

**Spring 2010 Follow-Up Habitat Monitoring Report
Associated with the
Temecula Valley Regional Water Reclamation Facility
December 25, 2009 Sewage Spill into Murrieta Creek**

City of Temecula, Riverside County, California
USGS – Murrieta and Temecula topographic quadrangles
Township 8 South, Range 3 West

Prepared for:

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CERTIFICATION: "I hereby certify that the statements furnished herein and in the attached exhibits present the data and information required for this habitat monitoring report, and that the facts, statements, and information presented are true and correct to the best of my knowledge and belief. Fieldwork conducted for this assessment was performed by me or under my direct supervision. I certify that I have not signed a non-disclosure or consultant confidentiality agreement with the project applicant or applicant's representative and that I have no financial interest relative to the spill event."



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Prepared on July 15, 2010

1 Table of Contents

1. Introduction	2
2. Background	2
3. Methods	2
4. Results	3
5. Conclusions.....	6
6. Recommendations	7
7. References	8

Figures (Located at the end of the document)

- Figure 1. Regional Location
- Figure 2. Study Area
- Figure 3. View of habitat conditions within Control Transect 1
- Figure 4. View of habitat conditions within Impact Transect 1
- Figure 5. View of habitat conditions within Impact Transect 2
- Figure 6. View of habitat conditions within Control Transect 2
- Figure 7. View of Aquatic conditions

1. Introduction

Tom Dodson & Associates (TDA) has prepared this habitat monitoring report on behalf of Eastern Municipal Water District (EMWD or District) to relay the findings of a follow-up habitat assessment within the potential impact area of the December 2009 sewage spill into Murrieta Creek from the Temecula Valley Regional Water Reclamation Facility (TVRWRF). The January 25, 2009 Biological Resources Damage Assessment report, prepared by TDA, recommended that the EMWD implement a short-term (2 year, spring time) habitat monitoring program within the spill impact area to identify and mitigate any residual habitat damage.

2. Background

The Eastern Municipal Water District (EMWD or District) operates five regional water reclamation facilities, one of which is the Temecula Valley Regional Water Reclamation Facility (TVRWRF) located in the City of Temecula. The TVRWRF was constructed in the early 1970s and has an expanded treatment capacity of 18 million gallons per day. Between December 25 and 26, 2009, approximately 2.4 million gallons of sewage was inadvertently released from the TVRWRF's influent structure into Murrieta Creek.

Murrieta Creek traverses the cities of Wildomar, Murrieta, and Temecula and unincorporated County areas of Riverside County. At its confluence with Temecula Creek, it forms the Santa Margarita River which flows through Camp Pendleton Marine Corps Base and on to the Pacific Ocean. Through Temecula, Murrieta Creek is channelized and maintained for flood control purposes. Downstream of Temecula where Murrieta Creek has its confluence with Temecula Creek and forms the Santa Margarita River, the overall stream ecology is physically undisturbed and remains in natural condition. Murrieta Creek is considered one of the last high quality riverine environments in Southern California and the ecological resources found in Murrieta Creek hold high value. Any potential disruption to the balance of the Murrieta Creek ecology would pose great concern to the natural resource regulatory agencies.

To help assess the potential spill-related affects to the biological resources within Murrieta Creek, the EMWD contracted Tom Dodson & Associates (TDA) to conduct and prepare a biological resources damage assessment. TDA Biologists, Shay Lawrey and Craig Lawrey conducted an intensive, initial assessment of the impact area in Murrieta Creek on December 30, 2009. Their study area encompassed a 2-mile stretch of Murrieta Creek including additional areas up and downstream of the known impact area. Visual signs of the spill included floating organic material and an oily film slicking over water that had pooled along the west side of the channel. During the initial survey, there were no visible indications that the spill traveled downstream of Ranch California Road or that the spill resulted in harmful affects to plants or animals. Although there were no visual indications of immediate harm to biological resources following the spill, TDA recommended that the EMWD implement a follow-up, short-term habitat monitoring program to track habitat conditions over time and to potentially identify any residual habitat damage not seen in the initial assessment.

3. Methods

On June 03, 2010, S. Lawrey and C. Lawrey conducted a follow-up habitat assessment in the same study area identified in the initial assessment to compare and document the habitat growth response in the affected area. The follow-up habitat assessment is mapped within Township 8 South, Range 3 West, Sections 11, 12, and 2 SBBM as shown on the USGS -

Murrieta and Temecula Quadrangle, 7.5 Minute Series topographic maps in the City of Temecula, Riverside County, California. Figure 1 shows the regional Location of the study area.

A gross visual assessment consisted of walking the known spill impact area and reviewing the habitat conditions, noting habitat types and vegetative composition, recording wildlife species and noting disturbance characteristics potentially associated with the December 2009 spill, such as dead flora and/or fauna, unusual odors, unusual organic matter, unusual oily film in pooled areas, unusual water clarity or color, and/or excessive algae blooms. Ms. Lawrey also looked for unusual coloration at the distal ends of the emergent vegetation. During the visual examination of the survey area, Ms. Lawrey determined the most appropriate locations for the sampling transects to be used in the follow-up and future quantitative assessments. On June 16, 2010, S. and C. Lawrey conducted quantitative evaluations of four transects that traversed areas upstream, downstream and within the spill area (Figure 2).

To estimate basal vegetative cover, the point-intercept method was used. In this methodology, data are tabulated on the basis of plants lying on a straight line cutting across the community understory. Only density indices and relative estimates of density can be calculated when using the point-intercept method. The surveyors walked along a 100 foot transect tape and recorded the number of "hits" of vegetation at the toe of the observers boot at 2 pace intervals for a total of 25 sample points within each transect. Four separate 100-foot transects were walked, two in the spill impact area identified as "Impact Transects 1 and 2" and two control transects, one upstream identified as Control Transect 1 and one downstream identified as Control Transect 2. A total of 100 sample points were taken with 25 sample points taken in each transect. A hit was recorded as positive if the toe of the observers boot was touching a plant. If no plant was touching the toe of the boot then the hit was recorded as negative.

Ground cover data consisted of bare ground, leaf litter, annual forbs and live perennial vegetation. Total cover was calculated as the percentage of hits, relative to the total number of points sampled. Cover of individual species was estimated by recording the plant species when intercepted by a point. Percent cover for each transect was calculated by totaling the "hits" for each cover component (bare ground, leaf litter, annual forbs and live perennial vegetation), dividing by the total number of hits for the transect, and multiplying by 100. Species composition was calculated totaling the number of "hits" for individual plant species, dividing that number by the total number of hits along the transect, and multiplying by 100.

Data taken for odor, soil discoloration, vegetation discoloration, water clarity, and amount of algae was scaled on a 1 to 5 scale, with 1 being low and 5 being high. The presence of dead flora or fauna, floating organic material, fish, amphibians, reptiles, birds, and/or mammals was noted as present or not. If present, number and type (species when relevant) found was recorded.

4. Results

During the surveys, skies were clear, the air was calm and temperatures ranged between 60°F and 78°F. Very little trash, debris or evidence of unauthorized intrusion was noted. No problems were encountered that would require remedial action. No dead flora and/or fauna were observed. The surveyors did not observe any unusual: odors; organic matter; oily film; water clarity or color; or algae blooms. They also did not observe any unusual coloration at the distal ends of the emergent vegetation (Table 1).

Table 1. Observations & Notations within the Control and Impact Transects

Factor	Control Transect 1	Impact Transect 1	Impact Transect 2	Control Transect 2
Water Clarity	Clear	Clear	Slightly Turbid but still could see to bottom of pools	Water not present
Unusual Odor	Not present	Not present	Not present	present
Unusual floating organic matter	Not present	Not present	Not present	present
Discolored soil	Not present	Not present	Not present	present
Discolored vegetation	Not present	Not present	Not present	present
Algae	Minimal amount of green algae at bottom of pools	S Not present	parse patches of green and brown algae.	Not present
Fish	Present. > 20 individuals of approx. 2 species	Present. > 35 individuals of approx. 3 species	Present. > 60 individuals of approx. 4 species	Not present
amphibians	present	present	present	Not observed
Birds	Nests, fledglings, juveniles, territorial adults	Nests, fledglings, juveniles, territorial adults	Nests, fledglings, juveniles, territorial adults	Several individuals from 12 species seen.
Mammals	Tracks & scat	Tracks & scat	Tracks & scat	Tracks & scat

The channel gradient, elevation, width, substrate, in-stream habitat, flow habitat, and disturbance characteristics are fairly uniform between Winchester Road and Rancho California Road. At the time of the follow-up survey, the width of the low-flow channel between Via Montezuma Road and Rancho California Road was 30 feet compared to a width of 20 feet that was observed in December 2009. Downstream of Rancho California Road, the in-stream habitat and flow habitat transitions into a dry stream with a sandy river bottom, where no surface flow is present. The creek is shallow with a substrate consisting mostly of mud, sand, and rocks. Intermediate sized substrate, namely gravel and cobble, are rare. When present this intermediate sized substrate is mixed with 20 to 80 percent finer material, usually sand. Elevations range from 996 to 1000 feet above mean sea level and the average bankfull width of the channel is 200 (ft) or 61 meters (m) wide.

The habitat types within the channel, in vicinity of the spill, include marsh/wetland, riparian, annual grassland, and sandy river wash. Riverside County Flood Control District maintains the affected reach of Murrieta Creek by mowing an approximate 150 ft or 45 m wide center-flow channel. The vast majority of vegetation consists of sedges (*Sparganium*), tules (*Scirpus*), cattails (*Typha*), and willows (*Salix* spp.). Small patches of annual grassland habitat are interspersed among the dense stands of *Typha*. The primary plant species growing along both banks include mule fat (*Baccharis salicifolia*), willow (*Salix exigua* and *S. gooddingii*), sycamore (*Platanus occidentalis*), tamarisk (*Tamarix* sp) and arundo (*Arundo donax*).

The surveyors noted that the wetland, riparian and aquatic habitats found within the survey area were growing in a lush and healthy manner. The emergent wetland habitat consists mostly of cattails that were approximately 5 feet tall during the June 2010 survey. In December 2009, the channel had recently been mowed for center-flow flood control maintenance and as a result the mowed vegetation stood approximately 8 inches tall. The riparian vegetation observed in June 2010, is also in an emergent seral stage, and generally consists of 4-6 feet tall, single layered, canopy willow-mule fat vegetation. The characteristic vegetative species include: Fremont cottonwood (*Populus fremontii*), black willow (*Salix goodingii*) narrow-leaved willow (*S. exigua*), arroyo willow (*S. lasiolepis*), mule fat (*Baccharis salicifolia*), and sycamore (*Platanus recemosa*). Table 1 below provides a list of habitat characteristics noted in each of the four transects.

Table 1. Habitat Details

Transect	Canopy Structure	Max canopy Ht.	Species Richness	% Cover Basal	% Native Cover	% Alien Cover excluding grasses	Primary element of cover	Invasive Species & # w/in transect
1	1 story	5 feet	13	100	95	5	perennial	Tamarisk (2)
2	1 story	6 feet	12	100	90	10	perennial	Arundo (1) Tamarisk (2)
3	1 story	5 feet	11	95	95	10	perennial	Arundo (1) Tamarisk (2)
4	Shrub level	3 feet	8	30	98	2	herbaceous	Tamarisk (1)

In addition to the fundamental flood control and water-related functions of Murrieta Creek, this watercourse serves as a wildlife habitat linkage, corridor and buffer. Ms. Lawrey has observed the following neotropical migratory birds within the spill impact area: yellow-rumped warbler (*Dendroica coronata*); orange-crowned warbler (*Vermivora celata*); blackthroated gray warbler (*Dendroica nigrescens*); MacGillivray's warbler (*Oporornis tolmiet*); white-crowned sparrow (*Zonotrichia leucophrys*); golden-crowned sparrow (*Zonotrichia atricapilla*); song sparrow (*Melospiza melodia*); common yellowthroat (*Geothlypis trichas*); yellow warbler (*Dendroica petechia*); and ruby-crowned kinglet (*Regulus calendula*). She also observed two sensitive bird species, the rufous-crowned sparrow (*Aimophila ruficeps canescens*) and black-crowned night heron (*Nycticorax nycticorax*). Several nests were found nestled in the dense wetland riparian stands and a number of fledglings of various species were also seen.

The surveyors observed a fairly diverse group of reptiles and amphibians in the survey area of Murrieta Creek since the spill, such as the western fence lizard (*Sceloporus occidentalis*), coastal western whiptail (*Aspidoscelis tigris stejnegeri*), western skink (*Eumeces sldtonianus*), San Diego gopher snake (*Pituophis melanoleucus annectens*), red coachwhip (*Masticophis flagellum piceus*), Pacific chorus frog (*Pseudacris regila*), and western toad (*Bufo boreus*).

Various isolated pockets of pooled water occur between Winchester Road and Rancho California Road. Murrieta Creek is an intermittent creek most of the year with average flows of 2.4 cubic feet per second (cfs). Although it is an intermittent creek it supports pockets of aquatic habitat. Native fish have been found in the lowermost reach of Murrieta Creek, near the gorge and in a few isolated localities upstream of Temecula, near Rancho California Road. Many fish were observed swimming in the pools. Although a focused fish survey was not conducted, it appeared that four separate species of fish were swimming together. In its present state, Murrieta Creek supports one freshwater fish species native to the system, namely

the arroyo chub, *Gila orcutti*, a small cyprinid minnow. Non-native bullfrogs (*Rana catesbeiana*) were observed in Transects 1 and 2.

Few mammals were seen but scat and tracks were found in the survey area indicating the presence of a variety of rodents, raccoon (*Procyon lotor*), long-tailed weasel (*Mustela frenata*), striped skunk (*Mephitis mephitis*), and coyote (*Canis latrans*).

No federally or State listed species were observed in the spill impact area of Murrieta Creek during the June 2010 site inspection. The emerging habitat is growing into a density and structure that is potentially suitable to support the least Bell's vireo (*Vireo belli pusillus*) and southwestern willow flycatcher (*Empidonax traillii extimus*).

5. Conclusions

One of the primary unknowns following the December 25-26 sewage spill was the level of biological harm potentially caused by additional nutrients, toxins and pathogens that were introduced into the creek as a result of the spill. The initial damage assessment report pointed out that the potential impacts associated with the sewage spill on avifauna, mammals, reptiles, amphibians and fish would not be easy to determine. The report generalized the potential impacts (bacterial infection and exposure to toxins and pathogens) by explaining that raw human sewage contains a mixture of contaminants including a variety of bacteria, protozoans, viruses, and numerous toxic chemicals, as well as high concentrations of nitrogen and phosphorus (Mallin et al. 2007). It is intuitive that sewage-contaminated water contains viruses and bacteria that are a potential vehicle for disease transmission to ecological receptors (Hamilton 2007) and that elevated fecal coliform counts can persist in the environment for several weeks after a sewage spill.

Several observations made during the June 2010 follow-up survey can serve to ease some of the concerns over possible spill-related harmful effects to flora and/or fauna. The intent of the follow-up monitoring was to document species occurrence and overall habitat health upstream, downstream and within the affected spill area. The surveyors looked for any potential signs of residual impacts from the sewage spill on the flora and fauna by focusing on habitat conditions, growth rates, species diversity, recruitment rates, and visual evidence of unusual growth, disease, or pest problems.

The surveyors found the habitat growing in Murrieta Creek upstream, downstream and within the affected spill area to be in a healthy and vigorous condition and comparable between transects. The presence of surface flow within transects 1-3 has allowed a rich growing wetland/riparian habitat to develop, with high foliage coverage, species diversity and species richness. Although, no surface flow is present downstream of Rancho California Road, the habitat also appears vigorous and healthy with no visual evidence of deterioration or degradation. Recruitment levels were high and in all areas surveyed.

It appears that the existing biological system has been able to naturally remove dissolved biodegradable material from the sewage spill area. Presumably, the microscopic decomposers (bacteria, fungi, and actinomycetes) living in the wetland habitat, have managed to break down the particulate organic material from the spill. The plants may have actively incorporated some of the nitrogen, phosphorus, and other compounds found in the sewage spill and as a result have provided a mechanism for nutrient removal. The moderate amount of rain that fell in 2010 also may have helped remove or dilute the residual nutrients from the area. This presumed

nitrogen uptake and natural filtration is evidenced by the vigorous habitat regeneration within the spill impact area in the mow-zone.

The pools of water found in the survey area were clear, supported a number of fish and displayed no sign of unusual disturbance. The habitat is serving a variety of wildlife as evidenced by the presence of several bird nests. The presence of fledgling birds indicates some level of nesting success in the survey area. Details of actual nesting success cannot be made without extended nest surveys, which were not conducted as part of this project.

Overall ecology of the impact area appears to be functioning in a healthy manner as compared to the control areas. As of June 2010, there were no apparent signs that the spill resulted in residual, deleterious effects to flora or fauna occurring in the impact area.

6. Recommendations

Based on the June 2010 collection and interpretation of biological resource data no immediate remedial actions (vegetation removal, revegetation, translocation of faunal species, etc.) are warranted. At this time, there is no evidence of harm to flora or fauna resulting from the accidental sewage release into Murrieta Creek that occurred between December 25-26 2009. If at anytime between now and the next scheduled monitoring event (April 2011), it becomes obvious that flora and/or fauna are showing signs of harm as a result of the spill, then a shift towards immediate remediation will be made in coordination with the appropriate agencies.

7. References

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Figure 1. Regional Location Map

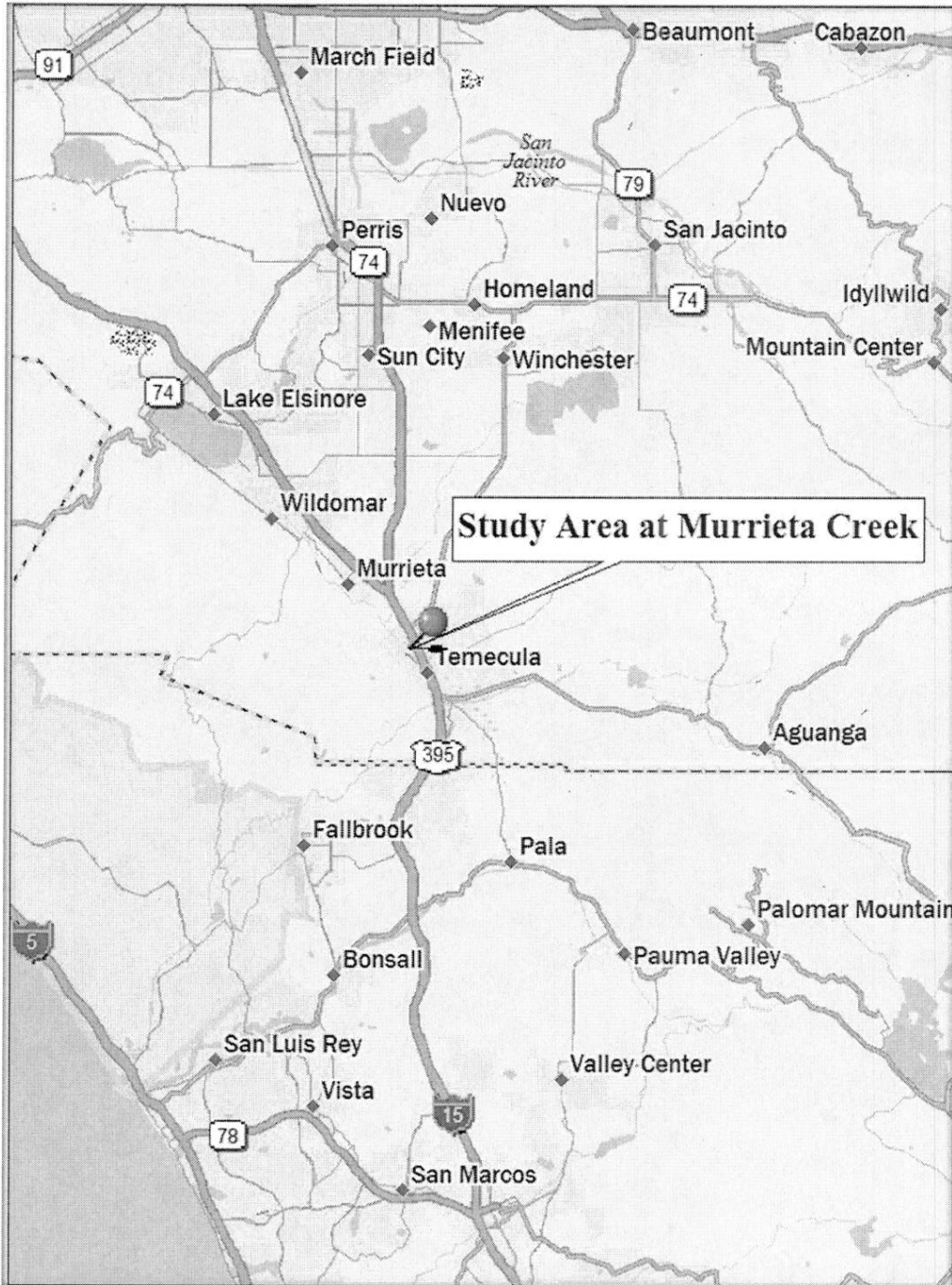


Figure 3. View of habitat conditions within Control Transect 1



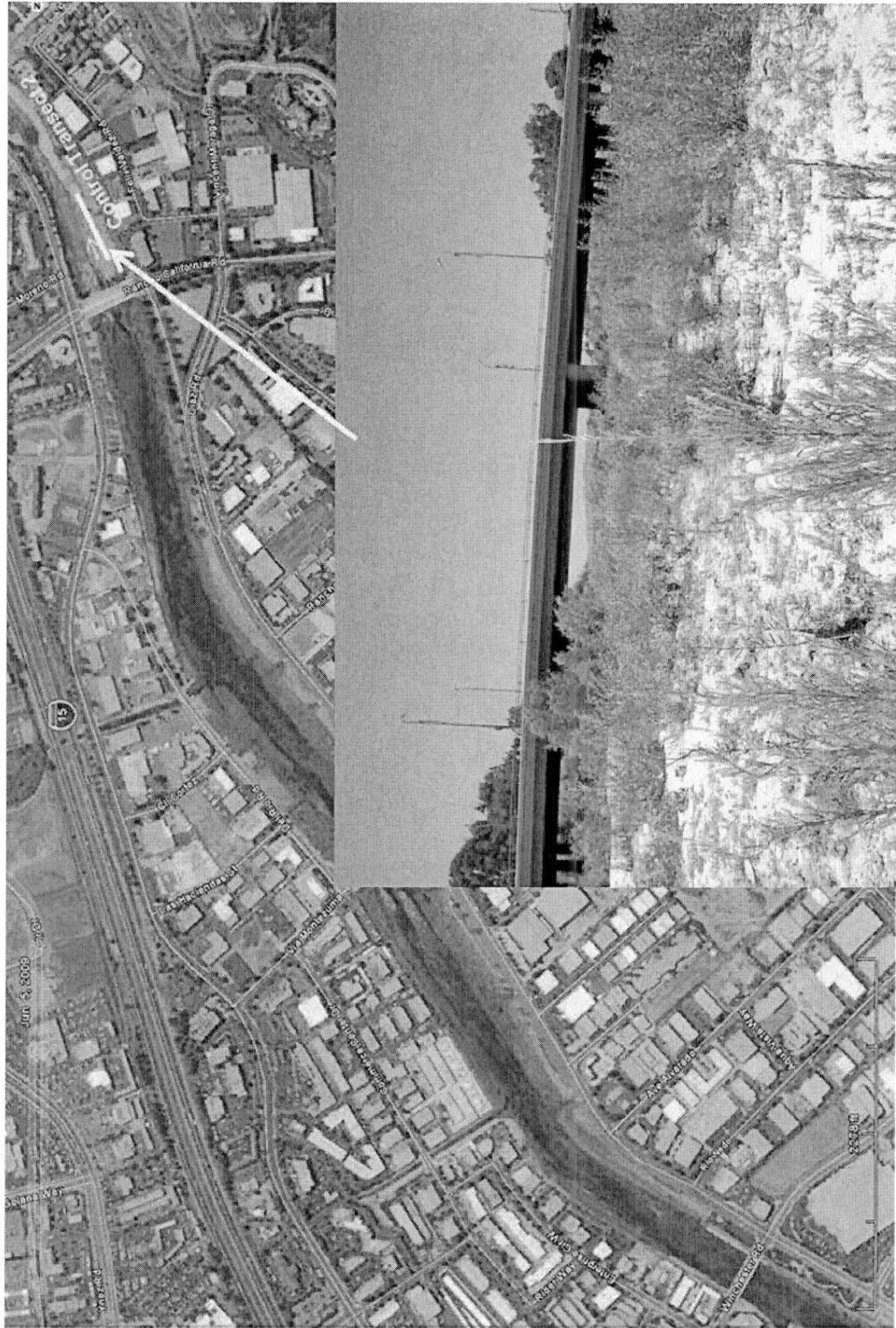
Figure 4. View of habitat conditions within Impact Transect 1



Figure 5. View of habitat conditions within Impact Transect 2



Figure 6. View of habitat conditions within Control Transect 2



July 15, 2010

Figure 7. View of aquatic conditions

