APPENDIX G

Aquatic Resources Technical Memorandum

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Technical Memorandum

Date:	November 22, 2009
To:	Cindy Walck, State Parks
From:	Chris Fitzer, EDAW-AECOM
Subject:	Aquatic Resources Technical Memorandum for the Upper Truckee River Restoration and Golf Course RelocationProject

Distribution:

1 INTRODUCTION

This technical memorandum summarizes aquatic biological assessments conducted as part of the proposed Upper Truckee River Restoration and Golf Course Relocation Project. The characterization of current conditions provides insight into current aquatic ecological health and provides a baseline against which future monitoring can be measured. Adequate, accurate monitoring and assessment are the cornerstones to preserving, enhancing, and restoring watershed functions and values. The information gathered from monitoring activities is critical to the effort to protect the beneficial uses of water, protect sensitive resources, and determine the effects of watershed development and protection, restoration, and enhancement programs.

The federal Clean Water Act (CWA) gives states and territories the primary responsibility for implementing programs to protect and restore water quality. CWA Section 106(e)(1) requires the U.S. Environmental Protection Agency (EPA) to determine that a state is monitoring the quality of navigable waters and compiling and analyzing data on water quality. To meet those CWA requirements and provide comprehensive information on the status of beneficial uses of California's surface waters, the State Water Resources Control Board and the regional water quality control boards introduced the Surface Water Ambient Monitoring Program (SWAMP) in 2001. The SWAMP provides the impetus to implement a better-organized, standardized program of biological assessment and monitoring throughout the state.

Biological assessments of aquatic communities, also referred to as bioassessments, are rapidly becoming a preferred tool for aquatic ecosystem monitoring. Bioassessments are gaining popularity among scientists, resource managers, and decision makers alike and have been adopted as a primary assessment method as part of the SWAMP. Standardized bioassessment procedures, combined with stream habitat typing and snorkel surveys (protocols developed by California Department of Fish and Game [CDFG]), were employed as primary assessment methods to characterize current conditions of existing aquatic resources in the Upper Truckee River (UTR).

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1.1 Background on Bioassessment

Aquatic benthic macroinvertebrates (BMIs) are common inhabitants of the stream bottom environment. Insects are the main types present, and commonly include mayflies, stoneflies, caddisflies, and true flies. Non-insect BMIs include snails, leeches, worms, and scuds. Aquatic insects and other BMIs are central to the proper ecological functioning of streams and surrounding terrestrial environments. These BMIs consume decomposing organic matter (e.g., detritus, wood and leaf debris) and attached algae, and in turn become an important food resource to fish and birds. In addition to their role in the food web, BMIs have varying degrees of ability to withstand environmental degradation; thus they may be used as indicators of water quality and habitat condition. For example, sediments from erosion and/or pollutants from runoff may decrease the variety of insects and other BMIs that are able to survive, which may indicate a degradation of biological health.

Use of the stream BMI fauna to gauge the biological health of a stream is known as bioassessment. Bottom-dwelling (or benthic) organisms are collected to detect changes in stream health based on the number of different types present (diversity) and their level of tolerance of environmental impacts and pollution (sensitivity). Monitoring stream BMIs in comparison to reference sites (areas having little or no impact but a similar physical setting) and/or over time at targeted sites provides a method to estimate the amount of degradation of aquatic systems or level of recovery in response to changing land uses. Bioassessment may be used together with other, more traditional methods of stream channel and riparian monitoring to measure the response of stream life to habitat changes. When pollution does not originate from a single point, it can be difficult to accurately characterize the source using chemical methods alone, because this type of pollution usually does not occur continuously and therefore may not be detected in a given water sample. Problems may also exist upstream of a location and not be reflected in the channel or riparian conditions at that site. The advantage of using stream BMIs is that because they live in the stream, they incorporate and embody changes in water quality that occur in both local and upstream areas of the watershed. Another advantage of bioassessment is that once baseline conditions (over a period of years and locations) have been established, repeated sampling can be done with less frequency to document future changes.

To fully understand the concept of bioassessments, it is important not only to know what they are, but also to understand the rationale for conducting them and how they can be used as a decision-making tool. The following text describes the rationale for conducting bioassessments, including the role of bioassessment in water quality determination and the utility of bioassessment as a decision-making tool.

1.1.1 The Role of Bioassessment in Water Quality Determination

State and tribal water resource agencies in the United States have developed bioassessment protocols that have added an important dimension of ecological understanding to their overburdened and underfunded monitoring programs (Barbour 1997). The central purpose of assessing the biological condition of aquatic communities is to determine how well a water body supports aquatic life (Barbour et al. 1996). Biological communities integrate the effects of different pollutant stressors such as excess nutrients, toxic chemicals, increased temperature, and excessive sediment loading; thus they provide an overall measure of the aggregate impact of the stressors. Use of information about ambient biological communities, assemblages, and populations to protect, manage, and exploit water resources has been developing for the past 150 years (Davis 1995). Despite this long history, it has only been in the last decade that a widely accepted technical

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framework has evolved for using biological assemblage data for assessment of the water resource (Barbour et al. 1996).

1.1.2 Utility of Bioassessment as a Decision-making Tool

Bioassessment provides important information for monitoring aquatic systems and managing watersheds. Bioassessment serves four primary functions or uses for assessing existing conditions all of which are relevant to the UTR:

1. Initial assessment of conditions
2. Characterizing the magnitude of impairment
3. Assisting in the diagnosis of causes to impairment (e.g., sedimentation, contaminants)
4. Monitoring of temporal trends to evaluate improvements or further degradation

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2 METHODS

This section provides a discussion on the methodologies used to conduct bioassessments in the UTR. Field surveys took place during fall 2006, and included stream habitat typing, snorkel surveys, and bioassessment. Stream habitat typing was conducted throughout the study area, snorkel surveys were conducted in selected deep-water habitats in each of the three main river reaches identified within the study area, and bioassessment surveys were conducted at two sites representative of study reaches 1 and 2. Aquatic habitat types, study reaches, and bioassessment locations are shown in Exhibit 1.

2.1 BIOASSESSMENT

Biologists and ecologists trained in conducting bioassessments performed the bioassessment sampling. This monitoring includes collection of BMIs, assessment of physical habitat characteristics, and general water quality measurements.

2.1.1 BENTHIC MACROINVERTEBRATE SAMPLING

Two different BMI sampling protocols were followed for comparison purposes. Field sampling for the UTR followed the Standard Operating Procedure of the California Stream Bioassessment Procedure (CSBP) for multihabitat sampling and targeted riffle composites of low-gradient streams developed by the CDFG's Aquatic Bioassessment Laboratory (ABL).

The multihabitat method (MH) can be used to sample any wadeable stream reach, since it does not target specific habitat types. It calls for the identification of a stream reach of 150 meters (m). For each reach, 11 cross-stream transects along the reach were identified at 15-m intervals. Starting at the most downstream transect, benthic samples were collected alternating from the left, center, and right end of the transect using a standard D-frame kick net with 0.5 millimeter (mm) mesh. Organisms were dislodged from the benthic substrate to a depth of 4–6 inches from within a 1 square-foot area of the benthic habitat (e.g., riffle, pool/glide, woody debris, vegetated banks, or submerged macrophytes) immediately upstream of the net. For each sample, the material retained in the net was immediately transferred into appropriately labeled 500-milliliter (mL) plastic wide-mouth jars containing 95% ethanol to preserve any organisms. A consistent amount of time was allocated to sampling each habitat type so as to not bias the BMI data generated during the study. Upon completion of the sample collection from a given transect, the next transect sample was collected in a similar fashion, and the collected material was placed into the same jar containing the material(s) from the previous transect(s). This sampling approach continued until all 11 transects were sampled.

The targeted riffle composite (TRC) method is designed for sampling BMIs in wadeable streams that contain fast-water (riffle-run) habitats and is not appropriate for waterbodies without fastwater habitats (ABL 2006). Riffles are the preferred habitat for TRC sampling, but other fast water habitats are acceptable for sampling if riffles are sparse (ABL 2006). A TRC sample is a composite of 8 individual kick samples of 1 ft^2 of substrate each that are randomly distributed among fast water habitats within the 150 m reach, giving preference to riffles where possible. If fewer than 8 riffles are present in a reach, more than one sample can be taken from a single riffle, especially if riffles are large. Net placement was determined by generating a pair of random numbers between 0 and 9. The first number (multiplied by 10) represents the percent upstream along the habitat unit's length; the second number (multiplied by 10) represents the percent of the riffle width from right bank. This position is the center of the 1 square foot sampling quadrant for that riffle. A standard D-framed kick net with 500 μ mesh was placed downstream of the sampling quadrant and after dislodging the

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substrate to a depth of 4-6 inches within the 1 square -foot; organisms were carried into the net by the current. Materials collected in the net mesh were deposited in the net were placed into appropriately labeled 500 mL plastic wide-mouth jars filled with 95% ethanol.

The preserved samples were transported, under chain of custody, to the ABL where they were stored at room temperature until sorting and organism identification was performed.

2.1.2 Physical Habitat Assessment

A physical habitat assessment was performed for each reach sampled. The physical habitat assessment methods included a reachwide scoring evaluation, and measurements and observations for transects and intertransects.

The reachwide evaluation included three physical habitat metrics: epifaunal substrate cover, sediment deposition, and channel alteration. Each metric was given a maximum score of 20, with greater values representing a better habitat for BMI; the combined habitat metric score for any site could not be greater than 60. Each metric was assigned to one of four categories of physical condition: optimal (20–16), suboptimal (15–11), marginal (10–6), and poor (5–0). Where possible, discharge was also measured for each reach. U.S. Geological Survey (USGS) gauge data were recorded where available.

Transect measurements and observations included the following attributes: photographs at select transects, wetted width, bankfull width, bankfull height, transect substrates (i.e., size class, depth, and embeddedness), bank stability, human influence, riparian vegetation, instream habitat complexity, and canopy cover. Intertransect attributes included wetted width, flow habitats, and substrates. Photographs were taken at the first transect (upstream [one photo]), the middle transect (upstream and downstream [two photos]), and at the last transect (downstream [one photo]).

A GARMIN Geko 201 global positioning system (GPS) was used to record latitude and longitude coordinates for each sampling site. Reach and transect length were measured using a tape measure. Wetted and bankfull widths and substrate depths were measured using a stadia rod. Canopy was measured using a spherical densiometer. Flow rate (discharge) was determined by reviewing gage data during the survey period. Copies of the field forms are provided in Attachment A.

2.1.3 Water Quality Sampling

The following water quality parameters were measured once upon arrival at each stream reach: temperature, pH, alkalinity, dissolved oxygen (DO), electrical conductivity (EC), and total dissolved solids (TDS). The following equipment was used to measure these water quality parameters:

- Temperature and DO were measured using a YSI Model 55 multi-meter.
- pH, EC, and TDS were measured using a Hanna Combo Model HI 98129 multi-meter.
- Alkalinity was measured using a LaMotte Model WAT-DR field test kit.

2.2 BMI Laboratory Procedures

The CDFG ABL was contracted to perform all BMI laboratory procedures. A discussion of these procedures is provided below.

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2.2.1 Sample Sorting

All sample sorting was performed at the ABL laboratory. Following the removal of alcohol from the 500-mL plastic wide-mouth jars, each sample was placed into a 0.5-mm mesh sieve and rinsed using deionized water. Each item was examined carefully for the presence of BMIs, then large debris (e.g., twigs, rocks) was removed from the sample. The remaining material was then evenly spread across a gridded tray. Following the random selection of a grid (using a random number generator), the materials from within the selected grid were transferred into a petri dish. Using a dissecting microscope, BMIs were removed from the dish during a systematic sorting of the sample. The BMIs were counted and then placed into 50-mL vials containing 70% ethanol/glycerin. This process was repeated grid by grid until 500 BMIs were collected.

Once 500 BMIs were collected, the remaining materials in the last grid being sorted were placed into an additional 50-mL vial labeled with the appropriate sample code. The remaining materials from all of the previously sorted grids were collected into a 500-mL plastic wide-mouth jar containing 70% ethanol/glycerin, and labeled with the sample code and identified as “sorted”; as a quality control measure, sorted materials from 20% of the samples were resorted by a different scientist, with the target of finding no more than 25 uncollected BMIs (5% of the overall number removed for identification). The remaining unsorted materials in the gridded tray were placed back into the original 500-mL plastic wide-mouth jar containing 70% ethanol/glycerin and the original sample label. This process was repeated for all of the samples collected.

2.2.2 Taxonomic Identification

A CSBP Level 2 taxonomic effort was approved for this study, whereby most organisms were taxonomically identified to family, with Chironomidae being identified to genus. This was achieved by removing the BMIs from the 50-mL vials, transferring them to a Petri dish, and identifying each organism using standard taxonomic keys (Harrington and Born 2000). A 10-mL vial with 70% ethanol/glycerin and a specimen label containing the sample identification number and family name was prepared for each taxonomic group, and each identified organism was transferred into the appropriate vial. Once an organism was identified, and before the scientist proceeded to another specimen, the Petri dish was searched for additional organisms of the same family, which were added to the vial for that family. A push-button counter was used to maintain an accurate count of the various organisms; the data from the push-button counter were then transferred to a Level 2 Taxonomic Effort Worksheet. This process continued until all organisms were identified.

2.3 Bioassessment Data Analysis/Management

2.3.1 Data Analysis

The data from the identification of the sorted BMIs for each sample were used to generate biological metrics that allow for an assessment of the biological condition of the reach at each sampling location. These biological metrics define a characteristic of the BMI assemblage that may change in some predictable way with increased human disturbance and/or ecological restoration. The biological metrics are classified into four categories: richness measures, composition measures, tolerance/intolerance measures, and trophic measures. Those specified in the CSBP are listed below.

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Richness Measures

- Taxa Richness
- EPT Taxa
- Plecoptera Taxa
- Trichoptera Taxa
- Ephemeroptera Taxa

Composition Measures

- EPT Index
- Sensitive EPT Index
- Percent Hydropsychidae
- Percent Baetidae

Tolerance/Intolerance Measures

- Tolerance Value
- Percent Dominant Taxa
- Percent Tolerant Organisms
- Percent Intolerant Organisms

Trophic Measures

- Percent Collectors
- Percent Filterers
- Percent Scrapers
- Percent Predators
- Percent Shredders

Richness Measures

Measures of richness reflect the diversity of the aquatic assemblage, where increasing diversity correlates with increasing health of the assemblage; decreasing richness correlates with increasing disturbance. The richness measures used in this study were taxa richness (the total number of individual taxa) and EPT taxa (number of families in the Ephemeroptera [mayfly], Plecoptera [stonefly], and Trichoptera [caddisfly] insect orders).

Composition Measures

Measures of composition reflect the relative contribution of the population of individual taxa to the total fauna and are based on the ecological patterns and environmental requirements of certain organism groups, such as those taxa considered to be environmentally sensitive, or alternatively, those considered to be a nuisance species. The composition measures used in this study were EPT index (percent composition of mayfly, stonefly, and caddisfly larvae); sensitive EPT index (percent composition of EPTs with low tolerance values); percent Hydropsychidae (percent of caddisflies in the more tolerant family Hydropsychidae); and percent Baetidae (a composition measure for a tolerant family of mayflies).

Tolerance/Intolerance Measures

Tolerance/intolerance measures are metrics that reflect the relative sensitivity of the community to aquatic disturbances. Although the taxa used are usually “pollutant tolerant” or “intolerant,” they are not specific to the type of stressor. For example, these metric values typically also vary with increasing fine particulate organic matter and sedimentation. The tolerance/intolerance measures used in this study were tolerance value [values between 0 and 10 weighted for abundance of

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individuals that are pollutant tolerant (higher values) and intolerant (lower values)]; percent intolerant organisms (percent of organisms that are considered highly intolerant to impairment as indicated by tolerance values of 0, 1, or 2); percent tolerant organisms (percent of organisms that are considered highly tolerant to impairment as indicated by tolerance values of 8, 9, or 10); and percent dominant taxa (percent composition of the single most abundant taxa).

Trophic Measures

Trophic measures are metrics that provide information on the balance of feeding strategies in the aquatic assemblage. An imbalance of the functional feeding groups reflects unstable food dynamics and indicates stressed conditions. The trophic measures included in this assessment were percent collector-filterers (percent of BMIs that collect, gather, and filter fine particulate matter); percent collector-gatherers (percent of BMIs that collect and gather particulate matter); percent scrapers (percent of BMIs that graze upon periphyton); percent predators (percent of BMIs that feed on other organisms); and percent shredders (percent of BMIs that shred coarse particulate organic matter). Those BMIs that did not clearly fit into one of the defined trophic measures were grouped into percent other functional feeding groups (FFGs).

Abundance

Abundance is one additional metric that provides information on the total number of organisms in a given sampling area. Abundance is calculated by dividing the total number of organisms collected by the area sampled. The abundance data represent the total number of organisms sampled per unit of measure.

These metrics were quantified for each site to characterize the parameter ranges for each portion of the watershed. General trends in biological metrics associated with disturbance are presented in Table 1. The data will be maintained for a future assessment of year-to-year trends. For the purposes of this technical memorandum, the BMI data and physical habitat data are presented and compared qualitatively, with overall watershed characteristics noted.

Table 1
Trends in Biological Metrics Associated with Disturbance

Biological Metrics	Response to Disturbance
Richness Measures	
Taxa Richness	Decrease
EPT Taxa	Decrease
Composition Measures	
EPT Index	Decrease
Sensitive EPT Index	Decrease
Percent Hydropsychidae	Increase
Percent Baetidae	Increase
Tolerance/Intolerance Measures	
Tolerance Value	Increase
Percent Intolerant Organisms	Decrease
Percent Tolerant Organisms	Increase
Percent Dominant Taxa	Increase
Trophic Measures	
Percent Collectors	Increase
Percent Filterers	Increase
Percent Scrapers	Increase
Percent Predators	Increase
Percent Shredders	Decrease

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2.4 AQUATIC HABITAT TYPING AND SNORKEL SURVEYS

Aquatic habitat typing and snorkel surveys were conducted using methods described in the California Stream Habitat Restoration Manual (Flosi and Reynolds 1998). The aquatic habitat typing was conducted to document habitat types throughout the study reaches. The snorkel survey was conducted to determine and evaluate fish species presence and distribution.

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3 RESULTS AND DISCUSSION

This section provides a discussion on the results of bioassessments, habitat typing, and snorkel surveys conducted on September 21, 2006.

3.1 BIOASSESSMENT

3.1.1 PHYSICAL HABITAT ASSESSMENT

Photo documentation of the study sites is presented in Exhibits 2a through 3b. Several trends in the habitat condition were recorded during the physical habitat assessment of the study sites (Tables 2 and 3 and Exhibits 4–13). The UTR sites ranked from optimal to marginal in habitat quality with physical habitat scores for UTR-1 and UTR-2 (32 and 46, respectively). UTR-1 showed suboptimal epifaunal substrate suited for colonization, some deposition of new gravel affecting a substantial percentage of the bottom, and evidence of channelization disrupting a majority of the stream. UTR-2 provided higher quality habitat overall with optimal epifaunal substrate for colonization, limited increase in bar formation, and no evidence of channelization.

Table 2
Physical Habitat Characteristics of the UTR (Reachwide Scores)

Physical Habitat Parameters	Sampling Sites	
	UTR-1	UTR-2
Epifaunal Substrate/Cover	12	16
Sediment Deposition	11	14
Channel Alteration	9	16
Total Habitat Score	**32**	**46**

Substrate class sizes recorded at UTR-1 included fines, sand, fine gravel, and coarse gravel, cobble, and boulders; with fine gravel being the most dominant class recorded (34%). Substrates in UTR-2 were similarly dominated by fine gravels (34%), however course gravel made up a large percentage (27%) and hardpan was present instead of boulders.

The amount and type of human influence on each reach varied dramatically. Logging was the sole human influence found in UTR-2 and at only 55% of transects. UTR-1 exhibited more urban/suburban influences with parks or lawns present in 91% of the reach, walls, rip-rap, or dams in 64%, and other urban influences such as trash and pipes found in 9% of the reach. Pasture or rangelands border all of the UTR-2 reach.

Bank stability varied substantially between the two reaches and was influenced mainly by logging and grazing. UTR-1 banks were mainly labeled as “vulnerable” (86%), with the remaining banks (14%) classified as “stable.” The vulnerability of UTR-1 banks may likely be influenced by pasture and rangelands along the reach. The bank conditions within UTR-2 proved to be both more stable and degraded with 41% eroded, 50% stable, and 9% vulnerable. Evidence of logging operations in 55% of the reach has most-likely caused bank erosion, however the majority of the reach remains stable. No other human influences were noted within the UTR-2 reach.

The dominant form of instream habitat complexity at both UTR-1 and UTR-2 was filamentous algae; however, many other forms of habitat structures were noted within the reaches. The extensive growth of filamentous algae could perhaps be attributed to the presence of cattle (and associated feces) that can lead to nutrient loading in the creek. However, while pasture/rangelands were found along all of UTR-1, they were not present along UTR-2; therefore the cause of filamentous algae growth in UTR-2 must be distinct or cattle-related inputs must come from elsewhere upstream. Another potential cause of nutrient loading is fertilizer and other runoff from the neighboring golf course. Other habitat areas in UTR-1 were provided by aquatic macrophytes, boulders, woody

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debris and overhanging vegetation. In UTR-2 the habitats included woody debris, undercut banks, overhanging vegetation, and live tree roots. Flow habitats in both reaches were dominated by glides, riffles as the second most dominant, and runs and pools.

Table 3
Physical Habitat Characteristics of the UTR

Physical Habitat Parameters	Sampling Sites	
	UTR-1	UTR-2
Channel Dimensions		
Wetted Width (m)	8.6	10.50
Depth (cm)	34.7	29.6
Bankfull Width (m)	14.32	25.45
Bankfull Height (m)	1.74	1.78
Mean for all 11 transects		
Substrate Size Class (% of reach)		
Large Boulder (1–4 m)	4%	0%
Small Boulder (0.25-1m)	6%	0%
Coarse Gravel (16–64 mm)	18%	27%
Fine Gravel (2–16 mm)	34%	34%
Sand (0.25–2 mm)	27%	22%
Fines (<0.25 mm)	9%	4%
Hardpan (Consol. Fines)	0%	11%
Cobble	2%	2%
Mean for all 11 transects		
Embeddedness (% substrate class ≥ gravel)	37.4%	29.6%
Mean for all 11 transects		
Bank Stability (% of reach)		
Eroded	0%	41%
Vulnerable	86%	9%
Stable	14%	50%
Average between transects for both banks (right and left)		
Human Influence (% of reach)		
Walls/Riprap/Dams	64%	0%
Buildings	0%	0%
Pavement/Cleared Lot	0%	0%
Road/Railroad	0%	0%
Pipes (Inlet/Outlet)	9%	0%
Landfill/Trash	9%	0%
Park/Lawn	91%	0%
Row Crops	0%	0%
Pasture/Rangeland	100%	0%
Logging Operations	0%	55%
Mining Activity	0%	0%
Average between transects		
Riparian Vegetation		
Upper Canopy (>5 m high)	0.52	2.45
Lower Canopy (<5 m high)	2.91	1.68
Ground Cover—Shrubs, Grasses	2.45	3.00
Ground Cover—Bare Soil	1.18	1.09
Mean for all 11 transects 0 = Absent (0%), 1 = Sparse (<10%), 2 = Moderate (10-40%), 3 = Heavy (40-75%), 4 = Very Heavy (>75%)		

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Table 3
Physical Habitat Characteristics of the UTR

Physical Habitat Parameters	Sampling Sites	
	UTR-1	UTR-2
Instream Habitat Complexity		
Filamentous Algae	2.60	2.45
Aquatic Macrophytes	0.90	0.09
Boulders	1.20	0.00
Large Woody Debris	0.00	0.55
Small Woody Debris	0.50	0.55
Undercut Banks	0.10	0.64
Overhanging Vegetation	0.40	0.45
Live Tree Roots	0.00	0.27
Artificial Structures	0.10	0.00
Mean for all 11 transects 0 = Absent (0%), 1 = Sparse (<10%), 2 = Moderate (10-40%), 3 = Heavy (40-75%), 4 = Very Heavy (>75%)		
Flow Habitats (% of reach)		
Riffle	11	18.5
Rapid	0	0
Run	14	8
Glide	67	73
Pool	10	0.5
Cascade/ Fall	0	0
Dry	0	0
Mean for all transects		

3.1.2 WATER QUALITY ASSESSMENT MODIFY FOR UTR

Results of field water quality measurements are presented in Table 4. Discharge was measured to be 9.9 cubic feet per second (cfs) at both sites (USGS 2006). Temperature was lower at UTR-2 (8.3°C) than at UTR-1 (12.8°C), likely due to the time of day that the recording was made (9:20 am versus 1:20 pm). DO, pH, electrical conductivity, salinity, and alkalinity were all found to be similar at both sites.

Table 4
Water Quality Characteristics for the UTR

Water Quality Parameters	Sampling Sites	
	UTR-1	UTR-2
Discharge (cfs)	9.9	9.9
Temperature (°C)	12.8	8.3
Dissolved Oxygen (mg/L)	7.86	8.18
pH (standard pH units)	7.31	7.58
Electrical Conductivity (µs)	78	80
Salinity (PPT)	38	40
Alkalinity (mg/L as $CaCO_3$)	25	25
[1] Reading from the USGS gauge located on the Upper Truckee River above Meyers, CA (USGS 103366092 Upper Truckee River at hwy 50 above Meyers CA)		

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3.1.3 BENTHIC MACROINVERTEBRATE BIOLOGICAL METRICS

Results of the biological metrics for BMIs collected in the UTR are provided in Table 5 and Exhibits 14–18. A discussion of each of the metrics is provided below. The BMI taxa list is provided in Attachment B.

Multi-Habitat

Richness Measures

Richness measures include taxa richness and EPT taxa. Taxa richness was the same for both reaches sampled with 55 taxa groups found. EPT taxa were sampled throughout both reaches with 20 taxa found in UTR-1 and 26 in UTR-2.

As discussed above, richness measures reflect the diversity of the aquatic assemblage where increasing diversity correlates with increasing health of the assemblage and suggests that niche space, habitat, and food sources are adequate to support survival and propagation of particular species.

Composition Measures

Composition measures include EPT index, sensitive EPT index, percent Hydropsychidae, and percent Baetidae. More EPT were found in UTR-2 (26) than in UTR-1 (20) and similarly both the EPT and sensitive EPT indexes were higher for UTR-2. The percentage of Baetid and Hydropsychid taxa sampled ranged from 1-2 % in both reaches, demonstrating a lack of domination by tolerant EPT taxa.

Composition metrics reflect the relative contribution of the population of individual taxa to the total fauna. Choice of a relevant taxon is based on knowledge of the individual taxa and their associated ecological patterns and environmental requirements, such as those that are environmentally sensitive or a nuisance species. Percent Hydropsychidae and Baetidae (two tolerant families) are regional metrics that have evolved to be particularly useful in California streams. The metric values usually increase as the effects of pollution in the form of fine particulate organic matter and sedimentation increase.

Tolerance/Intolerance Measures

Tolerance/intolerance measures include the tolerance value, percent intolerant organisms, percent tolerant organisms, and percent dominant taxa. Both reaches had high values of intolerant taxa sampled with 26.8% in UTR-1 and 37.3% in UTR-2. Tolerant taxa were less abundant with values of 7.7% in UTR-1 and 8.7% in UTR-2. Percent dominant taxon was 17.6% in UTR-1 and 20.1% in UTR-2.

Tolerance/intolerance measures reflect the relative sensitivity of the community to aquatic disturbances. The taxa used are usually pollution tolerant and intolerant, but are generally nonspecific to the type of pollution or stressors. High percentages of intolerant taxa in both reaches demonstrate healthy stream conditions.

Trophic Measures

Trophic measures include percent collectors-filterers, percent scrapers, percent predators, and percent shredders. Both UTR-1 and UTR-2 were dominated by collector-gatherers and scrapers,

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with predators being the next most prominent feeding group. UTR-1 had 29.8% collector gatherers and 28.8% scrapers, and UTR-2 had 33.3% collector-gatherers and 29.6% scrapers.

Trophic measures (i.e., functional feeding group measures) provide information on the balance of feeding strategies in the aquatic assemblage. The composition of the functional feeding group (FFG) is a surrogate for complex processes of trophic interaction, production, and availability of food sources. An imbalance of the functional feeding groups can reflect unstable food dynamics and can indicate a stressed condition. Although dominated by collectors and scrapers, both UTR-1 and UTR-2 contain diversity in functional feeding groups, demonstrating stream health.

Abundance

Abundance provides a measure of density of individuals collected over a fixed area. Because the abundance of individuals can be dominated by a single taxon and/or tolerant taxa, this measure does not necessarily reflect ecological health, function, or value. Nevertheless, abundance is a useful measure to document increases and/or decreases in the aquatic population over a given area.

UTR-1 had a higher abundance per square foot of individuals with 284. UTR-2 had a slightly lower abundance at 241. The relatively high abundance at UTR-1 can likely be attributed to more diverse and favorable substrate conditions, including higher concentrations of boulders and the lack of hardpan substrate.

Table 5
Biological Metrics for BMIs Collected in the UTR

Biological Metric	Sampling Sites			
	UTR-1		UTR-2	
	Multi-habitat	Targeted riffle	Multi-habitat	Targeted riffle
Richness Measures				
Taxa Richness	55	38	55	46
EPT Taxa	20	23	26	24
Composition Measures				
EPT Index	40.4	67.7	47.9	58.9
Sensitive EPT Index	27.2	58.1	37.9	46.8
Percent Hydropsychidae	2.0	3.8	1.2	3.2
Percent Baetidae	1.4	1.2	1.0	2.0
Tolerance/ Intolerance Measures				
Tolerance Value	4.2	2.4	3.6	3.1
Percent Intolerant Organisms	26.8	59.9	37.3	49.0
Percent Tolerant Organisms	7.7	2.2	8.7	3.0
Percent Dominant Taxa	17.6	20.2	20.1	20.4
Trophic Measures				
Percent Collectors-Filterers	6.1	4.4	2.8	5.7
Percent Collectors-Gatherers	29.8	29.4	33.3	43.3
Percent Scrapers	28.8	39.1	29.6	23.3
Percent Predators	17.8	19.4	18.1	19.4
Percent Shredders	8.1	6.0	9.3	5.3
Abundance (per square foot)	284.5	669	240.8	192

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Targeted Riffle Composite

Richness Measures

Richness measures include taxa richness and EPT taxa. Taxa richness was 38 for UTR-1 and 46 for UTR-2. EPT taxa were sampled throughout both reaches with 23 taxa found in UTR-1 and 24 in UTR-2.

As discussed above, richness measures reflect the diversity of the aquatic assemblage where increasing diversity correlates with increasing health of the assemblage and suggests that niche space, habitat, and food sources are adequate to support survival and propagation of particular species.

Composition Measures

Composition measures include EPT index, sensitive EPT index, percent Hydropsychidae, and percent Baetidae. About the same number of EPT were found in UTR-2 (24) and UTR-1 (23). The EPT index was 67.7% for UTR-1 and 58.9 for UTR-2. The sensitive EPT index was 58.1% for UTR-1 and 46.8% for UTR-2 demonstrating stream health. The percentage of Hydropsychid taxa sampled was 3.8% in UTR-1 and 3.2% in UTR-2. The percent Baetid taxa was 1.2% for UTR-1 and 2.0% for UTR-2. Low percentages of tolerant Baetids and Hydropsychids show the ability of intolerant EPT taxa to survive in the river.

Composition metrics reflect the relative contribution of the population of individual taxa to the total fauna. Choice of a relevant taxon is based on knowledge of the individual taxa and their associated ecological patterns and environmental requirements, such as those that are environmentally sensitive or a nuisance species. Percent Hydropsychidae and Baetidae (two tolerant families) are regional metrics that have evolved to be particularly useful in California streams. The metric values usually increase as the effects of pollution in the form of fine particulate organic matter and sedimentation increase. Low composition values indicate that all of the reaches of stream are currently limited in their ability to support sensitive EPT species.

Tolerance/Intolerance Measures

Tolerance/intolerance measures include tolerance value, percent intolerant organisms, percent tolerant organisms, and percent dominant taxa. Both reaches had high values of intolerant taxa sampled with 59.9% in UTR-1 and 49.0% in UTR-2. Tolerant taxa were less abundant with values of 2.2% in UTR-1 and 3.0% in UTR-2. Percent dominant taxon was 20.2% in UTR-1 and 20.4% in UTR-2. Both reaches demonstrate high abundance of intolerant taxa and taxonomic diversity, thus demonstrating the health of aquatic habitat.

Tolerance/intolerance measures reflect the relative sensitivity of the community to aquatic disturbances. The taxa used are usually pollution tolerant and intolerant, but are generally nonspecific to the type of pollution or stressors.

Trophic Measures

Trophic measures include percent collectors-filterers, percent scrapers, percent predators, and percent shredders. Both UTR-1 and UTR-2 were dominated by collector-gatherers and scrapers, with predators being the next most prominent feeding group. UTR-1 had 29.4% collector gatherers and 39.1 scrapers and UTR-2 had 43.3% collector-gatherers and 23.3% scrapers. Despite the high

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abundance of collector-gatherers, various other FFGs were found within the UTR-1 and UTR-2 reaches.

Trophic measures (i.e., functional feeding group measures) provide information on the balance of feeding strategies in the aquatic assemblage. The composition of the functional feeding group is a surrogate for complex processes of trophic interaction, production, and availability of food sources. An imbalance of the functional feeding groups can reflect unstable food dynamics and can indicate a stressed condition.

Abundance

Abundance provides a measure of density of individuals collected over a fixed area. Because the abundance of individuals can be dominated by a single taxon and/or tolerant taxa, this measure does not necessarily reflect ecological health, function, or value. Nevertheless, abundance is a useful measure to document increases and/or decreases in the aquatic population over a given area.

UTR-1 had a higher abundance per square foot of individuals with 669. UTR-2 had a drastically lower abundance at 192. The relatively high abundance at UTR-1 can likely be attributed to more diverse and favorable substrate conditions, including higher concentrations of boulders and the lack of hardpan substrate. Fewer individuals collected in UTR-2 could be related to logging activities in the reach and the erosion of the river banks.

3.2 AQUATIC HABITAT TYPING AND SNORKEL SURVEYS

3.2.1 AQUATIC HABITAT TYPING

A total of four different habitat types were noted throughout the 3 study reaches in the project study area (see Exhibit 1). Different habitat types serve a variety of functions for fish and BMIs. Habitat diversity has important influences on the aquatic community. Habitat types are often categorized by flow relationships. The four flow-related habitats documented within the study area are described below.

- **Riffles**—Riffles are shallow sections in a stream, where water breaks over rocks or other partially submerged organic debris and produces surface agitation. Riffles are typically higher gradient than other habitat types, and substrates in these sections are usually dominated by larger particle sizes (e.g., coarse gravel, cobble, and boulders). Riffles exhibit conditions conducive to spawning for certain fish species, improve water quality (e.g., turbulence increases dissolved oxygen), and often are productive areas for the BMI community.

- **Runs**—Runs are swiftly flowing reaches with little surface agitation and no major flow obstructions. They often appear as flooded or fully inundated riffles. Typical substrate in this habitat type consists of gravel, cobble, and boulders. Runs frequently are formed on the downstream end of riffles and provide many of the same functions. They meet varying habitat requirements for different species or different size class individuals.

- **Glides**—Glides are wide, relatively homogenous habitat types with uniform channel bottoms. Flows typically exhibit low to moderate velocities, lacking pronounced turbulence. Substrate usually consists of smaller particle sizes (sand, gravel, and cobble). Glides provide important transitional habitats between riffles, runs, and pools. Glides with adequate cover (in the form of substrate or woody debris, as described below) provide important rearing habitat for juvenile fish species.

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- **Pools**—Pools are deep habitat types, formed and maintained by hydraulic forces that create a scouring effect. Pools can be found in various locations, depending on the dominant processes associated with the formation. Pool habitat is important because they provide velocity refugia (i.e., shelter) during high winter and spring flows, and they are an especially supportive habitat during the summer low-flow period as well as during periodic droughts. Adults of many aquatic species, including rainbow trout, mountain whitefish, and Tahoe sucker, rely heavily on pool habitat. Deeper pools with good shelter characteristics provide important habitat (Bjornn and Reiser 1979).

The extent and quality of glide and pool habitats can be greatly influenced by the health of riparian vegetation, which provides important structure and shelter components.

Throughout the study area, habitat type diversity varies longitudinally along the river, with a pattern of decreasing diversity from upstream to downstream. Habitat in Reach 1, the furthest downstream reach, is least diverse in the study area, dominated by long, homogeneous glides with a few deep holes. Reach 2 also includes several long glides; however, these habitats are more frequently broken by small riffles and pools. Reach 3 has the largest relative length of habitat types classified as riffles (see Exhibit 1).

3.2.2 Snorkel Survey

Background

Seven native fish species (Table 6) are known to occur in the UTR (Murphy and Knopp 2000, Moyle 2002, Dill and Cordone 1997, Schlesinger and Romsos 2000). The general abundance of the native fish community has declined considerably since the arrival of the first Euro-Americans in the Tahoe Basin in the 1840s. Several factors are believed to have contributed to the decline or extinction of native fish and the degradation of fish habitat in the UTR as well as throughout the greater Tahoe Basin. Logging, water diversions, grazing, commercial harvest, road building, and the introduction of nonnative fish and other aquatic organisms have contributed cumulatively to the change in the Tahoe Basin's fisheries composition and degradation of fish habitat (Murphy and Knopp 2000). Since the Comstock Era (circa 1860), 20 additional species of nonnative fish have been introduced into Tahoe Basin aquatic communities, and at least six (Table 6) are known to occur in the UTR (Murphy and Knopp 2000, Moyle 2002, Dill and Cordone 1997, Schlesinger and Romsos 2000). The variety of nonnative fish introduced into the Tahoe Basin is the result of numerous attempts by State agencies and anglers to establish sustainable commercial and recreational fisheries. The introduction of nonnative fish has greatly influenced the native fish community.

Native Fish Species

The Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*) is the only salmonid native to lakes and streams in the Tahoe Basin. In the late 1800s and early 1900s, this species supported a commercial fishery in the Tahoe basin. The fishery declined in the 1920s, and it collapsed in the early 1930s (Cordone and Frantz 1966). By 1939, the Lahontan cutthroat trout was extirpated in the Tahoe Basin, from overharvesting, habitat degradation, and the introduction of nonnative fishes (Moyle 2002). Numerous attempts have been made to reintroduce this native trout. Between 1956 and 1964, Lahontan cutthroat trout was planted annually in headwater streams of the UTR (Cordone and Frantz 1966). In 1970, the species was Federally listed as endangered, but was reclassified as threatened in 1975 (40 *Federal Register* 29864, July 16, 1975), to facilitate its management and allow angling.

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Numerous efforts have been made to restore Lahontan cutthroat trout populations in streams and small lakes, including the upper reaches of the UTR. Reintroduction efforts in the Tahoe Basin have been hampered by the presence of nonnative trout (see below), which compete with, predate on, and/or hybridize with Lahontan cutthroat trout (Moyle 2002). For reintroduction of Lahontan cutthroat trout to be successful, nonnative salmonids must first be removed.

Large numbers of Lahontan cutthroat trout were stocked into lakes in the UTR watershed between 1996 and 2001. In 2001, CDFG curtailed planting all trout (including Lahontan cutthroat trout) in backcountry lakes and streams in the Sierra Nevada above 5,000 feet elevation because of concerns over their effects on native amphibians, particularly the Sierra Nevada yellow-legged frog (*Rana sierrae*) (Knutson, pers. comm., 2005 and Lehr, pers. comm., 2005). Lahontan cutthroat trout are presently confined to headwater tributaries of the UTR and are not present in the study area.

The mountain whitefish (*Prosopium williamsoni*) is native to lakes and streams of western North America, including the Tahoe Basin. Adults spawn in the fall or early winter among gravel, cobble, and boulders, in riffles of tributary streams. Mountain whitefish favor stream bottoms and feed mainly on aquatic insect larvae. Their current distribution throughout the Tahoe Basin is poorly documented, and they generally are believed to be less abundant and less widely distributed relative to historic levels. The reason for decline is unclear; construction of dams and predation on whitefish fry by nonnative trout species are believed to be possible causes (Moyle 2002). Mountain whitefish were not observed in the study area during snorkel surveys.

The Tahoe sucker (*Catostomus tahoensis*) is native to lakes and streams in the Tahoe Basin. This fish may spawn in Lake Tahoe or its tributary streams, including the UTR. In streams, spawning generally occurs in runs or areas of small gravel in pools. Juveniles prefer pools and deep runs with abundant cover (Moyle 2002). Tahoe sucker was observed in the study area during snorkel surveys.

The Paiute sculpin (*Cottus beldingi*) is the only sculpin native to the UTR watershed. This species inhabits streams with slight to moderate current and is found in riffle areas among rubble or large gravel. It also occurs in lakes, including Lake Tahoe. Its diet includes a variety of aquatic invertebrates. The Paiute sculpin is an important prey item for some species of trout (Moyle 2002) and it has been documented in the study area. However, Paiute sculpin were not observed in the study area during snorkel surveys.

The speckled dace (*Rhinichthyes osculus*) is the most widely distributed fish in western North America. Lahontan speckled dace (*R. o. robustus*) occurs throughout streams and lakes in the Tahoe Basin and is the only dace subspecies native to the UTR. Lahontan speckled dace may spawn among gravel areas in riffles in tributary streams. In streams, fry (i.e., early life stage, postlarval) speckled dace concentrate in warm shallows, particularly between large rocks or among emergent vegetation. Adults prefer large substrates (i.e., material on the channel bottom; gravel, cobbles, boulders) with interstitial spaces, shallow rocky riffles and runs, and submerged vegetation or tree roots (Moyle 2002). Speckled dace were not observed in the study area during snorkel surveys.

The Lahontan redside (*Richardsonius egregious*) is native to streams and lakes in the Tahoe Basin, including the UTR watershed. Spawning occurs in the littoral zone (less than 3 feet deep) in lakes or among gravel and cobble substrate in tributary streams. In small streams, adults associate with high-velocity water along the stream margin or in backwater areas (Moyle 2002). Lahontan redsides were observed in the study area during snorkel surveys.

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The tui chub (*Gila bicolor*) is native to streams and lakes in the Tahoe Basin. Two subspecies of tui chub have been reported to occur in the Tahoe Basin: the Lahontan lake tui chub (*G. b. pectinifer*) and the Lahontan stream tui chub (*G. b. obesa*). The lake form is a pelagic fish that feeds on zooplankton in the open waters of Lake Tahoe. The stream form is a benthic fish that feeds on bottom invertebrates in Lake Tahoe and tributary streams. The two forms are difficult to distinguish because of slight variations in morphology and are more readily indentified by their different habitat preferences. Both generally spawn over sandy bottoms or at the mouths of tributaries. Larvae of both forms eventually move out of nursery areas and into their respective habitats (Moyle 2002). No tui chubs, lake nor stream, were observed during snorkel surveys.

Nonnative Fish Species

Rainbow trout (*Oncorhynchus mykiss*) were first introduced into Lake Tahoe in the late 1800s. Large numbers of domestic, hatchery-raised rainbow trout are currently planted annually into Lake Tahoe. Rainbow trout have also been occasionally stocked in an irrigation pond (hole 9 pond) on the golf course. In the recent past, rainbow trout from the hole 9 pond have been transplanted into the UTR (with approval by CDFG) before the pond was drained to make repairs. Rainbow trout have the potential to threaten Lahontan cutthroat trout through competition, predation, and hybridization. Rainbow trout were observed in the study area during snorkel surveys.

Brown trout (*Salmo trutta*) were first introduced into eastern North America, and then into California in 1893 (Dill and Cordone 1997). This fish likely was introduced into the Tahoe Basin shortly after its first planting in other parts of California. Brown trout are fall spawners and have the potential to threaten cutthroat trout through predation and competition. Brown trout were not observed during snorkel surveys; however, they have been documented within the UTR watershed.

Brook trout (*Salvelinus fontinalis*) are native to eastern North America and were first brought to California in 1871 (Dill and Cordone 1997). They were planted in numerous streams and lakes throughout California. However, the timing of the first introduction of brook trout into the Tahoe Basin is undocumented. Large numbers of brook trout reportedly were planted into Lake Tahoe between 1953 and 1958 (Cordone and Frantz 1968). Brook trout introductions can fundamentally change alpine lake and stream ecosystems. Brook trout have eliminated yellow-legged frogs, other amphibians, and large invertebrates through predation. Brook trout also have been documented to contribute to elimination of native cutthroat trout through competitive interactions (Moyle 2002). Brook trout were not observed during snorkel surveys in the study area; however, they have been documented within the UTR watershed.

Several warm-water species—bluegill (*Lepomis macrochirus*), largemouth bass (*Micropterus salmoides*), smallmouth bass (*M. dolomieu*), and brown bullhead catfish (*Ictalurus nebulosus*)—have been introduced into Lake Tahoe and some tributary streams (Moyle 2002). Their influence on the aquatic ecosystem is unknown; however, their introduction likely has had an adverse effect on native fishes. Bluegill was observed during the fall 2006 snorkel surveys in the study area, while largemouth bass, smallmouth bass, and brown bullhead catfish were not.

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Table 6
Fish Species in the Upper Truckee River

Common Name	Scientific Name	Observed in the Study Area during Fall 2006 Snorkel Survey
Native Fish Species		
Lahontan cutthroat trout	*Oncorhynchus clarki henshawi*	
Mountain whitefish	*Prosopium williamsoni*	
Tahoe sucker	*Catostomus tahoensis*	X
Paiute sculpin	*Cottus beldingi*	
Lahontan speckled dace	*Rhinichthyes osculus robustus*	
Lahontan redside	*Richardsonius egregious*	X
Tui chub	*Gila bicolor*	
Nonnative Fish Species		
Rainbow trout	*Oncorhynchus mykiss*	X
Brown trout	*Salmo trutta*	X
Brook trout	*Salvelinus fontinalis*	
Kokanee salmon	*Oncohynchus nerka*	
Bluegill	*Lepomis macrochirus*	X
Brown bullhead catfish	*Ictalurus nebulosus*	
Source: Moyle 2002, Dill and Cordone 1997, Schlesinger and Romsos 2000, data compiled by EDAW in 2009		

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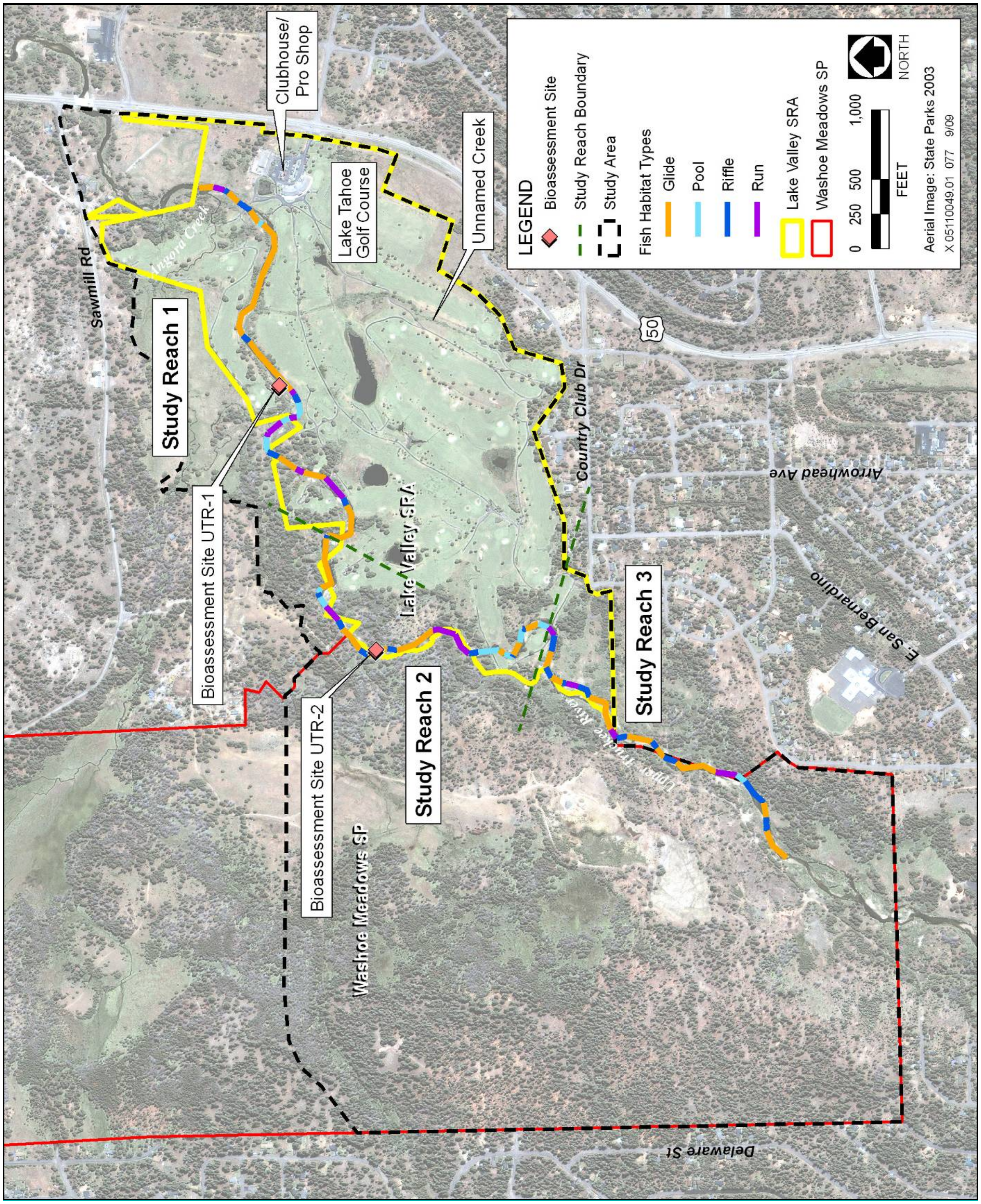

Source: Data compiled by EDAW in 2009

Fish Habitat and Bioassessment Survey Sites **Exhibit 1**

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UTR-1, Transect A (upstream)

UTR-1, Transect F (upstream)

Photodocumentation of Upper Truckee River (Reach UTR-1) (09/21/06) **Exhibit 2a**

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UTR-1, Transect F (downstream)

UTR-1, Transect K (downstream)

Photodocumentation of Upper Truckee River (Reach UTR-1) (09/21/06) Exhibit 2b

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UTR-2, Transect A (upstream)

UTR-2, Transect F (upstream)

Photodocumentation of Upper Truckee River (Reach UTR-2) (09/21/06) **Exhibit 3a**

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UTR-2, Transect F (downstream)

UTR-2, Transect K (upstream)

Photodocumentation of Upper Truckee River (Reach UTR-2) (09/21/06) **Exhibit 3b**

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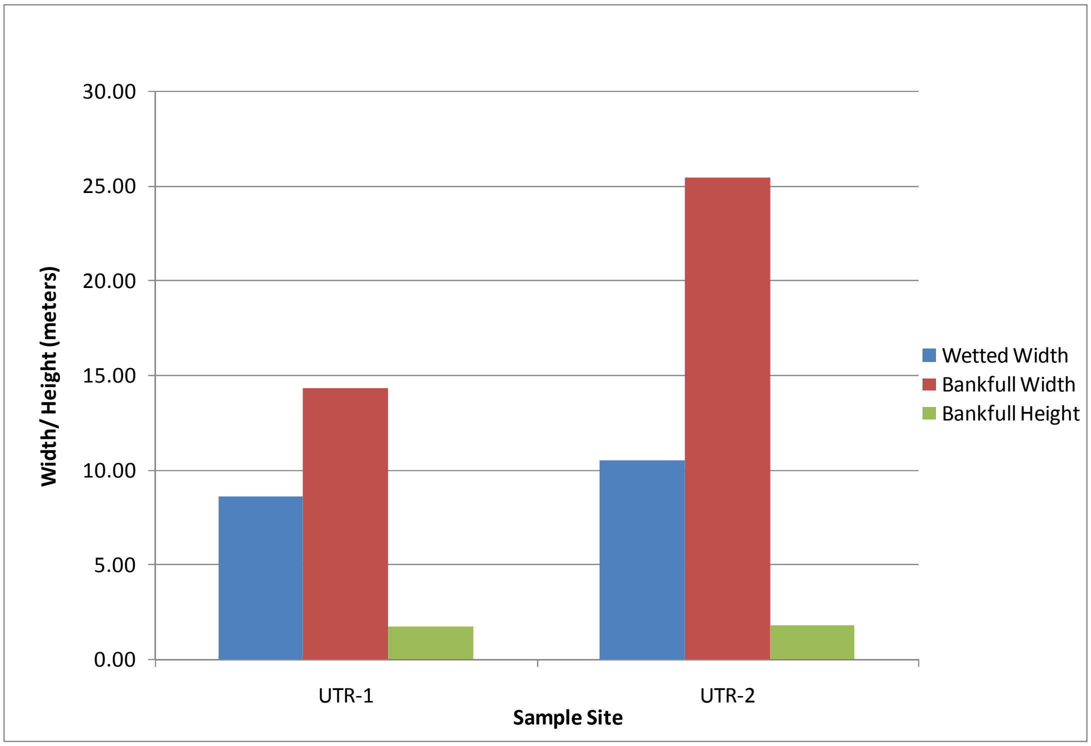
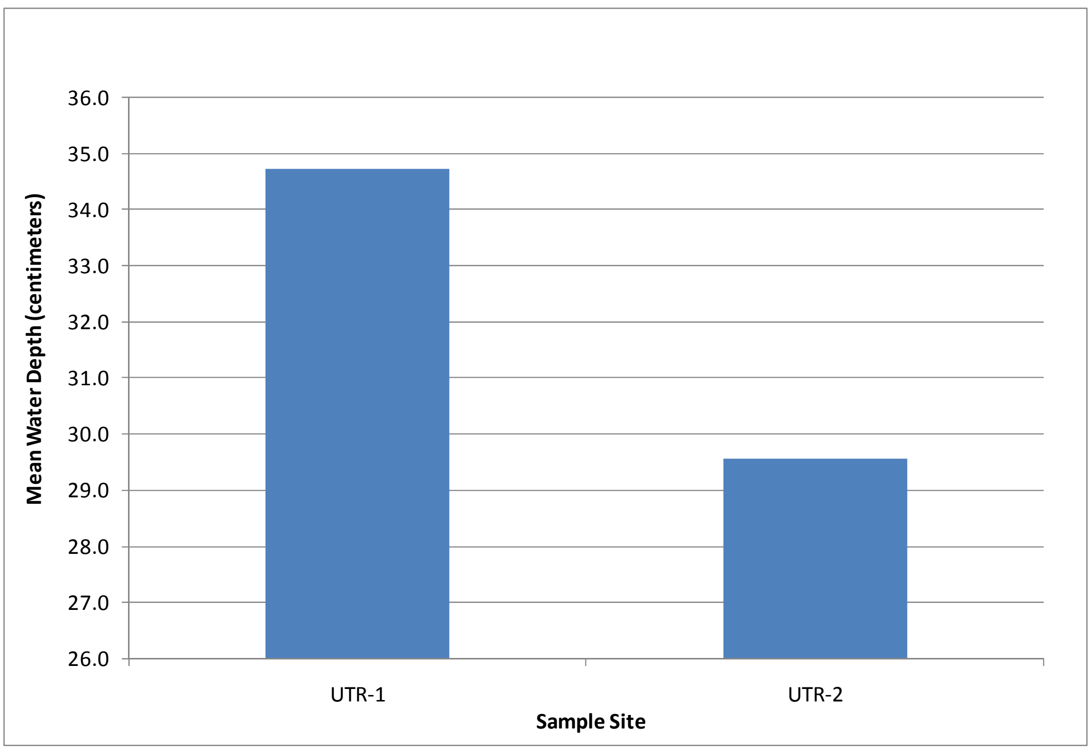


Mean Channel Dimensions by Reach **Exhibit 4**



Mean Water Depth by Reach **Exhibit 5**

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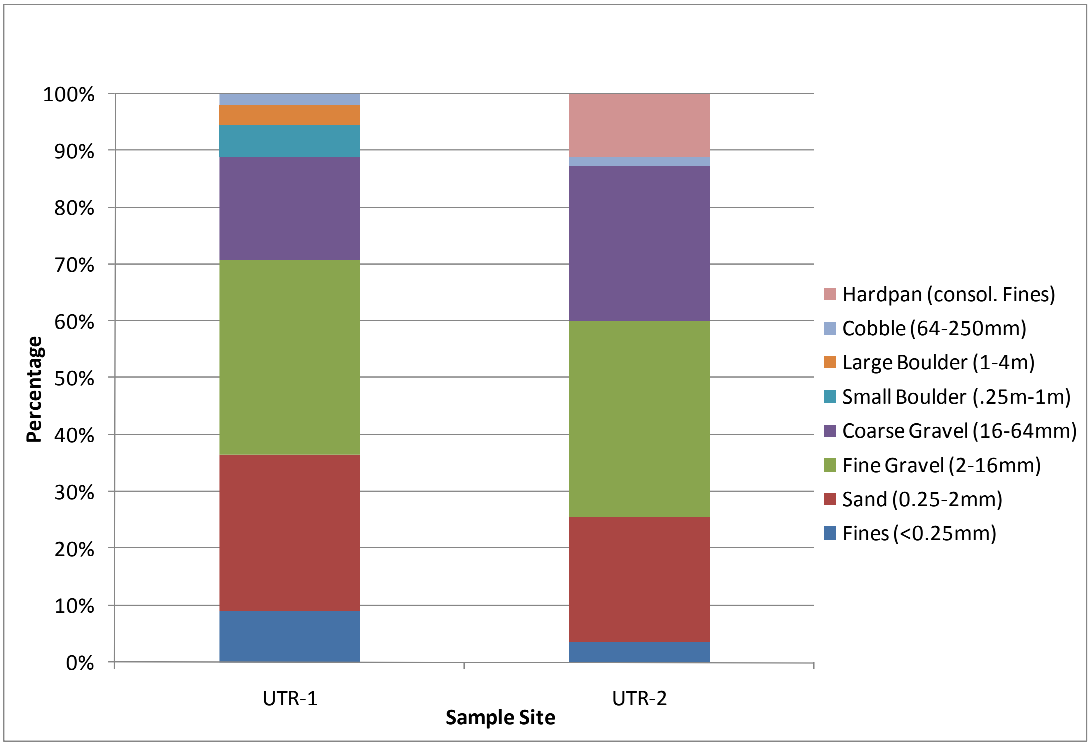
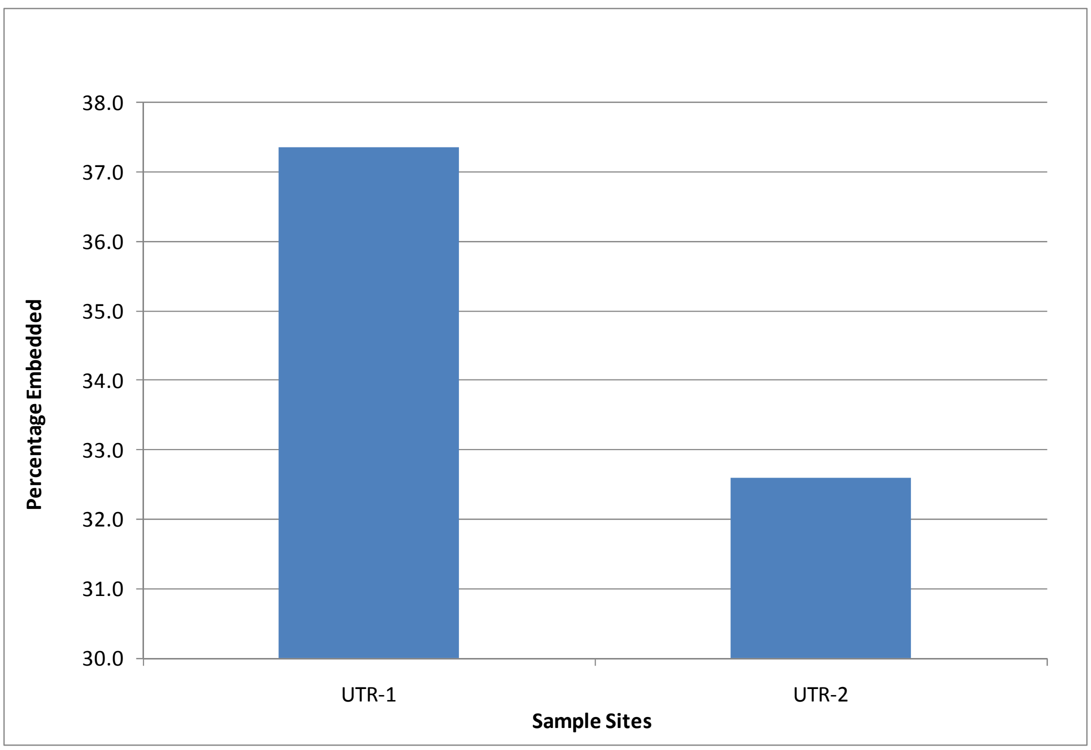


Substrate Size Class Abundance by Reach **Exhibit 6**



Cobble Embeddedness by Reach **Exhibit 7**

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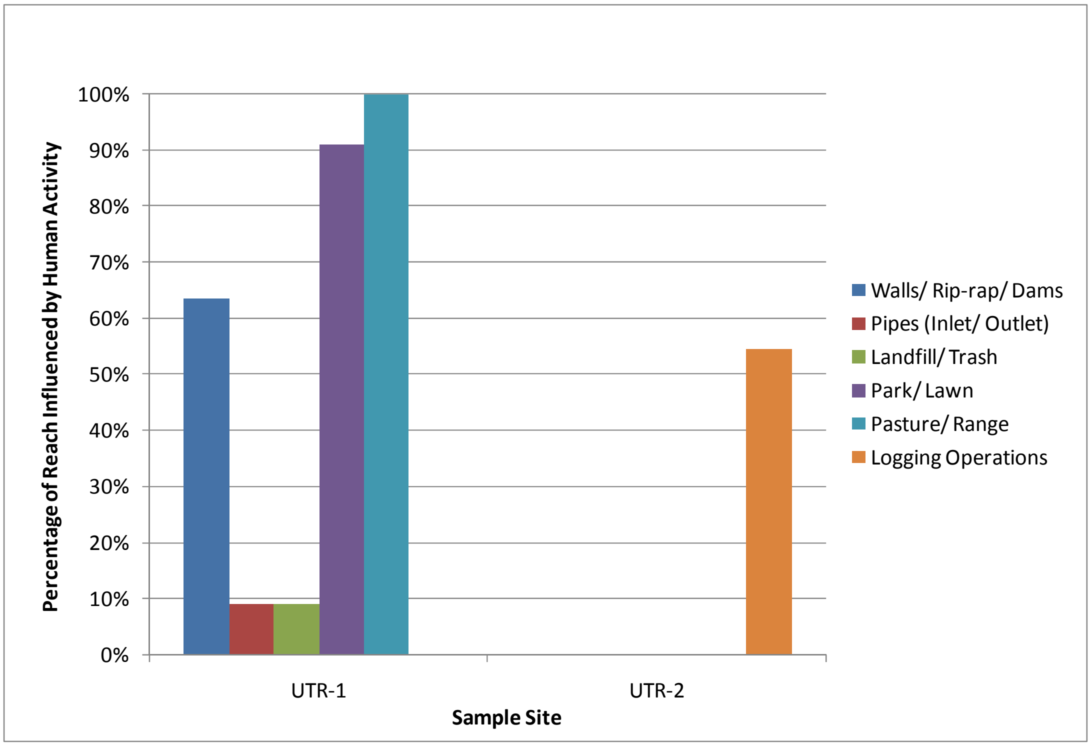
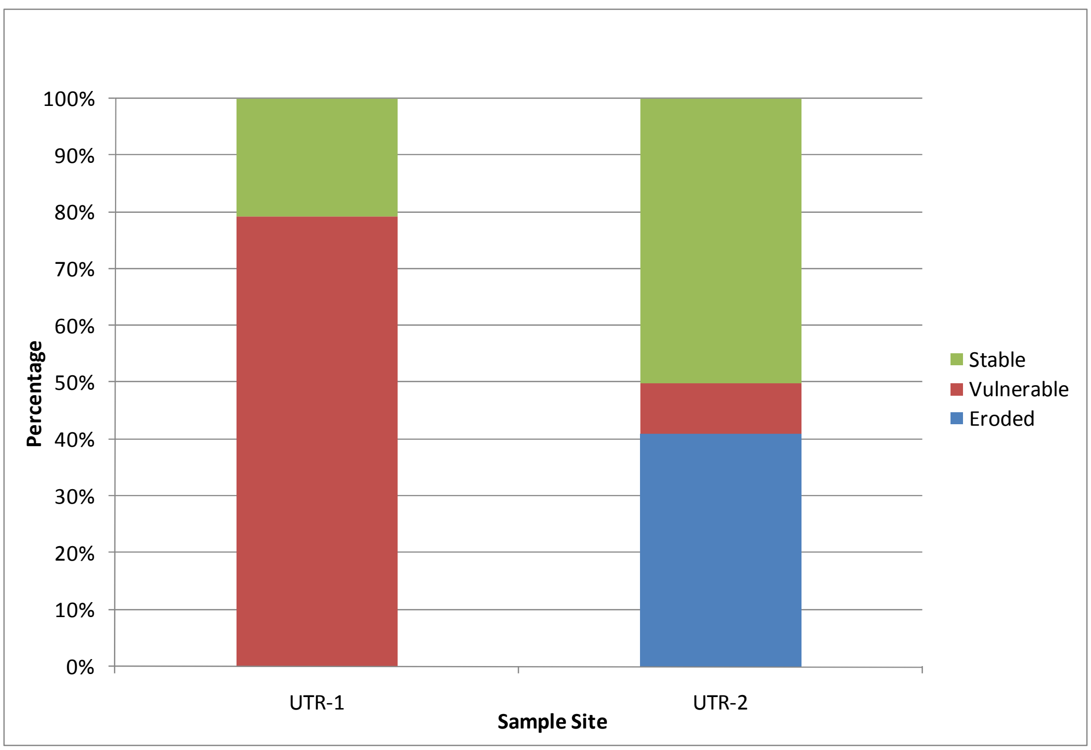


Human Influence by Reach **Exhibit 8**



Bank Stability by Reach **Exhibit 9**

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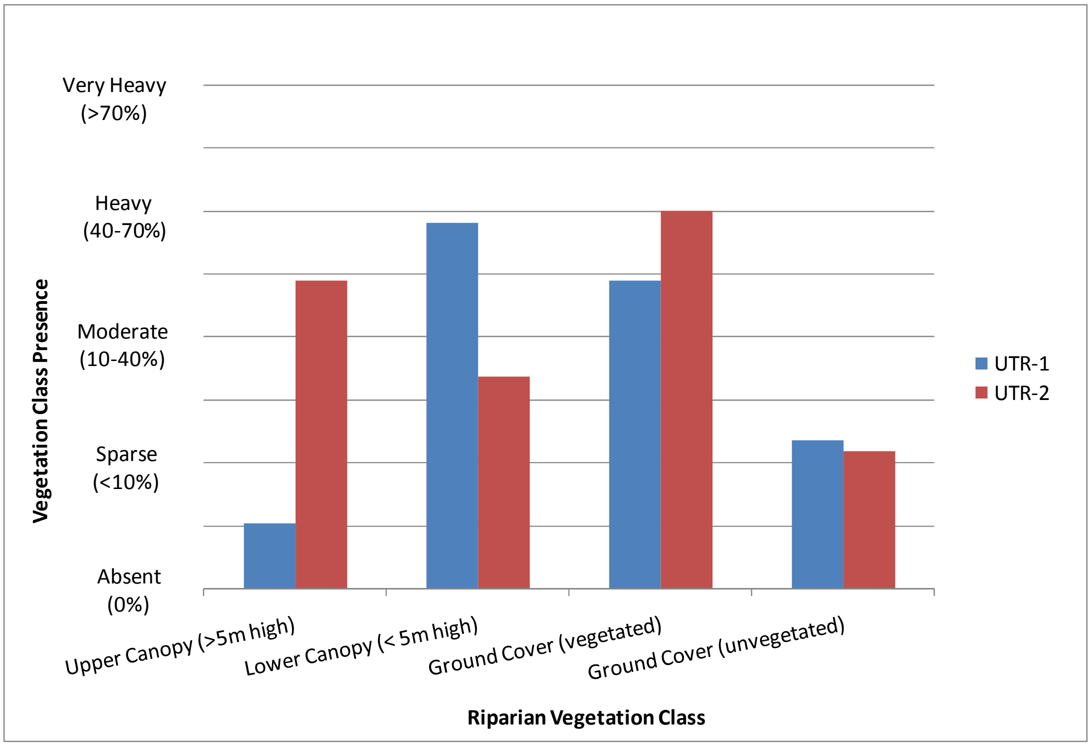
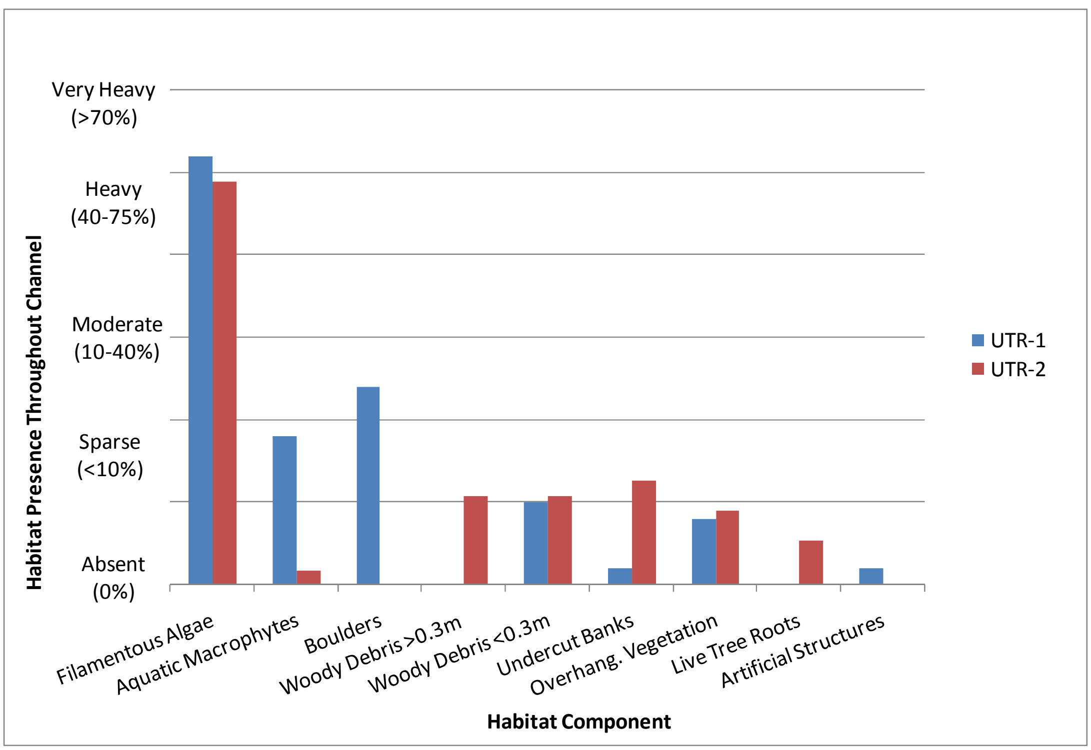


Riparian Vegetation Class by Reach **Exhibit 10**



Instream Habitat Complexity by Reach **Exhibit 11**

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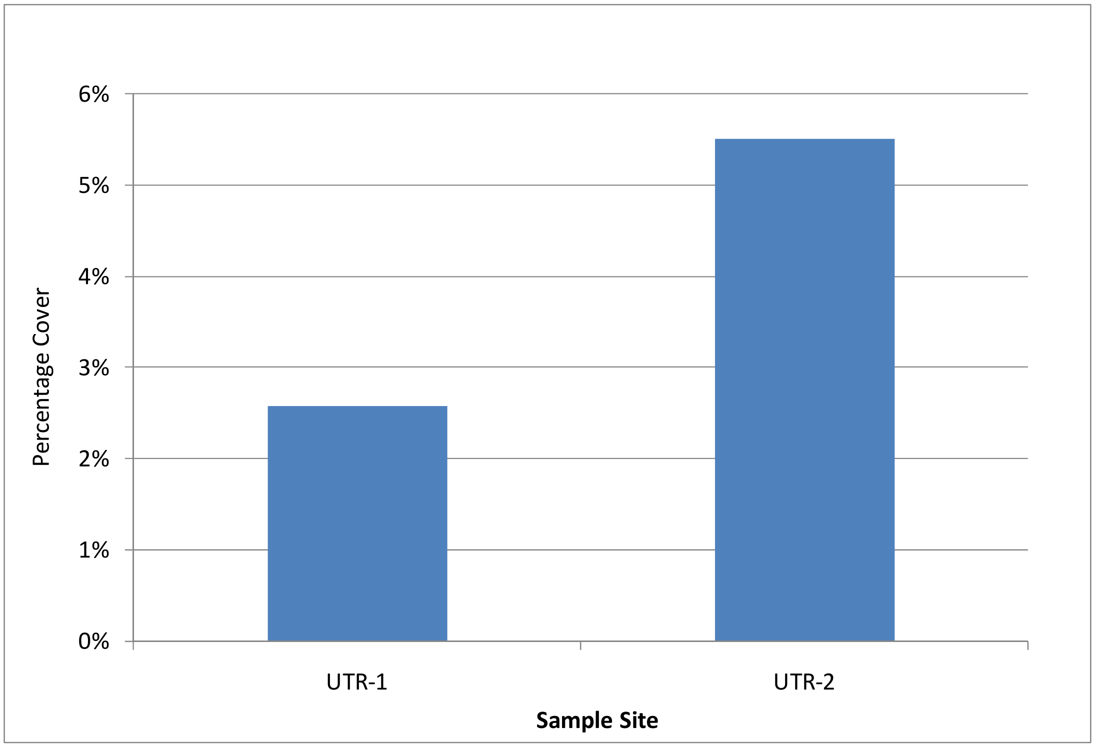
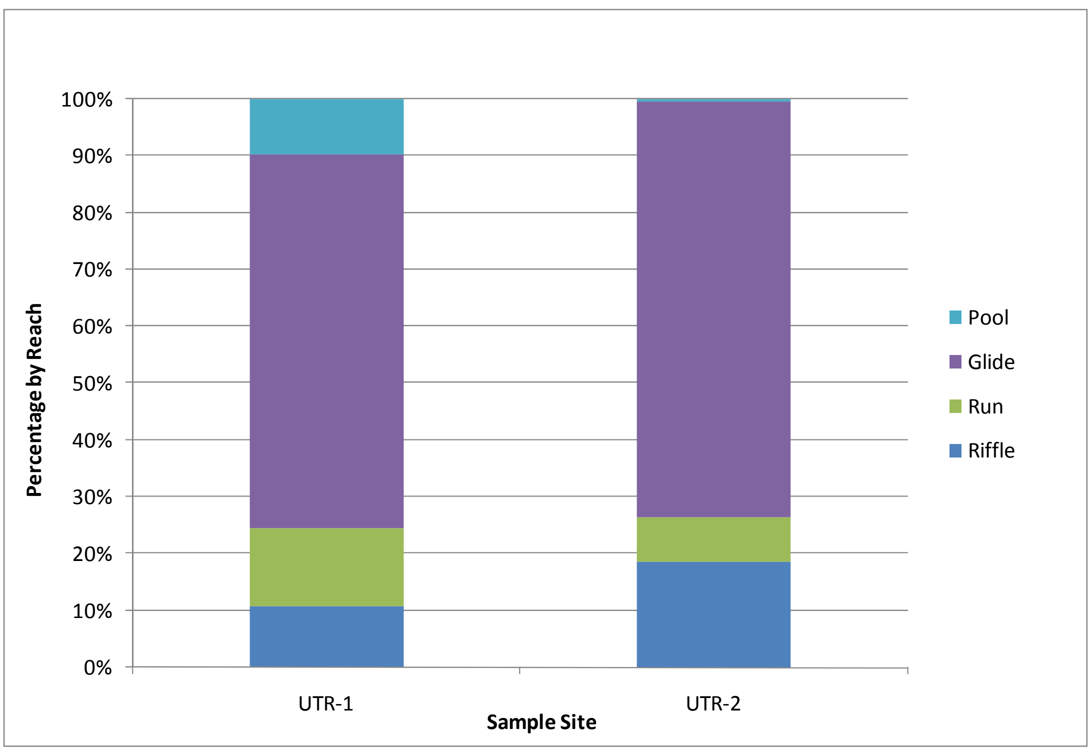


Riparian Canopy Cover by Reach **Exhibit 12**



Flow Habitats by Reach **Exhibit 13**

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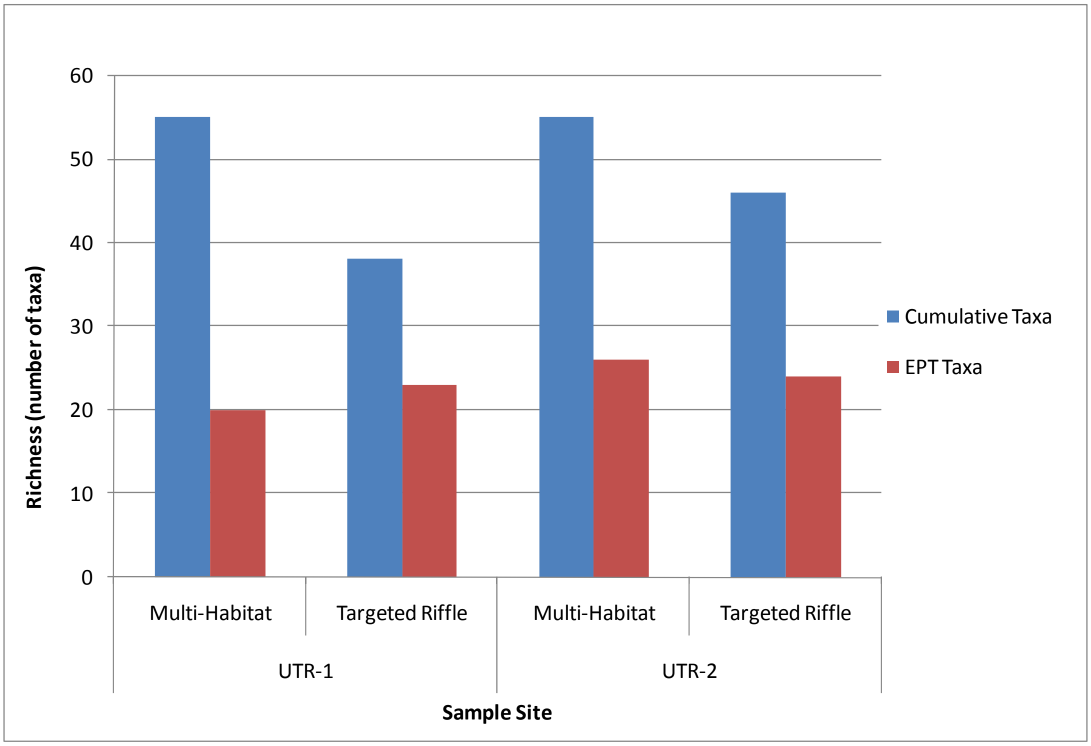
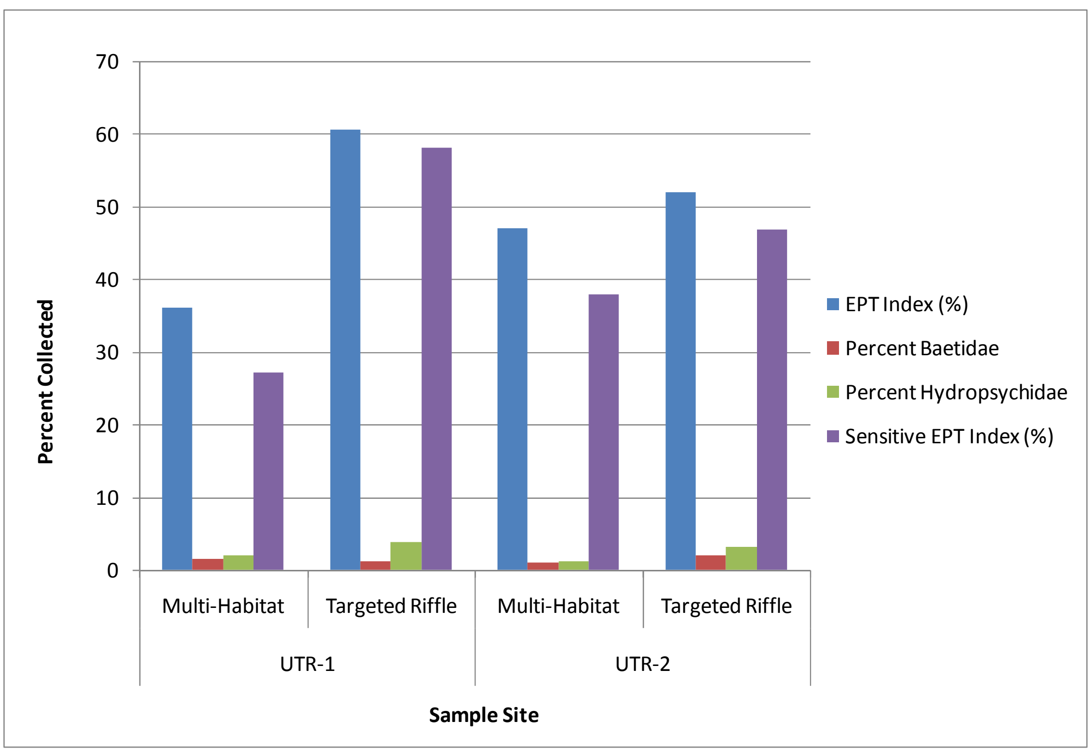


BMI Richness Measures by Reach **Exhibit 14**



BMI Composition Measures by Reach **Exhibit 15**

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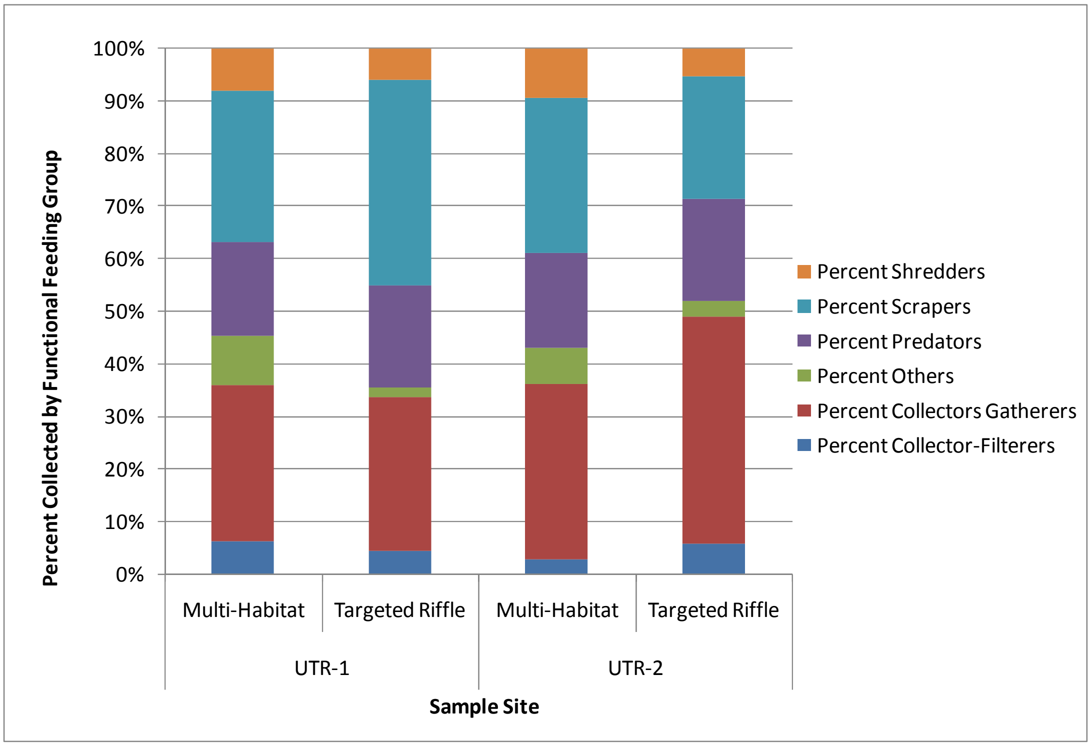
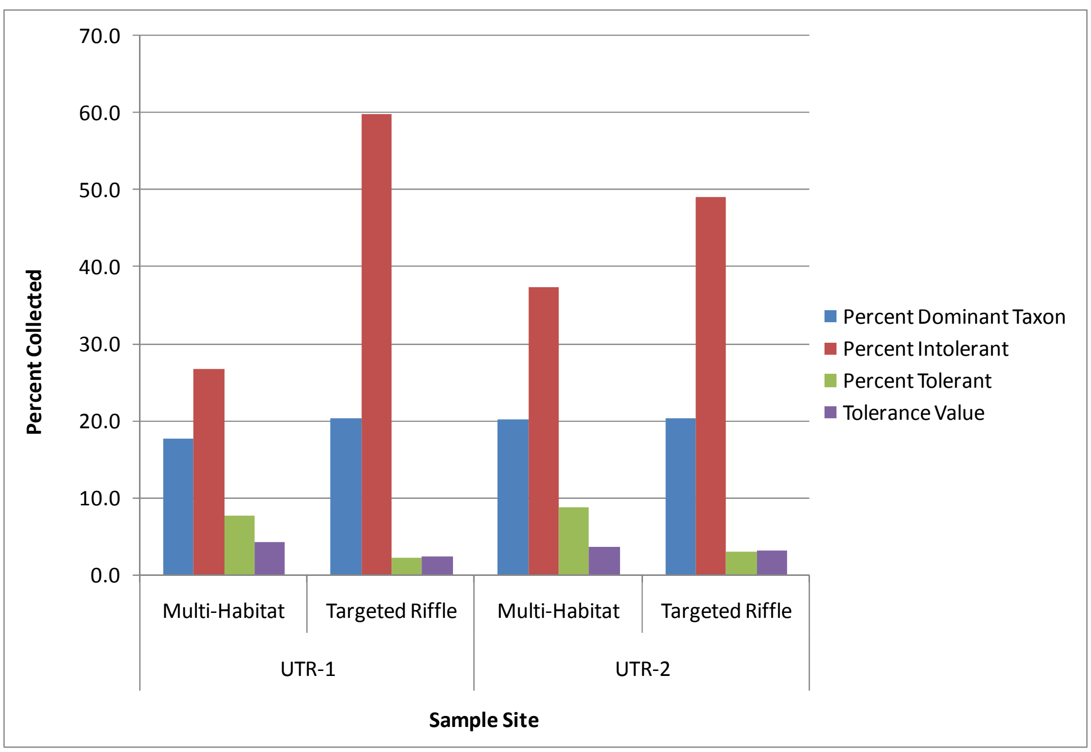


BMI Tolerance/Intolerance Measures by Reach **Exhibit 16**



BMI Trophic Measures by Reach **Exhibit 17**

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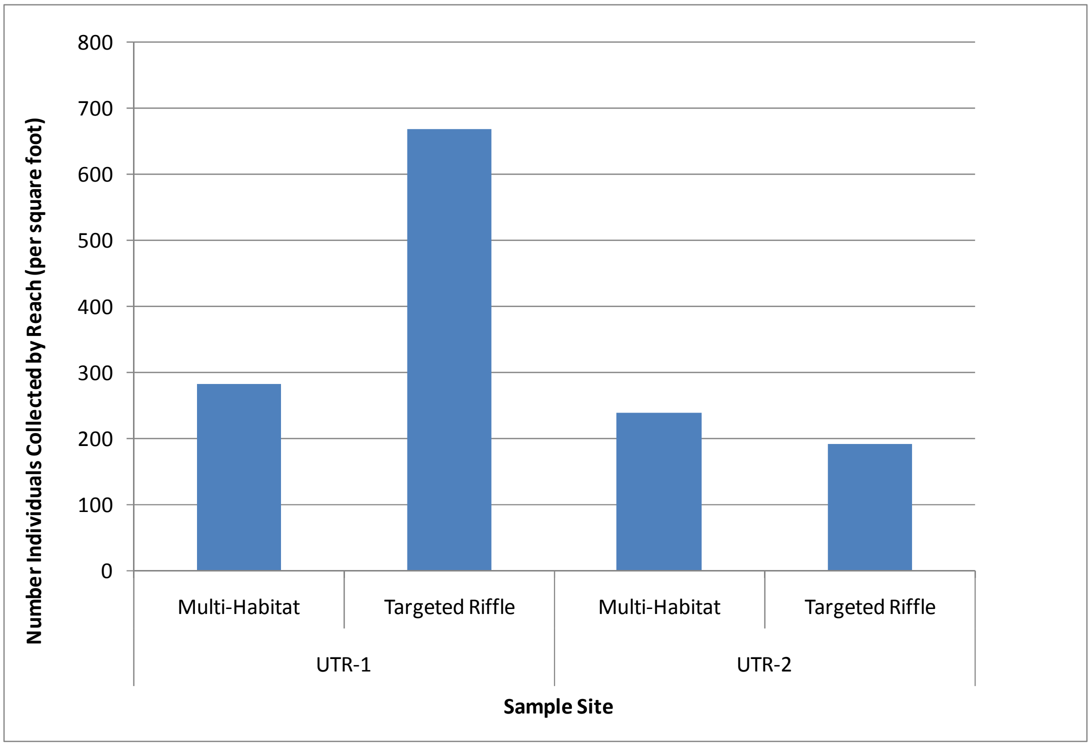

BMI Abundance by Reach **Exhibit 18**

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Attachment A

Bioassessment Forms

Aquatic Bioassessment Laboratory
Water Pollution Control Laboratory
California Department of Fish and Game

ABL Stream Habitat Characterization Form

FULL VERSION *Revision date: March 17, 2006*

REACH DOCUMENTATION Standard Reach Length = 150 m Distance between transects = 15 m		
Project Name:	Date:	Time:
Stream Name:	Site Name:	
Site Code:	Crew Members:	
Latitude: ºN	datum: NAD27 NAD83	
Longitude: ºW		

AMBIENT WATER QUALITY MEASUREMENTS							
Temperature (°C)		pH		Alkalinity (mg/L)		Turbidity (optional)	
Dissolved O_2 (mg/L)		Specific Cond. (µs)		Salinity (ppt)		Silica (optional)	

REACH LENGTH			
150 m		Other	
Actual Length (m)			
Explanation:			

PHOTOGRAPHS:	A (up): ☐	F (up): ☐	F (down): ☐	K (down): ☐
Additional Photographs (optional):				

DISCHARGE MEASUREMENTS (first measurement = left bank) **check if measurement not possible** ☐

VELOCITY AREA METHOD (preferred) **Transect Width:**

	Distance from Bank (cm)	Depth (cm)	Velocity (m/sec)		Distance from Bank (cm)	Depth (cm)	Velocity (m/sec)
1				11			
2				12			
3				13			
4				14			
5				15			
6				16			
7				17			
8				18			
9				19			
10				20			

BOUYANT OBJECT METHOD

	Float 1	Float 2	Float 3
Distance			
Float Time			

Float Reach Cross Section

width (m) depth (cm)	Upper Section	Middle Section	Lower Section
Width			
Depth 1			
Depth 2			
Depth 3			
Depth 4			
Depth 5			

NOTABLE FIELD CONDITIONS (check one box per topic)

Evidence of recent rainfall (enough to increase surface runoff)	NO		minimal		>10% flow increase	
Evidence of fires in reach or immediately upstream (<500 m)	NO		< 1 year		< 5 years	
Dominant landuse/ landcover in area surrounding reach	Agriculture		Forest		Rangeland	
	Urban/ Indus		Suburb/Town		Other	

Site Code:	Date: __ __ / __ __ / 2005	**FULL FORM**

SLOPE and BEARING FORM (transect based- for Full PHAB only)

	Main Segment			Supplemental Segment 1			Supplemental Segment 2		
Transect	**Slope (degrees)**	**Bearing (0º-359º)**	**Proportion (%)**	**Slope (degrees)**	**Bearing (0º-359º)**	**Proportion (%)**	**Slope (degrees)**	**Bearing (0º-359º)**	**Proportion (%)**
K-J									
J-I									
I-H									
H-G									
G-F									
F-E									
E-D									
D-C									
C-B									
B-A									

SLOPE MEASUREMENTS (use the fewest segments necessary, record as percent slope not degrees slope) BASIC ONLY

Segment Number	Segment Length	Percent Slope	Segment Number	Segment Length	Percent Slope	Segment Number	Segment Length	Percent Slope	Segment Number	Segment Length	Percent Slope
1			4			7			10		
2			5			8			11		
3			6			9			12		

ADDITIONAL HABITAT CHARACTERIZATION

Parameter	Optimal	Suboptimal	Marginal	Poor
Epifaunal Substrate/ Cover	Greater than 70% of substrate favorable for epifaunal colonization	40-70% mix of stable habitat; well-suited for colonization	20-40% mix of stable habitat; substrate frequently disturbed	Less than 20% stable habitat; lack of habitat is obvious
Score:	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected	Moderate deposition of new gravel, sand or fine sediment on bars; 30-50% of the bottom affected	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently
Score:	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, (e.g. bridge abutments; recent channelization not present.	Channelization or shoring structures present on both banks; 40 to 80% of stream reach disrupted	Over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed
Score:	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Site Code:	Date: __ __ / __ __ / 2006	**Take PHOTOGRAPH Upstream**
Wetted Width (m):	Bankfull Width (m):	Bankfull Height:
		Transect: A

TRANSECT SUBSTRATES				Cobble Embed (%)
Position	mm or Size Class	Depth (cm)	CPOM	
L Bank			P A	
LeftCtr			P A	
Center			P A	
RightCtr			P A	
R Bank			P A	

BANK STABILITY 5m up and 5m downstream of transect and from bankfull to wetted width

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

HUMAN INFLUENCE	0 = Not Present CH - Within Channel B = On Bank C = Within 10m of Channel P = >10m and <50m of Channel		
	Left Bank	**Channel**	**Right Bank**
Walls/ Rip-rap/ Dams	0 B C P	CH	0 B C P
Buildings	0 B C P	CH	0 B C P
Pavement/ Cleared Lot	0 B C P		0 B C P
Road/ Railroad	0 B C P	CH	0 B C P
Pipes (Inlet/ Outlet)	0 B C P	CH	0 B C P
Landfill/ Trash	0 B C P	CH	0 B C P
Park/ Lawn	0 B C P		0 B C P
Row Crops	0 B C P		0 B C P
Pasture/ Range	0 B C P		0 B C P
Logging Operations	0 B C P		0 B C P
Mining Activity	0 B C P	CH	0 B C P

RIPARIAN VEGETATION (downstream)	0 = Absent (0%) 3 = Heavy (40-75%) 1 = Sparse (<10%) 4 = Very Heavy>75%) 2 = Moderate (10-40%) **circle one**	
Riparian estimates are made 5m above and 5m below the transect and 10m to the side starting at the bank.		
Vegetation Class	**Left Bank**	**Right Bank**
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m to 5m high)		
Shrubs and saplings 0.5m to 5m high	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Shrubs and saplings, herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

INSTREAM HABITAT COMPLEXITY	0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)
Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3m	0 1 2 3 4
Woody Debris <0.3m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang. Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

DENSIOMETER READINGS (0-17) *count covered dots*	
Left Bank	
Center Upstream	
Center Downstream	
Right Bank	

Inter-transect: A-B Wetted Width (m):

FLOW HABITATS (% between transects, T=100%)	
Channel Type	**%**
Riffle	
Rapid	
Run	
Glide	
Pool	
Cascade/ Fall	
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)			
Position (%)	mm or Size Class	Depth (cm)	CPOM
L Bank			P A
LeftCtr			P A
Center			P A
RightCtr			P A
R Bank			P A

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size classes listed to right

SUBSTRATE SIZE CLASS CODES

RS = bedrock smooth (>car)
RR = bedrock rough (> car)
RC = concrete/asphalt
XB = large boulder (1-4m)
SB = sm blder (.25 m to 1m)
CB = cobble (64-250mm)
GC = coarse gravel (16-64)
GF = fine gravel (2-16 mm)
SA = sand (0.25-2mm)
FN = fines (<0.25mm)
HP = hardpan (consol. fines)
WD = wood
OT = other

CPOM/ COBBLE EMBEDDEDNESS

CPOM: Record presence (P)/ absence (A) of coarse particulate organic matter (>1.0 mm) within 1 cm of each particle.

Cobble Embeddedness: visually estimate % embedded by fine particles (record to nearest 5%)

Site Code:	Date: __ __ / __ __ / 2006	
Wetted Width (m):	Bankfull Width (m):	Bankfull Height: **Transect: B**

TRANSECT SUBSTRATES				Cobble Embed (%)
Position	mm or Size Class	Depth (cm)	CPOM	
L Bank			P A	
LeftCtr			P A	
Center			P A	
RightCtr			P A	
R Bank			P A	

BANK STABILITY 5m up and 5m downstream of transect and from bankfull to wetted width			
Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

HUMAN INFLUENCE	0 = Not Present CH - Within Channel B = On Bank C = Within 10m of Channel P = >10m and <50m of Channel								
	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	0	B	C	P	CH	0	B	C	P
Buildings	0	B	C	P	CH	0	B	C	P
Pavement/ Cleared Lot	0	B	C	P		0	B	C	P
Road/ Railroad	0	B	C	P	CH	0	B	C	P
Pipes (Inlet/ Outlet)	0	B	C	P	CH	0	B	C	P
Landfill/ Trash	0	B	C	P	CH	0	B	C	P
Park/ Lawn	0	B	C	P		0	B	C	P
Row Crops	0	B	C	P		0	B	C	P
Pasture/ Range	0	B	C	P		0	B	C	P
Logging Operations	0	B	C	P		0	B	C	P
Mining Activity	0	B	C	P	CH	0	B	C	P

RIPARIAN VEGETATION (downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) **circle one**

Riparian estimates are made 5m above and 5m below the transect and 10m to the side starting at the bank.

Vegetation Class	Left Bank					Right Bank				
Upper Canopy (>5 m high)										
Trees and saplings >5 m high	0	1	2	3	4	0	1	2	3	4
Lower Canopy (0.5 m to 5m high)										
Shrubs and saplings 0.5m to 5m high	0	1	2	3	4	0	1	2	3	4
Ground Cover (<0.5 m high)										
Shrubs and saplings, herbs/ grasses	0	1	2	3	4	0	1	2	3	4
Barren, bare soil/ duff	0	1	2	3	4	0	1	2	3	4

INSTREAM HABITAT COMPLEXITY	0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)				
Filamentous Algae	0	1	2	3	4
Aquatic Macrophytes	0	1	2	3	4
Boulders	0	1	2	3	4
Woody Debris >0.3m	0	1	2	3	4
Woody Debris <0.3m	0	1	2	3	4
Undercut Banks	0	1	2	3	4
Overhang. Vegetation	0	1	2	3	4
Live Tree Roots	0	1	2	3	4
Artificial Structures	0	1	2	3	4

DENSIOMETER READINGS (0-17) *count covered dots*	
Left Bank	
Center Upstream	
Center Downstream	
Right Bank	

Inter-transect: B-C Wetted Width (m):

FLOW HABITATS (% between transects, T=100%)	
Channel Type	%
Riffle	
Rapid	
Run	
Glide	
Pool	
Cascade/ Fall	
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)			
Position (%)	mm or Size Class	Depth (cm)	CPOM
L Bank			P A
LeftCtr			P A
Center			P A
RightCtr			P A
R Bank			P A

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size classes listed to right

SUBSTRATE SIZE CLASS CODES

RS = bedrock smooth (>car)
RR = bedrock rough (> car)
RC = concrete/asphalt
XB = large boulder (1-4m)
SB = sm blder (.25 m to 1m)
CB = cobble (64-250mm)
GC = coarse gravel (16-64)
GF = fine gravel (2-16 mm)
SA = sand (0.25-2mm)
FN = fines (<0.25mm)
HP = hardpan (consol. fines)
WD = wood
OT = other

CPOM/ COBBLE EMBEDDEDNESS

CPOM: Record presence (P)/ absence (A) of coarse particulate organic matter (>1.0 mm) within 1 cm of each particle.

Cobble Embeddedness: visually estimate % embedded by fine particles (record to nearest 5%)

Site Code:	Date: __ __ / __ __ / 2006	
Wetted Width (m):	Bankfull Width (m):	Bankfull Height:

Transect: C

TRANSECT SUBSTRATES				Cobble Embed (%)
Position	mm or Size Class	Depth (cm)	CPOM	
L Bank			P A	
LeftCtr			P A	
Center			P A	
RightCtr			P A	
R Bank			P A	

BANK STABILITY 5m up and 5m downstream of transect and from bankfull to wetted width			
Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

HUMAN INFLUENCE	0 = Not Present CH - Within Channel B = On Bank C = Within 10m of Channel P = >10m and <50m of Channel		
	Left Bank	Channel	Right Bank
Walls/ Rip-rap/ Dams	0 B C P	CH	0 B C P
Buildings	0 B C P	CH	0 B C P
Pavement/ Cleared Lot	0 B C P		0 B C P
Road/ Railroad	0 B C P	CH	0 B C P
Pipes (Inlet/ Outlet)	0 B C P	CH	0 B C P
Landfill/ Trash	0 B C P	CH	0 B C P
Park/ Lawn	0 B C P		0 B C P
Row Crops	0 B C P		0 B C P
Pasture/ Range	0 B C P		0 B C P
Logging Operations	0 B C P		0 B C P
Mining Activity	0 B C P	CH	0 B C P

RIPARIAN VEGETATION (downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) **circle one**

Riparian estimates are made 5m above and 5m below the transect and 10m to the side starting at the bank.

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m to 5m high)		
Shrubs and saplings 0.5m to 5m high	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Shrubs and saplings, herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

INSTREAM HABITAT COMPLEXITY	0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)
Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3m	0 1 2 3 4
Woody Debris <0.3m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang. Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

DENSIOMETER READINGS (0-17) *count covered dots*	
Left Bank	
Center Upstream	
Center Downstream	
Right Bank	

Inter-transect: C-D Wetted Width (m):

FLOW HABITATS (% between transects, T=100%)	
Channel Type	%
Riffle	
Rapid	
Run	
Glide	
Pool	
Cascade/ Fall	
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)			
Position (%)	mm or Size Class	Depth (cm)	CPOM
L Bank			P A
LeftCtr			P A
Center			P A
RightCtr			P A
R Bank			P A

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size classes listed to right

SUBSTRATE SIZE CLASS CODES

RS = bedrock smooth (>car)
RR = bedrock rough (> car)
RC = concrete/asphalt
XB = large boulder (1-4m)
SB = sm blder (.25 m to 1m)
CB = cobble (64-250mm)
GC = coarse gravel (16-64)
GF = fine gravel (2-16 mm)
SA = sand (0.25-2mm)
FN = fines (<0.25mm)
HP = hardpan (consol. fines)
WD = wood
OT = other

CPOM/ COBBLE EMBEDDEDNESS

CPOM: Record presence (P)/ absence (A) of coarse particulate organic matter (>1.0 mm) within 1 cm of each particle.

Cobble Embeddedness: visually estimate % embedded by fine particles (record to nearest 5%)

Site Code:	Date: __ __ / __ __ / 2006	
Wetted Width (m):	Bankfull Width (m):	Bankfull Height:	**Transect: D**

TRANSECT SUBSTRATES				Cobble Embed (%)
Position	**mm or Size Class**	**Depth (cm)**	**CPOM**	
L Bank			P A	
LeftCtr			P A	
Center			P A	
RightCtr			P A	
R Bank			P A	

BANK STABILITY 5m up and 5m downstream of transect and from bankfull to wetted width			
Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

HUMAN INFLUENCE	0 = Not Present CH - Within Channel B = On Bank C = Within 10m of Channel P = >10m and <50m of Channel								
	Left Bank				**Channel**	**Right Bank**			
Walls/ Rip-rap/ Dams	0	B	C	P	CH	0	B	C	P
Buildings	0	B	C	P	CH	0	B	C	P
Pavement/ Cleared Lot	0	B	C	P		0	B	C	P
Road/ Railroad	0	B	C	P	CH	0	B	C	P
Pipes (Inlet/ Outlet)	0	B	C	P	CH	0	B	C	P
Landfill/ Trash	0	B	C	P	CH	0	B	C	P
Park/ Lawn	0	B	C	P		0	B	C	P
Row Crops	0	B	C	P		0	B	C	P
Pasture/ Range	0	B	C	P		0	B	C	P
Logging Operations	0	B	C	P		0	B	C	P
Mining Activity	0	B	C	P	CH	0	B	C	P

RIPARIAN VEGETATION (downstream)	0 = Absent (0%) 3 = Heavy (40-75%) 1 = Sparse (<10%) 4 = Very Heavy>75%) 2 = Moderate (10-40%) **circle one**									
Riparian estimates are made 5m above and 5m below the transect and 10m to the side starting at the bank.										
Vegetation Class	**Left Bank**					**Right Bank**				
Upper Canopy (>5 m high)										
Trees and saplings >5 m high	0	1	2	3	4	0	1	2	3	4
Lower Canopy (0.5 m to 5m high)										
Shrubs and saplings 0.5m to 5m high	0	1	2	3	4	0	1	2	3	4
Ground Cover (<0.5 m high)										
Shrubs and saplings, herbs/ grasses	0	1	2	3	4	0	1	2	3	4
Barren, bare soil/ duff	0	1	2	3	4	0	1	2	3	4

INSTREAM HABITAT COMPLEXITY	0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)				
Filamentous Algae	0	1	2	3	4
Aquatic Macrophytes	0	1	2	3	4
Boulders	0	1	2	3	4
Woody Debris >0.3m	0	1	2	3	4
Woody Debris <0.3m	0	1	2	3	4
Undercut Banks	0	1	2	3	4
Overhang. Vegetation	0	1	2	3	4
Live Tree Roots	0	1	2	3	4
Artificial Structures	0	1	2	3	4

DENSIOMETER READINGS (0-17) *count covered dots*	
Left Bank	
Center Upstream	
Center Downstream	
Right Bank	

Inter-transect: D-E	Wetted Width (m):

FLOW HABITATS (% between transects, T=100%)	
Channel Type	**%**
Riffle	
Rapid	
Run	
Glide	
Pool	
Cascade/ Fall	
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)			
Position (%)	**mm or Size Class**	**Depth (cm)**	**CPOM**
L Bank			P A
LeftCtr			P A
Center			P A
RightCtr			P A
R Bank			P A

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size classes listed to right

SUBSTRATE SIZE CLASS CODES

RS = bedrock smooth (>car)
RR = bedrock rough (> car)
RC = concrete/asphalt
XB = large boulder (1-4m)
SB = sm blder (.25 m to 1m)
CB = cobble (64-250mm)
GC = coarse gravel (16-64)
GF = fine gravel (2-16 mm)
SA = sand (0.25-2mm)
FN = fines (<0.25mm)
HP = hardpan (consol. fines)
WD = wood
OT = other

CPOM/ COBBLE EMBEDDEDNESS

CPOM: Record presence (P)/ absence (A) of coarse particulate organic matter (>1.0 mm) within 1 cm of each particle.

Cobble Embeddedness: visually estimate % embedded by fine particles (record to nearest 5%)

Site Code:	Date: __ __ / __ __ / 2006	
Wetted Width (m):	Bankfull Width (m):	Bankfull Height:

Transect: E

TRANSECT SUBSTRATES				Cobble Embed (%)
Position	mm or Size Class	Depth (cm)	CPOM	
L Bank			P A	
LeftCtr			P A	
Center			P A	
RightCtr			P A	
R Bank			P A	

BANK STABILITY 5m up and 5m downstream of transect and from bankfull to wetted width			
Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

HUMAN INFLUENCE

0 = Not Present CH - Within Channel B = On Bank
C = Within 10m of Channel P = >10m and <50m of Channel

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	0	B	C	P	CH	0	B	C	P
Buildings	0	B	C	P	CH	0	B	C	P
Pavement/ Cleared Lot	0	B	C	P		0	B	C	P
Road/ Railroad	0	B	C	P	CH	0	B	C	P
Pipes (Inlet/ Outlet)	0	B	C	P	CH	0	B	C	P
Landfill/ Trash	0	B	C	P	CH	0	B	C	P
Park/ Lawn	0	B	C	P		0	B	C	P
Row Crops	0	B	C	P		0	B	C	P
Pasture/ Range	0	B	C	P		0	B	C	P
Logging Operations	0	B	C	P		0	B	C	P
Mining Activity	0	B	C	P	CH	0	B	C	P

RIPARIAN VEGETATION (downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) **circle one**

Riparian estimates are made 5m above and 5m below the transect and 10m to the side starting at the bank.

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m to 5m high)		
Shrubs and saplings 0.5m to 5m high	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Shrubs and saplings, herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0	1	2	3	4
Aquatic Macrophytes	0	1	2	3	4
Boulders	0	1	2	3	4
Woody Debris >0.3m	0	1	2	3	4
Woody Debris <0.3m	0	1	2	3	4
Undercut Banks	0	1	2	3	4
Overhang. Vegetation	0	1	2	3	4
Live Tree Roots	0	1	2	3	4
Artificial Structures	0	1	2	3	4

DENSIOMETER READINGS (0-17)
count covered dots

Left Bank	
Center Upstream	
Center Downstream	
Right Bank	

Inter-transect: E-F Wetted Width (m):

FLOW HABITATS (% between transects, T=100%)

Channel Type	%
Riffle	
Rapid	
Run	
Glide	
Pool	
Cascade/ Fall	
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position (%)	mm or Size Class	Depth (cm)	CPOM
L Bank			P A
LeftCtr			P A
Center			P A
RightCtr			P A
R Bank			P A

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size classes listed to right

SUBSTRATE SIZE CLASS CODES

RS = bedrock smooth (>car)
RR = bedrock rough (> car)
RC = concrete/asphalt
XB = large boulder (1-4m)
SB = sm blder (.25 m to 1m)
CB = cobble (64-250mm)
GC = coarse gravel (16-64)
GF = fine gravel (2-16 mm)
SA = sand (0.25-2mm)
FN = fines (<0.25mm)
HP = hardpan (consol. fines)
WD = wood
OT = other

CPOM/ COBBLE EMBEDDEDNESS

CPOM: Record presence (P)/ absence (A) of coarse particulate organic matter (>1.0 mm) within 1 cm of each particle.

Cobble Embeddedness: visually estimate % embedded by fine particles (record to nearest 5%)

Site Code:	Date: __ __ / __ __ / 2006	Photos UPSTREAM and DOWNSTREAM
Wetted Width (m):	Bankfull Width (m):	Bankfull Height: Transect: F

TRANSECT SUBSTRATES				Cobble Embed (%)
Position	mm or Size Class	Depth (cm)	CPOM	
L Bank			P A	
LeftCtr			P A	
Center			P A	
RightCtr			P A	
R Bank			P A	

BANK STABILITY 5m up and 5m downstream of transect and from bankfull to wetted width			
Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

HUMAN INFLUENCE

0 = Not Present CH - Within Channel B = On Bank
C = Within 10m of Channel P = >10m and <50m of Channel

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	0	B	C	P	CH	0	B	C	P
Buildings	0	B	C	P	CH	0	B	C	P
Pavement/ Cleared Lot	0	B	C	P		0	B	C	P
Road/ Railroad	0	B	C	P	CH	0	B	C	P
Pipes (Inlet/ Outlet)	0	B	C	P	CH	0	B	C	P
Landfill/ Trash	0	B	C	P	CH	0	B	C	P
Park/ Lawn	0	B	C	P		0	B	C	P
Row Crops	0	B	C	P		0	B	C	P
Pasture/ Range	0	B	C	P		0	B	C	P
Logging Operations	0	B	C	P		0	B	C	P
Mining Activity	0	B	C	P	CH	0	B	C	P

RIPARIAN VEGETATION (downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) **circle one**

Riparian estimates are made 5m above and 5m below the transect and 10m to the side starting at the bank.

Vegetation Class	Left Bank					Right Bank				
Upper Canopy (>5 m high)										
Trees and saplings >5 m high	0	1	2	3	4	0	1	2	3	4
Lower Canopy (0.5 m to 5m high)										
Shrubs and saplings 0.5m to 5m high	0	1	2	3	4	0	1	2	3	4
Ground Cover (<0.5 m high)										
Shrubs and saplings, herbs/ grasses	0	1	2	3	4	0	1	2	3	4
Barren, bare soil/ duff	0	1	2	3	4	0	1	2	3	4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0	1	2	3	4
Aquatic Macrophytes	0	1	2	3	4
Boulders	0	1	2	3	4
Woody Debris >0.3m	0	1	2	3	4
Woody Debris <0.3m	0	1	2	3	4
Undercut Banks	0	1	2	3	4
Overhang. Vegetation	0	1	2	3	4
Live Tree Roots	0	1	2	3	4
Artificial Structures	0	1	2	3	4

DENSIOMETER READINGS (0-17)
count covered dots

Left Bank	
Center Upstream	
Center Downstream	
Right Bank	

Inter-transect: F-G

Wetted Width (m):

FLOW HABITATS (% between transects, T=100%)

Channel Type	%
Riffle	
Rapid	
Run	
Glide	
Pool	
Cascade/ Fall	
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position (%)	mm or Size Class	Depth (cm)	CPOM
L Bank			P A
LeftCtr			P A
Center			P A
RightCtr			P A
R Bank			P A

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size classes listed to right

SUBSTRATE SIZE CLASS CODES

RS = bedrock smooth (>car)
RR = bedrock rough (> car)
RC = concrete/asphalt
XB = large boulder (1-4m)
SB = sm blder (.25 m to 1m)
CB = cobble (64-250mm)
GC = coarse gravel (16-64)
GF = fine gravel (2-16 mm)
SA = sand (0.25-2mm)
FN = fines (<0.25mm)
HP = hardpan (consol. fines)
WD = wood
OT = other

CPOM/ COBBLE EMBEDDEDNESS

CPOM: Record presence (P)/ absence (A) of coarse particulate organic matter (>1.0 mm) within 1 cm of each particle.

Cobble Embeddedness: visually estimate % embedded by fine particles (record to nearest 5%)

Site Code:	Date: __ __ / __ __ / 2006	
Wetted Width (m):	Bankfull Width (m):	Bankfull Height: **Transect: G**

TRANSECT SUBSTRATES				Cobble Embed (%)
Position	mm or Size Class	Depth (cm)	CPOM	
L Bank			P A	
LeftCtr			P A	
Center			P A	
RightCtr			P A	
R Bank			P A	

BANK STABILITY 5m up and 5m downstream of transect and from bankfull to wetted width			
Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

HUMAN INFLUENCE

0 = Not Present CH - Within Channel B = On Bank
C = Within 10m of Channel P = >10m and <50m of Channel

	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	0	B	C	P	CH	0	B	C	P
Buildings	0	B	C	P	CH	0	B	C	P
Pavement/ Cleared Lot	0	B	C	P		0	B	C	P
Road/ Railroad	0	B	C	P	CH	0	B	C	P
Pipes (Inlet/ Outlet)	0	B	C	P	CH	0	B	C	P
Landfill/ Trash	0	B	C	P	CH	0	B	C	P
Park/ Lawn	0	B	C	P		0	B	C	P
Row Crops	0	B	C	P		0	B	C	P
Pasture/ Range	0	B	C	P		0	B	C	P
Logging Operations	0	B	C	P		0	B	C	P
Mining Activity	0	B	C	P	CH	0	B	C	P

RIPARIAN VEGETATION (downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) **circle one**

Riparian estimates are made 5m above and 5m below the transect and 10m to the side starting at the bank.

Vegetation Class	Left Bank					Right Bank				
Upper Canopy (>5 m high)										
Trees and saplings >5 m high	0	1	2	3	4	0	1	2	3	4
Lower Canopy (0.5 m to 5m high)										
Shrubs and saplings 0.5m to 5m high	0	1	2	3	4	0	1	2	3	4
Ground Cover (<0.5 m high)										
Shrubs and saplings, herbs/ grasses	0	1	2	3	4	0	1	2	3	4
Barren, bare soil/ duff	0	1	2	3	4	0	1	2	3	4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0	1	2	3	4
Aquatic Macrophytes	0	1	2	3	4
Boulders	0	1	2	3	4
Woody Debris >0.3m	0	1	2	3	4
Woody Debris <0.3m	0	1	2	3	4
Undercut Banks	0	1	2	3	4
Overhang. Vegetation	0	1	2	3	4
Live Tree Roots	0	1	2	3	4
Artificial Structures	0	1	2	3	4

DENSIOMETER READINGS (0-17)
count covered dots

Left Bank	
Center Upstream	
Center Downstream	
Right Bank	

Inter-transect: G-H Wetted Width (m):

FLOW HABITATS (% between transects, T=100%)

Channel Type	%
Riffle	
Rapid	
Run	
Glide	
Pool	
Cascade/ Fall	
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)

Position (%)	mm or Size Class	Depth (cm)	CPOM
L Bank			P A
LeftCtr			P A
Center			P A
RightCtr			P A
R Bank			P A

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size classes listed to right

SUBSTRATE SIZE CLASS CODES

RS = bedrock smooth (>car)
RR = bedrock rough (> car)
RC = concrete/asphalt
XB = large boulder (1-4m)
SB = sm blder (.25 m to 1m)
CB = cobble (64-250mm)
GC = coarse gravel (16-64)
GF = fine gravel (2-16 mm)
SA = sand (0.25-2mm)
FN = fines (<0.25mm)
HP = hardpan (consol. fines)
WD = wood
OT = other

CPOM/ COBBLE EMBEDDEDNESS

CPOM: Record presence (P)/ absence (A) of coarse particulate organic matter (>1.0 mm) within 1 cm of each particle.

Cobble Embeddedness: visually estimate % embedded by fine particles (record to nearest 5%)

Site Code:	Date: __ __ / __ __ / 2006		
Wetted Width (m):	Bankfull Width (m):	Bankfull Height:	**Transect: H**

TRANSECT SUBSTRATES				**Cobble Embed (%)**
Position	**mm or Size Class**	**Depth (cm)**	**CPOM**	
L Bank			P A	
LeftCtr			P A	
Center			P A	
RightCtr			P A	
R Bank			P A	

BANK STABILITY 5m up and 5m downstream of transect and from bankfull to wetted width			
Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

HUMAN INFLUENCE	0 = Not Present CH - Within Channel B = On Bank C = Within 10m of Channel P = >10m and <50m of Channel								
	Left Bank				**Channel**	**Right Bank**			
Walls/ Rip-rap/ Dams	0	B	C	P	CH	0	B	C	P
Buildings	0	B	C	P	CH	0	B	C	P
Pavement/ Cleared Lot	0	B	C	P		0	B	C	P
Road/ Railroad	0	B	C	P	CH	0	B	C	P
Pipes (Inlet/ Outlet)	0	B	C	P	CH	0	B	C	P
Landfill/ Trash	0	B	C	P	CH	0	B	C	P
Park/ Lawn	0	B	C	P		0	B	C	P
Row Crops	0	B	C	P		0	B	C	P
Pasture/ Range	0	B	C	P		0	B	C	P
Logging Operations	0	B	C	P		0	B	C	P
Mining Activity	0	B	C	P	CH	0	B	C	P

RIPARIAN VEGETATION (downstream)	0 = Absent (0%) 3 = Heavy (40-75%) 1 = Sparse (<10%) 4 = Very Heavy>75%) 2 = Moderate (10-40%) **circle one**	
Riparian estimates are made 5m above and 5m below the transect and 10m to the side starting at the bank.		
Vegetation Class	**Left Bank**	**Right Bank**
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m to 5m high)		
Shrubs and saplings 0.5m to 5m high	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Shrubs and saplings, herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

INSTREAM HABITAT COMPLEXITY	0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)
Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3m	0 1 2 3 4
Woody Debris <0.3m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang. Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

DENSIOMETER READINGS (0-17) *count covered dots*	
Left Bank	
Center Upstream	
Center Downstream	
Right Bank	

Inter-transect: H-I	Wetted Width (m):

FLOW HABITATS (% between transects, T=100%)	
Channel Type	**%**
Riffle	
Rapid	
Run	
Glide	
Pool	
Cascade/ Fall	
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)			
Position (%)	**mm or Size Class**	**Depth (cm)**	**CPOM**
L Bank			P A
LeftCtr			P A
Center			P A
RightCtr			P A
R Bank			P A

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size classes listed to right

SUBSTRATE SIZE CLASS CODES

RS = bedrock smooth (>car)
RR = bedrock rough (> car)
RC = concrete/asphalt
XB = large boulder (1-4m)
SB = sm blder (.25 m to 1m)
CB = cobble (64-250mm)
GC = coarse gravel (16-64)
GF = fine gravel (2-16 mm)
SA = sand (0.25-2mm)
FN = fines (<0.25mm)
HP = hardpan (consol. fines)
WD = wood
OT = other

CPOM/ COBBLE EMBEDDEDNESS

CPOM: Record presence (P)/ absence (A) of coarse particulate organic matter (>1.0 mm) within 1 cm of each particle.

Cobble Embeddedness: visually estimate % embedded by fine particles (record to nearest 5%)

Site Code:	Date: __ __ / __ __ / 2006	
Wetted Width (m):	Bankfull Width (m):	Bankfull Height: **Transect: I**

TRANSECT SUBSTRATES				Cobble Embed (%)
Position	mm or Size Class	Depth (cm)	CPOM	
L Bank			P A	
LeftCtr			P A	
Center			P A	
RightCtr			P A	
R Bank			P A	

BANK STABILITY 5m up and 5m downstream of transect and from bankfull to wetted width			
Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

HUMAN INFLUENCE	0 = Not Present CH - Within Channel B = On Bank C = Within 10m of Channel P = >10m and <50m of Channel		
	Left Bank	Channel	Right Bank
Walls/ Rip-rap/ Dams	0 B C P	CH	0 B C P
Buildings	0 B C P	CH	0 B C P
Pavement/ Cleared Lot	0 B C P		0 B C P
Road/ Railroad	0 B C P	CH	0 B C P
Pipes (Inlet/ Outlet)	0 B C P	CH	0 B C P
Landfill/ Trash	0 B C P	CH	0 B C P
Park/ Lawn	0 B C P		0 B C P
Row Crops	0 B C P		0 B C P
Pasture/ Range	0 B C P		0 B C P
Logging Operations	0 B C P		0 B C P
Mining Activity	0 B C P	CH	0 B C P

RIPARIAN VEGETATION (downstream)	0 = Absent (0%) 3 = Heavy (40-75%) 1 = Sparse (<10%) 4 = Very Heavy>75%) 2 = Moderate (10-40%) circle one	
Riparian estimates are made 5m above and 5m below the transect and 10m to the side starting at the bank.		
Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m to 5m high)		
Shrubs and saplings 0.5m to 5m high	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Shrubs and saplings, herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

INSTREAM HABITAT COMPLEXITY	0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)
Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3m	0 1 2 3 4
Woody Debris <0.3m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang. Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

DENSIOMETER READINGS (0-17) *count covered dots*	
Left Bank	
Center Upstream	
Center Downstream	
Right Bank	

Inter-transect: I-J Wetted Width (m):

FLOW HABITATS (% between transects, T=100%)	
Channel Type	%
Riffle	
Rapid	
Run	
Glide	
Pool	
Cascade/ Fall	
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)			
Position (%)	mm or Size Class	Depth (cm)	CPOM
L Bank			P A
LeftCtr			P A
Center			P A
RightCtr			P A
R Bank			P A

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size classes listed to right

SUBSTRATE SIZE CLASS CODES

RS = bedrock smooth (>car)
RR = bedrock rough (> car)
RC = concrete/asphalt
XB = large boulder (1-4m)
SB = sm blder (.25 m to 1m)
CB = cobble (64-250mm)
GC = coarse gravel (16-64)
GF = fine gravel (2-16 mm)
SA = sand (0.25-2mm)
FN = fines (<0.25mm)
HP = hardpan (consol. fines)
WD = wood
OT = other

CPOM/ COBBLE EMBEDDEDNESS

CPOM: Record presence (P)/ absence (A) of coarse particulate organic matter (>1.0 mm) within 1 cm of each particle.

Cobble Embeddedness: visually estimate % embedded by fine particles (record to nearest 5%)

Site Code:	Date: __ __ / __ __ / 2006	
Wetted Width (m):	Bankfull Width (m):	Bankfull Height:

Transect: J

TRANSECT SUBSTRATES				Cobble Embed (%)
Position	mm or Size Class	Depth (cm)	CPOM	
L Bank			P A	
LeftCtr			P A	
Center			P A	
RightCtr			P A	
R Bank			P A	

BANK STABILITY 5m up and 5m downstream of transect and from bankfull to wetted width			
Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

HUMAN INFLUENCE	0 = Not Present CH - Within Channel B = On Bank C = Within 10m of Channel P = >10m and <50m of Channel								
	Left Bank				Channel	Right Bank			
Walls/ Rip-rap/ Dams	0	B	C	P	CH	0	B	C	P
Buildings	0	B	C	P	CH	0	B	C	P
Pavement/ Cleared Lot	0	B	C	P		0	B	C	P
Road/ Railroad	0	B	C	P	CH	0	B	C	P
Pipes (Inlet/ Outlet)	0	B	C	P	CH	0	B	C	P
Landfill/ Trash	0	B	C	P	CH	0	B	C	P
Park/ Lawn	0	B	C	P		0	B	C	P
Row Crops	0	B	C	P		0	B	C	P
Pasture/ Range	0	B	C	P		0	B	C	P
Logging Operations	0	B	C	P		0	B	C	P
Mining Activity	0	B	C	P	CH	0	B	C	P

RIPARIAN VEGETATION (downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy>75%)
2 = Moderate (10-40%) **circle one**

Riparian estimates are made 5m above and 5m below the transect and 10m to the side starting at the bank.

Vegetation Class	Left Bank					Right Bank				
Upper Canopy (>5 m high)										
Trees and saplings >5 m high	0	1	2	3	4	0	1	2	3	4
Lower Canopy (0.5 m to 5m high)										
Shrubs and saplings 0.5m to 5m high	0	1	2	3	4	0	1	2	3	4
Ground Cover (<0.5 m high)										
Shrubs and saplings, herbs/ grasses	0	1	2	3	4	0	1	2	3	4
Barren, bare soil/ duff	0	1	2	3	4	0	1	2	3	4

INSTREAM HABITAT COMPLEXITY	0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)				
Filamentous Algae	0	1	2	3	4
Aquatic Macrophytes	0	1	2	3	4
Boulders	0	1	2	3	4
Woody Debris >0.3m	0	1	2	3	4
Woody Debris <0.3m	0	1	2	3	4
Undercut Banks	0	1	2	3	4
Overhang. Vegetation	0	1	2	3	4
Live Tree Roots	0	1	2	3	4
Artificial Structures	0	1	2	3	4

DENSIOMETER READINGS (0-17) *count covered dots*	
Left Bank	
Center Upstream	
Center Downstream	
Right Bank	

Inter-transect: J-K Wetted Width (m):

FLOW HABITATS (% between transects, T=100%)	
Channel Type	%
Riffle	
Rapid	
Run	
Glide	
Pool	
Cascade/ Fall	
Dry	

INTER-TRANSECT SUBSTRATES (measure in mm or use size classes)			
Position (%)	mm or Size Class	Depth (cm)	CPOM
L Bank			P A
LeftCtr			P A
Center			P A
RightCtr			P A
R Bank			P A

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size classes listed to right

SUBSTRATE SIZE CLASS CODES

RS = bedrock smooth (>car)
RR = bedrock rough (> car)
RC = concrete/asphalt
XB = large boulder (1-4m)
SB = sm blder (.25 m to 1m)
CB = cobble (64-250mm)
GC = coarse gravel (16-64)
GF = fine gravel (2-16 mm)
SA = sand (0.25-2mm)
FN = fines (<0.25mm)
HP = hardpan (consol. fines)
WD = wood
OT = other

CPOM/ COBBLE EMBEDDEDNESS

CPOM: Record presence (P)/ absence (A) of coarse particulate organic matter (>1.0 mm) within 1 cm of each particle.

Cobble Embeddedness: visually estimate % embedded by fine particles (record to nearest 5%)

Site Code:	Date: __ __ / __ __ / 2006	**Take Photograph DOWNSTREAM**
Wetted Width (m):	Bankfull Width (m):	Bankfull Height: **Transect: K**

TRANSECT SUBSTRATES				Cobble Embed (%)
Position	**mm or Size Class**	**Depth (cm)**	**CPOM**	
L Bank			P A	
LeftCtr			P A	
Center			P A	
RightCtr			P A	
R Bank			P A	

BANK STABILITY 5m up and 5m downstream of transect and from bankfull to wetted width			
Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

HUMAN INFLUENCE	0 = Not Present CH - Within Channel B = On Bank C = Within 10m of Channel P = >10m and <50m of Channel		
	Left Bank	**Channel**	**Right Bank**
Walls/ Rip-rap/ Dams	0 B C P	CH	0 B C P
Buildings	0 B C P	CH	0 B C P
Pavement/ Cleared Lot	0 B C P		0 B C P
Road/ Railroad	0 B C P	CH	0 B C P
Pipes (Inlet/ Outlet)	0 B C P	CH	0 B C P
Landfill/ Trash	0 B C P	CH	0 B C P
Park/ Lawn	0 B C P		0 B C P
Row Crops	0 B C P		0 B C P
Pasture/ Range	0 B C P		0 B C P
Logging Operations	0 B C P		0 B C P
Mining Activity	0 B C P	CH	0 B C P

RIPARIAN VEGETATION (downstream)	0 = Absent (0%) 3 = Heavy (40-75%) 1 = Sparse (<10%) 4 = Very Heavy>75%) 2 = Moderate (10-40%) **circle one**	
Riparian estimates are made 5m above and 5m below the transect and 10m to the side starting at the bank.		
Vegetation Class	**Left Bank**	**Right Bank**
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m to 5m high)		
Shrubs and saplings 0.5m to 5m high	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Shrubs and saplings, herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

INSTREAM HABITAT COMPLEXITY	0 = Absent (0%) 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)
Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3m	0 1 2 3 4
Woody Debris <0.3m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang. Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

DENSIOMETER READINGS (0-17) *count covered dots*	
Left Bank	
Center Upstream	
Center Downstream	
Right Bank	

Additional Comments/ Field Notes:

Site Code:	Date: __ __ / __ __ / **2006**	**FULL FORM**

Site Map:

Field Notes/ Comments:

Attachment B

BMI Taxa List

Attachment B – Benthic Macroinvertebrate Taxa List for Upper Truckee River Golf Course Project

Upper Truckee River Golf Course Project Benthic Macroinvertebrate Taxa								Upper Truckee River 9/21/2006			
								Targeted Riffle	Multi-Habitat	Targeted Riffle	Multi-Habitat
Phylum	Subphylum	Class	Order	Family	Subfamily	Tribe	Taxon	UTR-1		UTR-2	
Arthropoda											
	Hexapoda										
		Insecta									
			Coleoptera								
				Elmidae							
							Optioservus sp.	54	22	43	19
							Zaitzevia sp.	--	1	1	--
							Narpus sp.	--	1	--	1
							Optioservus sp.	53	87	28	99
							Zaitzevia sp.	4	--	--	--
				Haliplidae							
							Brychius sp.	--	5	--	--
				Hydraenidae							
							Hydraena sp.	--	--	--	1
			Diptera								
				Athericidae							
							Atherix pachypus	--	--	1	--
				Ceratopogonidae							
							Bezzia/ Palpomyia	2	2	4	4
							Culicoides sp.	--	15	--	2
				Chironomidae							
					Chironominae						
						Chironomini					
							Apedilum sp.	--	1	--	1
							Cryptochironomus sp.	--	8	--	3
							Phaenopsectra sp.	--	17	--	--
							Polypedilum sp.	--	5	4	6
							Microtendipes pedellus group	--	1	--	--
						Tanytarsini					
							Rheotanytarsus sp.	--	--	1	4
							Tanytarsus sp.	--	19	--	2
					Diamesinae						
						Diamesini					

							Potthastia gaedii group	9	1	6	3
					Orthocladiinae						
							Orthocladius complex	--	25	37	21
							Cricotopus sp.	14	--	4	--
							Eukiefferiella sp.	8	--	12	16
							Parakiefferiella sp.	--	--	--	2
							Psectrocladius sp.	--	5	--	21
							Synorthocladius sp.	--	1	5	--
							Cricotopus bicinctus group	--	1	3	4
							Tvetenia bavarica group	2	2	28	15
							Cricotopus nostocicola	--	2	--	1
					Prodiamesinae						
							Monodiamesa sp.	--	1	--	1
							Odontomesa sp.	--	3	--	--
					Tanypodinae						
						Pentaneurini					
							Thienemannimyia group	--	6	2	13
							Pentaneura sp.	--	--	--	1
				Empididae							
							Chelifera/ Metachela	--	5	--	--
							Hemerodromia sp.	--	3	--	--
							Neoplasta sp.	1	--	--	--
				Psychodidae							
							Pericoma/ Telmatoscopus	--	4	1	--
				Simuliidae							
							Simulium sp.	3	--	12	2
				Tipulidae							
							Antocha sp.	1	1	1	--
							Dicranota sp.	--	--	2	1
							Hesperoconopa sp.	--	1	--	--
							Hexatoma sp.	--	--	--	2
							Limnophila sp.	--	--	--	1
			Ephemeroptera								
				Ameletidae							
							Ameletus sp.	2	--	--	3
				Baetidae							
							Centroptilum sp.	1	7	--	3
							Baetis tricaudatus	5	--	10	2
				Ephemerellidae				102	42	103	53
							Attenella sp.	3	1	3	7

							Drunella grandis	2	8	3	6
				Heptageniidae							
							Cinygmula sp.	22	6	30	11
							Epeorus sp.	1	--	--	--
							Ironodes sp.	--	--	1	1
							Rhithrogena sp.	62	4	14	6
				Leptohyphidae							
							Tricorythodes sp.	--	8	--	7
				Leptophlebiidae							
							Paraleptophlebia sp.	2	3	5	6
			Hemiptera								
				Corixidae				--	1	--	--
			Megaloptera								
				Sialidae							
							Sialis sp.	--	1	--	--
			Plecoptera								
				Capniidae				1	1	1	7
				Chloroperlidae							
							Sweltsa sp.	62	14	43	35
				Nemouridae							
							Zapada sp.	--	--	1	1
							Zapada cinctipes	1	--	7	4
				Perlidae				1	--	--	--
							Calineuria californica	--	--	1	--
				Perlodidae							
							Cultus sp.	4	3	3	4
							Perlinodes aureus	4	1	14	7
							Skwala americana	13	3	5	4
			Trichoptera								
				Brachycentridae							
							Micrasema sp.	1	3	3	1
				Glossosomatidae							
							Agapetus sp.	--	--	1	--
							Glossosoma sp.	1	--	--	1
				Hydropsychidae							
							Cheumatopsyche sp.	14	9	10	4
							Hydropsyche sp.	5	1	6	2
				Hydroptilidae							
							Hydroptila sp.	--	38	--	17
				Lepidostomatidae							

							Lepidostoma sp.	28	37	18	32
				Rhyacophilidae							
							Rhyacophila sp.	--	--	2	--
							Rhyacophila brunnea group	4	5	12	5
							Rhyacophila grandis group	--	--	2	--
				Uenoidae							
							Neophylax sp.	--	5	--	7
	Chelicerata										
		Arachnida									
			Trombidiformes								
				Hydryphantidae							
							Wandesia sp.	1	--	1	--
				Hygrobatidae							
							Hygrobates sp.	--	3	--	--
				Lebertiidae							
							Lebertia sp.	2	8	3	2
				Sperchontidae							
							Sperchon sp.	1	1	--	--
				Torrenticolidae							
							Torrenticola sp.	3	9	3	6
Annelida											
	Clitellata										
		Oligochaeta						5	14	6	2
Mollusca											
		Bivalvia									
			Veneroida								
				Sphaeriidae				--	12	--	--
		Gastropoda									
			Basommatophora								
				Physidae							
							Physa sp.	--	--	--	1
								504	493	506	493
							Total Organisms Recovered	504	493	506	493
							Extra Organisms	0	7	156	4
							QC Organisms	17	2	0	16
							Total Picked (extras + QC)	521	502	662	513
							Grids Processed	0.5	0.75	0.5	2
							Total Grids Possible	3	8	2	6
							Abundance (#/ sample)	3126	5355	2648	1539

APPENDIX H

Native American Contacts

State of California • The Resources Agency
Arnold Schwarzenegger, *Governor*

DEPARTMENT OF PARKS AND RECREATION
Ruth Coleman, *Director*

Sierra District
Cultural Resources
P. O. Box 266
Tahoma, Ca 96142
530-525-3386

April 24, 2006

William Dancing Feather
Cultural Resources Coordinator
Washoe Tribe of Nevada and California
Washoe Archive and Cultural Center
861 Crescent Drive
Carson City, NV 89701

Dear Mr. Dancing Feather,

The Department of Parks and Recreation (Parks), in conjunction with the Bureau of Reclamation (BOR), proposes to restore a 1.5 mile segment of the Upper Truckee River within the Lake Valley State Recreation Area (Lake Tahoe Golf Course) and Washoe Meadows State Park located in South Lake Tahoe, California (T12N, R18E, Section 20, 28 and 29). The principle activity associated with the proposed project would involve reconstructing channel alignment to restore channel morphology in planform, geometry and profile grade which would eventually create 267 acres of restored floodplain suitable for wetlands and native riparian vegetation communities. Project related activities associated with the project would involve relocating six golf course holes that currently exist on Lake Valley State Recreation Area property along the eastern edge of the Upper Truckee River. These holes and related fairways would be constructed on the western edge of the river in the southernmost portion of Washoe Meadows State Park. This action would likely involve impacting four prehistoric sites that may be considered eligible for the National Register of Historic Places (NRHP). The nature of the proposed project, and involvement of a federal agency (BOR), requires compliance with Section 106 of the National Historic Preservation Act, which mandates federal agencies to consider effects of projects on historic properties.

Parks performed reconnaissance and evaluation of the project area. The attached report is the result of the archaeological evaluations of four archaeological sites within the proposed project area. Please note that CA-ELD-555 is also located in the project area, but was excluded from evaluation during this investigation since it was already determined significant and eligible for listing on the NRHP based on surface remains.

The enclosed draft *Phase II Archaeological Field Testing Report & Evaluation for Four Prehistoric Sites: CA-ELD-2152, CA-ELD-2157, CA-ELD-2158, CA-ELD-2160, Washoe Meadows State Park, El Dorado County, California* is presented to the Washoe Tribe of Nevada and California for review and consideration. At this time we are specifically requesting comments on the archaeological site evaluations set-forth in the attached report. We also appreciate any comments, questions or concerns the Washoe Tribe may have regarding the proposed project's possible effects on Native American cultural resources.

If you or any of the Washoe Tribe have any questions concerning the attached report, please call me at (530) 525-9526 or email at djaffke@parks.ca.gov.

Sincerely,

Denise Jaffke
Associate State Archaeologist

Enclosed: Phase II Evaluation Report

Sierra District
Cultural Resources
P. O. Box 266
Tahoma, Ca 96142
530-525-3386

April 24, 2006

Lynda Shoshone
Washoe Tribe of Nevada and California
838 A Wa-She-Shu Way
Gardnerville, NV 89140

Dear Lynda,

The Department of Parks and Recreation (Parks), in conjunction with the Bureau of Reclamation (BOR), proposes to restore a 1.5 mile segment of the Upper Truckee River within the Lake Valley State Recreation Area (Lake Tahoe Golf Course) and Washoe Meadows State Park located in South Lake Tahoe, California (T12N, R18E, Section 20, 28 and 29). The principle activity associated with the proposed project would involve reconstructing channel alignment to restore channel morphology in planform, geometry and profile grade which would eventually create 267 acres of restored floodplain suitable for wetlands and native riparian vegetation communities. Project related activities associated with the project would involve relocating six golf course holes that currently exist on Lake Valley State Recreation Area property along the eastern edge of the Upper Truckee River. These holes and related fairways would be constructed on the western edge of the river in the southernmost portion of Washoe Meadows State Park. This action would likely involve impacting four prehistoric sites that may be considered eligible for the National Register of Historic Places (NRHP). The nature of the proposed project, and involvement of a federal agency (BOR), requires compliance with Section 106 of the National Historic Preservation Act, which mandates federal agencies to consider effects of projects on historic properties.

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If you or any of the Washoe Tribe have any questions concerning the attached report, please call me at (530) 525-9526 or email at djaffke@parks.ca.gov.

Sincerely,

Denise Jaffke
Associate State Archaeologist

Enclosed: Phase II Evaluation Report

Sierra District
Cultural Resources
P. O. Box 266
Tahoma, Ca 96142
530-525-3386

April 24, 2006

Brian Wallace
Tribal Chairperson
Washoe Tribe of Nevada and California
919 Highway 395 South
Gardnerville, NV 89410

Dear Mr. Wallace,

The Department of Parks and Recreation (Parks), in conjunction with the Bureau of Reclamation (BOR), proposes to restore a1.5 mile segment of the Upper Truckee River within the Lake Valley State Recreation Area (Lake Tahoe Golf Course) and Washoe Meadows State Park located in South Lake Tahoe, California (T12N, R18E, Section 20, 28 and 29). The principle activity associated with the proposed project would involve reconstructing channel alignment to restore channel morphology in planform, geometry and profile grade which would eventually create 267 acres of restored floodplain suitable for wetlands and native riparian vegetation communities. Project related activities associated with the project would involve relocating six golf course holes that currently exist on Lake Valley State Recreation Area property along the eastern edge of the Upper Truckee River. These holes and related fairways would be constructed on the western edge of the river in the southernmost portion of Washoe Meadows State Park. This action would likely involve impacting four prehistoric sites that may be considered eligible for the National Register of Historic Places (NRHP). The nature of the proposed project, and involvement of a federal agency (BOR), requires compliance with Section 106 of the National Historic Preservation Act, which mandates federal agencies to consider effects of projects on historic properties.

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If you or any of the Washoe Tribe have any questions concerning the attached report, please call me at (530) 525-9526 or email at djaffke@parks.ca.gov.

Sincerely,

Denise Jaffke
Associate State Archaeologist

Enclosed: Phase II Evaluation Report

cc:
William Dancing Feather
Lynda Shoshone
Cyndie Walck, DPR Project Manager

Sierra District
Cultural Resources
P. O. Box 266
Tahoma, Ca 96142
530-525-9526

June 14, 2004

Lynda Shoshone
Washoe Tribal Council of California and Nevada

Dear Lynda:

This letter accompanies a copy of my notes and photographs taken from the Public Meeting held at Lake Tahoe Golf Course on June 6, 2004. Also included are sections of the *Upper Truckee River Upper Reach Environmental Assessment* report prepared by Swanson Hydrology & Geomorphology (December 2003). I have only included the Cultural Resources and Proposed Alternative sections, but if you would like a copy of the full report, please let me know (see Contents for additional chapters).

Also, I would like to arrange a date for consultation with interested Washoe Tribal members—yourself included, of course—to discuss the Upper Truckee River Rehabilitation project. I thought it might be beneficial to visit portions of the project area the same day as the site tour at Washoe Meadows with Pacific Legacy and possibly Penny Rucks and Susan Lindström. Let me know if you think it would be feasible and what dates would work best for you. I have yet to speak with Lisa Shapiro to discuss a potential date of the Washoe Meadows site tour, but I was hoping for late July, early August.

If you would like to contact me regarding this project or the site tour, please do not hesitate to call (530) 525-9526 or sierraark@jps.net.

Sincerely,

Denise L. Thomas
Associate State Archaeologist

Sierra District
Cultural Resources
P. O. Box 266
Tahoma, Ca 96142
530-525-3386

July 19, 2004

William Dancing Feather
Cultural Resources Coordinator
Washoe Tribe of Nevada and California
Washoe Archive and Cultural Center
861 Crescent Drive
Carson City, NV 89701

Dear Mr. Dancing Feather,

The Department of Parks and Recreation (DPR) is conducting a cultural resources inventory for the proposed project, Upper Truckee River Restoration Project, Upper Reach. This inventory effort is intended to guarantee compliance with the California Environmental Quality Act (CEQA) of 1970, the CEQA Guidelines, and the National Historic Preservation Act (NHPA) of 1966.

The Upper Truckee River has been identified as a major pollutant source of sediment and nutrients flowing into Lake Tahoe, owing to the large drainage area of urban land. Nutrients, including bioavailable nitrogen and phosphorus, have been identified as a major contributor to algae growth in Lake Tahoe, which has led to a significant decline in the clarity of the Lake since measurements began in the 1960s. Fine sediments contributes to lake clarity decline, as well as the degradation of aquatic habitat for fish and other wildlife in the Upper Truckee River. The segment of the river that is contributing a high degree of sedimentation is located on DPR property at Lake Valley State Recreation Area (i.e., Tahoe Golf Course). The purpose of the proposed Upper Truckee River Restoration Project is to restore the existing river and surrounding area to pre-developed condition that sustains aquatic and riparian habitat, yields a more natural sediment transport system, and provides a natural watershed that is morphologically and hydrologically balanced.

I am contacting you to ask if you know of any traditional cultural places (e.g., plant gathering areas) or sites of religious and cultural significance which could potentially be impacted by the proposed project. We realize that the Upper Truckee River assumes cultural significance to modern Washoe people and are interested in contemporary Native American values that may be associated with the project area.

Susan Lindström, Ph.D., Consulting Archaeologist and Penny Rucks, M.A. Consulting Ethnographer conducted prefield research addressing the entire watershed south the Highway 50 bridge at Elks Club Drive. A field reconnaissance was conducted only for that portion of the Upper Truckee River corridor between Highway 50 bridge at Elks Club Drive and the Highway 50 bridge at Meyers, an area comprising roughly four miles of river channel and encompassing about 480 acres. The following sites were identified in the project vicinity:

1.	FS-05-19-331	Prehistoric Site	
2.	UTR-6	Prehistoric Isolate	Chert flake in dirt road
3.	UTR-9	Historic Isolate	"Pearl Oil" can with lead solder

No cultural resources have yet been identified directly within the Area of Potential Effects (APE) for the proposed project.

Since the project is located along an area considered highly sensitive for archaeological resources, we are planning an Extended Archaeological Field Survey which will involve a limited excavation along portions of the Upper Truckee River to check for the presence or absence of subsurface cultural deposits. The excavation will last up to four days and consist of backhoe trenches to maximize the sample area and deposit processed per unit-time. If any artifacts are recovered they will be identified and then returned. Further, if a subsurface deposit is identified, the location will be noted and the testing will conclude in that area and an Archaeological Test Excavation to assess site significance and integrity will be planned at a future date. I will submit a draft copy of the Extended Archaeological Field Survey Proposal for your review and comment by September 2004.*

Enclosed you will find a marked topographic map showing the project area. Please feel free to contact me at my office, 530.525.9526 or sierraark@jps.net, if you have any comments or questions.

Thank you for your assistance. I look forward to working with you on this important project.

Sincerely,

Denise L Thomas
Associate State Archaeologist

Enclosed: Project Location Map

Cc: Lynda Shoshone
William Dancing Feather
Judith Polanich
Cyndi Walck

Sierra District
Cultural Resources
P. O. Box 266
Tahoma, Ca 96142
530-525-3386

July 19, 2004

Rob Wood
Native American Heritage Commission
915 Capital Mall, Rm. 364
Sacramento, CA 95814

Dear Mr. Wood:

The Department of Parks and Recreation (DPR) is conducting a cultural resources inventory for the proposed project, Upper Truckee River Restoration Project, Upper Reach. The project is located in Sections 20, 29, 30 of T12N/R18E depicted on the South Lake Tahoe, California USGS 7.5' quadrangle. This inventory effort is intended to guarantee compliance with the California Environmental Quality Act (CEQA) of 1970, the CEQA Guidelines, and the National Historic Preservation Act (NHPA) of 1966.

The Upper Truckee River has been identified as a major pollutant source of sediment and nutrients flowing into Lake Tahoe, owing to the large drainage area of urban land. Nutrients, including bioavailable nitrogen and phosphorus, have been identified as a major contributor to algae growth in Lake Tahoe, which has led to a significant decline in the clarity of the Lake since measurements began in the 1960s. Fine sediments contribute to lake clarity decline, as well as the degradation of aquatic habitat for fish and other wildlife in the Upper Truckee River. The segment of the river that is contributing a high degree of sedimentation is located on DPR property at Lake Valley State Recreation Area (i.e., Tahoe Golf Course). The purpose of the proposed Upper Truckee River Restoration Project is to restore the existing river and surrounding area to a pre-developed condition that sustains aquatic and riparian habitat, yields a more natural sediment transport system, and provides a natural watershed that is morphologically and hydrologically balanced.

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No cultural resources have yet been identified directly within the Area of Potential Effects (APE) for the proposed project.

We are pleased to bring this proposed activity to your attention and would appreciate any background information you can provide regarding prehistoric, historic, or ethnographic land use. We are also interested in contemporary Native American values that may be associated with the project area or any other information contained in your Sacred Lands Inventory.

Enclosed you will find a marked topographic map showing the project area. Please feel free to contact me at my office, 530.525.9526 or sierraark@jps.net, if you have any comments or questions.

Thank you for your assistance.

Sincerely,

Denise L Thomas
Associate State Archaeologist

Enclosed: Project Location Map

Sierra District
Cultural Resources
P. O. Box 266
Tahoma, Ca 96142
530-525-3386

August 9, 2004

Brian Wallace
Tribal Chairperson
Washoe Tribe of Nevada and California
919 Highway 395 South
Gardnerville, NV 89410

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Thank you for your assistance. I look forward to working with you on this important project.

Sincerely,

Denise L Thomas
Associate State Archaeologist

Enclosed: Project Location Map

Cc: Lynda Shoshone
William Dancing Feather
Judith Polanich
Cyndi Walck

August 9, 2004

Brian Wallace
Tribal Chairperson
Washoe Tribe of Nevada and California
919 Highway 395 South
Gardnerville, NV 89410

Dear Mr. Wallace:

This letter accompanies a copy of the Extended Archaeological Field Survey proposal outlining exploratory trenching in areas along the Upper Truckee River. Proposed testing is currently scheduled for November 2004. I welcome any and all comments and/or suggestions. Please do not hesitate to contact me at (530) 525.9526.

Sincerely,

Denise L. Thomas
Associate State Archaeologist

September 2, 2004

William Dancing Feather
Cultural Resources Coordinator
Washoe Tribe of Nevada and California
Washoe Archive and Cultural Center
861 Crescent Drive
Carson City, NV 89701

Dear Mr. Dancing Feather,

This letter accompanies a copy of the Extended Archaeological Field Survey proposal outlining exploratory trenching in areas along the Upper Truckee River. Proposed testing is currently scheduled for November 2004. I welcome any and all comments and/or suggestions. Please do not hesitate to contact me at (530) 525.9526.

Sincerely,

Denise L. Thomas
Associate State Archaeologist

EDAW | AECOM

EDAW Inc
2022 J Street, Sacramento, California 95811
www.edaw.com

27 Feb., 2007

Debbie Pilas-Treadway
Native American Heritage Commission
915 Capitol Mall, Room 364
Sacramento, CA 95814

RE: Upper Truckee River Restoration Project

Dear Ms. Pilas-Treadway:

EDAW is conducting cultural resources studies for the above-referenced project located in El Dorado County, near the town of Meyers, and depicted on the Emerald Bay and Echo Lake USGS topographic quadrangle maps in Township 12N, Range 18E, Sections 18-20, 29, and 30. The proposed project would consist of re-channeling the Truckee River to its historic route to restore natural habitats and reduce the sediment flow into Lake Tahoe.

We are pleased to bring this activity to your attention, and would appreciate any information you can provide regarding prehistoric, historic, or ethnographic Native American land use. We are also interested in any contemporary Native American values that may be present near or within the project area. We would also like to request a search of the NAHC Sacred Land files.

Please send via mail or facsimile a listing of local Native American groups or representatives at your earliest convenience, so that we may contact appropriate individuals and account for their potential concerns in the planning process.

If you have any questions or comments feel free to contact me at my office. I can be reached by email at Ludwigb@edaw.com, or by phone at 916-414-5886. I look forward to hearing from you soon.

Sincerely,

Brian Ludwig, Ph.D.
Senior Archaeologist

enclosure: USGS map section

STATE OF CALIFORNIA Arnold Schwarzenegger, Governor

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-4082
Fax (916) 657-5390
Web Site www.nahc.ca.gov

March 7, 2007

Brian Ludwig
Senior Archaeologist
EDAW Inc.

Sent by Fax: 916-414-5850
Number of Pages: 2

Re: Proposed Upper Truckee River Restoration Project, El Dorado County.

Dear Mr. Ludwig:

A record search of the sacred land file has failed to indicate the presence of Native American cultural resources in the immediate project area. The absence of specific site information in the sacred lands file does not indicate the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Enclosed is a list of Native Americans individuals/organizations who may have knowledge of cultural resources in the project area. The Commission makes no recommendation or preference of a single individual, or group over another. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated, if they cannot supply information, they might recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe or group. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from any of these individuals or groups, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact me at (916) 653-4038.

Sincerely,

Debbie Pilas-Treadway
Environmental Specialist III

Native American Contacts
El Dorado County
March 7, 2007

Washoe Tribe of Nevada and California
Waldo Walker, Chairperson
919 Highway 395 South Washoe
Gardnerville , NV 89410
waldo.walker@washoetribe.us
775-265-4191
775-265-6240 Fax

Washoe Tribe of Nevada and California THPO
William Dancing Feather, Tribal Historic Preservation
861 Crescent Drive Washoe
Carson City , NV 89701
wthpo@yahoo.com
(775) 888-0936
(775) 888-0937 FAX

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources for the proposed Upper Truckee River Restoration project, El Dorado County.

EDAW | AECOM

EDAW Inc
2022 J Street, Sacramento, California 95811
www.edaw.com

10 March, 2007

Mr. Waldo Walker
Washoe Tribe of Nevada and California
919 Highway 395 South
Gardnerville, NV 89410

RE: Upper Truckee River Restoration Project

Dear Mr. Walker:

EDAW is conducting cultural resources studies for the above-referenced project located in El Dorado County, near the town of Meyers, and depicted on the Emerald Bay and Echo Lake USGS topographic quadrangle maps in Township 12N, Range 18E, Sections 18-20, 29, and 30. The proposed project would consist of re-channeling the Truckee River to its historic route to restore natural habitats and reduce the sediment flow into Lake Tahoe.

We would appreciate your help in identifying any concerns your community may have regarding the cultural resources in the study area. Please return the enclosed response form. Returning this form does not imply that you approve or disapprove of the study, nor does it limit your opportunity to comment at a later time.

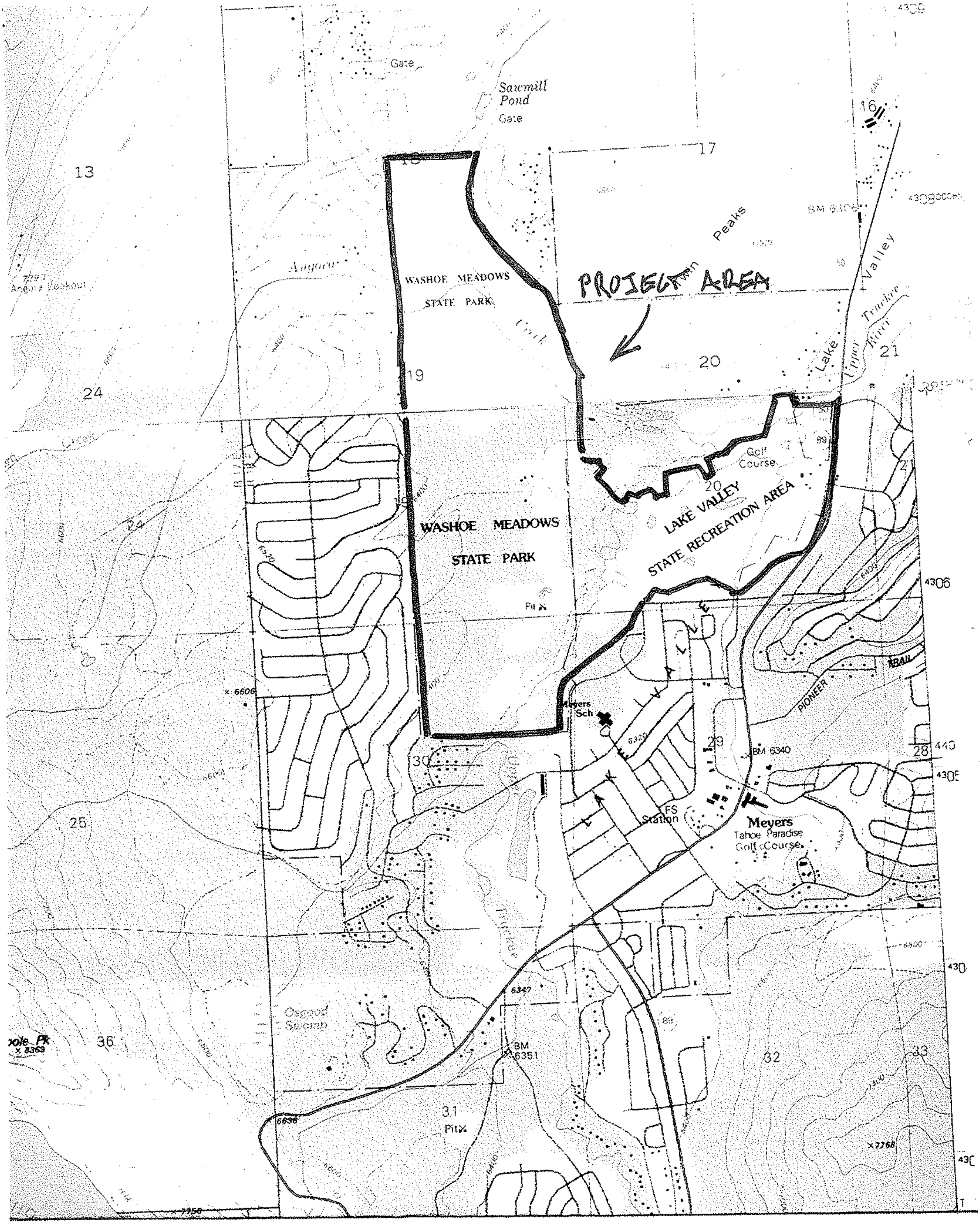
Efforts to address your concerns will be included in the planning process. A list of Native American communities that are being contacted has been included. If there are any other groups or individuals you think should be contacted, please let us know.

In order to incorporate your concerns and/or input in any forthcoming reports, we would appreciate receiving your comments by April 15, 2007. If you have questions, please feel free to contact me at your convenience. I can be reached by email at Brian.Ludwig@edaw.com or by phone at 916-414-5886.

Sincerely,

Brian Ludwig, Ph.D.
Senior Archaeologist

enclosure: USGS map section, response form


PROJECT AREA
WASHOE MEADOWS
STATE PARK
WASHOE MEADOWS
STATE PARK
LAKE VALLEY
STATE RECREATION AREA
Sawmill
Pond
Gate
Gate
Angora
Angora Lookout
Golf
Course
Meyers
Sch
FS
Station
Meyers
Tahoe Paradise
Golf Course
BM 6340
BM
6351
Osgood
Swamp
PIONEER
Lake
Valley
Upper
Truckee
River
Peaks
BM 6306
Pit
Pit
13
17
18
19
20
21
24
25
28
29
30
31
32
33
36
x 6606
x 7768
x 8369
6347
6636

Upper Truckee River Restoration Project

Please check all that apply:

Please call me to discuss the project further; my day-time phone number is (_____)___________
or my evening phone number is (_____)___________

I have further comments as provided below.

I do not have any comments.

Comments:

____

____

____

____

____

____

CONTACT LETTER MAILED TO:

Washoe Tribe of Nevada and California
Mr. Waldo Walker
919 Highway 395 South
Gardnerville, NV 89410

NAME AND ADDRESS (if different):

____
____
____
____
____

Signature:

______________________________ ______________________________
[Name of Recipient here] Date

Please return to:

Brian Ludwig
EDAW, Inc.
2022 J St.
Sacramento, CA 95814

00-095\Example Res Form .doc

EDAW | AECOM

EDAW Inc
2022 J Street, Sacramento, California 95811
www.edaw.com

10 March, 2007

Mr. William Dancing Feather
861 Crescent Dr.
Carson City, NV 89701

RE: Upper Truckee River Restoration Project

Dear Mr. Dancing Feather:

EDAW is conducting cultural resources studies for the above-referenced project located in El Dorado County, near the town of Meyers, and depicted on the Emerald Bay and Echo Lake USGS topographic quadrangle maps in Township 12N, Range 18E, Sections 18-20, 29, and 30. The proposed project would consist of re-channeling the Truckee River to its historic route to restore natural habitats and reduce the sediment flow into Lake Tahoe.

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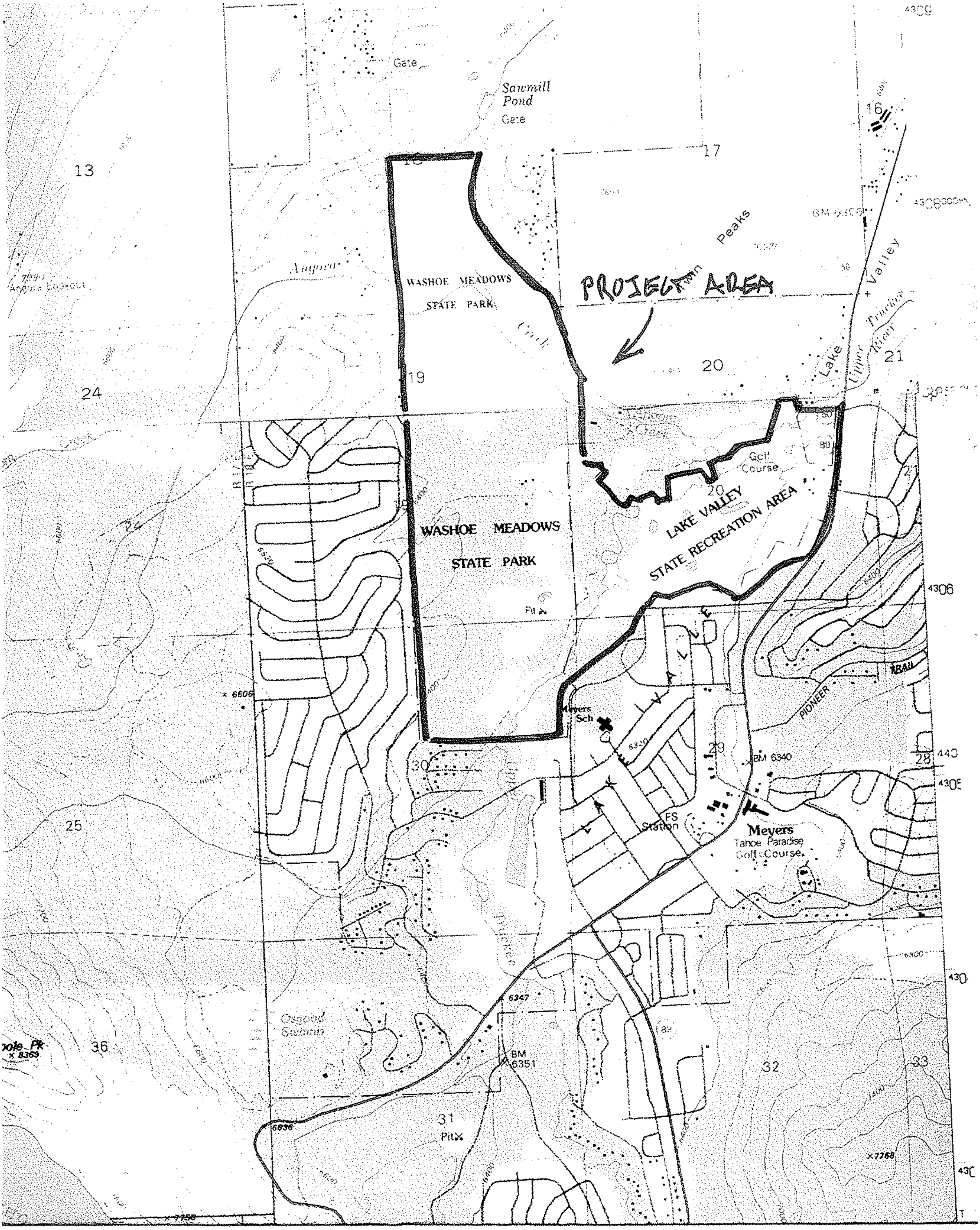
Efforts to address your concerns will be included in the planning process. A list of Native American communities that are being contacted has been included. If there are any other groups or individuals you think should be contacted, please let us know.

In order to incorporate your concerns and/or input in any forthcoming reports, we would appreciate receiving your comments by April 15, 2007. If you have questions, please feel free to contact me at your convenience. I can be reached by email at Brian.Ludwig@edaw.com or by phone at 916-414-5886.

Sincerely,

Brian Ludwig, Ph.D.
Senior Archaeologist

enclosure: USGS map section, response form



PROJECT AREA
WASHOE MEADOWS
STATE PARK
WASHOE MEADOWS
STATE PARK
LAKE VALLEY
STATE RECREATION AREA
Sawmill
Pond
Gate
Gate
Angora
Creek
Peaks
Golf
Course
Lake Valley
Upper Truckee River
Meyers
Sch
FS
Station
Meyers
Tahoe Paradise
Golf Course
PIONEER
BM 6340
BM
6351
Osgood
Swamp
Pit
Pit
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33
36
19
× 6606
6347
6636
× 7758
× 7758
× 8353

Upper Truckee River Restoration Project

Please check all that apply:

Please call me to discuss the project further; my day-time phone number is (_____)____________
or my evening phone number is (_____)____________

I have further comments as provided below.

I do not have any comments.

Comments:

____

____

____

____

____

____

CONTACT LETTER MAILED TO:

Washoe Tribe of Nevada and California
Mr. William Dancing Feather
861 Crescent Dr.
Carson City, NV 89701

NAME AND ADDRESS (if different):

____
____
____
____
____

Signature:

____
[Name of Recipient here]

____
Date

Please return to:

Brian Ludwig
EDAW, Inc.
2022 J St.
Sacramento, CA 95814

00-095\Example Res Form .doc

Sierra District
Cultural Resources
P. O. Box 266
Tahoma, Ca 96142
530-525-3386

September 16, 2009

Darrel Cruz
Tribal Historic Preservation Officer
Washoe Tribe of Nevada and California
919 Hwy 395, South
Gardnerville, NV 89410

Dear Mr. Cruz,

The enclosed *Finding of No Adverse Effect for the Upper Truckee River Restoration Project—Washoe Meadows, California State Parks* is presented to the Washoe Tribe of Nevada and California for your review. We appreciate any comments, questions or concerns the Washoe Tribe may have regarding the project and proposed conditions to preserve historic properties located in the Area of Potential Effects for the Upper Truckee River Restoration Project.

If you or any of the Washoe Tribe has any questions concerning the attached report, please call me at (530) 525-9526 or email at djaffke@parks.ca.gov.

Sincerely,

Denise Jaffke
Associate State Archaeologist

Enclosed: Research Design (1Hard Copy)

APPENDIX I

Air Quality Modeling Data

3/9/2010 1:31:05 PM

Urbemis 2007 Version 9.2.4

Detail Report for Summer Construction Unmitigated Emissions (Pounds/Day)

File Name: C:\Documents and Settings\weirichj\Desktop\UTRG Temp\UTR G Alt 2.urb924

Project Name: UTR Golf Course and Restoration Alt 2

Project Location: Mountain Counties Air Basin

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES (Summer Pounds Per Day, Unmitigated)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Time Slice 5/15/2012-5/31/2012 Active Days: 15	4.62	35.03	24.29	0.00	0.02	1.83	1.84	0.01	1.68	1.69	3,906.23
Mass Grading 05/15/2012-05/31/2012	4.62	35.03	24.29	0.00	0.02	1.83	1.84	0.01	1.68	1.69	3,906.23
Mass Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Off Road Diesel	4.44	34.69	19.92	0.00	0.00	1.82	1.82	0.00	1.67	1.67	3,604.81
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.18	0.33	4.36	0.00	0.02	0.01	0.03	0.01	0.01	0.01	301.42
Time Slice 6/1/2012-9/29/2012 Active Days: 104	10.94	**96.11**	55.56	**0.05**	245.47	4.83	250.30	51.29	4.44	55.73	11,977.39
Mass Grading 06/01/2012-09/30/2012	10.94	96.11	55.56	0.05	245.47	4.83	250.30	51.29	4.44	55.73	11,977.39
Mass Grading Dust	0.00	0.00	0.00	0.00	245.28	0.00	245.28	51.23	0.00	51.23	0.00
Mass Grading Off Road Diesel	8.88	68.28	38.32	0.00	0.00	3.88	3.88	0.00	3.57	3.57	7,023.21
Mass Grading On Road Diesel	1.70	27.17	8.52	0.04	0.15	0.93	1.08	0.05	0.85	0.90	4,351.34
Mass Grading Worker Trips	0.36	0.66	8.72	0.01	0.03	0.02	0.05	0.01	0.01	0.03	602.84
Time Slice 10/1/2012-10/15/2012 Active Days: 13	2.89	25.22	13.36	0.00	0.01	1.06	1.07	0.00	0.97	0.98	2,734.41
Trenching 10/01/2012-10/15/2012	2.89	25.22	13.36	0.00	0.01	1.06	1.07	0.00	0.97	0.98	2,734.41
Trenching Off Road Diesel	2.80	25.04	11.01	0.00	0.00	1.05	1.05	0.00	0.97	0.97	2,572.10
Trenching Worker Trips	0.10	0.18	2.35	0.00	0.01	0.00	0.01	0.00	0.00	0.01	162.30

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Time Slice 5/15/2013-5/31/2013 Active Days: 15	8.36	67.84	40.83	0.02	35.35	3.30	38.65	7.39	3.04	10.43	8,499.02
Mass Grading 05/15/2013-05/31/2013	6.57	54.03	33.39	0.01	35.34	2.58	37.92	7.39	2.37	9.76	6,744.71
Mass Grading Dust	0.00	0.00	0.00	0.00	35.28	0.00	35.28	7.37	0.00	7.37	0.00
Mass Grading Off Road Diesel	5.95	46.56	27.37	0.00	0.00	2.33	2.33	0.00	2.14	2.14	5,161.62
Mass Grading On Road Diesel	0.47	7.19	2.29	0.01	0.05	0.24	0.29	0.02	0.22	0.24	1,304.91
Mass Grading Worker Trips	0.15	0.28	3.72	0.00	0.01	0.01	0.02	0.01	0.01	0.01	278.19
Mass Grading 05/15/2013-10/15/2013	1.79	13.81	7.44	0.00	0.00	0.73	0.73	0.00	0.67	0.67	1,754.31
Mass Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Off Road Diesel	1.74	13.72	6.20	0.00	0.00	0.72	0.72	0.00	0.66	0.66	1,661.58
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.05	0.09	1.24	0.00	0.00	0.00	0.01	0.00	0.00	0.00	92.73
Time Slice 6/1/2013-9/30/2013 Active Days: 104	9.91	86.29	48.59	0.04	420.17	4.30	424.47	87.77	3.96	91.73	11,558.49
Fine Grading 06/01/2013-09/30/2013	8.11	72.48	41.15	0.04	420.17	3.58	423.74	87.77	3.29	91.06	9,804.18
Fine Grading Dust	0.00	0.00	0.00	0.00	420.00	0.00	420.00	87.71	0.00	87.71	0.00
Fine Grading Off Road Diesel	6.39	48.21	29.46	0.00	0.00	2.75	2.75	0.00	2.53	2.53	5,151.47
Fine Grading On Road Diesel	1.55	23.97	7.65	0.04	0.15	0.81	0.97	0.05	0.75	0.80	4,351.34
Fine Grading Worker Trips	0.16	0.30	4.03	0.00	0.02	0.01	0.03	0.01	0.01	0.01	301.37
Mass Grading 05/15/2013-10/15/2013	1.79	13.81	7.44	0.00	0.00	0.73	0.73	0.00	0.67	0.67	1,754.31
Mass Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Off Road Diesel	1.74	13.72	6.20	0.00	0.00	0.72	0.72	0.00	0.66	0.66	1,661.58
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.05	0.09	1.24	0.00	0.00	0.00	0.01	0.00	0.00	0.00	92.73

3/9/2010 1:31:05 PM

Time Slice 10/1/2013-10/15/2013 Active Days: 13	1.79	13.81	7.44	0.00	0.00	0.73	0.73	0.00	0.67	0.67	1,754.31
Mass Grading 05/15/2013-10/15/2013	1.79	13.81	7.44	0.00	0.00	0.73	0.73	0.00	0.67	0.67	1,754.31
Mass Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Off Road Diesel	1.74	13.72	6.20	0.00	0.00	0.72	0.72	0.00	0.66	0.66	1,661.58
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.05	0.09	1.24	0.00	0.00	0.00	0.01	0.00	0.00	0.00	92.73
Time Slice 5/15/2014-5/30/2014 Active Days: 14	3.07	22.93	15.97	0.00	0.01	1.22	1.23	0.00	1.13	1.13	2,837.17
Fine Grading 05/15/2014-05/30/2014	2.28	17.54	11.72	0.00	0.01	0.81	0.81	0.00	0.74	0.75	2,209.02
Fine Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Off Road Diesel	2.22	17.43	10.29	0.00	0.00	0.81	0.81	0.00	0.74	0.74	2,093.12
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.06	0.11	1.43	0.00	0.01	0.00	0.01	0.00	0.00	0.01	115.90
Mass Grading 05/15/2014-10/15/2014	0.80	5.39	4.25	0.00	0.00	0.42	0.42	0.00	0.38	0.38	628.16
Mass Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Off Road Diesel	0.77	5.35	3.68	0.00	0.00	0.41	0.41	0.00	0.38	0.38	581.80
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.02	0.04	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.36
Time Slice 5/31/2014-5/31/2014 Active Days: 1	0.80	5.39	4.25	0.00	0.00	0.42	0.42	0.00	0.38	0.38	628.16
Mass Grading 05/15/2014-10/15/2014	0.80	5.39	4.25	0.00	0.00	0.42	0.42	0.00	0.38	0.38	628.16
Mass Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Off Road Diesel	0.77	5.35	3.68	0.00	0.00	0.41	0.41	0.00	0.38	0.38	581.80
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.02	0.04	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.36

3/9/2010 1:31:05 PM

Time Slice 6/2/2014-8/30/2014 Active Days: 78	8.04	69.95	41.50	0.04	420.17	3.39	423.57	87.77	3.12	90.89	10,383.47
Mass Grading 05/15/2014-10/15/2014	0.80	5.39	4.25	0.00	0.00	0.42	0.42	0.00	0.38	0.38	628.16
Mass Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Off Road Diesel	0.77	5.35	3.68	0.00	0.00	0.41	0.41	0.00	0.38	0.38	581.80
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.02	0.04	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.36
Mass Grading 06/01/2014-09/30/2014	7.25	64.56	37.25	0.04	420.17	2.98	423.15	87.77	2.74	90.51	9,755.31
Mass Grading Dust	0.00	0.00	0.00	0.00	420.00	0.00	420.00	87.71	0.00	87.71	0.00
Mass Grading Off Road Diesel	5.68	43.50	26.20	0.00	0.00	2.27	2.27	0.00	2.09	2.09	5,097.72
Mass Grading On Road Diesel	1.40	20.74	6.76	0.04	0.15	0.70	0.85	0.05	0.64	0.69	4,309.90
Mass Grading Worker Trips	0.17	0.32	4.29	0.00	0.02	0.01	0.03	0.01	0.01	0.02	347.69

3/9/2010 1:31:05 PM

Time Slice 9/1/2014-9/30/2014 Active Days: 26	**11.66**	93.88	**59.33**	0.05	**420.18**	**5.08**	**425.26**	**87.77**	**4.67**	**92.45**	**13,264.32**
Mass Grading 05/15/2014-10/15/2014	0.80	5.39	4.25	0.00	0.00	0.42	0.42	0.00	0.38	0.38	628.16
Mass Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Off Road Diesel	0.77	5.35	3.68	0.00	0.00	0.41	0.41	0.00	0.38	0.38	581.80
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.02	0.04	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.36
Mass Grading 06/01/2014-09/30/2014	7.25	64.56	37.25	0.04	420.17	2.98	423.15	87.77	2.74	90.51	9,755.31
Mass Grading Dust	0.00	0.00	0.00	0.00	420.00	0.00	420.00	87.71	0.00	87.71	0.00
Mass Grading Off Road Diesel	5.68	43.50	26.20	0.00	0.00	2.27	2.27	0.00	2.09	2.09	5,097.72
Mass Grading On Road Diesel	1.40	20.74	6.76	0.04	0.15	0.70	0.85	0.05	0.64	0.69	4,309.90
Mass Grading Worker Trips	0.17	0.32	4.29	0.00	0.02	0.01	0.03	0.01	0.01	0.02	347.69
Mass Grading 09/01/2014-09/30/2014	3.62	23.93	17.83	0.00	0.01	1.69	1.70	0.00	1.55	1.55	2,880.85
Mass Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Off Road Diesel	3.54	23.78	15.83	0.00	0.00	1.68	1.68	0.00	1.55	1.55	2,718.60
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.08	0.15	2.00	0.00	0.01	0.00	0.01	0.00	0.00	0.01	162.25

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Time Slice 10/1/2014-10/15/2014 Active Days: 13	3.68	27.82	18.34	0.00	0.01	1.45	1.45	0.00	1.33	1.33	3,380.90
Fine Grading 10/01/2014-10/15/2014	2.88	22.43	14.09	0.00	0.00	1.03	1.04	0.00	0.95	0.95	2,752.75
Fine Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Off Road Diesel	2.84	22.35	12.95	0.00	0.00	1.03	1.03	0.00	0.95	0.95	2,660.03
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.05	0.09	1.14	0.00	0.00	0.00	0.01	0.00	0.00	0.00	92.72
Mass Grading 05/15/2014-10/15/2014	0.80	5.39	4.25	0.00	0.00	0.42	0.42	0.00	0.38	0.38	628.16
Mass Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Off Road Diesel	0.77	5.35	3.68	0.00	0.00	0.41	0.41	0.00	0.38	0.38	581.80
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.02	0.04	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.36

Phase Assumptions

Phase: Fine Grading 6/1/2013 - 9/30/2013 - Type Your Description Here

Total Acres Disturbed: 84

Maximum Daily Acreage Disturbed: 21

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 1080.81

Off-Road Equipment:

2 Excavators (168 hp) operating at a 0.57 load factor for 6 hours per day

1 Forklifts (145 hp) operating at a 0.3 load factor for 6 hours per day

1 Graders (174 hp) operating at a 0.61 load factor for 6 hours per day

1 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

2 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day

4 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 6 hours per day

1 Trenchers (63 hp) operating at a 0.75 load factor for 6 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 6 hours per day

Phase: Fine Grading 5/15/2014 - 5/30/2014 - Type Your Description Here

Total Acres Disturbed: 0

Maximum Daily Acreage Disturbed: 0

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

1 Excavators (168 hp) operating at a 0.57 load factor for 6 hours per day

1 Forklifts (145 hp) operating at a 0.3 load factor for 6 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 6 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 6 hours per day

Phase: Fine Grading 10/1/2014 - 10/15/2014 - Type Your Description Here

Total Acres Disturbed: 0

Maximum Daily Acreage Disturbed: 0

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

1 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Mass Grading 5/15/2012 - 5/31/2012 - Type Your Description Here

Total Acres Disturbed: 0

Maximum Daily Acreage Disturbed: 0

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

2 Excavators (168 hp) operating at a 0.57 load factor for 4 hours per day

1 Forklifts (145 hp) operating at a 0.3 load factor for 4 hours per day

2 Graders (174 hp) operating at a 0.61 load factor for 4 hours per day

2 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 4 hours per day

1 Skid Steer Loaders (44 hp) operating at a 0.55 load factor for 4 hours per day

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3 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 4 hours per day

2 Water Trucks (189 hp) operating at a 0.5 load factor for 4 hours per day

Phase: Mass Grading 6/1/2012 - 9/30/2012 - Default Mass Site Grading Description

Total Acres Disturbed: 84

Maximum Daily Acreage Disturbed: 21

Fugitive Dust Level of Detail: Low

Onsite Cut/Fill: 258 cubic yards/day; Offsite Cut/Fill: 11 cubic yards/day

On Road Truck Travel (VMT): 1080.81

Off-Road Equipment:

2 Cranes (399 hp) operating at a 0.43 load factor for 4 hours per day

4 Excavators (168 hp) operating at a 0.57 load factor for 4 hours per day

1 Forklifts (145 hp) operating at a 0.3 load factor for 4 hours per day

2 Graders (174 hp) operating at a 0.61 load factor for 4 hours per day

1 Paving Equipment (104 hp) operating at a 0.53 load factor for 4 hours per day

1 Rollers (95 hp) operating at a 0.56 load factor for 4 hours per day

3 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 4 hours per day

7 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 4 hours per day

2 Trenchers (63 hp) operating at a 0.75 load factor for 4 hours per day

3 Water Trucks (189 hp) operating at a 0.5 load factor for 4 hours per day

Phase: Mass Grading 5/15/2013 - 5/31/2013 - Default Mass Site Grading Description

Total Acres Disturbed: 0

Maximum Daily Acreage Disturbed: 0

Fugitive Dust Level of Detail: Low

Onsite Cut/Fill: 258 cubic yards/day; Offsite Cut/Fill: 11 cubic yards/day

On Road Truck Travel (VMT): 324.12

Off-Road Equipment:

2 Excavators (168 hp) operating at a 0.57 load factor for 6 hours per day

1 Forklifts (145 hp) operating at a 0.3 load factor for 6 hours per day

2 Graders (174 hp) operating at a 0.61 load factor for 6 hours per day

2 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day

1 Skid Steer Loaders (44 hp) operating at a 0.55 load factor for 6 hours per day

2 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 6 hours per day

2 Water Trucks (189 hp) operating at a 0.5 load factor for 6 hours per day

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Phase: Mass Grading 5/15/2013 - 10/15/2013 - Type Your Description Here

Total Acres Disturbed: 0

Maximum Daily Acreage Disturbed: 0

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

2 Pumps (53 hp) operating at a 0.74 load factor for 8 hours per day

2 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Mass Grading 5/15/2014 - 10/15/2014 - Type Your Description Here

Total Acres Disturbed: 0

Maximum Daily Acreage Disturbed: 0

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

2 Pumps (53 hp) operating at a 0.74 load factor for 8 hours per day

Phase: Mass Grading 6/1/2014 - 9/30/2014 - Type Your Description Here

Total Acres Disturbed: 84

Maximum Daily Acreage Disturbed: 21

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 1070.51

Off-Road Equipment:

1 Cranes (399 hp) operating at a 0.43 load factor for 6 hours per day

3 Dumpers/Tenders (16 hp) operating at a 0.38 load factor for 6 hours per day

2 Excavators (168 hp) operating at a 0.57 load factor for 6 hours per day

2 Pumps (53 hp) operating at a 0.74 load factor for 6 hours per day

1 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

2 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day

3 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 6 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 6 hours per day

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Phase: Mass Grading 9/1/2014 - 9/30/2014 - Type Your Description Here

Total Acres Disturbed: 0

Maximum Daily Acreage Disturbed: 0

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

1 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day

1 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day

1 Paving Equipment (104 hp) operating at a 0.53 load factor for 8 hours per day

1 Rollers (95 hp) operating at a 0.56 load factor for 8 hours per day

2 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Trenching 10/1/2012 - 10/15/2012 - Default Mass Site Grading Description

Off-Road Equipment:

1 Excavators (168 hp) operating at a 0.57 load factor for 4 hours per day

3 Other General Industrial Equipment (238 hp) operating at a 0.51 load factor for 4 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 4 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 4 hours per day

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Urbemis 2007 Version 9.2.4

Summary Report for Annual Emissions (Tons/Year)

File Name: C:\Documents and Settings\weirichj\Desktop\UTRG Temp\UTR G Alt 2.urb924

Project Name: UTR Golf Course and Restoration Alt 2

Project Location: Mountain Counties Air Basin

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2012 TOTALS (tons/year unmitigated)	0.62	5.42	3.16	0.00	12.76	0.27	13.04	2.67	0.25	2.92	669.89
2013 TOTALS (tons/year unmitigated)	0.59	5.09	2.88	0.00	22.11	0.25	22.37	4.62	0.23	4.85	676.19
2014 TOTALS (tons/year unmitigated)	0.51	4.29	2.62	0.00	21.85	0.22	22.07	4.56	0.20	4.76	619.54

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	0.01	0.00	0.14	0.00	0.00	0.00	0.25

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	0.16	0.02	0.17	0.00	0.00	0.00	11.46

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SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	0.17	0.02	0.31	0.00	0.00	0.00	11.71

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Urbemis 2007 Version 9.2.4

Detail Report for Summer Construction Unmitigated Emissions (Pounds/Day)

File Name: C:\Documents and Settings\weirichj\Desktop\UTRG Temp\UTR G Alt 3.urb924

Project Name: UTR Golf Course and Restoration Alt 3

Project Location: Mountain Counties Air Basin

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES (Summer Pounds Per Day, Unmitigated)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Time Slice 5/15/2012-5/31/2012 Active Days: 15	3.51	27.15	18.30	0.00	0.01	1.33	1.35	0.00	1.23	1.23	3,024.00
Mass Grading 05/15/2012-05/31/2012	3.51	27.15	18.30	0.00	0.01	1.33	1.35	0.00	1.23	1.23	3,024.00
Mass Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Off Road Diesel	3.38	26.89	14.95	0.00	0.00	1.33	1.33	0.00	1.22	1.22	2,792.14
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.14	0.25	3.36	0.00	0.01	0.01	0.02	0.00	0.01	0.01	231.86
Time Slice 6/1/2012-9/29/2012 Active Days: 104	3.81	40.04	19.96	0.03	200.41	1.77	202.19	41.87	1.63	43.50	5,543.30
Mass Grading 06/01/2012-09/30/2012	3.81	40.04	19.96	0.03	200.41	1.77	202.19	41.87	1.63	43.50	5,543.30
Mass Grading Dust	0.00	0.00	0.00	0.00	200.28	0.00	200.28	41.83	0.00	41.83	0.00
Mass Grading Off Road Diesel	2.37	18.32	10.86	0.00	0.00	1.03	1.03	0.00	0.95	0.95	1,931.02
Mass Grading On Road Diesel	1.35	21.54	6.75	0.03	0.12	0.74	0.86	0.04	0.68	0.72	3,449.98
Mass Grading Worker Trips	0.10	0.18	2.35	0.00	0.01	0.00	0.01	0.00	0.00	0.01	162.30
Time Slice 10/1/2012-10/15/2012 Active Days: 13	1.94	16.14	9.45	0.00	0.01	0.73	0.73	0.00	0.67	0.67	1,779.15
Trenching 10/01/2012-10/15/2012	1.94	16.14	9.45	0.00	0.01	0.73	0.73	0.00	0.67	0.67	1,779.15
Trenching Off Road Diesel	1.87	16.01	7.77	0.00	0.00	0.72	0.72	0.00	0.67	0.67	1,663.22
Trenching Worker Trips	0.07	0.13	1.68	0.00	0.01	0.00	0.01	0.00	0.00	0.01	115.93

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Time Slice 5/14/2013-5/14/2013 Active Days: 1	1.57	11.81	6.82	0.00	0.00	0.66	0.66	0.00	0.61	0.61	1,484.36
Mass Grading 05/14/2013-10/15/2013	1.57	11.81	6.82	0.00	0.00	0.66	0.66	0.00	0.61	0.61	1,484.36
Mass Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Off Road Diesel	1.52	11.71	5.58	0.00	0.00	0.66	0.66	0.00	0.60	0.60	1,391.63
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.05	0.09	1.24	0.00	0.00	0.00	0.01	0.00	0.00	0.00	92.73
Time Slice 5/15/2013-5/31/2013 Active Days: 15	5.48	45.82	27.20	0.02	35.35	2.12	37.46	7.39	1.95	9.34	5,965.10
Mass Grading 05/14/2013-10/15/2013	1.57	11.81	6.82	0.00	0.00	0.66	0.66	0.00	0.61	0.61	1,484.36
Mass Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Off Road Diesel	1.52	11.71	5.58	0.00	0.00	0.66	0.66	0.00	0.60	0.60	1,391.63
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.05	0.09	1.24	0.00	0.00	0.00	0.01	0.00	0.00	0.00	92.73
Mass Grading 05/15/2013-05/31/2013	3.92	34.01	20.39	0.01	35.34	1.46	36.80	7.39	1.34	8.73	4,480.74
Mass Grading Dust	0.00	0.00	0.00	0.00	35.28	0.00	35.28	7.37	0.00	7.37	0.00
Mass Grading Off Road Diesel	3.32	26.59	14.99	0.00	0.00	1.21	1.21	0.00	1.11	1.11	2,944.01
Mass Grading On Road Diesel	0.47	7.19	2.29	0.01	0.05	0.24	0.29	0.02	0.22	0.24	1,304.91
Mass Grading Worker Trips	0.13	0.23	3.10	0.00	0.01	0.01	0.02	0.00	0.01	0.01	231.82

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Time Slice 6/1/2013-9/30/2013 Active Days: 104	7.39	64.76	36.80	**0.04**	**330.14**	3.19	333.33	**68.96**	2.93	71.90	8,874.57
Fine Grading 06/01/2013-09/30/2013	5.82	52.96	29.98	0.03	330.14	2.53	332.67	68.96	2.33	71.29	7,390.21
Fine Grading Dust	0.00	0.00	0.00	0.00	330.00	0.00	330.00	68.92	0.00	68.92	0.00
Fine Grading Off Road Diesel	4.42	33.65	19.88	0.00	0.00	1.87	1.87	0.00	1.72	1.72	3,638.86
Fine Grading On Road Diesel	1.23	19.00	6.07	0.03	0.12	0.65	0.77	0.04	0.59	0.63	3,449.98
Fine Grading Worker Trips	0.16	0.30	4.03	0.00	0.02	0.01	0.03	0.01	0.01	0.01	301.37
Mass Grading 05/14/2013-10/15/2013	1.57	11.81	6.82	0.00	0.00	0.66	0.66	0.00	0.61	0.61	1,484.36
Mass Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Off Road Diesel	1.52	11.71	5.58	0.00	0.00	0.66	0.66	0.00	0.60	0.60	1,391.63
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.05	0.09	1.24	0.00	0.00	0.00	0.01	0.00	0.00	0.00	92.73
Time Slice 10/1/2013-10/14/2013 Active Days: 12	4.28	34.06	19.52	0.00	0.01	1.65	1.66	0.00	1.52	1.52	4,060.64
Mass Grading 05/14/2013-10/15/2013	1.57	11.81	6.82	0.00	0.00	0.66	0.66	0.00	0.61	0.61	1,484.36
Mass Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Off Road Diesel	1.52	11.71	5.58	0.00	0.00	0.66	0.66	0.00	0.60	0.60	1,391.63
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.05	0.09	1.24	0.00	0.00	0.00	0.01	0.00	0.00	0.00	92.73
Trenching 10/01/2013-10/14/2013	2.72	22.25	12.70	0.00	0.01	0.99	1.00	0.00	0.91	0.91	2,576.28
Trenching Off Road Diesel	2.65	22.13	11.15	0.00	0.00	0.99	0.99	0.00	0.91	0.91	2,460.37
Trenching Worker Trips	0.06	0.12	1.55	0.00	0.01	0.00	0.01	0.00	0.00	0.01	115.91
Time Slice 10/15/2013-10/15/2013 Active Days: 1	1.57	11.81	6.82	0.00	0.00	0.66	0.66	0.00	0.61	0.61	1,484.36
Mass Grading 05/14/2013-10/15/2013	1.57	11.81	6.82	0.00	0.00	0.66	0.66	0.00	0.61	0.61	1,484.36
Mass Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Off Road Diesel	1.52	11.71	5.58	0.00	0.00	0.66	0.66	0.00	0.60	0.60	1,391.63
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.05	0.09	1.24	0.00	0.00	0.00	0.01	0.00	0.00	0.00	92.73

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Time Slice 5/14/2014-5/14/2014 Active Days: 1	2.31	17.70	12.08	0.00	0.01	0.82	0.82	0.00	0.75	0.75	2,249.57
Fine Grading 05/14/2014-05/31/2014	2.31	17.70	12.08	0.00	0.01	0.82	0.82	0.00	0.75	0.75	2,249.57
Fine Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Off Road Diesel	2.24	17.57	10.36	0.00	0.00	0.81	0.81	0.00	0.75	0.75	2,110.49
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.07	0.13	1.72	0.00	0.01	0.00	0.01	0.00	0.00	0.01	139.08
Time Slice 5/15/2014-5/31/2014 Active Days: 15	3.11	23.09	16.33	0.00	0.01	1.23	1.24	0.00	1.13	1.14	2,877.72
Fine Grading 05/14/2014-05/31/2014	2.31	17.70	12.08	0.00	0.01	0.82	0.82	0.00	0.75	0.75	2,249.57
Fine Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Off Road Diesel	2.24	17.57	10.36	0.00	0.00	0.81	0.81	0.00	0.75	0.75	2,110.49
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.07	0.13	1.72	0.00	0.01	0.00	0.01	0.00	0.00	0.01	139.08
Mass Grading 05/15/2014-10/14/2014	0.80	5.39	4.25	0.00	0.00	0.42	0.42	0.00	0.38	0.38	628.16
Mass Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Off Road Diesel	0.77	5.35	3.68	0.00	0.00	0.41	0.41	0.00	0.38	0.38	581.80
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.02	0.04	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.36

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Time Slice 6/2/2014-8/30/2014 Active Days: 78	6.92	59.83	35.08	0.03	330.13	2.87	333.00	68.96	2.64	71.60	8,736.67
Mass Grading 05/15/2014-10/14/2014	0.80	5.39	4.25	0.00	0.00	0.42	0.42	0.00	0.38	0.38	628.16
Mass Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Off Road Diesel	0.77	5.35	3.68	0.00	0.00	0.41	0.41	0.00	0.38	0.38	581.80
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.02	0.04	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.36
Mass Grading 06/01/2014-09/30/2014	6.12	54.43	30.84	0.03	330.13	2.45	332.58	68.96	2.25	71.21	8,108.51
Mass Grading Dust	0.00	0.00	0.00	0.00	330.00	0.00	330.00	68.92	0.00	68.92	0.00
Mass Grading Off Road Diesel	4.90	37.78	22.62	0.00	0.00	1.89	1.89	0.00	1.74	1.74	4,459.60
Mass Grading On Road Diesel	1.11	16.44	5.36	0.03	0.12	0.56	0.67	0.04	0.51	0.55	3,417.12
Mass Grading Worker Trips	0.12	0.22	2.86	0.00	0.01	0.01	0.02	0.00	0.01	0.01	231.79

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Time Slice 9/1/2014-9/29/2014 Active Days: 25	**9.46**	**78.94**	**47.76**	0.04	330.14	**3.83**	**333.97**	68.96	**3.52**	**72.49**	**11,071.54**
Mass Grading 05/15/2014-10/14/2014	0.80	5.39	4.25	0.00	0.00	0.42	0.42	0.00	0.38	0.38	628.16
Mass Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Off Road Diesel	0.77	5.35	3.68	0.00	0.00	0.41	0.41	0.00	0.38	0.38	581.80
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.02	0.04	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.36
Mass Grading 06/01/2014-09/30/2014	6.12	54.43	30.84	0.03	330.13	2.45	332.58	68.96	2.25	71.21	8,108.51
Mass Grading Dust	0.00	0.00	0.00	0.00	330.00	0.00	330.00	68.92	0.00	68.92	0.00
Mass Grading Off Road Diesel	4.90	37.78	22.62	0.00	0.00	1.89	1.89	0.00	1.74	1.74	4,459.60
Mass Grading On Road Diesel	1.11	16.44	5.36	0.03	0.12	0.56	0.67	0.04	0.51	0.55	3,417.12
Mass Grading Worker Trips	0.12	0.22	2.86	0.00	0.01	0.01	0.02	0.00	0.01	0.01	231.79
Mass Grading 09/01/2014-09/29/2014	2.54	19.11	12.67	0.00	0.01	0.96	0.97	0.00	0.89	0.89	2,334.87
Mass Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Off Road Diesel	2.48	19.00	11.24	0.00	0.00	0.96	0.96	0.00	0.88	0.88	2,218.98
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.06	0.11	1.43	0.00	0.01	0.00	0.01	0.00	0.00	0.01	115.90

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Time Slice 9/30/2014-9/30/2014 Active Days: 1	6.92	59.83	35.08	0.03	330.13	2.87	333.00	68.96	2.64	71.60	8,736.67
Mass Grading 05/15/2014-10/14/2014	0.80	5.39	4.25	0.00	0.00	0.42	0.42	0.00	0.38	0.38	628.16
Mass Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Off Road Diesel	0.77	5.35	3.68	0.00	0.00	0.41	0.41	0.00	0.38	0.38	581.80
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.02	0.04	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.36
Mass Grading 06/01/2014-09/30/2014	6.12	54.43	30.84	0.03	330.13	2.45	332.58	68.96	2.25	71.21	8,108.51
Mass Grading Dust	0.00	0.00	0.00	0.00	330.00	0.00	330.00	68.92	0.00	68.92	0.00
Mass Grading Off Road Diesel	4.90	37.78	22.62	0.00	0.00	1.89	1.89	0.00	1.74	1.74	4,459.60
Mass Grading On Road Diesel	1.11	16.44	5.36	0.03	0.12	0.56	0.67	0.04	0.51	0.55	3,417.12
Mass Grading Worker Trips	0.12	0.22	2.86	0.00	0.01	0.01	0.02	0.00	0.01	0.01	231.79
Time Slice 10/1/2014-10/14/2014 Active Days: 12	3.07	22.91	15.66	0.00	0.01	1.24	1.25	0.00	1.14	1.14	2,797.76
Fine Grading 10/01/2014-10/15/2014	2.27	17.52	11.41	0.00	0.00	0.83	0.83	0.00	0.76	0.76	2,169.61
Fine Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Off Road Diesel	2.23	17.43	10.26	0.00	0.00	0.82	0.82	0.00	0.76	0.76	2,076.89
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.05	0.09	1.14	0.00	0.00	0.00	0.01	0.00	0.00	0.00	92.72
Mass Grading 05/15/2014-10/14/2014	0.80	5.39	4.25	0.00	0.00	0.42	0.42	0.00	0.38	0.38	628.16
Mass Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Off Road Diesel	0.77	5.35	3.68	0.00	0.00	0.41	0.41	0.00	0.38	0.38	581.80
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.02	0.04	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.36

Time Slice 10/15/2014-10/15/2014 Active Days: 1	2.27	17.52	11.41	0.00	0.00	0.83	0.83	0.00	0.76	0.76	2,169.61
Fine Grading 10/01/2014-10/15/2014	2.27	17.52	11.41	0.00	0.00	0.83	0.83	0.00	0.76	0.76	2,169.61
Fine Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Off Road Diesel	2.23	17.43	10.26	0.00	0.00	0.82	0.82	0.00	0.76	0.76	2,076.89
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.05	0.09	1.14	0.00	0.00	0.00	0.01	0.00	0.00	0.00	92.72

Phase Assumptions

Phase: Fine Grading 6/1/2013 - 9/30/2013 - Type Your Description Here

Total Acres Disturbed: 66

Maximum Daily Acreage Disturbed: 16.5

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 856.92

Off-Road Equipment:

2 Excavators (168 hp) operating at a 0.57 load factor for 4 hours per day

1 Graders (174 hp) operating at a 0.61 load factor for 4 hours per day

1 Rollers (95 hp) operating at a 0.56 load factor for 4 hours per day

2 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 4 hours per day

4 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 4 hours per day

1 Trenchers (63 hp) operating at a 0.75 load factor for 4 hours per day

2 Water Trucks (189 hp) operating at a 0.5 load factor for 4 hours per day

Phase: Fine Grading 5/14/2014 - 5/31/2014 - Type Your Description Here

Total Acres Disturbed: 0

Maximum Daily Acreage Disturbed: 0

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

1 Dumpers/Tenders (16 hp) operating at a 0.38 load factor for 6 hours per day

1 Excavators (168 hp) operating at a 0.57 load factor for 6 hours per day

1 Forklifts (145 hp) operating at a 0.3 load factor for 6 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 6 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 6 hours per day

Phase: Fine Grading 10/1/2014 - 10/15/2014 - Type Your Description Here

Total Acres Disturbed: 0

Maximum Daily Acreage Disturbed: 0

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

1 Excavators (168 hp) operating at a 0.57 load factor for 6 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 6 hours per day

Phase: Mass Grading 5/15/2012 - 5/31/2012 - Type Your Description Here

Total Acres Disturbed: 0

Maximum Daily Acreage Disturbed: 0

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

2 Excavators (168 hp) operating at a 0.57 load factor for 4 hours per day

1 Forklifts (145 hp) operating at a 0.3 load factor for 4 hours per day

2 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 4 hours per day

1 Skid Steer Loaders (44 hp) operating at a 0.55 load factor for 4 hours per day

2 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 4 hours per day

2 Water Trucks (189 hp) operating at a 0.5 load factor for 4 hours per day

Phase: Mass Grading 6/1/2012 - 9/30/2012 - Default Mass Site Grading Description

Total Acres Disturbed: 66

Maximum Daily Acreage Disturbed: 16.5

Fugitive Dust Level of Detail: Low

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Onsite Cut/Fill: 258 cubic yards/day; Offsite Cut/Fill: 11 cubic yards/day

On Road Truck Travel (VMT): 856.92

Off-Road Equipment:

2 Excavators (168 hp) operating at a 0.57 load factor for 4 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 4 hours per day

3 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 4 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 4 hours per day

Phase: Mass Grading 5/14/2013 - 10/15/2013 - Type Your Description Here

Total Acres Disturbed: 0

Maximum Daily Acreage Disturbed: 0

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

2 Pumps (53 hp) operating at a 0.74 load factor for 8 hours per day

2 Water Trucks (189 hp) operating at a 0.5 load factor for 6 hours per day

Phase: Mass Grading 5/15/2013 - 5/31/2013 - Default Mass Site Grading Description

Total Acres Disturbed: 0

Maximum Daily Acreage Disturbed: 0

Fugitive Dust Level of Detail: Low

Onsite Cut/Fill: 258 cubic yards/day; Offsite Cut/Fill: 11 cubic yards/day

On Road Truck Travel (VMT): 324.12

Off-Road Equipment:

2 Excavators (168 hp) operating at a 0.57 load factor for 4 hours per day

1 Forklifts (145 hp) operating at a 0.3 load factor for 4 hours per day

2 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 4 hours per day

2 Rubber Tired Loaders (164 hp) operating at a 0.54 load factor for 4 hours per day

1 Skid Steer Loaders (44 hp) operating at a 0.55 load factor for 4 hours per day

2 Water Trucks (189 hp) operating at a 0.5 load factor for 4 hours per day

Phase: Mass Grading 5/15/2014 - 10/14/2014 - Type Your Description Here

Total Acres Disturbed: 0

Maximum Daily Acreage Disturbed: 0

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Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

2 Pumps (53 hp) operating at a 0.74 load factor for 8 hours per day

Phase: Mass Grading 6/1/2014 - 9/30/2014 - Type Your Description Here

Total Acres Disturbed: 66

Maximum Daily Acreage Disturbed: 16.5

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 848.76

Off-Road Equipment:

2 Excavators (168 hp) operating at a 0.57 load factor for 6 hours per day

1 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

2 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day

3 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 6 hours per day

2 Water Trucks (189 hp) operating at a 0.5 load factor for 6 hours per day

Phase: Mass Grading 9/1/2014 - 9/29/2014 - Type Your Description Here

Total Acres Disturbed: 0

Maximum Daily Acreage Disturbed: 0

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

1 Excavators (168 hp) operating at a 0.57 load factor for 6 hours per day

1 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 6 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 6 hours per day

Phase: Trenching 10/1/2013 - 10/14/2013 - Type Your Description Here

Off-Road Equipment:

1 Excavators (168 hp) operating at a 0.57 load factor for 6 hours per day

1 Other General Industrial Equipment (238 hp) operating at a 0.51 load factor for 6 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 6 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 6 hours per day

Phase: Trenching 10/1/2012 - 10/15/2012 - Type Your Description Here

Off-Road Equipment:

1 Excavators (168 hp) operating at a 0.57 load factor for 4 hours per day

1 Other Material Handling Equipment (191 hp) operating at a 0.59 load factor for 4 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 4 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 4 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 4 hours per day

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Urbemis 2007 Version 9.2.4

Detail Report for Summer Construction Unmitigated Emissions (Pounds/Day)

File Name: C:\Documents and Settings\weirichj\Desktop\UTRG Temp\UTR G Alt 4.urb924

Project Name: UTR Golf Course and Restoration Alt 4

Project Location: Mountain Counties Air Basin

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES (Summer Pounds Per Day, Unmitigated)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Time Slice 5/15/2012-5/30/2012 Active Days: 14	3.51	27.15	18.30	0.00	37.80	1.33	39.13	7.90	1.23	9.12	3,024.00
Mass Grading 05/15/2012-05/30/2012	3.51	27.15	18.30	0.00	37.80	1.33	39.13	7.90	1.23	9.12	3,024.00
Mass Grading Dust	0.00	0.00	0.00	0.00	37.78	0.00	37.78	7.89	0.00	7.89	0.00
Mass Grading Off Road Diesel	3.38	26.89	14.95	0.00	0.00	1.33	1.33	0.00	1.22	1.22	2,792.14
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.14	0.25	3.36	0.00	0.01	0.01	0.02	0.00	0.01	0.01	231.86
Time Slice 6/1/2012-9/29/2012 Active Days: 104	8.40	87.14	42.30	0.07	78.06	3.83	81.89	16.34	3.52	19.86	11,928.93
Mass Grading 06/01/2012-10/14/2012	8.40	87.14	42.30	0.07	78.06	3.83	81.89	16.34	3.52	19.86	11,928.93
Mass Grading Dust	0.00	0.00	0.00	0.00	77.78	0.00	77.78	16.24	0.00	16.24	0.00
Mass Grading Off Road Diesel	5.33	41.48	22.42	0.00	0.00	2.28	2.28	0.00	2.09	2.09	4,290.73
Mass Grading On Road Diesel	2.83	45.24	14.18	0.07	0.25	1.55	1.80	0.08	1.42	1.51	7,244.04
Mass Grading Worker Trips	0.24	0.43	5.70	0.00	0.02	0.01	0.03	0.01	0.01	0.02	394.16

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Time Slice 10/1/2012-10/13/2012 Active Days: 12	**10.03**	**100.11**	**50.62**	**0.07**	78.06	**4.46**	82.52	16.34	**4.10**	20.44	**13,351.69**
Mass Grading 06/01/2012-10/14/2012	8.40	87.14	42.30	0.07	78.06	3.83	81.89	16.34	3.52	19.86	11,928.93
Mass Grading Dust	0.00	0.00	0.00	0.00	77.78	0.00	77.78	16.24	0.00	16.24	0.00
Mass Grading Off Road Diesel	5.33	41.48	22.42	0.00	0.00	2.28	2.28	0.00	2.09	2.09	4,290.73
Mass Grading On Road Diesel	2.83	45.24	14.18	0.07	0.25	1.55	1.80	0.08	1.42	1.51	7,244.04
Mass Grading Worker Trips	0.24	0.43	5.70	0.00	0.02	0.01	0.03	0.01	0.01	0.02	394.16
Trenching 10/01/2012-10/15/2012	1.63	12.96	8.32	0.00	0.00	0.63	0.63	0.00	0.58	0.58	1,422.76
Trenching Off Road Diesel	1.57	12.86	6.98	0.00	0.00	0.62	0.62	0.00	0.57	0.57	1,330.02
Trenching Worker Trips	0.06	0.10	1.34	0.00	0.00	0.00	0.01	0.00	0.00	0.00	92.74
Time Slice 10/15/2012-10/15/2012 Active Days: 1	1.63	12.96	8.32	0.00	0.00	0.63	0.63	0.00	0.58	0.58	1,422.76
Trenching 10/01/2012-10/15/2012	1.63	12.96	8.32	0.00	0.00	0.63	0.63	0.00	0.58	0.58	1,422.76
Trenching Off Road Diesel	1.57	12.86	6.98	0.00	0.00	0.62	0.62	0.00	0.57	0.57	1,330.02
Trenching Worker Trips	0.06	0.10	1.34	0.00	0.00	0.00	0.01	0.00	0.00	0.00	92.74
Time Slice 5/15/2013-9/30/2013 Active Days: 119	6.19	64.97	31.49	0.06	85.24	2.70	87.93	17.83	2.48	20.31	9,952.57
Mass Grading 05/15/2013-10/15/2013	6.19	64.97	31.49	0.06	85.24	2.70	87.93	17.83	2.48	20.31	9,952.57
Mass Grading Dust	0.00	0.00	0.00	0.00	85.00	0.00	85.00	17.75	0.00	17.75	0.00
Mass Grading Off Road Diesel	3.76	29.63	16.57	0.00	0.00	1.50	1.50	0.00	1.38	1.38	3,308.41
Mass Grading On Road Diesel	2.27	35.07	11.19	0.06	0.22	1.19	1.41	0.07	1.10	1.17	6,365.97
Mass Grading Worker Trips	0.15	0.28	3.72	0.00	0.01	0.01	0.02	0.01	0.01	0.01	278.19

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Time Slice 10/1/2013-10/14/2013 Active Days: 12	7.74	77.12	39.43	0.06	**85.24**	3.27	**88.51**	**17.83**	3.01	**20.84**	11,375.31
Mass Grading 05/15/2013-10/15/2013	6.19	64.97	31.49	0.06	85.24	2.70	87.93	17.83	2.48	20.31	9,952.57
Mass Grading Dust	0.00	0.00	0.00	0.00	85.00	0.00	85.00	17.75	0.00	17.75	0.00
Mass Grading Off Road Diesel	3.76	29.63	16.57	0.00	0.00	1.50	1.50	0.00	1.38	1.38	3,308.41
Mass Grading On Road Diesel	2.27	35.07	11.19	0.06	0.22	1.19	1.41	0.07	1.10	1.17	6,365.97
Mass Grading Worker Trips	0.15	0.28	3.72	0.00	0.01	0.01	0.02	0.01	0.01	0.01	278.19
Trenching 10/01/2013-10/14/2013	1.55	12.14	7.95	0.00	0.00	0.58	0.58	0.00	0.53	0.53	1,422.74
Trenching Off Road Diesel	1.50	12.05	6.71	0.00	0.00	0.57	0.57	0.00	0.53	0.53	1,330.02
Trenching Worker Trips	0.05	0.09	1.24	0.00	0.00	0.00	0.01	0.00	0.00	0.00	92.73
Time Slice 10/15/2013-10/15/2013 Active Days: 1	6.19	64.97	31.49	0.06	85.24	2.70	87.93	17.83	2.48	20.31	9,952.57
Mass Grading 05/15/2013-10/15/2013	6.19	64.97	31.49	0.06	85.24	2.70	87.93	17.83	2.48	20.31	9,952.57
Mass Grading Dust	0.00	0.00	0.00	0.00	85.00	0.00	85.00	17.75	0.00	17.75	0.00
Mass Grading Off Road Diesel	3.76	29.63	16.57	0.00	0.00	1.50	1.50	0.00	1.38	1.38	3,308.41
Mass Grading On Road Diesel	2.27	35.07	11.19	0.06	0.22	1.19	1.41	0.07	1.10	1.17	6,365.97
Mass Grading Worker Trips	0.15	0.28	3.72	0.00	0.01	0.01	0.02	0.01	0.01	0.01	278.19

Phase Assumptions

Phase: Mass Grading 5/15/2012 - 5/30/2012 - Default Mass Site Grading Description

Total Acres Disturbed: 1

Maximum Daily Acreage Disturbed: 0.25

Fugitive Dust Level of Detail: Low

Onsite Cut/Fill: 258 cubic yards/day; Offsite Cut/Fill: 11 cubic yards/day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

2 Excavators (168 hp) operating at a 0.57 load factor for 4 hours per day

1 Forklifts (145 hp) operating at a 0.3 load factor for 4 hours per day

2 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 4 hours per day

1 Skid Steer Loaders (44 hp) operating at a 0.55 load factor for 4 hours per day

2 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 4 hours per day

2 Water Trucks (189 hp) operating at a 0.5 load factor for 4 hours per day

Phase: Mass Grading 6/1/2012 - 10/14/2012 - Default Mass Site Grading Description

Total Acres Disturbed: 17

Maximum Daily Acreage Disturbed: 4.25

Fugitive Dust Level of Detail: Low

Onsite Cut/Fill: 258 cubic yards/day; Offsite Cut/Fill: 11 cubic yards/day

On Road Truck Travel (VMT): 1799.31

Off-Road Equipment:

2 Cranes (399 hp) operating at a 0.43 load factor for 2 hours per day

3 Excavators (168 hp) operating at a 0.57 load factor for 4 hours per day

1 Forklifts (145 hp) operating at a 0.3 load factor for 4 hours per day

1 Pavers (100 hp) operating at a 0.62 load factor for 4 hours per day

1 Paving Equipment (104 hp) operating at a 0.53 load factor for 4 hours per day

1 Rollers (95 hp) operating at a 0.56 load factor for 4 hours per day

2 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 4 hours per day

3 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 4 hours per day

3 Water Trucks (189 hp) operating at a 0.5 load factor for 4 hours per day

Phase: Mass Grading 5/15/2013 - 10/15/2013 - Type Your Description Here

Total Acres Disturbed: 17

Maximum Daily Acreage Disturbed: 4.25

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 1581.21

Off-Road Equipment:

2 Excavators (168 hp) operating at a 0.57 load factor for 4 hours per day

1 Forklifts (145 hp) operating at a 0.3 load factor for 4 hours per day

1 Rollers (95 hp) operating at a 0.56 load factor for 4 hours per day

2 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 4 hours per day

3 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 4 hours per day

3 Water Trucks (189 hp) operating at a 0.5 load factor for 4 hours per day

Phase: Trenching 10/1/2012 - 10/15/2012 - Default Mass Site Grading Description

Off-Road Equipment:

1 Excavators (168 hp) operating at a 0.57 load factor for 4 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 4 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 4 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 4 hours per day

Phase: Trenching 10/1/2013 - 10/14/2013 - Type Your Description Here

Off-Road Equipment:

1 Excavators (168 hp) operating at a 0.57 load factor for 4 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 4 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 4 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 4 hours per day

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Urbemis 2007 Version 9.2.4

Summary Report for Annual Emissions (Tons/Year)

File Name: C:\Documents and Settings\weirichj\Desktop\UTRG Temp\UTR G Alt 3.urb924

Project Name: UTR Golf Course and Restoration Alt 3

Project Location: Mountain Counties Air Basin

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2012 TOTALS (tons/year unmitigated)	0.24	2.39	1.24	0.00	10.42	0.11	10.53	2.18	0.10	2.28	322.50
2013 TOTALS (tons/year unmitigated)	0.45	3.93	2.24	0.00	17.43	0.19	17.62	3.64	0.18	3.82	532.06
2014 TOTALS (tons/year unmitigated)	0.44	3.68	2.21	0.00	17.17	0.18	17.35	3.59	0.16	3.75	524.07

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Urbemis 2007 Version 9.2.4

Summary Report for Annual Emissions (Tons/Year)

File Name: C:\Documents and Settings\weirichj\Desktop\UTRG Temp\UTR G Alt 4.urb924

Project Name: UTR Golf Course and Restoration Alt 4

Project Location: Mountain Counties Air Basin

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2012 TOTALS (tons/year unmitigated)	0.52	5.33	2.64	0.00	4.79	0.24	5.03	1.00	0.22	1.22	722.29
2013 TOTALS (tons/year unmitigated)	0.42	4.36	2.13	0.00	5.63	0.18	5.81	1.18	0.17	1.34	665.41

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Urbemis 2007 Version 9.2.4

Detail Report for Summer Construction Unmitigated Emissions (Pounds/Day)

File Name: C:\Documents and Settings\weirichj\Desktop\UTRG Temp\UTR G Alt 5.urb924

Project Name: UTR Golf Course and Restoration Alt 5

Project Location: Mountain Counties Air Basin

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES (Summer Pounds Per Day, Unmitigated)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Time Slice 5/15/2012-5/31/2012 Active Days: 15	3.35	26.50	17.36	0.00	35.30	1.29	36.58	7.37	1.18	8.55	2,934.11
Mass Grading 05/15/2012-05/31/2012	3.35	26.50	17.36	0.00	35.30	1.29	36.58	7.37	1.18	8.55	2,934.11
Mass Grading Dust	0.00	0.00	0.00	0.00	35.28	0.00	35.28	7.37	0.00	7.37	0.00
Mass Grading Off Road Diesel	3.22	26.27	14.34	0.00	0.00	1.28	1.28	0.00	1.18	1.18	2,725.43
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.12	0.23	3.02	0.00	0.01	0.01	0.02	0.00	0.00	0.01	208.68
Time Slice 6/1/2012-9/29/2012 Active Days: 104	3.58	36.34	18.80	0.03	315.11	1.65	316.75	65.82	1.51	67.33	4,950.70
Mass Grading 06/01/2012-09/30/2012	3.58	36.34	18.80	0.03	315.11	1.65	316.75	65.82	1.51	67.33	4,950.70
Mass Grading Dust	0.00	0.00	0.00	0.00	315.00	0.00	315.00	65.78	0.00	65.78	0.00
Mass Grading Off Road Diesel	2.37	18.32	10.86	0.00	0.00	1.03	1.03	0.00	0.95	0.95	1,931.02
Mass Grading On Road Diesel	1.12	17.84	5.59	0.03	0.10	0.61	0.71	0.03	0.56	0.59	2,857.38
Mass Grading Worker Trips	0.10	0.18	2.35	0.00	0.01	0.00	0.01	0.00	0.00	0.01	162.30
Time Slice 10/1/2012-10/15/2012 Active Days: 13	1.94	16.14	9.45	0.00	0.01	0.73	0.73	0.00	0.67	0.67	1,779.15
Trenching 10/01/2012-10/15/2012	1.94	16.14	9.45	0.00	0.01	0.73	0.73	0.00	0.67	0.67	1,779.15
Trenching Off Road Diesel	1.87	16.01	7.77	0.00	0.00	0.72	0.72	0.00	0.67	0.67	1,663.22
Trenching Worker Trips	0.07	0.13	1.68	0.00	0.01	0.00	0.01	0.00	0.00	0.01	115.93

Time Slice 5/15/2013-5/31/2013 Active Days: 15	0.31	2.20	1.94	0.00	0.00	0.13	0.13	0.00	0.12	0.12	296.73
Mass Grading 05/15/2013-05/31/2013	0.31	2.20	1.94	0.00	0.00	0.13	0.13	0.00	0.12	0.12	296.73
Mass Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Off Road Diesel	0.30	2.18	1.63	0.00	0.00	0.13	0.13	0.00	0.12	0.12	273.54
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.01	0.02	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.18
Time Slice 6/1/2013-9/30/2013 Active Days: 104	6.65	57.76	34.19	0.03	315.12	2.86	317.98	65.82	2.63	68.46	7,809.66
Mass Grading 06/01/2013-09/30/2013	6.65	57.76	34.19	0.03	315.12	2.86	317.98	65.82	2.63	68.46	7,809.66
Mass Grading Dust	0.00	0.00	0.00	0.00	315.00	0.00	315.00	65.78	0.00	65.78	0.00
Mass Grading Off Road Diesel	5.43	41.67	24.51	0.00	0.00	2.32	2.32	0.00	2.13	2.13	4,604.55
Mass Grading On Road Diesel	1.02	15.74	5.02	0.03	0.10	0.53	0.63	0.03	0.49	0.52	2,857.38
Mass Grading Worker Trips	0.19	0.35	4.65	0.00	0.02	0.01	0.03	0.01	0.01	0.02	347.73
Time Slice 10/1/2013-10/15/2013 Active Days: 13	1.84	15.07	9.03	0.00	0.01	0.67	0.67	0.00	0.61	0.61	1,779.13
Trenching 10/01/2013-10/15/2013	1.84	15.07	9.03	0.00	0.01	0.67	0.67	0.00	0.61	0.61	1,779.13
Trenching Off Road Diesel	1.78	14.96	7.48	0.00	0.00	0.66	0.66	0.00	0.61	0.61	1,663.22
Trenching Worker Trips	0.06	0.12	1.55	0.00	0.01	0.00	0.01	0.00	0.00	0.01	115.91

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Time Slice 5/15/2014-5/31/2014 Active Days: 15	2.79	20.74	14.33	0.00	35.30	1.07	36.37	7.37	0.99	8.36	2,725.72
Mass Grading 05/15/2014-05/31/2014	1.54	11.73	8.29	0.00	35.29	0.54	35.83	7.37	0.50	7.87	1,511.31
Mass Grading Dust	0.00	0.00	0.00	0.00	35.28	0.00	35.28	7.37	0.00	7.37	0.00
Mass Grading Off Road Diesel	1.48	11.62	6.86	0.00	0.00	0.54	0.54	0.00	0.49	0.49	1,395.42
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.06	0.11	1.43	0.00	0.01	0.00	0.01	0.00	0.00	0.01	115.90
Mass Grading 05/15/2014-10/15/2014	1.25	9.02	6.04	0.00	0.00	0.53	0.54	0.00	0.49	0.49	1,214.40
Mass Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Off Road Diesel	1.21	8.93	4.89	0.00	0.00	0.53	0.53	0.00	0.49	0.49	1,121.69
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.05	0.09	1.14	0.00	0.00	0.00	0.01	0.00	0.00	0.00	92.72
Time Slice 6/2/2014-9/30/2014 Active Days: 104	5.65	48.92	29.10	0.03	192.90	2.29	195.19	40.30	2.11	42.41	7,372.39
Mass Grading 05/15/2014-10/15/2014	1.25	9.02	6.04	0.00	0.00	0.53	0.54	0.00	0.49	0.49	1,214.40
Mass Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Off Road Diesel	1.21	8.93	4.89	0.00	0.00	0.53	0.53	0.00	0.49	0.49	1,121.69
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.05	0.09	1.14	0.00	0.00	0.00	0.01	0.00	0.00	0.00	92.72
Mass Grading 06/01/2014-09/30/2014	4.40	39.91	23.07	0.03	192.90	1.76	194.66	40.30	1.62	41.92	6,157.99
Mass Grading Dust	0.00	0.00	0.00	0.00	192.78	0.00	192.78	40.26	0.00	40.26	0.00
Mass Grading Off Road Diesel	3.35	26.06	15.48	0.00	0.00	1.29	1.29	0.00	1.19	1.19	3,072.85
Mass Grading On Road Diesel	0.92	13.62	4.44	0.03	0.10	0.46	0.56	0.03	0.42	0.46	2,830.17
Mass Grading Worker Trips	0.13	0.24	3.15	0.00	0.01	0.01	0.02	0.00	0.01	0.01	254.97

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Time Slice 10/1/2014-10/15/2014 Active Days: 13	3.00	22.93	14.69	0.00	0.01	1.13	1.14	0.00	1.04	1.04	2,993.52
Mass Grading 05/15/2014-10/15/2014	1.25	9.02	6.04	0.00	0.00	0.53	0.54	0.00	0.49	0.49	1,214.40
Mass Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Off Road Diesel	1.21	8.93	4.89	0.00	0.00	0.53	0.53	0.00	0.49	0.49	1,121.69
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.05	0.09	1.14	0.00	0.00	0.00	0.01	0.00	0.00	0.00	92.72
Trenching 10/01/2014-10/15/2014	1.74	13.91	8.66	0.00	0.01	0.60	0.60	0.00	0.55	0.55	1,779.12
Trenching Off Road Diesel	1.69	13.80	7.23	0.00	0.00	0.59	0.59	0.00	0.55	0.55	1,663.22
Trenching Worker Trips	0.06	0.11	1.43	0.00	0.01	0.00	0.01	0.00	0.00	0.01	115.90

Phase Assumptions

Phase: Mass Grading 5/15/2014 - 5/31/2014 - Type Your Description Here

Total Acres Disturbed: 0

Maximum Daily Acreage Disturbed: 0

Fugitive Dust Level of Detail: Low

Onsite Cut/Fill: 258 cubic yards/day; Offsite Cut/Fill: 11 cubic yards/day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

1 Excavators (168 hp) operating at a 0.57 load factor for 4 hours per day

1 Forklifts (145 hp) operating at a 0.3 load factor for 4 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 4 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 4 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 4 hours per day

Phase: Mass Grading 6/1/2014 - 9/30/2014 - Type Your Description Here

Total Acres Disturbed: 63

Maximum Daily Acreage Disturbed: 15.75

Fugitive Dust Level of Detail: Low

Onsite Cut/Fill: 258 cubic yards/day; Offsite Cut/Fill: 11 cubic yards/day

On Road Truck Travel (VMT): 702.97

Off-Road Equipment:

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2 Cranes (399 hp) operating at a 0.43 load factor for 2 hours per day

2 Excavators (168 hp) operating at a 0.57 load factor for 4 hours per day

1 Rollers (95 hp) operating at a 0.56 load factor for 4 hours per day

2 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 4 hours per day

3 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 4 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 4 hours per day

Phase: Mass Grading 5/15/2012 - 5/31/2012 - Default Mass Site Grading Description

Total Acres Disturbed: 0

Maximum Daily Acreage Disturbed: 0

Fugitive Dust Level of Detail: Low

Onsite Cut/Fill: 258 cubic yards/day; Offsite Cut/Fill: 11 cubic yards/day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

2 Excavators (168 hp) operating at a 0.57 load factor for 4 hours per day

1 Forklifts (145 hp) operating at a 0.3 load factor for 4 hours per day

2 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 4 hours per day

2 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 4 hours per day

2 Water Trucks (189 hp) operating at a 0.5 load factor for 4 hours per day

Phase: Mass Grading 6/1/2012 - 9/30/2012 - Default Mass Site Grading Description

Total Acres Disturbed: 63

Maximum Daily Acreage Disturbed: 15.75

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 709.73

Off-Road Equipment:

2 Excavators (168 hp) operating at a 0.57 load factor for 4 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 4 hours per day

3 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 4 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 4 hours per day

Phase: Mass Grading 5/15/2013 - 5/31/2013 - Default Mass Site Grading Description

Total Acres Disturbed: 0

Maximum Daily Acreage Disturbed: 0

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Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

1 Excavators (168 hp) operating at a 0.57 load factor for 4 hours per day

Phase: Mass Grading 5/15/2014 - 10/15/2014 - Type Your Description Here

Total Acres Disturbed: 0

Maximum Daily Acreage Disturbed: 0

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

2 Pumps (53 hp) operating at a 0.74 load factor for 8 hours per day

2 Water Trucks (189 hp) operating at a 0.5 load factor for 4 hours per day

Phase: Mass Grading 6/1/2013 - 9/30/2013 - Type Your Description Here

Total Acres Disturbed: 63

Maximum Daily Acreage Disturbed: 15.75

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 709.73

Off-Road Equipment:

2 Excavators (168 hp) operating at a 0.57 load factor for 4 hours per day

1 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day

1 Graders (174 hp) operating at a 0.61 load factor for 8 hours per day

2 Pumps (53 hp) operating at a 0.74 load factor for 8 hours per day

1 Rollers (95 hp) operating at a 0.56 load factor for 4 hours per day

2 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 4 hours per day

3 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 4 hours per day

3 Water Trucks (189 hp) operating at a 0.5 load factor for 4 hours per day

Phase: Trenching 10/1/2014 - 10/15/2014 - Type Your Description Here

Off-Road Equipment:

1 Excavators (168 hp) operating at a 0.57 load factor for 4 hours per day

3/9/2010 11:42:25 AM

1 Other Material Handling Equipment (191 hp) operating at a 0.59 load factor for 4 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 4 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 4 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 4 hours per day

Phase: Trenching 10/1/2012 - 10/15/2012 - Default Mass Site Grading Description

Off-Road Equipment:

1 Excavators (168 hp) operating at a 0.57 load factor for 4 hours per day

1 Other Material Handling Equipment (191 hp) operating at a 0.59 load factor for 4 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 4 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 4 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 4 hours per day

Phase: Trenching 10/1/2013 - 10/15/2013 - Type Your Description Here

Off-Road Equipment:

1 Excavators (168 hp) operating at a 0.57 load factor for 4 hours per day

1 Other Material Handling Equipment (191 hp) operating at a 0.59 load factor for 4 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 4 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 4 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 4 hours per day

3/9/2010 11:42:40 AM

Urbemis 2007 Version 9.2.4

Summary Report for Annual Emissions (Tons/Year)

File Name: C:\Documents and Settings\weirichj\Desktop\UTRG Temp\UTR G Alt 5.urb924

Project Name: UTR Golf Course and Restoration Alt 5

Project Location: Mountain Counties Air Basin

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2012 TOTALS (tons/year unmitigated)	0.22	2.19	1.17	0.00	16.65	0.10	16.75	3.48	0.09	3.57	291.01
2013 TOTALS (tons/year unmitigated)	0.36	3.12	1.85	0.00	16.39	0.15	16.54	3.42	0.14	3.56	419.89
2014 TOTALS (tons/year unmitigated)	0.33	2.85	1.72	0.00	10.30	0.13	10.43	2.15	0.12	2.27	423.27

APPENDIX J

Noise Modeling Data

Appendix XX

24 Hour Noise Modeling

Model Input Sheet

EDAW | AECOM

Project: UTR Golf Course

Date: **June 30, 2009**

Condition: Individual Source Calculations

Ambient Noise Level (dBA Leq) as Monitored on November 15, 2008

36.60 ambient level

Lawn Mower Noise Levels (dBA Leq) as Monitored on October 12, 2006

74.00 at 6 feet

Human Conversation Noise Level (dBA Leq)

60.00 at 3 feet

Decibel Addition

=10*LOG(10^(N1/10)+10^(N2/10)+10^(N3/10))

Decibel Attenuation

=N1-(20.5*(LOG(D1/D2)))

Calculation Table

	at 100 feet
Ambient	36.6
Lawn Mower (1)	49.0
Humans (4)	33.6

Appendix XX

24 Hour Noise Modeling

Model Input Sheet

EDAW | AECOM

Project: UTR Golf Course

Date: **June 30, 2009**

Condition: Existing

Hour	Leq	Lmax	L50	L90
12:00	36.6			
13:00	36.6			
14:00	36.6			
15:00	36.6			
16:00	36.6			
17:00	36.6			
18:00	36.6			
19:00	36.6			
20:00	36.6			
21:00	36.6			
22:00	36.6			
23:00	36.6			
0:00	36.6			
1:00	36.6			
2:00	36.6			
3:00	36.6			
4:00	36.6			
5:00	36.6			
6:00	36.6			
7:00	36.6			
8:00	36.6			
9:00	36.6			
10:00	36.6			
11:00	36.6			

Averages

	Leq	Lmax	L50	L90
Daytime (7 a.m. - 7 p.m.)	36.6	-	-	-
Evening (7 p.m. - 9 p.m.)	36.6	-	-	-
Nighttime (9 p.m. - 7 a.m.)	36.6	-	-	-

Uppermost-Level

	Leq	Lmax	L50	L90
Daytime (7 a.m. - 7 p.m.)	36.6	-	-	-
Evening (7 p.m. - 9 p.m.)	36.6	-	-	-
Nighttime (9 p.m. - 7 a.m.)	36.6	-	-	-

Percentage of Energy

Daytime	50%
Evening	13%
Nighttime	38%

Calculated CNEL, dBA

43.3

Appendix XX

24 Hour Noise Modeling

Model Input Sheet

EDAW | AECOM

Project: UTR Golf Course

Date: **June 30, 2009**

Condition: Existing + Lawn Mowers

Hour	Leq	Lmax	L50	L90
12:00	36.6			
13:00	36.6			
14:00	36.6			
15:00	36.6			
16:00	36.6			
17:00	36.6			
18:00	36.6			
19:00	36.6			
20:00	36.6			
21:00	36.6			
22:00	36.6			
23:00	36.6			
0:00	36.6			
1:00	36.6			
2:00	36.6			
3:00	36.6			
4:00	36.6			
5:00	36.6			
6:00	36.6			
7:00	49.0			
8:00	49.0			
9:00	36.6			
10:00	36.6			
11:00	36.6			

Averages

	Leq	Lmax	L50	L90
Daytime (7 a.m. - 7 p.m.)	42.3	0.0	0.0	0.0
Evening (7 p.m. - 9 p.m.)	36.6	0.0	0.0	0.0
Nighttime (9 p.m. - 7 a.m.)	36.6	0.0	0.0	0.0

Uppermost-Level

	Leq	Lmax	L50	L90
Daytime (7 a.m. - 7 p.m.)	49.0	0.0	0.0	0.0
Evening (7 p.m. - 9 p.m.)	36.6	0.0	0.0	0.0
Nighttime (9 p.m. - 7 a.m.)	36.6	0.0	0.0	0.0

Percentage of Energy

Daytime	79%
Evening	5%
Nighttime	16%

Calculated CNEL, dBA

44.4

Appendix XX

24 Hour Noise Modeling

Model Input Sheet

EDAW | AECOM

Project: UTR Golf Course

Date: **June 30, 2009**

Condition: Existing + Lawn Mowers + Golfing

Hour	Leq	Lmax	L50	L90
12:00	39.0			
13:00	39.0			
14:00	39.0			
15:00	39.0			
16:00	39.0			
17:00	39.0			
18:00	39.0			
19:00	36.6			
20:00	36.6			
21:00	36.6			
22:00	36.6			
23:00	36.6			
0:00	36.6			
1:00	36.6			
2:00	36.6			
3:00	36.6			
4:00	36.6			
5:00	36.6			
6:00	36.6			
7:00	49.0			
8:00	49.0			
9:00	39.0			
10:00	39.0			
11:00	39.0			

Averages

	Leq	Lmax	L50	L90
Daytime (7 a.m. - 7 p.m.)	43.0	0.0	0.0	0.0
Evening (7 p.m. - 9 p.m.)	36.6	0.0	0.0	0.0
Nighttime (9 p.m. - 7 a.m.)	36.6	0.0	0.0	0.0

Uppermost-Level

	Leq	Lmax	L50	L90
Daytime (7 a.m. - 7 p.m.)	49.0	0.0	0.0	0.0
Evening (7 p.m. - 9 p.m.)	36.6	0.0	0.0	0.0
Nighttime (9 p.m. - 7 a.m.)	36.6	0.0	0.0	0.0

Percentage of Energy

Daytime	81%
Evening	5%
Nighttime	14%

Calculated CNEL, dBA

44.6

Appendix X2

Project-Generated Construction Source Noise Prediction Model

Upper Truckee River Restoration and Golf Course

Location	Distance to Nearest Receiver in feet	Combined Predicted Noise Level (L_{eq} dBA)
Threshold*	2,720	55.0
	50	89.7
	100	83.7
	150	80.2
	200	77.7
	250	75.7
	300	74.1
	350	72.8
	400	71.7
	450	70.6
	500	69.7
	550	68.9
	600	68.1

Assumptions:	Reference Emission Noise Levels (L_{max}) at 50 feet[1]	Usage Factor[1]
Excavator	85	0.4
Dozer	85	0.4
Crane	85	0.16
Impact Pile Driver	95	0.2

Ground Type	Hard
Source Height	8
Receiver Height	5
Ground Factor	0.00

Predicted Noise Level [2]	L_{eq} dBA at 50 feet[2]
Excavator	81.0
Dozer	81.0
Crane	77.0
Impact Pile Driver	88.0

Combined Predicted Noise Level (L_{eq} dBA at 50 feet)
89.7

Sources:

[1] Obtained from the FHWA Roadway Construction Noise Model, January 2006.

[2] Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2006.

L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50)

Where: E.L. = Emission Level;

U.F.= Usage Factor;

G = Constant that accounts for topography and ground effects; and

D = Distance from source to receiver.

*Project specific threshold

Appendix X2

Project-Generated Construction Source Noise Prediction Model

Upper Truckee River Restoration and Golf Course

EDAW | AECOM

Location	Distance to Nearest Receiver in feet	Combined Predicted Noise Level (L_{eq} dBA)
Threshold*	1,648	55.0
	50	85.4
	100	79.3
	150	75.8
	200	73.3
	250	71.4
	300	69.8
	350	68.5
	400	67.3
	450	66.3
	500	65.4
	550	64.5
	600	63.8

Assumptions:	Reference Emission Noise Levels (L_{max}) at 50 feet[1]	Usage Factor[1]
Excavator	85	0.4
Dozer	85	0.4
Crane	85	0.16
Front End Loader	80	0.4

Ground Type	Hard
Source Height	8
Receiver Height	5
Ground Factor	0.00

Predicted Noise Level [2]	L_{eq} dBA at 50 feet[2]
Excavator	81.0
Dozer	81.0
Crane	77.0
Front End Loader	76.0

Combined Predicted Noise Level (L_{eq} dBA at 50 feet)
85.4

Sources:

[1] Obtained from the FHWA Roadway Construction Noise Model, January 2006.

[2] Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2006.

L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50)

Where: E.L. = Emission Level;

U.F.= Usage Factor;

G = Constant that accounts for topography and ground effects; and

D = Distance from source to receiver.

*Project specific threshold

Appendix XX

Traffic Noise Prediction Model, (FWHA RD-77-108)

Model Input Sheet

Project Name : UTRR and Golf Course
Project Number : 5110049.01
Modeling Condition : Existing
Ground Type : Soft
Metric (L_{eq}, L_{dn}, CNEL) : CNEL

K Factor :
Traffic Desc. (Peak or ADT) : ADT

Segment	Roadway	Segment From	Segment To	Traffic Vol.	Speed (Mph)	Distance to CL	% Autos	%MT	% HT	Day %	Eve %	Night %	Offset (dB)
1	US 50	Pioneer Trail	Sawmill Road	13700	45	68	96.91	1.58	1.51	77.74	12.62	9.64	0
2	US 50	SR 89	Pioneer Trail	13600	45	76	96.91	1.58	1.51	77.74	12.62	9.64	0

Appendix XX

Traffic Noise Prediction Model, (FWHA RD-77-108)

Predicted Noise Levels

Project Name : UTRR and Golf Course
Project Number : 5110049.01
Modeling Condition : Existing
Metric (Leq, Ldn, CNEL) : CNEL

		Segment		Noise Levels, dB CNEL				Distance to Traffic Noise Contours, Feet				
Segment	Roadway	From	To	Auto	MT	HT	Total	70 dB	65 dB	60 dB	55 dB	50 dB
1	US 50	Pioneer Trail	Sawmill Road	64.9	55.3	59.6	66.4	39	84	181	390	840
2	US 50	SR 89	Pioneer Trail	64.2	54.5	58.8	65.6	39	84	180	388	836