Appendix A: Monitoring Event Summaries for Toxicity, OC Pesticides, Nutrients, Metals, and Salts

Calleguas Creek Watershed TMDL Monitoring Program Post Event Summary Event 74: Sediment & Dry Season Water Sampling

Sampling Crews:	Kinnetic Laboratories, Inc. (KLI), Fugro			
	Crew #1: Greg Cotten (KLI), Danielle Gonsman (KLI) Crew #2: David Thornhill (Fugro), Shaun Stringer (KLI)			
Sampling Dates:	Receiving water and land use sites on August 7 th and 8 th .			
Sampling Type:	Sediment, Quarterly Water Chemistry, Toxicity, Metals, PCBs, and Salts.			

SITES SAMPLED

		Constituents					
Site ID	Sample Date	General Parameters	Toxicity	Metals	Nutrients	PCBs, OP, OC, and Pyrethroid Pesticides	Salts
01_RR_BR	8/8/19	х		х	x	х	
02_PCH	8/8/19	х		х	x		
03_UNIV	8/7/19	Х	Х	Х	x	Х	
9B_ADOLF	8/8/19	x	Х		x	х	
9BD_ADOLF	8/8/19	x		х		х	Х
05D_SANT_VCWPD	8/8/19	x		х	x	х	Х
05_CENTR	8/7/19	x			x		
04_WOOD	8/8/19	x	Х	х	x	х	
01T_ODD2_DCH	8/8/19	x		х	x	х	
07_HITCH	8/8/19	x	Х		x	х	
07D_SIM_BUS	8/7/19	x				х	Х
13_SB_HILL	8/7/19	х				х	Х
10_GATE	8/8/19	x	Х			х	
13_BELT	8/8/19	X	Х			X	
04D_SPRINGVILLE	8/7/19	Х		Х		Х	Х

SITES NOT SAMPLED

Site ID	Reason for Omission
02D_BROOM	Site was dry.
04D_WOOD	Site was dry.
06T_FC_BR	Site was dry.
07D_HITCH_LEVEE2	Site was dry.
07D_MPK	Site was dry.
06_UPLAND	Site was dry.
9BD_GERRY	Site was dry.

DEVIATIONS FROM QAPP

Site ID	Deviation
01_RR_BR	No photo was taken due to rule against photography on base. Flow was not measured due to tidal influence.
02_PCH	Flow was not measured due to tidal influence.
04_WOOD	The conductivity at the site was greater than the accepted range for the designated test species (<i>Ceriodaphnia dubia</i>). The QAPP requires the use of <i>Americamysis bahia</i> . However, <i>Hylella azteca</i> is identified by SWAMP as an appropriate water test species when conductivity is greater than 3,000 us/cm and is currently utilized by the Ventura County Irrigated Lands Group which conducts monitoring in the watershed. To maintain consistency with an existing watershed program, the toxicity testing lab (Pacific EcoRisk) utilized <i>Hylella azteca</i> in place of <i>Americamysis bahia</i> .
9BD_ADOLF	Intermediate container (Ziploc bag) used to top off sample bottles.
06_UPLAND	Intermediate container (Ziploc bag) used for sediment sample.
9B_ADOLF	Intermediate container (Ziploc bag) used for sediment sample.
07_HITCH	Intermediate container (Ziploc bag) used for sediment sample.

FOLLOW UP ACTIONS

None

SEDIMENT SITES

Site ID	Sample Notes
02_PCH	Sediment tox and chemistry sampled 8-7-19 at 09:10: low tide 1.5 feet
04_WOOD	Sediment tox and chemistry sampled 8-7-19 at 10:20
03_UNIV	Sediment tox and chemistry sampled 8-7-18 at 11:40
9B_ADOLF	Sediment chemistry sampled 8-8-18 at 16:50
06_UPLAND	Sediment chemistry sampled 8-8-18 at 16:20
07_HITCH	Sediment chemistry only sampled 8-8-18 at 14:50
9A_HOWAR	Sediment tox and chemistry sampled 8-7-18 at 12:45

ADDITIONAL COMMENTS

- 10_GATE had a weir and flume installed
- 01_RR_BR water was sampled near 2.0 ft. tidal stage at Point Mugu.
- 02_PCH water was sampled near 2.5 ft. tidal stage at Point Mugu.
- 01T_ODD2_DCH dissolved oxygen values very low. Values confirmed with meter photos.
- Sediment samples were collected with lab cleaned unused stainless steel scoops.
- Pacific EcoRisk subsampled composited bulk tox sediment for chemistry analysis.

Field meter calibration notes:

Team 1 (13_BELT, 10_GATE, 07_HITCH, 9B_ADOLF, 9BD_ADOLF, 07D_SIM_BUS, and 13_SB_HILL) field meter passed all parameters for both initial and post calibration other than turbidity which failed calibration. A Hach 2100Q turbidity meter was used in the field and passed all calibration.

Team 2 (02_PCH, 03_UNIV, 05D_SANT_VCWPD, 05_CENTR, 04_WOOD, 01T_ODD2_DCH, 01_RR_BR and 04D_SPRINGVILLE) field meter passed all parameters both initial and post calibration.

Prepared by:	Amy Howk, KLI	Date:	9/5/2019
Reviewed by:	Greg Cotten, KLI	Date:	10/5/2019
Approved by:	Michael Marson, LWA	Date:	10/28/2019

Calleguas Creek Watershed TMDL Monitoring Program Post Event Summary Event 75: Dry Season Water Sampling

Sampling Crews:	Kinnetic Laboratories, Inc. (KLI), Fugro
	Crew #1: Greg Cotten (KLI), Jake Mullett (KLI) Crew #2: David Thornhill (Fugro), Jason Kim (Fugro)
Sampling Dates:	Receiving water and land use sites on November 18 th and 19 th
Sampling Type:	Quarterly Water Chemistry, Toxicity, Metals, PCBs, and Salts.

SITES SAMPLED

		Constituents					
Site ID	Sample Date	General Parameters	Toxicity	Metals	Nutrients	PCBs, OP, OC, and Pyrethroid Pesticides	Salts
01_RR_BR	11/19/19	x		х	x	х	
02_PCH	11/19/19	x		х	x		
03_UNIV	11/19/19	x	х	Х	x	Х	
9B_ADOLF	11/19/19	x	х		x	Х	
9BD_ADOLF	11/19/19	x		х		Х	x
05D_SANT_VCWPD	11/19/19	x		Х	х	Х	x
05_CENTR	11/19/19	x			х		
04_WOOD	11/19/19	x	х	Х	х	Х	
04D_WOOD	11/19/19	x		Х	х	Х	x
01T_ODD2_DCH	11/19/19	x		Х	х	Х	
07_HITCH	11/19/19	x	х		х	Х	
07D_SIM_BUS	11/18/19	x				Х	x
07D_MPK	11/18/19	x				Х	x
13_SB_HILL	11/18/19	x				Х	x
10_GATE	11/19/19	x	х			Х	
13_BELT	11/19/19	Х	Х			Х	
04D_SPRINGVILLE	11/19/19	х		Х		Х	x

SITES NOT SAMPLED

Site ID	Date	Reason for Omission
02D_BROOM	11/19/2019	Site was dry.
06T_FC_BR	11/18/2019	Site was dry.
07D_HITCH_LEVEE_2	11/19/2019	Site was dry.
06_UPLAND	11/19/2019	Site was dry.
9BD_GERRY	11/19/2019	Site was dry.

DEVIATIONS FROM QAPP

Site ID	Deviation
01_RR_BR	No photo was taken due to rule against photography on base. Flow was not measured due to tidal influence.
02_PCH	Flow was not measured due to tidal influence.
04_WOOD	The conductivity at the site was greater than the accepted range for the designated test species (<i>Ceriodaphnia dubia</i>). The QAPP requires the use of <i>Americamysis bahia</i> . However, <i>Hylella azteca</i> is identified by SWAMP as an appropriate water test species when conductivity is greater than 3,000 uS/cm and is currently utilized by the Ventura County Irrigated Lands Group which conducts monitoring in the watershed. To maintain consistency with an existing watershed program, the toxicity testing lab (Pacific EcoRisk) utilized <i>Hylella azteca</i> in place of <i>Americamysis bahia</i> .
04D_SPRINGVILLE	Intermediate container (Ziploc bag) used.
05_SANT_VCWPD	Intermediate container (Ziploc bag) used.
07D_MPK	Intermediate container (Ziploc bag) used.
9BD_ADOLF	Intermediate container (Ziploc bag) used.

FOLLOW UP ACTIONS

None

ADDITIONAL COMMENTS

- 01_RR_BR water was sampled near 3.1 ft. tidal stage at Point Mugu.
- 02_PCH water was sampled near 3.1 ft. tidal stage at Point Mugu.

Field meter calibration notes:

Team 1 (07_HITCH, 07D_MPK, 07D_SIM_BUS, 9B_ADOLF, 9BD_ADOLF, 10_GATE, 13_BELT and 13_SB_HILL) field meter passed all parameters for both initial and post calibration.

Team 2 (01_RR_BR, 01T_ODD2_DCH, 02_PCH, 03_UNIV, 04_WOOD, 04D_WOOD, 04D_SPRINGVILLE, 05_CENTR and 05D_SANT_VCWPD) field meter passed all parameters both initial and post calibration.

Prepared by:	Amy Howk, KLI	Date:	12/27/2019
Reviewed by:	Greg Cotton, KLI	Date:	01/10/2020
Approved by:	Michael Marson, LWA	Date:	02/20/2020

Calleguas Creek Watershed TMDL Monitoring Program Post Event Summary Event 76: Wet Weather Sampling

Sampling Crews:	Kinnetic Laboratories, Inc. (KLI), Fugro
	Crew #1: Greg Cotten (KLI), Lupe Delgado (KLI) Crew #2: Spencer Johnson (KLI), Jake Mullett (KLI) Crew #3: David Thornhill (Furgo), Jack Signorella (Furgo) Crew #4: Talen Wickenden (Fugro), Jason Kim (Fugro)
Sampling Dates:	Receiving water and land use sites on December 4 ^{th,} 2019.
Sampling Type:	Wet weather water chemistry, toxicity, metals, nutrients, PCBs, and salts

SITES SAMPLED

		Constituents							
Site ID	Sample Date	General Parameters	Toxicity	Metals	Nutrients	PCBs, OP, OC, and Pyrethroid Pesticides	Salts		
01_RR_BR	12/4/19	х		Х	x	Х			
02_PCH	12/4/19	х		Х	x	Х			
03_UNIV	12/4/19	х	Х	Х	x	Х	Х		
9B_ADOLF	12/4/19	х	Х		x	Х			
9BD_ADOLF	12/4/19	х		Х		Х	Х		
05D_SANT_VCWPD	12/4/19	х		Х	x	Х	Х		
05_CENTR	12/4/19	х			x				
04_WOOD	12/4/19	х	Х	Х	x	Х	Х		
04D_WOOD	12/4/19	х		Х	x	Х	Х		
01T_ODD2_DCH	12/4/19	Х		Х	х	Х			
07_HITCH	12/4/19	Х	Х		х	Х			
07D_SIM_BUS	12/4/19	х				Х	Х		
07D_MPK	12/4/19	х				Х	Х		
13_SB_HILL	12/4/19	х				Х	Х		
10_GATE	12/4/19	X	Х			X			
13_BELT	12/4/19	х	Х			X			
04D_SPRINGVILLE	12/4/19	Х		Х		Х	Х		

02D_BROOM	12/4/19	х		Х	Х	Х	
06T_FC_BR	12/4/19	х			Х	х	
07D_HITCH_LEVEE_2	12/4/19	х			Х	х	Х
06_UPLAND	12/4/19	х	Х		Х	х	
9BD_GERRY	12/4/19	х		Х	Х	х	х
07_TIERRA	12/4/19						х
9A_HOWAR	12/4/19						х
9B_BARON	12/4/19						Х

SITES NOT SAMPLED

None

DEVIATIONS FROM QAPP

Site ID	Deviation
01_RR_BR	No photo was taken due to rule against photography on base. Flow was not measured due to tidal influence.
02_PCH	Flow was not measured due to tidal influence.
04_WOOD	 The conductivity at the site was greater than the accepted range for the designated test species (<i>Ceriodaphnia dubia</i>). The QAPP requires the use of <i>Americamysis bahia</i>. However, <i>Hylella azteca</i> is identified by SWAMP as an appropriate water test species when conductivity is greater than 3,000 us/cm and is currently utilized by the Ventura County Irrigated Lands Group which conducts monitoring in the watershed. To maintain consistency with an existing watershed program, the toxicity testing lab (Pacific EcoRisk) utilized <i>Hylella azteca</i> in place of <i>Americamysis bahia</i>. Flow was taken 6 hours after the chemistry with significantly different measurements
9BD_GERRY	Intermediate container (Ziploc bag) used.

FOLLOW UP ACTIONS

None

ADDITIONAL COMMENTS

- 01_RR_BR water was sampled near 2.9 ft. tidal stage at Point Mugu.
- 02_PCH water was sampled near 2.9 ft. tidal stage at Point Mugu.

Field meter calibration notes:

Team 1 (13_SB_HILL, 07D_SIM_BUS, 07D_MPK, 07_HITCH, 07D_HITCH_LEVEE_2, 03_UNIV and 07_TIERRA) field meter, Sonde, passed initial calibration except for turbidity and passed post calibration except for dissolved oxygen. Turbidity was taken as grab samples and analyzed with turbidity meter

Team 2 (9B_ADOLF, 9BD_ADOLF, 9BD_GERRY, 10_GATE, 13_BELT and 9B_BARON) field meter, 2692, passed both initial and post calibration except for the turbidity. Turbidity was taken as grab samples and analyzed with the turbidity meter.

Team 3 (06 _UPLAND, 06T_FC_BR, 05D_SANT_VCWPD, 05_CENTR, 04D_SPRINGVILLE, and 9A_HOWAR) field meter, 3760, passed both the initial and post calibration.

Team 4 (04_WOOD, 04D_WOOD, 01T_ODD2_DCH, 02_PCH and 01_RR, 02D_BROOM) field meter, 4547, passed both the initial and post calibration.

Meter exceedances:

Sites where turbidity exceeded 1000 NTU (field meter maximum) Turbidity was added to the site COC for laboratory analysis and was recorded in the spreadsheet as ">1000". These sites were: 04D_WOOD, 04_WOOD, 01T_ODD2_DCH, 03_UNIV, 05_CENTR, 05D_SANT_VCWPD, 06_UPLAND, 9BD_GERRY, 01_RR_BR, and 06T_FC_BR

Flow:

Due to dangerous flow conditions, flow was estimated at all sites except 07D_MPK, where flow was measured using preferred methods.

Prepared by:	Jacob Mullett, KLI	Date:	01/20/2020
Reviewed by:	Amy Howk, KLI	Date:	02/03/2020
Approved by:	Michael Marson, LWA	Date:	02/20/2020

Calleguas Creek Watershed TMDL Monitoring Program Post Event Summary Event 77: Dry Season Water Sampling

Sampling Crews:	Kinnetic Laboratories, Inc. (KLI), Fugro
	Crew #1: Greg Cotten (KLI), Sean Noble (KLI) Crew #2: Jason Kim (Fugro), Talen Wickenden (Fugro)
Sampling Dates:	Receiving water and land use sites on February 3 rd and 4 th
Sampling Type:	Quarterly Water Chemistry, Toxicity, Metals, PCBs, Salts, and Bacteria

SITES SAMPLED

		Constituents							
Site ID	Sample Date	General Parameters	Toxicity	Metals	Nutrients	PCBs, OP, OC, and Pyrethroid Pesticides	Salts		
01_RR_BR	2/4/20	х		х	х	х			
02_PCH	2/4/20	х		х	х				
03_UNIV	2/4/20	х	Х	Х	х	Х			
9B_ADOLF	2/4/20	х	х		х	Х			
9BD_ADOLF	2/4/20	X		х		Х	Х		
05D_SANT_VCWPD	2/4/20	х		х	х	х	Х		
05_CENTR	2/4/20	х			х				
04D_SPRINGVILLE	2/4/20	х		х		Х	Х		
04_WOOD	2/4/20	х	x	х	х	х			
01T_ODD2_DCH	2/4/20	х		х	х	х			
06T_FC_BR	2/3/20	х			х	Х	Х		
07_HITCH	2/4/20	х	Х		х	Х			
07D_SIM_BUS	2/3/20	х				Х	Х		
07D_MPK	2/4/20	х				Х	Х		
13_SB_HILL	2/3/20	х				Х	Х		
10_GATE	2/4/20	Х	Х			Х			
13_BELT	2/4/20	х	Х			Х			

SITES NOT SAMPLED

Site ID	Reason for Omission
02D_BROOM	Site was dry.
04D_WOOD	Site was dry.
06_UPLAND	Site was dry.
07D_HITCH_LEVEE	Site was dry.
9BD_GERRY	Site was dry.

DEVIATIONS FROM QAPP

Site ID	Deviation
01_RR_BR	No photo was taken due to rule against photography on base. Flow was not measured due to tidal influence.
02_PCH	Flow was not measured due to tidal influence.
03_UNIV	Flow was not measured
04_WOOD	The conductivity at the site was greater than the accepted range for the designated test species (<i>Ceriodaphnia dubia</i>). The QAPP requires the use of <i>Americamysis bahia</i> . However, <i>Hylella azteca</i> is identified by SWAMP as an appropriate water test species when conductivity is greater than 3,000 us/cm and is currently utilized by the Ventura County Irrigated Lands Group which conducts monitoring in the watershed. To maintain consistency with an existing watershed program, the toxicity testing lab (Pacific EcoRisk) utilized <i>Hylella azteca</i> in place of <i>Americamysis bahia</i> .
04D_SPRINGVILLE	Intermediate container (Ziploc bag) used.
05_CENTR	Intermediate container (Ziploc bag) used.
05_SANT_VCWPD	Intermediate container (Ziploc bag) used.
07D_MPK	Intermediate container (Ziploc bag) used.
9BD_ADOLF	Intermediate container (Ziploc bag) used.

FOLLOW UP ACTIONS

None

ADDITIONAL COMMENTS

- 01_RR_BR water was sampled near 0.2 ft. tidal stage at Point Mugu.
- 02_PCH water was sampled near 0.5 ft. tidal stage at Point Mugu.

Field meter calibration notes:

Team 1 (06T_FC_BR, 07_HITCH, 07D_MPK, 07D_SIM_BUS, 9B_ADOLF, 9BD_ADOLF, 10_GATE, 13_BELT and 13_SB_HILL) field meter passed all parameters for both initial and post calibration.

Team 2 (01_RR_BR, 01T_ODD2_DCH, 02_PCH, 03_UNIV, 04_WOOD, 04D_SPRINGVILLE, 05_CENTR and 05D_SANT_VCWP) field meter passed all parameters both initial and post calibration other than pH which failed post calibration.

Prepared by:	Amy Howk, KLI	Date:	04/16/2020
Reviewed by:	Greg Cotten, KLI	Date:	04/17/2020
Approved by:	Michael Marson, LWA	Date:	05/22/2020

Calleguas Creek Watershed TMDL Monitoring Program Post Event Summary Event 78: Wet Weather Sampling

Sampling Crews:	Kinnetic Laboratories, Inc. (KLI), Fugro USA
	Team #1: Kagen Holland (KLI), Daniel Garza (Fugro USA) Team #2: Jake Mullett (KLI), Kathy Uccello (KLI) Team #3: Greg Cotten (KLI), Jeremiah Glover (Fugro USA) Team #4: Sean Noble (KLI), Peter Cornell (Fugro USA)
Sampling Dates:	Receiving water and land use sites on March 16th, 2020.
Sampling Type:	Wet weather water chemistry, toxicity, metals, nutrients, PCBs, and salts

SITES SAMPLED

		Constituents						
Site ID	Sample Date	General Parameters	Toxicity	Metals	Nutrients	PCBs, OP, OC, and Pyrethroid Pesticides	Salts	
02_PCH	3/16/20	х		Х	Х			
03_UNIV	3/16/20	х	Х	Х	x	Х	Х	
9B_ADOLF	3/16/20	х	х		X	Х		
9BD_ADOLF	3/16/20	х		Х		Х	Х	
05D_SANT_VCWPD	3/16/20	х		Х	X	Х	Х	
05_CENTR	3/16/20	х			X			
04_WOOD	3/16/20	х	х	Х	X	Х	Х	
04D_WOOD	3/16/20	х		Х	X	Х	Х	
01T_ODD2_DCH	3/16/20	х		Х	x	Х		
07_HITCH	3/16/20	х	Х		x	Х		
07_TIERRA	3/16/20	х					Х	
07D_SIM_BUS	3/16/20	х				Х	Х	
07D_MPK	3/16/20	х				Х	Х	
13_SB_HILL	3/16/20	х				Х	Х	
10_GATE	3/16/20	х	Х			Х		
13_BELT	3/16/20	X	х			х		
04D_SPRINGVILLE	3/16/20	х		Х		Х	Х	

		Constituents						
Site ID	Sample Date	General Parameters	Toxicity	Metals	Nutrients	PCBs, OP, OC, and Pyrethroid Pesticides	Salts	
06T_FC_BR	3/16/20	х			Х	х	Х	
07D_HITCH_LEVEE	3/16/20	х			Х	х	Х	
06_UPLAND	3/16/20	х	Х		Х	х		
9BD_GERRY	3/16/20	х		Х	Х	х	Х	
9A_HOWAR	3/16/20	х					Х	

SITES NOT SAMPLED

Site ID	Reason for Omission
02D_BROOM	Site was dry.
01_RR_BR	Crew with Navy pass unable to sample this event due to Covid-19
9B_BARON	Closed gate. Could not access site at 14:53 on Mar 16, 2020.

DEVIATIONS FROM QAPP

Site ID	Deviation
02_PCH	Flow not measured due to tidal influence.
9BD_GERRY	Intermediate container (Ziploc bag) used.
07D_MPK	No photos taken at site.
04D_WOOD	Intermediate container (1L AG bottle) used.
05D_SANT_VCWPD	Intermediate container (1L AG bottle #063) used.
07D_HITCH_LEVEE	There was some confusion on the exact site location, samples were taken at wrong pipe. MRM will investigate location and determine if sample is relative or not.
01T_ODD2_DCH	Intermediate container (1L AG) used.

FOLLOW UP ACTIONS

Physis will be resubmitting the EDD for 9BD_GERRY due to the wrong sample time noted on the COC.

ADDITIONAL COMMENTS

This event occurred during the beginning of the Covid-19 outbreak. Both team leads from Fugro USA were quarantined due to associate with Covid-19 symptoms. KLI was able to recover from the last minute team lead shortage by utilizing staff that had worked the Calleguas Creek TMDL project before. While we overcame a great number of obstacles during a dangerous time, this staffing irregularity resulted in a few errors and omissions. These primarily included, not having staff with Navy base passes to sample Ronald Reagan Bridge, omissions in some flow estimates, and 07D_HITCH LEVEE was sampled from the wrong pipe.

Team 1. The field lead for) 07_HITCH and 07D_HITCH_LEVEE filled out field logs correctly but then thought he switched them thinking he made an error. He re-wrote some of the observations on the wrong sheet. This error was caught moments later. The water quality measurements and sample times are on the correct page of the log. A couple 'describe flow conditions' and 'dominate substrate' observations were corrected and noted in the spreadsheet comments. No flow recorded at 07D_HITCH_LEVEE.

Team 2. 9BD_GERRY sample time was incorrectly recorded on the original Chain of Custody (COC). Actual sample time was 17:40.

Team 3. Prior to sampling, it was discussed with LWA that sites with USGS staff gauges could forgo measured estimates and note the level at time of sample. This allowed Team 3 to support Team 1 by sampling 9A_HOWAR and conducting flow estimates and photos of 9B_ADOLF before dark.

Team 4. No additional comments.

Field meter calibration notes:

Team 1: 13_SB_HILL, 07D_SIM_BUS, 07D_MPK, 07_HITCH, 07D_HITCH_LEVEE_2, 07_TIERRA and 06T_FC_BR. Field sonde 0952, passed initial calibrations and passed post calibration except for turbidity. Turbidity was measured from grab samples with turbidity meter 3760.

Team 2: 9B_ADOLF, 9BD_ADOLF, 9BD_GERRY, 10_GATE, 13_BELT, 06 _UPLAND and 9B_BARON. Field meter 3760, passed both initial and post calibration except for the pH. The pH was analyzed from grab samples with the sonde 0952.

Team 3: 03_UNIV, 05D_SANT_VCWPD, 05_CENTR, 04D_SPRINGVILLE, 9A_HOWAR and 02D_BROOM. Field meter 2692, passed both initial and post calibration except for the turbidity. Turbidity was measured from grab samples with the meter 3760.

Team 4: 04_WOOD, 04D_WOOD, 01T_ODD2_DCH, and 02_PCH. Field meter 4547, passed all initial and post calibrations.

Collected grab samples for water-quality meter probe failure, were kept on ice and analyzed within 20 hours of sampling.

Meter exceedances:

Sites where turbidity exceeded 1000 NTU (field meter maximum) Turbidity was added to the site COC for laboratory analysis and was recorded in the spreadsheet as ">1000". These sites were: 04D_WOOD, 04_WOOD, 01T_ODD2_DCH, 03_UNIV, 05_CENTR, 05D_SANT_VCWPD, 06_UPLAND, 07D_HITCH_LEVEE_2, and 06T_FC_BR

Flow:

Due to hazardous flow conditions, flow was estimated at all sites but 07D_HITCH_LEVEE.

Team 1 depths were only recorded at MPK. Safety was noted for the reason. Velocity was measured at all sites. Using photographs from similar, previous flow events, those measured estimates were used. This data have been highlighted and noted in the spreadsheet comments.

Prepared by:	Amy Howk, KLI	Date:	04-29-2020
Reviewed by:	Greg Cotten, KLI	Date:	05-18-202
Approved by:	Michael Marson, LWA	Date:	05-20-2020

Calleguas Creek Watershed TMDL Monitoring Program Post Event Summary Event 79: Dry Season Water Sampling

Sampling Crews:	Kinnetic Laboratories, Inc. (KLI), Fugro		
	Crew #1: Greg Cotten (KLI), Sean Noble (KLI) Crew #2: Jason Kim (Fugro), Talen Wickenden (Fugro)		
Sampling Dates:	Receiving water and land use sites on June 1 st and 2 nd		
Sampling Type:	Quarterly Water Chemistry, Toxicity, Metals, PCBs, Salts, and Bacteria		

SITES SAMPLED

		Constituents					
Site ID	Sample Date	General Parameters	Toxicity	Metals	Nutrients	PCBs, OP, OC, and Pyrethroid Pesticides	Salts
01_RR_BR	6/2/20	х		х	x	х	
02_PCH	6/2/20	x		х	x		
03_UNIV	6/2/20	Х	Х	Х	х	Х	
9B_ADOLF	6/2/20	x	×		x	Х	
9BD_ADOLF	6/2/20	x		х		Х	Х
05D_SANT_VCWPD	6/2/20	x		х	x	х	Х
05_CENTR	6/2/20	х			x		
04D_SPRINGVILLE	6/2/20	х		х		Х	Х
04_WOOD	6/2/20	x	Х	х	x	Х	
01T_ODD2_DCH	6/2/20	x		х	x	Х	
07_HITCH	6/2/20	x	Х		x	Х	
07D_HITCH_LEVEE2	6/2/20	х			x	Х	Х
07D_SIM_BUS	6/1/20	х				х	Х
07D_MPK	6/1/20	x				Х	Х
13_SB_HILL	6/1/20	x				Х	Х
10_GATE	6/2/20	X	Х			Х	
13_BELT	6/2/20	X	X			Х	

SITES NOT SAMPLED

Site ID	Reason for Omission
02D_BROOM	Site was dry.
04D_WOOD	Site was dry.
06_UPLAND	Site was dry.
06T_FC_BR	Site was ponded.
9BD_GERRY	Site was dry.

DEVIATIONS FROM QAPP

Site ID	Deviation
01_RR_BR	No photo was taken due to rule against photography on base. Flow was not measured due to tidal influence.
02_PCH	Flow was not measured due to tidal influence.
13_BELT	Flow was recoded but failed to save in digital log.
04_WOOD	The conductivity at the site was found at 2920 uS/cm, the edge of the accepted range for the designated test species (<i>Ceriodaphnia dubia</i>). The QAPP requires the use of <i>Americamysis bahia</i> . However, <i>Hylella azteca</i> is identified by SWAMP as an appropriate water test species when conductivity is greater than 3,000 us/cm and is currently utilized by the Ventura County Irrigated Lands Group which conducts monitoring in the watershed. It is possible the laboratory will choose <i>Hylella azteca</i> in place of <i>Americamysis bahia</i> .
13_BELT	Flow was measured at Belt but error occurred in saving. Flow measurements not available.
05D_SANT_VCWPD	Intermediate container (Ziploc bag) used.
07D_MPK	Intermediate container (Ziploc bag) used.
9BD_ADOLF	Intermediate container (Ziploc bag) used.

FOLLOW UP ACTIONS

None

ADDITIONAL COMMENTS

- 01_RR_BR water was sampled at low tide near 0.8 ft. tidal stage at Point Mugu.
- 02_PCH water was sampled beginning flood low tide 0.8 ft. tidal stage at Point Mugu.

Field meter calibration notes:

Team 1 (KLI) used meter 2692 (07_HITCH, 07_HITCH_LEVEE_2, 07D_MPK, 07D_SIM_BUS, 9B_ADOLF, 9BD_ADOLF, 10_GATE, 13_BELT and 13_SB_HILL) field meter passed all parameters for both initial and post calibration.

Team 2 (FUGRO) used meter 4547 (01_RR_BR, 01T_ODD2_DCH, 02_PCH, 03_UNIV, 04_WOOD, 04D_SPRINGVILLE, 05_CENTR and 05D_SANT_VCWP) field meter passed all parameters both initial and post calibration.

Prepared by:	Amy Howk, KLI	Date: 06/30/2020
Reviewed by:	Greg Cotten, KLI	Date: 07/10/2020
Approved by:	Michael Marson, LWA	Date: 08/05/2020

Appendix B. Rating Curves and EC/Salt Relationships for Salts TMDL Compliance Sites for the July 2019-June 2020 Monitoring Year

Rating Curves

Continuous water level time series data (5-min intervals) were converted to time series of flow estimates (cfs) using the USGS shift-adjusted rating curve method. The method establishes a base rating for a given date range. Over the date range that shares a base rating, this rating is then shifted, as necessary, for subsets of the data to account for small changes in the geometry of natural channels often caused by deposition, scouring, and vegetation. Rating curves for all sites took the form $Q = c^* (LvI + a + S)^b$ where,

Q = discharge (cfs)

- Lvl = water level or "stage", referenced to depth sensor elevation (cm)
- c = scaling coefficient
- a = coefficient accounting for the vertical difference between depth sensor elevation (stage = 0) and stage at zero discharge (cm)
- b = coefficient accounting for channel shape, natural channels fall between endpoints b=1.5 (square channel), and b=2.5 (triangular channel).
- S = stage shift, typically varies over time for natural channels (cm).

Monthly (or more frequent) manual measurements of discharge are performed at all sites and are used to establish base ratings and to determine the required "shifts" ("S" in the equation above) over time for a monitoring year. Base rating curve equations used for the July 2019-June 2020 monitoring year are provided in Table 1.

Site	Rating Curve					
03_UNIV	Q = 0.05	$Q = 0.052^{*}(LvI - 28.2 + S)^{2.4}$				
04_WOOD	Q = 0.01	$a = 0.018^{*}(LvI - 17.00 + S)^{1.7}$				
07_TIERRA ^{[a] [b]}	7/1/19- 5/13/20	$Q = 0.023^{*}(LvI - 12 + S)^{1.8} + 0.0155^{*}(LvI - 36 + S)^{2.3}$				
	post 5/13/20	$Q = 0.125^{*}(LvI - 16 + S)^{1.0} + 0.044^{*}(LvI - 22 + S)^{1.8} + 0.0132^{*}(LvI - 27 + S)^{1.6}$				
	7/1/19- 5/18/20	$Q = 0.0036^{*}(LvI - 3.0 + S)^{2.3}$				
	post 5/18/20	$Q = 0.0031^{*}(LvI - 1.5 + S)^{2.2}$				
9B_BARON	Q = 0.02	41*(Lvl -4 + S) ^{2.10}				

Table 1. Rating Curves for Salts TMDL Compliance Sites for Monitoring Year July 2019-June 2020

[a] Starting in the 2016/2017 monitoring year, compound ratings have been used for 07_TIERRA to account for details in the shape of the channel control (a metal drop structure) that affect the wetted width of the cross section where the gage is located.

[b] New monitoring equipment was installed in May 2020, necessitating use of a new compound rating curve for the remainder of the 2019/2020 monitoring year.

[c] A new rating was developed after 5/18/20 because unknown persons had arranged rocks in the channel below the sensor site creating a dam which altered the channel control.

EC/Salt Relationships

Site-specific, linear relationships between specific conductivity (EC) and salt constituents were used to convert continuous EC sensor data to estimate salt concentrations. Surrogate relationships were derived from field data for EC and salts (grab samples for TDS, sulfate, chloride, or boron from quarterly-dry and up to two wet events per year) using linear regression, in the following form:

[Ion] = A*EC + B, where

[Ion] = concentration of TDS, sulfate, chloride, or boron (mg/L)

A = slope

EC = specific conductivity (μ S/cm)

B = y intercept

At the conclusion of the 2019/2020 monitoring year, surrogate relationships were evaluated and updated in cases where merited by new data. Surrogate relationships used to process the 2019/2020 EC sensor data are reported in **Table 2** and illustrated in figures following the table.

Site	Proxy Relationship	r ²	Underlying Field Data		
			Sample Size	Date Range	
03_UNIV	TDS = (0.6277 * EC) – 11.7286	0.9881	85	1/31/2011 – 6/18/2020	
	CI = (0.1439 * EC) – 21.3383	0.9767	26	8/25/2016 - 6/18/2020	
	SO4 = (0.1519 * EC) – 11.9376	0.9799	25	8/25/2016 - 6/18/2020	
		-			
04_WOOD	TDS = (0.9137 * EC) – 184.8321	0.9898	83	1/31/2011 – 6/18/2020	
	High Conductivity (>2500 µS/cm): Cl = (0.0652 * EC) – 63.388	0.8215	29	5/23/2013 - 6/18/2020	
	Low Conductivity (≤2500 µS/cm): CI = (0.0450 * EC) – 2.0162	0.9970	9	5/23/2013 - 6/18/2020	
	SO4 = (0.4615 * EC) – 99.7859	0.9730	33	2/28/2014 - 6/18/2020	
	B = (0.000469 * EC) - 0.1065	0.9079	92	1/31/2011 – 6/18/2020	
07_TIERRA	TDS = (0.7150 * EC) – 65.5633	0.9878	70	1/31/2011 – 6/18/2020	
	Cl = (0.1054 * EC) – 10.4593	0.9718	38	2/28/2014 - 6/18/2020	
	High Conductivity (>1400 µS/cm): SO4 = (0.4077 * EC) – 256.36	0.7487	52	1/31/2011 – 6/18/2020	
	Low Conductivity (≤1400 µS/cm): SO4 = (0.2546 * EC) – 22.4674	0.9635	13	1/31/2011 – 6/18/2020	
	B = (0.000423 * EC) - 0.0508	0.9367	60	8/28/12 - 6/18/2020	
9A_HOWAR	TDS = (0.6207 * EC) – 13.3730	0.9862	74	1/31/2011 - 6/18/2020	
	CI = (0.1452 * EC) – 21.9601	0.9375	26	8/25/2016 - 6/18/2020	
	SO4 = (0.1668 * EC) – 30.7520	0.9398	25	8/25/2016 - 6/18/2020	
		-			
9B_BARON	TDS = (0.6144 * EC) – 20.6748	0.9798	73	1/31/2011 – 6/18/2020	
	CI = (0.1352 * EC) – 10.5449	0.9048	67	1/31/2011 - 6/18/2020	
	High Conductivity (>1000 µS/cm): SO4 = (0.291 * EC) -181.92	0.7817	52	3/20/2011 - 6/18/2020	
	Low Conductivity (≤1000 µS/cm): SO4 = (0.1400 * EC) – 4.8380	0.9779	11	3/20/2011 - 6/18/2020	

Table 2. Surrogate Relationships Used to Convert EC to Salt Concentrations for the 2019/2020Monitoring Year











Appendix C: Toxicity Testing and Toxicity Identification Evaluations (TIE) Summary

TOXICITY TESTING PROCEDURES

For the Calleguas Creek Watershed Total Maximum Daily Load (TMDL) Compliance Monitoring Program (CCWTMP), toxicity testing at various locations is conducted to meet TMDL requirements. The following is a brief summary of the procedures for the analytical methods used by the CCWTMP. Specific details concerning the standard operating procedures (SOPs) followed by field crews collecting applicable samples and laboratory analyses can be found in the Quality Assurance Project Plan (QAPP).

For the CCWTMP toxicity measures, standard test species were utilized for toxicity testing. *Ceriodaphnia dubia* was used for freshwater aquatic toxicity testing and *Hyalella azteca* for the saline/brackish water aquatic toxicity testing and bulk sediment and porewater toxicity testing. *Hyalella azteca* was used to conduct aquatic toxicity testing if sample salinity exceeded 1.5 part per thousand (PPT) but was less than 15 PPT. All test species are standard United States Environmental Protection Agency (USEPA) test species and considered the most applicable for the various types of pollutants impacting the watershed, and all analytical testing procedures were conducted using standard USEPA methods.

The results of each toxicity test are used to trigger further investigations to determine the cause of observed laboratory toxicity, if necessary, per the QAPP. If testing indicates the presence of significant toxicity in the sample, toxicity identification evaluations (TIEs) procedures are initiated to investigate the cause of toxicity. For the purpose of triggering TIE procedures, significant toxicity is defined as at least 50 percent mortality. The 50 percent mortality threshold is consistent with the approach recommended in guidance published by USEPA for conducting TIEs (USEPA, 1996), which recommends a minimum threshold of 50 percent mortality because the probability of completing a successful TIE decreases rapidly for samples with less than this level of toxicity.¹ A component of the compliance requirement when significant toxicity is found is to initiate a targeted Phase 1 TIE and test to determine the general class of constituent (*i.e.*, non-polar organics) causing toxicity. The targeted TIE focuses on classes of constituents anticipated to be observed in drainages dominated by urban and agricultural discharges and those previously observed to cause toxicity. Phase 2 TIEs may also be utilized to identify specific constituents causing toxicity if warranted. TIE methods will generally adhere to USEPA procedures documented in conducting TIEs.^{2,3,4,5} For samples exhibiting toxic effects consistent

¹ United States Environmental Protection Agency (USEPA). 1996. Marine Toxicity Identification Evaluation. Phase I Guidance Document EPA/600/R-96/054. USEPA, Office of Research and Development, Washington, D.C.

² United States Environmental Protection Agency (USEPA). 1991. Methods for Aquatic Toxicity Identification Evaluations: Phase 1 Toxicity Characterization Procedures (Second Edition). EPA-600/6-91/003. USEPA, Environmental Research Laboratory, Duluth, MN.

³ United States Environmental Protection Agency (USEPA). 1992. Toxicity Identification Evaluation: Characterization of Chronically Toxic Effluents Phase 1. EPA/600/6-91/005. USEPA, Office of Research and Development, Washington, D.C.

with carbofuran, diazinon, or chlorpyrifos, TIE procedures follow those documented in Bailey $et al.^6$

The decision to initiate TIE procedures on any sample, including samples exceeding the mortality threshold, as well as the focus and scope of TIE procedures, is determined by the Project Manager and toxicity laboratory staff. When deciding whether to initiate TIE procedures for a specific site and monitoring event, a number of factors are considered, including the level of toxicity, the magnitude of sample mortality and/or reburial levels as compared to lab control results, history of toxicity at the site, the species and endpoints exhibiting toxic effects, as well as the primary technical basis for triggering TIEs described above. A summary of the toxicity results and subsequent TIE actions, including the rationale for initiating TIE procedures for a specific sample are described below.

TOXICITY RESULTS SUMMARY

Freshwater sediment toxicity samples are collected annually during the first event of each monitoring year. Water column toxicity samples are collected at freshwater sites during each of the quarterly and wet weather events. Sediment toxicity samples are collected every three years in Mugu Lagoon. As such, lagoon sediment toxicity samples were not collected during this monitoring year. Monitored sites include the following:

- Freshwater Sediment Toxicity Sites
 - 02_PCH (Toxicity Investigation site)
 - o 03_UNIV
 - 04_WOOD
 - 9A_HOWAR (Toxicity Investigation site)
- Freshwater Water Column Toxicity Sites
 - o 04_WOOD
 - o 03_UNIV
 - 9B_ADOLF
 - 06_UPLAND
 - 07_HITCH
 - 10_GATE (Toxicity Investigation site)

⁵ United States Environmental Protection Agency (USEPA). 1993b. Methods for Aquatic Toxicity Identification Evaluations: Phase II Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity. EPA/600/R-02/080. USEPA, Office of Research and Development, Washington, D.C.

⁶ Bailey, H.C., DiGiorgio, C., Kroll, K., Miller, J.L., Hinton, D.E., Starrett, G. 1996. Development of Procedures for Identifying Pesticide Toxicity in Ambient Waters: Carbofuran, Diazinon, Chlorpyrifos. Environ. Tox. and Chem. V15, No. 6, 837-845.

⁴ United States Environmental Protection Agency (USEPA). 1993a. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fourth Edition. EPA/600/4-90/027F. USEPA, Office of Research and Development, Washington, D.C.

13_BELT (Toxicity Investigation site)

Sediment toxicity samples were collected during dry weather event 74. Water column toxicity testing was conducted during all four dry weather events (Events 74, 75, 77, and 79), and the wet weather events (Events 76 and 78). The following section describes the toxicity samples collected at each site for each event, the results of the tests, and a summary of applicable TIEs initiated per the requirements in the QAPP.

Event 74 Sediment Toxicity

Sito ID	Н		
Site ID	Survival	Growth	TIE?
02_PCH	Yes	Yes	No
03_UNIV	No	No	No
04_WOOD	Yes	No	No
9A_HOWAR	No	Yes	No

Table 1. Freshwater Sediment Toxicity Event 74 - Hyalella azteca

Event 74 Water Column Toxicity

Site ID	Ceriodaphnia dubia			Hyalella azteca	
Site iD	Survival	Reproduction	TIE?	Survival	TIE?
03_UNIV	No	No	No		
04_WOOD				No	No
07_HITCH	No	No	No		
9B_ADOLF	No	No	No		
10_GATE	No	Yes	No		
13_BELT	No	Yes	No		

Table 2. Freshwater Water Column Toxicity Event 74 - Ceriodaphnia dubia and Hyalella azteca

Event 74 Toxicity and TIE Summary

- Freshwater sediment sites exhibited reduced reproduction at 02_PCH and 09A_HOWAR. Significant reduction in survival was observed at 02_PCH and 04_WOOD.
- No significant reductions in survival were observed for *Ceriodaphnia dubia* at the five freshwater sample sites during the sampling event. However, significant reductions in reproduction were observed at 10_GATE and 13_BELT.
- No significant reduction in survival and reproduction of *Hyalella azteca* was observed for Calleguas Creek ambient waters.
- No TIEs were performed on samples collected at any site for this sampling event.

Event 75 Water Quality Toxicity

Site ID	C	Ceriodaphnia dubia	Hyalella azteca		
Site iD	Survival Reproduction T		TIE?	Survival	Survival
03_UNIV	No	No	No		
04_WOOD				No	No
07_HITCH	No	Yes	No		
9B_ADOLF	No	No	No		
13_BELT	No	No	No		
10_GATE	No	Yes	No		

Table 3. Water Quality Toxicity Event 75 - Ceriodaphnia dubia and Hyalella azteca

Event 75 Toxicity and TIE Summary

- No significant reductions in survival were observed for *Ceriodaphnia dubia* at the five freshwater sample sites during the sampling event.
- Significant reductions in reproduction were observed for *Ceriodaphnia dubia* at 07_HITCH, and 10_GATE.
- No significant reduction in survival was observed for *Hyalella azteca* at the 04_WOOD site.
- No TIEs were performed on samples collected for this sampling event.

Event 76 Water Quality Toxicity

Site ID	Ceriodaphnia dubia							
Sile ID	Survival	Reproduction	TIE?					
03_UNIV	No	No	No					
04_WOOD	No	Yes	No					
06_UPLAND	No	Yes	No					
07_HITCH	No	No	No					
9B_ADOLF	No	No	No					
10_GATE	No	No	No					
13_BELT	No	No	No					

Table 4. Water Quality Toxicity Event 76 - Ceriodaphnia dubia

Event 76 Toxicity and TIE Summary

- No significant reductions in survival were observed for *Ceriodaphnia dubia* at six freshwater sample sites during the sampling event.
- Significant reductions in reproduction were observed for *Ceriodaphnia dubia* at 06_UPLAND and 04_WOOD sites.
- No TIEs were performed on samples collected for this sampling event.

Event 77 Water Quality Toxicity

Site ID	Ce	eriodaphnia dubia	Hyalella azteca			
Site iD	Survival	Survival Reproduction TIE?		Survival	Survival	
03_UNIV	No	No	No			
04_WOOD				No	No	
07_HITCH	No	No	No			
9B_ADOLF	No	No	No			
10_GATE	No	No	No			
13_BELT	No	No	No			

Table 5. Water Quality Toxicity Event 77 - Ceriodaphnia dubia and Hyalella azteca

Event 77 Toxicity and TIE Summary

- No significant reductions in survival or reproduction were observed for *Ceriodaphnia dubia* from the ambient water samples of this sampling event.
- No significant reductions in survival were observed for *Hyalella azteca* from the ambient waters at 04_WOOD.
- No TIEs were performed on samples collected at the remaining sites for this sampling event.

Event 78 Water Quality Toxicity

Site ID	Ceriodaphnia dubia							
Site iD	Survival	TIE?						
03_UNIV	Yes	Yes	Yes					
04_WOOD	Yes	Yes	No ¹					
06_UPLAND	No	Yes	No					
07_HITCH	No	Yes	No					
9B_ADOLF	No	No	No					
10_GATE	No	No	No					
13_BELT	No	No	No					

Table 6. Water Quality Toxicity Event 78 - Ceriodaphnia dubia

1. A TIE was not initiated at this site. TIEs conducted during previous monitoring years identified organic compounds such as pesticides as the likely cause of the toxicity. TIEs have been suspended while efforts are taken to reduce the source of the toxicity.

Event 78 Toxicity and TIE Summary

- Significant reductions in reproduction for *Ceriodaphnia dubia* were observed at 06_UPLAND and 07_HITCH.
- Significant reductions in both survival and reproduction were observed for *Ceriodaphnia dubia* at 03_UNIV and 04_WOOD.
- A TIE was not initiated at the 04_WOOD site. TIEs conducted during previous monitoring years identified organic compounds such as pesticides as the likely cause of the toxicity. TIEs have been suspended while efforts are taken to reduce the source of the toxicity.
- A TIE was performed on the sample taken for this event at 03_UNIV. The results suggest that toxicity was due to dissolved non-polar organic compounds, and some of the toxicity was due to participate-associated substances.

Event 79 Water Quality Toxicity

Site ID	Ceriodaphnia dubia							
Site iD	Survival	TIE?						
03_UNIV	No	No	No					
04_WOOD	Yes	Yes	No ¹					
07_HITCH	No	No	No					
9B_ADOLF	No	No	No					
10_GATE	No	No	No					
13_BELT	No	No	No					

Table 7. Water Quality Toxicity Event 79 - Ceriodaphnia dubia

1. A TIE was not initiated at this site. TIEs conducted during previous monitoring years identified organic compounds such as pesticides as the likely cause of the toxicity. TIEs have been suspended while efforts are taken to reduce the source of the toxicity.

Event 79 Toxicity and TIE Summary

- Significant reductions in survival and reproduction were observed for *Ceriadaphnia dubia* at 04_WOOD.
- No significant reductions in survival or reproduction were observed for *Ceriodaphnia dubia* at any of the remaining freshwater sites.
- A TIE was not initiated at the 04_WOOD site. TIEs conducted during previous monitoring years identified organic compounds such as pesticides as the likely cause of the toxicity. TIEs have been suspended while efforts are taken to reduce the source of the toxicity.
- No TIEs were performed on samples collected from any other site for this sampling event.

Appendix D: Laboratory QA/QC Results and Discussion

QUALITY ASSURANCE/QUALITY CONTROL

Quality assurance and quality control (QA/QC) measures are built into the Calleguas Creek Watershed Total Maximum Daily Load (TMDL) Compliance Monitoring Program (CCWTMP) to assure that collected data are credible. Two types of quality controls were conducted, field quality controls and laboratory quality controls. Field quality controls (to test for field contamination and precision) were conducted by the field crews and include: equipment blanks, field blanks, and field duplicates. Laboratory quality controls (to test for laboratory contamination and precision) were conducted by the laboratories and include: method blanks, blank spikes, blank spike duplicates, lab duplicates, matrix spikes, matrix spike duplicates, laboratory control samples, and surrogates (for organics only). Equipment blanks only apply to the shovels used in sediment sample collection. All field protocols for the collection of clean samples were followed according to the Quality Assurance Project Plan (QAPP). The following section lists the quality control failures that occurred during the 2019-2020 monitoring year and any associated qualifiers and comments.

Blank Contamination

Blank samples are used to identify the presents of and potential sources of sample contamination. During the twelfth year of monitoring, there were three types of blank samples conducted.

- **Field blanks** are conducted by field crews and are looking for possible contamination in the collection process and transportation of samples.
- **Equipment blanks** are done by the field crews and look for contamination with the sampling equipment (IE shovels for sediment).
- Laboratory blanks are conducted by the analyzing laboratory and look for contamination in the lab.

Blank sample constituent detections were less than one percent considering all blank samples for the monitoring year. Most detections in blank samples were within the field blanks. Most of the field blank detections occurred within pesticides and a few salts or nutrients. Very few qualifications were required because the environmental sample was greater than 10 times the blank concentrations, or the environmental sample was not detected. There was one equipment blank (EB) detection that was between the MDL and the RL in ammonia. Of the 17 laboratory blank failures, one was for Zinc and the rest were from the salts (chloride, sulfate, electrical conductivity. All but one analysis was between the MDL and the RL, or the environmental samples were greater than 10 times the blank detection, so very few qualifications were needed. Details of all the blank sample detections are reported in **Table 1** below. The following lists a basic summary of the blank contamination results:

- Field Blanks 1867 analyzed 27 detections above the MDL (1.45%) (does not include lab duplicates or surrogates)
- Equipment Blanks 151 analyzed 1 detection above the MDL (0.66%) (does not include lab duplicates or surrogates)
- Laboratory Blanks 3493 analyzed 17 detections above the MDL (0.49%) (does not include surrogates)

Precision

Precision (reproducibility) of sample collection, preparation, and analytical methods is demonstrated by analyzing duplicate samples and calculating the relative percent difference (RPD) between the original sample and its duplicate. The RPD is reported for field duplicates, lab duplicates, blank spike duplicates, laboratory control spike (LCS) duplicates, and matrix spike duplicates. An RPD is computed as:

$$RPD = 2 * |Oi - Di| / (Oi + Di) * 100$$

Where:

RPD = Relative Percent Difference Oi = value of compound i in original sample Di = value of compound i in duplicate sample

QA failures for precision are noted when the RPD between a sample and its duplicate are greater than the acceptance value. Details of all the RPD failures are reported in **Table 2** below. The following list summarizes the precision analysis results:

- Field Duplicates 2020 analyzed 68 failed RPD (3.37%) (does not include surrogates)
- Laboratory Duplicates 1066 analyzed 16 failed RPD (1.50%) (includes surrogates)
- Blank Spike/LCS Duplicates 2819 analyzed 7 failed RPD (0.25%) (includes surrogates)
- Matrix Spike Duplicates 890 analyzed 9 failed RPD (1.01%) (includes surrogates)

Accuracy

Accuracy is defined as the degree of agreement of a measurement to an accepted reference or true value. Accuracy is measured as the percent recovery (%R) of a spiked compound and calculated as:

%R = 100 * [(Cs - C) / S]

Where:

%R = Percent Recovery Cs = analyzed spiked concentration C = analyzed concentration of sample matrix S = known spiked concentration

Percent recoveries of blank spike samples, LCS samples, and matrix spike samples check the accuracy of the laboratory reported sample concentrations. The blank spike samples that fell outside the acceptable range were all from the pesticides except two for orthophosphate as P. The failures were about evenly divided from Physis Laboratory and Weck Laboratory. Of the matrix spike samples that fell outside the acceptable range, they were from all three matrixes; 94 from water (over half of these were from Weck Laboratories and were not on our sample), 12 from sediment (all but from within the pesticides), and 29 from tissue (again all from with the pesticides group).

Table 3 summarizes the QA/QC sample results for accuracy that did not meet percent recovery objectives. The following lists the results of the accuracy analysis results:

- Blank Spike/LCS Samples 5726 Analyzed 31 fell outside the range (0.54%) (does not include surrogates)
- Matrix Spike Samples 1728 Analyzed 137 fell outside the range (7.93%) (does not include surrogates)

Table 1. Blank Contamination Observed

		Event		Equip			Program
Constituent	Matrix	Number	Lab Batch	Blank	Field Blank	Lab Blank	Qualifier
General Water Quality							
None							
Salts							
Sulfate (mg/L)	Water	77	6977		0.237		
Nutrients							
Ammonia as N (mg/L)	Water	74	Physis C-39142 W	0.0172			
Ammonia as N (mg/L)	Water	77	C-48023		0.0088		
Ammonia as N (mg/L)	Water	79	Physis C-48065 W		0.0793		
Total Kjeldahl Nitrogen (mg/L)	Water	79	Associated_247377		0.084		
Total Kjeldahl Nitrogen (mg/L)	Water	76	Associated_QC1212600_W_CON		0.113		
Total Kjeldahl Nitrogen (mg/L)	Water	77	242223_W_		0.24		
Metals & Selenium							
Boron, Total (μg/L)	Water	74	E-17091		1.9		
Boron, Total (μg/L)	Water	75	9751		2.166		
Boron, Total (μg/L)	Water	79	9974		2.52		
Zinc, Dissolved (µg/L)	Water	77	W0B1037			1.04	
OC Pesticides							
Chlordane (µg/L)	Water	78	LWA - Calculation		0.00255		
Chlordane, alpha- (μg/L)	Water	78	Physis O-24136 W		0.0014		
Chlordane, gamma- (µg/L)	Water	78	Physis O-24136 W		0.00115		
Nonachlor, trans (µg/L)	Water	78	Physis O-24136 W		0.00128		
OP Pesticides							
Chlorpyrifos (µg/L)	Water	78	Physis O-24136 W		0.00103		

		Event		Equip			Program
Constituent	Matrix	Number	Lab Batch	Blank	Field Blank	Lab Blank	Qualifier
PCBs							
PCB 138 (µg/L)	Water	78	Physis O-24136 W		0.00106		
PCB 149 (µg/L)	Water	78	Physis O-24136 W		0.00101		
PCB 153 (μg/L)	Water	78	Physis O-24136 W		0.00094		
Pyrethroid Pesticides							
Bifenthrin (µg/L)	Water	78	Physis O-24136 W		0.0641		
Cyfluthrin, total (μg/L)	Water	78	Physis O-24136 W		0.0108		
Cypermethrin, total (µg/L)	Water	78	Physis O-24136 W		0.003		
Danitol (μg/L)	Water	78	Physis O-24136 W		0.00324		
Deltamethrin (μg/L)	Water	78	Physis O-24136 W		0.0115		
L-Cyhalothrin (µg/L)	Water	78	Physis O-24136 W		0.0129		
Permethrin, cis- (µg/L)	Water	78	Physis O-24136 W		0.0065		
Permethrin, trans- (µg/L)	Water	78	Physis O-24136 W		0.00743		

					BS/	Field	Lab	MS/ MSD	Program	
Constituent	Matrix	Event	Lab Batch	Site	RPD	RPD	RPD	RPD	Qualifier	Comments
General Water Quality										
None										
Nutrients										
										Estimated,
										FieldDup RPD
Ammonia as N (mg/dry kg)	Sediment	74	Physis C-39145 W	9A_HOWAR	9	61	3	5	U, FD RPD	Failed
			6 40000				2	2		FieldDup RPD
Ammonia as N (mg/L)	water	//	C-48023	07_HITCH		88	2	2	FD RPD	Failed
Ammonia as N (mg/L)	Water	75	Physic C_48005 W			25	2	2		FieldDup RPD Failed
AIIIIIOIIId ds N (IIIg/L)	water	75	PTTYSIS C-46005 W			35	3	5	FURFU	Falleu
										FieldDun RPD
Ammonia as N (mg/L)	Water	79	Physis C-48065 W	03 UNIV		41	0	2	U. FD RPD	Failed
							-		-,	Estimated,
										FieldDup RPD
Ammonia as N (mg/L)	Water	79	Physis C-48065 W	9B_ADOLF		65	0	2	U, FD RPD	Failed
										Estimated,
Total Kjeldahl Nitrogen										FieldDup RPD
(mg/L)	Water	77	242223_W_	07_HITCH		107	10		U, FD RPD	Failed
Total Kjeldahl Nitrogen			Associated_24369							FieldDup RPD
(mg/L)	Water	78	1	04_WOOD		64		0	FD RPD	Failed
Total Kjeldahl Nitrogen			Associated_QC120							FieldDup RPD
(mg/L)	Water	75	9421_W_CON	03_UNIV		78		0	FD RPD	Failed
Salts										
None										
OC Pesticides										
Chlordane, alpha- (µg/L)	Water	76	Physis O-24044 W	9B_ADOLF		37			FD RPD	FieldDup RPD

Table 2. Precision QA/QC Issues

					BS/	Field	Lab	MS/		
a					BSD	Dup	Dup	MSD	Program	• ·
Constituent	Matrix	Event	Lab Batch	Site	RPD	RPD	RPD	RPD	Qualifier	Comments
										Failed
Chlordane, alpha- (ng/dry										LabDup RPD
<u>g)</u>	Sediment	74	Physis O-21124 W	9A_HOWAR	1	13	44	5	LD RPD	Failed
										FieldDup RPD
Chlordane, gamma- (µg/L)	Water	78	Physis O-24136 W	04_WOOD		49			FD RPD	Failed
		70								FieldDup RPD
DDD(o,p') (μg/L)	Water	/8	Physis O-24136 W	04_WOOD		39			FD RPD	Failed
		- 4								FieldDup RPD
DDD(p,p ⁻) (μg/L)	Water	74	Physis 0-23104 W	04_WOOD		32			FD RPD	Failed
		70								FieldDup RPD
DDD(p,p ⁻) (μg/L)	Water	/8	Physis O-24136 W	04_WOOD		40			FD RPD	Failed
										MS Recovery
										below lower limit,
									IVIS <ll,< td=""><td>Estimated due to</td></ll,<>	Estimated due to
DDD(r, r') (reduced r)	Tiesue	70					0	00		
DDD(p,p) (ng/wet g)	lissue	79	Physis U-25058 W	04_WOOD			9	99	IVIS/IVISD	
	Mator	70	Dhusia O 2412C M			52				FieldDup RPD
DDE(p,p) (µg/L)	water	/8	Physis U-24136 W	04_0000		53			FD RPD	
	Mator	70				52				FieldDup RPD
DDT(0,p) (μg/L)	water	/8	Physis 0-24136 W	04_0000		55			FURPU	
DDT(n n') (u n')	Mator	74	Dhucic O 22104 W			00				
DDT(p,p) (μg/L)	water	74	Physis 0-23104 W	04_0000		00			FD KPD	
DDT(n n') (u q l)	\M/ator	70	Dhucic O 24126 W			61				FieldDup RPD
	water	70	P11y515 0-24150 W	04_0000		01			FURFU	Estimate due to
									ECT	
DDT(n n') (ng/wet g)	Tissue	79	Physis 0-25058 W				14	54		failure
	113300	15	1 11y313 0-23030 W	000000			74	54	1013/10130	Estimate due to
									FST	MS/MSD RPD
Endrin aldehyde (ng/dry g)	Sediment	74	Physis O-21120 W	07 НІТСН	18		0	92		failure
Enaminaldenyde (ng/dryg)	Jeument	/4	1 11313 0-21120 10	07_1111011	10		U	52		Tanule

					BS/	Field	Lab	MS/	Dragnan	
Constituent	Matrix	Event	Lab Batch	Site	RPD	Dup RPD	Dup RPD	RPD	Program Qualifier	Comments
										Estimate due to
									EST	BS/BSD RPD
									MS/MSD,	failure, Estimate
									EST	due to MS/MSD
Endrin aldehyde (ng/dry g)	Water	74	Physis O-21124 W	LABQA	55	0	0	35	BS/BSD	RPD failure
										FieldDup RPD
Hexachlorobenzene (µg/L)	Water	78	Physis O-24136 W	04_WOOD	10	41			FD RPD	Failed
										FieldDup RPD
Nonachlor, trans (µg/L)	Water	76	Physis O-24044 W	9B_ADOLF	4	42			FD RPD	Failed
										FieldDup RPD
Nonachlor, trans (µg/L)	Water	78	Physis O-24136 W	04_WOOD	6	57			FD RPD	Failed
										Estimated,
										FieldDup RPD
Nonachlor, trans (µg/L)	Water	78	Physis O-24136 W	13_SB_HILL		36			U, FD RPD	Failed
Tetrachloro-m-xylene										FieldDup RPD
(Surrogate) (% Recovery)	Water	74	Physis O-23104 W	13_BELT	1	41			FD RPD	Failed
Tetrachloro-m-xylene										FieldDup RPD
(Surrogate) (% Recovery)	Water	75	Physis O-24032 W	10_GATE	1	64			FD RPD	Failed
Tetrachloro-m-xylene										FieldDup RPD
(Surrogate) (% Recovery)	Water	78	Physis O-24136 W	04_WOOD	6	54			FD RPD	Failed
Tetrachloro-m-xylene										FieldDup RPD
(Surrogate) (% Recovery)	Water	78	Physis O-24136 W	13_SB_HILL	6	40			FD RPD	Failed
OP Pesticides										
										FieldDup RPD
Chlorpyrifos (µg/L)	Water	75	Physis O-24032 W	10_GATE		166			FD RPD	Failed
										FieldDup RPD
Chlorpyrifos (ng/dry g)	Sediment	74	Physis O-21124 W	9A_HOWAR	1	<i>39</i>	24	2	FD RPD	Failed
										Estimate due to
									EST	MS/MSD RPD
Demeton-s (µg/L)	Water	75	W9K0374	10D_HILL				35	MS/MSD	failure
Hexachlorobenzene (μg/L) Nonachlor, trans (μg/L) Nonachlor, trans (μg/L) Nonachlor, trans (μg/L) Tetrachloro-m-xylene (Surrogate) (% Recovery) Tetrachloro-m-xylene (Surrogate) (% Recovery) Tetrachloro-m-xylene (Surrogate) (% Recovery) Tetrachloro-m-xylene (Surrogate) (% Recovery) OP Pesticides Chlorpyrifos (μg/L) Chlorpyrifos (ng/dry g) Demeton-s (μg/L)	Water Water Water Water Water Water Water Water Sediment Water	78 76 78 78 78 74 75 78 78 78 78 75 74	Physis O-24136 W Physis O-24044 W Physis O-24136 W Physis O-24136 W Physis O-24136 W Physis O-24032 W Physis O-24136 W Physis O-24136 W Physis O-24132 W	04_WOOD 9B_ADOLF 04_WOOD 13_SB_HILL 13_BELT 10_GATE 04_WOOD 13_SB_HILL 10_GATE 9A_HOWAR 9A_HOWAR	10 4 6 1 1 6 6 6 1	41 42 57 36 41 64 54 40 166 39		2 35	FD RPD FD RPD FD RPD U, FD RPD FD RPD FD RPD FD RPD FD RPD FD RPD FD RPD	FieldDup RPD Failed FieldDup RPD Failed FieldDup RPD Failed Estimated, FieldDup RPD Failed FieldDup RPD Failed FieldDup RPD Failed FieldDup RPD Failed FieldDup RPD Failed FieldDup RPD Failed FieldDup RPD Failed FieldDup RPD Failed FieldDup RPD Failed FieldDup RPD Failed

					BS/	Field	Lab	MS/		
Constituent	Matrix	Fvont	Lah Batch	Sito	BSD RPD	Dup RPD	Dup RPD	MSD RPD	Program Qualifier	Comments
constituent	WIGCHA	Lvent		Site		N D			Quanner	FieldDup RPD
Dichlorvos (µg/L)	Water	78	Physis O-24136 W	04_WOOD	15	148			FD RPD	Failed
										Estimate due to
									EST	BS/BSD RPD
Fensulfothion (µg/L)	Water	75	Physis O-24020 W	LABQA	33				BS/BSD	failure
Malathian (ug/L)	Wator	70	Physic O 24126 W		2	25				FieldDup RPD
Ivialatilion (µg/L)	Water	70	PTIYSIS 0-24150 W	04_0000	3	35				Estimate due to
									EST	MS/MSD RPD
Naled (µg/L)	Water	74	W9H0511	10D_HILL				31	MS/MSD	failure
										Estimate due to
									EST	MS/MSD RPD
Parathion, Ethyl (µg/L)	Water	75	W9K0374	10D_HILL				33	MS/MSD	failure
Particle Size Distribution										
										LabDup RPD
Clay (%)	Sediment	74	Physis P-1115 W	04_WOOD			67		LD RPD	Failed
Close (0/)	Codino ont	74	Dhucia D 1115 M/				122			LabDup RPD
	Sealment	74	Physis P-1115 W	U6_UPLAND			133		LD RPD	Falled
Pyrethroid Pesticides										
	Cadimant	74	Dhusia () 21124 M			70	12	10		FieldDup RPD
Alarin (ng/ary g)	Sealment	74	Physis O-21124 W	9A_HOWAR		70	13	12	FD RPD	
Rifenthrin (11g/l)	Water	77	0-24092	04 WOOD		56			FD RPD	Failed
	Water	,,	0 24032	04_11000		50			TERIE	FieldDup RPD
Bifenthrin (µg/L)	Water	77	O-24092	07_HITCH		66			FD RPD	Failed
										Estimated,
										FieldDup RPD
Bifenthrin (μg/L)	Water	78	Physis O-24136 W	04_WOOD		84			U, FD RPD	Failed
Diferent heirs (u.g./1)	\M/ator	70	Dhucic O 2412C M	12 50 1111		27				Estimated,
Birenthrin (µg/L)	water	/ð	Physis 0-24136 W	T2_2R_HILL		5/			U, FD RPD	гівіарир кро

					BS/	Field	Lab	MS/		
		_			BSD	Dup	Dup	MSD	Program	_
Constituent	Matrix	Event	Lab Batch	Site	RPD	RPD	RPD	RPD	Qualifier	Comments
										Failed
										Estimated,
										FieldDup RPD
Cyfluthrin, total (µg/L)	Water	78	Physis O-24136 W	04_WOOD		45			U, FD RPD	Failed
		70								FieldDup RPD
Cypermethrin, total (µg/L)	Water	/8	Physis O-24136 W	04_WOOD		55			FD RPD	Failed
		70								FieldDup RPD
Danitol (µg/L)	water	/8	Physis 0-24136 W	04_WOOD		44			FD RPD	Falled
									гст	Estimate due to
Doltomothrin (ug/l)	Mator	75	Dhucic O 24020 M		22					failura
Deitametiinii (µg/L)	water	75	PTIYSIS 0-24020 W	LABQA	52				03/030	Estimato duo to
Deltamethrin/Tralomethri									FCT	
n (ug/L)	Water	75	W9K0846		56					failure
··· (µ8/ -)	Water	75	W31(00+0	100_1112	50				03/030	FieldDup RPD
Esfenvalerate (ug/L)	Water	78	Physis O-24136 W	04 WOOD	0	50			FD RPD	Failed
	Water	70	1117515 0 2 1150 11	01_11000	0	50				FieldDup RPD
Fenvalerate (ug/L)	Water	78	Physis O-24136 W	04 WOOD	3	39			FD RPD	Failed
					-					Estimated.
										FieldDup RPD
L-Cyhalothrin (µg/L)	Water	78	Physis O-24136 W	04 WOOD	1	48			U, FD RPD	Failed
			•	—					-	Estimated,
										FieldDup RPD
L-Cyhalothrin (μg/L)	Water	78	Physis O-24136 W	13_SB_HILL	1	34			U, FD RPD	Failed
										Estimated,
										FieldDup RPD
Permethrin, cis- (μg/L)	Water	78	Physis O-24136 W	04_WOOD	1	50			U, FD RPD	Failed
										MS recover above
										Upper limit,
									MS >UL,	FieldDup RPD
Permethrin, cis- (ng/dry g)	Sediment	74	Physis O-21124 W	9A_HOWAR	2	124	0	13	FD RPD	Failed

					BS/	Field	Lab	MS/		
				-	BSD	Dup	Dup	MSD	Program	
Constituent	Matrix	Event	Lab Batch	Site	RPD	RPD	RPD	RPD	Qualifier	Comments
										Estimated,
		70			•					FieldDup RPD
Permethrin, trans- (µg/L)	Water	/8	Physis 0-24136 W	04_WOOD	0	49			U, FD RPD	Failed
PCBs										
PCB 030 (Surrogate) (%										FieldDup RPD
Recovery)	Water	75	Physis O-24032 W	10_GATE	1	74			FD RPD	Failed
PCB 030 (Surrogate) (%										FieldDup RPD
Recovery)	Water	78	Physis O-24136 W	04_WOOD	4	51			FD RPD	Failed
PCB 030 (Surrogate) (%										FieldDup RPD
Recovery)	Water	78	Physis O-24136 W	13_SB_HILL	4	35			FD RPD	Failed
										LabDup RPD
PCB 049 (ng/wet g)	Tissue	79	Physis O-25058 W	04_WOOD			32	7	LD RPD	Failed
PCB 112 (Surrogate) (%										FieldDup RPD
Recovery)	Water	75	Physis O-24032 W	10_GATE	1	59			FD RPD	Failed
PCB 112 (Surrogate) (%										FieldDup RPD
Recovery)	Water	78	Physis O-24136 W	04_WOOD	4	37			FD RPD	Failed
PCB 112 (Surrogate) (%										FieldDup RPD
Recovery)	Water	78	Physis O-24136 W	13_SB_HILL	4	39			FD RPD	Failed
										FieldDup RPD
PCB 138 (µg/L)	Water	78	Physis O-24136 W	13_SB_HILL	4	144			FD RPD	Failed
										FieldDup RPD
PCB 151 (μg/L)	Water	78	Physis O-24136 W	13_SB_HILL	0	87			FD RPD	Failed
										Estimate due to
									EST	MS/MSD RPD
PCB 153 (ng/wet g)	Tissue	79	Physis O-25058 W	04_WOOD			2	47	MS/MSD	failure
										LabDup RPD
PCB 156 (ng/wet g)	Tissue	79	Physis O-25058 W	04_WOOD			50	3	LD RPD	Failed
										LabDup RPD
PCB 167 (ng/wet g)	Tissue	79	Physis O-25058 W	04_WOOD			58	10	LD RPD	Failed
PCB 180 (ng/wet g)	Tissue	79	Physis O-25058 W	04_WOOD			16	31	EST	Estimate due to

					BS/	Field	Lab	MS/		
					BSD	Dup	Dup	MSD	Program	
Constituent	Matrix	Event	Lab Batch	Site	RPD	RPD	RPD	RPD	Qualifier	Comments
									MS/MSD	MS/MSD RPD
										failure
PCB 198 (Surrogate) (%										FieldDup RPD
Recovery)	Water	75	Physis O-24032 W	10_GATE	1	54			FD RPD	Failed
Metals and Selenium										
Aluminum, Dissolved										FieldDup RPD
(μg/L)	Water	77	E-20012	04_WOOD		123	0	0	FD RPD	Failed
Aluminum, Dissolved				01T_ODD2_						FieldDup RPD
(μg/L)	Water	76	Physis E-17124 W	DCH		160	4	3	FD RPD	Failed
										FieldDup RPD
Aluminum, Total (μg/L)	Water	74	Physis E-17086 W	04_WOOD		<i>98</i>	4		FD RPD	Failed
Antimony, Dissolved										FieldDup RPD
(μg/L)	Water	74	Physis E-17086 W	04_WOOD		92	2	1	FD RPD	Failed
Antimony, Dissolved				01T_ODD2_						FieldDup RPD
(μg/L)	Water	76	Physis E-17124 W	DCH		78	5	0	FD RPD	Failed
										LabDup RPD
Antimony, Total (μg/L)	Water	78	Physis E-20057 W	9BD_ADOLF		5	68		LD RPD	Failed
Cadmium, Dissolved				01T_ODD2_						FieldDup RPD
(μg/L)	Water	76	Physis E-17124 W	DCH		35	25	2	FD RPD	Failed
Cadmium, Dissolved										LabDup RPD
(μg/L)	Water	79	Physis E-20069 W	07D_SIMI			43	0	LD RPD	Failed
										LabDup RPD
									LD RPD,	Failed, FieldDup
Cadmium, Total (µg/L)	Water	77	E-20012	04_WOOD		36	<i>69</i>		FD RPD	RPD Failed
										LabDup RPD
									LD RPD,	Failed, FieldDup
Cadmium, Total (µg/L)	Water	74	Physis E-17086 W	04_WOOD		41	59		FD RPD	RPD Failed
										FieldDup RPD
Beryllium, Total (µg/L)	Water	74	Physis E-17086 W	04_WOOD		31	0		FD RPD	Failed
Chromium, Total (µg/L)	Water	74	Physis E-17086 W	04_WOOD		34	7		FD RPD	FieldDup RPD

					BS/	Field	Lab	MS/		
					BSD	Dup	Dup	MSD	Program	
Constituent	Matrix	Event	Lab Batch	Site	RPD	RPD	RPD	RPD	Qualifier	Comments
										Failed
										FieldDup RPD
Copper, Total (μg/L)	Water	74	Physis E-17086 W	04_WOOD		36			FD RPD	Failed
										LabDup RPD
Iron, Dissolved (µg/L)	Water	74	Physis E-17089 W	01_RR_BR			75		LD RPD	Failed
				01T_ODD2_						FieldDup RPD
Iron, Dissolved (µg/L)	Water	76	Physis E-17124 W	DCH		53	8	6	FD RPD	Failed
										FieldDup RPD
Iron, Total (μg/L)	Water	74	Physis E-17086 W	04_WOOD	2	61	1		FD RPD	Failed
										FieldDup RPD
Iron, Total (μg/L)	Water	78	Physis E-20057 W	04_WOOD	2	31	1		FD RPD	Failed
										FieldDup RPD
Lead, Total (µg/L)	Water	74	Physis E-17086 W	04_WOOD	1	<i>99</i>	5		FD RPD	Failed
										FieldDup RPD
Manganese, Total (µg/L)	Water	74	Physis E-17086 W	04_WOOD	1	41	1		FD RPD	Failed
				01T_ODD2_						FieldDup RPD
Mercury, Dissolved (µg/L)	Water	76	Physis E-18095 W	DCH		34			FD RPD	Failed
										FieldDup RPD
Mercury, Total (µg/L)	Water	74	Physis E-18035 W	04_WOOD	1	34	14		FD RPD	Failed
										LabDup RPD
Molybdenum, Total (μg/L)	Water	78	Physis E-20057 W	9BD_GERRY	0	14	<i>59</i>		LD RPD	Failed
										LabDup RPD
									LD RPD,	Failed, FieldDup
Selenium, Total (µg/L)	Water	78	Physis E-20057 W	04_WOOD	3	43	44		FD RPD	RPD Failed
				04D_SPRIN						LabDup RPD
Selenium, Total (µg/L)	Water	79	Physis E-20105 W	GVILLE	1	3	65		LD RPD	Failed
										LabDup RPD
									LD RPD,	Failed, FieldDup
Silver, Dissolved (µg/L)	Water	75	Physis E-17117 W	03_UNIV		37	38	2	FD RPD	RPD Failed
										FieldDup RPD
Silver, Dissolved (µg/L)	Water	79	Physis E-20105 W	03_UNIV		50	0	6	FD RPD	Failed

					BS/	Field	Lab	MS/	_	
Constituent	Matrix	Fvent	Lab Batch	Site	BSD RPD	Dup RPD	Dup RPD	MSD RPD	Program Qualifier	Comments
				0.10					4	Estimate due to
									EST	BS/BSD RPD
Silver, Total (µg/L)	Water	78	Physis E-20057 W	LABQA	43	0	0		BS/BSD	failure
				01T_ODD2_						FieldDup RPD
Tin, Dissolved (μg/L)	Water	76	Physis E-17124 W	DCH		194	3	4	FD RPD	Failed
										LabDup RPD
Tin, Total (μg/L)	Water	76	Physis E-17124 W	04_WOOD	0	0	36		LD RPD	Failed
										FieldDup RPD
Tin, Total (μg/L)	Water	78	Physis E-20057 W	04_WOOD	2	34.4	0		FD RPD	Failed
										FieldDup RPD
Zinc, Dissolved (µg/L)	Water	74	Physis E-17086 W	04_WOOD		36	0	0	FD RPD	Failed
										FieldDup RPD
Zinc, Total (μg/L)	Water	77	E-20012	04_WOOD	0	38	2		FD RPD	Failed
										FieldDup RPD
Zinc, Total (μg/L)	Water	74	Physis E-17086 W	04_WOOD	0	97	0		FD RPD	Failed

EST BS/BSD = Estimated due to Blank Spike/Blank Spike Duplicate RPD failure. EST MS/MSD = Estimated due to Matrix Spike/Matrix Spike Duplicate RPD failure FD RPD = Field Duplicate Relative Percent Difference failure LD RPD = Lab Duplicate Relative Percent Difference failure MS <LL = Matrix spike recovery was below the Lower Limit of the acceptance range MS >UL = Matrix spike recovery was above the Upper Limit of the acceptance range

Table 3. Accuracy QA/QC Issues

Constituent	Matrix Name	Event Number	Lab Batch	ICI	UCI	105		MS	MSD	Comments
General Water Quality	Hume	Humber				200	1000		11100	connicitio
None										
Salts										
Chloride (mg/L)	Water	76	6909	80	120	104		105	123	MS >UL
Sulfate (mg/L)	Water	76	6909	80	120	106		107	131	MS >UL
Sulfate (mg/L)	Water	77	6977	80	120	101	101	123	133	MS >UL
Nutrients										
Nitrite as N (mg/L)	Water	77	C-47098	70	130	93	93	-44	-48	MS <ll< td=""></ll<>
Nitrite as N (mg/L)	Water	77	C-46074	80	120	90	96	129	132	MS >UL
Nitrite as N (mg/L)	Water	78	Physis C-46100 W	80	120	100	94	120	121	MS >UL
Orthophosphate as P (mg/L)	Water	74	Physis C-46011 W	90	110	86	88	96	94	BS <ll< td=""></ll<>
Phosphorus, Total as P (mg/L)	Water	76	Physis C-47075 W	67	119	107	105	-773	-770	MS <ll< td=""></ll<>
Phosphorus, Total as P (mg/L)	Water	78	Physis C-49013 W	67	119	101	98	-18	-19	MS <ll< td=""></ll<>
Total Kjeldahl Nitrogen (mg/L)	Water	79	Associated_247377	90	110	97		114	112	MS >UL
OC Pesticides										
Chlordane, alpha- (ng/wet g)	Tissue	79	Physis O-25058 W	67	135			150	141	MS >UL
Chlordane, gamma-	Tissue	74	Physis O-21126 W	70	135			56	57	MS <ll< td=""></ll<>

	Matrix	Event								
Constituent	Name	Number	Lab Batch	LCL	UCL	LCS	LCSD	MS	MSD	Comments
(ng/wet g)										
Chlordane, gamma-										
(ng/wet g)	Tissue	79	Physis O-25058 W	70	135			1 53	148	MS >UL
DDD(o,p') (ng/wet g)	Tissue	79	Physis O-25058 W	66	138	94		158	138	MS >UL
DDD(p,p') (ng/wet g)	Tissue	79	Physis O-25058 W	46	154	106		77	26	MS <ll, est="" ms="" msd<="" td=""></ll,>
DDE(o,p') (ng/wet g)	Tissue	79	Physis O-25058 W	70	131	92		154	152	MS >UL
DDE(p,p') (ng/wet g)	Tissue	79	Physis O-25058 W	44	148	94		474	512	MS >UL
Endosulfan I (ng/dry g)	Sediment	74	Physis O-21124 W	21	114	2	2	11	9	BS <ll, <ll<="" ms="" td=""></ll,>
Endosulfan II (ng/dry g)	Sediment	74	Physis O-21124 W	47	117	12	11	13	13	BS <ll, <ll<="" ms="" td=""></ll,>
Endosulfan II (ng/wet g)	Tissue	79	Physis O-25058 W	29	125	9		84	100	BS <ll< td=""></ll<>
Endrin (ng/wet g)	Tissue	79	Physis O-25058 W	21	187	103		196	189	MS >UL
Endrin ketone (µg/L)	Water	75	Physis O-24032 W	63	131	156	164			BS >UL
Dieldrin (ng/wet g)	Tissue	79	Physis O-25058 W	51	147	96		138	154	MS >UL
Heptachlor (µg/L)	Water	75	Physis O-24032 W	68	142	144	166			BS >UL
Nonachlor, trans (ng/wet										
g)	Tissue	79	Physis O-25058 W	66	135	93		146	133	MS >UL
Perthane (ng/wet g)	Tissue	79	Physis O-25058 W	65	163	111		177	158	MS >UL
OP Pesticides										
Azinphos methyl (μg/L)	Water	75	W9K0374	0.1	154	208		247	233	BS >UL, MS >UL
Azinphos methyl (µg/L)	Water	77	W0B0494	0.1	154	72		287	243	MS >UL
Azinphos methyl (µg/L)	Water	79	W0E0541	0.1	154	169		327	383	BS >UL, MS >UL
Bolstar (µg/L)	Water	75	Physis O-24032 W	46	147	165	178			BS >UL

Council to count	Matrix	Event	Lak Datak			1.00		NAC		Commente
Constituent	Name	Number	Lab Batch	LCL	UCL	LCS	LCSD	IVIS	IVISD	Comments
Bolstar (µg/L)	Water	79	W0E0541	4	184	108		204	249	MS >UL
Chlorpyrifos (µg/L)	Water	77	W0B0494	37	168	152		164	180	MS >UL
Coumaphos (µg/L)	Water	77	W0B0494	0.1	203	67		260	221	MS >UL
Coumaphos (µg/L)	Water	79	W0E0541	0.1	225	220		363	363	MS >UL
Demeton-s (µg/L)	Water	79	W0E0541	0.1	207	150		223	224	MS >UL
Diazinon (µg/L)	Water	77	W0B0494	43	152	475		94	103	BS >UL
Dichlorvos (µg/L)	Water	75	W9K0374	42	137	126		159	130	MS >UL
Ethoprop (µg/L)	Water	79	W0E0541	51	167	150		179	177	MS >UL
Fenchlorphos (µg/L)	Water	79	Physis O-26012 W	75	128	124	135			BS >UL
Malathion (µg/L)	Water	77	W0B0494	6	175	184		257	237	BS >UL, MS >UL
Malathion (µg/L)	Water	79	W0E0541	6	175	182		209	211	BS >UL, MS >UL
Merphos (µg/L)	Water	74	W9H0511	3	210	346		178	139	BS >UL
Merphos (µg/L)	Water	77	W0B0494	3	210	95		411	342	MS >UL
Merphos (µg/L)	Water	79	W0E0541	3	210	226		347	437	BS >UL, MS >UL
Mevinphos (µg/L)	Water	75	W9K0374	25	189	140		215	175	MS >UL
Naled (µg/L)	Water	75	W9K0374	0.1	242	268		380	350	BS >UL, MS >UL
Tetrachlorvinphos (µg/L)	Water	74	W9H0511	0.1	167	122		168	142	MS >UL
Tetrachlorvinphos (µg/L)	Water	75	W9K0374	0.1	167	154		238	189	MS >UL
Tetrachlorvinphos (µg/L)	Water	77	W0B0494	0.1	188	179		263	247	MS >UL
Tetrachlorvinphos (µg/L)	Water	79	W0E0541	0.1	167	209		275	265	BS >UL, MS >UL
Tokuthion (μg/L)	Water	74	W9H0511	27	160	113		200	151	MS >UL

	Matrix	Event				1.00	1000			0
Constituent	Name	Number	Lab Batch	LCL	UCL	LCS	LCSD	IVIS	MSD	Comments
Tokuthion (μg/L)	Water	79	W0E0541	27	160	150		175	194	MS >UL
Pyrethroid Pesticides										
Allethrin (µg/L)	Water	74	W9H0488	50	150	81		0	0	MS <ll< td=""></ll<>
Allethrin (µg/L)	Water	79	W0E0806	50	150	241	249			BS >UL
Bifenthrin (μg/L)	Water	74	W9H0488	50	150	86		0	0	MS <ll< td=""></ll<>
Cyfluthrin, total (µg/L)	Water	74	W9H0488	50	150	84		0	0	MS <ll< td=""></ll<>
Cyfluthrin, total (µg/L)	Water	77	W0B0478	50	150	158	165			BS >UL
Cyfluthrin, total (ng/dry g)	Sediment	74	Physis O-21124 W	50	150	116	119	157	19 3	MS >UL
Cypermethrin, total (µg/L)	Water	74	W9H0488	50	150	85		0	0	MS <ll< td=""></ll<>
Cypermethrin, total (µg/L)	Water	77	W0B0478	50	150	172	<i>162</i>			BS >UL
Cypermethrin, total										
(ng/dry g)	Sediment	74	Physis O-21124 W	50	150	118	121	168	199	MS >UL
Danitol (µg/L)	Water	74	W9H0488	50	150	83		0	0	MS <ll< td=""></ll<>
Deltamethrin (ng/dry g)	Sediment	74	Physis O-21124 W	50	150	111	112	43	39	MS <ll< td=""></ll<>
Deltamethrin/Tralomethri										
n (µg/L)	Water	77	W0B0478	50	150	157	152			BS >UL
Dichloran (µg/L)	Water	74	W9H0488	50	150	73		0	0	MS <ll< td=""></ll<>
Fenvalerate/Esfenvalerate										
(µg/L)	Water	74	W9H0488	50	150	86		0	0	MS <ll< td=""></ll<>
Fenvalerate/Esfenvalerate										
(µg/L)	Water	79	W0E0806	50	150	140	156			BS >UL
Fluvalinate (ng/dry g)	Sediment	74	Physis O-21124 W	50	150	104	105	123	153	MS >UL
L-Cyhalothrin (µg/L)	Water	74	W9H0488	50	150	82		0	0	MS <ll< td=""></ll<>

	Matrix	Event								
Constituent	Name	Number	Lab Batch	LCL	UCL	LCS	LCSD	MS	MSD	Comments
Permethrin (µg/L)	Water	74	W9H0488	50	150	83		0	0	MS <ll< td=""></ll<>
Permethrin (μg/L)	Water	77	W0B0478	50	150	152	163			BS >UL
Permethrin, cis- (ng/dry g)	Sediment	74	Physis O-21124 W	50	150	104	106	138	157	MS >UL
Prallethrin (µg/L)	Water	74	W9H0488	50	150	81		0	0	MS <ll< td=""></ll<>
Sumithrin (Phenothrin)										
(µg/L)	Water	77	W0B0478	50	150	148	151			BS >UL
Tefluthrin (μg/L)	Water	74	W9H0488	50	150	73		0	0	MS <ll< td=""></ll<>
Triphenyl phosphate										
(µg/L)	Water	74	W9H0511	40	163	116		208	180	MS >UL
Triphenyl phosphate										
(µg/L)	Water	77	W0B0494	40	163	123		168	147	MS >UL
Triphenyl phosphate										BS >UL, MS >UL, EST
(µg/L)	Water	79	W0E0541	40	163	208		160	220	MS/MSD
PCBs										
PCB 003 (ng/wet g)	Tissue	74	Physis O-21126 W	65	153	89	78	140	161	MS >UL
PCB 003 (ng/wet g)	Tissue	79	Physis O-25058 W	65	153	75		125	168	MS >UL
PCB 018 (ng/wet g)	Tissue	79	Physis O-25058 W	59	136	86		253	307	MS >UL
PCB 037 (ng/wet g)	Tissue	74	Physis O-21126 W	57	137	107	100	196	178	MS >UL
PCB 037 (ng/wet g)	Tissue	79	Physis O-25058 W	57	137	94		292	314	MS >UL
PCB 066 (ng/wet g)	Tissue	74	Physis O-21126 W	52	141	112	103	226	201	MS >UL
PCB 168/132 (ng/wet g)	Tissue	74	Physis O-21126 W	46	143	100	96	218	225	MS >UL
Metals and Selenium										
Silver, Dissolved (µg/L)	Water	78	Physis E-20057 W	52	115			38	51	MS <ll< td=""></ll<>

Constituent	Matrix Name	Event Number	Lab Batch	LCL	UCL	LCS	LCSD	MS	MSD	Comments
Strontium, Dissolved (μg/L)	Water	75	Physis E-17117 W	75	125			280	240	MS >UL
Strontium, Dissolved (µg/L)	Water	77	E-20012	75	125			210	210	MS >UL
Strontium, Dissolved (µg/L)	Water	79	Physis E-20105 W	75	125			190	186	MS >UL
Thallium, Dissolved (µg/L)	Water	79	Physis E-20069 W	84	118			<i>83</i>	86	MS <ll< td=""></ll<>

LCL = Lower Control Limit UCL = Upper Control Limit LCS = Laboratory Control Spike LCSD = Laboratory Control Spike Duplicate MS = Matrix Spike MSD = Matrix Spike Duplicate