THE CITY OF SAN DIEGO

SAN DIEGO REGIONAL
WATER QUALITY
CONTROL BOARD

2014 OCT 31 PM 3 47

October 31, 2014

Executive Officer
California Regional Water Quality Control Board
San Diego Region
Attn: 401 Certification; Project No. 09C-077; Kelly Dorsey
2375 Northside Drive Ste 100
San Diego, CA 92108
(619) 521-3357

Dear Executive Officer:

Subject: Clean Water Act Section 401 Water Quality Certification for Tijuana River Valley Channel Maintenance Project, 09C-077 (reference 745397: jebsen)

Pursuant to the Tijuana River Valley Channel Maintenance Project 401 certification, Project No. 09C-077, section VI, the City submits the Biological Addendum (Oct. 2014) for the Final Tijuana River Valley Channel Maintenance Project Receiving Water Monitoring Report (May 2014)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Please feel free to contact Rory Driskell, Associate Planner, by phone at (619) 527-3495 or e-mail at RDriskell@sandiego.gov, with questions or requests for clarification.

Respectfully,

Gene Matter
Assistant Deputy Director

GM/rd

Enclosure: Final Tijuana River Valley Channel Maintenance Project Receiving Water Monitoring Report: Biological Addendum

DIVERSITY BRINGS US ALL TOGETHER

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Operations and Maintenance • Storm Water
Chollas Operations Station
2781 Caminito Chollas • San Diego, CA 92105

FINAL

TIJUANA RIVER VALLEY CHANNEL MAINTENANCE PROJECT
RECEIVING WATER MONITORING REPORT
YEAR ONE ANNUAL MAINTENANCE EVENT
Biological Report Addendum

Prepared for:

City of San Diego
Transportation and Storm Water Department
9370 Chesapeake Drive, Suite 100
San Diego, California 92123

Submitted by:
AMEC Environment & Infrastructure, Inc.
9210 Sky Park Court, Suite 200
San Diego, California 92123
(858) 300-4300

October 2014

AMEC Project No. 5025141106

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ACRONYMS AND ABBREVIATIONS

%	percent
AMEC	AMEC Environment & Infrastructure, Inc
BMI	Benthic Macroinvertebrate
^{o}C	Degrees Celsius
CDFW	California Department of Fish & Wildlife
City	City of San Diego
CNDDB	California Natural Diversity Database
CRAM	California Rapid Assessment Method
DO	Dissolved Oxygen
EPA	Environmental Protection Agency
EPT	Ephemeroptera, Plecoptera, and Trichoptera
FFG	Functional Feeding Groups
HBI	Hilsenhoff Biotic Index
L	liter
m	meter(s)
MRI	Margalef's Richness Index
mg	milligrams
Project	Tijuana River Valley Channel Maintenance Project 09C-077
RWQCB	Regional Water Quality Control Board
SD	San Diego
SDRWQCB	San Diego Regional Water Quality Control Board
SWI	Shannon-Weaver Index
SQO	Sediment Quality Objectives
SWAMP	Surface Water Ambient Monitoring Program
SWRCB	State Water Resources Control Board
TSWD	Transportation and Storm Water Department
TV	Tolerance Value
µS	microSiemens

1.0 INTRODUCTION

The City of San Diego (City) is implementing a maintenance dredging program within the Tijuana River to restore storm water conveyance capabilities of selected channels and reduce the potential for flooding of nearby properties. Dredging will remove between 10,000 and 30,000 cubic yards of dredge material from the Tijuana River Pilot Channel (Pilot Channel) and Smuggler's Gulch (SDRWQCB 2012).

The San Diego Regional Water Quality Control Board (SDRWQCB) issued an amendment to the Clean Water Act Section 401 Water Quality Certification (Certification) and acknowledged enrollment under State Water Resources Control Board (SWRCB) Order No. 2003-17-DWQ for Statewide General Waste Discharge Requirements for Dredged or Fill Discharges for the Tijuana River Valley Channel Maintenance Project 09C-077 (Project). The Certification required the Project to include the following three monitoring components to help quantify the potential impacts to the Tijuana River from the annual dredging of the Pilot Channel and Smuggler's Gulch:

- Benthic Biological Monitoring (Section VI.C.1): Assessment of the effects of the project on the biological integrity of the Pilot Channel and Smuggler's Gulch by analyzing the benthic macroinvertebrate (BMI) community.
- Water Quality Assessment (Section VI.C.2): Analysis of the water quality through the collection of grab samples, which are to be analyzed for the constituents listed in the Certification.
- California Rapid Assessment Method (CRAM) (Section VI.C.3): Quantitative function-based health assessment of the wetland and riparian habitat.

Each of the three components are to be implemented before the five-year maintenance begins (pre-project), during the five-year maintenance period (before/during/after each maintenance event), and after maintenance is concluded (post-project) at the completion of the five-year permit cycle. To quantify impacts, results of the three monitoring components will be compared over time and between locations. The data will be reviewed to determine whether there are discernable differences between initial-maintenance assessment, during-maintenance assessment, and final-maintenance assessment results.

This current report presents results of the benthic biological monitoring associated with the 2013-2014 monitoring period, and is an addendum to the June 3, 2014 water quality and CRAM report for this same period (AMEC, 2014).

2.0 METHODS

2.1 Sampling Events

Benthic infauna samples and associated water quality measurements were collected during three monitoring events scheduled to coincide with dredging activities. Pre-dredge samples (within two weeks prior to dredge initiation) were collected September 16, 2013. Samples taken during the dredge maintenance were collected October 17, 2013. Post-dredge samples (within two weeks after dredge maintenance completion) were collected February 25, 2014.

Pre-project baseline benthic community samples were collected in May 2013 against which future sampling events would be compared to assess the potential influence of dredging activity.

2.2 Monitoring Station

An October 2012 pre-project reconnaissance of the three bioassessment monitoring stations detailed in the Certification concluded that the upstream and downstream locations immediately surrounding the Project area were not viable locations for standard freshwater bioassessment sampling due to the following site conditions:

- The area immediately upstream of the dredge footprint on the Pilot Channel presented unsafe sampling conditions with deep water and soft fine sediment.
- The downstream location on the Pilot Channel consisted of saline conditions due to tidal influence.
- The upstream location on Smuggler's Gulch is dry for the vast majority of the year, only flowing briefly after a rain event.

In an effort to remain within the parameters and intent outlined in the Certification, it was determined that a location downstream of the maintenance footprint (see Table 2-1, Figure 1) would be solely utilized for biological collections, as this would represent the section of the Pilot Channel most influenced by dredging activities and appeared to remain wetted year-round.

Table 2-1. Locations of Benthic Biota Field Sampling

Station	Location	Sample ID	Monitoring Type	Latitude[(a)]	Longitude[(a)]
TJ-PC-D	Pilot Channel downstream of dredge footprint	DC-TJPCD-091613	Benthic Invertebrates	32.558035	-117.103524
		DC-TJPCD-101713	Benthic Invertebrates	32.558035	-117.103524
		DC-TJPCD-022514	Benthic Invertebrates	32.558035	-117.103524

Notes:
Three field replicates collected during each event.
[a] NAD_1983_StatePlane_California_V_FIPS_0405_Feet WKID: 2229 Authority: EPSG

Given that the location of the dredging and existing stream hydrology/morphology required the biological collection location to be moved into a tidally influenced area, standard freshwater bioassessment methods and metrics would no longer apply at the downstream Pilot Channel

location. Thus, a sediment biota sampling method similar to the Water Quality Control Plan for Enclosed Bays and Estuaries - Part 1 Sediment Quality promulgated by the SWRCB (SWRCB, 2009) and the Sediment Quality Objectives (SQO) Technical Support Manual (SCCWRP, 2014) used in estuarine and marine environments was employed for the benthic biota collections.

Three field replicates were collected approximately eight meters (m) apart, starting downstream and moving upstream with each successive collection. A 0.2m x 0.2m Eckman grab was used for collection of the sediment samples. The grab was pushed by hand down into the undisturbed sediment approximately six to eight centimeters (cm). The grab jaws were then triggered and closed. The grab device was removed from the substrate and placed unopened into a large plastic tray. The depth of sediment penetration was measured and an assessment of the acceptability of the grab was made (i.e. >5cm penetration, >90% of the sediment surface intact, no washing or canting). Observations of sediment type, color, and odor were recorded. The entire contents of each sediment grab was then emptied into the plastic tray and systematically sieved through a 1.0-millimeter (mm) metal sieve. The material and organisms from each replicate retained on the sieve were placed separately into 1-liter (L) Nalgene bottles and preserved with 95% ethanol. These three samples were then shipped to a certified laboratory for taxonomic identification.

2.3 Water Quality Monitoring

In-situ water quality measurements were recorded at the biological sampling location using hand-held field meters. Due to the lack of significant spatial separation of the three field replicates (each within 16m), a single location at the midpoint of the three field replicates was selected for measurements. These measurements included pH, dissolved oxygen (DO), turbidity, salinity, temperature, and conductivity.

3.0 RESULTS

3.1 Water Quality Results

The *in-situ* field water quality measurements recorded are provided in Table 3-1.

Table 3-1. *In-situ* Field Measurements

			Date		
Analyte	**Method**	**Units**	**9/16/13**	**10/17/13**	**2/25/14**
pH	Field Meter	pH units	7.30	7.48	7.30
Dissolved Oxygen	Field Meter	mg/L	2.5	0.9	4.9
Specific Conductance	Field Meter	microSiemens per centimeter (µS/cm)	9,400	29,500	4,446
Temperature	Field Meter	° Celsius	21.2	15.3	17.1
Salinity	Field Meter	Parts per Thousand (ppt)	5.7	22.9	2.8
Turbidity	Field Meter	NTU	7.0	7.8	7.1

Some differences were noted in the *in-situ* water quality measurements across sampling events. The October 2013 event had a distinctly higher salinity/conductivity, lower temperature, and lower dissolved oxygen concentration than the other two events. As the TJPCD location is near the upper extent of the tidal influence at freshwater/marine interface, these dissimilarities most likely reflect a difference in the tidal height and timing of the tidal cycle in relation to the sampling event.

3.2 Benthic Biological Results

3.2.1 BMI Community Composition

A list of taxa present in the samples is presented in Table 3-2. Total abundance of organisms among all samples ranged from 9 to 273 individuals, with no distinct pattern among collection events. In various combinations, Oligochaetes, Ostracods, and the gastropod *Tryonia* sp. were generally the three most abundant taxa observed, with *Chironomus* sp. being observed in greater abundance in the post-dredge samples. Across the three collection events these three taxa dominated each sample, comprising 81 to 100 percent of the organisms collected. *Chironomus*, Oligochaetes, and Ostracods are generally considered tolerant taxa (Tolerance Value (TV) between 8 and 10), meaning they are relatively insensitive to anthropogenic stressors and are typically found in higher abundances at disturbed or stressed sites. Members of the *Chironomus* genus are generally bottom-dwelling and many live within tubes constructed of silt and fines. Some species within this group are able to tolerate high conductivity water and can be found in estuarine locations (i.e. *Chironomus salinarius* and *Chironomus halophilus*). Some occur in highly polluted waters, others are restricted to cool clear water. Chironomidae are important indicator organisms, because the presence, absence, or quantities of various

species within this Family can be a very good indicator of water quality. Oligochaetes are segmented aquatic worms, generally found in silty substrate and detritus. While Oligochaetes can be found in both good quality and highly impacted streams, a population dominated by members of this Family is generally an indicator of stressed conditions. Ostracods, sometimes called seed shrimp, can be found in many different substrate types where they eat bacteria, mold, algae and detritus. Similar to Oligochaetes, Ostracods can be found across a full spectrum of water or habitat conditions; however, dominance by this group is generally an indicator of degraded conditions.

The genus *Tryonia* is a group of gastropods (snails) with a wide distribution. The genus contains 23 species and can be found across the southern United States. Although most *Tryonia* species are restricted to springs, which are generally thermal and highly mineralized, some also live in lakes (Thompson, 1968), and two species (*T. imitator* and *T. porrecta*) can be found in brackish, coastal waters (Kellogg, 1985; Hershler, 2007). Under SAFIT Level 2 standard taxonomic effort, *Tryonia* is left at genus, however follow up communication with the taxonomic laboratory was able to identify these individuals to *Tryonia imitator*, the California Brackish Water Snail. *Tryonia imitator* is a gastropod that inhabits coastal lagoons, estuaries and salt marshes, from Sonoma County to San Diego County. While the California Natural Diversity Database (CNDDB) supported by the California Department of Fish & Wildlife (CDFW), does not list *Tryonia imitator* as a species of special concern, threatened, or endangered; it is designated as vulnerable due to its restricted range and relatively few populations. *Tryonia* sp. does not have a specific TV, however the Class Gastropoda is generally considered moderately to highly insensitive to anthropogenic stressors.

Table 3-2. Raw Abundance of Individual Sorted Taxa

Date		Sept 2013			Oct 2013			Feb 2014		
Taxonomic Group	**Taxon**	**DC-TJPCD-091613-01**	**DC-TJPCD-091613-02**	**DC-TJPCD-091613-03**	**DC-TJPCD-101713-01**	**DC-TJPCD-101713-02**	**DC-TJPCD-101713-03**	**DC-TJPCD-022514-01**	**DC-TJPCD-022514-02**	**DC-TJPCD-022514-03**
Hemiptera	Trichocorixa sp.				1					
Diptera-Chironomidae	Chironomus sp.							19	18	46
	Stempellinella sp.							1		
	Pseudosmittia sp.						1			
Diptera	Diptera								8	16
	Psychoda sp.		1		1		20			
	Psychodidae						1			
	Dasyhelea sp.						1			
Lepidoptera	Lepidoptera					1				
Annelida-Oligochaeta	Oligochaeta	6	30	50	4	7	81	3	12	
Mollusca-Gastropoda	Tryonia sp.	8	14	194	7	1	1	33	14	22
Crustacea-Amphipoda	Hyalella sp.				1					
Crustacea-Ostracoda	Ostracoda	24	10	29			9		51	
	TOTAL	**38**	**55**	**273**	**14**	**9**	**114**	**56**	**103**	**84**

3.2.2 Diversity Metrics

Diversity metrics provide information regarding the number of taxa observed and the evenness of the distribution of individuals among those taxa (Washington 1984). Pristine ecosystems are typically expected to have a high diversity of invertebrate taxa with a relatively even distribution of organisms between them. In contrast, degraded systems may consist of high numbers of individuals, but few taxa. A summary of diversity metrics is presented in Table 3-3. Two methods were used to measure invertebrate diversity, including the Shannon-Weaver Diversity Index (SWI) and Margalef's Richness Index (MRI). The MRI is a measure of the number of taxa observed at a given site, while the SWI evaluates the number of taxa and the evenness of distribution among them. Typically these index scores are used to compare differences in diversity between several sites along a condition gradient, a potentially impacted site versus reference location, or temporal changes at a single location. The SWI can range from 0 to 4.6, with a score approaching 2.0 typically indicating a more diverse community. Typical MRI scores at diverse high quality sites are above 5.0. Both diversity indices calculated for the DC-TJPCD monitoring station across all sample dates indicate a benthic community with very low diversity and dominance by a few species.

3.2.3 Sensitivity Metrics

A summary of sensitivity metrics is provided in Table 3-3. The tolerance of many BMI taxa to habitat impairment and water quality has been determined through prior studies (Hilsenhoff, 1987). The Hilsenhoff Biotic Index (HBI) ranks BMI taxa on a scale of 0 to 10 regarding their sensitivity to impairment, with a TV of 0 being given to taxa that are highly sensitive to habitat impairment, water quality degradation, or other stressor, and a TV of 10 to those that are very tolerant. While organisms with a high TV can be found in streams with good water and habitat quality, they tend to be a lesser proportion of the community. Conversely, taxa with low TVs (i.e. sensitive organisms) will very rarely be found at sites with poor water or habitat quality. Although originally developed to assess low dissolved oxygen caused by organic loading (Hilsenhoff 1977, 1982, 1987), the HBI may also be sensitive to the effects of impoundment, thermal pollution, and some types of chemical pollution (Hilsenhoff 1988, Hooper 1993).

The mean HBI score among field replicates within each of the three events ranged from 7.94 to 9.31, indicating tolerant organisms, generally insensitive to stressors. No individuals considered intolerant to disturbance (TV score 0 to 2) were reported for any of the three collection events from this site.

Ephemeroptera, Plecoptera, and Trichoptera (EPT) taxa comprise a group of sensitive organisms, commonly known as EPT taxa, which are found worldwide and provide a good estimate of the water and habitat quality in a stream. While some of the taxa from this group are moderately insensitive to impairment, the majority are good indicators of community health. No EPT taxa were reported for any of the three collection events from this site.

3.2.4 Functional Feeding Groups

BMI may be grouped according to mode of feeding, referred to as Functional Feeding Groups (FFG). A healthy assemblage will typically contain a variety of FFG, while dominance of the

community by few FFG suggests the water body may not support a diversity of ecological niches and may be general indicator of poor community health. The type and relative abundance of groups present can provide valuable insight with regard to ecological integrity, especially when considered with other assessment data.

A summary of the FFG distribution obtained is presented in Table 3-4. The distribution of FFGs at the DC-TJPCD location was rather disproportionate. Two FFGs dominated the taxa present: collector-gatherers and unclassified. The collector-gatherer FFG is a subset of a larger collector group, comprised of collector-gatherers and collector-filterers. The collector-gatherers typically acquire fine particulate organic matter from the bottom by ingesting fine sediments, while the collector-filterers use mucous nets or fans to filter out fine particulate organic matter suspended in the passing water column. Both of these collectors are typically found in higher numbers in streams containing a high proportion of silts and fines. The unclassified group contains those taxa that have not been assigned a specific mode of feeding. With the exception of DC-TJPCD-022514-02 and DC-TJPCD-022514-03, *Tryonia* sp. individuals alone accounted for the percent unclassified FFG.

Table 3-3. Select Biological Metrics

Date	Sept 2013			Oct 2013			Feb 2014		
Biological Metric	DC-TJPCD-091613-01	DC-TJPCD-091613-02	DC-TJPCD-091613-03	DC-TJPCD-101713-01	DC-TJPCD-101713-02	DC-TJPCD-101713-03	DC-TJPCD-022514-01	DC-TJPCD-022514-02	DC-TJPCD-022514-03
# Organisms Sorted	38	55	273	14	9	114	56	103	84
# Organisms in the sample[1]	38	55	273	14	9	114	56	103	84
Taxa Richness	3	4	3	5	3	7	4	5	3
1st Dominant Taxa	Ostracoda	Oligochaeta	*Tryonia* sp.	*Tryonia* sp.	Oligochaeta	Oligochaeta	*Tryonia* sp.	Ostracoda	*Chironomus* sp.
% Top Dominant Taxa	63.16	54.55	71.06	50.00	77.78	71.05	58.93	49.51	54.76
% 3 Top Dominant Taxa	100.0	98.18	100.0	85.71	100.0	96.49	98.21	80.58	100.0
% Intolerant Individuals	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
% Sensitive EPT Taxa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dominant FFG	Gatherers	Gatherers	Unclassified	Unclassified	Gatherers	Gatherers	Unclassified	Gatherers	Gatherers
Shannon Weaver Diversity Index (log10)	0.40	0.46	0.34	0.55	0.30	0.40	0.39	0.60	0.43
Margalef's Richness Index	0.55	0.75	0.36	1.52	0.91	1.27	0.75	0.86	0.45
Mean Hilsenhoff Biotic Index	8.00	8.05	8.00	7.86	7.62	8.36	9.48	8.44	10.00

[1] Estimate based on number subsampled and percent of sample sorted.

Table 3-4. Percentages of Functional Feeding Groups

Date	Sept 2013			Oct 2013			Feb 2014		
Metric (%)	DC-TJPCD-091613-01	DC-TJPCD-091613-02	DC-TJPCD-091613-03	DC-TJPCD-101713-01	DC-TJPCD-101713-02	DC-TJPCD-101713-03	DC-TJPCD-022514-01	DC-TJPCD-022514-02	DC-TJPCD-022514-03
Collector-Filterers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Collector-Gatherers	78.95	74.55	28.94	42.86	77.78	99.12	41.07	78.64	54.76
Predators	0.00	0.00	0.00	7.14	0.00	0.00	0.00	0.00	0.00
Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Shredders	0.00	0.00	0.00	0.00	11.11	0.00	0.00	0.00	0.00
Piercer-Herbivores	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unclassified	21.05	25.45	71.06	50.00	11.11	0.88	58.93	21.36	45.24

3.3 Comparison to Pre-Project Baseline Assessment

Overall, the benthic community condition of the three current during-maintenance monitoring events were similar to that observed for the pre-project baseline collections. The *in-situ* water quality measures and specific benthic taxa observed between the two events were comparable. While a slight improvement was seen in both the diversity and pollution tolerance scores from pre- to during-maintenance events, this is likely within the range of expected variability and could be more a reflection of the taxa seasonality.

With the exception of conductivity and salinity, the *in-situ* water quality measurements obtained during the pre-project assessment were similar to those recorded during the three collection events of the during-maintenance monitoring. The conductivity and salinity measured during the pre-project assessment (1603 µS/cm and 0.8 ppt, respectively) was slightly lower than those recorded during the three current collection events (4,446 - 29,500 µS/cm and 2.8 - 22.9 ppt, respectively). However, this is probably due to a difference in tidal cycle at the time of the water quality readings, and not a result of maintenance activity.

Likewise, biological metrics obtained for the pre-project assessment were within the range of expected variability relative to those observed for the three during-maintenance collection events. While the most abundant taxa observed during the pre-project event (*Chironomus sp.*) was different than 8 of the 9 samples collected for the during-maintenance events, this is likely a reflection of the season in which the samples were collected. It has been well documented that seasonal shifts in benthic macroinvertebrate community composition can occur at the site scale (Linke, 1999). The pre-project event in May 2013, was collected during the designated bioassessment sampling index period for the Southern California coastal region (i.e. May - July). The during-maintenance event was restricted the period surrounding dredging activities (i.e.

September - February). Despite this difference in most abundant taxa, the top three taxa observed in the majority of the during-maintenance events were also collected during the pre-project event. In addition, the percent three most abundant taxa, percent intolerant individuals, percent sensitive EPT taxa, dominant FFG, were all similar between the pre- and during-maintenance events.

Diversity of the during-maintenance benthic community was found to be slightly higher than that observed at the pre-project collection event. The mean pre-project MRI was 0.69 (field replicate range 0.37 - 0.96), while the mean MRI of the three during-maintenance events was 0.82 (field replicate range 0.36 – 1.52). Likewise, the mean pre-project SWI was 0.19 (field replicate range 0.06 - 0.34), while the mean SWI of the three during-maintenance events was 0.43 (field replicate range 0.30 – 0.60).

The mean benthic community HBI score for each of the three during-maintenance events ranged from 7.95 to 9.31 (overall mean = 8.43). The mean pre-project HBI score was slightly higher at 9.72, indicating a somewhat more pollution tolerant community. While the overall HBI score represents the mean pollution tolerance of the taxa present, as previously mentioned, the shift in the taxa present is likely a reflection of the season in which the samples were collected, rather than a fundamental change in the benthic community.

These metrics will continue to be monitored across future dredging activity and compared to both pre-project and previous maintenance events.

4.0 QUALITY ASSURANCE/QUALITY CONTROL

The data presented has been reviewed in accordance with the AMEC internal quality assurance program and are deemed acceptable for reporting. Identified deviations from the protocol are discussed below, or are otherwise considered minor with no likely effect upon the assessment.

4.1 Benthic Macroinvertebrate Identification

EcoAnalysts, Inc. performed taxonomic identification and metric calculations. Quality Assurance measures included re-sorting a minimum of 20 percent of each sample to determine sorting efficacy (which exceeded 94 percent in each case). In addition, 10 percent of samples were completely re-sorted. Surface Water Ambient Monitoring Program (SWAMP) methods under the Standard Taxonomic Effort Level 2 requires sorting random aliquots of a sample until a minimum of 600 ± 10% individuals are obtained, or sorting the entire sample if <600 individuals are acquired. None of the samples reached the 600 individuals goal, and therefore the entire sample was sorted.

5.0 SUMMARY AND NEXT STEPS

5.1 Summary

This report summarizes the results of benthic biological community monitoring during the first dredge maintenance activity of the Tijuana River Valley Channel Maintenance Project 09C-077. The biological sampling station was located downstream of the proposed dredging impact area and was performed prior to, during, and after dredging activity. The benthic community results reported in this document will be retained for comparison during future maintenance dredging activities.

5.1.1 Biological Monitoring

Results from the current biological monitoring events indicate a benthic community that is highly tolerant to disturbance. The low diversity, high HBI scores, and dominance of two FFGs point to a biological community that may be responding to one or more stressors.

The tidal influence present at the downstream Pilot Channel location likely affects the types of organisms that can survive there. Increased TDS/Conductivity is one of the factors used in generating the HBI scores. The limited community, with few taxa, and high average HBI score observed at this station may be indicative of stress due to fluctuations in salinity known to occur at this location due to tidal influx, as have been recorded in the current water quality measures, and as has been documented in the initial reconnaissance siting technical memo (AMEC 2013a). While it is difficult to tease apart natural versus anthropogenic impacts to ambient biological conditions at a station with physical characteristics such as this, there appears to be little difference in the benthic community relative to the May 2013 pre-project initial biological assessment (AMEC 2013b), or between the three distinct sampling events associated with the first dredge maintenance event.

Continued biological monitoring at this location in association with future dredging operations should provide an assessment of the biological community and how/if it is changing in response to the ongoing maintenance dredging.

5.2 Next Steps

A biological monitoring event is scheduled to occur when the maintenance dredging program resumes. Biologic monitoring will continue to be performed in accordance with the provisions outlined in the 401 water quality certification.

6.0 REFERENCES

AMEC. 2013a. Memo - Updates to Siting of Bioassessment Collections for the Tijuana River Receiving Water Dredge Maintenance Project. June.

AMEC. 2013b. Tijuana River Valley Channel Maintenance Project Receiving Water Monitoring Report Pre-Project Initial Assessment - Biological Report Addendum. October.

AMEC. 2014. Tijuana River Valley Channel Maintenance Project Receiving Water Monitoring Report Year One Maintenance Event, May.

Hershler, R., C. Davis, C. Kitting, and H. Liu. 2007. Discovery of introduced and cryptogenic cochliopid gastropods in the San Francisco Estuary, California. Journal of Molluscan Studies. Vol. 73(4):323-332.

Hilsenhoff, W.L. 1977. Use of arthropods to evaluate water quality of streams. Tech. Bull. Wisconsin Dept. Nat. Resour. 100. 15pp.

Hilsenhoff, W.L. 1982. Using a Biotic Index to Evaluate Water Quality in Streams. Tech. Bull. Wisc. Dept. Nat. Res. 132p.

Hilsenhoff, WL. 1987. An improved biotic index of organic stream pollution. The Great Lakes Entomologist 20:31–37.

Hilsenhoff, W.L. 1998. A modification of the biotic index of organic stream pollution to remedy problems and permit its use throughout the year. Great Lakes Entomologist. 33:1-12.

Hooper, A. E. 1993. Effects of season, habitat, and an impoundment on twenty-five benthic community measures used to assess water quality. University of Wisconsin Stevens Point Masters Thesis.

Kellogg, M.G. 1985. Contributions to our Knowedge of *Tryonia imitator* (Pilsbry, 1899). 78 pages. Master's thesis, Department of Biology, San Francisco State University, California.

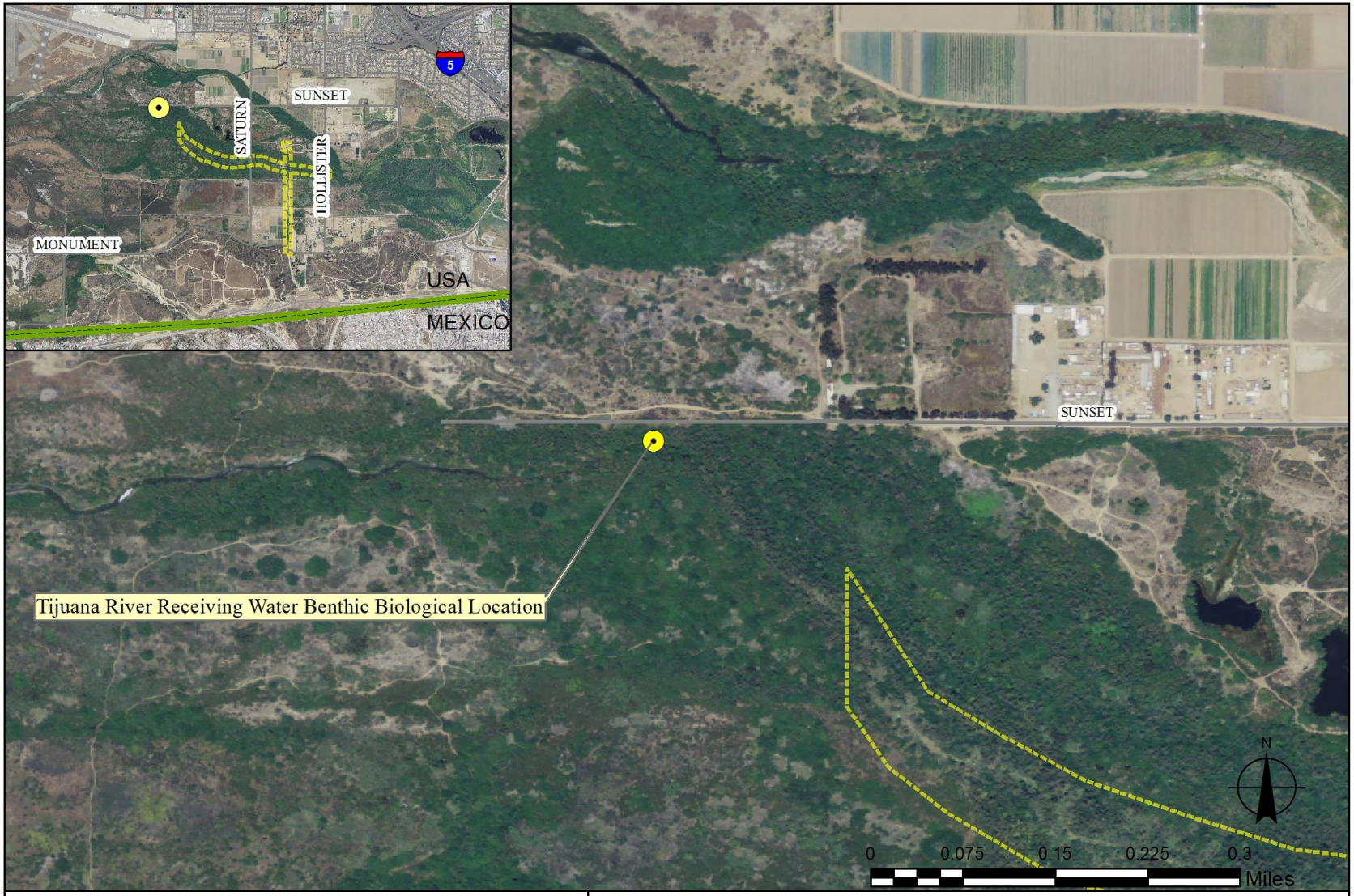
Linke, S., R.C. Bailey, and J. Schwindt. 1999. Temporal variability of stream bioassessments using benthic macroinvertebrates. Freshwater Biology. 42(3):575-584.

SDRWQCB. 2012. Action on Request for Amendment to Clean Water Act Section 401 Water Quality Certification for Tijuana River Valley Channel Maintenance Project, 09C-077. April.

Thompson, F.G. 1968. The Aquatic Snails of the Family Hydrobiidae of Peninsular Florida, xv + 268 pages. Gainesville: University of Florida Press.

Washington, H.G. (1984). Diversity, biotic and similarity indices: a review with special relevance to aquatic ecosystems. Water Research. 18; 653-694.

APPENDIX A
FIGURES



Legend

- Project Boundary
- Roads
- Monitoring Location

Figure 1. Tijuana River Receiving Water Benthic Biological Location

Map Notes

Produced for Tijuana River Receiving Waters Initial Baseline Report
Project Number: 5025131056
Date: October 2013

amec

APPENDIX B
PHOTO LOG

Tijuana River Pilot Channel Downstream Station – Biological Collection Location looking upstream September 2013

Tijuana River Pilot Channel Downstream Station – Biological Collection Location looking downstream September 2013

Tijuana River Pilot Channel Downstream Station – Biological Collection Location looking upstream October 2013

Tijuana River Pilot Channel Downstream Station – Biological Collection Location looking downstream October 2013

Tijuana River Pilot Channel Downstream Station – Biological Collection Location looking upstream February 2014

Tijuana River Pilot Channel Downstream Station – Biological Collection Location looking downstream February 2014

APPENDIX C
BIOLOGICAL SAMPLING FIELD SHEETS

City of San Diego
~~Bacteria TMDL Monitoring~~ TJ River Monitoring
AMEC Project No. ~~6025121040~~ 5025131056

Tijuana River
Scripps Watershed
~~October 2012~~
Sept. 2013

Field Data Log Sheet

Site ID	TJPC-D	Longitude	32.5580	Field Crew	TA, JR	Date	9/10/13
Location	Downstream PC	Latitude	-117.1035	Site Specific Event	DC-09162013	Time	1230

ATMOSPHERIC/OCEANIC & SITE CONDITIONS

Weather	(Sunny)	(Partly Cloudy)	Overcast	Fog	Raining	Drizzle	
Last Rain	> 72 Hours	< 72 Hours	Rainfall	(None)	< 0.1"	> 0.1"	
Tide	High	Mid	Low	Rising ↑	(Falling) ↓	Ht. 1.3	

SAMPLE CHARACTERISTICS

Odor	None	(Musty)	Rotten Eggs	Chemical	Sewage	Other	
Color	None	Yellow	Brown	White	Gray	(Other) Light brn Tint	
Clarity	(Clear)	Slightly Cloudy	Opaque	Other			
Floatables	None	Trash	Bubbles/Foam	Sheen	(Other) Algal Clumps		
Deposits	(None)	Sediment/Gravel	Fine Particles	Stains	Oily Deposits	Other	
Vegetation	None	(Limited)	Normal	Excessive	Other		
Biology	None	Insects	(Algae)	Snail	Seaweed	Mollusk	Crustacean	Other

FLOW OBSERVED?

Yes	✓	No	
Ponded		Tidal	✓

ESTIMATED FLOW

Width (ft)	3.5 ft	Velocity (ft/sec)	0.5 ft/sec
Depth (ft)	4 inches	Flow (ft3/sec)	

FIELD MEASUREMENTS SALINITY - 5.7 DO% 34.4

Temp	21.2	Sp Cond (µS/cm)	9400	Turbidity (NTU)	7.04	DO (mg/L)	2.51	pH	7.3 mg/L

SAMPLE COLLECTION

Sample Type	Date	Time	Sample ID
Primary	9/10/13	1230	DC-TJPCD-09162013-01 (MS/MSD)
F. Dup	9/10/13	1230	DC-TJPCD-09162013-02

POST EVENT DATA

Sample Count	2	Photos Taken?	(0) N	Photo Count	2

NOTES/COMMENTS

Extra Volume Collected for MS/MSD

Sediment Sampling Fieldsheet for Tijuana River Estuary

amec

Date: 9/16/13
Personnel: TA JR
Weather: Clear, Hot
Time / Height low tide: 13:38 / 1.3
Time / Height high tide: 08:00 / 5.3

Station ID	Time	Grab #	Water Depth (m)	Penetration Depth (cm)	% Surface Intact	Overlying Water (Y/N)?	Acceptable (Y/N)?*	Sed Type	Color	Odor	Photo ID
Rep1 → TJPCD 091613 -1	1100	1	0.1	7	90	Y	Y	Sand	Grey Black	Musty	
TJPCD-091613-2	1120	2	0.1	6	95	Y	Y	Sand	Grey Black	Musty	
TJPCD-091613-3	1135	3	0.1	7	95	Y	Y	Sand	Grey Black	Musty	

* Acceptability criteria: minimum 5-cm penetration, even sample surface, minimal disturbance/high % surface intact, overlying water present
** Record all grab attempts

Notes:

City of San Diego
~~Bacteria TMDL Monitoring~~ TJ River Monitoring
AMEC Project No. ~~5025121040~~ 5025131046

Tijuana River
~~Scripps~~ Watershed
October ~~2012~~ 2013

Field Data Log Sheet

Site ID	TJ-PCD	**Longitude**	32.5580	**Field Crew**	TA, JR	**Date**	10/17/13
Location	MAIN-DS	**Latitude**	-117.1035	**Site Specific Event**	DC-101713	**Time**	1255

ATMOSPHERIC/OCEANIC & SITE CONDITIONS

Weather	(Sunny)	Partly Cloudy	Overcast	Fog	Raining	Drizzle	
Last Rain	~~>72 Hours~~	< 72 Hours	**Rainfall**	(None)	< 0.1"	> 0.1"	
Tide	High	(Mid)	Low	Rising ↑	(Falling ↓)	Ht.	

SAMPLE CHARACTERISTICS

Odor	None	(Musty)	Rotten Eggs	Chemical	Sewage	Other	
Color	(None)	Yellow	Brown	White	Gray	Other	
Clarity	(Clear)	Slightly Cloudy	Opaque	Other	Slightly Milky		
Floatables	None	Trash	Bubbles/Foam	Sheen	Other	Organic	
Deposits	(None)	Sediment/Gravel	Fine Particles	Stains	Oily Deposits	Other	
Vegetation	None	(Limited)	(Normal)	Excessive	Other		
Biology	None	(Insects)	Algae	Snail	Seaweed	Mollusk	Crustacean	Other

FLOW OBSERVED?				**ESTIMATED FLOW**			
Yes	✓	No		Width (ft)	4	Velocity (ft/sec)	<0.1
Ponded		Tidal	✓	Depth (ft)	0.3	Flow (ft3/sec)	

FIELD MEASUREMENTS

Temp	15.3	**Sp Cond** (~~uS/cm~~ mS/cm)	29.5	**Turbidity (NTU)**	7.8	**DO (mg/L)**	0.9	**pH**	7.48

SAMPLE COLLECTION

Sample Type	Date	Time	Sample ID
H2O	10/17/13	1255	DC-TJPCD-101713-01

POST EVENT DATA

Sample Count	#1	**Photos Taken?**	(Y) N	**Photo Count**	

NOTES/COMMENTS

High Tide receding = High Conductivity reading

Sediment Sampling Fieldsheet for Tijuana River Estuary

amec

Date: 10/17/2013
Personnel: JR, TA
Weather: Clear
Time / Height low tide: 08:35 / 6.5
Time / Height high tide: 15:02 / -0.09

	Station ID	Time	Grab #	Water Depth (inch)	Penetration Depth (cm)	% Surface Intact	Overlying Water (Y/N)?	Acceptable (Y/N)?*	Sed Type	Color	Odor	Photo ID
(1)	TJ-PC-D-01	1330	1	6"	2"	100	Y	Y	Silt	Black Bottom	mild	100-0025
										Brn Top		100-0030
(2)	TJ-PC-D-02	1400	1	6"	3"	100	Y	Y	Sand	Brn Top Grey below	"	100-0031
												100-0033
(3)	TJ-PC-D-03	1420	1	5"	3"	100	Y	Y	Sand	"	"	100-0035
												100-0036

* Acceptability criteria: minimum 5-cm penetration, even sample surface, minimal disturbance/high % surface intact, overlying water present
** Record all grab attempts

Notes: 1st A Grab Sample Pics → Grab #1

City of San Diego TJ River Monitoring
~~Bacteria TMDL Monitoring~~
AMEC Project No. ~~5025121040~~ 5025131056

Tijuana River
~~Scripps~~ Watershed
~~October 2012~~ February 2014

Field Data Log Sheet

Site ID	DC-TJPCD	**Longitude**	32.5580	**Field Crew**	JH/JR	**Date**	2/25/14
Location	TJRCD	**Latitude**	-117.1035	**Site Specific Event**		**Time**	1345

ATMOSPHERIC/OCEANIC & SITE CONDITIONS

Weather	(Sunny)	Partly Cloudy	Overcast	Fog	Raining	Drizzle	
Last Rain	(> 72 Hours)	< 72 Hours	**Rainfall**	(None)	< 0.1"	> 0.1"	
Tide	High	Mid	(Low)	Rising ↑	(Falling ↓)	Ht.____	

/slack?

SAMPLE CHARACTERISTICS

Odor	None	(Musty)	Rotten Eggs	Chemical	Sewage	Other____	
Color	None	(Yellow)	Brown	White	Gray	Other____	
Clarity	(Clear)	Slightly Cloudy	Opaque	Other____			
Floatables	(None)	Trash	Bubbles/Foam	Sheen	Other____		
Deposits	None	(Sediment/Gravel)	Fine Particles	Stains	Oily Deposits	Other____	
Vegetation	None	(Limited)	Normal	Excessive	Other____		
Biology	(None)	Insects	Algae	Snail	Seaweed	Mollusk	Crustacean	Other____

FLOW OBSERVED?

Yes	X	No	
Ponded		Tidal	X

ESTIMATED FLOW

Width (ft)	2.5	Velocity (ft/sec)	0.8
Depth (ft)	0.3	Flow (ft3/sec)	

FIELD MEASUREMENTS

Sal = 2.4ppt

DO% ~~150.5%~~ 50.5%

Temp	17.1°C	**Sp Cond (µS/cm)**	4446 mS/cm	**Turbidity (NTU)**	7.1 NTU	**DO (mg/L)**	~~8.0 mg/L~~ 4.9 mg/L	**pH**	7.3 pH

SAMPLE COLLECTION

Sample Type	Date	Time	Sample ID
Water	2/25/14	1345	

POST EVENT DATA

Sample Count | **Photos Taken?** (Y) N | **Photo Count**

NOTES/COMMENTS

6 bottles, 2 field filtered.

Sediment Sampling Fieldsheet for Tijuana River Estuary

amec

Date: 2/25/2014
Personnel: JR, TH
Weather: Clear
Time / Height low tide: 12:40 / -0.8
Time / Height high tide: 05:35 / 5.9

Station ID	Time	Grab #	Water Depth (m)	Penetration Depth (cm)	% Surface Intact	Overlying Water (Y/N)?	Acceptable (Y/N)?*	Sed Type	Color	Odor	Photo ID
3 jars 1 jar DC-TJPCD-1	1415	1	.05m	8cm	100%	y	y	silt	grey/black	sulfide	yes.
DC-TJPCD-2	1435	1	.05m	6cm	100%	y	y	sand (med)	gray	minor organic	yes.
DC-TJPCD-3	1500	1	0.05m	6cm	100%	y	y	mix of silts + sand	gray	musty	yes

* Acceptability criteria: minimum 5-cm penetration, even sample surface, minimal disturbance/high % surface intact, overlying water present
** Record all grab attempts

Notes:

@ DC-TJPCD-3 observed 2 chironimids and a Tryonix imitator snail

site 3 is most up stream / Towards trailhead.

APPENDIX D
BENTHIC TAXONOMY LAB REPORT

ECOANALYSTS, INC.

LIFE IN WATER

Project Name: AMEC-Merkel&Associates Tijuana River SWAMP Benthos 2013 (Batch2)

Project Contact: John Rudolph
AMEC Environment & Infrastructure
9177 Sky Park Court
San Diego, CA 92123

EcoAnalysts Project: 6514.2

Report Date: April 14, 2014

Report Declaration:

Six benthic macroinvertebrate samples collected from the Tijuana River sites in September and October 2013 were received at EcoAnalysts, Inc. on January 14, 2014 and processed according to SWAMP protocols. Following are the processing results complete and accurate to the best of our knowledge.

Approved By _____
(Senior Taxonomist)

_____
(Project Coordinator)

Approval Date 4/14/2014

AMEC-Merkel&Associates Tijuana River SWAMP Benthos 2013 (Batch2)
Sort Report

EcoAnalysts, Inc.

EcoA Sample ID	Sample ID	Time	Collection Date	Sorter	Sort Date	% Subsampled	Primary Matrix	Estimated Pre-Rinse Volume (L)	Estimated Post-Rinse Volume (L)	QC Sorter	QC Date	Estimated %Recovery1	Estimated %Recovery2	Estimated %Recovery3
6514.2-1	DC-TJPCD-091613-01	11:00	09/16/2013	Nora Williams	04/03/2014	100.00	Inorganic	0.35	0.05	Megan Payne	04/04/2014	100.00	N/A	N/A
6514.2-2	DC-TJPCD-091613-02	11:20	09/16/2013	Nora Williams	04/03/2014	100.00	Coarse Organic	0.35	0.20	Megan Payne	04/04/2014	100.00	N/A	N/A
6514.2-3	DC-TJPCD-091613-03	11:35	09/16/2013	Nora Williams	04/09/2014	100.00	Filamentous Algae	0.60	0.50	Megan Payne	04/10/2014	95.96	N/A	N/A
6514.2-4	DC-TJPCD-101713-01	---	10/17/2013	Bryce Nance	04/10/2014	100.00	Coarse Organic	1.20	1.10	Nora Williams	04/10/2014	100.00	N/A	N/A
6514.2-5	DC-TJPCD-101713-02	---	10/17/2013	Bryce Nance	04/09/2014	100.00	Inorganic	0.20	0.05	Nora Williams	04/10/2014	100.00	N/A	N/A
6514.2-6	DC-TJPCD-101713-03	---	10/17/2013	Nora Williams	04/09/2014	100.00	Inorganic	0.85	0.10	Carolyn Connelly	04/10/2014	94.92	N/A	N/A

AMEC-Merkel&Associates Tijuana River SWAMP Benthos
2013 (Batch2)
No subsampling was done in the lab

EcoAnalysts, Inc.

	Sample ID	DC-TJPCD-091613-01	DC-TJPCD-091613-02	DC-TJPCD-091613-03	DC-TJPCD-101713-01
	Time	11:00	11:20	11:35	---
	Collection Date	09-16-2013	09-16-2013	09-16-2013	10-17-2013
	Percent Subsampled	100.00	100.00	100.00	100.00
	EcoAnalysts Sample ID	6514.2-1	6514.2-2	6514.2-3	6514.2-4
Hemiptera	Trichocorixa sp.	0	0	0	1
Diptera-Chironomidae	Pseudosmittia sp.	0	0	0	0
Diptera	Dasyhelea sp.	0	0	0	0
	Psychoda sp.	0	1	0	1
	Psychodidae	0	0	0	0
Lepidoptera	Lepidoptera	0	0	0	0
Annelida-Oligochaeta	Oligochaeta	6	30	50	4
Mollusca-Gastropoda	Tryonia sp.	8	14	194	7
Crustacea-Amphipoda	Hyalella sp.	0	0	0	1
Crustacea-Ostracoda	Ostracoda	24	10	29	0
	TOTAL	**38**	**55**	**273**	**14**

AMEC-Merkel&Associates Tijuana River SWAMP Benthos
2013 (Batch2)
No subsampling was done in the lab

EcoAnalysts, Inc.

	Sample ID	DC-TJPCD-101713-02	DC-TJPCD-101713-03
	Time	---	---
	Collection Date	10-17-2013	10-17-2013
	Percent Subsampled	100.00	100.00
	EcoAnalysts Sample ID	6514.2-5	6514.2-6
Hemiptera	Trichocorixa sp.	0	0
Diptera-Chironomidae	Pseudosmittia sp.	0	1
Diptera	Dasyhelea sp.	0	1
	Psychoda sp.	0	20
	Psychodidae	0	1
Lepidoptera	Lepidoptera	1	0
Annelida-Oligochaeta	Oligochaeta	7	81
Mollusca-Gastropoda	Tryonia sp.	1	1
Crustacea-Amphipoda	Hyalella sp.	0	0
Crustacea-Ostracoda	Ostracoda	0	9
	TOTAL	9	114

AMEC-Merkel&Associates Tijuana River SWAMP Benthos
2013 (Batch2)
No subsampling was done in the lab
****Calculations use EcoAnalysts Inc. standard attributes****

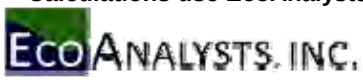
Sample ID	DC-TJPCD-091613-01	DC-TJPCD-091613-02
Time	11:00	11:20
Collection Date	09-16-2013	09-16-2013
Percent Subsampled	100.00	100.00
EcoAnalysts Sample ID	6514.2-1	6514.2-2
Abundance Measures		
Abundance	38.00	55.00
EPT Abundance	0.00	0.00
Dominance Measures		
Dominant Taxon	Ostracoda	Oligochaeta
Dominant Abundance	24.00	30.00
2nd Dominant Taxa	Tryonia sp.	Tryonia sp.
2nd Dominant Abundance	8.00	14.00
3rd Dominant Taxa	Oligochaeta	Ostracoda
3rd Dominant Abundance	6.00	10.00
% Dominant Taxon	63.16	54.55
% 2 Dominant Taxa	84.21	80.00
% 3 Dominant Taxa	100.00	98.18
Richness Measures		
Species Richness	3.00	4.00
EPT Richness	0.00	0.00
Ephemeroptera Richness	0.00	0.00
Plecoptera Richness	0.00	0.00
Trichoptera Richness	0.00	0.00
Chironomidae Richness	0.00	0.00
Oligochaeta Richness	1.00	1.00
Non-Chiro. Non-Olig. Richness	2.00	3.00
Rhyacophila Richness	0.00	0.00
Community Composition		
% Ephemeroptera	0.00	0.00
% Plecoptera	0.00	0.00
% Trichoptera	0.00	0.00
% EPT	0.00	0.00
% Coleoptera	0.00	0.00
% Diptera	0.00	1.82
% Oligochaeta	15.79	54.55
% Baetidae	0.00	0.00
% Brachycentridae	0.00	0.00
% Chironomidae	0.00	0.00
% Ephemerellidae	0.00	0.00
% Hydropsychidae	0.00	0.00
% Odonata	0.00	0.00
% Perlidae	0.00	0.00
% Pteronarcyidae	0.00	0.00
% Simuliidae	0.00	0.00
Functional Group Composition		
% Filterers	0.00	0.00
% Gatherers	78.95	74.55
% Predators	0.00	0.00
% Scrapers	0.00	0.00
% Shredders	0.00	0.00
% Piercer-Herbivores	0.00	0.00
% Unclassified	21.05	25.45

AMEC-Merkel&Associates Tijuana River SWAMP Benthos
2013 (Batch2)
No subsampling was done in the lab
****Calculations use EcoAnalysts Inc. standard attributes****

EcoAnalysts, Inc.

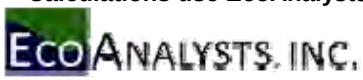
Sample ID	DC-TJPCD-091613-01	DC-TJPCD-091613-02
Time	11:00	11:20
Collection Date	09-16-2013	09-16-2013
Percent Subsampled	100.00	100.00
EcoAnalysts Sample ID	6514.2-1	6514.2-2
Filterer Richness	0.00	0.00
Gatherer Richness	2.00	3.00
Predator Richness	0.00	0.00
Scraper Richness	0.00	0.00
Shredder Richness	0.00	0.00
Piercer-Herbivore Richness	0.00	0.00
Unclassified	1.00	1.00
Diversity/Evenness Measures		
Shannon-Weaver H' (log 10)	0.40	0.46
Shannon-Weaver H' (log 2)	1.31	1.53
Shannon-Weaver H' (log e)	0.91	1.06
Margalef's Richness	0.55	0.75
Pielou's J'	0.83	0.77
Simpson's Heterogeneity	0.55	0.62
Biotic Indices		
% Indiv. w/ HBI Value	78.95	74.55
Hilsenhoff Biotic Index	8.00	8.05
% Indiv. w/ MTI Value	0.00	0.00
Metals Tolerance Index	0.00	0.00
% Indiv. w/ FSBI Value	0.00	0.00
Fine Sediment Biotic Index	N/A	N/A
FSBI - average	N/A	N/A
FSBI - weighted average	N/A	N/A
% Indiv. w/ TPM Value	0.00	0.00
Temp. Pref. Metric - average	N/A	N/A
TPM - weighted average	N/A	N/A
Karr BIBI Metrics		
Long-Lived Taxa Richness	0.00	0.00
Clinger Richness	0.00	0.00
% Clingers	0.00	0.00
Intolerant Taxa Richness	0.00	0.00
% Tolerant Individuals	100.00	100.00
% Tolerant Taxa	66.67	75.00
Coleoptera Richness	0.00	0.00
Montana DEQ Metrics		
MT Biotic Index	8.00	8.05
C-Gatherers + C-Filterers	78.95	74.55
% Scraper + % Shredder	0.00	0.00
% Univoltine	0.00	0.00
% Multivoltine	63.16	20.00
% Semivoltine	0.00	0.00
Community Tolerance Quotient	N/A	N/A
% Hydropsychinae	0.00	0.00
Lake Metrics		
% Orthocladiinae	0.00	0.00
Orthocladiinae Richness	0.00	0.00
% Chironomini	0.00	0.00
Chironomini Richness	0.00	0.00

AMEC-Merkel&Associates Tijuana River SWAMP Benthos 2013 (Batch2)
No subsampling was done in the lab
****Calculations use EcoAnalysts Inc. standard attributes****



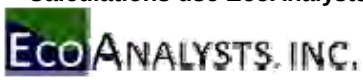
Sample ID	DC-TJPCD-091613-01	DC-TJPCD-091613-02
Time	11:00	11:20
Collection Date	09-16-2013	09-16-2013
Percent Subsampled	100.00	100.00
EcoAnalysts Sample ID	6514.2-1	6514.2-2
% Tanytarsini	0.00	0.00
% Chironomus	0.00	0.00
% Tanytarsus	0.00	0.00
% Dicrotendipes	0.00	0.00
% Dicrotendipes + Chironomus	0.00	0.00
% Corbicula	0.00	0.00
% Manayunkia speciosa	0.00	0.00
% Intolerant	0.00	0.00
% Intolerant Indiv. (S.CA)	0.00	0.00
% Individuals w/ CAHBI value	78.95	72.73
% Intolerant Indiv. (CAHBI)	0.00	0.00
% Sensitive EPT (CAHBI)	0.00	0.00
% Non-Insect Individuals (S.CA)	100.00	98.18
% Non-Insect Taxa	100.00	75.00
% Crustacea + Mollusca	84.21	43.64
Average Abundance (per Taxon)	12.67	13.75
NYDEC PMA Metrics		
% Crustacea	63.16	18.18
% Mollusca	21.05	25.45
% Non-Chironomidae	0.00	1.82

AMEC-Merkel&Associates Tijuana River SWAMP Benthos
2013 (Batch2)
No subsampling was done in the lab
****Calculations use EcoAnalysts Inc. standard attributes****



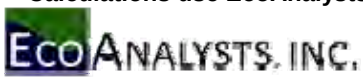
Sample ID	DC-TJPCD-091613-03	DC-TJPCD-101713-01
Time	11:35	---
Collection Date	09-16-2013	10-17-2013
Percent Subsampled	100.00	100.00
EcoAnalysts Sample ID	6514.2-3	6514.2-4
Abundance Measures		
Abundance	273.00	14.00
EPT Abundance	0.00	0.00
Dominance Measures		
Dominant Taxon	Tryonia sp.	Tryonia sp.
Dominant Abundance	194.00	7.00
2nd Dominant Taxa	Oligochaeta	Oligochaeta
2nd Dominant Abundance	50.00	4.00
3rd Dominant Taxa	Ostracoda	Hyalella sp.
3rd Dominant Abundance	29.00	1.00
% Dominant Taxon	71.06	50.00
% 2 Dominant Taxa	89.38	78.57
% 3 Dominant Taxa	100.00	85.71
Richness Measures		
Species Richness	3.00	5.00
EPT Richness	0.00	0.00
Ephemeroptera Richness	0.00	0.00
Plecoptera Richness	0.00	0.00
Trichoptera Richness	0.00	0.00
Chironomidae Richness	0.00	0.00
Oligochaeta Richness	1.00	1.00
Non-Chiro. Non-Olig. Richness	2.00	4.00
Rhyacophila Richness	0.00	0.00
Community Composition		
% Ephemeroptera	0.00	0.00
% Plecoptera	0.00	0.00
% Trichoptera	0.00	0.00
% EPT	0.00	0.00
% Coleoptera	0.00	0.00
% Diptera	0.00	7.14
% Oligochaeta	18.32	28.57
% Baetidae	0.00	0.00
% Brachycentridae	0.00	0.00
% Chironomidae	0.00	0.00
% Ephemerellidae	0.00	0.00
% Hydropsychidae	0.00	0.00
% Odonata	0.00	0.00
% Perlidae	0.00	0.00
% Pteronarcyidae	0.00	0.00
% Simuliidae	0.00	0.00
Functional Group Composition		
% Filterers	0.00	0.00
% Gatherers	28.94	42.86
% Predators	0.00	7.14
% Scrapers	0.00	0.00
% Shredders	0.00	0.00
% Piercer-Herbivores	0.00	0.00
% Unclassified	71.06	50.00

AMEC-Merkel&Associates Tijuana River SWAMP Benthos
2013 (Batch2)
No subsampling was done in the lab
****Calculations use EcoAnalysts Inc. standard attributes****



Sample ID	DC-TJPCD-091613-03	DC-TJPCD-101713-01
Time	11:35	---
Collection Date	09-16-2013	10-17-2013
Percent Subsampled	100.00	100.00
EcoAnalysts Sample ID	6514.2-3	6514.2-4
Filterer Richness	0.00	0.00
Gatherer Richness	2.00	3.00
Predator Richness	0.00	1.00
Scraper Richness	0.00	0.00
Shredder Richness	0.00	0.00
Piercer-Herbivore Richness	0.00	0.00
Unclassified	1.00	1.00
Diversity/Evenness Measures		
Shannon-Weaver H' (log 10)	0.34	0.55
Shannon-Weaver H' (log 2)	1.14	1.83
Shannon-Weaver H' (log e)	0.79	1.27
Margalef's Richness	0.36	1.52
Pielou's J'	0.72	0.79
Simpson's Heterogeneity	0.45	0.70
Biotic Indices		
% Indiv. w/ HBI Value	28.94	50.00
Hilsenhoff Biotic Index	8.00	7.86
% Indiv. w/ MTI Value	0.00	0.00
Metals Tolerance Index	0.00	0.00
% Indiv. w/ FSBI Value	0.00	0.00
Fine Sediment Biotic Index	N/A	N/A
FSBI - average	N/A	N/A
FSBI - weighted average	N/A	N/A
% Indiv. w/ TPM Value	0.00	7.14
Temp. Pref. Metric - average	N/A	0.40
TPM - weighted average	N/A	2.00
Karr BIBI Metrics		
Long-Lived Taxa Richness	0.00	0.00
Clinger Richness	0.00	0.00
% Clingers	0.00	0.00
Intolerant Taxa Richness	0.00	0.00
% Tolerant Individuals	100.00	85.71
% Tolerant Taxa	66.67	60.00
Coleoptera Richness	0.00	0.00
Montana DEQ Metrics		
MT Biotic Index	8.00	7.86
C-Gatherers + C-Filterers	28.94	42.86
% Scraper + % Shredder	0.00	0.00
% Univoltine	0.00	0.00
% Multivoltine	10.62	14.29
% Semivoltine	0.00	0.00
Community Tolerance Quotient	N/A	N/A
% Hydropsychinae	0.00	0.00
Lake Metrics		
% Orthocladiinae	0.00	0.00
Orthocladiinae Richness	0.00	0.00
% Chironomini	0.00	0.00
Chironomini Richness	0.00	0.00

AMEC-Merkel&Associates Tijuana River SWAMP Benthos 2013 (Batch2)
No subsampling was done in the lab
****Calculations use EcoAnalysts Inc. standard attributes****



Sample ID	DC-TJPCD-091613-03	DC-TJPCD-101713-01
Time	11:35	---
Collection Date	09-16-2013	10-17-2013
Percent Subsampled	100.00	100.00
EcoAnalysts Sample ID	6514.2-3	6514.2-4
% Tanytarsini	0.00	0.00
% Chironomus	0.00	0.00
% Tanytarsus	0.00	0.00
% Dicrotendipes	0.00	0.00
% Dicrotendipes + Chironomus	0.00	0.00
% Corbicula	0.00	0.00
% Manayunkia speciosa	0.00	0.00
% Intolerant	0.00	0.00
% Intolerant Indiv. (S.CA)	0.00	0.00
% Individuals w/ CAHBI value	28.94	28.57
% Intolerant Indiv. (CAHBI)	0.00	0.00
% Sensitive EPT (CAHBI)	0.00	0.00
% Non-Insect Individuals (S.CA)	100.00	85.71
% Non-Insect Taxa	100.00	60.00
% Crustacea + Mollusca	81.68	57.14
Average Abundance (per Taxon)	91.00	2.80
NYDEC PMA Metrics		
% Crustacea	10.62	7.14
% Mollusca	71.06	50.00
% Non-Chironomidae	0.00	14.29

AMEC-Merkel&Associates Tijuana River SWAMP Benthos
2013 (Batch2)
No subsampling was done in the lab
****Calculations use EcoAnalysts Inc. standard attributes****

EcoAnalysts, Inc.

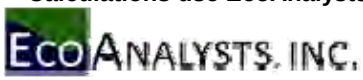
Sample ID	DC-TJPCD-101713-02	DC-TJPCD-101713-03
Time	---	---
Collection Date	10-17-2013	10-17-2013
Percent Subsampled	100.00	100.00
EcoAnalysts Sample ID	6514.2-5	6514.2-6
Abundance Measures		
Abundance	9.00	114.00
EPT Abundance	0.00	0.00
Dominance Measures		
Dominant Taxon	Oligochaeta	Oligochaeta
Dominant Abundance	7.00	81.00
2nd Dominant Taxa	Lepidoptera	Psychoda sp.
2nd Dominant Abundance	1.00	20.00
3rd Dominant Taxa	Tryonia sp.	Ostracoda
3rd Dominant Abundance	1.00	9.00
% Dominant Taxon	77.78	71.05
% 2 Dominant Taxa	88.89	88.60
% 3 Dominant Taxa	100.00	96.49
Richness Measures		
Species Richness	3.00	7.00
EPT Richness	0.00	0.00
Ephemeroptera Richness	0.00	0.00
Plecoptera Richness	0.00	0.00
Trichoptera Richness	0.00	0.00
Chironomidae Richness	0.00	1.00
Oligochaeta Richness	1.00	1.00
Non-Chiro. Non-Olig. Richness	2.00	5.00
Rhyacophila Richness	0.00	0.00
Community Composition		
% Ephemeroptera	0.00	0.00
% Plecoptera	0.00	0.00
% Trichoptera	0.00	0.00
% EPT	0.00	0.00
% Coleoptera	0.00	0.00
% Diptera	0.00	20.18
% Oligochaeta	77.78	71.05
% Baetidae	0.00	0.00
% Brachycentridae	0.00	0.00
% Chironomidae	0.00	0.88
% Ephemerellidae	0.00	0.00
% Hydropsychidae	0.00	0.00
% Odonata	0.00	0.00
% Perlidae	0.00	0.00
% Pteronarcyidae	0.00	0.00
% Simuliidae	0.00	0.00
Functional Group Composition		
% Filterers	0.00	0.00
% Gatherers	77.78	99.12
% Predators	0.00	0.00
% Scrapers	0.00	0.00
% Shredders	11.11	0.00
% Piercer-Herbivores	0.00	0.00
% Unclassified	11.11	0.88

AMEC-Merkel&Associates Tijuana River SWAMP Benthos
2013 (Batch2)
No subsampling was done in the lab
****Calculations use EcoAnalysts Inc. standard attributes****

EcoAnalysts, Inc.

Sample ID	DC-TJPCD-101713-02	DC-TJPCD-101713-03
Time	---	---
Collection Date	10-17-2013	10-17-2013
Percent Subsampled	100.00	100.00
EcoAnalysts Sample ID	6514.2-5	6514.2-6
Filterer Richness	0.00	0.00
Gatherer Richness	1.00	6.00
Predator Richness	0.00	0.00
Scraper Richness	0.00	0.00
Shredder Richness	1.00	0.00
Piercer-Herbivore Richness	0.00	0.00
Unclassified	1.00	1.00
Diversity/Evenness Measures		
Shannon-Weaver H' (log 10)	0.30	0.40
Shannon-Weaver H' (log 2)	0.99	1.32
Shannon-Weaver H' (log e)	0.68	0.91
Margalef's Richness	0.91	1.27
Pielou's J'	0.62	0.47
Simpson's Heterogeneity	0.42	0.46
Biotic Indices		
% Indiv. w/ HBI Value	88.89	98.25
Hilsenhoff Biotic Index	7.62	8.36
% Indiv. w/ MTI Value	0.00	0.00
Metals Tolerance Index	0.00	0.00
% Indiv. w/ FSBI Value	0.00	0.00
Fine Sediment Biotic Index	N/A	N/A
FSBI - average	N/A	N/A
FSBI - weighted average	N/A	N/A
% Indiv. w/ TPM Value	0.00	0.00
Temp. Pref. Metric - average	N/A	N/A
TPM - weighted average	N/A	N/A
Karr BIBI Metrics		
Long-Lived Taxa Richness	0.00	0.00
Clinger Richness	0.00	0.00
% Clingers	0.00	0.00
Intolerant Taxa Richness	0.00	0.00
% Tolerant Individuals	87.50	99.11
% Tolerant Taxa	33.33	57.14
Coleoptera Richness	0.00	0.00
Montana DEQ Metrics		
MT Biotic Index	7.62	8.36
C-Gatherers + C-Filterers	77.78	99.12
% Scraper + % Shredder	11.11	0.00
% Univoltine	0.00	0.00
% Multivoltine	0.00	26.32
% Semivoltine	0.00	0.00
Community Tolerance Quotient	N/A	N/A
% Hydropsychinae	0.00	0.00
Lake Metrics		
% Orthocladiinae	0.00	0.88
Orthocladiinae Richness	0.00	1.00
% Chironomini	0.00	0.00
Chironomini Richness	0.00	0.00

AMEC-Merkel&Associates Tijuana River SWAMP Benthos 2013 (Batch2)
No subsampling was done in the lab
****Calculations use EcoAnalysts Inc. standard attributes****



Sample ID	DC-TJPCD-101713-02	DC-TJPCD-101713-03
Time	---	---
Collection Date	10-17-2013	10-17-2013
Percent Subsampled	100.00	100.00
EcoAnalysts Sample ID	6514.2-5	6514.2-6
% Tanytarsini	0.00	0.00
% Chironomus	0.00	0.00
% Tanytarsus	0.00	0.00
% Dicrotendipes	0.00	0.00
% Dicrotendipes + Chironomus	0.00	0.00
% Corbicula	0.00	0.00
% Manayunkia speciosa	0.00	0.00
% Intolerant	0.00	0.00
% Intolerant Indiv. (S.CA)	0.00	0.00
% Individuals w/ CAHBI value	77.78	79.82
% Intolerant Indiv. (CAHBI)	0.00	0.00
% Sensitive EPT (CAHBI)	0.00	0.00
% Non-Insect Individuals (S.CA)	88.89	79.82
% Non-Insect Taxa	66.67	42.86
% Crustacea + Mollusca	11.11	8.77
Average Abundance (per Taxon)	3.00	16.29
NYDEC PMA Metrics		
% Crustacea	0.00	7.89
% Mollusca	11.11	0.88
% Non-Chironomidae	11.11	19.30

ECOANALYSTS, INC.

LIFE IN WATER

Project Name: AMEC-Merkel&Associates Tijuana River SWAMP Benthos 2013-2014 (Batch3)

Project Contact: John Rudolph
AMEC Environment & Infrastructure
9177 Sky Park Court
San Diego, CA 92123

EcoAnalysts Project: 6514.03

Report Date: June 4, 2014

Report Declaration:

Three benthic macroinvertebrate samples collected from the Tijuana River sites in February 2014 were received at EcoAnalysts, Inc. on March 7, 2014 and processed according to SWAMP protocols. Following are the processing results complete and accurate to the best of our knowledge.

Approved By _____
(Senior Taxonomist)

_____
(Project Coordinator)

Approval Date June 4, 2014

AMEC-Merkel&Associates Tijuana River SWAMP Benthos 2014
Sort Report

ECOANALYSTS, INC.
LIFE IN WATER

EcoA Sample ID	Sample ID	Client ID	Time	Collection Date	Sorter	Sort Date	% Subsampled	Primary Matrix	Estimated Pre-Rinse Volume (L)	Estimated Post-Rinse Volume (L)	QC Sorter	QC Date	Estimated %Recovery 1	Estimated %Recovery 2	Estimated %Recovery 3
6514.03-1	DC-TJPCD-022514-1	Pilot Channel Down 1	14:15	02/25/2014	Nora Williams	05/29/2014	100.00	Coarse Organic	2.05	2.00	Zach Meier	06/03/2014	100.00	N/A	N/A
6514.03-2	DC-TJPCD-022514-2	Pilot Channel Down 2	14:35	02/25/2014	Nora Williams	05/27/2014	100.00	Coarse Organic	0.40	0.20	Zach Meier	06/02/2014	100.00	N/A	N/A
6514.03-3	DC-TJPCD-022514-3	Pilot Channel Down 3	15:00	02/25/2014	Nora Williams	05/28/2014	100.00	Coarse Organic	0.75	0.60	Zach Meier	06/02/2014	100.00	N/A	N/A

AMEC-Merkel&Associates Tijuana River SWAMP Benthos 2014
No Subsampling was done in the lab

EcoAnalysts, Inc.
LIFE IN WATER

	Sample ID	DC-TJPCD-022514-1	DC-TJPCD-022514-2	DC-TJPCD-022514-3
	Client ID	**Pilot Channel Down 1**	**Pilot Channel Down 2**	**Pilot Channel Down 3**
	Time	**14:15**	**14:35**	**15:00**
	Collection Date	**02-25-2014**	**02-25-2014**	**02-25-2014**
	Percent Subsampled	**100.00**	**100.00**	**100.00**
	EcoAnalysts Sample ID	**6514.3-1**	**6514.3-2**	**6514.3-3**
Diptera-Chironomidae	Chironomus sp.	19	18	46
	Stempellinella sp.	1	0	0
Diptera	Diptera	0	8	16
Annelida-Oligochaeta	Oligochaeta	3	12	0
Mollusca-Gastropoda	Tryonia sp.	33	14	22
Crustacea-Ostracoda	Ostracoda	0	51	0
	TOTAL	**56**	**103**	**84**

AMEC-Merkel&Associates Tijuana River SWAMP Benthos 2014
No Subsampling was done in the lab
****Calculations use EcoAnalysts Inc. standard attributes****

ECOANALYSTS, INC.
LIFE IN WATER

Sample ID	DC-TJPCD-022514-1	DC-TJPCD-022514-2	DC-TJPCD-022514-3
Client ID	Pilot Channel Down 1	Pilot Channel Down 2	Pilot Channel Down 3
Time	14:15	14:35	15:00
Collection Date	02-25-2014	02-25-2014	02-25-2014
Percent Subsampled	100.00	100.00	100.00
EcoAnalysts Sample ID	6514.3-1	6514.3-2	6514.3-3
Abundance Measures			
Abundance	56.00	103.00	84.00
EPT Abundance	0.00	0.00	0.00
Dominance Measures			
Dominant Taxon	Tryonia sp.	Ostracoda	Chironomus sp.
Dominant Abundance	33.00	51.00	46.00
2nd Dominant Taxa	Chironomus sp.	Chironomus sp.	Tryonia sp.
2nd Dominant Abundance	19.00	18.00	22.00
3rd Dominant Taxa	Oligochaeta	Tryonia sp.	Diptera
3rd Dominant Abundance	3.00	14.00	16.00
% Dominant Taxon	58.93	49.51	54.76
% 2 Dominant Taxa	92.86	66.99	80.95
% 3 Dominant Taxa	98.21	80.58	100.00
Richness Measures			
Species Richness	4.00	5.00	3.00
EPT Richness	0.00	0.00	0.00
Ephemeroptera Richness	0.00	0.00	0.00
Plecoptera Richness	0.00	0.00	0.00
Trichoptera Richness	0.00	0.00	0.00
Chironomidae Richness	2.00	1.00	1.00
Oligochaeta Richness	1.00	1.00	0.00
Non-Chiro. Non-Olig. Richness	1.00	3.00	2.00
Rhyacophila Richness	0.00	0.00	0.00
Community Composition			
% Ephemeroptera	0.00	0.00	0.00
% Plecoptera	0.00	0.00	0.00
% Trichoptera	0.00	0.00	0.00
% EPT	0.00	0.00	0.00
% Coleoptera	0.00	0.00	0.00
% Diptera	35.71	25.24	73.81
% Oligochaeta	5.36	11.65	0.00
% Baetidae	0.00	0.00	0.00
% Brachycentridae	0.00	0.00	0.00
% Chironomidae	35.71	17.48	54.76
% Ephemerellidae	0.00	0.00	0.00
% Hydropsychidae	0.00	0.00	0.00
% Odonata	0.00	0.00	0.00
% Perlidae	0.00	0.00	0.00
% Pteronarcyidae	0.00	0.00	0.00
% Simuliidae	0.00	0.00	0.00
Functional Group Composition			
% Filterers	0.00	0.00	0.00

AMEC-Merkel&Associates Tijuana River SWAMP Benthos 2014
No Subsampling was done in the lab
****Calculations use EcoAnalysts Inc. standard attributes****

ECOANALYSTS, INC.
LIFE IN WATER

Sample ID	DC-TJPCD-022514-1	DC-TJPCD-022514-2	DC-TJPCD-022514-3
Client ID	Pilot Channel Down 1	Pilot Channel Down 2	Pilot Channel Down 3
Time	14:15	14:35	15:00
Collection Date	02-25-2014	02-25-2014	02-25-2014
Percent Subsampled	100.00	100.00	100.00
EcoAnalysts Sample ID	6514.3-1	6514.3-2	6514.3-3
% Gatherers	41.07	78.64	54.76
% Predators	0.00	0.00	0.00
% Scrapers	0.00	0.00	0.00
% Shredders	0.00	0.00	0.00
% Piercer-Herbivores	0.00	0.00	0.00
% Unclassified	58.93	21.36	45.24
Filterer Richness	0.00	0.00	0.00
Gatherer Richness	3.00	3.00	1.00
Predator Richness	0.00	0.00	0.00
Scraper Richness	0.00	0.00	0.00
Shredder Richness	0.00	0.00	0.00
Piercer-Herbivore Richness	0.00	0.00	0.00
Unclassified	1.00	2.00	2.00
Diversity/Evenness Measures			
Shannon-Weaver H' (log 10)	0.39	0.60	0.43
Shannon-Weaver H' (log 2)	1.31	1.98	1.44
Shannon-Weaver H' (log e)	0.91	1.37	1.00
Margalef's Richness	0.75	0.86	0.45
Pielou's J'	0.65	0.85	0.91
Simpson's Heterogeneity	0.54	0.69	0.60
Biotic Indices			
% Indiv. w/ HBI Value	41.07	78.64	54.76
Hilsenhoff Biotic Index	9.48	8.44	10.00
% Indiv. w/ MTI Value	33.93	17.48	54.76
Metals Tolerance Index	4.00	4.00	4.00
% Indiv. w/ FSBI Value	0.00	0.00	0.00
Fine Sediment Biotic Index	N/A	N/A	N/A
FSBI - average	N/A	N/A	N/A
FSBI - weighted average	N/A	N/A	N/A
% Indiv. w/ TPM Value	1.79	0.00	0.00
Temp. Pref. Metric - average	1.50	N/A	N/A
TPM - weighted average	6.00	N/A	N/A
Karr BIBI Metrics			
Long-Lived Taxa Richness	0.00	0.00	0.00
Clinger Richness	0.00	0.00	0.00
% Clingers	0.00	0.00	0.00
Intolerant Taxa Richness	0.00	0.00	0.00
% Tolerant Individuals	13.04	77.78	0.00
% Tolerant Taxa	50.00	60.00	33.33
Coleoptera Richness	0.00	0.00	0.00
Montana DEQ Metrics			
MT Biotic Index	9.48	8.44	10.00

AMEC-Merkel&Associates Tijuana River SWAMP Benthos 2014
No Subsampling was done in the lab
****Calculations use EcoAnalysts Inc. standard attributes****

ECOANALYSTS, INC.
LIFE IN WATER

Sample ID	DC-TJPCD-022514-1	DC-TJPCD-022514-2	DC-TJPCD-022514-3
Client ID	Pilot Channel Down 1	Pilot Channel Down 2	Pilot Channel Down 3
Time	14:15	14:35	15:00
Collection Date	02-25-2014	02-25-2014	02-25-2014
Percent Subsampled	100.00	100.00	100.00
EcoAnalysts Sample ID	6514.3-1	6514.3-2	6514.3-3
C-Gatherers + C-Filterers	41.07	78.64	54.76
% Scraper + % Shredder	0.00	0.00	0.00
% Univoltine	0.00	0.00	0.00
% Multivoltine	33.93	66.99	54.76
% Semivoltine	0.00	0.00	0.00
Community Tolerance Quotient	N/A	N/A	N/A
% Hydropsychinae	0.00	0.00	0.00
Lake Metrics			
% Orthocladiinae	0.00	0.00	0.00
Orthocladiinae Richness	0.00	0.00	0.00
% Chironomini	33.93	17.48	54.76
Chironomini Richness	1.00	1.00	1.00
% Tanytarsini	1.79	0.00	0.00
% Chironomus	33.93	17.48	54.76
% Tanytarsus	0.00	0.00	0.00
% Dicrotendipes	0.00	0.00	0.00
% Dicrotendipes + Chironomus	33.93	17.48	54.76
% Corbicula	0.00	0.00	0.00
% Manayunkia speciosa	0.00	0.00	0.00
% Intolerant	0.00	0.00	0.00
% Intolerant Indiv. (S.CA)	0.00	0.00	0.00
% Individuals w/ CAHBI value	7.14	61.17	0.00
% Intolerant Indiv. (CAHBI)	0.00	0.00	N/A
% Sensitive EPT (CAHBI)	0.00	0.00	N/A
% Non-Insect Individuals (S.CA)	64.29	74.76	26.19
% Non-Insect Taxa	50.00	60.00	33.33
% Crustacea + Mollusca	58.93	63.11	26.19
Average Abundance (per Taxon)	14.00	20.60	28.00
NYDEC PMA Metrics			
% Crustacea	0.00	49.51	0.00
% Mollusca	58.93	13.59	26.19
% Non-Chironomidae	0.00	7.77	19.05

APPENDIX E
CHAIN OF CUSTODY

0514.2

Analysis Request and Chain of Custody

City of San Diego

Tijuana River Receiver Waters Monitoring 2012-2013

From:

AMEC Environment & Infrastructure, Inc.
Attn: Kristina Schneider
9177 Sky Park Court
San Diego, CA 92123
Phone: (858) 278-3600 Fax: (858) 278-5300

To:

Merkel & Associates, Inc.
5435 Ruffin Road
San Diego, CA 92123
Phone: (858) 560-5465
Fax: (858) 560-7779

SampleID	Date	Time	Analyses	Bottle Type	Preservative	Bottle Count
DC BC-TJPCD-091613-01	09/16/13	1100	Benthic Macroinvertebrates	250mL - Polyethylene	70% Ethanol	1
DC BC-TJPCD-091613-02		1120	Benthic Macroinvertebrates	250mL - Polyethylene	70% Ethanol	1
DC BC-TJPCD-091613-03		1135	Benthic Macroinvertebrates	250mL - Polyethylene	70% Ethanol	1

DC TJPCD 101713 01 2 Jars
02 1 Jar
03 1 Jar

Sampler's Initials: TR/TA

Relinquished By: _____ Date/Time: 1/13/14 1048 Received By: _____ Date/Time: 1/13/14 10:48

Relinquished By: _____ Date/Time: 1/13/14 1:35pm Received By: Jennifer Reynolds Date/Time: 1/14/14

RELINQUISHED: Jason Reynolds
ECOANALYSTS, INC.

Page: 1 of 1

6514.03

amec

Chain of Custody

Control Number:

Date: 2/25/2014 Page: 1 of 1

Project Manager: Kristina Schneider	phone: 587-3600	Bill To:	Report To: John Rudolph
		Company:	Company: AMEC
Project Number: 5025131056		Address:	Address: 9177 Sky Park Court, San Diego, CA 92123 (electronic copies only)
Sampler's Name: JR, TH		Lab Use	
QC Level:	TAT: Standard	Preservatives	

Sample Data					Matrix					Analyses
Sample Station ID	Client ID	Date Collected	Time Collected	# Containers	Soil/Sediment	Seawater	Freshwater	Algae	Benthic Macroinverts	600 Count, SAFIT Level 2
DC-TJPCD-022514-1	Pilot Channel Down 1	2/25/2014	1415	3					X	X
DC-TJPCD-022514-2	Pilot Channel Down 2	2/25/2014	1435	1					X	X
DC-TJPCD-022514-3	Pilot Channel Down 3	2/25/2014	1500	1					X	X

Samplers Signature	Date 2/25/14	Time 1615	For Lab Use
Relinquished By:	Date 3/5/14	Time 1130	Lab No.:
Received By:	Date 3/5/14	Time 11:30	Does COC match samples: Y or N Broken container: Y or N Received within holding time: Y or N COC seal intact: Y or N NA
Relinquished By:	Date 3/5/14	Time 1700	Any other problems: Y or N If problems, Amec contacted: Y or N NA
Received By (LAB): Jennifer Reynolds	Date 3/7/14	Time	Date contacted: / / NA Temperature (°C): RM

Comments

Preserved 70% ethanol

City of San Diego Tijuana River Receiving Water Monitoring

RELINQUISHED: Jennifer Reynolds
ECO ANALYSTS, INC.