

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

Event 68 – Water & Sediment

Calleguas Creek Watershed TMDL Monitoring Program

Post Event Summary

Event 68: Sediment & Quarterly Water Sampling

Sampling Crews: Kinnetic Laboratories, Inc. (KLI), Fugro
Crew #1: Greg Cotten (KLI), Tanner Barnes (KLI)
Crew #2: David Thornhill (Fugro), Seth Gray (Fugro)

Sampling Dates: Receiving water and land use sites on August 7th and 8th.

Sampling Type: Sediment, Quarterly Water Chemistry, Toxicity, Metals, PCBs, and Salts.

SITES SAMPLED

| Site ID | Sample Date | Constituents | | | | | |
|----------------|-------------|--------------------|----------|--------|-----------|---|-------|
| | | General Parameters | Toxicity | Metals | Nutrients | PCBs, OP, OC, and Pyrethroid Pesticides | Salts |
| 01_RR_BR | 8/8/18 | X | | X | X | X | |
| 02_PCH | 8/8/18 | X | | X | X | | |
| 03_UNIV | 8/8/18 | X | X | X | X | X | |
| 9B_ADOLF | 8/8/18 | X | X | | X | X | |
| 9BD_ADOLF | 8/8/18 | X | | X | | X | X |
| 05D_SANT_VCWPD | 8/7/18 | X | | X | X | X | X |
| 05_CENTR | 8/7/18 | X | | | X | | |
| 04_WOOD | 8/8/18 | X | X | X | X | X | |
| 01T_ODD2_DCH | 8/8/18 | X | | X | X | X | |
| 07_HITCH | 8/8/18 | X | X | | X | X | |
| 07D_SIM_BUS | 8/7/18 | X | | | | X | X |
| 13_SB_HILL | 8/7/18 | X | | | | X | X |
| 10_GATE | 8/8/18 | X | X | | | X | |
| 13_BELT | 8/8/18 | X | X | | | X | |

SITES NOT SAMPLED

| Site ID | Reason for Omission |
|-----------------|---|
| 02D_BROOM | Site was dry. |
| 06T_FC_BR | Site was dry. |
| 07D_HITCH_LEVEE | Site was dry. |
| 07D_MPK | Site was dry. |
| 06_UPLAND | Site was dry. |
| 04D_WOOD | Site was dry. |
| 04D_VENTURA | Site was under construction. Not accessible |
| 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 | <p>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.</p> <p>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>.</p> |
| 05_CENTR | Intermediate container (Ziploc bag) used to fill sample bottles. |
| 05D_SANT_VCWPD | Intermediate container (Ziploc bag) used to fill sample bottles. |
| 9BD_ADOLF | Intermediate container (Ziploc bag) used to fill sample bottles. |

FOLLOW UP ACTIONS

None

SEDIMENT SITES

| Site ID | Sample Notes |
|-----------|---|
| 02_PCH | Sediment tox and chemistry sampled 8-7-18 at 13:15: low tide 2.2 feet |
| 04_WOOD | Sediment tox and chemistry sampled 8-7-18 at 12:10 |
| 03_UNIV | Sediment tox and chemistry sampled 8-7-18 at 09:15 |
| 9B_ADOLF | Sediment chemistry sampled 8-8-18 at 11:00 |
| 06_UPLAND | Sediment chemistry sampled 8-7-18 at 20:00 |
| 07_HITCH | Sediment chemistry only sampled 8-8-18 at 18:10 |
| 9A_HOWAR | Sediment tox and chemistry sampled 8-7-18 at 10:45 |

ADDITIONAL COMMENTS

- 10_GATE had a weir and flume installed
- Both teams used digital field logs with paper logs as backup.
- 01_RR_BR water was sampled near 2.3 ft. tidal stage at Point Mugu.
- 02_PCH water was sampled near 2.7 ft. tidal stage at Point Mugu.
- Sediment samples were collected with lab cleaned unused stainless steel scoops.

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.

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

Prepared by: Tanner Barnes, KLI Date: 8/27/2018

Reviewed by: Michael Ray, KLI Date: 8/28/2018

Approved by: Michael Marson, LWA Date: 10/08/2018

Event 69

Calleguas Creek Watershed TMDL Monitoring Program

Post Event Summary

Event 69: Dry Weather Sampling

Sampling Crews: Kinnetic Laboratories, Inc. (KLI), Fugro
Crew #1: Greg Cotten (KLI), Tanner Barnes (KLI)
Crew #2: David Thornhill (Fugro), Seth Gray (Fugro)

Sampling Dates: Receiving water and land use sites on November 7th and 8th, 2018.

Sampling Type: Quarterly Water Chemistry, Toxicity, Metals, PCBs and Salts.

SITES SAMPLED

| Site ID | Sample Date | Constituents | | | | | |
|----------------|-------------|--------------------|----------|--------|-----------|---|-------|
| | | General Parameters | Toxicity | Metals | Nutrients | PCBs, OP, OC, and Pyrethroid Pesticides | Salts |
| 01_RR_BR | 11/7/18 | X | | X | X | X | |
| 02_PCH | 11/7/18 | X | | X | X | | |
| 03_UNIV | 11/7/18 | X | X | X | X | X | |
| 9B_ADOLF | 11/7/18 | X | X | | X | X | |
| 9BD_ADOLF | 11/7/18 | X | | X | | X | X |
| 05D_SANT_VCWPD | 11/7/18 | X | | X | X | X | X |
| 05_CENTR | 11/7/18 | X | | | X | | |
| 04D_WOOD | 11/7/18 | X | | X | X | X | X |
| 04_WOOD | 11/7/18 | X | X | X | X | X | |
| 01T_ODD2_DCH | 11/7/18 | X | | X | X | X | |
| 07_HITCH | 11/7/18 | X | X | | X | X | |
| 07D_MPK | 11/7/18 | X | | | | X | X |
| 07D_SIM_BUS | 11/8/18 | X | | | | X | X |
| 13_SB_HILL | 11/8/18 | X | | | | X | X |
| 9BD_GERRY | 11/7/18 | X | | X | X | X | X |
| 10_GATE | 11/7/18 | X | X | | | X | |
| 13_BELT | 11/7/18 | X | X | | | X | |

SITES NOT SAMPLED

| Site ID | Reason for Omission |
|-----------------|--|
| 02D_BROOM | Site was dry. |
| 06T_FC_BR | Site was dry. |
| 07D_HITCH_LEVEE | Site was dry. |
| 04D_VENTURA | Site construction has installed subterranean culvert. No longer accessible. New site pending approval. |
| 06_UPLAND | 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 | <p>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.</p> <p>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>.</p> |
| 05_CENTR | Intermediate container (Ziploc bag) used to fill sample bottles. |
| 05D_SANT_VCWPD | Intermediate container (Ziploc bag) used to fill sample bottles. |
| 9BD_ADOLF | Intermediate container (Ziploc bag) used to fill sample bottles. |
| 04D_WOOD | Intermediate container (Ziploc bag) used to fill sample bottles. |
| 9BD_GERRY | Intermediate container (Ziploc bag) used to fill sample bottles. |
| 07D_MPK | Intermediate container (Ziploc bag) used to fill sample bottles. |

FOLLOW UP ACTIONS

None

ADDITIONAL COMMENTS

- Both teams used digital field logs with paper logs as backup.
- 01_RR_BR was sampled near 0.2 ft. tidal stage at Point Mugu.
- 02_PCH was sampled near -0.29 ft. tidal stage at Point Mugu.
- Gerry exceeded the field meters ability to accurately measure turbidity. Turbidity was added to the analytical list for Physis.

Field meter calibration notes:

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

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

| | | |
|--------------|----------------|----------------|
| Prepared by: | Tanner Barnes | Date: 11/12/18 |
| Reviewed by: | Michael Ray | Date: 11/12/18 |
| Approved by: | Michael Marson | Date: 01/25/19 |

Event 70 – Storm 1

Calleguas Creek Watershed TMDL Monitoring Program

Post Event Summary

Event 70: Wet Weather Sampling

Sampling Crews: Kinnetic Laboratories, Inc. (KLI), Fugro

Crew #1: Greg Cotten (KLI), Kagen Holland (KLI)

Crew #2: Gary Gillingham (KLI), Tanner Barnes (KLI)

Crew #3: Jeff Polis (Fugro), Cory Crocker (Fugro)

Crew #4: David Thornhill (Fugro), Seth Gray (Fugro)

Sampling Dates: Receiving water and land use sites on November 29, 2018

Sampling Type: Wet weather water chemistry, toxicity, metals, PCBs and salts.

SITES SAMPLED

| Site ID | Sample Date | Constituents | | | | | |
|-------------------|-------------|--------------------|----------|--------|-----------|---|-------|
| | | General Parameters | Toxicity | Metals | Nutrients | PCBs, OP, OC, and Pyrethroid Pesticides | Salts |
| 01_RR_BR | 11/29/18 | X | | X | X | X | |
| 02_PCH | 11/29/18 | X | | X | X | | |
| 03_UNIV | 11/29/18 | X | X | X | X | X | X |
| 9A_HOWAR | 11/29/18 | X | | | | | X |
| 9B_ADOLF | 11/29/18 | X | X | | X | X | |
| 9BD_ADOLF | 11/29/18 | X | | X | | X | X |
| 05D_SANT_VCWPD | 11/29/18 | X | | X | X | X | X |
| 05_CENTR | 11/29/18 | X | | | X | | |
| 04D_WOOD | 11/29/18 | X | | X | X | X | X |
| 04_WOOD | 11/29/18 | X | X | X | X | X | X |
| 01T_ODD2_DCH | 11/29/18 | X | | X | X | X | |
| 06_UPLAND | 11/29/18 | X | X | | X | X | |
| 07_HITCH | 11/29/18 | X | X | | X | X | |
| 07D_HITCH_LEVEE_2 | 11/29/18 | X | | | X | X | X |
| 07_TIERRA | 11/29/18 | X | | | | | X |
| 07D_MPK | 11/29/18 | X | | | | X | X |

| Site ID | Sample Date | Constituents | | | | | |
|-------------|-------------|--------------------|----------|--------|-----------|---|-------|
| | | General Parameters | Toxicity | Metals | Nutrients | PCBs, OP, OC, and Pyrethroid Pesticides | Salts |
| 07D_SIM_BUS | 11/29/18 | X | | | | X | X |
| 13_SB_HILL | 11/29/18 | X | | | | X | X |
| 9B_BARON | 11/29/18 | X | | | | | X |
| 9BD_GERRY | 11/29/18 | X | | X | X | X | X |
| 10_GATE | 11/29/18 | X | X | | | X | |
| 13_BELT | 11/29/18 | X | X | | | X | |

SITES NOT SAMPLED

| Site ID | Reason for Omission |
|-------------|--|
| 02D_BROOM | Site was dry. |
| 04D_VENTURA | Construction effort installed subterranean culvert. Site no longer accessible. New site is pending approval. |
| 06T_FC_BR | 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. |

FOLLOW UP ACTIONS

None

ADDITIONAL COMMENTS

Less safe and less productive night conditions prevented an earlier sampling start. Sampling began at first light. It appears these samples were collected at the middle of the event with some sites rising and some falling while sampling. Our general approach for this and all storms is to begin our sampling at sites higher in the watershed and work our way downstream.

Field meter calibration notes:

Team 1 (13_SB_HILL, 07D_SIM_BUS, 07D_MPK, 07_HITCH, 07D_HITCH_LEVEE_2, 07_TIERRA and 9B_ADOLF) field meter # 0925 passed the initial calibration but failed for DO and conductivity during post calibration.

Team 2 (9BD_ADOLF, 9BD_GERRY, 10_GATE, 13_BELT and 9B_BARON) field meter # 2692 turbidity failed initial calibration, but passed all other parameters for initial and post calibration. Grab samples were taken and measured within 8 hours with meter #4547.

Team 3 (06T_FC_BR , 05D_SANT_VCWPD, 05_CENTR, 04D_VENTURA, 06_UPLAND, 9A_HOWAR and 03_UNIV) field meter # 3760 passed both the initial and post calibration.

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

Meter exceedences:

Sites where turbidity exceeded 1000 NTU (field meter maximum) Turbidity was added to the site COC for laboratory analysis. These sites were: 9BD_GERRY, 05D_SANT_VCWPD, 05_CENTR, 06_UPLAND, 04D_WOOD.

Flow:

Due to dangerous flow conditions, flow was estimated at all sites except 07D_SIM_BUS, 9B_ADOLF, 07_HITCH and 07D_MPK, where flow was measured using preferred methods. 02D_BROOM, 04D_VENTURA, and 06T_FC_BR were 'dry'.

Prepared by: Michael Ray, KLI Date: 12/12/18

Reviewed by: Tanner Barnes, KLI Date: 12/13/18

Approved by: Michael Marson, LWA Date: 01/25/19

Event 71 – Storm 2

Calleguas Creek Watershed TMDL Monitoring Program

Post Event Summary

Event 71: Wet Weather Sampling

Sampling Crews: Kinnetic Laboratories, Inc. (KLI), Fugro
Crew #1: Greg Cotten (KLI), Kagen Holland (KLI)
Crew #2: Michael Ray (KLI), Tanner Barnes (KLI)
Crew #3: Jeff Polis (Fugro), Dustin Snider (Fugro)
Crew #4: Cory Crocker (Fugro), Seth Gray (Fugro)

Sampling Dates: Receiving water and land use sites on January 15, 2019.

Sampling Type: Wet weather water chemistry, toxicity, metals, PCBs and salts.

SITES SAMPLED

| Site ID | Sample Date | Constituents | | | | | |
|-----------------|-------------|--------------------|----------|--------|-----------|---|-------|
| | | General Parameters | Toxicity | Metals | Nutrients | PCBs, OP, OC, Triazines and Pyrethroid Pesticides | Salts |
| 01_RR_BR | 1/15/19 | X | | X | X | X | |
| 02_PCH | 1/15/19 | X | | X | X | | |
| 03_UNIV | 1/15/19 | X | X | X | X | X | X |
| 9A_HOWAR | 1/15/19 | X | | | | | X |
| 9B_ADOLF | 1/15/19 | X | X | | X | X | |
| 9BD_ADOLF | 1/15/19 | X | | X | | X | X |
| 05D_SANT_VCWPD | 1/15/19 | X | | X | X | X | X |
| 05_CENTR | 1/15/19 | X | | | X | | |
| 04D_SPRINGVILLE | 1/15/19 | X | | X | | X | X |
| 04D_WOOD | 1/15/19 | X | | X | X | X | X |
| 04_WOOD | 1/15/19 | X | X | X | X | X | X |
| 01T_ODD2_DCH | 1/15/19 | X | | X | X | X | |
| 06T_FC_BR | 1/15/19 | X | | | X | X | X |
| 06_UPLAND | 1/15/19 | X | X | | X | X | |
| 07_HITCH | 1/15/19 | X | X | | X | X | |

| Site ID | Sample Date | Constituents | | | | | |
|-------------------|-------------|--------------------|----------|--------|-----------|---|-------|
| | | General Parameters | Toxicity | Metals | Nutrients | PCBs, OP, OC, Triazines and Pyrethroid Pesticides | Salts |
| 07D_HITCH_LEVEE_2 | 1/15/19 | X | | | X | X | X |
| 07_TIERRA | 1/15/19 | X | | | | | X |
| 07D_MPK | 1/15/19 | X | | | | X | X |
| 07D_SIM_BUS | 1/15/19 | X | | | | X | X |
| 13_SB_HILL | 1/15/19 | X | | | | X | X |
| 9B_BARON | 1/15/19 | X | | | | | X |
| 9BD_GERRY | 1/15/19 | X | | X | X | X | X |
| 10_GATE | 1/15/19 | X | X | | | X | |
| 13_BELT | 1/15/19 | X | X | | | X | |

SITES NOT SAMPLED

| Site ID | Reason for Omission |
|-----------|---------------------|
| 02D_BROOM | 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. |
| 9BD_ADOLF | Intermediate container (1L AG) used for metals. |
| 9BD_GERRY | Intermediate container (1L AG) used for metals. |

FOLLOW UP ACTIONS

None

ADDITIONAL COMMENTS

Field meter calibration notes:

Team 1 (13_SB_HILL, 07D_SIM_BUS, 07D_MPK, 07_HITCH, 07D_HITCH_LEVEE_2 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 analysed with Team 4 meter # 3760.

Team 2 (06_UPLAND, 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 analysed with Team 3 meter #4547.

Team 3 (06T_FC_BR , 05D_SANT_VCWPD, 05_CENTR, 04D_SPRINGVILLE, 9A_HOWAR and 03_UNIV) field meter, 4547, passed both the initial and post calibration.

Team 4 (04_WOOD, 04D_WOOD, 01T_ODD2_DCH, 02_PCH and 01_RR) field meter, 3760, passed both the initial and post calibration.

Meter exceedences:

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, 06T_FC_BR and 9BD_GERRY.

Flow:

Due to dangerous flow conditions, flow was estimated at all sites except 04D_WOOD, 07D_HITCH_LEVEE, 13_SB_HILL, 07D_SIM_BUS and 07D_MPK, where flow was measured using preferred methods. 02D_BROOM outfall was 'dry'.

Photos:

Some locations were collected after sunset. In order to maximize the information from these site photos, digital enhancements were applied and therefore may appear grainy.

Prepared by: Tanner Barnes and Michael Ray, KLI Date: 1/22/19

Reviewed by: Greg Cotten, KLI Date: 3/06/19

Approved by: Michael Marson, LWA Date: 05/07/19

Event 72

Calleguas Creek Watershed TMDL Monitoring Program

Post Event Summary

Event 72: Dry Weather Sampling

Sampling Crews: Kinnetic Laboratories, Inc. (KLI), Fugro

Crew #1: Greg Cotten (KLI), Tanner Barnes (KLI)

Crew #2: David Thornhill (Fugro), Seth Gray (Fugro)

Sampling Dates: Receiving water and land use sites on March 18th and 19th, 2019.

Sampling Type: Quarterly Water Chemistry, Toxicity, Metals, PCBs and Salts.

SITES SAMPLED

| Site ID | Sample Date | Constituents | | | | | |
|-------------------|-------------|--------------------|----------|--------|-----------|---|-------|
| | | General Parameters | Toxicity | Metals | Nutrients | PCBs, OP, OC, and Pyrethroid Pesticides | Salts |
| 01_RR_BR | 3-19-19 | X | | X | X | X | |
| 02_PCH | 3-19-19 | X | | X | X | | |
| 03_UNIV | 3-19-19 | X | X | X | X | X | |
| 9B_ADOLF | 3-19-19 | X | X | | X | X | |
| 9BD_ADOLF | 3-19-19 | X | | X | | X | X |
| 05D_SANT_VCWPD | 3-19-19 | X | | X | X | X | X |
| 05_CENTR | 3-19-19 | X | | | X | | |
| 04D_SPRINGVILLE | 3-19-19 | X | | X | | X | X |
| 04D_WOOD | 3-19-19 | X | | X | X | X | X |
| 04_WOOD | 3-19-19 | X | X | X | X | X | |
| 01T_ODD2_DCH | 3-19-19 | X | | X | X | X | |
| 07_HITCH | 3-19-19 | X | X | | X | X | |
| 07D_HITCH_LEVEE_2 | 3-19-19 | X | | | X | X | X |
| 07D_MPK | 3-18-19 | X | | | | X | X |
| 07D_SIM_BUS | 3-18-19 | X | | | | X | X |
| 13_SB_HILL | 3-18-19 | X | | | | X | X |
| 10_GATE | 3-19-19 | X | X | | | X | |

| Site ID | Sample Date | Constituents | | | | | |
|---------|-------------|--------------------|----------|--------|-----------|---|-------|
| | | General Parameters | Toxicity | Metals | Nutrients | PCBs, OP, OC, and Pyrethroid Pesticides | Salts |
| 13_BELT | 3-19-19 | X | X | | | X | |

SITES NOT SAMPLED

| Site ID | Reason for Omission |
|-----------|---|
| 02D_BROOM | Site was dry 3-19-19. |
| 06T_FC_BR | Site had standing water with no flow 3-18-19. |
| 06_UPLAND | Site was dry 3-18-19. |
| 9BD_GERRY | Site was dry 3-19-19. |

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 | <p>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.</p> <p>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>.</p> |
| 07D_MPK | Intermediate container (Ziploc bag) used to fill sample bottles. |
| 9BD_ADOLF | Intermediate container (Ziploc bag) used to fill sample bottles. |
| 05_CENTR | Intermediate container (Ziploc bag) used to fill sample bottles. |
| 13_SB_HILL | Flow was not recorded at this site. |
| 07D_HITCH_LEVEE_2 | Intermediate container (Ziploc bag) used to fill sample bottles. |

FOLLOW UP ACTIONS

None

ADDITIONAL COMMENTS

- Both teams used digital field logs.
- 01_RR_BR was sampled near -1.2 ft. tidal stage at Point Mugu.
- 02_PCH was sampled near -1.1 ft. tidal stage at Point Mugu.
- 05_Center construction drainage hose was downstream of sampling site. It was not operating but water in the hose may indicate it was dewatering an agricultural field.
- 13_SB_HILL flow was measured but there is no record of it.
- 07D_MPK was extremely low flow but it was sampled.

Field meter calibration notes:

Team 1 (13_BELT, 10_GATE, 07_HITCH, 07D_HITCH_LEVEE_2, 9B_ADOLF, 9BD_ADOLF, 07D_SIM_BUS, 13_SB_HILL, 06T_FC_BR) field meter #4547 passed all parameters for the pre calibration, but failed the post calibration for dissolved oxygen.

Team 2 (01_RR_BR, 02_PCH, 03_UNIV, 05D_SANT_VCWPD, 05_CENTR, 04D_WOOD, 04_WOOD, 01T_ODD2_DCH, and 04D_SPRINGVILLE) field meter #3670 passed all parameters for both pre and post calibration.

| | | | |
|--------------|---------------------|-------|---------|
| Prepared by: | Michael Ray | Date: | 4/1/19 |
| Reviewed by: | Greg Cotten | Date: | 5/8/19 |
| Approved by: | Michael Marson, LWA | Date: | 5/10/19 |

Event 73 – Water & Tissue

Calleguas Creek Watershed TMDL Monitoring Program

Post Event Summary

Event 73: Dry Weather Sampling

Sampling Crews: Kinnetic Laboratories, Inc. (KLI), Fugro
Crew #1: Greg Cotten (KLI), Amy Howk (KLI)
Crew #2: David Thornhill (Fugro), Seth Gray (Fugro)

Sampling Dates: Receiving water and land use sites on May 28th and 29th, 2019.

Sampling Type: Quarterly Water Chemistry, Toxicity, Metals, PCBs and Salts.

SITES SAMPLED

| Site ID | Sample Date | Constituents | | | | | |
|-----------------|-------------|--------------------|----------|--------|-----------|---|-------|
| | | General Parameters | Toxicity | Metals | Nutrients | PCBs, OP, OC, and Pyrethroid Pesticides | Salts |
| 01_RR_BR | 5-29-19 | X | | X | X | X | |
| 02_PCH | 5-29-19 | X | | X | X | | |
| 03_UNIV | 5-29-19 | X | X | X | X | X | |
| 9B_ADOLF | 5-29-19 | X | X | | X | X | |
| 9BD_ADOLF | 5-29-19 | X | | X | | X | X |
| 05D_SANT_VCWPD | 5-29-19 | X | | X | X | X | X |
| 05_CENTR | 5-29-19 | X | | | X | | |
| 04D_SPRINGVILLE | 5-29-19 | X | | X | | X | X |
| 04D_WOOD | 5-29-19 | X | | X | X | X | X |
| 04_WOOD | 5-29-19 | X | X | X | X | X | |
| 01T_ODD2_DCH | 5-29-19 | X | | X | X | X | |
| 07_HITCH | 5-29-19 | X | X | | X | X | |
| 07D_MPK | 5-29-19 | X | | | | X | X |
| 07D_SIM_BUS | 5-28-19 | X | | | | X | X |
| 13_SB_HILL | 5-28-19 | X | | | | X | X |
| 10_GATE | 5-29-19 | X | X | | | X | |
| 13_BELT | 5-29-19 | X | X | | | X | |

SITES NOT SAMPLED

| Site ID | Reason for Omission |
|-------------------|----------------------------------|
| 02D_BROOM | Site was dry 5-29-19 |
| 06T_FC_BR | Site was dry 5-28-19 |
| 06_UPLAND | Site was dry 5-28-19 |
| 07D_HITCH_LEVEE_2 | Site was dry 5-29-19 |
| 9BD_GERRY | Site was dry 5-28-19 and 5-29-19 |

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 | <p>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.</p> <p>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>.</p> |
| 07D_MPK | Intermediate container (Ziploc bag) used to fill sample bottles. |
| 9BD_ADOLF | Intermediate container (Ziploc bag) used to fill sample bottles. |

FOLLOW UP ACTION

- In the case of 05D_SANT_VCWPD that was sampled downstream of paused channel work, field crews have been instructed to sample upstream of in-stream disturbances such as this for future sampling events.

ADDITIONAL COMMENTS

- Both teams used digital field logs.
- 01_RR_BR was sampled at low tide which was 1.0 ft. tidal stage
- 02_PCH was sampled near 1.2 ft. rising tidal stage at Point Mugu.
- 05_CENTR construction drainage hose was downstream of sampling site. It was not operating at sample time but hoses were positioned to drain agriculture ditch above site.
- 07D_MPK was dry on 5-28-19 but had minimal flow and was sampled on 5-29-19.
- 04_SPRINGVILLE flow was collected by meter with limited success so it was also measured by capturing the flow.

Field meter calibration notes:

Team 1 (13_BELT, 10_GATE, 07_HITCH, 07D_HITCH_LEVEE_2, 9B_ADOLF, 9BD_ADOLF, 07D_SIM_BUS, 13_SB_HILL, 06T_FC_BR) field meter #3760 passed all parameters for the pre and post calibrations.

Team 2 (01_RR_BR, 02_PCH, 03_UNIV, 05D_SANT_VCWPD, 05_CENTR, 04D_WOOD, 04_WOOD, 01T_ODD2_DCH, and 04D_SPRINGVILLE) field meter #4547 passed all parameters for pre and post calibration.

Prepared by: Greg Cotten 06/26/2019

Reviewed by: Amy Howk 06/26/2019

Approved by: Michael Marson 08/06/2019

Calleguas Creek Watershed TMDL Monitoring Program

Post Event Summary

Event 73: Tissue Sampling

Sampling Crews: ICF International (ICF)
Crew: Joel Mulder (ICF), Sarah Horwath (ICF)

Sampling Dates: Receiving water sites on April 8th, 2019
 Followup fishing day: August 13th, 2019

Sampling Type: Yearly Fish Tissue Chemistry

SITES SAMPLED

| Site ID | Sample Date | Constituents | | | |
|-----------|-------------|---------------------------------------|-----------------------------------|------------------------------|------------------------|
| | | General Parameters (Lipids, % solids) | Metals (Methyl Mercury, Selenium) | OP Pesticides (Chlorpyrifos) | PCBs and OC Pesticides |
| 03_UNIV | | | | | |
| 9B_ADOLF | 04-08-19 | X | | | X |
| 04_WOOD | 04-08-19 | X | X | X | X |
| 07_HITCH | | | | | |
| 07_TIERRA | 08-13-19 | X | | | X |
| 9B_BARON | | | | | |

SITES NOT SAMPLED

| Site ID | Reason for Omission |
|-----------|---|
| 07_TIERRA | Site was visited, but could not see any fish. |
| 9B_BARON | Site was visited, but could not see any fish. |
| 03_UNIV | Site was visited, but could not catch fish. |

DEVIATIONS FROM QAPP

| Site ID | Deviation |
|---------|-----------|
| | |
| | |

FOLLOW UP ACTIONS

No goldfish were caught at any site. A second day of fishing might be required later.

Goldfish were spotted at the drop structure at TIERRA on August 6th and 8th, so a second day was scheduled for August 13th and the team went there and caught all the goldfish there was.

ADDITIONAL COMMENTS

Prepared by: Michael Marson, LWA

Date: August 28, 2019

Appendix B. Rating Curves and EC/Salt Relationships for Salts TMDL Compliance Sites for the July 2018-June 2019 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 $Q = c * (Lvl + a + S)^b$ 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 2018-June 2019 monitoring year are provided in Table 1.

Table 1. Rating Curves for Salts TMDL Compliance Sites for Monitoring Year July 2018-June 2019

| Site | Rating Curve |
|---------------|--|
| 03_UNIV | $Q = 0.45 * (Lvl - 29.42 + S)^{1.92}$ |
| 04_WOOD | $Q = 0.020 * (Lvl - 22.00 + S)^{1.7}$ |
| 07_TIERRA [a] | $Q = 0.0270 * (Lvl - 20 + S)^{1.8} + 0.012 * (Lvl - 40 + S)^{2.3}$ |
| 9A_HOWAR | $Q = 0.0043 * (Lvl - 5.1 + S)^{2.2}$ |
| 9B_BARON | $Q = 0.0102 * (Lvl + 11 + S)^{2.10}$ |

[a] Starting in the 2016/2017 monitoring year, a compound rating has been used for 07_TIERRA that includes a second term that applies to stage heights above Lvl=40 cm 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.

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

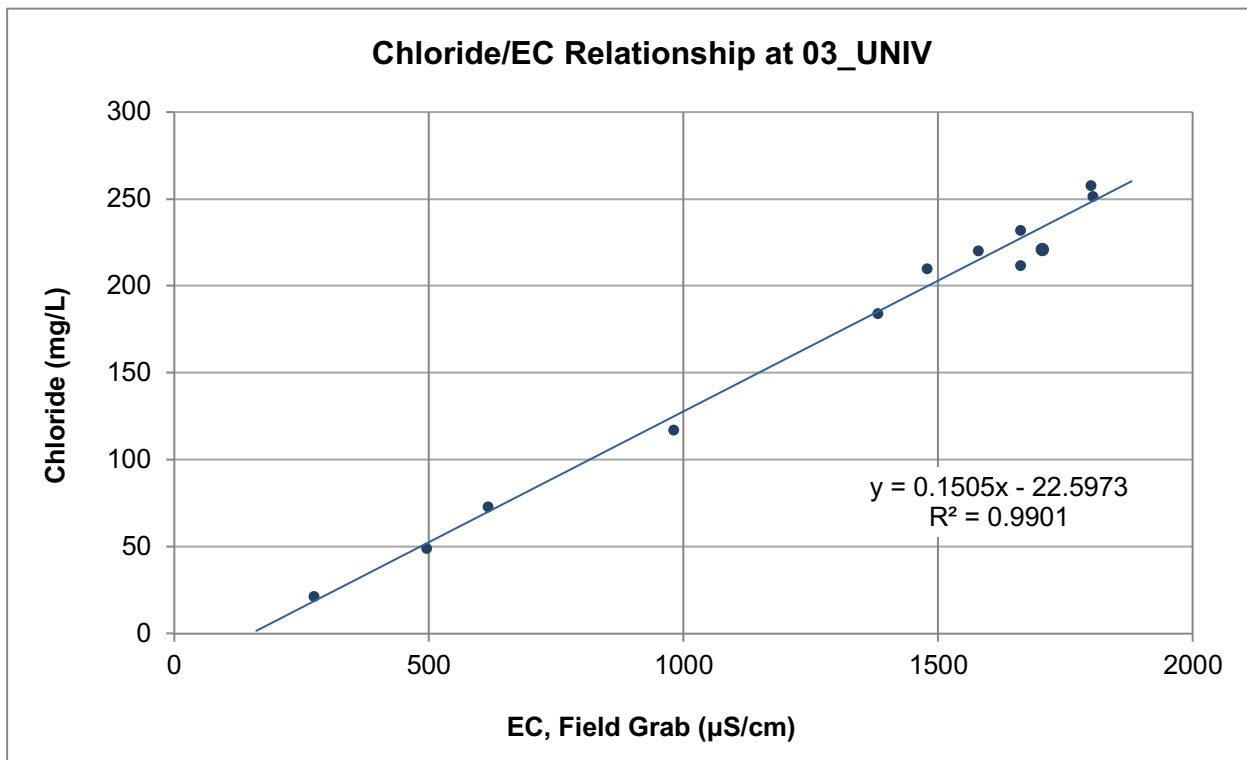
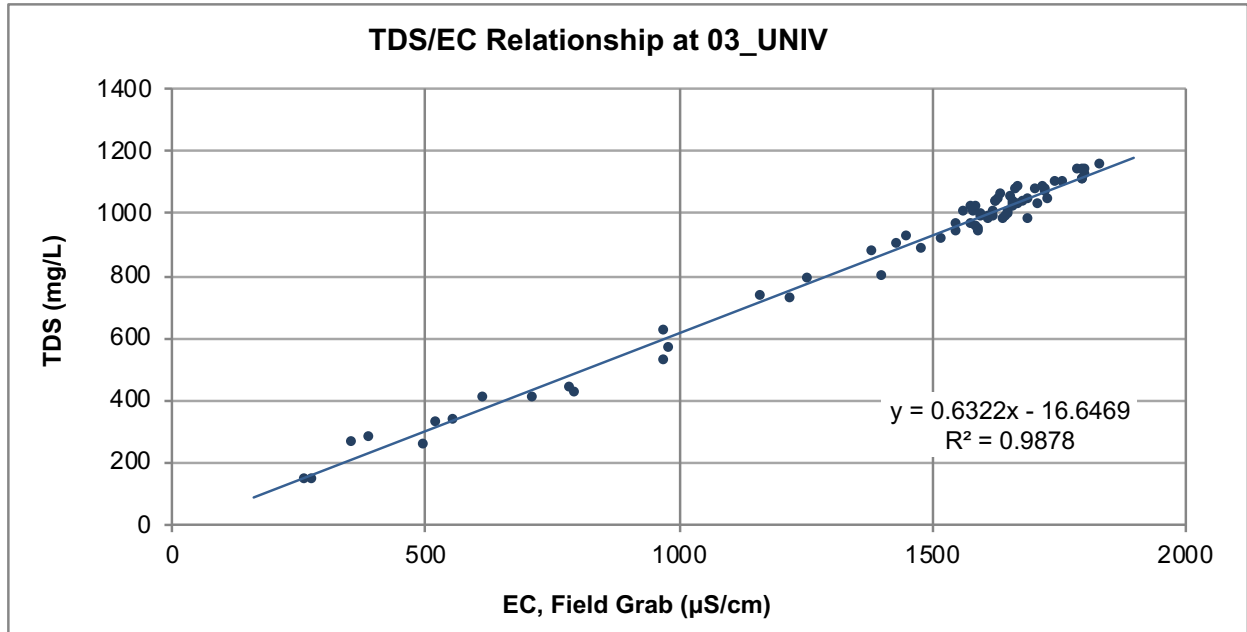
EC = specific conductivity ($\mu\text{S}/\text{cm}$)

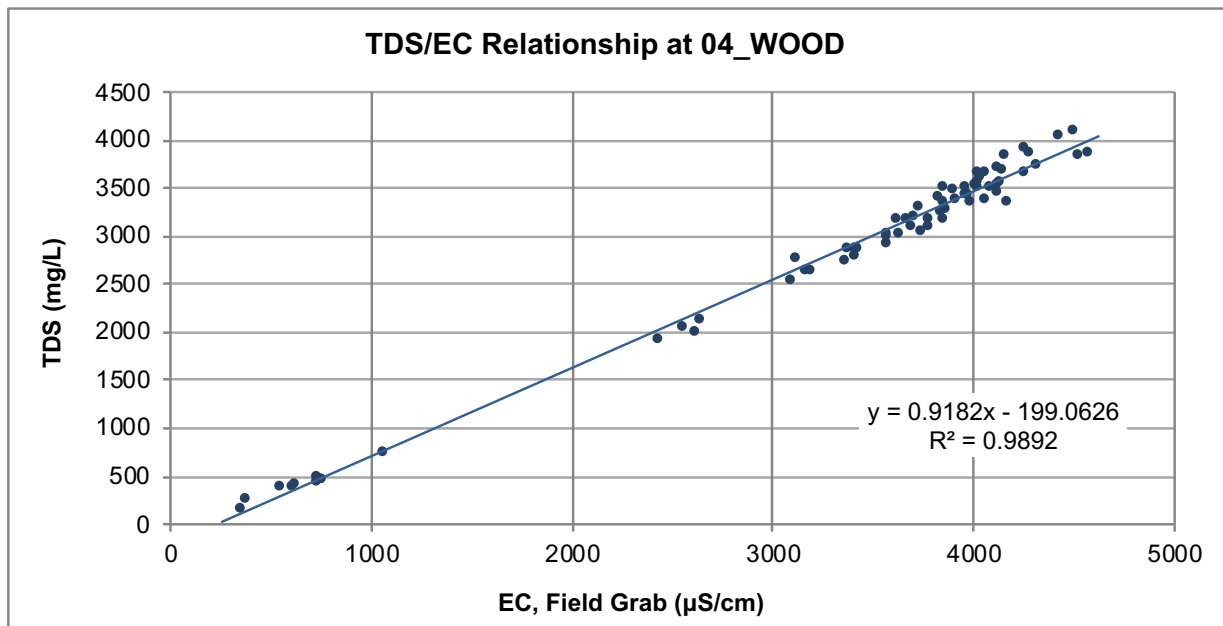
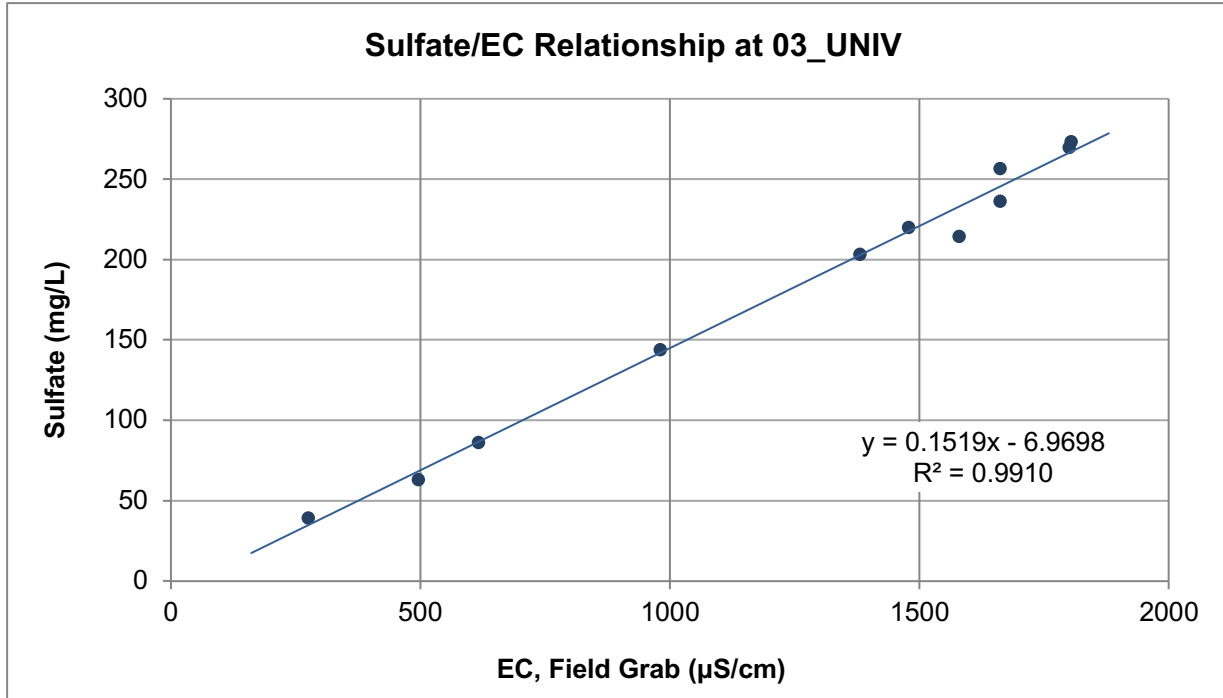
B = y intercept

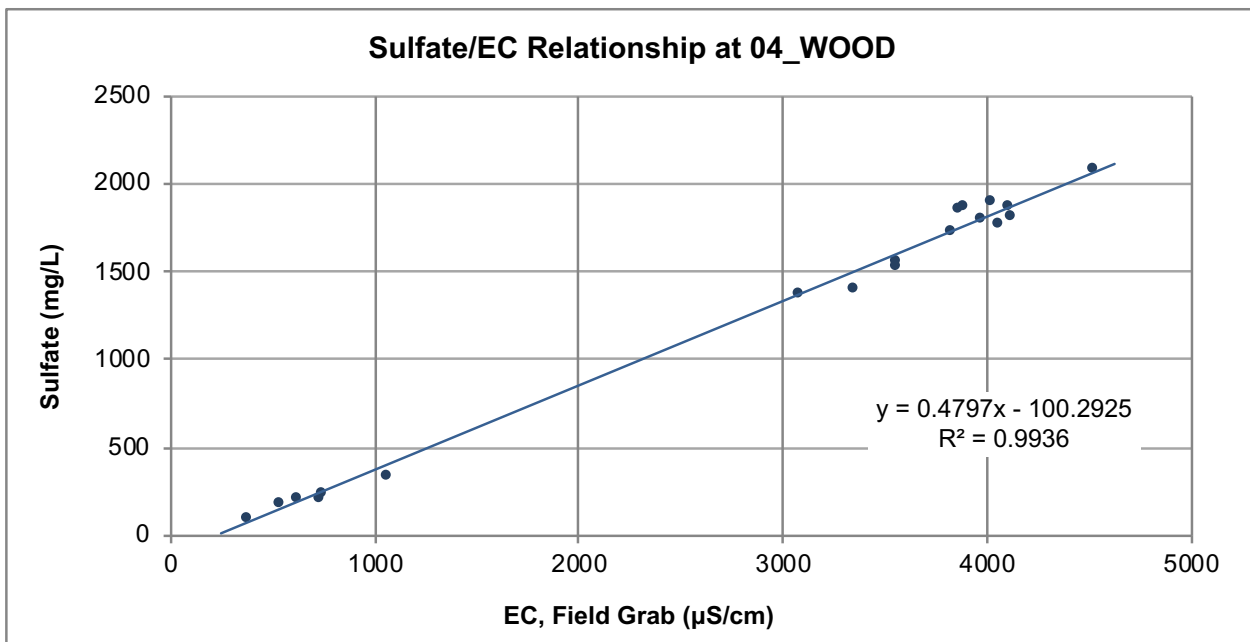
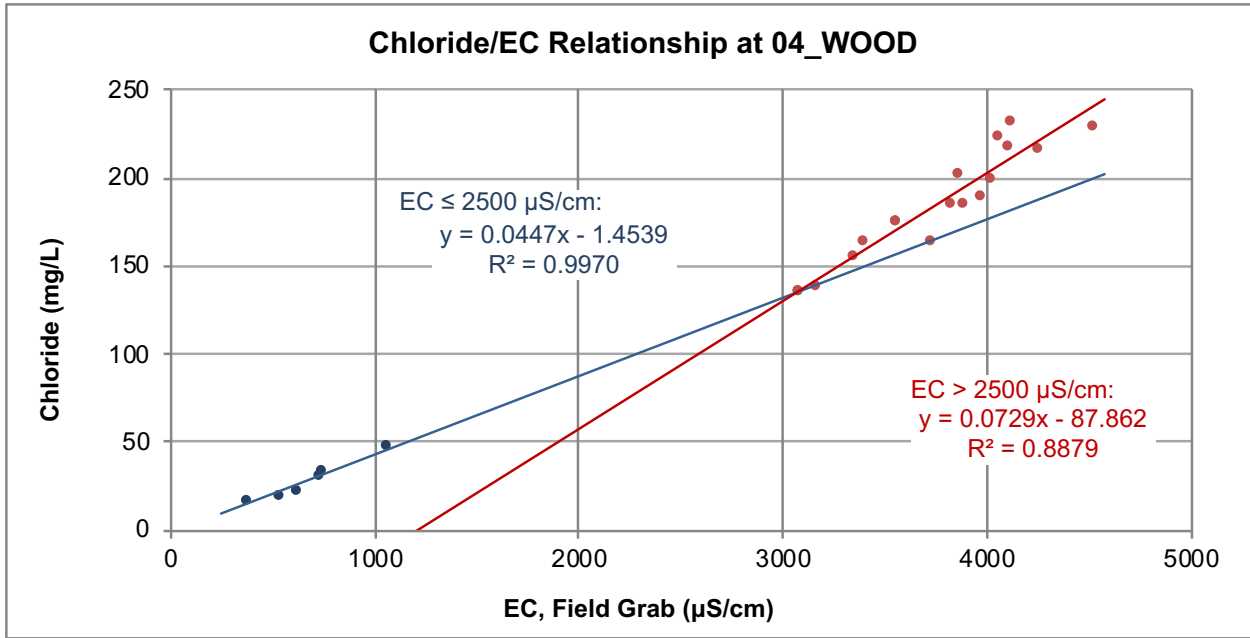
At the conclusion of the 2018/2019 monitoring year, surrogate relationships were evaluated and updated in cases where merited by new data. Surrogate relationships used to process the 2018/2019 EC sensor data are reported in **Table 2** and illustrated in figures following the table.

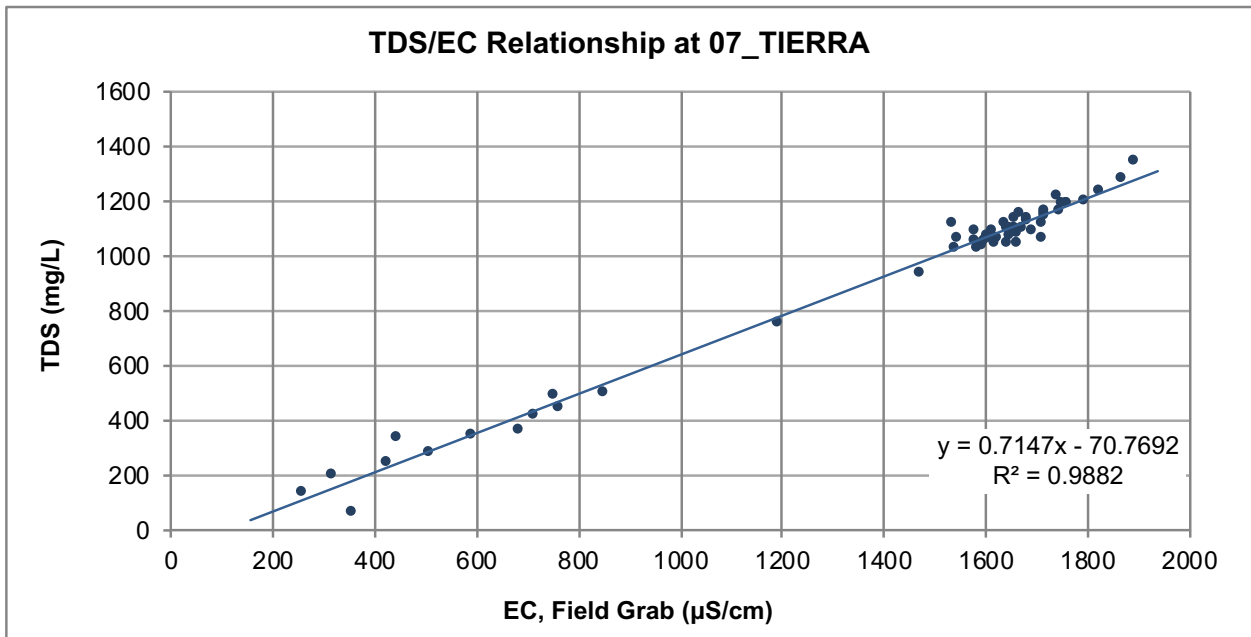
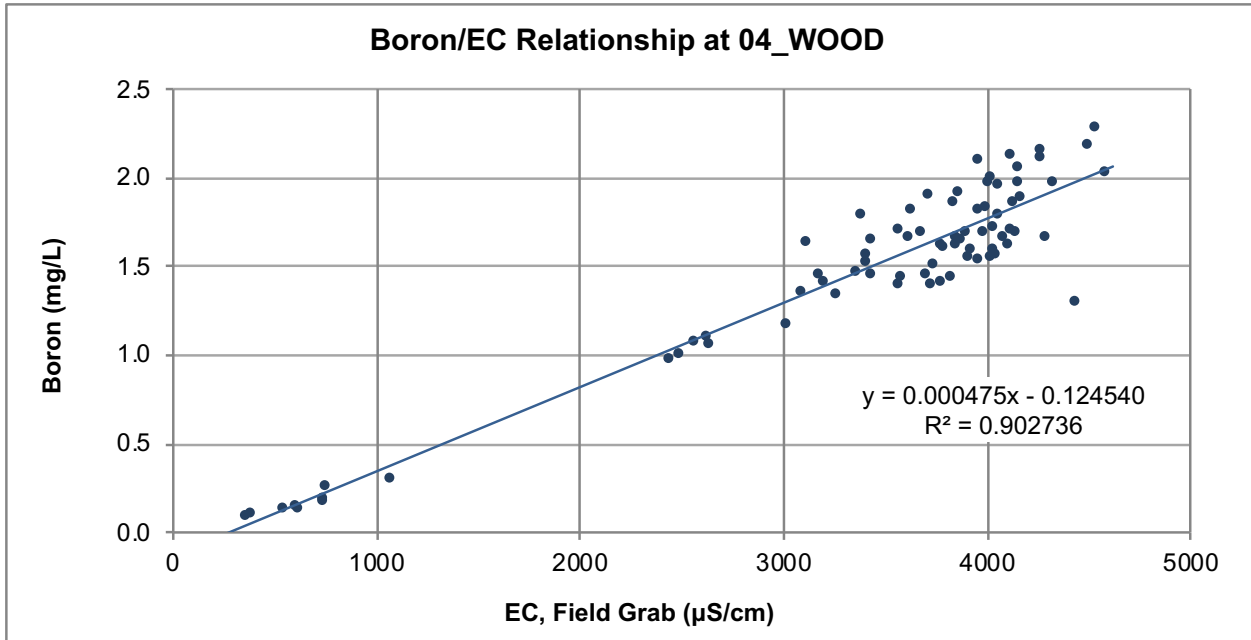
Table 2. Surrogate Relationships Used to Convert EC to Salt Concentrations for the 2017/2018 Monitoring Year

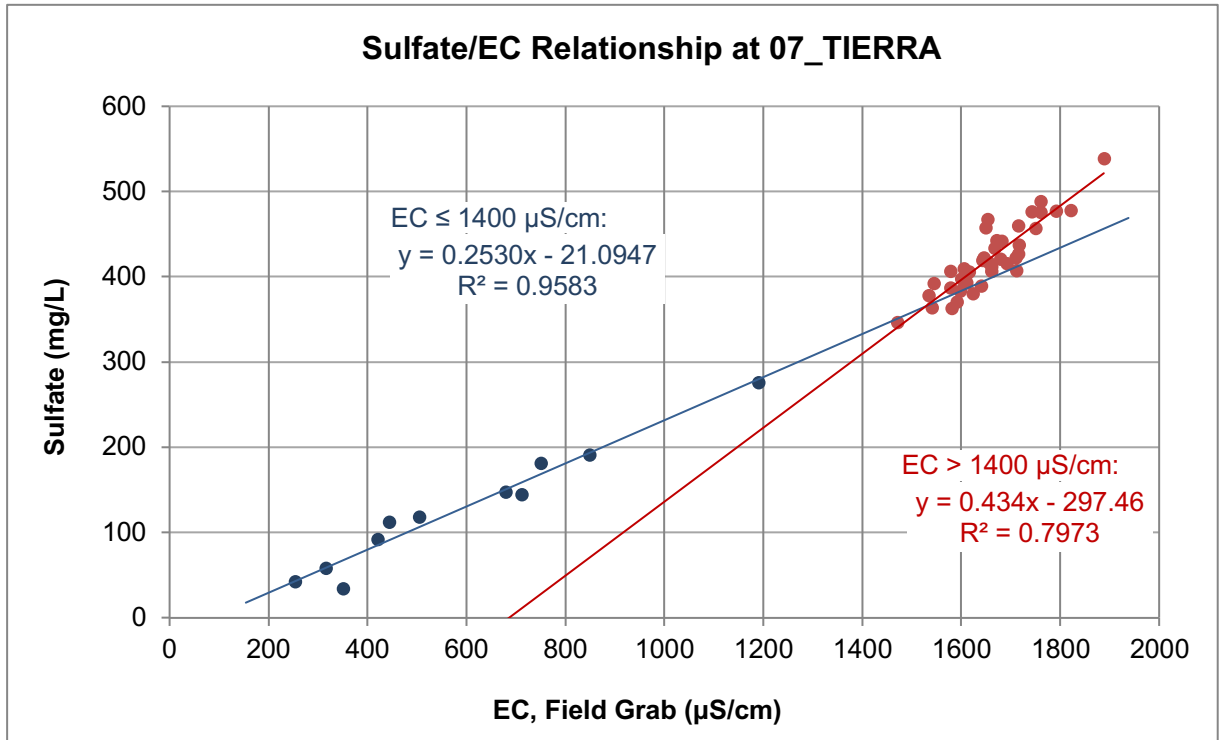
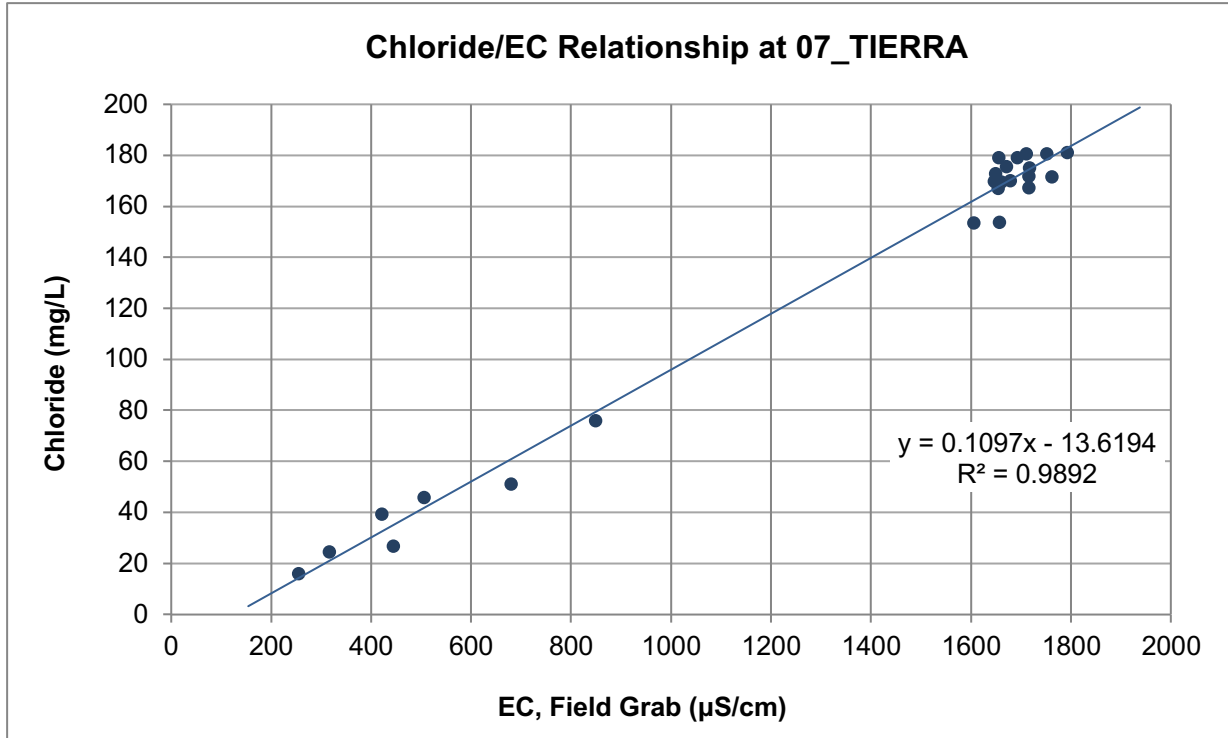
| Site | Proxy Relationship | r ² | Underlying Field Data | |
|-----------|--|----------------|-----------------------|----------------------|
| | | | Sample Size | Date Range |
| 03_UNIV | TDS = (0.6322 * EC) – 16.6469 | 0.9878 | 72 | 1/31/2011 – 5/8/2019 |
| | Cl = (0.1505 * EC) – 22.5973 | 0.9901 | 12 | 8/25/2016 - 5/7/2018 |
| | SO4 = (0.1519 * EC) – 6.9698 | 0.9910 | 11 | 8/25/2016 - 5/7/2018 |
| 04_WOOD | TDS = (0.9182 * EC) – 199.0626 | 0.9892 | 70 | 1/31/2011 – 5/8/2019 |
| | High Conductivity (>2500 µS/cm): Cl = (0.0729 * EC) – 87.8625 | 0.8879 | 17 | 5/23/2013 - 5/7/2018 |
| | Low Conductivity (≤2500 µS/cm): Cl = (0.0447 * EC) – 1.4539 | 0.9970 | 7 | 5/23/2013 - 5/7/2018 |
| | SO4 = (0.4797 * EC) – 100.2925 | 0.9936 | 19 | 2/28/2014 - 5/7/2018 |
| | B = (0.000475 * EC) - 0.1245 | 0.9027 | 78 | 1/31/2011 – 5/8/2019 |
| 07_TIERRA | TDS = (0.7147 * EC) – 70.7692 | 0.9882 | 58 | 1/31/2011 – 5/8/2019 |
| | Cl = (0.1097 * EC) – 13.6194 | 0.9892 | 24 | 2/28/2014 - 5/7/2018 |
| | High Conductivity (>1400 µS/cm): SO4 = (0.4340 * EC) – 297.4593 | 0.7973 | 40 | 1/31/2011 – 5/7/2018 |
| | Low Conductivity (≤1400 µS/cm): SO4 = (0.2530 * EC) – 21.0947 | 0.9583 | 11 | 1/31/2011 – 5/7/2018 |
| | B = (0.000427 * EC) - 0.0607 | 0.9550 | 46 | 8/28/12 - 6/26/2019 |
| 9A_HOWAR | TDS = (0.6232 * EC) – 18.9374 | 0.9886 | 61 | 1/31/2011 – 5/8/2019 |
| | Cl = (0.1544 * EC) – 21.4908 | 0.9712 | 12 | 8/25/2016 - 5/7/2018 |
| | SO4 = (0.1637 * EC) – 23.6693 | 0.9723 | 11 | 8/25/2016 - 5/7/2018 |
| 9B_BARON | TDS = (0.6141 * EC) – 21.5706 | 0.9794 | 61 | 1/31/2011 – 5/8/2019 |
| | Cl = (0.1634 * EC) – 25.8230 | 0.9846 | 12 | 8/25/2016 - 5/7/2018 |
| | High Conductivity (>1000 µS/cm): SO4 = (0.2812 * EC) -168.0055 | 0.8039 | 40 | 3/20/2011 - 5/7/2018 |
| | Low Conductivity (≤1000 µS/cm): SO4 = (0.1367 * EC) – 2.5933 | 0.9793 | 10 | 3/20/2011 - 5/7/2018 |

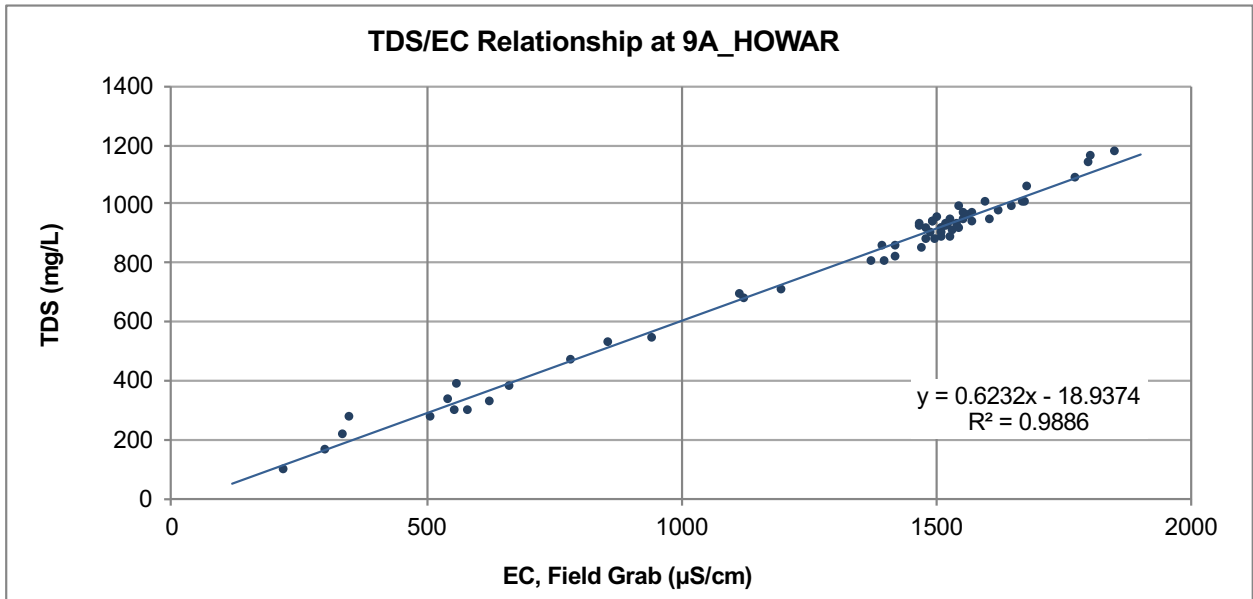
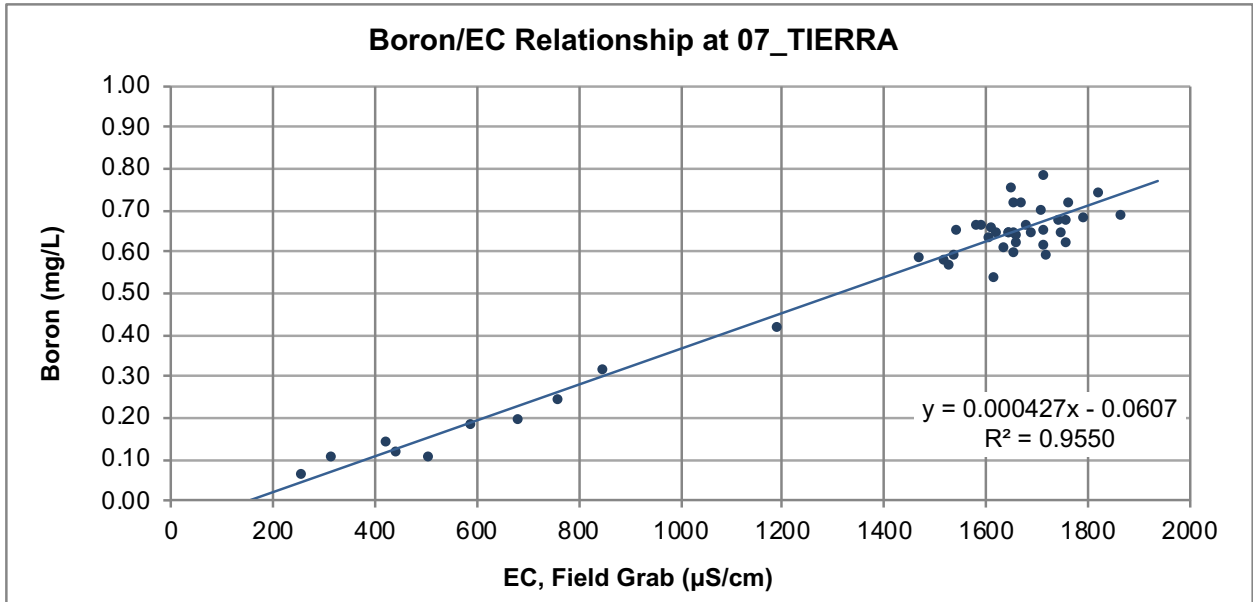


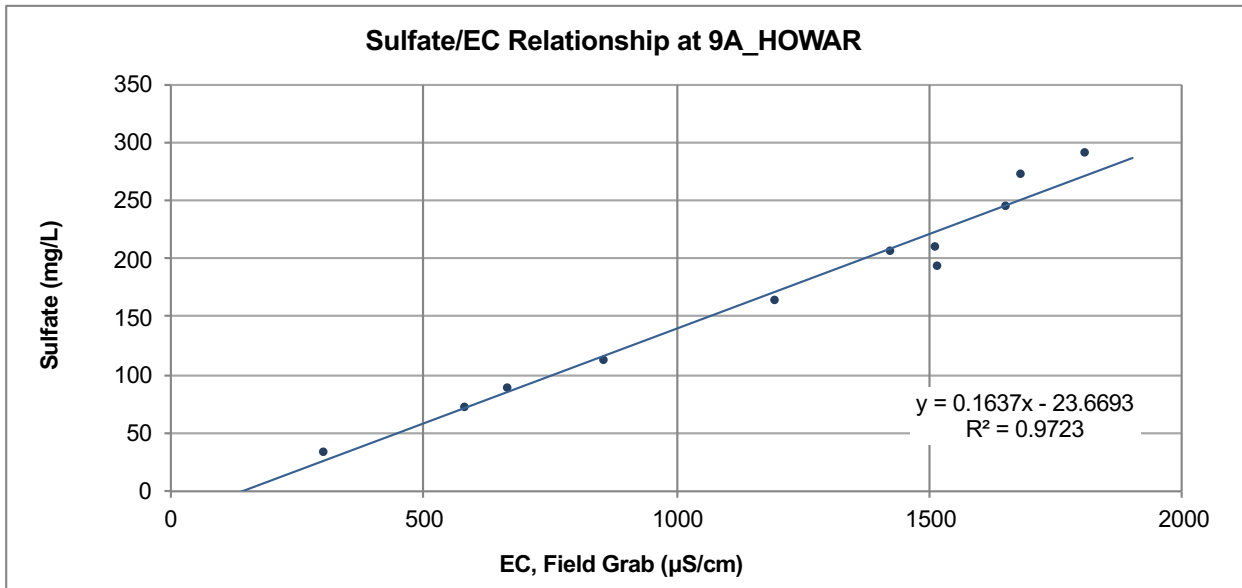
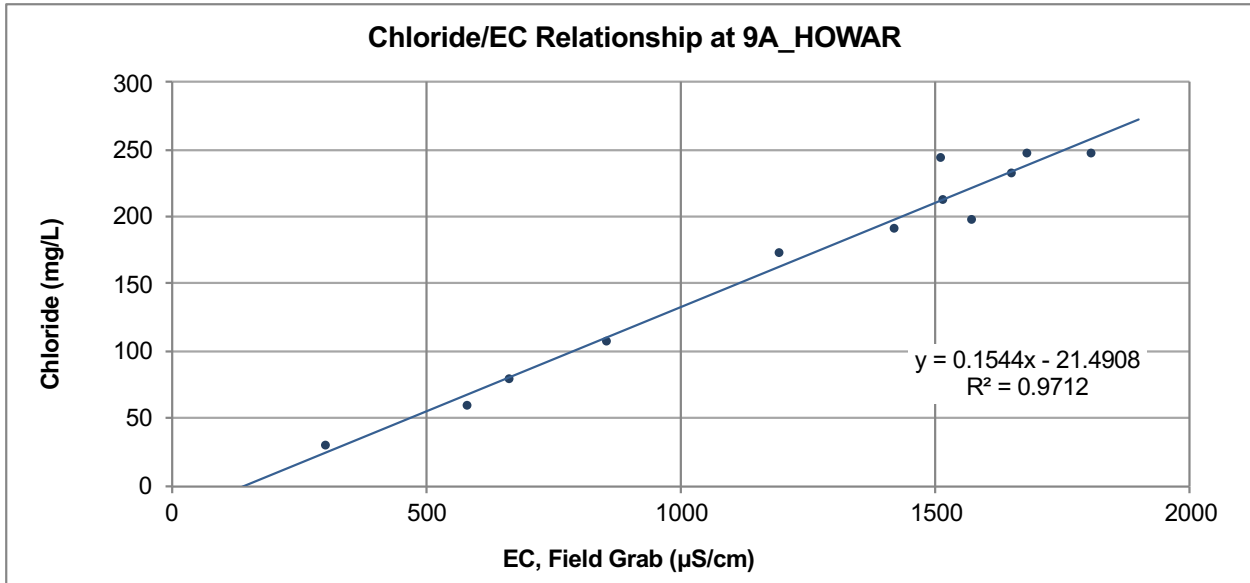


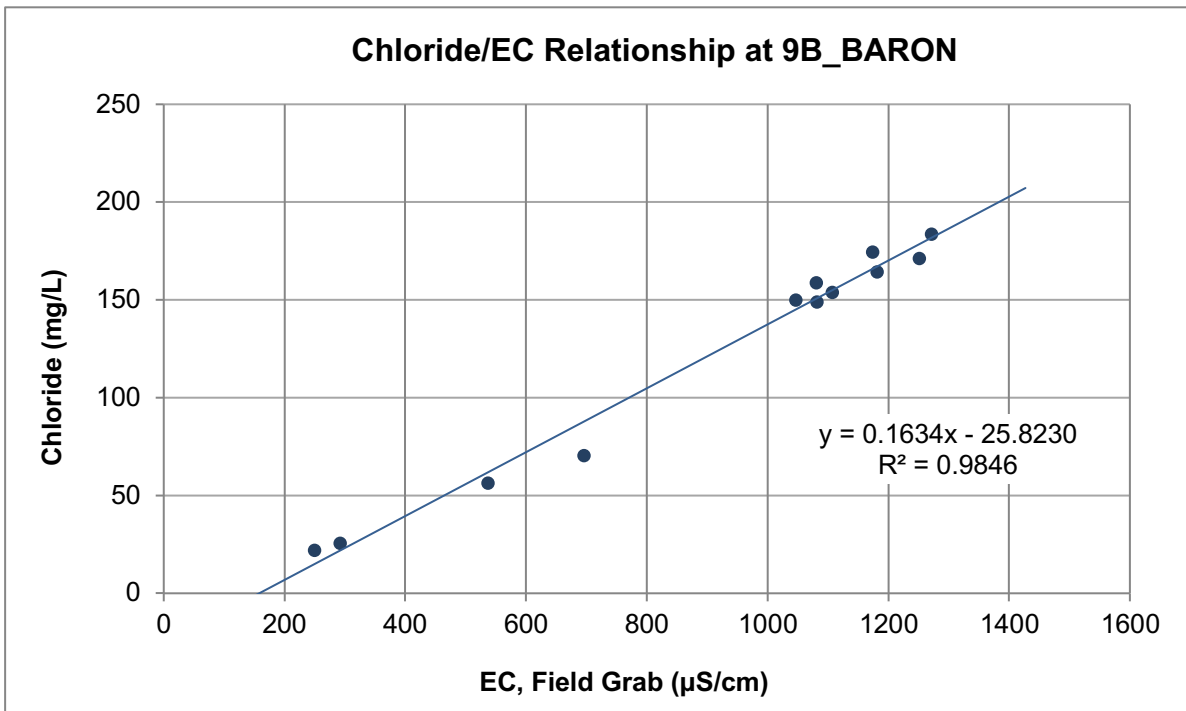
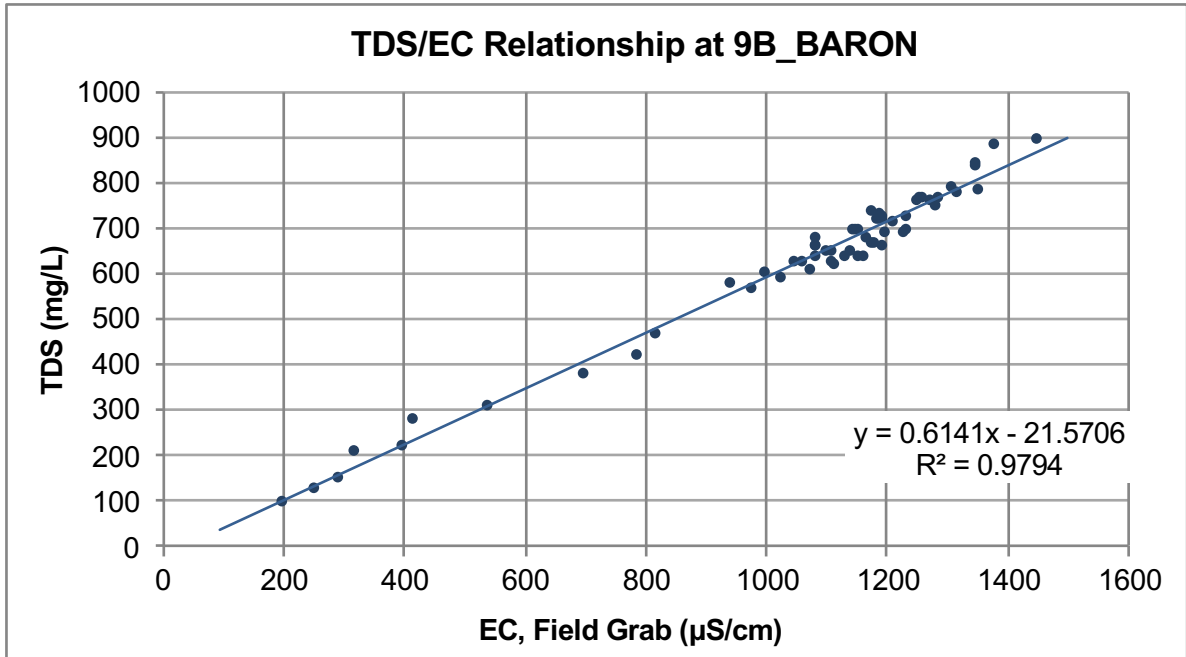


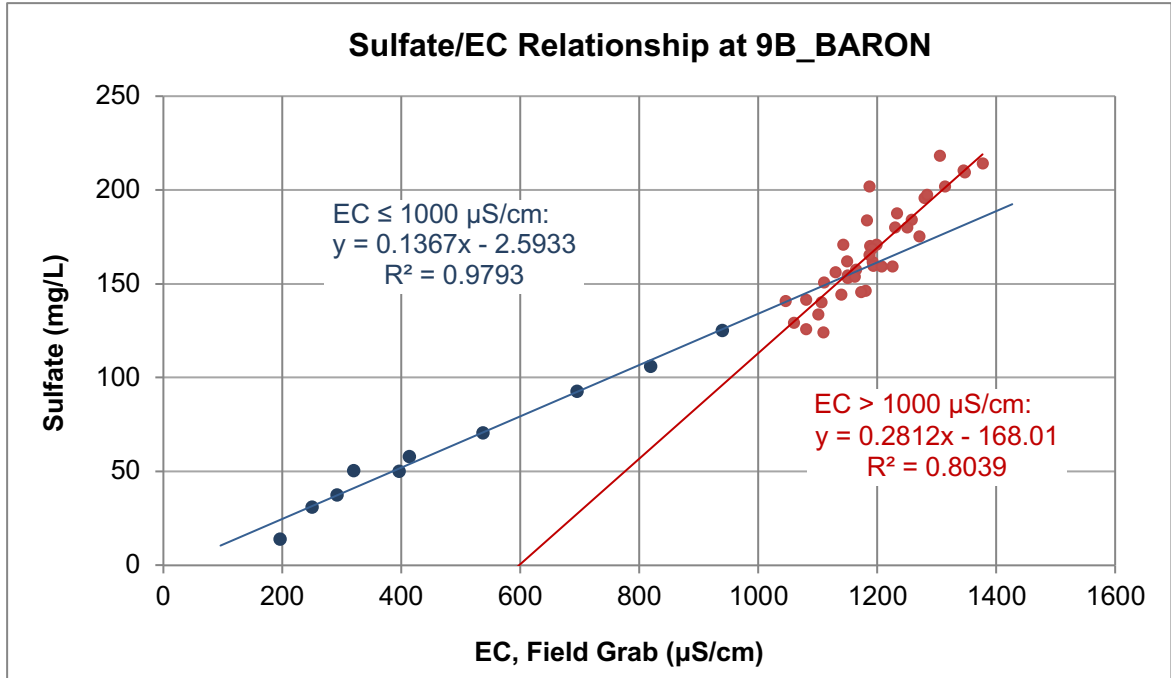












Appendix C:

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 fresh water aquatic toxicity testing and *Hyalella azteca* for the saline 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)
 - 03_UNIV
 - 04_WOOD
 - 9A_HOWAR (Toxicity Investigation site)
- **Freshwater Water Column Toxicity Sites**
 - 04_WOOD
 - 03_UNIV
 - 9B_ADOLF
 - 06_UPLAND
 - 07_HITCH
 - 10_GATE (Toxicity Investigation site)

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.

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.

- 13_BELT (Toxicity Investigation site)

Sediment toxicity samples were collected during dry weather event 68. Water column toxicity testing was conducted during all four dry weather events (Events 68, 69, 72, and 73), and the wet weather events (Events 70 and 71). 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 68 Sediment Toxicity

Table 1. Freshwater Sediment Toxicity Event 68 - *Hyaella azteca*

| Site ID | <i>Hyaella azteca</i> | | |
|----------|-----------------------|--------|------|
| | Survival | Growth | TIE? |
| 02_PCH | No | No | No |
| 03_UNIV | No | No | No |
| 04_WOOD | No | Yes | No |
| 9A_HOWAR | No | No | No |

Event 68 Water Column Toxicity

Table 2. Freshwater Water Column Toxicity Event 68 - *Ceriodaphnia dubia* and *Hyalella azteca*

| Site ID | <i>Ceriodaphnia dubia</i> | | | <i>Hyalella azteca</i> | |
|----------|---------------------------|--------------|------|------------------------|------|
| | 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 | No | No | | |
| 13_BELT | No | No | No | | |

Event 68 Toxicity and TIE Summary

- Freshwater sediment sites exhibited reduced reproduction at 04_WOOD. However, no significant reduction in survival was observed at any site.
- No significant reductions in survival or reproduction were observed for *Ceriodaphnia dubia* at the five freshwater sample sites during the sampling event.
- There were no significant reductions in survival or reproduction of *Hyalella Azteca* in any of the Calleguas Creek ambient waters.
- No TIEs were performed on samples collected at any other site for this sampling event.

Event 69 Water Quality Toxicity

Table 3. Water Quality Toxicity Event 69 - *Ceriodaphnia dubia* and *Hyalella azteca*

| Site ID | <i>Ceriodaphnia dubia</i> | | | <i>Hyalella azteca</i> | |
|----------|---------------------------|--------------|------|------------------------|------|
| | Survival | Reproduction | TIE? | Survival | TIE? |
| 03_UNIV | No | Yes | No | | |
| 04_WOOD | | | | No | No |
| 07_HITCH | No | Yes | No | | |
| 9B_ADOLF | No | Yes | No | | |
| 13_BELT | No | No | No | | |
| 10_GATE | No | Yes | No | | |

Event 69 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 03_UNIV, 07_HITCH, 9B_ADOLF, 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 70 Water Quality Toxicity

Table 4. Water Quality Toxicity Event 70 - *Ceriodaphnia dubia* and *Hyalella azteca*

| Site ID | <i>Ceriodaphnia dubia</i> | | |
|-----------|---------------------------|--------------|-----------------|
| | Survival | Reproduction | TIE? |
| 03_UNIV | No | No | No |
| 04_WOOD | Yes | Yes | No ¹ |
| 06_UPLAND | No | No | No |
| 07_HITCH | No | No | No |
| 9B_ADOLF | No | No | No |
| 10_GATE | No | No | No |
| 13_BELT | No | No | No |

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 70 Toxicity and TIE Summary

- No significant reductions in survival or reproduction were observed for *Ceriodaphnia dubia* at six freshwater sample sites during the sampling event.
- Significant reductions in survival and reproduction were observed for *Ceriodaphnia dubia* at the 04_WOOD site.
- 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 at any other site for this sampling event.

Event 71 Water Quality Toxicity

Table 5. Water Quality Toxicity Event 71 - *Ceriodaphnia dubia*

| Site ID | <i>Ceriodaphnia dubia</i> | | |
|-----------|---------------------------|--------------|------|
| | Survival | Reproduction | TIE? |
| 03_UNIV | No | No | No |
| 04_WOOD | No | No | No |
| 07_HITCH | No | No | No |
| 9B_ADOLF | No | No | No |
| 06_UPLAND | No | Yes | No |
| 10_GATE | No | No | No |
| 13_BELT | No | No | No |

Event 71 Toxicity and TIE Summary

- No significant reductions in survival were observed for *Ceriodaphnia dubia* at the seven freshwater sample sites during the sampling event.
- There was a significant reduction in reproduction observed for *Ceriodaphnia dubia* at the 06_UPLAND site.
- No TIEs were performed on samples collected at the remaining sites for this sampling event.

Event 72 Water Quality Toxicity

Table 6. Water Quality Toxicity Event 72 - *Ceriodaphnia dubia*

| Site ID | <i>Ceriodaphnia dubia</i> | | |
|----------|---------------------------|--------------|------|
| | Survival | Reproduction | TIE? |
| 03_UNIV | No | No | No |
| 04_WOOD | No | No | No |
| 07_HITCH | No | No | No |
| 9B_ADOLF | No | No | No |
| 10_GATE | No | No | No |
| 13_BELT | No | No | No |

Event 72 Toxicity and TIE Summary

- No significant reductions in survival or significant reductions in reproduction were observed for *Ceriodaphnia dubia* at all sites.
- No TIEs were performed on samples collected for this sampling event.

Event 73 Water Quality Toxicity

Table 7. Water Quality Toxicity Event 73 - *Ceriodaphnia dubia* and *Hyalella azteca*

| Site ID | <i>Ceriodaphnia dubia</i> | | | <i>Hyalella azteca</i> | |
|----------|---------------------------|--------------|------|------------------------|-----------------|
| | Survival | Reproduction | TIE? | Survival | TIE? |
| 03_UNIV | No | No | No | | |
| 04_WOOD | | | | Yes | No ¹ |
| 07_HITCH | No | No | No | | |
| 9B_ADOLF | No | No | No | | |
| 10_GATE | No | No | No | | |
| 13_BELT | No | Yes | No | | |

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 73 Toxicity and TIE Summary

- No significant reductions in survival were observed for *Ceriodaphnia dubia* at all five freshwater sites.
- Significant reproduction toxicity for *Ceriodaphnia dubia* was observed at 13_BELT.
- Significant reductions in survival were observed for *Hyalella azteca* at 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.
- 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 (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 2018-2019 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 eleventh 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 the metal's suite or with Ammonia. There was one Total Kjeldahl Nitrogen (TKN) and one Malathion field blank detection. 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 were no equipment blank (EB) failures. Of the 11 laboratory blank failures, four were from general water quality parameters (Electrical Conductivity and Total Dissolved Solids), four were from dissolved metals, and the remainder occurred in pyrethroids samples. Even though the detections were above the MDL value, most were below the RL level and 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 – 1871 analyzed – 33 detections above the MDL (1.76%) (does not include lab duplicates or surrogates)
- Equipment Blanks – 151 analyzed – 0 detections above the MDL (0.00%) (does not include lab duplicates or surrogates)
- Laboratory Blanks – 3432 analyzed – 11 detections above the MDL (0.32%) (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:

$$RPD = 2 * |O_i - D_i| / (O_i + D_i) * 100$$

Where:

RPD = Relative Percent Difference

O_i = value of compound i in original sample

D_i = 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 – 2034 analyzed – 68 failed RPD (3.34%) (does not include surrogates)
- Laboratory Duplicates – 928 analyzed – 18 failed RPD (1.94%) (includes surrogates)
- Blank Spike/LCS Duplicates – 3006 analyzed – 8 failed RPD (0.27%) (includes surrogates)
- Matrix Spike Duplicates – 703 analyzed – 17 failed RPD (2.42%) (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:

$$\%R = 100 * [(C_s - C) / S]$$

Where:

%R = Percent Recovery

C_s = 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 three blank spike samples that fell outside the acceptable range were for Merphos, Dichlorvos, and PCB 153. Of the matrix spike samples that fell outside the acceptable range, they were from all three matrixes; 34 from water (most from within the metals suite), 36 from sediment (all but one from within the pesticides group), and 21 from tissue (a third from Methyl Mercury, and the rest from 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 – 5982 Analyzed – 3 fell outside the range (0.05%) (does not include surrogates)
- Matrix Spike Samples – 1370 Analyzed – 91 fell outside the range (6.64%) (does not include surrogates)

Table 1. Blank Contamination Observed

| Constituent | Matrix | Event Number | Lab Batch | Equip Blank | Field Blank | Lab Blank | Program Qualifier |
|------------------------------------|--------|--------------|----------------------------|-------------|-------------|-----------|-------------------|
| General Water Quality | | | | | | | |
| Electrical Conductivity (umhos/cm) | Water | 69 | 2P1813356-B | | | 0.2 | DNQ |
| Total Dissolved Solids (mg/L) | Water | 69 | 2P1813383-A | | | 7.8431 | DNQ |
| Total Dissolved Solids (mg/L) | Water | 69 | 2P1813495-B | | | 10.784 | DNQ |
| Nutrients | | | | | | | |
| Ammonia as N (mg/L) | Water | 71 | Physis C-39093 W | | 0.0207 | | DNQ |
| Ammonia as N (mg/L) | Water | 72 | Physis C-39106 W | | 0.0755 | | |
| Ammonia as N (mg/L) | Water | 73 | Physis C-39129 W | | 0.024 | | DNQ |
| Total Kjeldahl Nitrogen (mg/L) | Water | 68 | Associated_QC1194405_W_CON | | 0.244 | | DNQ |
| Metals & Selenium | | | | | | | |
| Aluminum, Dissolved (ug/L) | Water | 68 | Physis E-16095 W | | 85.2 | | |
| Aluminum, Dissolved (ug/L) | Water | 73 | Physis E-17064 W | | 10.8 | | |
| Aluminum, Total (ug/L) | Water | 73 | Physis E-17064 W | | 21 | | |
| Antimony, Dissolved (ug/L) | Water | 68 | Physis E-16095 W | | 0.254 | | |
| Arsenic, Dissolved (ug/L) | Water | 68 | Physis E-16095 W | | 0.0947 | | DNQ |
| Barium, Dissolved (ug/L) | Water | 68 | Physis E-16095 W | | 1.57 | | |
| Barium, Dissolved (ug/L) | Water | 73 | Physis E-17064 W | | 4.62 | | |
| Barium, Total (ug/L) | Water | 73 | Physis E-17064 W | | 5.29 | | |
| Chromium, Dissolved (ug/L) | Water | 68 | Physis E-16095 W | | 1.32 | | |
| Cobalt, Dissolved (ug/L) | Water | 68 | Physis E-16095 W | | 0.0548 | | |
| Copper, Dissolved (ug/L) | Water | 68 | Physis E-16095 W | | 0.533 | | |
| Copper, Dissolved (ug/l) | Water | 69 | W8K0942 | | | 0.34 | DNQ |
| Iron, Dissolved (ug/L) | Water | 68 | Physis E-16095 W | | 84.6 | | |
| Iron, Total (ug/L) | Water | 73 | Physis E-17064 W | | 1.39 | | DNQ |
| Lead, Dissolved (ug/L) | Water | 68 | Physis E-16095 W | | 0.233 | | |

| Constituent | Matrix | Event Number | Lab Batch | Equip Blank | Field Blank | Lab Blank | Program Qualifier |
|------------------------------|--------|--------------|------------------|-------------|-------------|-----------|-------------------|
| Manganese, Dissolved (ug/L) | Water | 68 | Physis E-16095 W | | 0.489 | | |
| Nickel, Dissolved (ug/L) | Water | 68 | Physis E-16095 W | | 0.0653 | | |
| Nickel, Dissolved (ug/l) | Water | 69 | W8K0942 | | | 0.22 | DNQ |
| Nickel, Dissolved (ug/l) | Water | 73 | W9E0694 | | | 0.05 | DNQ |
| Selenium, Dissolved (ug/L) | Water | 68 | Physis E-16095 W | | 0.0222 | | DNQ |
| Strontium, Dissolved (ug/L) | Water | 68 | Physis E-16095 W | | 1.78 | | |
| Tin, Dissolved (ug/L) | Water | 68 | Physis E-16095 W | | 0.12 | | DNQ |
| Tin, Dissolved (ug/L) | Water | 73 | Physis E-17064 W | | 3.55 | | |
| Tin, Total (ug/L) | Water | 73 | Physis E-17064 W | | 6.23 | | |
| Titanium, Dissolved (ug/L) | Water | 68 | Physis E-16095 W | | 4.77 | | |
| Titanium, Dissolved (ug/L) | Water | 73 | Physis E-17064 W | | 0.292 | | DNQ |
| Titanium, Total (ug/L) | Water | 73 | Physis E-17064 W | | 0.458 | | |
| Vanadium, Dissolved (ug/L) | Water | 68 | Physis E-16095 W | | 0.046 | | DNQ |
| Zinc, Dissolved (ug/L) | Water | 68 | Physis E-16095 W | | 0.472 | | |
| Zinc, Dissolved (ug/l) | Water | 69 | W8K0942 | | | 2.24 | DNQ |
| OC Pesticides | | | | | | | |
| None | | | | | | | |
| OP Pesticides | | | | | | | |
| Malathion, Total (ug/L) | Water | 69 | Physis O-20148 W | | 0.0225 | | |
| PCBs | | | | | | | |
| None | | | | | | | |
| Pyrethroid Pesticides | | | | | | | |
| Bifenthrin (ug/L) | Water | 69 | W8K0930 | | | 0.00168 | DNQ |
| Cyfluthrin (ug/L) | Water | 69 | W8K0930 | | | 0.00258 | |
| Cypermethrin (ug/L) | Water | 69 | W8K0930 | | | 0.00361 | |

Table 2. Precision QA/QC Issues

| Constituent | Matrix | Event | Lab Batch | Site | BS/ BSD RPD | Field Dup RPD | Lab Dup RPD | MS/ MSD RPD | Program Qualifier | Comments |
|---------------------------------|---------------|--------------|--------------------------------|---------------------------------|----------------------------|------------------------------|----------------------------|----------------------------|------------------------------|--|
| General Water Quality | | | | | | | | | | |
| Total Suspended Solids (mg/L) | Water | 72 | Physis C-40100 W | 07D_SIMI | | | 44 | | FD RPD | Field Duplicate RPD Failed |
| Total Suspended Solids (mg/L) | Water | 72 | Physis C-40119 W | 07_HITCH/ 07D_MPK | | 44 | 11 | | FD RPD | Field Duplicate RPD Failed |
| Nutrients | | | | | | | | | | |
| Ammonia as N (mg/L) | Water | 68 | Physis C-39028 W | 03_UNIV/ 05D_SANT_VCWP D | 7 | 47 | 1 | 19 | FD RPD | Field Duplicate RPD Failed |
| Ammonia as N (mg/L) | Water | 68 | Physis C-39028 W | 07_HITCH /05D_SANT_VCWP D | 7 | 55 | 1 | 19 | FD RPD | Field Duplicate RPD Failed |
| Ammonia as N (mg/L) | Water | 72 | Physis C-39106 W | 07_HITCH/ 9B_ADOLF | 1 | 31 | 1 | 1 | U | Estimated, constituent was found in blank at >1/10 th concentration |
| Total Kjeldahl Nitrogen (mg/L) | Water | 71 | Associated_QC12 10642_W_CON | 03_UNIV | | 185 | | 9 | FD RPD | Field Duplicate RPD Failed |
| Salts | | | | | | | | | | |
| Sulfate (mg/L) | Water | 68 | Physis C-37110 W | 9BD_ADOLF | 2 | | | 55 | EST MS/MSD | Estimate MS/MSD failed |
| Sulfate (mg/L) | Water | 68 | Physis C-37111 W | 03_UNIV | 6 | 5 | 2 | 33 | MS <LL, EST MS/MSD | MS failed Lower Limit; Estimate MS/MSD failed |
| OC Pesticides | | | | | | | | | | |
| Chlordane, alpha- (ng/dry g) | Sediment | 68 | Physis O-18104 W | 03_UNIV/ 9A_HOWAR | 5 | 13 | 33 | 3 | | |
| Chlordane, alpha-, Total (ug/L) | Water | 70 | Physis O-22004 W | 01T_ODD2_DCH | 2 | 58 | | | | |

| Constituent | Matrix | Event | Lab Batch | Site | BS/ BSD RPD | Field Dup RPD | Lab Dup RPD | MS/ MSD RPD | Program Qualifier | Comments |
|------------------------------------|----------|-------|---------------------|----------------------|-------------------|---------------------|-------------------|-------------------|----------------------|-----------------------------|
| Chlordane, alpha-, Total (ug/L) | Water | 70 | Physis O-22004 W | 10_GATE | 2 | 46 | | | | |
| Chlordane, gamma- (ng/dry g) | Sediment | 68 | Physis O-18104 W | 03_UNIV/ 9A_HOWAR | 5 | 16.4 | 58 | 0 | | |
| DDD(o,p'), Total (ug/L) | Water | 70 | Physis O-22004 W | 01T_ODD2_DCH | 3 | 51 | | | | |
| DDD(p,p') (ng/dry g) | Sediment | 68 | Physis O-18104 W | 03_UNIV/ 9A_HOWAR | 4 | 51 | 0 | 1 | | |
| DDD(p,p'), Total (ug/L) | Water | 69 | Physis O-20148 W | 01T_ODD2_DCH | 2 | 34 | | | | |
| DDE(o,p') (ng/wet g) | Tissue | 73 | Physis O-21060 W | 04_WOOD | 2 | | 32 | 1 | | |
| DDE(p,p') (ng/dry g) | Sediment | 68 | Physis O-18104 W | 03_UNIV/ 9A_HOWAR | 5 | 16 | 42 | 5 | LD RPD | Lab Duplicate RPD Failed |
| DDE(p,p') (ng/wet g) | Tissue | 73 | Physis O-21060 W | 04_WOOD | 3 | | 12 | 64 | MS >UL | MS failed Upper Limit |
| DDE(p,p'), Total (ug/L) | Water | 68 | Physis O-20062 W | 03_UNIV | 2 | 68.4 | | | | |
| DDE(p,p'), Total (ug/L) | Water | 72 | Physis O-22122 W | 07_HITCH | 4 | 55 | | | | |
| DDE(p,p'), Total (ug/L) | Water | 73 | Physis O-23034 W | 03_UNIV | 2 | 86 | | | | |
| DDT(o,p') (ng/wet g) | Tissue | 73 | Physis O-21060 W | 04_WOOD | 0 | | 74 | 1 | | |
| DDT(o,p'), Total (ug/L) | Water | 72 | Physis O-22122 W | 04_WOOD | 6 | 56 | | | | |
| DDT(p,p') (ng/wet g) | Tissue | 73 | Physis O-21060 W | 04_WOOD | 2 | | 32 | 10 | | |
| DDT(p,p'), Total (ug/L) | Water | 69 | Physis O-20148 W | 01T_ODD2_DCH | 1 | 140 | | | | |

| Constituent | Matrix | Event | Lab Batch | Site | BS/ BSD RPD | Field Dup RPD | Lab Dup RPD | MS/ MSD RPD | Program Qualifier | Comments |
|--|----------|-------|---------------------|----------------------|-------------------|---------------------|-------------------|-------------------|----------------------|-------------------------------|
| DDT(p,p'), Total (ug/L) | Water | 71 | Physis O-22082 W | 03_UNIV | 1 | 48 | | | FD RPD | Field Duplicate RPD Failed |
| Endrin aldehyde (ng/dry g) | Water | 68 | Physis O-18104 W | 03_UNIV/ 9A_HOWAR | 71 | 0 | 0 | 24 | EST BS/BSD | Estimate BS/BSD failed |
| Endrin aldehyde (ng/wet g) | Water | 73 | Physis O-21060 W | 04_WOOD | 108 | | 0 | 5 | EST BS/BSD | Estimate BS/BSD failed |
| Nonachlor, cis, Total (ug/L) | Water | 71 | Physis O-22082 W | 03_UNIV | 2 | 36 | | | | |
| Nonachlor, trans, Total (ug/L) | Water | 70 | Physis O-22004 W | 10_GATE | 0 | 31 | | | | |
| Nonachlor, trans, Total (ug/L) | Water | 71 | Physis O-22084 W | 13_BELT | 2 | 61 | | | | |
| Tetrachloro-m-xylene (Surrogate), Total (%) | Water | 73 | Physis O-23034 W | 03_UNIV | 0 | 80 | | | | |
| PCBs | | | | | | | | | | |
| PCB 018 (ng/wet g) | Tissue | 73 | Physis O-21060 W | 04_WOOD | 2 | | 0 | 35 | EST MS/MSD | Estimate MS/MSD failed |
| PCB 030 (Surrogate), Total (%) | Water | 73 | Physis O-23034 W | 03_UNIV | 0 | 89 | | | | |
| PCB 049, Total (ug/L) | Water | 71 | Physis O-22082 W | 03_UNIV | 4 | 87 | | | | |
| PCB 052 (ng/wet g) | Tissue | 73 | Physis O-21060 W | 04_WOOD | 3 | | 31 | 3 | | |
| PCB 052, Total (ug/L) | Water | 71 | Physis O-22082 W | 03_UNIV | 2 | 42 | | | | |
| PCB 066, Total (ug/L) | Water | 71 | Physis O-22082 W | 03_UNIV | 0 | 67 | | | | |
| PCB 070, Total (ug/L) | Water | 71 | Physis O-22082 W | 03_UNIV | 4 | 68 | | | | |
| PCB 101 (ng/dry g) | Sediment | 68 | Physis O-18104 W | 03_UNIV/ 9A_HOWAR | 8 | 0 | 157 | 8 | | |

| Constituent | Matrix | Event | Lab Batch | Site | BS/ BSD RPD | Field Dup RPD | Lab Dup RPD | MS/ MSD RPD | Program Qualifier | Comments |
|-----------------------------------|----------|-------|---------------------|----------------------|-------------------|---------------------|-------------------|-------------------|----------------------|-----------------------------|
| PCB 101, Total (ug/L) | Water | 71 | Physis O-22082 W | 03_UNIV | 7 | 31 | | | | |
| PCB 110, Total (ug/L) | Water | 71 | Physis O-22082 W | 03_UNIV | 1 | 46 | | | | |
| PCB 112 (Surrogate), Total (%) | Water | 73 | Physis O-23034 W | 03_UNIV | 1 | 91 | | | | |
| PCB 138 (ng/dry g) | Sediment | 68 | Physis O-18104 W | 03_UNIV | 2 | 117 | | | | |
| PCB 138, Total (ug/L) | Water | 71 | Physis O-22082 W | 03_UNIV | 11 | 62 | | | | |
| PCB 153 (ng/dry g) | Sediment | 68 | Physis O-18104 W | 03_UNIV/ 9A_HOWAR | 1 | 0 | 124 | 3 | LD RPD | Lab Duplicate RPD Failed |
| PCB 153 (ng/wet g) | Tissue | 73 | Physis O-21060 W | 04_WOOD | 4 | | 8 | 31 | EST MS/MSD | Estimate MS/MSD failed |
| PCB 153, Total (ug/L) | Water | 71 | Physis O-22082 W | 03_UNIV | 6 | 54 | | | | |
| PCB 158 (ng/dry g) | Sediment | 68 | Physis O-18104 W | 03_UNIV/ 9A_HOWAR | 2 | 92 | 0 | 4 | | |
| PCB 170 (ng/wet g) | Tissue | 73 | Physis O-21060 W | 04_WOOD | 2 | | 21 | 40 | EST MS/MSD | Estimate MS/MSD failed |
| PCB 180 (ng/wet g) | Tissue | 73 | Physis O-21060 W | 04_WOOD | 0 | | 24 | 85 | EST MS/MSD | Estimate MS/MSD failed |
| PCB 187 (ng/wet g) | Tissue | 73 | Physis O-21060 W | 04_WOOD | 2 | | 17 | 31 | EST MS/MSD | Estimate MS/MSD failed |
| PCB 194 (ng/wet g) | Tissue | 73 | Physis O-21060 W | 04_WOOD | 1 | | 0 | 40 | EST MS/MSD | Estimate MS/MSD failed |
| PCB 198 (Surrogate), Total (%) | Water | 73 | Physis O-23034 W | 03_UNIV | 0 | 99 | | | | |
| PCB 200 (ng/wet g) | Tissue | 73 | Physis O-21060 W | 04_WOOD | 4 | | 47 | 27 | | |

| Constituent | Matrix | Event | Lab Batch | Site | BS/ BSD RPD | Field Dup RPD | Lab Dup RPD | MS/ MSD RPD | Program Qualifier | Comments |
|--|----------|-------|---------------------|----------------------|-------------------|---------------------|-------------------|-------------------|--------------------------|---|
| PCB 206 (ng/wet g) | Tissue | 73 | Physis O-21060 W | 04_WOOD | 8 | | 138 | 21 | | |
| PCB 209 (ng/wet g) | Tissue | 73 | Physis O-21060 W | 04_WOOD | 2 | | 0 | 39 | EST MS/MSD | Estimate MS/MSD failed |
| PCB-1260 (Aroclor 1260), Total (ug/L) | Water | 71 | Physis O-22082 W | 03_UNIV | | | 83 | | | |
| OP Pesticides | | | | | | | | | | |
| Chlorpyrifos (ng/dry g) | Sediment | 68 | Physis O-18104 W | 03_UNIV/ 9A_HOWAR | 9 | 7 | 36 | 14 | | |
| Chlorpyrifos, Total (ug/L) | Water | 69 | Physis O-20148 W | 10_GATE | 4 | | 80 | | | |
| Chlorpyrifos, Total (ug/L) | Water | 71 | Physis O-22082 W | 03_UNIV | 1 | | 63 | | FD RPD | Field Duplicate RPD Failed |
| Chlorpyrifos, Total (ug/L) | Water | 72 | Physis O-22122 W | 07_HITCH | 1 | | 80 | | FD RPD | Field Duplicate RPD Failed |
| Demeton-o (ug/L) | Water | 69 | W8K0847 | 10D_HILL | | | | 35 | | |
| Demeton-s (ng/dry g) | Sediment | 68 | Physis O-18104 W | 03_UNIV/ 9A_HOWAR | 1 | 0 | 0 | 44 | EST MS/MSD | Estimate MS/MSD failed |
| Demeton-s, Total (ug/L) | Water | 70 | Physis O-22004 W | 01T_ODD2_DCH | 31 | 44 | | | EST BS/BSD, FD RPD | Field Duplicate RPD Failed |
| Diazinon, Total (ug/L) | Water | 70 | Physis O-22004 W | 01T_ODD2_DCH | 5 | | 42 | | FD RPD | Field Duplicate RPD Failed |
| Malathion, Total (ug/L) | Water | 70 | Physis O-22004 W | 10_GATE | 3 | | 178 | | | |
| Methidathion (ng/dry g) | Sediment | 68 | Physis O-18104 W | 03_UNIV/ 9A_HOWAR | 2 | 0 | 0 | 38 | MS <LL, EST MS/MSD | MS failed Lower Limit; Estimate MS/MSD failed |

| Constituent | Matrix | Event | Lab Batch | Site | BS/ BSD RPD | Field Dup RPD | Lab Dup RPD | MS/ MSD RPD | Program Qualifier | Comments |
|-----------------------------------|----------|-------|---------------------|----------------------|-------------------|---------------------|-------------------|-------------------|--------------------------|---|
| Phorate (ng/dry g) | Sediment | 68 | Physis O-18104 W | 03_UNIV/ 9A_HOWAR | 1 | 0 | 0 | 57 | MS <LL, EST MS/MSD | MS failed Lower Limit; Estimate MS/MSD failed |
| Partical Size Distribution | | | | | | | | | | |
| Clay (%) | Sediment | 68 | Physis P-1096b W | 03_UNIV/02_PCH | | 196 | 0 | | | |
| Granule (%) | Sediment | 68 | Physis P-1096b W | 03_UNIV/02_PCH | | 199 | 0 | | | |
| Silt (%) | Sediment | 68 | Physis P-1096b W | 03_UNIV/02_PCH | | 199 | 6 | | | |
| Pyrethroid Pesticides | | | | | | | | | | |
| Bifenthrin, Total (ug/L) | Water | 68 | Physis O-20062 W | 03_UNIV | 7 | 37.4 | | | | |
| Bifenthrin, Total (ug/L) | Water | 70 | Physis O-22004 W | 01T_ODD2_DCH | 4 | 38 | | | FD RPD | Field Duplicate RPD Failed |
| Bifenthrin, Total (ug/L) | Water | 71 | Physis O-22084 W | 13_BELT | 16 | 33 | | | FD RPD | Field Duplicate RPD Failed |
| Cyfluthrin, total, Total (ug/L) | Water | 70 | Physis O-22004 W | 10_GATE | 0 | 41 | | | FD RPD | Field Duplicate RPD Failed |
| Cyfluthrin, total, Total (ug/L) | Water | 71 | Physis O-22082 W | 03_UNIV | 6 | 126 | | | FD RPD | Field Duplicate RPD Failed |
| Cypermethrin, total, Total (ug/L) | Water | 70 | Physis O-22004 W | 01T_ODD2_DCH | 8 | 195 | | | | |
| Cypermethrin, total, Total (ug/L) | Water | 71 | Physis O-22082 W | 03_UNIV | 7 | 181 | | | FD RPD | Field Duplicate RPD Failed |
| Danitol, Total (ug/L) | Water | 69 | Physis O-20148 W | 01T_ODD2_DCH | 4 | 65 | | | | |
| Danitol, Total (ug/L) | Water | 70 | Physis O-22004 W | 01T_ODD2_DCH | 11 | 44 | | | FD RPD | Field Duplicate RPD Failed |
| Deltamethrin, Total (ug/L) | Water | 73 | Physis O-23034 W | 03_UNIV | 32 | 0 | | | EST BS/BS | Estimate BS/BS failed |
| L-Cyhalothrin, Total (ug/L) | Water | 70 | Physis O-22004 W | 01T_ODD2_DCH | 2 | 196 | | | | |

| Constituent | Matrix | Event | Lab Batch | Site | BS/ BSD RPD | Field Dup RPD | Lab Dup RPD | MS/ MSD RPD | Program Qualifier | Comments |
|-------------------------------------|----------|-------|---------------------|---------------------------|-------------------|---------------------|-------------------|-------------------|--------------------------|--|
| Permethrin, cis-, Total (ug/L) | Water | 73 | Physis O-23006 W | LABQA | 35 | | | | EST BS/BSD | Estimate BS/BSD failed |
| Permethrin, trans-, Total (ug/L) | Water | 70 | Physis O-22004 W | 01T_ODD2_DCH | 67 | 0 | | | EST BS/BSD | Estimate BS/BSD failed |
| Prallethrin (ng/dry g) | Sediment | 68 | Physis O-18104 W | 03_UNIV/ 9A_HOWAR | 16 | 0 | 0 | 54 | MS <LL, EST MS/MSD | MS failed Lower Limit; Estimate MS/MSD failed |
| Metals and Selenium | | | | | | | | | | |
| Aluminum, Dissolved (ug/L) | Water | 69 | Physis E-16132 W | 01T_ODD2_DCH/ 07D_SIMI | | 42 | 29 | 3 | | |
| Aluminum, Dissolved (ug/L) | Water | 70 | Physis E-16148 W | 01T_ODD2_DCH/ 03_UNIV | | 62 | 4 | 2 | | |
| Antimony, Dissolved (ug/L) | Water | 72 | Physis E-17029 W | 04_WOOD/ 03_UNIV | | 86 | 6 | 1 | FD RPD | Field Duplicate RPD Failed |
| Beryllium, Dissolved (ug/L) | Water | 71 | Physis E-17010 W | 03_UNIV/ 9BD_GERRY | | 35 | 6 | 1 | | |
| Boron, Total (ug/L) | Water | 71 | Physis E-17009 W | 03_UNIV/ 9BD_ADOLF | 3 | 15 | 86 | 1 | FD RPD | Field Duplicate RPD Failed |
| Cadmium, Dissolved (ug/L) | Water | 72 | Physis E-17029 W | 04_WOOD/ 03_UNIV | | 31 | 14 | 2 | | |
| Calcium, Total (mg/L) | Water | 72 | Physis E-17028 W | 04_WOOD | 0 | 0 | 0 | 40 | | |
| Chromium, Dissolved (ug/L) | Water | 71 | Physis E-17010 W | 03_UNIV/ 9BD_GERRY | | 36 | 3 | 1 | FD RPD | Field Duplicate RPD Failed |
| Chromium, Total (ug/L) | Water | 71 | Physis E-17010 W | 03_UNIV/ 9BD_GERRY | 2 | 36 | 1 | | FD RPD | Field Duplicate RPD Failed |
| Copper, Total (ug/L) | Water | 71 | Physis E-17010 W | 03_UNIV/ 9BD_GERRY | 1 | 46 | 0 | | FD RPD | Field Duplicate RPD Failed |
| Iron, Dissolved (ug/L) | Water | 70 | Physis E-16147 W | 02_PCH | | | 34 | | MS >UL | MS failed Upper Limit |
| Iron, Total (ug/L) | Water | 71 | Physis E-17010 W | 03_UNIV/ 9BD_GERRY | 1 | 108 | 3 | | FD RPD | Field Duplicate RPD Failed |

| Constituent | Matrix | Event | Lab Batch | Site | BS/ BSD RPD | Field Dup RPD | Lab Dup RPD | MS/ MSD RPD | Program Qualifier | Comments |
|-------------------------------|--------|-------|------------------|---------------------------|-------------------|---------------------|-------------------|-------------------|----------------------|---|
| Lead, Dissolved (ug/L) | Water | 68 | Physis E-16095 W | 03_UNIV | | 77 | 1 | 0 | U, FD RPD | Estimated, constituent was found in blank at >1/5 th concentration; Field Duplicate RPD Failed |
| Lead, Dissolved (ug/L) | Water | 72 | Physis E-17029 W | 04_WOOD/ 03_UNIV | | 48 | 4 | 1 | | |
| Lead, Total (ug/L) | Water | 71 | Physis E-17010 W | 9BD_GERRY | 0 | 36 | 2 | | FD RPD | Field Duplicate RPD Failed |
| Mercury, Dissolved (ug/L) | Water | 68 | Physis E-15055 W | 03_UNIV | | 111 | | | | |
| Mercury, Total (ug/L) | Water | 68 | Physis E-15055 W | 03_UNIV/ 01_RR_BR | 4 | 145 | 1 | 7 | FD RPD | Field Duplicate RPD Failed |
| Silver, Dissolved (ug/L) | Water | 69 | Physis E-16141 W | 01_RR_BR | | | 61 | | | |
| Thallium, Dissolved (ug/L) | Water | 69 | Physis E-16133 W | 9BD_GERRY | | | 32 | 1 | | |
| Thallium, Total (ug/L) | Water | 71 | Physis E-17010 W | 03_UNIV | 1 | 47 | | | | |
| Tin, Dissolved (ug/L) | Water | 68 | Physis E-16095 W | 03_UNIV | 2 | 32 | 23 | 0 | U | Estimated, constituent was found in blank at >1/5 th concentration |
| Tin, Dissolved (ug/L) | Water | 69 | Physis E-16132 W | 01T_ODD2_DCH/ 07D_SIMI | | 0 | 39 | 2 | | |
| Tin, Dissolved (ug/L) | Water | 73 | Physis E-17064 W | 03_UNIV/ 9BD_ADOLF | | 67 | 0 | 1 | U | Estimated, constituent was found in blank at >1/5 th concentration |
| Vanadium, Total (ug/L) | Water | 71 | Physis E-17010 W | 03_UNIV/ 9BD_GERRY | 0 | 54 | 1 | | FD RPD | Field Duplicate RPD Failed |

| Constituent | Matrix | Event | Lab Batch | Site | BS/ BSD RPD | Field Dup RPD | Lab Dup RPD | MS/ MSD RPD | Program Qualifier | Comments |
|------------------------|--------|-------|------------------|-----------------------|-------------------|---------------------|-------------------|-------------------|--------------------------|--|
| Zinc, Dissolved (ug/L) | Water | 71 | Physis E-17010 W | 03_UNIV/ 9BD_GERRY | | 2 | 11 | 84 | MS >UL, EST MS/MSD | MS failed Upper Limit; Estimate MS/MSD failed |
| Zinc, Total (ug/L) | Water | 71 | Physis E-17010 W | 03_UNIV/ 9BD_GERRY | 0 | 46 | 1 | | FD RPD | Field Duplicate 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 | LabBatch | LCL | UCL | LCS | LCSD | MS | MSD | Comments |
|--------------------------------|-------------|--------------|--------------------------------|-----|-----|-----------|------|------------|-------------|---|
| General Water Quality | | | | | | | | | | |
| None | | | | | | | | | | |
| Salts | | | | | | | | | | |
| Chloride (mg/L) | Water | 68 | Physis C-37110 W | 82 | 114 | 98 | 98 | 122 | 128 | MS failed Upper Limit |
| Chloride (mg/L) | Water | 68 | Physis C-37111 W | 51 | 147 | 93 | 91 | | | |
| Chloride (mg/L) | Water | 68 | Physis C-37111 W | 82 | 114 | | | 112 | 106 | |
| Sulfate (mg/L) | Water | 68 | Physis C-37110 W | 77 | 134 | 108 | 106 | 140 | 80 | MS failed Upper Limit, Estimate due to MS/MSD RPD failure |
| Sulfate (mg/L) | Water | 68 | Physis C-37111 W | 77 | 134 | 107 | 101 | 72 | 100 | MS failed Lower Limit, Estimate due to MS/MSD RPD failure |
| Nutrients | | | | | | | | | | |
| Ammonia as N (mg/dry kg) | Sediment | 68 | Physis C-39027 W | 78 | 121 | 98 | 97 | 84 | 77 | MS failed Lower Limit |
| Total Kjeldahl Nitrogen (mg/L) | Water | 72 | Associated_QC1200237 _W_CON | 80 | 120 | 88 | | 77 | 77 | |
| OC Pesticides | | | | | | | | | | |
| Chlordane, gamma- (ng/wet g) | Tissue | 73 | Physis O-21060 W | 70 | 135 | 93 | 90 | 50 | 64 | MS failed Lower Limit |
| DDD(p,p') (ng/wet g) | Tissue | 73 | Physis O-21060 W | 46 | 154 | 93 | 93 | 141 | 178 | MS failed Upper Limit |
| DDE(p,p') (ng/wet g) | Tissue | 73 | Physis O-21060 W | 44 | 148 | 91 | 88 | 772 | 1492 | MS failed Upper Limit |
| Endosulfan I (ng/dry g) | Sediment | 68 | Physis O-18104 W | 21 | 114 | 20 | 26 | 14 | 17 | MS failed Lower Limit |

| Constituent | Matrix Name | Event Number | LabBatch | LCL | UCL | LCS | LCSD | MS | MSD | Comments |
|--------------------------|-------------|--------------|------------------|-----|-----|------------|------------|--------------|--------------|---|
| Endosulfan I (ng/wet g) | Tissue | 73 | Physis O-21060 W | 0 | 162 | 49 | 60 | 16951 | 21514 | MS failed Upper Limit |
| Endosulfan II (ng/dry g) | Sediment | 68 | Physis O-18104 W | 47 | 117 | 33 | 33 | 36 | 34 | MS failed Lower Limit |
| Methoxychlor (ng/dry g) | Sediment | 68 | Physis O-18104 W | 42 | 128 | 151 | 164 | 135 | 135 | MS failed Upper Limit |
| Perthane (ng/dry g) | Sediment | 68 | Physis O-18104 W | 63 | 133 | 127 | 134 | 138 | 137 | MS failed Upper Limit |
| PCBs | | | | | | | | | | |
| PCB 003 (ng/wet g) | Tissue | 73 | Physis O-21060 W | 65 | 153 | 89 | 88 | 128 | 156 | MS failed Upper Limit |
| PCB 037 (ng/wet g) | Tissue | 73 | Physis O-21060 W | 57 | 137 | 99 | 93 | 453 | 528 | MS failed Upper Limit |
| PCB 066 (ng/wet g) | Tissue | 73 | Physis O-21060 W | 52 | 141 | 98 | 95 | 173 | 195 | MS failed Upper Limit |
| PCB 149 (ng/wet g) | Tissue | 73 | Physis O-21060 W | 39 | 140 | 93 | 91 | 18 | 15 | MS failed Lower Limit |
| PCB 153, Total (ug/L) | Water | 73 | Physis O-23006 W | 70 | 120 | 116 | 122 | | | |
| PCB 153, Total (ug/L) | Water | 73 | Physis O-23006 W | 70 | 120 | 116 | 122 | | | |
| OP Pesticides | | | | | | | | | | |
| Dichlorvos (ug/L) | Water | 69 | W8K0847 | 42 | 137 | 138 | | 144 | 147 | |
| Disulfoton (ng/dry g) | Sediment | 68 | Physis O-18104 W | 25 | 125 | | | 27 | 20 | MS failed Lower Limit |
| Fensulfothion (ng/dry g) | Sediment | 68 | Physis O-18104 W | 50 | 150 | 80 | 81 | 151 | 153 | MS failed Upper Limit |
| Merphos (ug/L) | Water | 69 | W8K0847 | 3 | 181 | 205 | | 206 | 180 | |
| Methidathion (ng/dry g) | Sediment | 68 | Physis O-18104 W | 50 | 150 | 110 | 112 | 17 | 25 | MS failed Lower Limit, Estimate due to MS/MSD RPD failure |

| Constituent | Matrix Name | Event Number | LabBatch | LCL | UCL | LCS | LCSD | MS | MSD | Comments |
|--------------------------------|-------------|--------------|------------------|-----|-----|-----|------|------------|------------|---|
| Parathion, Methyl (ng/dry g) | Sediment | 68 | Physis O-18104 W | 50 | 150 | 143 | 141 | 158 | 154 | MS failed Upper Limit |
| Phorate (ng/dry g) | Sediment | 68 | Physis O-18104 W | 50 | 150 | 93 | 92 | 5 | 9 | MS failed Lower Limit, Estimate due to MS/MSD RPD failure |
| Phosmet (ng/dry g) | Sediment | 68 | Physis O-18104 W | 50 | 150 | 124 | 130 | 46 | 42 | MS failed Lower Limit |
| Tetrachlorvinphos (ng/dry g) | Sediment | 68 | Physis O-18104 W | 50 | 150 | 150 | 144 | 159 | 157 | MS failed Upper Limit |
| PAHs | | | | | | | | | | |
| None | | | | | | | | | | |
| Pyrethroid Pesticides | | | | | | | | | | |
| Cyfluthrin, total (ng/dry g) | Sediment | 68 | Physis O-18104 W | 50 | 150 | 70 | 64 | 33 | 30 | MS failed Lower Limit |
| Cypermethrin, total (ng/dry g) | Sediment | 68 | Physis O-18104 W | 50 | 150 | 69 | 63 | 33 | 30 | MS failed Lower Limit |
| Deltamethrin (ng/dry g) | Sediment | 68 | Physis O-18104 W | 50 | 150 | 59 | 53 | 14 | 12 | MS failed Lower Limit |
| Esfenvalerate (ng/dry g) | Sediment | 68 | Physis O-18104 W | 50 | 150 | 59 | 55 | 22 | 19 | MS failed Lower Limit |
| Fenvalerate (ng/dry g) | Sediment | 68 | Physis O-18104 W | 50 | 150 | 61 | 56 | 26 | 23 | MS failed Lower Limit |
| Fluvalinate (ng/dry g) | Sediment | 68 | Physis O-18104 W | 50 | 150 | 59 | 56 | 20 | 18 | MS failed Lower Limit |
| Prallethrin (ng/dry g) | Sediment | 68 | Physis O-18104 W | 50 | 150 | 75 | 88 | 0 | 1 | MS failed Lower Limit, Estimate due to MS/MSD RPD failure |
| Metals and Selenium | | | | | | | | | | |
| Barium, Dissolved (ug/L) | Water | 70 | Physis E-16148 W | 90 | 120 | | | 168 | 172 | |

| Constituent | Matrix Name | Event Number | LabBatch | LCL | UCL | LCS | LCSD | MS | MSD | Comments |
|-----------------------------------|-------------|--------------|------------------|-----|-----|-----|------|------------|------------|-----------------------|
| Beryllium, Dissolved (ug/L) | Water | 70 | Physis E-16148 W | 86 | 118 | | | 112 | 119 | |
| Calcium, Total (mg/L) | Water | 72 | Physis E-17028 W | 85 | 115 | 100 | 100 | 135 | 90 | |
| Iron, Dissolved (ug/L) | Water | 70 | Physis E-16148 W | 65 | 134 | | | 868 | 925 | |
| Manganese, Dissolved (ug/L) | Water | 70 | Physis E-16148 W | 83 | 125 | | | 124 | 126 | |
| Mercury, Methyl, Total (ng/wet g) | Tissue | 73 | F905326_T_ | 70 | 130 | 72 | 71 | 60 | 68 | |
| Mercury, Methyl, Total (ng/wet g) | Tissue | 73 | F905326_T_ | 65 | 130 | 72 | 71 | 62 | 57 | MS failed Lower Limit |
| Mercury, Methyl, Total (ng/wet g) | Tissue | 73 | F905326_T_ | 65 | 130 | 72 | 71 | 52 | 47 | MS failed Lower Limit |
| Mercury, Methyl, Total (ng/wet g) | Tissue | 73 | F905326_T_ | 65 | 130 | 72 | 71 | 59 | 49 | MS failed Lower Limit |
| Molybdenum, Dissolved (ug/L) | Water | 70 | Physis E-16148 W | 79 | 133 | | | 200 | 210 | |
| Selenium, Dissolved (ug/L) | Water | 70 | Physis E-16148 W | 77 | 144 | | | 140 | 145 | |
| Silver, Dissolved (ug/L) | Water | 72 | Physis E-17027 W | 52 | 115 | | | 49 | 52 | |
| Sodium, Total (mg/L) | Water | 72 | Physis E-17028 W | 75 | 125 | 99 | 100 | 140 | 140 | |
| Strontium, Dissolved (ug/L) | Water | 68 | Physis E-16095 W | 75 | 125 | | | 132 | 123 | MS failed Upper Limit |
| Strontium, Dissolved (ug/L) | Water | 69 | Physis E-16133 W | 75 | 125 | | | 72 | 74 | MS failed Lower Limit |
| Strontium, Dissolved (ug/L) | Water | 70 | Physis E-16148 W | 75 | 125 | | | 369 | 386 | |
| Strontium, Dissolved (ug/L) | Water | 72 | Physis E-17029 W | 75 | 125 | | | 127 | 135 | |
| Strontium, Dissolved (ug/L) | Water | 73 | Physis E-17064 W | 75 | 125 | | | 60 | 50 | MS failed Lower Limit |

| Constituent | Matrix Name | Event Number | LabBatch | LCL | UCL | LCS | LCSD | MS | MSD | Comments |
|----------------------------|-------------|--------------|------------------|-----|-----|-----|------|------------|------------|----------|
| Vanadium, Dissolved (ug/L) | Water | 70 | Physis E-16148 W | 96 | 126 | | | 126 | 129 | |
| Zinc, Dissolved (ug/L) | Water | 71 | Physis E-17010 W | 85 | 132 | | | 267 | 109 | |

LCL = Lower Control Limit

UCL = Upper Control Limit

MS = Matrix Spike

MSD = Matrix Spike Duplicate

LCS = Laboratory Control Spike

LCSD = Laboratory Control Spike Duplicate