016	6.0	25-Jul-2017	4.5	25-May-2017	3.7
23-Jul-2016	5.7	27-Jul-2017	6.7	15-Jun-2017	3.2
26-Jul-2016	8.8	29-Jul-2017	3.5	17-Jun-2017	2.8
28-Jul-2016	3.5	5-Aug-2017	3.8	29-Jun-2017	2.7
30-Jul-2016	4.8	15-Aug-2017	5.2	1-Jul-2017	2.3
4-Aug-2016	2.2	17-Aug-2017	1.3	11-Jul-2017	4.2
6-Aug-2016	4.2	19-Aug-2017	3.5	18-Jul-2017	1.0
9-Aug-2016	2.8	22-Aug-2017	4.8	20-Jul-2017	4.5
11-Aug-2016	2.7	24-Aug-2017	5.7	1-Aug-2017	4.7
13-Aug-2016	2.2	26-Aug-2017	5.8	3-Aug-2017	5.3
16-Aug-2016	4.7	29-Aug-2017	5.2	10-Aug-2017	4.3
20-Aug-2016	2.0	31-Aug-2017	4.0	7-Sep-2017	5.2
1-Apr-2017	6.3	2-Sep-2017	2.7	21-Sep-2017	5.7
4-Apr-2017	3.8	5-Sep-2017	8.7	23-Sep-2017	4.3
6-Apr-2017	5.8	9-Sep-2017	8.3	28-Sep-2017	4.3
8-Apr-2017	3.7	12-Sep-2017	3.3	12-Oct-2017	6.3
11-Apr-2017	3.2	14-Sep-2017	1.7	19-Oct-2017	17.0
13-Apr-2017	5.0	16-Sep-2017	6.3	21-Oct-2017	8.8
18-Apr-2017	5.5	19-Sep-2017	7.0	26-Oct-2017	4.7
22-Apr-2017	4.5	30-Sep-2017	3.8	28-Oct-2017	7.0
25-Apr-2017	14.3	3-Oct-2017	6.2	31-Oct-2017	6.0
27-Apr-2017	6.0	5-Oct-2017	6.3		
2-May-2017	5.7	7-Oct-2017	9.5		
4-May-2017	2.3	14-Oct-2017	8.7		
9-May-2017	5.2	17-Oct-2017	13.8		
13-May-2017	6.3	24-Oct-2017	8.0		
16-May-2017	1.0				
18-May-2017	4.8				
20-May-2017	2.2				
23-May-2017	4.3				
27-May-2017	1.5				
30-May-2017	1.0				
1-Jun-2017	2.8				

No Dredging Work		With Dredging Works	
Raw Statistics		Raw Statistics	
Number of Valid Observations	89	Number of Valid Observations	36
Number of Distinct Observations	40	Number of Distinct Observations	27
Minimum	1	Minimum	1
Maximum	14.33	Maximum	17
Mean of Raw Data	4.633	Mean of Raw Data	4.991
Standard Deviation of Raw Data	2.484	Standard Deviation of Raw Data	2.778
Kstar	3.598	Kstar	3.615
Mean of Log Transformed Data	1.393	Mean of Log Transformed Data	1.475
Standard Deviation of Log Transformed Data	0.553	Standard Deviation of Log Transformed Data	0.54
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.95	Correlation Coefficient R	0.894
Approximate Shapiro Wilk Test Statistic	0.904	Shapiro Wilk Test Statistic	0.828
Approximate Shapiro Wilk P Value	2.23E-07	Shapiro Wilk Critical (0.95) Value	0.935
Lilliefors Test Statistic	0.109	Approximate Shapiro Wilk P Value	2.11E-05
Lilliefors Critical (0.95) Value	0.0939	Lilliefors Test Statistic	0.154
		Lilliefors Critical (0.95) Value	0.148
Data not Normal at (0.05) Significance Level		Data not Normal at (0.05) Significance Level	

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs

User Selected Options	
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0%
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: With Dredging Works
Background Data: No Dredging Work

Raw Statistics

	Site	Background
Number of Valid Observations	36	89
Number of Distinct Observations	27	40
Minimum	1	1
Maximum	17	14.33
Mean	4.991	4.633
Median	4.583	4
SD	2.778	2.484
SE of Mean	0.463	0.263

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	2411
WMW Test U-Stat	0.774
WMW Critical Value (0.050)	1.645
P-Value	0.219

Conclusion with Alpha = 0.05
Do Not Reject H0, Conclude Site <= Background
P-Value >= alpha (0.05)