Macroinvertebrate Zoology Appendix

*Appendix A. Locations of 13 monitoring stations where macroinvertebrate, habitat and water chemistry data were collected and used in this study, in the Granite Creek watershed, Prescott, AZ 2008-12 (*sites sampled by ADEQ 2008-2010).*

SiteID	Stream Location	Latitude/longitude (DD-NAD83)	A-priori stream type	Elevation	Watershed area	Rosgen stream type
MGIDN002.66*	Indian Creek upstream of Hwy 89	34.486;112.506	Reference	5950	1.4	B4
VRASP000.37/ VRASP000.03	Aspen Creek, just upstream of Granite Creek	34.53267, 112.48732	Non-reference	5420	3.8	C4b
VRASP005.07*	Upper Aspen Creek @ Forest boundary	34.50166;112.52145	Non-reference	6250	1.3	B5
VRBAN000.06	Banning Cr abv the Granite Creek confluence	34.51718, 112.47639	Non-reference, perennial	5520	4.9	E4b
VRBTT000.32	Butte Cr upstream of Sheldon St @ Prescott College	34.54695, 112.47504	Non-reference	5360	4.0	E5
VRBTT005.70	Butte Cr abv Thumb Butte Rec area near headwaters	34.51923, 112.55004	Reference	6480	0.41	A4
VRGRA026.57*	Granite Creek @ Watson Woods restoration reach	34.57676, 112.43018	Non-reference	5220	36.0	C4
VRGRA027.35	Granite Cr @ Watson Woods & wetland ponds	34.57262, 112.43254	Non-reference	5220	36.0	C4
VRGRA029.97	Granite Cr @ Granite Creek Park	34.54990, 112.46763	Stressed	5280	27.7	C5
VRGRA033.51*	Granite Cr @ White Spar campground	34.50548;112.47871	Non-reference	5600	2.3	B5
VRMAN000.52	Manzanita Cr, downstream of Canyon Dr. crossing	34.52538, 112.47814	Non-reference	5480	2.0	C5
VRMIL000.22	Miller Cr blw Butte Cr and Lincoln Dr crossing	34.54668, 112.47376	Stressed	5290	9.1	C5
VRMIL006.07	Upper Miller Cr-abv Thumb Butte Rec area	34.53400, 112.55300	Reference	6200	0.52	B4a

Appendix B: The 10-Jab 5-minute Multi-habitat Macroinvertebrate Sampling Method

This method is a modification of the USEPA methods for rocky and muddy bottomed streams (USEPA, 1997) and a slight modification of methods proposed in the "Draft Arizona Biosurvey Protocols for volunteers (Marsh & Spindler, 2007). The EPA method produces two separate methods which have to be analyzed and scored separately. The following method is a 10-jab 5-minute composite sample which works in both cobble and mud-bottomed streams and produces samples that can be analyzed with a single assessment tool.

The first task is to identify the study reach by pacing off the length of each habitat in the study reach. Mark the top and bottom of a 100-meter stream segment that is representative of the larger stream reach. Avoid walking in the stream, since this might dislodge macroinvertebrates and alter the results. Sketch the 100-meter sampling reach, indicating the number of paces and location of the riffles, pools, runs on the sketch. Also sketch the location of snags/logs, aquatic vegetation beds, and decaying organic matter such as leaf packs. Sum up the number of paces of each habitat and subhabitat type. Calculate the percentage of each over the entire 100m/300ft reach. Use these percentages to identify how many of each habitat to sample, with the total being 10. Number each of the 10 stations/habitats on the sketch, starting downstream and working upstream.

Macroinvertebrate Collection:

The method for collecting macroinvertebrates is the 10-jab multi-habitat method but is divided into two stream types to provide suggestions on the types of habitats expected for sampling.

- Rocky-bottom approach applies where:
  - Channel substrate is primarily gravel, cobble, or boulders; and
  - Stream segments are primarily riffle and run habitats

- Muddy-bottom approach applies where:
  - Stream flow is slow moving or has dried to large pools of water;
  - Channel substrate is muddy, silty, or sandy;
  - Stream segments have little to no riffles; or
  - Channel bottom is flat.

Rocky-bottom Approach

Use the following method of macroinvertebrate sampling in stream segments that have primarily riffles and gravel or cobble substrates. A D-frame net is used to jab at 10 different habitat locations including riffle, run, pools and woody debris or in-stream vegetation.

To collect a sample:

- Always approach the sampling locations from the downstream end, sampling the most downstream spot first.

- Use a clean kick net, free of mud and debris from previous uses.

- Fill a spray bottle and a bucket (about a third full) with stream water.

- Select a 1 foot square riffle area for sampling. Position the net (a 500 μm mesh D-frame net) on the downstream end of this area. Be sure that the bottom of the net is tight against the streambed so macroinvertebrates do not escape under the net. Don't allow water to flow over the net.

- Thoroughly kick and stir the sampling area down into the underlying sand and gravel. All dislodged organisms should be carried by the stream flow into the net. Be sure to disturb the first few inches of stream sediment to dislodge burrowing organisms. Use the D-frame net, and stir up an area 1 foot square in front of the net for approximately 30 seconds. This is referred to as a "jab."

- Pick up any large rocks in the sampling area and rub them thoroughly (but gently) over the partially filled bucket so that any macroinvertebrates clinging to the rocks will be dislodged into the bucket. Place each cleaned rock outside of the sampling area until the task is completed. Then return the rocks.

- Remove the net without allowing the organisms to wash away (use a forward scooping motion). Empty the nets contents into the partially filled bucket. Pour water and spray the net to flush its contents into the bucket. If necessary pick debris and organisms from the net by hand. Release back into the stream any fish, amphibians, or reptiles caught in the net.

Crawfish

Crawfish may eat other critters collected, so count and remove them from the samples. They are an exotic predator that may be negatively impacting the health of the benthic community, so you may want to remove the crawfish from the stream, rather than place them back in the stream.

- Repeat this at all 10 stations, whether they be riffles, runs or pools. In pools, disturb the bottom sediment with your feet, then sweep the net 3 times thru the water column to capture dislodged invertebrates. Put the samples from all ten stations into the same bucket forming a composite sample.

Muddy-Bottom Approach:

In muddy-bottom streams the goal is to sample a diversity of habitats to look for a wide variety of organisms. A D-frame dip net is used to jab at 10 different habitat locations and scoop up the organisms that become dislodged.

The typical habitats to sample in these streams are:

- Vegetative bank margins – Consisting of overhanging bank vegetation and submerged root mats attached to banks. This is often the most abundant type of habitat.

- Snags and logs – Submerged wood and leaf packs lodged between rocks or logs.
- Aquatic vegetation beds and decaying organic matter – Beds of submerged green-leafy plants that are attached to the stream bottom.
- Silt/sand/gravel substrate – This includes rocks along the stream bottom, wetted gravel bars, and algae covered rocks.

Use the D-frame net, and stir up an area 1 foot square in front of the net for approximately 30 seconds. This is referred to as a "jab." Collect 10 jabs within the stream reach. Prior to entering the stream, decide how many jabs to take in each habitat type to make a representative sample. Then proceed from downstream to upstream moving from habitat to habitat identified in your site sketch.

To collect a sample:

- Always approach the sampling locations from the downstream end, sampling the site farthest downstream first.
- Use a clean kick net, free of mud and debris from previous uses.
- Fill a spray bottle and a bucket half full with stream water.
- Collect samples in the different habitats, handing the net to a second person after every few jabs, who can rinse the contents of the net into the bucket.
    - To sample vegetated bank margins, jab vigorously with an upward motion, brushing the net against vegetation and roots along the bank. The entire jab motion should occur underwater.
    - To sample snags and logs, hold the net with one hand under the section of submerged wood and with the other hand (gloved), rub about 1 square foot of area on the snag or log. Scoop organisms, bark, twigs or other organic matter you dislodge into the net. Each combination of log rubbing and net scooping is one jab.
    - To sample aquatic vegetation beds, jab vigorously, with an upward motion, against or through the plant bed. The entire motion should occur under water.
    - To sample silt/sand/gravel substrate, place the net with one edge against the stream bottom and push it forward about a foot moving upstream to dislodge the first few inches of silt sand, gravel or rocks. Avoid gathering a net full of mud by periodically sweeping the net back and forth in the water. Make sure that the water does not run over the top of the net. This will allow fine silts to rinse out of the net.
- When you have completed all 10 jabs, rinse the net thoroughly into the bucket. If necessary, pick any clinging organisms from the net by hand and put them in the bucket. All jabs are combined in one bucket, the composite sample.

Equipment

500 micron mesh D-frame net	Waders
500 micron mesh metal sieve	Gloves
100 meter tape	Forceps
Large white bucket(s)	Flagging materials and pins
White dissecting tray(s)	Squirt or spray bottle(s)

Composite Sample Handling

The composite sample must now be condensed into smaller containers for preservation or field identification.

- Swirl the contents of the bucket and pour the non-sediment portion into a 500 μm mesh sieve. Add water to the bucket, swirl and pour the contents into the sieve several times until all insects and organic debris are emptied.

- Dump the remaining sediment into a dissecting tray and search the sediment for any remaining organisms (e.g., Trichoptera, snails, and clams), then discard the sediment.

- *Gently* squeeze the sample to remove excess water from algae laden samples. Using a plastic spoon or hands, *gently* dispense the sample from the sieve into a wide mouth, one-liter sample jar. Fill the jar half to three-quarters full. Fill a maximum of two jars.

- The sample must be field split if too large to fit in two jars or if a split sample is to be sent to ADEQ's contract lab for identification verification.
  - Evenly spread the entire sample in a white dissecting tray and divide the sample with your hands into two equal portions.
    - If splitting with ADEQ, place each half in the jar(s) provided.
    - If dividing to reduce the size of the sample, place one half of the sample into the jar(s) and discard the other half into the stream.
    - If still too much, split the sample into additional equal portions.
    - Note on the field form how the sample was divided. For example, "field split ½" if sample was split in half.

- Organisms can be identified in the field (see instructions below) or preserved and brought to a laboratory for identification. If samples are to be held for more than 24 hours, the samples need to be preserved in alcohol.
  - If the sample is going to a lab for identification, add enough 99% isopropyl alcohol to the jar to cover the sample material by about 1 inch and label jars as instructed below.
  - Note that the isopropyl is flammable, so caution should be used when using or storing. It is appropriate to store in a cabinet for flammable materials.

- Place a label inside the jar, seal the jar, and place a second label on the outside the jar (attached with clear plastic tape). If more than one jar is used for a sample, put jar numbers on all labels (1 of 2, 2 of 2). Each tag should have the following information at a minimum:
    - Waterbody name
    - Site code
    - Type of sample (10jab multihabitat)
    - Date
    - "Prescott Creeks Project", and initials of lead sampler
    - Lab name
- Place samples in an ice chest with ice to prevent overheating and degradation of the samples. This also prevents fumes from developing inside a vehicle. Samples will need to be kept in a cool environment and within flammable storage areas (at a minimum, in a cooler) prior to shipping to a laboratory.

Equipment
> Wide-mouth sample jars
> 99% isopropyl alcohol (if taking to local lab for identification)
> Forceps, eyedroppers, and plastic spoons
> Labels, pens/pencils, and tape appropriate for water/alcohol

Macroinvertebrate Taxonomy Analysis

Volunteers will identify the organisms in the sample to order level using a key and the specimen set. Once the number of individuals in each "Order" has been entered on the Macroinvertebrate Field Form, some of the Orders will be keyed to family level. Then a Biosurvey rating score will be calculated based on the abundance and diversity of specimens represented.

Presorting – Separate the invertebrates from the sample matrix. Float the sample in water in a white plastic tray. Rinse off large debris and remove from the sample. Sorting of invertebrates from the sample matrix is best performed by trained volunteers using dissecting scopes with a minimum magnification of 5X. Track any matrix problems or other issues with the sample.

Sub-sampling – Arizona samples typically contain thousands of invertebrates so they must be sub-sampled to limit the counts to between 500-600 organisms. A Caton Tray is used to randomly obtain fractions of the total sample for counting. Spread the sample out across a Caton Tray and randomly select a section (1/30th of the sample). Additional fractions are selected until the 500-600 organisms have been identified. Additional fractions are exampled if one fraction is dominated by a single species. After the target number of specimens has been achieved, the rest of the sample (the unsorted portion) is scanned for large or rare taxa, which may aid in identification of smaller instars or may expand the taxa list for that sample.
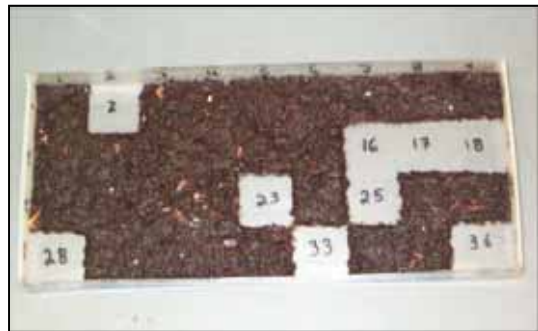
Caton Tray Sub-sampling

Look through the remaining portion and pull out any unusual or rare individuals to be included in the order and family identification discussed below. The remaining unsorted sample is re-preserved with 70% ethanol in individual containers and archived in the laboratory for one year. Track the number of fractions sorted.

Identification to Order Level – Sort organisms by taxonomic order into ice cube trays or Petri dishes. Place any you cannot identify into a dish for the biological advisor to identify. Use an aquatic organism identification key and the set of reference specimens to aid identification. (See reference list for recommended keys.)

- Sort similar individuals into containers with isopropynol;
- Terrestrial insects and non-benthic insects (e.g. corixidae, other swimmers, mosquitoes, or surface tension dwellers) should not be included in the count.
- If an organism cannot be identified, place one or two specimens in an alcohol filled vial, to be sent to ADEQ for positive identification.

Record the findings at order level on the Macroinvertebrate Field Count Form and calculate a Biosurvey Order Level score for the site. A supervisor should check the sample to determine if the identifications were correct and matrix residues have been completely sorted. Sorting efficacy of 95% or better is expected.

<u>Identification to Family Level (only for Intermittent IBI samples)</u> – This should be done by a trained entomologist or laboratory. Identify insect Orders to Family level, other groups only to Class level.

- Use taxonomic keys, the reference collection, a dissection scope, and assistance of a biological advisor to key these organisms accurately to Family level;
- Return organisms to the subsample vial and replace the tag. Refill the subsample vial with 70% isopropyl alcohol. Be sure caps are on tight.
- The biological advisor or highly trained volunteer should validate the sample identifications. Again a sorting efficacy of 95% or better is expected.

Biossessment Calculations:

Intermittent IBI Method:

The Intermittent Indexes of Biological Integrity can be applied to family level macroinvertebrate taxonomic data generated by the sample collection procedures provided in this document. The following steps are required:

1. Calculate the macroinvertebrate metric values for the study sample following metric calculation procedures listed in Figure 1. Table 1 lists all the metrics used in the index and their definitions.
2. Calculate the metric percent of reference score, using the metric threshold values listed in Table 2.
3. Calculate an average of the percent of reference scores for all metrics to produce the IBI score. Table 3 provides an example of the scoring system for a sample.
4. Determine assessment category for the IBI score from Table 4.

Use the following formula to calculate the metric score (percentage of reference) for sensitive metrics whose values decrease with disturbance. Apply this formula to the following metrics.

Metric Score = (Sample value / metric threshold value) * 100

1. Total taxa richness
2. Percent Plecoptera
3. Percent Filterers

Apply the following formula to calculate the metric score (percentage of reference) for tolerant metrics whose values increase with disturbance.

Metric score = (100 – Sample value) / (100 – Metric threshold value) * 100

1. Percent Midges
2. Percent dominant taxon
3. percent collector-gatherers

Figure 1. Formulas for calculating macroinvertebrate metrics for the Intermittent Indexes of Biological Integrity.

Table 1. Descriptions of various metrics used in the Intermittent IBIs.

Category	Metric	Definition	Expected Response to increasing disturbance
Richness measures	**Total number of taxa**	Number of different macroinvertebrate taxa	Decrease
Tolerance measure	**% Dominant taxon**	Percent abundance of the single most abundant taxon.	Increase
Percent Composition measures	**% Chironomidae (midges)**	Percent abundance of midges, compared to total abundance of the sample	Increase
	% Plecoptera	Percent abundance of stoneflies, compared to total abundance of the sample	Decrease
Trophic measures	**% Collector gatherers**	Percent abundance of the collector-gatherer functional feeding group, compared to total abundance of the sample	Increase
	% Filterers	Number of taxa in the filterers functional feeding group	Decrease

Table 2. Reference scoring thresholds for the Intermittent IBI

Metric	Metric threshold value
Total taxa richness	15.9
Percent stoneflies	40.2
Percent midges	6.7
Percent dominant taxon	32.6
Percent collector-	12.4

gatherers	
Percent filterers	72.6

Table 3. Example calculation of the Intermittent Index of Biological Integrity scoring system; Granite Creek at Watson Woods, April 2012.

Metric	Metric Value	Metric Score (compared to warm water reference scoring threshold)
Total taxa richness	8	50.3
Percent stoneflies	0	0
Percent midges	20	86.3
Percent dominant taxon	55	68
Percent collector-gatherers	45	63
Percent filterers	55	75
Index Score (average of all Metric Scores)		57 Good

Table 4. Assessment category thresholds for Intermittent IBI scores.

Macroinvertebrate bioassessment result	Scores	Assessment
Greater than the 50th percentile of reference condition	57 - 100	Good/meeting
Between the 25th and 50th percentile of reference condition	51 – 56	Inconclusive
Less than the 25th percentile of reference condition	0 – 50	Poor/Impaired

Simple Four Metric Index:

This index is based on order level macroinvertebrate taxonomic data generated by the sample

collection procedures provided earlier in this document. The following steps are required:

1. Calculate the macroinvertebrate metric values for the sample following the metric calculation procedures listed Figure 1. Use the Order level identification for total taxa richness metric. Table 1 lists all the metrics used in the index and their definitions.
2. Calculate the biosurvey score as in the Table 5 example. Enter the metric value for your site, then compare each metric value to the value ranges in the biosurvey score columns. Choose the matching range and circle it; this gives you the corresponding score (6, 3, or 0) for your metric score.
3. Calculate the column score by multiplying the number of circled values by the biosurvey score for that column.
4. Sum all three column scores to obtain the total biosurvey score.
5. Determine assessment category for the IBI score from Table 6.

Table 5. Example metric worksheet for Simple Four Metric Index

Metric	Monitored site metric value	Biosurvey Metric Score (circle the correct range)		
		6	**3**	**0**
Total taxa richness		(6-8)	4-5	0-3
Percent stoneflies		11-30	(6-10)	0-5
Percent midges		0-33	(34-66)	67-100
Percent dominant taxon		(0-33)	34-66	67-100
Column Score (multiply the no. of circled values by the biosurvey metric score)		12	6	0
Index Score (sum of metric scores)		18		

Table 6. Assessment category thresholds for Simple Four Metric Index

Condition Class	Simple Four Index score range	Assessment
Good	≥15	Meeting reference
Fair	12-14	Inconclusive
Poor	0-11	Impaired

Tolerance Index:

This index is based on order level macroinvertebrate taxonomic data generated by volunteers in the field using sample collection procedures provided earlier in this document. The Tolerance Index is calculated using a stream quality rating based on the pollutant sensitivity of the organisms and their relative abundance at the Order level of identification. The following steps are required:

1. Assign an abundance code to the abundance value for each macroinvertebrate order:
    a. Rare (R) = 1-9 individuals
    b. Common (C) = 10-99 organisms
    c. Dominant (D) = 100+ organisms found in the sample.
2. Fill in the "Macroinvertebrate Count to Order Level" form. See Figure 2. Taxa have been placed into three tolerance groups: sensitive, somewhat sensitive and tolerant.
    a. Sensitive Organisms (e.g., mayflies, stoneflies, non-net-spinning caddisflies) are typically found in good-quality water.
    b. Somewhat Sensitive Organisms (e.g. net-spinning caddisflies, crayfish, sowbugs, clams) are found in fair- quality water.
    c. Tolerant Organisms (e.g., worms, leeches, midges) are found in poor-quality water.
3. Calculate the sum of the number of taxa in each tolerance category.
4. Multiply these sums by the multiplier factor for each tolerance category.
5. Sum all three together for the total tolerance score.
6. Compare to thresholds for good, and poor listed in Table 7.

Table 7. Assessment category thresholds Tolerance Index

Condition Class	Tolerance Index score range	Assessment
Good	≥12	Meeting reference conditions
Poor	0-11	Impaired

Macroinvertebrate Count to Order Level

Group 1 Sensitive				Group 2 Somewhat Sensitive				Group 3 Tolerant			
Code	#	Abun	Group	Code	#	Abun	Group	Code	#	Abun	Group
EPH			Ephemoroptera (mayflies) Minus family Baetidae	BAE			Baetidae (minnow mayflies)	ACA			Acari (mites & ticks)
ELM			Elmidae (riffle beetles)	COL			Coleoptera (beetles) (Minus family Elmidae)	AST			Astacidae (crayfish)
PLE			Plecoptera (stoneflies)	DIP			Diptera (gnats, flies) Count all Diptera here, if family Chironomidae is not dominant. Minus family Simuliidae	DIP			Diptera (gnats, flies) Count all Diptera here, if family Chironomidae is dominant. Or count family Simuliidae (black flies).
TRI			Tricoptera (caddisflies) Minus family Hydropsychidae	HYD			Hydropsychidae (net-spinning caddisflies)	COP			Copepoda (copepods)
PRO			Prosobranchia (gilled snails)	CLA			Cladocera (Daphnia, water fleas)	ISO			Isopoda (sow bugs)
				HEM			Hemiptera (true bugs)	GAM			Gammaridae (amphipods)
				LEP			Lepidoptera (butterflies and moths)	HIR			Hirudinea (leeches)
				MEG			Megoloptera (dobsonflies, helgrammite)	OLI			Oligochaeta (earth worms)
				ODO			Odonata (dragonflies, damselflies)	OST			Ostracoda (seed shrimp)
								VER			Vemeroida (clams, mussels)
								PUL			Pulmonata (lunged snails)
								NEM			Nematoda (round worms)
								MOR			Nematomopha (horsehair worms)
								TUB			Tubellaria (flatworms)

Water Quality Rating – Order Level

Group 1 Sensitive	Group 2 Somewhat Sensitive	Group 3 Tolerant
____ (# of R's) x 5.0 = ____	____ (# of R's) x 3.2 = ____	____ (# of R's) x 1.2 = ____

Combined score = water quality Score ____

Abun = Abundance. Use the following codes: R (Rare) if 1-9 organisms; C (Common) if 10-99 organisms; D (Dominant) if 100 or more organisms

Figure 2. Macroinvertebrate Count to Order Level form for calculation of the Tolerance Index for Intermittent Streams (Abun = Abundance category. Use the following codes: R (Rare) if 1-9 organisms; C (Common) if 10-99 organisms; D (Dominant) if 100 or more organisms. Use these abundance categories to track trends over time).

Appendix C: Table of habitat data for samples from streams in the Granite Creek watershed of Prescott AZ, 2008-2012.

STATIONID	CollDate	Site type	Canopy Density (%)	D50 (RIFFLE PC)	Embedded reach	Fines_percent <2mm (REACH)	Habitat % of ideal	Pfankuch % of ideal	PFC_%_Ideal	Pool_%	Riffle_%	Run_%
VRASP000.37	04-12-2011	Non-reference	51	30.9	56.0	35.4	85.0	77.4	80.0	34.0	32.0	34.0
MGIDN002.66	04-22-2008	Reference	74	28.0	44.1	13.7	90.0	88.2	86.7	30.7	37.2	32.1
MGIDN002.66	04-06-2009	Reference	5	20.7	41.5	20.0	85.0	84.9	100.0	28.2	33.8	38.0
MGIDN002.66	04-13-2010	Reference	40	39.4	38.5	22.0	100.0	84.9	100.0	16.8	49.6	33.6
VRASP000.37	04-22-2012	Non-reference	50				85.0	71.0	73.3	38.5	23.1	38.5
VRASP005.07	04-21-2008	Non-reference	72	6.0	64.0	42.0	70.0	73.1	76.9	20.6	45.6	33.8
VRASP005.07	04-06-2009	Non-reference	64	36.8	64.0	44.0	70.0	55.9	53.3	28.8	42.4	28.8
VRASP005.07	04-13-2010	Non-reference	53	21.1	64.0	50.0	62.5	55.9	42.9	4.0	45.2	50.8
VRBAN000.06	04-23-2008	Non-reference	96	6.0	58.4	38.6	77.5	84.9	86.7	9.3	50.4	40.3
VRBAN000.06	04-14-2011	Non-reference	83	12.8	68.0	32.0	80.0	80.6	86.7	28.1	46.2	25.6
VRBAN000.06	04-22-2012	Non-reference	50				75.0	77.4	66.7	28.1	34.4	37.5
VRBTT000.32	04-14-2011	Non-reference	60	23.0	65.2	55.0	70.0	67.7	53.3	0.0	28.8	71.2
VRBTT000.32	04-22-2012	Non-reference	50				70.0	67.7	53.3	0.0	35.2	64.8
VRBTT005.70	04-24-2008	Reference	82		48.0	21.0	85.0	72.0	73.3	20.0	55.2	24.8
VRBTT005.70	04-07-2009	Reference	72	42.7	57.0	31.0	90.0	83.9	84.6	35.8	41.6	22.6
VRBTT005.70	04-14-2010	Reference	68	65.0	51.0	24.0	92.5	76.3	58.3	9.9	46.0	44.1
VRBTT005.70	04-17-2011	Reference	60	64.0	52.3	27.0	87.5	65.6	53.3	13.6	74.2	12.3
VRBTT005.70	04-21-2012	Reference	90				90.0	68.8	53.3	28.0	58.7	13.3
VRGRA026.57	04-13-2011	Non-reference	17	20.0	59.0	47.0	80.0	75.3	86.7	15.3	36.9	47.7
VRGRA026.57	04-23-2012	Non-reference	34	17.5	61.2	36	80.0	75.3	86.7	11.0	43.4	45.6

STATIONID	CollDate	Site type	Canopy Density (%)	D50 (RIFFLE PC)	Embedded reach	Fines_percent <2mm (REACH)	Habitat % of ideal	Pfankuch % of ideal	PFC_%_Ideal	Pool_%	Riffle_%	Run_%
VRGRA029.97	04-23-2008	Stressed	58	0.4	75.0	53.5	70.0	74.2	66.7	14.2	28.4	57.4
VRGRA027.35	04-24-2008	Non-reference	65	22.0	75.0	28.0	75.0	64.5	68.8	2.4	36.7	60.9
VRGRA029.97	04-08-2009	Stressed	78	0.7	77.0	73.3	72.5	72.0	66.7	23.5	14.3	62.2
VRGRA029.97	04-13-2011	Stressed	30	27.3	66.3	55.0	65.0	71.0	80.0	8.2	13.1	78.7
VRGRA029.97	04-13-2012	Stressed	50	13.0	56.0	35.0	65.0	74.2	80.0	12.2	20.4	67.3
VRGRA033.51	04-22-2008	Non-reference	58	8.0	58.0	39.0	60.0	34.4	40.0	14.0	60.3	25.6
VRGRA033.51	04-08-2009	Non-reference	61				65.0	52.7	40.0	5.2	32.1	62.7
VRMAN000.52	04-12-2011	Non-reference	37	25.4	67.7	36.9	62.5	57.0	33.3	0.0	37.0	63.0
VRMAN000.52	04-22-2012	Non-reference	30				57.5	50.5	50.0	4.5	24.6	70.9
VRMIL000.22	04-22-2008	Stressed	69	0.3	80.0	57.0	45.0	53.8	66.7	46.9	13.1	40.0
VRMIL000.22	04-08-2009	Stressed	70				67.5	72.0	73.3	27.5	13.7	58.8
VRMIL000.22	04-17-2011	Stressed	72	1.4	70.4	68.5	55.0	74.2	80.0	7.4	11.6	81.1
VRMIL000.22	04-13-2012	Stressed	70				60.0	75.3	80.0	23.7	11.3	65.0
VRMIL006.07	04-21-2008	Reference	48	12.0	57.2	32.3	80.0	80.6	73.3	8.8	56.5	34.7
VRMIL006.07	04-07-2009	Reference	56	23.0	54.3	34.0	95.0	83.9	86.7	30.7	34.7	34.7
VRMIL006.07	04-14-2010	Reference	52	37.7	53.8	28.0	82.5	69.9	75.0	10.1	52.1	37.8
VRMIL006.07	04-15-2011	Reference	43	43.1	46.6	25.8	80.0	55.9	50.0	3.8	58.5	37.7
VRMIL006.07	04-21-2012	Reference	43				70.0	60.2	46.2	14.8	58.1	27.1

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Appendix D: Habitat Assessment reports for Nine Intermittent Stream Sites in the Granite Creek Watershed, 2011-2012

Habitat SEM Results

Aspen Creek, above confluence with Granite Cr

Station ID VRASP000.37   Latitude: 34.53267   Longitude: -112.48732
HabSample ID   1220   Rep Num   1   Date   04-12-2011

Field Conditions at Time of Visit

Flood Evidence (last   7) recent flood < BF   Flood Width

Precipitation   none   Precipitation (w/in   Cloud Cover

Reach Observations

General appearance in the	3) small refuse common	Fish:	1) absent	
General appearance along	2) small refuse visible	Crayfish:	1) absent	
Water Clarity	1) clear	Sunfish:	1) absent	
Water odor	1=none	Leapard Frogs -	0	Dea 0
Appearance at water's	1) No salt crusts	Floating	1) absent	
% algae cover within 10m of	10	Settled	3) common	
% macrophyte cover within 10m of	5			

Flow Measurements

Flow Regime   I) intermittent   Flow Regime Category

Marsh-McBirney	Total Width (ft):	Average Depth	Avg. Velocity	Discharge (cfs):
Flow	14	0.42	0.29	2.3

USGS   Gage   Discharg   **Float**   Discharge

Stream Type Identification

Watershed Area   Regional   Central / Southern

Predicted X-   25   Valley Type: IV

Measurements for Determining Stream Type

Bankfull	18	Floodprone	52
BF max.	2.2	Actual X Section	27.7
Corr. Factor:	0.7	**Stream**	C4
BF mean	1.54	BF	6) Presence of a floodplain
Depositional Features	4) side bars		

Organic Debris / Channel Blockages   3) Mod. debris <10%

Segment Habitat Quality

Cobble:	4) abundant			
Undercut	3) common	**Reach Channel / Habitat**		
Leaf Packs:	3) common		Feet	Percent
Root	2) rare	Riffle:	32	32
Macrophyte	2) rare	Pool:	34	34
Submerged	2) rare	Run:	34	34
Sand Dominated	4) abundant	Riffle / Pool	0.941176	
Filamentous Algae	2) rare			

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Habitat SEM Results

Aspen Creek, above confluence with Granite Cr

Station ID   VRASP000.37   Latitude: 34.53267   Longitude: -112.48732
HabSample ID   1220   Rep Num   1   Date   04-12-2011

Macroinvertebrate Decision

Hydrologic	1) Baseflow conditions	**Macroinvertebrate Field Split**
Substrate	3) mixture of particles	
Waterbody	3) Intermittent	100 (0-

Biological Sampling Observations

Invert	Multihabitat –	Algal Identifications:
		unknown green filamentous algae
Algal		
Filam. Algae	2) 1-25%	
Floating	1) <1%	
		Macrophyte Identifications:
Algal Slime:	3) thick coating	Pondweed, grass
Macrophyte	2) 1-25%	

Riffle Pebble Count

% fines <	18.3
# size	12
D15:	0.81
D50:	30.9
D84:	107.6

Reach Pebble Count

% fines <	35.4
# size	12
D15:	0.09
D50:	9.8
D84:	108

Riffle Embeddedness and Geometry

Avg. Riffle	38	Avg Reach	56	Avg Length / Width	4.4

Riparian Vegetation Cover and Riparian Association

Canopy (%):	30	Riparian	2) Interior
Understory	40		
Ground Cover	95		
Bare ground	5	Riparian Species:	

Riparian Vegetation

Alder, Arizona; Cottonwood, Fremont; Ash, Velvet;

Dominant Species:	Alder, Arizona
Measured % Canopy	50.5
Regeneration	2) 2 age classes

Habitat SEM Results

Aspen Creek, above confluence with Granite Cr

Station ID   VRASP000.37   Latitude: 34.53267   Longitude: -112.48732
HabSample ID   1220   Rep Num   1   Date   04-12-2011

Pfankuch Stability Evaluation

Upper			**Lower**			**Channel Bottom**		
1) Landform slope	6	Fair	1) Channel Capacity	2	Good	1) Bottom	12	Good
2) Mass	3		2) Surface	2		2) Bar Devel. and	8	Good
3) Debris Jam	4	Good	3) Obstructions	2		3)	6	Fair
4) Veget. Bank	3		4) Cutting	2	R 2			

Sum of Scores
Final Pfankuch   Rosgen   Sediment Supply
Pfankuch   Stream Bed Stability
                                                                            Width - Depth Ratio

Proper Functioning Condition

Hydrologic		**Vegetative**		**Erosion Deposition**	
1) Floodplain	Yes	6) Vegetative	Yes	13) Energy	Yes
2) Beaver	N/A	7) Vegetative	Yes	14) Vegetated	N/A
3) Channel	Maybe	8) "Moist"	Yes	15) Natural	Yes
4) Riparian	Yes	9) Root Masses	Yes	16) Vertical	Yes
5) Upland	Maybe	10) Vigorous	Yes	17) Sediment	Maybe
		11) Vegetative	Yes		
		12) Woody	Yes		

Functional   12
Functional   PFC
PFCComments: 3- Excess sediment in stream bottom from watershed erosion.
                   5- Sediment/embeddedness of stream bottom due to watershed conditions
                   17- Same comment as #3

Habitat Assessment

Habitat	3.0)	Sum of	17
Extent of	4.0) optimal	Habitat	Good Condition
Riffle	3.0)		
Sediment	3.0)		
Bank Stability	4.0) optimal		

Non-Point Sources

4300 other urban runoff; 4500 urban hwy runoff; 04

Hab/comments:

Nice C channel with 2 cascades in reach; cobble with lots of sand/gravel. Good riparian
abundance (willow, cottonwood, alder, ash) and stable banks with 5-10 m floodplain on either side
of the channel. Bugs look good; winter stoneflies, tons of beetle larvae, large midges, 1
hellgramite, tropisternus beetle, no mayflies or caddisflies or blackflies. Some earthworms. Pretty

Habitat SEM Results

Aspen Creek, above confluence with Granite Cr

Station ID   VRASP000.37   Latitude: 34.53267   Longitude: -112.48732
HabSample ID   1229   Rep Num   1   Date   04-22-2012

Field Conditions at Time of Visit

Flood Evidence (last   1) none   Flood Width

Precipitation   none   Precipitation (w/in   Cloud Cover

Reach Observations

General appearance in the	3) small refuse common	Fish:	1) absent		
General appearance along	2) small refuse visible	Crayfish:	1) absent		
Water Clarity	1) clear	Sunfish:	1) absent		
Water odor	1=none	Leapard Frogs -	0	Dea	0
Appearance at water's	1) No salt crusts	Floating	1) absent		
% algae cover within 10m of	75	Settled	3) common		
% macrophyte cover within 10m of	0				

Flow Measurements

Flow Regime   I) intermittent   Flow Regime Category

Marsh-McBirney	Total Width (ft):	Average Depth	Avg. Velocity	Discharge (cfs):
Flow	4.65	0.52	0.15	0.31

USGS   Gage   Discharg   **Float**   Discharge

Stream Type Identification

Watershed Area   Regional   Central / Southern

Predicted X-   25   Valley Type: IV

Measurements for Determining Stream Type

Bankfull		Floodprone	
BF max.		Actual X Section	
Corr. Factor:		**Stream**	C4b
BF mean		BF	6) Presence of a floodplain
Depositional Features	9) no bars		

Organic Debris / Channel Blockages   3) Mod. debris <10%

Segment Habitat Quality

Cobble:	4) abundant		
Undercut	1) absent	**Reach Channel / Habitat**	
Leaf Packs:	4) abundant		Feet	Percent
Root	2) rare	Riffle:	42	23.076923
Macrophyte	2) rare	Pool:	70	38.461538
Submerged	2) rare	Run:	70	38.461538
Sand Dominated	4) abundant	Riffle / Pool	0.6	
Filamentous Algae	4) abundant			

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Habitat SEM Results

Aspen Creek, above confluence with Granite Cr

Station ID VRASP000.37   Latitude: 34.53267   Longitude: -112.48732
HabSample ID   1229   Rep Num   1   Date   04-22-2012

Macroinvertebrate Decision

Hydrologic	1) Baseflow conditions	Macroinvertebrate Field Split
Substrate	3) mixture of particles	
Waterbody	1) riffle/run habitats present	100 (0-

Biological Sampling Observations

Invert	Riffle	Algal Identifications:
		Spirogyra
Algal		
Filam. Algae	5) 76-100%	
Floating	2) 1-25%	
		Macrophyte Identifications:
Algal Slime:	2) thin coating	
Macrophyte	2) 1-25%	

Riffle Pebble Count

% fines <
# size
D15:
D50:
D84:

Reach Pebble Count

% fines <
# size
D15:
D50:
D84:

Riffle Embeddedness and Geometry

Avg. Riffle   35   Avg Reach   Avg Length / Width   6.8

Riparian Vegetation Cover and Riparian Association

Canopy (%):	30	Riparian 2) Interior
Understory	40	
Ground Cover	95	
Bare ground	5	Riparian Species:

Riparian Vegetation

Riparian Species: Ash, Velvet; Willow, Bonpland; Elm

Dominant Species:	Willow, Bonpland
Measured % Canopy	50
Regeneration	2) 2 age classes

Habitat SEM Results

Aspen Creek, above confluence with Granite Cr

Station ID VRASP000.37   Latitude: 34.53267   Longitude: -112.48732
HabSample ID   1229   Rep Num   1   Date   04-22-2012

Pfankuch Stability Evaluation

Upper			Lower			Channel Bottom		
1) Landform slope	6	Fair	1) Channel Capacity	2	Good	1) Bottom	18	Fair
2) Mass	3		2) Surface	2		2) Bar Devel. and	8	Good
3) Debris Jam	4	Good	3) Obstructions	2		3)	6	Fair
4) Veget. Bank	3		4) Cutting	2	R 2			

Sum of Scores
Final Pfankuch   Rosgen   Sediment Supply
Pfankuch   Stream Bed Stability
                                                               Width - Depth Ratio

Proper Functioning Condition

Hydrologic		Vegetative		Erosion Deposition	
1) Floodplain	Yes	6) Vegetative	Maybe	13) Energy	Yes
2) Beaver	N/A	7) Vegetative	Yes	14) Vegetated	N/A
3) Channel	Maybe	8) "Moist"	Yes	15) Natural	Yes
4) Riparian	Yes	9) Root Masses	Yes	16) Vertical	Yes
5) Upland	Maybe	10) Vigorous	Yes	17) Sediment	Maybe
		11) Vegetative	Yes		
		12) Woody	Yes		

Functional   11
Functional   PFC
PFCComment 3. some excess sediment in stream bottom. 5. Excess sediment. 6. Only 2 age classes. 17. Same comment
as
s: 5.

Habitat Assessment

Habitat	3.0)	Sum of	17	
Extent of	4.0) optimal	Habitat	Good Condition	
Riffle	3.0)			
Sediment	3.0)			
Bank Stability	4.0) optimal			

Non-Point Sources

4300 - other urban runoff. 4500 - urban hyw/road/

Hab/comments:

Flow elevated compared to 2011. Bank full indicators are slope break and presence of a flood plain. Substrate conditions same as 2011. Estimated canopy density 50%. Vegetation not completely leafed out. This channel is very stable with lots of woody veg, bedrock and boulder areas. Several cascades/short drops in elevation through reach constitute most of riffle habitat. Long sandy runs and few deep pools in reach. Good substrate, simular to 2011. Banks very stable. Filamentous green 90% cover. Bugs= midges, beetle larvae, bed blood worms, earthworms. Excess fine sediment. Pfankuch = 70 for C4-good. Riparian PFC 73%-ideal. Habitat index = 17-good.

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Habitat SEM Results

Bannon Creek, ABOVE GRANITE CREEK AND ROAD CROSSING

Station ID   VRBAN000.06   Latitude: 34.51997   Longitude: -112.47617
HabSample ID   1221   Rep Num   1   Date   04-14-2011

Field Conditions at Time of Visit

Flood Evidence (last   1) none   Flood Width

Precipitation   none   Precipitation (w/in   Cloud Cover

Reach Observations

General appearance in the	1) no refuse	Fish:	1) absent
General appearance along	1) no refuse	Crayfish:	1) absent
Water Clarity	1) clear	Sunfish:	1) absent
Water odor	1=none	Leapard Frogs - 0	Dea 0
Appearance at water's	1) No salt crusts	Floating	1) absent
% algae cover within 10m of	0	Settled	3) common
% macrophyte cover within 10m of	30		

Flow Measurements

Flow Regime   p) perennial   Flow Regime Category

Marsh-McBirney Flow	Total Width (ft): 2	Average Depth 0.27	Avg. Velocity 0.12	Discharge (cfs): 0.1
USGS Gage	Discharg	**Float**	Discharge	

Stream Type Identification

Watershed Area   Regional   Central / Southern

Predicted X-   18   Valley Type: IV

Measurements for Determining Stream Type

Bankfull	5	Floodprone	25	
BF max.	1.1	Actual X Section	4.5	
Corr. Factor:	0.75	**Stream**	E4b	
BF mean	0.83	BF	6) Presence of a floodplain	
Depositional Features		9) no bars		

Organic Debris / Channel Blockages   3) Mod. debris <10%

Segment Habitat Quality

Cobble:	3) common	
Undercut	3) common	**Reach Channel / Habitat**
Leaf Packs:	4) abundant	
Root	3) common	
Macrophyte	2) rare	
Submerged	2) rare	
Sand Dominated	2) rare	
Filamentous Algae	3) common	

Reach Channel / Habitat

	Feet	Percent
Riffle:	46	46.231155
Pool:	27.5	28.140703
Run:	25.5	25.628140
Riffle / Pool	1.642857	

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Habitat SEM Results

Bannon Creek, ABOVE GRANITE CREEK AND ROAD CROSSING

Station ID   VRBAN000.06   Latitude: 34.51997   Longitude: -112.47617
HabSample ID   1221   Rep Num   1   Date   04-14-2011

Macroinvertebrate Decision

Hydrologic	1) Baseflow conditions	**Macroinvertebrate Field Split**
Substrate	3) mixture of particles	
Waterbody	1) riffle/run habitats present	50 (0-

Biological Sampling Observations

Invert	Multihabitat –	Algal Identifications:
		Nostoc; Filamentous green algae
Algal		
Filam. Algae	3) 26-50%	
Floating	1) <1%	
		Macrophyte Identifications:
Algal Slime:	3) thick coating	Watergrass, mint
Macrophyte	2) 1-25%	

Riffle Pebble Count

% fines <	28.7
# size	10
D15:	0.12
D50:	12.8
D84:	51.7

Reach Pebble Count

% fines <	32
# size	12
D15:	0.09
D50:	12.1
D84:	64

Riffle Embeddedness and Geometry

Avg. Riffle	63	Avg Reach	68	Avg Length / Width	3.6

Riparian Vegetation Cover and Riparian Association

Canopy (%):	50	Riparian	2) Interior
Understory	25		
Ground Cover	90		
Bare ground	10	Riparian Species:	

Riparian Vegetation

Riparian Species:
Red willow; Box elder

Dominant Species:	Red willow
Measured % Canopy	83
Regeneration	2) 2 age classes

Habitat SEM Results

Bannon Creek, ABOVE GRANITE CREEK AND ROAD CROSSING

Station ID   VRBAN000.06   Latitude: 34.51997   Longitude: -112.47617
HabSample ID   1221   Rep Num   1   Date   04-14-2011

Pfankuch Stability Evaluation

Upper			Lower			Channel Bottom		
1) Landform slope	4	Good	1) Channel Capacity	2	Good	1) Bottom	12	Good
2) Mass	6	Good	2) Surface	2		2) Bar Devel. and	4	Excellent
3) Debris Jam	2		3) Obstructions	4	Good	3)	4	Good
4) Veget. Bank	3		4) Cutting	3 Good R	3 Good			

Sum of Scores
Final Pfankuch   Rosgen   Sediment Supply
Pfankuch   Stream Bed Stability
                                                                              Width - Depth Ratio

Proper Functioning Condition

Hydrologic		Vegetative		Erosion Deposition	
1) Floodplain	Yes	6) Vegetative	Yes	13) Energy	Yes
2) Beaver	N/A	7) Vegetative	Yes	14) Vegetated	N/A
3) Channel	Yes	8) "Moist"	Yes	15) Natural	Yes
4) Riparian	Yes	9) Root Masses	Yes	16) Vertical	Maybe
5) Upland	Yes	10) Vigorous	Yes	17) Sediment	Maybe
		11) Vegetative	Yes		
		12) Woody	Yes		

Functional   13
Functional   PFC
**PFCComment
s:**   16- channel is slightly entrenched in places with 1' drops and a headcut moving upstream
                   17- one headcut, some incision, braiding in a couple spots

Habitat Assessment

Habitat	4.0) optimal	Sum of	16
Extent of	4.0) optimal	Habitat	Good Condition
Riffle	2.0) marginal		
Sediment	2.0) marginal		
Bank Stability	4.0) optimal		

Non-Point Sources

4300 other urban runoff; 4600 nonurban runoff/eros

Hab/comments:

This Eb channel is in moderately good shape with well vegetated grassy banks with some willows
and boxelder trees. The narrow floodplain is silt-clay material that is easily eroded and there are
several 1' drops at riffles and one headcut chewing headward up the stream. Stream bottom has
lots of sand & fine gravel and heavily covered with algae & watergrass. Bugs depauperate;

Habitat SEM Results

Bannon Creek, ABOVE GRANITE CREEK AND ROAD CROSSING

Station ID   VRBAN000.06   Latitude: 34.51997   Longitude: -112.47617
HabSample ID   1230   Rep Num   1   Date   04-22-2012

Field Conditions at Time of Visit

Flood Evidence (last   1) none   Flood Width

Precipitation   none   Precipitation (w/in   Cloud Cover   0

Reach Observations

General appearance in the	1) no refuse	Fish:	1) absent	
General appearance along	1) no refuse	Crayfish:	1) absent	
Water Clarity	1) clear	Sunfish:	1) absent	
Water odor	1=none	Leapard Frogs -	0	Dea 0
Appearance at water's	1) No salt crusts	Floating	1) absent	
% algae cover within 10m of	0	Settled	3) common	
% macrophyte cover within 10m of	2			

Flow Measurements

Flow Regime   I) intermittent   Flow Regime Category

Marsh-McBirney   Total Width (ft):   Average Depth   Avg. Velocity   Discharge (cfs):
Flow

USGS   Gage   Discharg   **Float**   Discharge   0.21

Stream Type Identification

Watershed Area   Regional   Central / Southern
Predicted X-   Valley Type: VIII

Measurements for Determining Stream Type

Bankfull   Floodprone
BF max.   Actual X Section
Corr. Factor: **Stream**   E4b
BF mean   BF   3) Slope break
Depositional Features   9) no bars

Organic Debris / Channel Blockages   3) Mod. debris <10%

Segment Habitat Quality

Cobble:	3) common			
Undercut	3) common	**Reach Channel / Habitat**		
Leaf Packs:	4) abundant		Feet	Percent
Root	3) common	Riffle:	44	34.375
Macrophyte	2) rare	Pool:	36	28.125
Submerged	2) rare	Run:	48	37.5
Sand Dominated	4) abundant	Riffle / Pool	1.222222	
Filamentous Algae	2) rare			

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Habitat SEM Results

Bannon Creek, ABOVE GRANITE CREEK AND ROAD CROSSING

Station ID   VRBAN000.06   Latitude: 34.51997   Longitude: -112.47617
HabSample ID   1230   Rep Num   1   Date   04-22-2012

Macroinvertebrate Decision

Hydrologic	1) Baseflow conditions	**Macroinvertebrate Field Split**
Substrate	3) mixture of particles	
Waterbody	1) riffle/run habitats present	100 (0-

Biological Sampling Observations

Invert	Riffle	Algal Identifications:
		Nostoc, Filamentous green
Algal		
Filam. Algae	2) 1-25%	
Floating	1) <1%	
		Macrophyte Identifications:
Algal Slime:	2) thin coating	Sedge, Water grass
Macrophyte	2) 1-25%	

Riffle Pebble Count   ## Reach Pebble Count

% fines <		% fines <
# size		# size
D15:		D15:
D50:		D50:
D84:		D84:

Riffle Embeddedness and Geometry

Avg. Riffle	63	Avg Reach	Avg Length / Width	7.6

Riparian Vegetation Cover and Riparian Association

Canopy (%):	10	Riparian	3) montane
Understory	30		
Ground Cover	97		
Bare ground	0	Riparian Species:	

Riparian Vegetation   Boxelder; Willow, Unknown

Dominant Species:	Willow, Unknown
Measured % Canopy	50
Regeneration	2) 2 age classes

Habitat SEM Results

Bannon Creek, ABOVE GRANITE CREEK AND ROAD CROSSING

Station ID   VRBAN000.06   Latitude: 34.51997   Longitude: -112.47617

HabSample ID   1230   Rep Num   1   Date   04-22-2012

Pfankuch Stability Evaluation

Upper			Lower				Channel Bottom		
1) Landform slope	4	Good	1) Channel Capacity	2	Good		1) Bottom	12	Good
2) Mass	6	Good	2) Surface	2			2) Bar Devel. and	4	Excellent
3) Debris Jam	4	Good	3) Obstructions	2			3)	4	Good
4) Veget. Bank	6	Good	4) Cutting	3	Good	R 3 Good			

Sum of Scores				Sediment Supply	
Final Pfankuch		Rosgen		Stream Bed Stability	
Pfankuch				Width - Depth Ratio	

Proper Functioning Condition

Hydrologic		Vegetative		Erosion Deposition	
1) Floodplain	Yes	6) Vegetative	Maybe	13) Energy	Yes
2) Beaver	N/A	7) Vegetative	Maybe	14) Vegetated	N/A
3) Channel	Yes	8) "Moist"	Yes	15) Natural	Yes
4) Riparian	Yes	9) Root Masses	Yes	16) Vertical	Maybe
5) Upland	No	10) Vigorous	Yes	17) Sediment	No
		11) Vegetative	Yes		
		12) Woody	Yes		

Functional   10

Functional   FAR-NA

PFCComment diverse, **s:** and

5. Excess fine sediment in stream bottom. 6. Only 2 age classes of willows observed. 7. Woody veg not only 2 species. 16. Slightly entrenched channel with one head cut. 17. Some excess fine in stream bottom slightly entrenched.

Habitat Assessment

Habitat	3.0)	Sum of	15
Extent of	4.0) optimal	Habitat	Good Condition
Riffle	2.0) marginal		
Sediment	2.0) marginal		
Bank Stability	4.0) optimal		

Non-Point Sources

8700-recreation/dog walking.

Hab/comments:

Lower flow than last april 2011. Bankfull indicators are slope break and presence of floodplain. Canopy estimated at 50%-vegetation not leafed out fully. This channel is fairly stable with well vegetated (carex and willows) banks. Bottom has excess fine sediment and heavy leaf pack. Little algae growth prob due to large shading of stream. Bugs depanperate in diversity but lots of beetles, one caddis fly. Channel still has several 1 foot drops ant headcuts. There were no evident channel substrate changes since last year and no major flood/channel changing flow events since last year, therefore no pebble count was conducted this sample event.

Habitat SEM Results

Butte Creek, abv Sheldon St Bridge by Prescott college

Station ID   VRBTT000.32   Latitude: 34.54499   Longitude: -112.47777
HabSample ID   1231   Rep Num   1   Date   04-22-2012

Field Conditions at Time of Visit

Flood Evidence (last	1) none		Flood Width	
Precipitation	none	Precipitation (w/in	Cloud Cover	15

Reach Observations

General appearance in the	2) small refuse visible	Fish:	1) absent		
General appearance along	2) small refuse visible	Crayfish:	1) absent		
Water Clarity	1) clear	Sunfish:	1) absent		
Water odor	1=none	Leapard Frogs -	0	Dea	0
Appearance at water's	1) No salt crusts	Floating	1) absent		
% algae cover within 10m of	60	Settled	3) common		
% macrophyte cover within 10m of	0				

Flow Measurements

Flow Regime   I) intermittent   Flow Regime Category

Marsh-McBirney	Total Width (ft):	Average Depth	Avg. Velocity	Discharge (cfs):
Flow	5.3	0.34	0.19	0.26

USGS   Gage   Discharg   **Float**   Discharge

Stream Type Identification

Watershed Area		Regional	Central / Southern
Predicted X-	25	Valley Type:	VIII

Measurements for Determining Stream Type

Bankfull	Floodprone	
BF max.	Actual X Section	
Corr. Factor:	**Stream**	E5
BF mean	BF	3) Slope break
Depositional Features	4) side bars	

Organic Debris / Channel Blockages   2) infrequent debris

Segment Habitat Quality

Cobble:	3) common		**Reach Channel / Habitat**	
Undercut	2) rare			
Leaf Packs:	3) common		Feet	Percent
Root	2) rare	Riffle:	69	35.204081
Macrophyte	2) rare	Pool:	0	0
Submerged	2) rare	Run:	127	64.795918
Sand Dominated	4) abundant	Riffle / Pool		
Filamentous Algae	3) common			

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Habitat SEM Results

Butte Creek, abv Sheldon St Bridge by Prescott college

Station ID   VRBTT000.32   Latitude: 34.54499   Longitude: -112.47777
HabSample ID   1231   Rep Num   1   Date   04-22-2012

Macroinvertebrate Decision

Hydrologic	1) Baseflow conditions	**Macroinvertebrate Field Split**
Substrate	3) mixture of particles	
Waterbody	1) riffle/run habitats present	100 (0-

Biological Sampling Observations

Invert	Riffle	Algal Identifications:
		Nostoc, Filamentous green
Algal		
Filam. Algae	4) 51-75%	
Floating	2) 1-25%	
		Macrophyte Identifications:
Algal Slime:	2) thin coating	Watercress
Macrophyte	2) 1-25%	

Riffle Pebble Count

% fines <
# size
D15:
D50:
D84:

Reach Pebble Count

% fines <
# size
D15:
D50:
D84:

Riffle Embeddedness and Geometry

Avg. Riffle	63	Avg Reach		Avg Length / Width

Riparian Vegetation Cover and Riparian Association

Canopy (%):	30	Riparian	2) Interior
Understory	20		
Ground Cover	100		
Bare ground	0	Riparian Species:	

Riparian Vegetation

Ash, Velvet; Willow, Unknown; Elm

Dominant Species:	Elm
Measured % Canopy	50
Regeneration	1) 3 or more age classes

Habitat SEM Results

Butte Creek, abv Sheldon St Bridge by Prescott college

Station ID VRBTT000.32   Latitude: 34.54499   Longitude: -112.47777
HabSample ID   1231   Rep Num   1   Date   04-22-2012

Pfankuch Stability Evaluation

Upper		Lower			Channel Bottom		
1) Landform slope	2	1) Channel Capacity	1		1) Bottom	24	Poor
2) Mass	3	2) Surface	2		2) Bar Devel. and	12	Fair
3) Debris Jam	2	3) Obstructions	2		3)	6	Fair
4) Veget. Bank	3	4) Cutting	2	R 2			

Sum of Scores
Final Pfankuch   Rosgen   Sediment Supply
Pfankuch   Stream Bed Stability
                                                    Width - Depth Ratio

Proper Functioning Condition

Hydrologic		Vegetative		Erosion Deposition	
1) Floodplain	Yes	6) Vegetative	Maybe	13) Energy	Yes
2) Beaver	N/A	7) Vegetative	Maybe	14) Vegetated	N/A
3) Channel	Maybe	8) "Moist"	Yes	15) Natural	Yes
4) Riparian	Yes	9) Root Masses	Yes	16) Vertical	Maybe
5) Upland	No	10) Vigorous	Maybe	17) Sediment	No
		11) Vegetative	Yes		
		12) Woody	Yes		

Functional   8
Functional   FAR-NA
PFCComment   3. Excess sediment in stream bottom and bar features. 5. Excess fine sediment and bars. 6. only elm has 3
age
s: classes, 2 for ash. 7. Not very diverse. 10. Lots of broken branches, poor canopy on ash. 16. Somewhat entrenched and bar features. 17. same as 5.

Habitat Assessment

Habitat	2.0) marginal	Sum of	14	
Extent of	4.0) optimal	Habitat	Impaired	
Riffle	2.0) marginal			
Sediment	2.0) marginal			
Bank Stability	4.0) optimal			

Non-Point Sources

4500-urban highway/bridge/road runoff. 8700-non b

Hab/comments:

Algal bloom. Bankfull indicators are slope break and floodplain. This channel has woody trees
and grass holding channel stable, however thare are excess fine sediments filling in stream bottom
 and creation mid channel and side bars especially in lower reach by college. Lots of filamentous
algae, already with senescent floating mats and some moss. Bugs not diverse = midges, beetles,
diptera. Pebble count not needed, not done b/c construction at Prescott college is downstream of study reach.
Pfankuch = 75, E5 channel - marginally good. Riparian = Functional at risk, no
trend. 53% ideal. Habitat index = 14 Impaired.

Habitat SEM Results

Butte Creek, abv Sheldon St Bridge by Prescott college

Station ID   VRBTT000.32   Latitude: 34.54499   Longitude: -112.47777
HabSample ID   1223   Rep Num   1   Date   04-22-2011

Field Conditions at Time of Visit

Flood Evidence (last   Flood Width

Precipitation   none   Precipitation (w/in   Cloud Cover

Reach Observations

General appearance in the	1) no refuse	Fish:	1) absent		
General appearance along	1) no refuse	Crayfish:	1) absent		
Water Clarity	1) clear	Sunfish:	1) absent		
Water odor	1=none	Leapard Frogs -	0	Dea	0
Appearance at water's	1) No salt crusts	Floating	2) rare		
% algae cover within 10m of	50	Settled	3) common		
% macrophyte cover within 10m of	0				

Flow Measurements

Flow Regime   I) intermittent   Flow Regime Category

Marsh-McBirney	Total Width (ft):	Average Depth	Avg. Velocity	Discharge (cfs):
Flow	9.3	0.5	0.6	

USGS   Gage   Discharg   **Float**   Discharge

Stream Type Identification

Watershed Area   Regional   Central / Southern

Predicted X-   25   Valley Type: IV

Measurements for Determining Stream Type

Bankfull	9	Floodprone	45
BF max.	2.1	Actual X Section	14.2
Corr. Factor:	0.75	**Stream**	E5
BF mean	1.6	BF	6) Presence of a floodplain

Depositional Features   2) point + mid-channel bars

Organic Debris / Channel Blockages   2) infrequent debris

Segment Habitat Quality

Cobble:	3) common
Undercut	3) common
Leaf Packs:	3) common
Root	2) rare
Macrophyte	1) absent
Submerged	1) absent
Sand Dominated	4) abundant
Filamentous Algae	4) abundant

Reach Channel / Habitat

	Feet	Percent
Riffle:	34	28.813559
Pool:	0	0
Run:	84	71.186440
Riffle / Pool		

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Habitat SEM Results

Butte Creek, abv Sheldon St Bridge by Prescott college

Station ID   VRBTT000.32   Latitude: 34.54499   Longitude: -112.47777
HabSample ID   1223   Rep Num   1   Date   04-22-2011

Macroinvertebrate Decision

Hydrologic	1) Baseflow conditions	Macroinvertebrate Field Split
Substrate	3) mixture of particles	
Waterbody	3) Intermittent	100 (0-

Biological Sampling Observations

Invert	Multihabitat –	Algal Identifications:
		Filamentous greens
Algal		
Filam. Algae	4) 51-75%	
Floating	1) <1%	
		Macrophyte Identifications:
Algal Slime:	2) thin coating	
Macrophyte	1) <1%	

Riffle Pebble Count

% fines <	24.4
# size	12
D15:	0.43
D50:	23
D84:	108

Reach Pebble Count

% fines <	55
# size	12
D15:	0.06
D50:	1.2
D84:	32

Riffle Embeddedness and Geometry

Avg. Riffle	63	Avg Reach	65.2	Avg Length / Width	5.1

Riparian Vegetation Cover and Riparian Association

Canopy (%):	20	Riparian	2) Interior
Understory	60		
Ground Cover	80		
Bare ground	20	Riparian Species:	

Riparian Vegetation

Riparian Species: Elm, Willow sp.

Dominant Species:	Elm
Measured % Canopy	60
Regeneration	1) 3 or more age classes

Habitat SEM Results

Butte Creek, abv Sheldon St Bridge by Prescott college

Station ID VRBTT000.32   Latitude: 34.54499   Longitude: -112.47777
HabSample ID   1223   Rep Num   1   Date   04-22-2011

Pfankuch Stability Evaluation

Upper		Lower			Channel Bottom		
1) Landform slope	2	1) Channel Capacity	1		1) Bottom	24	Poor
2) Mass	3	2) Surface	2		2) Bar Devel. and	12	Fair
3) Debris Jam	2	3) Obstructions	2		3)	6	Fair
4) Veget. Bank	3	4) Cutting	2	R 2			

Sum of Scores
Final Pfankuch   Rosgen   Sediment Supply
Pfankuch   Stream Bed Stability
                                                                     Width - Depth Ratio

Proper Functioning Condition

Hydrologic		Vegetative		Erosion Deposition	
1) Floodplain	Yes	6) Vegetative	Maybe	13) Energy	Yes
2) Beaver	N/A	7) Vegetative	Maybe	14) Vegetated	N/A
3) Channel	No	8) "Moist"	Yes	15) Natural	Yes
4) Riparian	Yes	9) Root Masses	Yes	16) Vertical	Maybe
5) Upland	No	10) Vigorous	Maybe	17) Sediment	No
		11) Vegetative	Yes		
		12) Woody	Yes		

Functional   8

Functional   FAR-NA

PFCComments: 3-Excess sand in substrate-few riffles and no pools, slightly entrenched,
5-mid and side channel bars present, excess fines in substrate
7-not very diverse-only willow and elm
6-only 2 age classes elm
10-some trees have broken branches and dead branches; few dead elms in reach.
16-somewhat entrenched channel and excess bar features
17- see #5

Habitat Assessment

Habitat	2.0) marginal	Sum of	14
Extent of	4.0) optimal	Habitat	Impaired
Riffle	2.0) marginal		
Sediment	2.0) marginal		
Bank Stability	4.0) optimal		

Non-Point Sources

4300-other urban runoff, 4500-urban hwy, road, bri

Hab/comments:

This E5 channel has stable banks begetated by grasses, elm and willow trees. Banks are in good condition except where trails cross. Stream bottom has 55% fines with loss of riffle and pool habitats. Bugs in poor condition with low diversity, dominance by cladocera and no ept. Riparian is in good condition for an intermittent channel but has poor diversity. Rosgen type=E5, Pfankuch

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Habitat SEM Results

Butte Creek, AT HEAD WATERS

Station ID   VRBTT005.70   Latitude: 34.51931   Longitude: -112.55003
HabSample ID   1232   Rep Num   1   Date   04-21-2012

Field Conditions at Time of Visit

Flood Evidence (last   1) none   Flood Width

Precipitation   none   Precipitation (w/in   Cloud Cover   0

Reach Observations

General appearance in the   1) no refuse   Fish: 1) absent
General appearance along   1) no refuse   Crayfish: 1) absent
Water Clarity   1) clear   Sunfish: 1) absent
Water odor   1=none   Leapard Frogs -   0   Dea   0
Appearance at water's   1) No salt crusts   Floating   1) absent
% algae cover within 10m of   25   Settled   3) common
% macrophyte cover within 10m of   0

Flow Measurements

Flow Regime   I) intermittent   Flow Regime Category

Marsh-McBirney   Total Width (ft):   Average Depth   Avg. Velocity   Discharge (cfs):
Flow
USGS   Gage   Discharg   **Float**   Discharge   0.16

Stream Type Identification

Watershed Area   Regional   Central / Southern
Predicted X-   6   Valley Type: I

Measurements for Determining Stream Type

Bankfull   Floodprone
BF max.   Actual X Section
Corr. Factor: **Stream**   A4
BF mean   BF   3) Slope break
Depositional Features   9) no bars

Organic Debris / Channel Blockages   4) debris piles <30%

Segment Habitat Quality

Cobble: 4) abundant
Undercut   1) absent   **Reach Channel / Habitat**
Leaf Packs: 4) abundant   Feet   Percent
Root   3) common   Riffle: 88   58.666666
Macrophyte   3) common   Pool: 42   28
Submerged   3) common   Run: 20   13.333333
Sand Dominated   3) common   Riffle / Pool   2.095238
Filamentous Algae   3) common

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Habitat SEM Results

Butte Creek, AT HEAD WATERS

Station ID   VRBTT005.70   Latitude: 34.51931   Longitude: -112.55003
HabSample ID   1232   Rep Num   1   Date   04-21-2012

Macroinvertebrate Decision

Hydrologic	1) Baseflow conditions	Macroinvertebrate Field Split
Substrate	3) mixture of particles	
Waterbody	1) riffle/run habitats present	100 (0-

Biological Sampling Observations

Invert	Riffle	Algal Identifications: Filementous green.
Algal		
Filam. Algae	3) 26-50%	
Floating	1) <1%	
		Macrophyte Identifications:
Algal Slime:	2) thin coating	Moss
Macrophyte	3) 26-50%	

Riffle Pebble Count

% fines <
# size
D15:
D50:
D84:

Reach Pebble Count

% fines <
# size
D15:
D50:
D84:

Riffle Embeddedness and Geometry

Avg. Riffle   Avg Reach   Avg Length / Width   6.8

Riparian Vegetation Cover and Riparian Association

Canopy (%):	30	Riparian	3) montane
Understory	10		
Ground Cover	95		
Bare ground	5	Riparian Species:	

Riparian Vegetation

Riparian Species:
Ash, Velvet; Boxelder; Honey Locust

Dominant Species:	Boxelder
Measured % Canopy	90
Regeneration	1) 3 or more age classes

Habitat SEM Results

Butte Creek, AT HEAD WATERS

Station ID   VRBTT005.70   Latitude: 34.51931   Longitude: -112.55003
HabSample ID   1232   Rep Num   1   Date   04-21-2012

Pfankuch Stability Evaluation

Upper			Lower			Channel Bottom		
1) Landform slope	6	Fair	1) Channel Capacity	2	Good	1) Bottom	12	Good
2) Mass	3		2) Surface	4	Good	2) Bar Devel. and	4	Excellent
3) Debris Jam	8	Poor	3) Obstructions	4	Good	3)	6	Fair
4) Veget. Bank	6	Good	4) Cutting 3 Good R 2					

Sum of Scores
Final Pfankuch   Rosgen   Sediment Supply
Pfankuch   Stream Bed Stability
                                                                         Width - Depth Ratio

Proper Functioning Condition

Hydrologic		Vegetative		Erosion Deposition	
1) Floodplain	Yes	6) Vegetative	Yes	13) Energy	Yes
2) Beaver	N/A	7) Vegetative	Maybe	14) Vegetated	N/A
3) Channel	Maybe	8) "Moist"	Yes	15) Natural	Yes
4) Riparian	Maybe	9) Root Masses	Yes	16) Vertical	Yes
5) Upland	No	10) Vigorous	No	17) Sediment	No
		11) Vegetative	Maybe		
		12) Woody	Yes		

Functional	8
Functional	FAR-NA
PFCComment Some	3. Excess fine sediment due to fire/erosion. Wider/shallower channel. 4. No recrutment of riparian veg. 5.
s:	sediment in pools/runs. 7.only 2 riparian species. 10. thin crowns and broken branches on boxelder. 11.<50% riparian cover due to intermittency. 17. Excess fines, woody debris and filled in pools.

Habitat Assessment

Habitat	4.0) optimal	Sum of	18
Extent of	4.0) optimal	Habitat	Good Condition
Riffle	3.0)		
Sediment	3.0)		
Bank Stability	4.0) optimal		

Non-Point Sources

8700 - Non-boating recreation. 4600 - Non-urban ru

Hab/comments:

This A type channel is relatively stable but expericing post-fire problems of excess sediment
filling in pools and runs and lots of woody debris in active channel. Approx 75% cover algae and
moss covering stream bottom. Flow better than last spring, prob due to late showers in
march/april. Only hellgramites and beetles seen in sample. Run Habitat length similar to last year,
but ruffle is reduced and pool increased. This is partly due to longer reach length last spring with more
riffle habitat, and to greater flows this year. No leaves on vegetation. ID not easy.
Pfankuch channel stability=Good for A4 channel, PFC Riparian score=Functional at risk-no trend,
Habitat index=17.5 Good, Riffle %fines=13.6%, Embeddedness=52%. Habitat coll on 5-29-11

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Habitat SEM Results

Butte Creek, AT HEAD WATERS

Station ID   VRBTT005.70   Latitude: 34.51931   Longitude: -112.55003
HabSample ID   1222   Rep Num   1   Date   04-17-2011

Field Conditions at Time of Visit

Flood Evidence (last   1) none   Flood Width

Precipitation   none   Precipitation (w/in   Cloud Cover   0

Reach Observations

General appearance in the	2) small refuse visible	Fish:	1) absent
General appearance along	2) small refuse visible	Crayfish:	1) absent
Water Clarity	3) light brown	Sunfish:	1) absent
Water odor	1=none	Leapard Frogs -	0 Dea 0
Appearance at water's	1) No salt crusts	Floating	1) absent
% algae cover within 10m of	10	Settled	3) common
% macrophyte cover within 10m of	10		

Flow Measurements

Flow Regime   I) intermittent   Flow Regime Category

Marsh-McBirney   Total Width (ft):   Average Depth   Avg. Velocity   Discharge (cfs):
Flow

USGS   Gage   Discharg   **Float**   Discharge   0.47

Stream Type Identification

Watershed Area   Regional   Central / Southern

Predicted X-   6   Valley Type: I

Measurements for Determining Stream Type

Bankfull	8.5	Floodprone	12
BF max.	0.9	Actual X Section	5.7
Corr. Factor:	0.75	**Stream**	A4
BF mean	0.68	BF	3) Slope break
Depositional Features	9) no bars		

Organic Debris / Channel Blockages   4) debris piles <30%

Segment Habitat Quality

Cobble:	4) abundant
Undercut	1) absent
Leaf Packs:	4) abundant
Root	1) absent
Macrophyte	3) common
Submerged	3) common
Sand Dominated	3) common
Filamentous Algae	4) abundant

Reach Channel / Habitat

	Feet	Percent
Riffle:	290	74.168797
Pool:	53	13.554987
Run:	48	12.276214
Riffle / Pool		5.471698

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Habitat SEM Results

Butte Creek, AT HEAD WATERS

Station ID   VRBTT005.70   Latitude: 34.51931   Longitude: -112.55003
HabSample ID   1222   Rep Num   1   Date   04-17-2011

Macroinvertebrate Decision

Hydrologic	1) Baseflow conditions	**Macroinvertebrate Field Split**
Substrate	3) mixture of particles	
Waterbody	3) Intermittent	100 (0-

Biological Sampling Observations

Invert	Multihabitat –	Algal Identifications:
		Nostoc; filamentous greens
Algal		
Filam. Algae	5) 76-100%	
Floating	2) 1-25%	
		Macrophyte Identifications:
Algal Slime:	3) thick coating	Moss
Macrophyte	3) 26-50%	

Riffle Pebble Count

% fines <	13.6
# size	12
D15:	4.5
D50:	64
D84:	126

Reach Pebble Count

% fines <	27
# size	12
D15:	0.35
D50:	36.8
D84:	120

Riffle Embeddedness and Geometry

Avg. Riffle	63	Avg Reach	52.3	Avg Length / Width	10

Riparian Vegetation Cover and Riparian Association

Canopy (%):	40	Riparian	3) montane
Understory	20		
Ground Cover	40		
Bare ground	60	Riparian Species:	

Riparian Vegetation

Boxelder; Ash, Velvet; Locust, New Mexican

Dominant Species:	Box elder
Measured % Canopy	60
Regeneration	1) 3 or more age classes

Habitat SEM Results

Butte Creek, AT HEAD WATERS

Station ID VRBTT005.70   Latitude: 34.51931   Longitude: -112.55003
HabSample ID   1222   Rep Num   1   Date   04-17-2011

Pfankuch Stability Evaluation

Upper			Lower			Channel Bottom		
1) Landform slope	6	Fair	1) Channel Capacity	2	Good	1) Bottom	12	Good
2) Mass	3		2) Surface	4	Good	2) Bar Devel. and	4	Excellent
3) Debris Jam	8	Poor	3) Obstructions	4	Good	3)	6	Fair
4) Veget. Bank	9	Fair	4) Cutting	3 Good R	2			

Sum of Scores
Final Pfankuch   Rosgen   Sediment Supply
Pfankuch   Stream Bed Stability
                                                           Width - Depth Ratio

Proper Functioning Condition

Hydrologic		Vegetative		Erosion Deposition	
1) Floodplain	Yes	6) Vegetative	Yes	13) Energy	Yes
2) Beaver	N/A	7) Vegetative	Maybe	14) Vegetated	N/A
3) Channel	Maybe	8) "Moist"	Yes	15) Natural	Yes
4) Riparian	Maybe	9) Root Masses	Yes	16) Vertical	Yes
5) Upland	Maybe	10) Vigorous	No	17) Sediment	Maybe
		11) Vegetative	Maybe		
		12) Woody	Yes		

Functional	8
Functional	FAR-NA

PFCComment than **s:**

3-Fire increased fallen trees and sediment to channel, causing W/D ratio to increase, wider shallower pools
in the past
4-Ok for intermittent stream, no recruitment unless it's a wet year
5-See #3
7-Ok for intermittent, only 2 riparian species
11-Est 40% cover on banks, but good for intermittent stream
17-some excess fines, woody debris and filling in pools/widening channel
10-Broken branches on several box-elders
Overall rating is Functional-at-risk-no trend. This rating system not designed for intermittent/ephemeral stream
riparian areas so this reating seems poor but may be normal.

Habitat Assessment

Habitat	4.0) optimal	Sum of	17.5
Extent of	4.0) optimal	Habitat	Good Condition
Riffle	3.0)		
Sediment	3.0)		
Bank Stability	3.5) fair-good		

<u>Non-Point Sources</u>

2100-forestry harvesting, 8610-wildfires/control b

<u>Hab/comments:</u>

This A type channel is still in good condition but is experiencing some excess sediment and woody debris problems from fire in watershed (pools filled in w sand, some runs widened and debris in channel damming up sediment). Some green filamentous algae and moss in April when bugs collected. On May 29 algae and moss are abundant and decaying as stream is drying back to a few runs and pools. April bug sample included hellgramites. Pfankuch channel stability=Good for A4 channel, PFC Riparian score=Functional at risk-no trend, Habitat index=17.5 Good

Habitat SEM Results

Granite Creek, at Watson Woods- Restoration reach

Station ID   VRGRA026.57   Latitude: 34.57676   Longitude: -112.43018
HabSample ID   1233   Rep Num   1   Date   04-23-2012

Field Conditions at Time of Visit

Flood Evidence (last	1) none	Flood Width	
Precipitation	none	Precipitation (w/in	Cloud Cover 2

Reach Observations

General appearance in the	1) no refuse	Fish:	1) absent
General appearance along	2) small refuse visible	Crayfish:	2) rare
Water Clarity	1) clear	Sunfish:	1) absent
Water odor	1=none	Leapard Frogs - 0	Dea 0
Appearance at water's	1) No salt crusts	Floating	1) absent
% algae cover within 10m of	5	Settled	3) common
% macrophyte cover within 10m of	1		

Flow Measurements

Flow Regime   I) intermittent   Flow Regime Category

Marsh-McBirney	Total Width (ft):	Average Depth	Avg. Velocity	Discharge (cfs):
Flow	6.7	0.23	0.27	0.55

USGS   Gage   Discharg   **Float**   Discharge

Stream Type Identification

Watershed Area		Regional	Central / Southern
Predicted X-	80	Valley Type:	VIII

Measurements for Determining Stream Type

Bankfull		Floodprone	
BF max.		Actual X Section	
Corr. Factor:		**Stream**	C4
BF mean		BF	3) Slope break
Depositional Features	9) no bars		

Organic Debris / Channel Blockages   2) infrequent debris

Segment Habitat Quality

Cobble:	4) abundant
Undercut	3) common
Leaf Packs:	2) rare
Root	2) rare
Macrophyte	2) rare
Submerged	1) absent
Sand Dominated	4) abundant
Filamentous Algae	3) common

Reach Channel / Habitat

	Feet	Percent
Riffle:	158	43.406593
Pool:	40	10.989010
Run:	166	45.604395
Riffle / Pool	3.95	

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Habitat SEM Results

Granite Creek, at Watson Woods- Restoration reach

Station ID   VRGRA026.57   Latitude: 34.57676   Longitude: -112.43018
HabSample ID   1233   Rep Num   1   Date   04-23-2012

Macroinvertebrate Decision

Hydrologic	1) Baseflow conditions	**Macroinvertebrate Field Split**
Substrate	3) mixture of particles	
Waterbody	1) riffle/run habitats present	100 (0-

Biological Sampling Observations

Invert   Riffle   Algal Identifications:
                                      Nostoc, Stoneworts, filementous green
Algal

Filam. Algae   4) 51-75%

Floating   1) <1%
                                      Macrophyte Identifications:
Algal Slime: 2) thin coating   Water grass, unknown macrophyte

Macrophyte   2) 1-25%

Riffle Pebble Count

% fines <	14
# size	10
D15:	4
D50:	35.9
D84:	97.5

Reach Pebble Count

% fines <	36
# size	11
D15:	0.25
D50:	17.5
D84:	84.7

Riffle Embeddedness and Geometry

Avg. Riffle   63   Avg Reach   61.2   Avg Length / Width   6.1

Riparian Vegetation Cover and Riparian Association

Canopy (%):   5   Riparian   2) Interior
Understory   40
Ground Cover   50

Bare ground   50   Riparian Species:
Riparian Vegetation
                                          Willow, Gooding; Willow, Unknown; Cottonwood, hink

Dominant Species: Willow, Gooding
Measured % Canopy   33.9
Regeneration   1) 3 or more age
                        classes

Habitat SEM Results

Granite Creek, at Watson Woods- Restoration reach

Station ID   VRGRA026.57   Latitude: 34.57676   Longitude: -112.43018
HabSample ID   1233   Rep Num   1   Date   04-23-2012

Pfankuch Stability Evaluation

Upper			Lower				Channel Bottom		
1) Landform slope	2		1) Channel Capacity	2	Good		1) Bottom	12	Good
2) Mass	3		2) Surface	2			2) Bar Devel. and	8	Good
3) Debris Jam	4	Good	3) Obstructions	2			3)	6	Fair
4) Veget. Bank	9	Fair	4) Cutting	2	R	2			

Sum of Scores
Final Pfankuch   Rosgen   Sediment Supply
Pfankuch   Stream Bed Stability
                                                                                                        Width - Depth Ratio

Proper Functioning Condition

Hydrologic		Vegetative		Erosion Deposition	
1) Floodplain	Yes	6) Vegetative	Yes	13) Energy	Yes
2) Beaver	N/A	7) Vegetative	Yes	14) Vegetated	N/A
3) Channel	Yes	8) "Moist"	Yes	15) Natural	Yes
4) Riparian	Yes	9) Root Masses	Yes	16) Vertical	Yes
5) Upland	No	10) Vigorous	Yes	17) Sediment	No
		11) Vegetative	Yes		
		12) Woody	Yes		

Functional   13
Functional

**PFCComment
s:**   5. Erosion and sedimentation throughout upland watershed and excess sand in substrate. 17. See number 5.

Habitat Assessment

Habitat	4.0) optimal	Sum of	16	
Extent of	4.0) optimal	Habitat	Good Condition	
Riffle	2.0) marginal			
Sediment	2.0) marginal			
Bank Stability	4.0) optimal			

<u>Non-Point Sources</u>

4500 - urban highway/road/bridge runoff. 8700 - r

<u>Hab/comments:</u>

Flow lower than last year. Bankfull features are slope break and floodplain. This C4 channel in
the watson woods restoration reach has more cobble than last year and several nice riffles. There
 are some deeper areas in runs but no real pools in reach. Banks are stable with thick growth of
willow on both banks. Good cobble substrate and filamentous algae cover, but low macrophyte
cover. Macroinverts present but not diverse- no EPT taxa seen. Colinization sources are far
upstream or downstream in lake. Black flies, midges, beetles. Pfankuch index= good for C4 channel.
PFC riparian 87% =PFC. Habitat index = 16-good. % riffle fines = 16% (meets standard).
 % embeddedness = 61% reach and 53% riffles. Willow shoots pruned by beavers.

Habitat SEM Results

Granite Creek, at Watson Woods- Restoration reach

Station ID   VRGRA026.57   Latitude: 34.57676   Longitude: -112.43018
HabSample ID   1224   Rep Num   1   Date   04-13-2011

Field Conditions at Time of Visit

Flood Evidence (last   1) none   Flood Width

Precipitation   none   Precipitation (w/in   Cloud Cover

Reach Observations

General appearance in the	2) small refuse visible	Fish:	1) absent
General appearance along	1) no refuse	Crayfish:	2) rare
Water Clarity	1) clear	Sunfish:	1) absent
Water odor	1=none	Leapard Frogs -	0 Dea 0
Appearance at water's	1) No salt crusts	Floating	1) absent
% algae cover within 10m of	1	Settled	2) rare
% macrophyte cover within 10m of	0		

Flow Measurements

Flow Regime   I) intermittent   Flow Regime Category

Marsh-McBirney   Total Width (ft):   Average Depth   Avg. Velocity   Discharge (cfs):
Flow

USGS   Gage   Discharg   7.5   **Float**   Discharge

Stream Type Identification

Watershed Area   Regional   Central / Southern
Predicted X-   80   Valley Type: VIII

Measurements for Determining Stream Type

Bankfull	47	Floodprone	600	
BF max.	3.3	Actual X Section	104	
Corr. Factor:	0.67	**Stream**	C4	
BF mean	2.2	BF	6) Presence of a floodplain	

Depositional Features   2) point + mid-channel bars

Organic Debris / Channel Blockages   2) infrequent debris

Segment Habitat Quality

Cobble:	4) abundant			
Undercut	3) common	**Reach Channel / Habitat**		
Leaf Packs:	2) rare		Feet	Percent
Root	1) absent	Riffle:	205	36.936936
Macrophyte	2) rare	Pool:	85	15.315315
Submerged	1) absent	Run:	265	47.747747
Sand Dominated	3) common	Riffle / Pool	2.411764	
Filamentous Algae	2) rare			

Habitat SEM Results

Granite Creek, at Watson Woods- Restoration reach

Station ID   VRGRA026.57   Latitude: 34.57676   Longitude: -112.43018
HabSample ID   1224   Rep Num   1   Date   04-13-2011

Macroinvertebrate Decision

Hydrologic	1) Baseflow conditions	Macroinvertebrate Field Split
Substrate	3) mixture of particles	
Waterbody	3) Intermittent	100 (0-

Biological Sampling Observations

Invert	Multihabitat –	Algal Identifications:
		Nostoc, Filamentous algae
Algal		
Filam. Algae	2) 1-25%	
Floating	1) <1%	
		Macrophyte Identifications:
Algal Slime:	3) thick coating	Pondweed, watergrass
Macrophyte	2) 1-25%	

Riffle Pebble Count / Reach Pebble Count

Riffle Pebble Count		Reach Pebble Count	
% fines <	25.9	% fines <	47
# size	11	# size	11
D15:	0.37	D15:	0.06
D50:	20	D50:	3
D84:	103	D84:	51

Riffle Embeddedness and Geometry

Avg. Riffle	63	Avg Reach	59	Avg Length / Width	7

Riparian Vegetation Cover and Riparian Association

Canopy (%):	5	Riparian	2) Interior
Understory	80		
Ground Cover	30		
Bare ground	70	Riparian Species:	

Riparian Vegetation

Hinkley cottonwood, fremont cottonwood, Goodding W

Dominant Species:	Willow, Gooding
Measured % Canopy	17
Regeneration	2) 2 age classes

Habitat SEM Results

Granite Creek, at Watson Woods- Restoration reach

Station ID   VRGRA026.57   Latitude: 34.57676   Longitude: -112.43018
HabSample ID   1224   Rep Num   1   Date   04-13-2011

Pfankuch Stability Evaluation

Upper			Lower			Channel Bottom		
1) Landform slope	2		1) Channel Capacity	2	Good	1) Bottom	12	Good
2) Mass	3		2) Surface	2		2) Bar Devel. and	8	Good
3) Debris Jam	4	Good	3) Obstructions	2		3)	6	Fair
4) Veget. Bank	9	Fair	4) Cutting	2	R 2			

Sum of Scores
Final Pfankuch   Rosgen
Pfankuch

Sediment Supply
Stream Bed Stability
Width - Depth Ratio

Proper Functioning Condition

Hydrologic		Vegetative		Erosion Deposition	
1) Floodplain	Yes	6) Vegetative	Yes	13) Energy	Yes
2) Beaver	N/A	7) Vegetative	Yes	14) Vegetated	N/A
3) Channel	Yes	8) "Moist"	Yes	15) Natural	Yes
4) Riparian	Yes	9) Root Masses	Yes	16) Vertical	Yes
5) Upland	No	10) Vigorous	Yes	17) Sediment	Maybe
		11) Vegetative	Yes		
		12) Woody	Yes		

Functional   13
Functional   PFC

PFCComments:
to the

5-tributaries have bank erosion problems. There is excess sand here in substrate and mid-channel bar.
17-same comment as #5. This C-channel is moving the water and sediment from its watershed well, thanks

channel restoration work and revegetation.

Habitat Assessment

Habitat	4.0) optimal	Sum of	16	
Extent of	4.0) optimal	Habitat	Good Condition	
Riffle	2.0) marginal			
Sediment	2.0) marginal			
Bank Stability	4.0) optimal			

Non-Point Sources

1410-grazing, 8610-wildfires, 4000-urban runoff-st

Hab/comments:

This C4 channel has nice riffle/run habitat and some pool habitat created behind fiber rolls. Banks
are stabilized with abundant willows. Substrate appears to have more cobble than pre-restoration,
though cobble is embedded in sand and bottom appears armoured. Bugs not abundant or diverse
& may be washed out from elevated flows 4d ago. Midges most abundant, beetle larvae,adult
tropisternus, black fly, no stoneflies, prob. Crayfish. The riparian growth is amazing=PFC and is protecting banks and preventing
erosion. Channel is stable, though there is much sediment from
the watershed. Substrate should be good for macroinverts. Pfankuch stability=66, good for C4,
Riparian score=PFC, Habitat index=16, good, Riffle %fines=26%, Embeddedness=59%

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Habitat SEM Results

Granite Creek, AT GRANITE PARK

Station ID   VRGRA029.97   Latitude: 34.54989   Longitude: -112.46764
HabSample ID   1234   Rep Num 1   Date   04-13-2012

Field Conditions at Time of Visit

Flood Evidence (last   1) none   Flood Width

Precipitation   none   Precipitation (w/in   Cloud Cover

Reach Observations

General appearance in the	2) small refuse visible	Fish:	1) absent	
General appearance along	3) small refuse common	Crayfish:	1) absent	
Water Clarity	1) clear	Sunfish:	1) absent	
Water odor	6=other organic smell	Leapard Frogs -	0	Dea 0
Appearance at water's	1) No salt crusts	Floating	1) absent	
% algae cover within 10m of		Settled	1) absent	
% macrophyte cover within 10m of				

Flow Measurements

Flow Regime   I) intermittent   Flow Regime Category

Marsh-McBirney   Total Width (ft):   Average Depth   Avg. Velocity   Discharge (cfs):
Flow   9   0.63   0.19   0.82

USGS   Gage   Discharg   **Float**   Discharge

Stream Type Identification

Watershed Area   Regional   Central / Southern

Predicted X-   67   Valley Type: IV

Measurements for Determining Stream Type

Bankfull   Floodprone
BF max.   Actual X Section
Corr. Factor: **Stream**   C5
BF mean   BF   3) Slope break
Depositional Features   9) no bars

Organic Debris / Channel Blockages   2) infrequent debris

Segment Habitat Quality

Cobble:	3) common	
Undercut	3) common	**Reach Channel / Habitat**
Leaf Packs:	3) common	

	Feet	Percent
Riffle:	40	20.408163
Pool:	24	12.244897
Run:	132	67.346938
Riffle / Pool	1.666666	

Root   3) common
Macrophyte   2) rare
Submerged   2) rare
Sand Dominated 4) abundant
Filamentous Algae 3) common

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Habitat SEM Results

Granite Creek, AT GRANITE PARK

Station ID VRGRA029.97   Latitude: 34.54989   Longitude: -112.46764
HabSample ID   1234   Rep Num   1   Date   04-13-2012

Macroinvertebrate Decision

Hydrologic	1) Baseflow conditions	**Macroinvertebrate Field Split**
Substrate	3) mixture of particles	
Waterbody	1) riffle/run habitats present	100 (0-

Biological Sampling Observations

Invert	Riffle	Algal Identifications: Filamentous green
Algal		
Filam. Algae	3) 26-50%	
Floating	1) <1%	
		Macrophyte Identifications:
Algal Slime:	3) thick coating	Pondweed, watergrass
Macrophyte	2) 1-25%	

Riffle Pebble Count

% fines <
# size
D15:
D50:
D84:

Reach Pebble Count

% fines <
# size
D15:
D50:
D84:

Riffle Embeddedness and Geometry

Avg. Riffle   38   Avg Reach   Avg Length / Width   2

Riparian Vegetation Cover and Riparian Association

Canopy (%):	40	Riparian 2) Interior
Understory	24	
Ground Cover	50	
Bare ground	50	Riparian Species:

Riparian Vegetation

Boxelder; Cottonwood, Fremont; Willow, Gooding

Dominant Species:	Willow, Gooding
Measured % Canopy	50
Regeneration	1) 3 or more age classes

Habitat SEM Results

Granite Creek, AT GRANITE PARK

Station ID VRGRA029.97   Latitude: 34.54989   Longitude: -112.46764
HabSample ID   1234   Rep Num   1   Date   04-13-2012

Pfankuch Stability Evaluation

Upper			Lower			Channel Bottom		
1) Landform slope	4	Good	1) Channel Capacity	2	Good	1) Bottom	18	Fair
2) Mass	3		2) Surface	2		2) Bar Devel. and	4	Excellent
3) Debris Jam	4	Good	3) Obstructions	2		3)	6	Fair
4) Veget. Bank	6	Good	4) Cutting	2	R 2			

Sum of Scores
Final Pfankuch   Rosgen   Sediment Supply
Pfankuch   Stream Bed Stability
                                                                          Width - Depth Ratio

Proper Functioning Condition

Hydrologic		Vegetative		Erosion Deposition	
1) Floodplain	Yes	6) Vegetative	Yes	13) Energy	Yes
2) Beaver	N/A	7) Vegetative	Yes	14) Vegetated	N/A
3) Channel	Yes	8) "Moist"	Yes	15) Natural	Yes
4) Riparian	Yes	9) Root Masses	Yes	16) Vertical	Maybe
5) Upland	No	10) Vigorous	Yes	17) Sediment	Maybe
		11) Vegetative	Yes		
		12) Woody	Yes		

Functional   12
Functional   FAR-NA
PFCComments: 5. Excess sediment in streambed. 16. Channel somewhat incised. 17. Excess Sediment from watershed, substrate very sandy.

Habitat Assessment

Habitat	2.0) marginal	Sum of	13
Extent of	3.0)	Habitat	Impaired
Riffle	2.0) marginal		
Sediment	2.0) marginal		
Bank Stability	4.0) optimal		

<u>Non-Point Sources</u>

4500-urban highway/road/bridge runoff. 8700-non b

<u>Hab/comments:</u>

Bankfull features are slope break and floodplain. This C5 channel is slightly incised though
willows are dense on left bank and right bank is also well vegetated. Substrate is sand dominated
with short riffle segments. Glow is very low. Algae cover high. Bug havitat poor. Pfankuch =
67, good for C5 channel. Riparian=80% functinal at risk-no trend. Havitat index=13 impaired. Ph

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Habitat SEM Results

Granite Creek, AT GRANITE PARK

Station ID   VRGRA029.97   Latitude: 34.54989   Longitude: -112.46764
HabSample ID   1225   Rep Num   1   Date   04-13-2011

Field Conditions at Time of Visit

Flood Evidence (last   1) none   Flood Width

Precipitation   none   Precipitation (w/in   Cloud Cover

Reach Observations

General appearance in the	2) small refuse visible	Fish:	1) absent
General appearance along	3) small refuse common	Crayfish:	1) absent
Water Clarity	1) clear	Sunfish:	1) absent
Water odor	2=sewage	Leapard Frogs -	0 Dea 0
Appearance at water's	1) No salt crusts	Floating	1) absent
% algae cover within 10m of	50	Settled	1) absent
% macrophyte cover within 10m of	5		

Flow Measurements

Flow Regime   Flow Regime Category

Marsh-McBirney	Total Width (ft):	Average Depth	Avg. Velocity	Discharge (cfs):
Flow	4.4	1.12	0.41	2.4
USGS Gage		Discharg	**Float**	Discharge

Stream Type Identification

Watershed Area   Regional   Central / Southern
Predicted X-   67   Valley Type: IV

Measurements for Determining Stream Type

Bankfull	33	Floodprone	320	
BF max.	4.3	Actual X Section	71	
Corr. Factor:	0.5	**Stream**	C5	
BF mean	2.15	BF	6) Presence of a floodplain	
Depositional Features	9) no bars			

Organic Debris / Channel Blockages   3) Mod. debris <10%

Segment Habitat Quality

Cobble:	4) abundant
Undercut	3) common
Leaf Packs:	2) rare
Root	3) common
Macrophyte	2) rare
Submerged	2) rare
Sand Dominated	4) abundant
Filamentous Algae	2) rare

Reach Channel / Habitat

	Feet	Percent
Riffle:	48	13.114754
Pool:	30	8.1967213
Run:	288	78.688524
Riffle / Pool	1.6	

Habitat SEM Results

Granite Creek, AT GRANITE PARK

Station ID   VRGRA029.97   Latitude: 34.54989   Longitude: -112.46764
HabSample ID   1225   Rep Num   1   Date   04-13-2011

Macroinvertebrate Decision

Hydrologic	1) Baseflow conditions	Macroinvertebrate Field Split
Substrate	3) mixture of particles	
Waterbody	3) Intermittent	100 (0-

Biological Sampling Observations

Invert	Multihabitat –	Algal Identifications:
		Filamentous greens,
Algal		
Filam. Algae	2) 1-25%	
Floating	1) <1%	
		Macrophyte Identifications:
Algal Slime:	2) thin coating	Pondweed, watergrass
Macrophyte	2) 1-25%	

Riffle Pebble Count

% fines <	36.1
# size	13
D15:	0.17
D50:	27.3
D84:	95

Reach Pebble Count

% fines <	55
# size	13
D15:	0.06
D50:	1.2
D84:	70

Riffle Embeddedness and Geometry

Avg. Riffle	63	Avg Reach	66.3	Avg Length / Width	4.4

Riparian Vegetation Cover and Riparian Association

Canopy (%):	40	Riparian	2) Interior
Understory	25		
Ground Cover	50		
Bare ground	50	Riparian Species:	

Riparian Vegetation

Goodding willow, Fremont cottonwood, Boxelder

Dominant Species:	Goodding willow
Measured % Canopy	30
Regeneration	1) 3 or more age classes

Habitat SEM Results

Granite Creek, AT GRANITE PARK

Station ID   VRGRA029.97   Latitude: 34.54989   Longitude: -112.46764
HabSample ID   1225   Rep Num   1   Date   04-13-2011

Pfankuch Stability Evaluation

Upper			Lower			Channel Bottom		
1) Landform slope	4	Good	1) Channel Capacity	2	Good	1) Bottom	18	Fair
2) Mass	3		2) Surface	2		2) Bar Devel. and	4	Excellent
3) Debris Jam	4	Good	3) Obstructions	4	Good	3)	6	Fair
4) Veget. Bank	6	Good	4) Cutting	2	R 3 Good			

Sum of Scores			Sediment Supply
Final Pfankuch		Rosgen	Stream Bed Stability
Pfankuch			Width - Depth Ratio

Proper Functioning Condition

Hydrologic		Vegetative		Erosion Deposition	
1) Floodplain	Yes	6) Vegetative	Yes	13) Energy	Yes
2) Beaver	N/A	7) Vegetative	Yes	14) Vegetated	N/A
3) Channel	Yes	8) "Moist"	Yes	15) Natural	Yes
4) Riparian	Yes	9) Root Masses	Yes	16) Vertical	Maybe
5) Upland	No	10) Vigorous	Yes	17) Sediment	Maybe
		11) Vegetative	Yes		
		12) Woody	Yes		

Functional   12
Functional   FAR-NA
PFCComments: 5-There is excess fine sediment in streambed and channel is confined along LB of floodplain ds of bridge.
but it is   16-Channel is slightly incised and confined along LB of floodplain; it does have access to floodplain on RB

above normal BF elevation
17- Same comment as #5

Habitat Assessment

Habitat	2.0) marginal	Sum of	13
Extent of	3.0)	Habitat	Impaired
Riffle	2.0) marginal		
Sediment	2.0) marginal		
Bank Stability	4.0) optimal		

Non-Point Sources

8610-wildfires, 4000-urban runoff-stormwater sewer

Hab/comments:

This C5 channel has stable, vegetated banks though it is slightly incised. Substrate is sand
dominated w few cobble areas. Poor habitat for bugs. Best habitat is grass & root mats on edges.
Bugs poor-only saw midges, cladocera, 1 beetle larva. Pfankuch stability=71, good for C5,
Riparian score= Functional at risk-no trend, Habitat index=13 Impaired, Riffle %fines=36%, Embeddedness=66%

Habitat SEM Results

Manzanita Creek, blw Canyon Drive

Station ID   VRMAN000.52   Latitude: 34.52595   Longitude: -112.48702

HabSample ID   1235   Rep Num   1   Date   04-22-2012

Field Conditions at Time of Visit

Flood Evidence (last   1) none   Flood Width

Precipitation   none   Precipitation (w/in   Cloud Cover   0

Reach Observations

General appearance in the	2) small refuse visible		Fish:	1) absent
General appearance along	1) no refuse		Crayfish:	1) absent
Water Clarity	1) clear		Sunfish:	1) absent
Water odor	1=none		Leapard Frogs -	0	Dea 0
Appearance at water's	1) No salt crusts		Floating	1) absent
% algae cover within 10m of	55		Settled	3) common
% macrophyte cover within 10m of				

Flow Measurements

Flow Regime   I) intermittent   Flow Regime Category

Marsh-McBirney   Total Width (ft):   Average Depth   Avg. Velocity   Discharge (cfs):
Flow

USGS   Gage   Discharg   **Float**   Discharge   0.11

Stream Type Identification

Watershed Area   Regional   Central / Southern

Predicted X-   25   Valley Type: IV

Measurements for Determining Stream Type

Bankfull   Floodprone

BF max.   Actual X Section

Corr. Factor: **Stream**   C5

BF mean   BF   3) Slope break

Depositional Features   3) many mid-channel bars

Organic Debris / Channel Blockages   2) infrequent debris

Segment Habitat Quality

Cobble:	3) common			
Undercut	1) absent	**Reach Channel / Habitat**		
Leaf Packs:	2) rare		Feet	Percent
Root	2) rare	Riffle:	44	24.581005
Macrophyte	1) absent	Pool:	8	4.4692737
Submerged	2) rare	Run:	127	70.949720
Sand Dominated	4) abundant	Riffle / Pool	5.5	
Filamentous Algae	3) common			

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Habitat SEM Results

Manzanita Creek, blw Canyon Drive

Station ID VRMAN000.52   Latitude: 34.52595   Longitude: -112.48702
HabSample ID   1235   Rep Num   1   Date   04-22-2012

Macroinvertebrate Decision

Hydrologic	1) Baseflow conditions	Macroinvertebrate Field Split
Substrate	3) mixture of particles	
Waterbody	1) riffle/run habitats present	100 (0-

Biological Sampling Observations

Invert   Riffle   Algal Identifications:
                                    filametous green
Algal

Filam. Algae   4) 51-75%

Floating   2) 1-25%
                                    Macrophyte Identifications:
Algal Slime: 2) thin coating   Water grass

Macrophyte   1) <1%

Riffle Pebble Count   ## Reach Pebble Count

% fines <   % fines <
# size   # size
D15:   D15:
D50:   D50:
D84:   D84:

Riffle Embeddedness and Geometry

Avg. Riffle   63   Avg Reach   Avg Length / Width   4.3

Riparian Vegetation Cover and Riparian Association

Canopy (%):   5   Riparian   3) montane
Understory   5
Ground Cover   100

Bare ground   0   Riparian Species:
Riparian Vegetation   Cottonwood, Fremont; Willow, Unknown

Dominant Species: Cottonwood,
                         Fremont
Measured % Canopy   30
Regeneration   3) one age class

Habitat SEM Results

Manzanita Creek, blw Canyon Drive

Station ID   VRMAN000.52   Latitude: 34.52595   Longitude: -112.48702
HabSample ID   1235   Rep Num   1   Date   04-22-2012

Pfankuch Stability Evaluation

Upper			Lower			Channel Bottom		
1) Landform slope	6	Fair	1) Channel Capacity	3	Fair	1) Bottom	24	Poor
2) Mass	3		2) Surface	4	Good	2) Bar Devel. and	16	Poor
3) Debris Jam	4	Good	3) Obstructions	2		3)	8	Poor
4) Veget. Bank	3		4) Cutting	2	R 2			

Sum of Scores
Final Pfankuch   Rosgen   Sediment Supply
Pfankuch   Stream Bed Stability
                                                                           Width - Depth Ratio

Proper Functioning Condition

Hydrologic		Vegetative		Erosion Deposition	
1) Floodplain	Yes	6) Vegetative	No	13) Energy	Maybe
2) Beaver	N/A	7) Vegetative	Maybe	14) Vegetated	Yes
3) Channel	No	8) "Moist"	Yes	15) Natural	Yes
4) Riparian	No	9) Root Masses	No	16) Vertical	Yes
5) Upland	No	10) Vigorous	Yes	17) Sediment	Yes
		11) Vegetative	No		
		12) Woody	Yes		

Functional   8
Functional   FAR-D

PFCComment   5. Lots of sediment, channel too straight with headcut. 5. Sediment bulldozed along channel banks. 6. One
age
s: class. 7. No recruitment. 10. Not leafed out. Grasses healthy though. 14. Mid channel bars with no
vegetation.

                    17. Excess sediment in rreach, headcuts, unstable banks. 4. Insufficient vegetation and recruitment. 11. Low
%
                    cover on banks. 13. Channel is incised with headcuts. 15. Cutoff channel present and straightened segment.
16.
                    incision/headcut.

Habitat Assessment

Habitat	2.0) marginal	Sum of	11.5
Extent of	2.0) marginal	Habitat	Impaired
Riffle	2.0) marginal		
Sediment	2.0) marginal		
Bank Stability	3.5) fair-good		

<u>Non-Point Sources</u>

4300- other urban runoff. 8700-recreation non-boa

<u>Hab/comments:</u>

Low flow conditions. Trees not leafed out. This C5b channel is at very low flow with sand
dominated substrate and few small cobble riffles. Gilamentous green algae is overabundant
(>75% cover) with floating mats common. Dry winter=no scouring flows=algae buildup. There is
excess fine sediment on bottom with side and mid channel bars common. Bug community poor
with only beetles, midges, and worms seen. Riparian vegetation minimal with very few willows.

Habitat SEM Results

Manzanita Creek, blw Canyon Drive

Station ID VRMAN000.52   Latitude: 34.52595   Longitude: -112.48702
HabSample ID   1226   Rep Num   1   Date   04-12-2011

Field Conditions at Time of Visit

Flood Evidence (last   1) none   Flood Width

Precipitation   none   Precipitation (w/in   Cloud Cover

Reach Observations

General appearance in the	2) small refuse visible	Fish:	1) absent
General appearance along	2) small refuse visible	Crayfish:	1) absent
Water Clarity	1) clear	Sunfish:	1) absent
Water odor	1=none	Leapard Frogs - 0	Dea 0
Appearance at water's	1) No salt crusts	Floating	1) absent
% algae cover within 10m of	25	Settled	3) common
% macrophyte cover within 10m of	1		

Flow Measurements

Flow Regime   I) intermittent   Flow Regime Category

Marsh-McBirney	Total Width (ft):	Average Depth	Avg. Velocity	Discharge (cfs):
Flow	5	0.15	0.43	0.34

USGS   Gage   Discharg   **Float**   Discharge

Stream Type Identification

Watershed Area   Regional   Central / Southern

Predicted X-   25   Valley Type: IV

Measurements for Determining Stream Type

Bankfull	16	Floodprone	230
BF max.	2	Actual X Section	24
Corr. Factor:	0.75	**Stream**	C5
BF mean	1.5	BF	6) Presence of a floodplain

Depositional Features   3) many mid-channel bars

Organic Debris / Channel Blockages   2) infrequent debris

Segment Habitat Quality

Cobble:	3) common	
Undercut	2) rare	
Leaf Packs:	3) common	
Root	1) absent	
Macrophyte	2) rare	
Submerged	1) absent	
Sand Dominated	4) abundant	
Filamentous Algae	3) common	

Reach Channel / Habitat

	Feet	Percent
Riffle:	37	37
Pool:	0	0
Run:	63	63
Riffle / Pool		

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Habitat SEM Results

Manzanita Creek, blw Canyon Drive

Station ID   VRMAN000.52   Latitude: 34.52595   Longitude: -112.48702
HabSample ID   1226   Rep Num   1   Date   04-12-2011

Macroinvertebrate Decision

Hydrologic	1) Baseflow conditions	**Macroinvertebrate Field Split**
Substrate	3) mixture of particles	
Waterbody	3) Intermittent	100 (0-

Biological Sampling Observations

Invert	Multihabitat –	Algal Identifications:
		Filamentous green algae
Algal		
Filam. Algae	3) 26-50%	
Floating	2) 1-25%	
		Macrophyte Identifications:
Algal Slime:	3) thick coating	Sedges, watergrass
Macrophyte	2) 1-25%	

Riffle Pebble Count

% fines <	19.4
# size	11
D15:	0.83
D50:	25.4
D84:	70.2

Reach Pebble Count

% fines <	36.9
# size	11
D15:	0.18
D50:	8.8
D84:	61.2

Riffle Embeddedness and Geometry

Avg. Riffle	68	Avg Reach	67.7	Avg Length / Width	9.7

Riparian Vegetation Cover and Riparian Association

Canopy (%):	20	Riparian	2) Interior
Understory	10		
Ground Cover	90		
Bare ground	10	Riparian Species:	

Riparian Vegetation

Cottonwood, Fremont, Willow -unknown species

Dominant Species:	Cottonwood, Fremont
Measured % Canopy	36.5
Regeneration	3) one age class

Habitat SEM Results

Manzanita Creek, blw Canyon Drive

Station ID   VRMAN000.52   Latitude: 34.52595   Longitude: -112.48702
HabSample ID   1226   Rep Num   1   Date   04-12-2011

Pfankuch Stability Evaluation

Upper			Lower			Channel Bottom		
1) Landform slope	6	Fair	1) Channel Capacity	3	Fair	1) Bottom	18	Fair
2) Mass	3		2) Surface	4	Good	2) Bar Devel. and	12	Fair
3) Debris Jam	2		3) Obstructions	2		3)	6	Fair
4) Veget. Bank	6	Good	4) Cutting	3 Good R 6	Fair			

Sum of Scores			Sediment Supply
Final Pfankuch		Rosgen	Stream Bed Stability
Pfankuch			Width - Depth Ratio

Proper Functioning Condition

Hydrologic		Vegetative		Erosion Deposition	
1) Floodplain	Yes	6) Vegetative	No	13) Energy	No
2) Beaver	N/A	7) Vegetative	Yes	14) Vegetated	N/A
3) Channel	No	8) "Moist"	Yes	15) Natural	No
4) Riparian	Maybe	9) Root Masses	No	16) Vertical	No
5) Upland	No	10) Vigorous	Yes	17) Sediment	No
		11) Vegetative	No		
		12) Woody	Yes		

Functional   5
Functional   FAR-D
PFCComment   3-Channel straightened, gradient poor- aggraded w headcut; 4-insufficient veg cover and recruitment; 5-
excess
s: sediment from road & channel manipulation; 6-only 1 age class; 9-insuff woody veg to protect banks; 11-low
%cover on banks; 13-channel incised in lower reach; 15-channel appears to be straightened; 16-incised
reach; 17-
        excess sediment in this reach w channel making headcuts thru deposits.

Habitat Assessment

Habitat	2.0) marginal		Sum of	12.5
Extent of	4.0) optimal		Habitat	Impaired
Riffle	2.0) marginal			
Sediment	2.0) marginal			
Bank Stability	2.5) marginal-			

Non-Point Sources

4300-other urban runoff, 8700-rfecreation

Hab/comments:

This is an incised C type channel with excess sand in bottom substrates, filled in pools, incised
banks (approx 2' cut banks both sides whole reach) and a 3% cutoff channel at end of reach,
eroding thru a large sediment deposit. Channel has some woody veg (cottonwoods, 1stand
willows, sedges thruout) but it is insufficient to stabilize banks. Bank erosion & excess sediment
from watershed are impairing this reach of Manzanita. Lots of recreation at adjacent park w lots of
dog visits (poop everywhere) and park area slopes toward creek, could contribute nutrients and
bacteria. Bugs not so good; millions of midge larvae, beetle larvae and 2sp adults

Habitat SEM Results

Miller Creek, DOWNSTREAM OF BUTTE CREEK AT GRAINTE PARK

Station ID   VRMIL000.22   Latitude: 34.54667   Longitude: -112.47381
HabSample ID   1236   Rep Num   1   Date   04-13-2012

Field Conditions at Time of Visit

Flood Evidence (last   1) none   Flood Width

Precipitation   none   Precipitation (w/in   Cloud Cover

Reach Observations

General appearance in the	3) small refuse common	Fish:	1) absent
General appearance along	3) small refuse common	Crayfish:	1) absent
Water Clarity	3) light brown	Sunfish:	1) absent
Water odor	4=fishy	Leapard Frogs -	0 Dea 0
Appearance at water's	1) No salt crusts	Floating	1) absent
% algae cover within 10m of	75	Settled	2) rare
% macrophyte cover within 10m of	20		

Flow Measurements

Flow Regime   I) intermittent   Flow Regime Category

Marsh-McBirney	Total Width (ft):	Average Depth	Avg. Velocity	Discharge (cfs):
Flow	3.5	0.3	0.17	0.25

USGS   Gage   Discharg   **Float**   Discharge

Stream Type Identification

Watershed Area		Regional	Central / Southern
Predicted X-	35	Valley Type:	IV

Measurements for Determining Stream Type

Bankfull		Floodprone
BF max.		Actual X Section
Corr. Factor:	**Stream**	C5
BF mean	BF	3) Slope break
Depositional Features	9) no bars	

Organic Debris / Channel Blockages   2) infrequent debris

Segment Habitat Quality

Cobble:	2) rare
Undercut	2) rare
Leaf Packs:	2) rare
Root	4) abundant
Macrophyte	2) rare
Submerged	1) absent
Sand Dominated	4) abundant
Filamentous Algae	3) common

Reach Channel / Habitat

	Feet	Percent
Riffle:	20	11.299435
Pool:	42	23.728813
Run:	115	64.971751
Riffle / Pool		0.476190

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Habitat SEM Results

Miller Creek, DOWNSTREAM OF BUTTE CREEK AT GRAINTE PARK

Station ID   VRMIL000.22   Latitude: 34.54667   Longitude: -112.47381
HabSample ID   1236   Rep Num   1   Date   04-13-2012

Macroinvertebrate Decision

Hydrologic	1) Baseflow conditions	Macroinvertebrate Field Split
Substrate	3) mixture of particles	
Waterbody	1) riffle/run habitats present	100 (0-

Biological Sampling Observations

Invert	Riffle	Algal Identifications: filamentous green
Algal		
Filam. Algae	4) 51-75%	
Floating	2) 1-25%	
Algal Slime:	3) thick coating	Macrophyte Identifications: Watergrass
Macrophyte	2) 1-25%	

Riffle Pebble Count   ## Reach Pebble Count

Riffle Pebble Count	Reach Pebble Count
% fines <	% fines <
# size	# size
D15:	D15:
D50:	D50:
D84:	D84:

Riffle Embeddedness and Geometry

Avg. Riffle	63	Avg Reach	Avg Length / Width	2

Riparian Vegetation Cover and Riparian Association

Canopy (%):	30	Riparian	2) Interior
Understory	20		
Ground Cover	90		
Bare ground	10	Riparian Species:	

Riparian Vegetation

Willow, Gooding; Cottonwood, hinkley

Dominant Species:	cottonwood, Hinkley
Measured % Canopy	70
Regeneration	1) 3 or more age classes

Habitat SEM Results

Miller Creek, DOWNSTREAM OF BUTTE CREEK AT GRAINTE PARK

Station ID   VRMIL000.22   Latitude: 34.54667   Longitude: -112.47381
HabSample ID   1236   Rep Num   1   Date   04-13-2012

Pfankuch Stability Evaluation

Upper			Lower			Channel Bottom		
1) Landform slope	4	Good	1) Channel Capacity	2	Good	1) Bottom	18	Fair
2) Mass	3		2) Surface	2		2) Bar Devel. and	4	Excellent
3) Debris Jam	4	Good	3) Obstructions	4	Good	3)	6	Fair
4) Veget. Bank	3		4) Cutting	2	R 2			

Sum of Scores
Final Pfankuch   Rosgen   Sediment Supply
Pfankuch   Stream Bed Stability
                                                                Width - Depth Ratio

Proper Functioning Condition

Hydrologic		Vegetative		Erosion Deposition	
1) Floodplain	Yes	6) Vegetative	Yes	13) Energy	Yes
2) Beaver	N/A	7) Vegetative	Yes	14) Vegetated	N/A
3) Channel	Maybe	8) "Moist"	Yes	15) Natural	Yes
4) Riparian	Yes	9) Root Masses	Yes	16) Vertical	Yes
5) Upland	No	10) Vigorous	Yes	17) Sediment	Maybe
		11) Vegetative	Yes		
		12) Woody	Yes		

Functional   12

Functional

PFCComment   3. There is excess fines in substrate and channel is somewhat entrenched. 5.Wxcess sediment in substrate
and
s: floodplain. 17. Same as #5.

Habitat Assessment

Habitat	2.0) marginal	Sum of	12
Extent of	2.0) marginal	Habitat	Impaired
Riffle	2.0) marginal		
Sediment	2.0) marginal		
Bank Stability	4.0) optimal		

Non-Point Sources

4300- other urban runoff. 4500-Urban Highway/road

Hab/comments:

Algal bloom. Low flow conditions. Bankfull indicators are slope break and floodplain. Miller creek
 has low flow/lower than this time last year. Dry winter - no flushing slows to remove algae. As a
result theres lots of decaying algae. Bottm very silty/sandy. Fishy, sulfurous odor when doing
kick sample. Bug diversity generally poor though there were dragonflies, beetle larva, adult
beethles, midges, damselfly? Algae cover 75%. Some watercress and sedge 25 % cover.
Channel shape unchanged. Substreate appears same as last year though pool and run % slightly
different due to low flow conditions. Pebble count not needed, not done.   Pfankuch=good(66)
for C5 channel. Riparian = functonal at risk-no trend 80%. Havitat Index = 12 impaired.

Habitat SEM Results

Miller Creek, DOWNSTREAM OF BUTTE CREEK AT GRAINTE PARK

Station ID   VRMIL000.22   Latitude: 34.54667   Longitude: -112.47381
HabSample ID   1227   Rep Num   1   Date   04-13-2011

Field Conditions at Time of Visit

Flood Evidence (last   1) none   Flood Width

Precipitation   none   Precipitation (w/in   Cloud Cover

Reach Observations

General appearance in the   3) small refuse common   Fish: 1) absent
General appearance along   3) small refuse common   Crayfish: 1) absent
Water Clarity   1) clear   Sunfish: 1) absent
Water odor   1=none   Leapard Frogs -   0   Dea   0
Appearance at water's   1) No salt crusts   Floating   1) absent
% algae cover within 10m of   50   Settled   2) rare
% macrophyte cover within 10m of   5

Flow Measurements

Flow Regime   I) intermittent   Flow Regime Category

Marsh-McBirney   Total Width (ft):   Average Depth   Avg. Velocity   Discharge (cfs):
Flow   5.6   0.3   0.91   1.7
USGS   Gage   Discharg   **Float**   Discharge

Stream Type Identification

Watershed Area   Regional   Central / Southern
Predicted X-   35   Valley Type: VIII

Measurements for Determining Stream Type

Bankfull   23   Floodprone   75
BF max.   1.9   Actual X Section   21.9
Corr. Factor: 0.5   **Stream**   C5
BF mean   0.95   BF   3) Slope break
Depositional Features   9) no bars

Organic Debris / Channel Blockages   2) infrequent debris

Segment Habitat Quality

Cobble: 3) common
Undercut   2) rare   **Reach Channel / Habitat**
Leaf Packs: 1) absent   Feet   Percent
Root   3) common   Riffle: 11   11.578947
Macrophyte   2) rare   Pool: 7   7.3684210
Submerged   2) rare   Run: 77   81.052631
Sand Dominated   4) abundant   Riffle / Pool   1.571428
Filamentous Algae   4) abundant

Habitat SEM Results

Miller Creek, DOWNSTREAM OF BUTTE CREEK AT GRAINTE PARK

Station ID   VRMIL000.22   Latitude: 34.54667   Longitude: -112.47381
HabSample ID   1227   Rep Num   1   Date   04-13-2011

Macroinvertebrate Decision

Hydrologic	1) Baseflow conditions		Macroinvertebrate Field Split
Substrate	3) mixture of particles		
Waterbody	3) Intermittent	100	(0-

Biological Sampling Observations

Invert	Multihabitat –	Algal Identifications: Filamentous green algae
Algal		
Filam. Algae	4) 51-75%	
Floating	1) <1%	
		Macrophyte Identifications:
Algal Slime:	3) thick coating	Watergrass
Macrophyte	2) 1-25%	

Riffle Pebble Count

% fines <	54.7
# size	9
D15:	0.08
D50:	1.4
D84:	46.6

Reach Pebble Count

% fines <	68.5
# size	9
D15:	0.06
D50:	0.5
D84:	41.6

Riffle Embeddedness and Geometry

Avg. Riffle	68	Avg Reach	70.4	Avg Length / Width	5

Riparian Vegetation Cover and Riparian Association

Canopy (%):	35	Riparian	2) Interior
Understory	20		
Ground Cover	90		
Bare ground	5	Riparian Species:	

Riparian Vegetation

Hinkley Cottonwood, Goodding Willow

Dominant Species:	Cottonwood, Fremont
Measured % Canopy	71.5
Regeneration	1) 3 or more age classes

Habitat SEM Results

Miller Creek, DOWNSTREAM OF BUTTE CREEK AT GRAINTE PARK

Station ID   VRMIL000.22   Latitude: 34.54667   Longitude: -112.47381
HabSample ID   1227   Rep Num   1   Date   04-13-2011

Pfankuch Stability Evaluation

Upper			Lower			Channel Bottom		
1) Landform slope	4	Good	1) Channel Capacity	1		1) Bottom	18	Fair
2) Mass	3		2) Surface	2		2) Bar Devel. and	4	Excellent
3) Debris Jam	4	Good	3) Obstructions	4	Good	3)	6	Fair
4) Veget. Bank	3		4) Cutting	3 Good	R 3 Good			

Sum of Scores
Final Pfankuch   Rosgen   Sediment Supply
Pfankuch   Stream Bed Stability
                                                                             Width - Depth Ratio

Proper Functioning Condition

Hydrologic		Vegetative		Erosion Deposition	
1) Floodplain	Yes	6) Vegetative	Yes	13) Energy	Yes
2) Beaver	N/A	7) Vegetative	Yes	14) Vegetated	N/A
3) Channel	Maybe	8) "Moist"	Yes	15) Natural	Yes
4) Riparian	Yes	9) Root Masses	Yes	16) Vertical	Yes
5) Upland	No	10) Vigorous	Yes	17) Sediment	Maybe
		11) Vegetative	Yes		
		12) Woody	Yes		

Functional   12
Functional   FAR-NA
PFCComment   3= channel is slightly entrenched and stream bottom has excess sand and fines; 5=excess sediment on
streambed
s: and on floodplain; 17=see comment #5

Habitat Assessment

Habitat	2.0) marginal	Sum of	11
Extent of	2.0) marginal	Habitat	Impaired
Riffle	2.0) marginal		
Sediment	1.0) poor		
Bank Stability	4.0) optimal		

Non-Point Sources

4300-urban runoff; 4500-urban hwy/road/bridge runo

Hab/comments:

This C5 channel is in moderate to poor condition with a nicely vegetated riparian area and stable
channel and banks but with a stream bottom smothered by fine sediment (poor invertebrate
substrate), toxic and nutrient and sediment inputs and a resulting poor bug community. The
riparian area of this alluvial channel is well developed with multiple age classes of cottonwood
and willow and high percent cover. Banks are stabilized with native grasses. Stream bottom has
high percent fines exceeding WQ standards, little riffle habitat, poor habitat score, and thick deposits of
organic muck in depositional areas and occasional red blood worms (excess nutrient
indicators). Bugs are depauperate and limited to mostly midges and worms. Rosgen type=C5,
Pfankuch=Good, Riparian =Functional at Risk-no trend 80%, Habitat index=11, Impaired, %Riffle
fines=55% impaired, Embeddedness is 70%.

Habitat SEM Results

Miller Creek, ON THUMB BUTTE ROAD ABOVE DEARING ROAD

Station ID   VRMIL006.07   Latitude: 34.53350   Longitude: -112.55256

HabSample ID   1228   Rep Num   1   Date   04-15-2011

Field Conditions at Time of Visit

Flood Evidence (last   1) none   Flood Width

Precipitation   none   Precipitation (w/in   Cloud Cover

Reach Observations

General appearance in the	1) no refuse	Fish:	1) absent
General appearance along	1) no refuse	Crayfish:	1) absent
Water Clarity	1) clear	Sunfish:	1) absent
Water odor	1=none	Leapard Frogs -	0 Dea 0
Appearance at water's	1) No salt crusts	Floating	1) absent
% algae cover within 10m of	30	Settled	3) common
% macrophyte cover within 10m of	0		

Flow Measurements

Flow Regime   I) intermittent   Flow Regime Category

Marsh-McBirney	Total Width (ft):	Average Depth	Avg. Velocity	Discharge (cfs):
Flow	3.4	0.14	0.5	0.26

USGS   Gage   Discharg   **Float**   Discharge

Stream Type Identification

Watershed Area   Regional   Central / Southern

Predicted X-   7   Valley Type: II

Measurements for Determining Stream Type

Bankfull	9	Floodprone	12
BF max.	0.75	Actual X Section	4.7
Corr. Factor:	0.7	**Stream**	B4a
BF mean	0.53	BF	3) Slope break

Depositional Features   2) point + mid-channel bars

Organic Debris / Channel Blockages   4) debris piles <30%

Segment Habitat Quality

Cobble:	4) abundant
Undercut	1) absent
Leaf Packs:	3) common
Root	1) absent
Macrophyte	1) absent
Submerged	2) rare
Sand Dominated	2) rare
Filamentous Algae	3) common

Reach Channel / Habitat

	Feet	Percent
Riffle:	46.5	58.490566
Pool:	3	3.7735849
Run:	30	37.735849
Riffle / Pool	15.5	

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Habitat SEM Results

Miller Creek, ON THUMB BUTTE ROAD ABOVE DEARING ROAD

Station ID   VRMIL006.07   Latitude: 34.53350   Longitude: -112.55256
HabSample ID   1228   Rep Num   1   Date   04-15-2011

Macroinvertebrate Decision

		Macroinvertebrate Field Split
Hydrologic	1) Baseflow conditions	
Substrate	3) mixture of particles	
Waterbody	3) Intermittent	100 (0-

Biological Sampling Observations

Invert	Multihabitat –	Algal Identifications:
		Filamentous green algae
Algal		
Filam. Algae	3) 26-50%	
Floating	1) <1%	
		Macrophyte Identifications:
Algal Slime:	2) thin coating	Watergrass
Macrophyte	1) <1%	

Riffle Pebble Count / Reach Pebble Count

Riffle Pebble Count		Reach Pebble Count	
% fines <	15.2	% fines <	25.8
# size	12	# size	12
D15:	1.87	D15:	0.3
D50:	43.1	D50:	20.4
D84:	123.7	D84:	115.4

Riffle Embeddedness and Geometry

Avg. Riffle	12.5	Avg Reach	46.6	Avg Length / Width	6.8

Riparian Vegetation Cover and Riparian Association

Canopy (%):	10	Riparian	3) montane
Understory	20		
Ground Cover	50		
Bare ground	50	Riparian Species:	

Riparian Vegetation

California Buckthorn, Boxelder

Dominant Species:	Buckthorn
Measured % Canopy	42.5
Regeneration	2) 2 age classes

Habitat SEM Results

Miller Creek, ON THUMB BUTTE ROAD ABOVE DEARING ROAD

Station ID   VRMIL006.07   Latitude: 34.53350   Longitude: -112.55256
HabSample ID   1228   Rep Num   1   Date   04-15-2011

Pfankuch Stability Evaluation

Upper			Lower			Channel Bottom		
1) Landform slope	2		1) Channel Capacity	2	Good	1) Bottom	12	Good
2) Mass	6	Good	2) Surface	4	Good	2) Bar Devel. and	12	Fair
3) Debris Jam	8	Poor	3) Obstructions	4	Good	3)	4	Good
4) Veget. Bank	12	Poor	4) Cutting 3 Good R 3 Good					

Sum of Scores
Final Pfankuch   Rosgen
Pfankuch

Sediment Supply
Stream Bed Stability
Width - Depth Ratio

Proper Functioning Condition

Hydrologic		Vegetative		Erosion Deposition	
1) Floodplain	Yes	6) Vegetative	N/A	13) Energy	Yes
2) Beaver	N/A	7) Vegetative	N/A	14) Vegetated	N/A
3) Channel	Maybe	8) "Moist"	Maybe	15) Natural	Yes
4) Riparian	N/A	9) Root Masses	Yes	16) Vertical	Yes
5) Upland	No	10) Vigorous	No	17) Sediment	No
		11) Vegetative	Maybe		
		12) Woody	Yes		

Functional   6
Functional   FAR-D
PFCComment   3-excess sand in substrate prob due to 2003 fire, w/d ratio high in places, worse over the years; 5-excess
sediment
s: from upstream & banks; 8-Few riparian trees-1 boxelder and several buckthorn due to intermittency; 10-
some dead
                       trees and some with broken branches/flat tops; 11-veg cover is thin; 17-channel is getting choked w fine
sediment
                       and developing mid-channel bars and getting wide and shallow.

Habitat Assessment

Habitat	3.0)		Sum of	16
Extent of	4.0) optimal		Habitat	Good Condition
Riffle	4.0) optimal			
Sediment	2.0) marginal			
Bank Stability	3.0)			

Non-Point Sources

2100-Forestry; 8300-nonurban runoff

Hab/comments:

This B4a channel has degraded over the past few years, with the channel becoming wider and
shallower and filling in with fine sediment. There are some areas of bank erosion and sediment
from roadwork. Riparian veg is sparse and insufficient to keep banks stable. Large amount of
green filamentous algae on substrate. Fine gravel and sand are filling in interstitial space for bugs.
Stoneflies, blackflies collected but diversity is low. Rosgen stream type=B4a, Pfankuch= Poor,

66

Habitat SEM Results

Miller Creek, ON THUMB BUTTE ROAD ABOVE DEARING ROAD

Station ID   VRMIL006.07   Latitude: 34.53350   Longitude: -112.55256
HabSample ID   1237   Rep Num   1   Date   04-21-2012

Field Conditions at Time of Visit

Flood Evidence (last   1) none   Flood Width

Precipitation   none   Precipitation (w/in   Cloud Cover   0

Reach Observations

General appearance in the	1) no refuse	Fish:	1) absent
General appearance along	1) no refuse	Crayfish:	1) absent
Water Clarity	1) clear	Sunfish:	1) absent
Water odor	1=none	Leapard Frogs -	0 Dea 0
Appearance at water's	1) No salt crusts	Floating	1) absent
% algae cover within 10m of	5	Settled	3) common
% macrophyte cover within 10m of	0		

Flow Measurements

Flow Regime   Flow Regime Category

Marsh-McBirney   Total Width (ft):   Average Depth   Avg. Velocity   Discharge (cfs):
Flow

USGS   Gage   Discharg   **Float**   Discharge   0.09

Stream Type Identification

Watershed Area   Regional   Central / Southern

Predicted X-   7   Valley Type: II

Measurements for Determining Stream Type

Bankfull   Floodprone
BF max.   Actual X Section
Corr. Factor: **Stream**   B4a
BF mean   BF   2) Change in particle size
Depositional Features   2) point + mid-channel bars

Organic Debris / Channel Blockages   4) debris piles <30%

Segment Habitat Quality

Cobble: 4) abundant
Undercut   1) absent   **Reach Channel / Habitat**
Leaf Packs: 3) common   Feet   Percent
Root   2) rare   Riffle: 90   58.064516
Macrophyte   1) absent   Pool: 23   14.838709
Submerged   3) common   Run: 42   27.096774
Sand Dominated   4) abundant   Riffle / Pool   3.913043
Filamentous Algae   3) common

Habitat SEM Results

Miller Creek, ON THUMB BUTTE ROAD ABOVE DEARING ROAD

Station ID VRMIL006.07   Latitude: 34.53350   Longitude: -112.55256
HabSample ID   1237   Rep Num 1   Date   04-21-2012

Macroinvertebrate Decision

Hydrologic	1) Baseflow conditions	**Macroinvertebrate Field Split**
Substrate	3) mixture of particles	
Waterbody	1) riffle/run habitats present	100 (0-

Biological Sampling Observations

Invert	Riffle	Algal Identifications:
		Filamentous green
Algal		
Filam. Algae	3) 26-50%	
Floating	1) <1%	
		Macrophyte Identifications:
Algal Slime:	2) thin coating	Water grass, Unknown macro
Macrophyte	1) <1%	

Riffle Pebble Count / Reach Pebble Count

Riffle Pebble Count	Reach Pebble Count
% fines <	% fines <
# size	# size
D15:	D15:
D50:	D50:
D84:	D84:

Riffle Embeddedness and Geometry

Avg. Riffle	15	Avg Reach	Avg Length / Width	7.5

Riparian Vegetation Cover and Riparian Association

Canopy (%):	10	Riparian	3) montane
Understory	30		
Ground Cover	95		
Bare ground	5	Riparian Species:	

Riparian Vegetation

Gooseberry; Boxelder; unknown grass; yarro; scrub

Dominant Species:	Buckthorn
Measured % Canopy	43
Regeneration	2) 2 age classes

Habitat SEM Results

Miller Creek, ON THUMB BUTTE ROAD ABOVE DEARING ROAD

Station ID   VRMIL006.07   Latitude: 34.53350   Longitude: -112.55256
HabSample ID   1237   Rep Num   1   Date   04-21-2012

Pfankuch Stability Evaluation

Upper			**Lower**			**Channel Bottom**		
1) Landform slope	2		1) Channel Capacity	3	Fair	1) Bottom	12	Good
2) Mass	6	Good	2) Surface	4	Good	2) Bar Devel. and	12	Fair
3) Debris Jam	6	Fair	3) Obstructions	6	Fair	3)	4	Good
4) Veget. Bank	9	Fair	4) Cutting	2	R 2			

Sum of Scores
Final Pfankuch   Rosgen
Pfankuch

Sediment Supply
Stream Bed Stability
Width - Depth Ratio

Proper Functioning Condition

Hydrologic		**Vegetative**		**Erosion Deposition**	
1) Floodplain	Yes	6) Vegetative	N/A	13) Energy	Yes
2) Beaver	N/A	7) Vegetative	N/A	14) Vegetated	Maybe
3) Channel	No	8) "Moist"	Maybe	15) Natural	Yes
4) Riparian	N/A	9) Root Masses	Yes	16) Vertical	Yes
5) Upland	No	10) Vigorous	No	17) Sediment	No
		11) Vegetative	Maybe		
		12) Woody	Yes		

Functional   6
Functional   FAR-D
PFCComment   3. excess sand in substrate from upstream prob due to fire. Channel wider and shallower. 5. excess sediment
from
s: upstream and banks. 8. few riparian tree species- 1 boxelder, some buckthorn. 11. Veg cover thin. 10. some
dead
                      trees, broken branches, flat tops. 17. channel is getting choked with fine sediment. Wider/shallower in open
                      channel reaches.

Habitat Assessment

Habitat	3.0)	Sum of	14
Extent of	4.0) optimal	Habitat	Impaired
Riffle	2.0) marginal		
Sediment	2.0) marginal		
Bank Stability	3.0)		

Non-Point Sources

4600-non urban runoff/erosion and sedimentation.

Hab/comments:

Bankfull indicators are change in particle size and slope break. This channel is still impacted by
fire damage in the watershed; excess fire sediment n pools and runs, bar features and lots of large
woody debris fallen over and in the channel. Riparian veg is sparse. Lots of filamentous green
algae, as last year. Macroinvert habitat suboptimal. Bugs = Helgramites and beetles, diversity
low. There was similar amount riffle habitat as last year, but more pool habitat and less run habitat.
 Likely die to very low flow conditions this year. Sediment in stream bottom-similar to last year.

Appendix E: Bioassessment reports for Nine Intermittent Stream Sites and the Wetland ponds @ Watson Woods Preserve, 2011-2012

Bioassessment Report - Indexes of Biological Integrity
for Intermittent Stream Macroinvertebrate Communities

Stream	**Aspen Creek above confluence with Granite Cr**
StationID	**VRASP000.37**
Collection Date	**4/11/2011**
Habitat sampled	**Multi-habitat**
Stream type	**Intermittent**
Site Class	**Non-reference**

Intermittent IBI Score				
Intermittent IBI Metrics	**Intermittent IBI Metric Values**	**Intermittent IBI Scores**	**Intermittent IBI Thresholds**	
Total Taxa Richness-family level	9.0	56.6	Good/Meets	57-100
Stoneflies, percent composition	0.0	0.0	Fair/inconclusive	51-56
Midges, percent composition	60.9	41.9	Poor/violates	0-50
Dominant taxon, percent composition	60.9	58.0		
Collector-gatherers, percent composition	71.6	32.4		
Filterers, percent composition	24.9	34.3		
Total Score		**37.8**	Poor/violates	0-50

Simple Four Index				
Simple Four Index metrics	**Simple Four Metric Value**	**Simple Four Metric Score**	**Simple Four Index Thresholds**	
Total Taxa Richness-order level	6	6	Good/Meets	≥ 15
Stoneflies, percent composition	0.0	0	Fair/inconclusive	12-14
Midges, percent composition	60.9	3	Poor/violates	0-11
Dominant taxon, percent composition	60.9	3		
Total Score		**12**	Fair/inconclusive	12-14

Volunteer Tolerance Index				
Volunteer Tolerance Index	**Number of taxa**	**Tolerance score (#taxa *multiplier)**	**Tolerance Index Scoring**	
Sensitive taxa	0	0	Good/Meets	≥ 12
Moderate taxa	1	3	Poor/violates	0-11
Tolerant taxa	5	5		
Total Score		**8**	Poor/violates	0-11

Macroinvertebrate Taxa list			
Order	**Family**	**FinalID**	**Individuals**
Basommatophora	Planorbidae	Planorbidae	1
Coleoptera	Dytiscidae	Dytiscidae	19
Copepoda	Copepoda	Copepoda	19
Diptera	Ceratopogonidae	Ceratopogonidae	1
Diptera	Chironomidae	Chironomidae	34
Diptera	Chironomidae	Chironomidae	335
Diptera	Ephydridae	Ephydridae	3
Diptera	Simuliidae	Simuliidae	110
Diptera	Simuliidae	Simuliidae	41
Oligochaeta	Oligochaeta	Oligochaeta	22
Ostracoda	Ostracoda	Ostracoda	21
		Total	606

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Bioassessment Report - Indexes of Biological Integrity
for Intermittent Stream Macroinvertebrate Communities

Stream	**Aspen Creek above confluence with Granite Cr**
StationID	**VRASP000.37**
Collection Date	**4/22/2012**
Habitat sampled	**Multi-habitat**
Stream type	**Intermittent**
Site Class	**Non-reference**

Intermittent IBI Score			
Intermittent IBI Metrics	**Intermittent IBI Metric Values**	**Intermittent IBI Scores**	**Intermittent IBI Thresholds**
Total Taxa Richness-family level	9	56.6	Good/Meets 57-100
Stoneflies, percent composition	0.20	0.5	Fair/inconclusive 51-56
Midges, percent composition	18.6	87.2	Poor/violates 0-50
Dominant taxon, percent composition	64.4	52.8	
Collector-gatherers, percent composition	92.5	8.6	
Filterers, percent composition	6.7	9.2	
Total Score		**36**	**Poor/violates 0-50**

Simple Four Index			
Simple Four Index metrics	**Simple Four Metric Value**	**Simple Four Metric Score**	**Simple Four Index Thresholds**
Total Taxa Richness-order level	6	6	Good/Meets ≥ 15
Stoneflies, percent composition	0.20	0	Fair/inconclusive 12-14
Midges, percent composition	18.6	6	Poor/violates 0-11
Dominant taxon, percent composition	64.4	3	
Total Score		**15**	**Good/Meets ≥ 15**

Volunteer Tolerance Index			
Volunteer Tolerance Index	**Number of taxa**	**Tolerance score (#taxa *multiplier)**	**Tolerance Index Scoring**
Sensitive taxa	1	5	Good/Meets ≥ 12
Moderate taxa	1	3	Poor/violates 0-11
Tolerant taxa	4	4	
Total Score		**12**	**Good/Meets ≥ 12**

Macroinvertebrate Taxa list			
Order	**Family**	**FinalID**	**Individuals**
Plecoptera	Taeniopterygidae	Taeniopterygidae	1
Coleoptera	Dytiscidae	Dytiscidae	2
Diptera-Chironomidae	Chironomidae	Chironomidae	106
Diptera	Ceratopogonidae	Ceratopogonidae	1
Diptera	Psychodidae	Psychodidae	1
Diptera	Simuliidae	Simuliidae	38
Annelida	Oligochaeta	Oligochaeta	53
Crustacea	Ostracoda	Ostracoda	368
Other Organisms	Nematoda	Nematoda	1
		Total	606

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Bioassessment Report - Indexes of Biological Integrity for Intermittent Stream Macroinvertebrate Communities

Stream	Banning Creek Abv Granite Creek and Haisley Rd
StationID	VRBAN000.06
Collection Date	4/13/2011
Habitat sampled	Multi-habitat
Stream type	Intermittent
Site Class	Non-reference

Intermittent IBI Score				
Intermittent IBI Metrics	Intermittent IBI Metric Values	Intermittent IBI Scores	Intermittent IBI Thresholds	
Total Taxa Richness-family level	8.0	50.3	Good/Meets	57-100
Stoneflies, percent composition	0.0	0.0	Fair/inconclusive	51-56
Midges, percent composition	73.1	28.8	Poor/violates	0-50
Dominant taxon, percent composition	73.1	39.9		
Collector-gatherers, percent composition	88.1	13.6		
Filterers, percent composition	1.5	2.1		
Total Score		26.5	Poor/violates	0-50

Simple Four Index				
Simple Four Index metrics	Simple Four Metric Value	Simple Four Metric Score	Simple Four Index Thresholds	
Total Taxa Richness-order level	6	6	Good/Meets	≥ 15
Stoneflies, percent composition	0.0	0	Fair/inconclusive	12-14
Midges, percent composition	73.1	0	Poor/violates	0-11
Dominant taxon, percent composition	73.1	0		
Total Score		6	Poor/violates	0-11

Volunteer Tolerance Index				
Volunteer Tolerance Index	Number of taxa	Tolerance score (#taxa *multiplier)	Tolerance Index Scoring	
Sensitive taxa	1	5	Good/Meets	≥ 12
Moderate taxa	1	3	Poor/violates	0-11
Tolerant taxa	3	3		
Total Score		11	Poor/violates	0-11

Macroinvertebrate Taxa list			
Order	Family	FinalID	Individuals
Basommatophora	Lymnaeidae	Lymnaeidae	3
Basommatophora	Physidae	Physidae	2
Coleoptera	Hydrophilidae	Hydrophilidae	1
Diptera	Chironomidae	Chironomidae	49
Diptera	Simuliidae	Simuliidae	1
Diptera	Tipulidae	Tipulidae	1
Oligochaeta	Oligochaeta	Oligochaeta	7
Trichoptera	Limnephilidae	Limnephilidae	3
		Total count	67

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Bioassessment Report - Indexes of Biological Integrity for Intermittent Stream Macroinvertebrate Communities

Stream	Banning Creek Abv Granite Creek and Haisley Rd
StationID	VRBAN000.06
Collection Date	4/22/2012
Habitat sampled	Multi-habitat
Stream type	Intermittent
Site Class	Non-reference

Intermittent IBI Score			
Intermittent IBI Metrics	Intermittent IBI Metric Values	Intermittent IBI Scores	Intermittent IBI Thresholds
Total Taxa Richness-family level	13	81.8	Good/Meets 57-100
Stoneflies, percent composition	0.00	0.0	Fair/inconclusive 51-56
Midges, percent composition	63.0	39.7	Poor/violates 0-50
Dominant taxon, percent composition	63	54.9	
Collector-gatherers, percent composition	79.5	23.4	
Filterers, percent composition	9.8	13.5	
Total Score		36	Poor/violates 0-50

Simple Four Index			
Simple Four Index metrics	Simple Four Metric Value	Simple Four Metric Score	Simple Four Index Thresholds
Total Taxa Richness-order level	8	6	Good/Meets ≥ 15
Stoneflies, percent composition	0.00	0	Fair/inconclusive 12-14
Midges, percent composition	63.0	3	Poor/violates 0-11
Dominant taxon, percent composition	63	3	
Total Score		12	Fair/inconclusive 12-14

Volunteer Tolerance Index			
Volunteer Tolerance Index	Number of taxa	Tolerance score (#taxa *multiplier)	Tolerance Index Scoring
Sensitive taxa	2	10	Good/Meets ≥ 12
Moderate taxa	1	3	Poor/violates 0-11
Tolerant taxa	5	5	
Total Score		18	Good/Meets ≥ 12

Macroinvertebrate Taxa list			
Order	Family	FinalID	Individuals
Ephemeroptera	Siphlonuridae	Siphlonuridae	1
Coleoptera	Dytiscidae	Dytiscidae	23
Coleoptera	Hydrophilidae	Hydrophilidae	1
Diptera-Chironomidae	Chironomidae	Chironomidae	347
Diptera	Ceratopogonidae	Ceratopogonidae	16
Diptera	Muscidae	Muscidae	2
Diptera	Simuliidae	Simuliidae	54
Diptera	Stratiomyidae	Stratiomyidae	5
Trichoptera	Limnephilidae	Limnephilidae	7
Gastropoda	Lymnaeidae	Lymnaeidae	3
Annelida	Oligochaeta	Oligochaeta	51
Crustacea	Ostracoda	Ostracoda	31
Other Organisms	Nematoda	Nematoda	10
		Total count	551

Bioassessment Report - Indexes of Biological Integrity
for Intermittent Stream Macroinvertebrate Communities

Stream	Butte Creek abv Sheldon St Bridge by Prescott college
StationID	VRBTT000.32
Collection Date	4/13/2011
Habitat sampled	Multi-habitat
Stream type	Intermittent
Site Class	Non-reference

Intermittent IBI Score			
Intermittent IBI Metrics	Intermittent IBI Metric Values	Intermittent IBI Scores	Intermittent IBI Thresholds
Total Taxa Richness-family level	11.0	69.2	Good/Meets 57-100
Stoneflies, percent composition	0.0	0.0	Fair/inconclusive 51-56
Midges, percent composition	73.8	28.1	Poor/violates 0-50
Dominant taxon, percent composition	73.8	38.9	
Collector-gatherers, percent composition	89.5	12.0	
Filterers, percent composition	3.6	5.0	
Total Score		29.6	Poor/violates 0-50

Simple Four Index			
Simple Four Index metrics	Simple Four Metric Value	Simple Four Metric Score	Simple Four Index Thresholds
Total Taxa Richness-order level	5	3	Good/Meets ≥ 15
Stoneflies, percent composition	0.0	0	Fair/inconclusive 12-14
Midges, percent composition	73.8	0	Poor/violates 0-11
Dominant taxon, percent composition	73.8	0	
Total Score		3	Poor/violates 0-11

Volunteer Tolerance Index			
Volunteer Tolerance Index	Number of taxa	Tolerance score (#taxa *multiplier)	Tolerance Index Scoring
Sensitive taxa	0	0	Good/Meets ≥ 12
Moderate taxa	1	3	Poor/violates 0-11
Tolerant taxa	4	4	
Total Score		7	Poor/violates 0-11

Macroinvertebrate Taxa list			
Order	Family	FinalID	Individuals
Basommatophora	Lymnaeidae	Lymnaeidae	6
Coleoptera	Dytiscidae	Dytiscidae	24
Diptera	Ceratopogonidae	Ceratopogonidae	1
Diptera	Chironomidae	Chironomidae	2
Diptera	Chironomidae	Chironomidae	372
Diptera	Culicidae	Culicidae	3
Diptera	Empididae	Empididae	3
Diptera	Simuliidae	Simuliidae	7
Diptera	Simuliidae	Simuliidae	11
Diptera	Tabanidae	Tabanidae	4
Diptera	Tipulidae	Tipulidae	1
Oligochaeta	Oligochaeta	Oligochaeta	34
Ostracoda	Ostracoda	Ostracoda	40
		Total	508

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Bioassessment Report - Indexes of Biological Integrity
for Intermittent Stream Macroinvertebrate Communities

Stream	**Butte Creek abv Sheldon St Bridge by Prescott college**
StationID	**VRBTT000.32**
Collection Date	**4/22/2012**
Habitat sampled	**Multi-habitat**
Stream type	**Intermittent**
Site Class	**Non-reference**

Intermittent IBI Score				
Intermittent IBI Metrics	**Intermittent IBI Metric Values**	**Intermittent IBI Scores**	**Intermittent IBI Thresholds**	
Total Taxa Richness-family level	12	75.5	Good/Meets	57-100
Stoneflies, percent composition	0.00	0.0	Fair/inconclusive	51-56
Midges, percent composition	40.5	63.8	Poor/violates	0-50
Dominant taxon, percent composition	40.5	88.3		
Collector-gatherers, percent composition	88.1	13.6		
Filterers, percent composition	9.5	13.1		
Total Score		**42**	**Poor/violates**	**0-50**

Simple Four Index				
Simple Four Index metrics	**Simple Four Metric Value**	**Simple Four Metric Score**	**Simple Four Index Thresholds**	
Total Taxa Richness-order level	8	6	Good/Meets	≥ 15
Stoneflies, percent composition	0.00	0	Fair/inconclusive	12-14
Midges, percent composition	40.5	3	Poor/violates	0-11
Dominant taxon, percent composition	40.5	3		
Total Score		**12**	**Fair/inconclusive**	**12-14**

Volunteer Tolerance Index				
Volunteer Tolerance Index	**Number of taxa**	**Tolerance score (#taxa *multiplier)**	**Tolerance Index Scoring**	
Sensitive taxa	0	0	Good/Meets	≥ 12
Moderate taxa	2	6	Poor/violates	0-11
Tolerant taxa	6	6		
Total Score		**12**	**Good/Meets**	**≥ 12**

Macroinvertebrate Taxa list			
Order	**Family**	**FinalID**	**Individuals**
Hemiptera	Corixidae	Corixidae	1
Coleoptera	Dytiscidae	Dytiscidae	4
Diptera	Chironomidae	Chironomidae	217
Diptera	Ephydridae	Ephydridae	6
Diptera	Psychodidae	Psychodidae	1
Diptera	Simuliidae	Simuliidae	51
Diptera	Stratiomyidae	Stratiomyidae	1
Gastropoda	Lymnaeidae	Lymnaeidae	6
Annelida	Oligochaeta	Oligochaeta	88
Acari	Limnesiidae	Limnesiidae	1
Crustacea	Ostracoda	Ostracoda	153
Other Organisms	Nematoda	Nematoda	7
		Total	536

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Bioassessment Report - Indexes of Biological Integrity for Intermittent Stream Macroinvertebrate Communities

Stream	Butte Creek near headwater
StationID	VRBTT005.70
Collection Date	4/16/2011
Habitat sampled	Multi-habitat
Stream type	Intermittent
Site Class	Reference

Intermittent IBI Score			
Intermittent IBI Metrics	Intermittent IBI Metric Values	Intermittent IBI Scores	Intermittent IBI Thresholds
Total Taxa Richness-family level	9.0	56.6	Good/Meets 57-100
Stoneflies, percent composition	1.4	3.6	Fair/inconclusive 51-56
Midges, percent composition	20.8	84.9	Poor/violates 0-50
Dominant taxon, percent composition	75.2	36.8	
Collector-gatherers, percent composition	21.3	89.8	
Filterers, percent composition	75.2	103.6	
Total Score		**54.3**	**Fair/inconclusive 51-56**

Simple Four Index			
Simple Four Index metrics	Simple Four Metric Value	Simple Four Metric Score	Simple Four Index Thresholds
Total Taxa Richness-order level	6	6	Good/Meets ≥ 15
Stoneflies, percent composition	1.4	0	Fair/inconclusive 12-14
Midges, percent composition	20.8	6	Poor/violates 0-11
Dominant taxon, percent composition	75.2	0	
Total Score		**12**	**Fair/inconclusive 12-14**

Volunteer Tolerance Index			
Volunteer Tolerance Index	Number of taxa	Tolerance score (#taxa *multiplier)	Tolerance Index Scoring
Sensitive taxa	1	5	Good/Meets ≥ 12
Moderate taxa	4	12	Poor/violates 0-11
Tolerant taxa	2	2	
Total Score		**19**	**Good/Meets ≥ 12**

Macroinvertebrate Taxa list			
Order	Family	FinalID	Individuals
Coleoptera	Dytiscidae	Dytiscidae	2
Diptera	Ceratopogonidae	Ceratopogonidae	7
Diptera	Chironomidae	Chironomidae	5
Diptera	Chironomidae	Chironomidae	110
Diptera	Ephydridae	Ephydridae	1
Diptera	Simuliidae	Simuliidae	416
Hemiptera	Corixidae	Corixidae	1
Megaloptera	Corydalidae	Corydalidae	1
Oligochaeta	Oligochaeta	Oligochaeta	2
Plecoptera	Taeniopterygidae	Taeniopterygidae	8
		Total count	553

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Bioassessment Report - Indexes of Biological Integrity
for Intermittent Stream Macroinvertebrate Communities

Stream	**Butte Creek near headwater**
StationID	**VRBTT005.70**
Collection Date	**4/21/2012**
Habitat sampled	**Multi-habitat**
Stream type	**Intermittent**
Site Class	**Reference**

Intermittent IBI Score				
Intermittent IBI Metrics	**Intermittent IBI Metric Values**	**Intermittent IBI Scores**	**Intermittent IBI Thresholds**	
Total Taxa Richness-family level	9	56.6	Good/Meets	57-100
Stoneflies, percent composition	1.70	4.2	Fair/inconclusive	51-56
Midges, percent composition	62.6	40.1	Poor/violates	0-50
Dominant taxon, percent composition	62.6	55.5		
Collector-gatherers, percent composition	63.3	41.8		
Filterers, percent composition	19.4	26.7		
Total Score		**37**	**Poor/violates**	**0-50**

Simple Four Index				
Simple Four Index metrics	**Simple Four Metric Value**	**Simple Four Metric Score**	**Simple Four Index Thresholds**	
Total Taxa Richness-order level	6	6	Good/Meets	≥ 15
Stoneflies, percent composition	1.70	0	Fair/inconclusive	12-14
Midges, percent composition	62.6	3	Poor/violates	0-11
Dominant taxon, percent composition	62.6	3		
Total Score		**12**	**Fair/inconclusive**	**12-14**

Volunteer Tolerance Index				
Volunteer Tolerance Index	**Number of taxa**	**Tolerance score (#taxa *multiplier)**	**Tolerance Index Scoring**	
Sensitive taxa	1	5	Good/Meets	≥ 12
Moderate taxa	2	6	Poor/violates	0-11
Tolerant taxa	3	3		
Total Score		**14**	**Good/Meets**	**≥ 12**

Macroinvertebrate Taxa list			
Order	**Family**	**FinalID**	**Individuals**
Coleoptera	Dytiscidae	Dytiscidae	13
Megaloptera	Corydalidae	Corydalidae	3
Diptera-Chironomidae	Chironomidae	Chironomidae	333
Diptera	Ceratopogonidae	Ceratopogonidae	62
Diptera	Simuliidae	Simuliidae	103
Diptera	Tipulidae	Tipulidae	3
Annelida	Oligochaeta	Oligochaeta	4
Other Organisms	Nematoda	Nematoda	2
		Total count	523

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Bioassessment Report - Indexes of Biological Integrity for Intermittent Stream Macroinvertebrate Communities			
Stream	Granite Creek at Watson Woods- Restoration reach		
StationID	VRGRA026.57		
Collection Date	4/12/2011		
Habitat sampled	Multi-habitat		
Stream type	Intermittent		
Site Class	Non-reference		

Intermittent IBI Score				
Intermittent IBI Metrics	Intermittent IBI Metric Values	Intermittent IBI Scores	Intermittent IBI Thresholds	
Total Taxa Richness-family level	7.0	44.0	Good/Meets	57-100
Stoneflies, percent composition	0.0	0.0	Fair/inconclusive	51-56
Midges, percent composition	66.3	36.1	Poor/violates	0-50
Dominant taxon, percent composition	66.3	49.9		
Collector-gatherers, percent composition	81.5	21.1		
Filterers, percent composition	15.2	20.9		
Total Score		30.2	Poor/violates	0-50

Simple Four Index				
Simple Four Index metrics	Simple Four Metric Value	Simple Four Metric Score	Simple Four Index Thresholds	
Total Taxa Richness-order level	4	3	Good/Meets	≥ 15
Stoneflies, percent composition	0.0	0	Fair/inconclusive	12-14
Midges, percent composition	66.3	3	Poor/violates	0-11
Dominant taxon, percent composition	66.3	3		
Total Score		9	Poor/violates	0-11

Volunteer Tolerance Index				
Volunteer Tolerance Index	Number of taxa	Tolerance score (#taxa *multiplier)	Tolerance Index Scoring	
Sensitive taxa	0	0	Good/Meets	≥ 12
Moderate taxa	1	3	Poor/violates	0-11
Tolerant taxa	3	3		
Total Score		6	Poor/violates	0-11

Macroinvertebrate Taxa list			
Order	Family	FinalID	Individuals
Coleoptera	Dytiscidae	Dytiscidae	8
Copepoda	Copepoda	Copepoda	3
Diptera	Ceratopogonidae	Ceratopogonidae	2
Diptera	Ceratopogonidae	Ceratopogonidae	7
Diptera	Chironomidae	Chironomidae	18
Diptera	Chironomidae	Chironomidae	327
Diptera	Ephydridae	Ephydridae	1
Diptera	Simuliidae	Simuliidae	78
Diptera	Simuliidae	Simuliidae	1
Oligochaeta	Oligochaeta	Oligochaeta	175
		Total count	620

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Bioassessment Report - Indexes of Biological Integrity for Intermittent Stream Macroinvertebrate Communities

Stream	Granite Creek at Watson Woods- Restoration reach
StationID	VRGRA026.57
Collection Date	4/23/2012
Habitat sampled	Multi-habitat
Stream type	Intermittent
Site Class	Non-reference

Intermittent IBI Score

Intermittent IBI Metrics	Intermittent IBI Metric Values	Intermittent IBI Scores	Intermittent IBI Thresholds	
Total Taxa Richness-family level	8	50.3	Good/Meets	57-100
Stoneflies, percent composition	0.00	0.0	Fair/inconclusive	51-56
Midges, percent composition	19.5	86.3	Poor/violates	0-50
Dominant taxon, percent composition	54.5	67.5		
Collector-gatherers, percent composition	44.8	63.0		
Filterers, percent composition	54.5	75.1		
Total Score		57	Good/Meets	57-100

Simple Four Index

Simple Four Index metrics	Simple Four Metric Value	Simple Four Metric Score	Simple Four Index Thresholds	
Total Taxa Richness-order level	6	6	Good/Meets	≥ 15
Stoneflies, percent composition	0.00	0	Fair/inconclusive	12-14
Midges, percent composition	19.5	6	Poor/violates	0-11
Dominant taxon, percent composition	54.5	3		
Total Score		15	Good/Meets	≥ 15

Volunteer Tolerance Index

Volunteer Tolerance Index	Number of taxa	Tolerance score (#taxa *multiplier)	Tolerance Index Scoring	
Sensitive taxa	0	0	Good/Meets	≥ 12
Moderate taxa	1	3	Poor/violates	0-11
Tolerant taxa	5	5		
Total Score		8	Poor/violates	0-11

Macroinvertebrate Taxa list

Order	Family	FinalID	Individuals
Coleoptera	Dytiscidae	Dytiscidae	1
Diptera-Chironomidae	Chironomidae	Chironomidae	112
Diptera	Ephydridae	Ephydridae	1
Diptera	Simuliidae	Simuliidae	313
Gastropoda	Lymnaeidae	Lymnaeidae	1
Annelida	Oligochaeta	Oligochaeta	143
Acari	Hygrobatidae	Hygrobatidae	2
Other Organisms	Nematoda	Nematoda	1
			574

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Bioassessment Report - Indexes of Biological Integrity for Intermittent Stream Macroinvertebrate Communities

Stream	**Granite Creek at Granite Creek Park**
StationID	**VRGRA029.97**
Collection Date	**4/12/2011**
Habitat sampled	**Multi-habitat**
Stream type	**Intermittent**
Site Class	**Stressed**

Intermittent IBI Score			
Intermittent IBI Metrics	**Intermittent IBI Metric Values**	**Intermittent IBI Scores**	**Intermittent IBI Thresholds**
Total Taxa Richness-family level	8	50.3	Good/Meets 57-100
Stoneflies, percent composition	0.0	0.0	Fair/inconclusive 51-56
Midges, percent composition	90.5	10.2	Poor/violates 0-50
Dominant taxon, percent composition	90.5	14.1	
Collector-gatherers, percent composition	97.8	2.5	
Filterers, percent composition	1.1	1.5	
Total Score		**15.4**	**Poor/violates 0-50**

Simple Four Index			
Simple Four Index metrics	**Simple Four Metric Value**	**Simple Four Metric Score**	**Simple Four Index Thresholds**
Total Taxa Richness-order level	5	3	Good/Meets ≥ 15
Stoneflies, percent composition	0.0	0	Fair/inconclusive 12-14
Midges, percent composition	90.5	0	Poor/violates 0-11
Dominant taxon, percent composition	90.5	0	
Total Score		**3**	**Poor/violates 0-11**

Volunteer Tolerance Index			
Volunteer Tolerance Index	**Number of taxa**	**Tolerance score (#taxa *multiplier)**	**Tolerance Index Scoring**
Sensitive taxa	0	0	Good/Meets ≥ 12
Moderate taxa	1	3	Poor/violates 0-11
Tolerant taxa	4	4	
Total Score		**7**	**Poor/violates 0-11**

Macroinvertebrate Taxa list			
Order	**Family**	**FinalID**	**Individuals**
Basommatophora	Lymnaeidae	Lymnaeidae	3
Coleoptera	Dytiscidae	Dytiscidae	5
Diptera	Chironomidae	Chironomidae	40
Diptera	Chironomidae	Chironomidae	456
Diptera	Simuliidae	Simuliidae	3
Diptera	Simuliidae	Simuliidae	3
Diptera	Stratiomyidae	Stratiomyidae	1
Diptera	Tipulidae	Tipulidae	1
Oligochaeta	Oligochaeta	Oligochaeta	35
Ostracoda	Ostracoda	Ostracoda	1
		Total count	548

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Bioassessment Report - Indexes of Biological Integrity
for Intermittent Stream Macroinvertebrate Communities

Stream	Granite Creek at Granite Creek Park
StationID	VRGRA029.97
Collection Date	4/13/2012
Habitat sampled	Multi-habitat
Stream type	Intermittent
Site Class	Stressed

Intermittent IBI Score			
Intermittent IBI Metrics	Intermittent IBI Metric Values	Intermittent IBI Scores	Intermittent IBI Thresholds	
Total Taxa Richness-family level	11	69.2	Good/Meets	57-100
Stoneflies, percent composition	0.00	0.0	Fair/inconclusive	51-56
Midges, percent composition	14.3	91.9	Poor/violates	0-50
Dominant taxon, percent composition	79.7	30.1		
Collector-gatherers, percent composition	95.7	4.9		
Filterers, percent composition	0.9	1.3		
Total Score		**32.9**	**Poor/violates**	**0-50**

Simple Four Index			
Simple Four Index metrics	Simple Four Metric Value	Simple Four Metric Score	Simple Four Index Thresholds	
Total Taxa Richness-order level	9	6	Good/Meets	≥ 15
Stoneflies, percent composition	0.00	0	Fair/inconclusive	12-14
Midges, percent composition	14.3	6	Poor/violates	0-11
Dominant taxon, percent composition	79.7	0		
Total Score		**12**	**Fair/inconclusive**	**12-14**

Volunteer Tolerance Index			
Volunteer Tolerance Index	Number of taxa	Tolerance score (#taxa *multiplier)	Tolerance Index Scoring	
Sensitive taxa	0	0	Good/Meets	≥ 12
Moderate taxa	2	6	Poor/violates	0-11
Tolerant taxa	7	7		
Total Score		**13**	**Good/Meets**	**≥ 12**

Macroinvertebrate Taxa list			
Order	Family	FinalID	Individuals
Odonata	Coenagrionidae	Coenagrionidae	2
Coleoptera	Dytiscidae	Dytiscidae	3
Diptera-Chironomidae	Chironomidae	Chironomidae	76
Diptera	Simuliidae	Simuliidae	5
Diptera	Tipulidae	Tipulidae	2
Gastropoda	Physidae	Physidae	2
Trichoptera	Limnephilidae	Limnephilidae	0
Gastropoda	Lymnaeidae	Lymnaeidae	0
Annelida	Oligochaeta	Oligochaeta	424
Crustacea	Cambaridae	Cambaridae	1
Crustacea	Ostracoda	Ostracoda	8
Other Organisms	Nematoda	Nematoda	8
Nemertea	Tetrastemmatidae	Tetrastemmatidae	1
		Total count	532

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Bioassessment Report - Indexes of Biological Integrity for Intermittent Stream Macroinvertebrate Communities	
Stream	**Manzanita Creek blw Canyon Drive crossing**
StationID	**VRMAN000.52**
Collection Date	**4/11/2011**
Habitat sampled	**Multi-habitat**
Stream type	**Intermittent**
Site Class	**Non-reference**

Intermittent IBI Score			
Intermittent IBI Metrics	Intermittent IBI Metric Values	Intermittent IBI Scores	Intermittent IBI Thresholds
Total Taxa Richness-family level	9	56.6	Good/Meets 57-100
Stoneflies, percent composition	0.0	0.0	Fair/inconclusive 51-56
Midges, percent composition	89.8	10.9	Poor/violates 0-50
Dominant taxon, percent composition	89.8	15.2	
Collector-gatherers, percent composition	96.2	4.3	
Filterers, percent composition	2.4	3.3	
Total Score		**17.4**	Poor/violates 0-50

Simple Four Index			
Simple Four Index metrics	Simple Four Metric Value	Simple Four Metric Score	Simple Four Index Thresholds
Total Taxa Richness-order level	6	6	Good/Meets ≥ 15
Stoneflies, percent composition	0.0	0	Fair/inconclusive 12-14
Midges, percent composition	89.8	0	Poor/violates 0-11
Dominant taxon, percent composition	89.8	0	
Total Score		**6**	Poor/violates 0-11

Volunteer Tolerance Index			
Volunteer Tolerance Index	Number of taxa	Tolerance score (#taxa *multiplier)	Tolerance Index Scoring
Sensitive taxa	0	0	Good/Meets ≥ 12
Moderate taxa	2	6	Poor/violates 0-11
Tolerant taxa	4	4	
Total Score		**10**	Poor/violates 0-11

Macroinvertebrate Taxa list			
Order	Family	FinalID	Individuals
Coleoptera	Dytiscidae	Dytiscidae	2
Copepoda	Copepoda	Copepoda	1
Diptera	Ceratopogonidae	Ceratopogonidae	4
Diptera	Ceratopogonidae	Ceratopogonidae	3
Diptera	Chironomidae	Chironomidae	31
Diptera	Chironomidae	Chironomidae	601
Diptera	Ephydridae	Ephydridae	15
Diptera	Simuliidae	Simuliidae	13
Diptera	Simuliidae	Simuliidae	4
Hemiptera	Notonectidae	Notonectidae	1
Oligochaeta	Oligochaeta	Oligochaeta	28
Ostracoda	Ostracoda	Ostracoda	1
		Total count	704

Bioassessment Report - Indexes of Biological Integrity for Intermittent Stream Macroinvertebrate Communities

Stream	**Manzanita Creek blw Canyon Drive crossing**
StationID	**VRMAN000.52**
Collection Date	**4/22/2012**
Habitat sampled	**Multi-habitat**
Stream type	**Intermittent**
Site Class	**Non-reference**

Intermittent IBI Score			
Intermittent IBI Metrics	**Intermittent IBI Metric Values**	**Intermittent IBI Scores**	**Intermittent IBI Thresholds**
Total Taxa Richness-family level	11	69.2	Good/Meets 57-100
Stoneflies, percent composition	0.00	0.0	Fair/inconclusive 51-56
Midges, percent composition	35.4	69.2	Poor/violates 0-50
Dominant taxon, percent composition	39.9	89.2	
Collector-gatherers, percent composition	93.7	7.2	
Filterers, percent composition	1.3	1.8	
Total Score		**39**	**Poor/violates 0-50**

Simple Four Index			
Simple Four Index metrics	**Simple Four Metric Value**	**Simple Four Metric Score**	**Simple Four Index Thresholds**
Total Taxa Richness-order level	6	6	Good/Meets ≥ 15
Stoneflies, percent composition	0.00	0	Fair/inconclusive 12-14
Midges, percent composition	35.4	3	Poor/violates 0-11
Dominant taxon, percent composition	39.9	3	
Total Score		**12**	**Fair/inconclusive 12-14**

Volunteer Tolerance Index			
Volunteer Tolerance Index	**Number of taxa**	**Tolerance score (#taxa *multiplier)**	**Tolerance Index Scoring**
Sensitive taxa	0	0	Good/Meets ≥ 12
Moderate taxa	1	3	Poor/violates 0-11
Tolerant taxa	5	5	
Total Score		**8**	**Poor/violates 0-11**

Macroinvertebrate Taxa list			
Order	**Family**	**FinalID**	**Individuals**
Coleoptera	Dytiscidae	Dytiscidae	8
Diptera-Chironomidae	Chironomidae	Chironomidae	192
Diptera	Ceratopogonidae	Ceratopogonidae	8
Diptera	Ephydridae	Ephydridae	30
Diptera	Muscidae	Muscidae	6
Diptera	Simuliidae	Simuliidae	7
Diptera	Stratiomyidae	Stratiomyidae	1
Annelida	Oligochaeta	Oligochaeta	216
Acari	Hygrobatidae	Hygrobatidae	3
Crustacea	Ostracoda	Ostracoda	69
Other Organisms	Nematoda	Nematoda	2
		Total count	542

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Bioassessment Report - Indexes of Biological Integrity
for Intermittent Stream Macroinvertebrate Communities

Stream	Miller Creek downstream of Butte Creek at Park
StationID	VRMIL000.22
Collection Date	4/16/2011
Habitat sampled	Multi-habitat
Stream type	Intermittent
Site Class	Stressed

Intermittent IBI Score			
Intermittent IBI Metrics	Intermittent IBI Metric Values	Intermittent IBI Scores	Intermittent IBI Thresholds
Total Taxa Richness-family level	10	62.9	Good/Meets 57-100
Stoneflies, percent composition	0.0	0.0	Fair/inconclusive 51-56
Midges, percent composition	55.0	48.2	Poor/violates 0-50
Dominant taxon, percent composition	55.0	66.8	
Collector-gatherers, percent composition	97.7	2.6	
Filterers, percent composition	0.2	0.3	
Total Score		36.1	Poor/violates 0-50

Simple Four Index			
Simple Four Index metrics	Simple Four Metric Value	Simple Four Metric Score	Simple Four Index Thresholds
Total Taxa Richness-order level	7	6	Good/Meets ≥ 15
Stoneflies, percent composition	0.0	0	Fair/inconclusive 12-14
Midges, percent composition	55.0	3	Poor/violates 0-11
Dominant taxon, percent composition	55.0	3	
Total Score		12	Fair/inconclusive 12-14

Volunteer Tolerance Index			
Volunteer Tolerance Index	Number of taxa	Tolerance score (#taxa *multiplier)	Tolerance Index Scoring
Sensitive taxa	0	0	Good/Meets ≥ 12
Moderate taxa	2	6	Poor/violates 0-11
Tolerant taxa	5	5	
Total Score		11	Poor/violates 0-11

Macroinvertebrate Taxa list			
Order	Family	FinalID	Individuals
Acari	Acari	Acari	1
Basommatophora	Lymnaeidae	Lymnaeidae	2
Coleoptera	Dytiscidae	Dytiscidae	9
Copepoda	Copepoda	Copepoda	9
Diptera	Chironomidae	Chironomidae	5
Diptera	Chironomidae	Chironomidae	287
Diptera	Ephydridae	Ephydridae	8
Diptera	Simuliidae	Simuliidae	1
Hemiptera	Mesoveliidae	Mesovelia	1
Oligochaeta	Oligochaeta	Oligochaeta	160
Ostracoda	Ostracoda	Ostracoda	48
		Total count	531

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Bioassessment Report - Indexes of Biological Integrity
for Intermittent Stream Macroinvertebrate Communities

Stream	Miller Creek downstream of Butte Creek at Park
StationID	VRMIL000.22
Collection Date	4/13/2012
Habitat sampled	Multi-habitat
Stream type	Intermittent
Site Class	Stressed

Intermittent IBI Score			
Intermittent IBI Metrics	Intermittent IBI Metric Values	Intermittent IBI Scores	Intermittent IBI Thresholds
Total Taxa Richness-family level	13	81.8	Good/Meets 57-100
Stoneflies, percent composition	0.00	0.0	Fair/inconclusive 51-56
Midges, percent composition	10.2	96.2	Poor/violates 0-50
Dominant taxon, percent composition	59.9	59.5	
Collector-gatherers, percent composition	92.5	8.5	
Filterers, percent composition	0.6	0.8	
Total Score		**41.1**	**Poor/violates 0-50**

Simple Four Index			
Simple Four Index metrics	Simple Four Metric Value	Simple Four Metric Score	Simple Four Index Thresholds
Total Taxa Richness-order level	8	6	Good/Meets ≥ 15
Stoneflies, percent composition	0.00	0	Fair/inconclusive 12-14
Midges, percent composition	10.2	6	Poor/violates 0-11
Dominant taxon, percent composition	59.9	3	
Total Score		**15**	**Good/Meets ≥ 15**

Volunteer Tolerance Index			
Volunteer Tolerance Index	Number of taxa	Tolerance score (#taxa *multiplier)	Tolerance Index Scoring
Sensitive taxa	0	0	Good/Meets ≥ 12
Moderate taxa	2	6	Poor/violates 0-11
Tolerant taxa	6	6	
Total Score		**12**	**Good/Meets ≥ 12**

Macroinvertebrate Taxa list			
Order	Family	FinalID	Individuals
Odonata	Aeshnidae	Aeshnidae	1
Odonata	Coenagrionidae	Coenagrionidae	3
Coleoptera	Dytiscidae	Dytiscidae	14
Diptera-Chironomidae	Chironomidae	Chironomidae	52
Diptera	Simuliidae	Simuliidae	1
Diptera	Tipulidae	Tipulidae	1
Gastropoda	Lymnaeidae	Lymnaeidae	26
Gastropoda	Physidae	Physidae	7
Bivalvia	Sphaeriidae	Sphaeriidae	2
Annelida	Oligochaeta	Oligochaeta	305
Acari	Acari	Acari	1
Crustacea	Ostracoda	Ostracoda	88
Other Organisms	Nematoda	Nematoda	8
		Total count	509

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Bioassessment Report - Indexes of Biological Integrity for Intermittent Stream Macroinvertebrate Communities

Stream	**Miller Creek Upstream of Dearing Rd crossing**
StationID	**VRMIL006.07**
Collection Date	**4/14/2011**
Habitat sampled	**Multi-habitat**
Stream type	**Intermittent**
Site Class	**Reference**

Intermittent IBI Score				
Intermittent IBI Metrics	**Intermittent IBI Metric Values**	**Intermittent IBI Scores**	**Intermittent IBI Thresholds**	
Total Taxa Richness-family level	11	69.2	Good/Meets	57-100
Stoneflies, percent composition	3.2	8.1	Fair/inconclusive	51-56
Midges, percent composition	67.9	34.4	Poor/violates	0-50
Dominant taxon, percent composition	67.9	47.6		
Collector-gatherers, percent composition	69.9	34.3		
Filterers, percent composition	22.4	30.8		
Total Score		**38.7**	**Poor/violates**	**0-50**

Simple Four Index				
Simple Four Index metrics	**Simple Four Metric Value**	**Simple Four Metric Score**	**Simple Four Index Thresholds**	
Total Taxa Richness-order level	5	3	Good/Meets	≥ 15
Stoneflies, percent composition	3.2	0	Fair/inconclusive	12-14
Midges, percent composition	67.9	0	Poor/violates	0-11
Dominant taxon, percent composition	67.9	0		
Total Score		**3**	**Poor/violates**	**0-11**

Volunteer Tolerance Index				
Volunteer Tolerance Index	**Number of taxa**	**Tolerance score (#taxa *multiplier)**	**Tolerance Index Scoring**	
Sensitive taxa	1	5	Good/Meets	≥ 12
Moderate taxa	2	6	Poor/violates	0-11
Tolerant taxa	2	2		
Total Score		**13**	**Good/Meets**	**≥ 12**

Macroinvertebrate Taxa list			
Order	**Family**	**FinalID**	**Individuals**
Coleoptera	Dytiscidae	Dytiscidae	7
Diptera	Ceratopogonidae	Ceratopogonidae	8
Diptera	Chironomidae	Chironomidae	9
Diptera	Chironomidae	Chironomidae	328
Diptera	Ephydridae	Ephydridae	3
Diptera	Simuliidae	Simuliidae	111
Diptera	Stratiomyidae	Stratiomyidae	2
Diptera	Tabanidae	Tabanidae	2
Diptera	Tipulidae	Tipulidae	2
Megaloptera	Corydalidae	Corydalidae	3
Oligochaeta	Oligochaeta	Oligochaeta	5
Plecoptera	Taeniopterygidae	Taeniopterygidae	16
		Total count	496

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Bioassessment Report - Indexes of Biological Integrity
for Intermittent Stream Macroinvertebrate Communities

Stream	**Miller Creek Upstream of Dearing Rd crossing**
StationID	**VRMIL006.07**
Collection Date	**4/21/2012**
Habitat sampled	**Multi-habitat**
Stream type	**Intermittent**
Site Class	**Reference**

Intermittent IBI Score			
Intermittent IBI Metrics	**Intermittent IBI Metric Values**	**Intermittent IBI Scores**	**Intermittent IBI Thresholds**
Total Taxa Richness-family level	10	62.9	Good/Meets 57-100
Stoneflies, percent composition	3.2	8.0	Fair/inconclusive 51-56
Midges, percent composition	70.2	31.9	Poor/violates 0-50
Dominant taxon, percent composition	70.2	44.2	
Collector-gatherers, percent composition	72.1	31.8	
Filterers, percent composition	10.0	13.7	
Total Score		**32**	**Poor/violates 0-50**

Simple Four Index			
Simple Four Index metrics	**Simple Four Metric Value**	**Simple Four Metric Score**	**Simple Four Index Thresholds**
Total Taxa Richness-order level	6	6	Good/Meets $\geq$ 15
Stoneflies, percent composition	3.20	0	Fair/inconclusive 12-14
Midges, percent composition	70.2	0	Poor/violates 0-11
Dominant taxon, percent composition	70.2	0	
Total Score		**6**	**Poor/violates 0-11**

Volunteer Tolerance Index			
Volunteer Tolerance Index	**Number of taxa**	**Tolerance score (#taxa *multiplier)**	**Tolerance Index Scoring**
Sensitive taxa	1	5	Good/Meets $\geq$ 12
Moderate taxa	2	6	Poor/violates 0-11
Tolerant taxa	3	3	
Total Score		**14**	**Good/Meets $\geq$ 12**

Macroinvertebrate Taxa list			
Order	**Family**	**FinalID**	**Individuals**
Plecoptera	Capniidae	Capniidae	15
Plecoptera	Taeniopterygidae	Taeniopterygidae	2
Coleoptera	Dytiscidae	Dytiscidae	5
Megaloptera	Corydalidae	Corydalidae	2
Diptera-Chironomidae	Chironomidae	Chironomidae	373
Diptera	Ceratopogonidae	Ceratopogonidae	12
Diptera	Simuliidae	Simuliidae	53
Diptera	Tipulidae	Tipulidae	3
Annelida	Oligochaeta	Oligochaeta	10
Other Organisms	Nematoda	Nematoda	56
		Total count	531

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Bioassessment Report - Indexes of Biological Integrity
for Intermittent Stream Macroinvertebrate Communities

Stream StationID	
Collection Date	**Wetland ponds @ Watson Woods Preserve**
	4/23/2011
Habitat sampled	**Pools**
Stream type	**Intermittent**
Site Class	**Non-reference**

Intermittent IBI Score			
Intermittent IBI Metrics	**Intermittent IBI Metric Values**	**Intermittent IBI Scores**	**Intermittent IBI Thresholds**
Total Taxa Richness-family level			Good/Meets 57-100
Stoneflies, percent composition			Fair/inconclusive 51-56
Midges, percent composition			Poor/violates 0-50
Dominant taxon, percent composition			
Collector-gatherers, percent composition			
Filterers, percent composition			
Total Score			

Simple Four Index			
Simple Four Index metrics	**Simple Four Metric Value**	**Simple Four Metric Score**	**Simple Four Index Thresholds**
Total Taxa Richness-order level			Good/Meets ≥ 15
Stoneflies, percent composition			Fair/inconclusive 12-14
Midges, percent composition			Poor/violates 0-11
Dominant taxon, percent composition			
Total Score			

Volunteer Tolerance Index			
Volunteer Tolerance Index	**Number of taxa**	**Tolerance score (#taxa *multiplier)**	**Tolerance Index Scoring**
Sensitive taxa			Good/Meets ≥ 12
Moderate taxa			Poor/violates 0-11
Tolerant taxa			
Total Score			

Macroinvertebrate Taxa list			
Order	**Family**	**FinalID**	**Individuals**
Coleoptera	Dytiscidae	Dytiscidae	18
Coleoptera	Hydrophilidae	Hydrophilidae	3
Diptera	Chironomidae	Chironomidae	4
Diptera	Culicidae	Culicidae	3
Acari			3
Crustacea	Ostracoda	Ostracoda	468
Cladocera			24
Copepoda			1
Hemiptera	unknown terrestrial		1
Collembola			1
Hymenoptera			1
Other Organisms	Nematoda	Nematoda	
		Total	527

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Bioassessment Report - Indexes of Biological Integrity
for Intermittent Stream Macroinvertebrate Communities

Stream	**Wetland Ponds @ Watson Woods Preserve**
StationID	
Collection Date	**4/23/2012**
Habitat sampled	**Pools**
Stream type	**Intermittent**
Site Class	**Non-reference**

Intermittent IBI Score			
Intermittent IBI Metrics	**Intermittent IBI Metric Values**	**Intermittent IBI Scores**	**Intermittent IBI Thresholds**
Total Taxa Richness-family level			Good/Meets 57-100
Stoneflies, percent composition			Fair/inconclusive 51-56
Midges, percent composition			Poor/violates 0-50
Dominant taxon, percent composition			
Collector-gatherers, percent composition			
Filterers, percent composition			
Total Score			

Simple Four Index			
Simple Four Index metrics	**Simple Four Metric Value**	**Simple Four Metric Score**	**Simple Four Index Thresholds**
Total Taxa Richness-order level			Good/Meets ≥ 15
Stoneflies, percent composition			Fair/inconclusive 12-14
Midges, percent composition			Poor/violates 0-11
Dominant taxon, percent composition			
Total Score			

Volunteer Tolerance Index			
Volunteer Tolerance Index	**Number of taxa**	**Tolerance score (#taxa *multiplier)**	**Tolerance Index Scoring**
Sensitive taxa			Good/Meets ≥ 12
Moderate taxa			Poor/violates 0-11
Tolerant taxa			
Total Score			

Macroinvertebrate Taxa list			
Order	**Family**	**FinalID**	**Individuals**
Coleoptera	Dytiscidae	Dytiscidae	17
Coleoptera	Hydrophilidae	Hydrophilidae	10
Diptera	Chironomidae	Chironomidae	19
Diptera	Culicidae	Culicidae	4
Diptera	Ephydridae	Ephydridae	13
Diptera	Simuliidae	Simuliidae	1
Gastropoda	Planorbidae	Planorbidae	1
Annelida	Oligochaeta	Oligochaeta	53
Acari	Pionidae	Pionidae	2
Crustacea	Ostracoda	Ostracoda	428
Other Organisms	Nematoda	Nematoda	2
		Total	550

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Appendix F: Macroinvertebrate metric and IBI scores for samples from streams in the Granite Creek watershed of Prescott AZ, 2008-2012.

STATIONID	COLLDATE	Total Taxa Family	Stonefly %	Midges %	Dom taxon %	Coll %	Filt %	Total taxa score	Stonefly score	Midges score	Dom taxon score	Coll score	Filt score	Int IBI score	IntIBI Assmt cat
MGIDN002.66	4/21/2008	13	27.4	11.5	34.2	24.0	7.9	81.8	68.2	93.2	97.6	86.8	10.9	85	Good
MGIDN002.66	4/5/2009	13	6.5	43.4	43.4	65.5	16.8	81.8	16.2	60.7	84.0	39.4	23.1	56	Fair
MGIDN002.66	4/12/2010	8	6.5	17.5	70.5	20.7	70.5	50.3	16.2	88.4	43.8	90.5	97.1	58	Good
VRASP000.37	4/11/2011	9	0.0	60.9	60.9	71.6	24.9	56.6	0.0	41.9	58.0	32.4	34.3	38	Poor
VRASP000.37	4/22/2012	9	0.20	18.6	64.4	92.5	6.7	56.6	0.5	87.2	52.8	8.6	9.2	36	Poor
VRASP005.07	4/20/2008	13	9.9	45.4	45.4	52.8	26.4	81.8	24.6	58.5	81.0	53.9	36.4	60	Good
VRASP005.07	4/5/2009	14	2.8	54.6	54.6	66.2	25.4	88.1	7.1	48.7	67.3	38.6	35.0	50	Poor
VRASP005.07	4/12/2010	7	4.1	83.9	83.9	88.0	7.4	44.0	10.2	17.3	23.9	13.7	10.2	22	Poor
VRBAN000.06	4/22/2008	15	0.0	54.6	54.6	78.8	4.4	94.3	0.0	48.7	67.4	24.2	6.1	47	Poor
VRBAN000.06	4/13/2011	8	0.0	73.1	73.1	88.1	1.5	50.3	0.0	28.8	39.9	13.6	2.1	27	Poor
VRBAN000.06	4/22/2012	13	0.00	63.0	63	79.5	9.8	81.8	0.0	39.7	54.9	23.4	13.5	36	Poor
VRBTT000.32	4/13/2011	11	0.0	73.8	73.8	89.5	3.6	69.2	0.0	28.1	38.9	12.0	5.0	30	Poor
VRBTT000.32	4/22/2012	12	0.00	40.5	40.5	88.1	9.5	75.5	0.0	63.8	88.3	13.6	13.1	42	Poor
VRBTT005.70	4/23/2008	15	15.3	63.1	63.1	63.7	17.1	94.3	37.9	39.5	54.8	41.4	23.6	54	Fair
VRBTT005.70	4/6/2009	10	7.5	37.1	52.4	37.5	52.4	62.9	18.5	67.4	70.7	71.4	72.1	58	Good
VRBTT005.70	4/13/2010	6	0.8	41.3	56.9	41.3	56.8	37.7	2.0	62.9	63.9	67.0	78.3	47	Poor
VRBTT005.70	4/16/2011	9	1.4	20.8	75.2	21.3	75.2	56.6	3.6	84.9	36.8	89.8	103.6	54	Fair
VRBTT005.70	4/21/2012	9	1.70	62.6	62.6	63.3	19.4	56.6	4.2	40.1	55.5	41.8	26.7	37	Poor
VRGRA026.57	4/12/2011	7	0.0	66.3	66.3	81.5	15.2	44.0	0.0	36.1	49.9	21.1	20.9	30	Poor
VRGRA026.57	4/23/2012	8	0.00	19.5	54.5	44.8	54.5	50.3	0.0	86.3	67.5	63.0	75.1	57	Good
VRGRA027.35	4/23/2008	9	0.0	18.1	64.4	33.0	64.4	56.6	0.0	87.8	52.8	76.5	88.7	55	Fair
VRGRA029.97	4/22/2008	6	0.0	80.0	79.9	86.4	13.2	37.7	0.0	21.4	29.9	15.5	18.2	21	Poor
VRGRA029.97	4/7/2009	9	0.0	69.4	69.4	93.9	0.6	56.6	0.0	32.8	45.5	7.0	0.8	28	Poor
VRGRA029.97	4/12/2011	8	0.0	90.5	90.5	97.8	1.1	50.3	0.0	10.2	14.1	2.5	1.5	15	Poor
VRGRA029.97	4/13/2012	11	0.00	14.3	79.7	95.7	0.9	69.2	0.0	91.9	30.1	4.9	1.3	33	Poor
VRGRA033.51	4/21/2008	14	51.0	36.8	45.0	44.6	1.0	88.1	126.8	67.7	81.6	63.2	1.3	85	Good
VRGRA033.51	4/7/2009	11	13.7	47.1	47.1	54.9	28.4	69.2	34.2	56.7	78.5	51.5	39.1	58	Good
VRMAN000.52	4/11/2011	9	0.0	89.8	89.8	96.2	2.4	56.6	0.0	10.9	15.2	4.3	3.3	17	Poor
VRMAN000.52	4/22/2012	11	0.00	35.4	39.9	93.7	1.3	69.2	0.0	69.2	89.2	7.2	1.8	39	Poor
VRMIL000.22	4/20/2008	7	0.0	80.1	80.1	96.7	0.0	44.0	0.0	21.3	29.6	3.8	0.0	20	Poor
VRMIL000.22	4/7/2009	5	0.0	92.8	92.8	99.1	0.0	31.4	0.0	7.7	10.7	1.0	0.0	10	Poor
VRMIL000.22	4/16/2011	10	0.0	55.0	55.0	97.7	0.2	62.9	0.0	48.2	66.8	2.6	0.3	36	Poor
VRMIL000.22	4/13/2012	13	0.00	10.2	59.9	92.5	0.6	81.8	0.0	96.2	59.5	8.5	0.8	41	Poor
VRMIL006.07	4/20/2008	17	31.3	8.4	30.5	13.1	37.5	106.9	78.0	98.2	103.1	99.2	51.6	97	Good
VRMIL006.07	4/6/2009	15	10.9	15.4	39.7	18.6	65.4	94.3	27.1	90.7	89.5	92.9	90.1	79	Good
VRMIL006.07	4/13/2010	11	5.4	57.8	57.8	57.8	34.0	69.2	13.4	45.2	62.6	48.1	46.8	48	Poor
VRMIL006.07	4/14/2011	11	3.2	67.9	67.9	69.9	22.4	69.2	8.1	34.4	47.6	34.3	30.8	39	Poor
VRMIL006.07	4/21/2012	10	3.20	70.2	70.2	72.1	10.0	62.9	8.0	31.9	44.2	31.8	13.7	32	Poor

STATIONID	COLLDATE	TaxaRich_Order	SimpleFour_Index	SimpleFour_Assmt cat	Tolerance_Index	Vol_Tol	Tol_Assmt_cat
MGIDN002.66	4/21/2008	7	21	Good	15	15	Good
MGIDN002.66	4/5/2009	7	18	Good	16	16	Good
MGIDN002.66	4/12/2010	5	15	Good	14	11	Good
VRASP000.37	4/11/2011	6	12	Fair	8	8	Poor
VRASP000.37	4/22/2012	6	15	Good	12	8	Good
VRASP005.07	4/20/2008	6	18	Good	14	14	Good
VRASP005.07	4/5/2009	8	12	Fair	20	20	Good
VRASP005.07	4/12/2010	3	0	Poor	7	7	Poor
VRBAN000.06	4/22/2008	9	12	Fair	17	17	Good
VRBAN000.06	4/13/2011	6	6	Poor	11	11	Poor
VRBAN000.06	4/22/2012	8	12	Fair	18	11	Good
VRBTT000.32	4/13/2011	5	3	Poor	7	7	Poor
VRBTT000.32	4/22/2012	8	12	Fair	12	7	Good
VRBTT005.70	4/23/2008	5	15	Good	11	11	Poor
VRBTT005.70	4/6/2009	5	15	Good	16	13	Good
VRBTT005.70	4/13/2010	3	6	Poor	10	7	Poor
VRBTT005.70	4/16/2011	6	12	Fair	19	19	Good
VRBTT005.70	4/21/2012	6	12	Fair	14	19	Good
VRGRA026.57	4/12/2011	4	9	Poor	6	6	Poor
VRGRA026.57	4/23/2012	6	15	Good	8	6	Poor
VRGRA027.35	4/23/2008	5	12	Fair	10	7	Poor
VRGRA029.97	4/22/2008	4	3	Poor	8	8	Poor
VRGRA029.97	4/7/2009	7	6	Poor	11	11	Poor
VRGRA029.97	4/12/2011	5	3	Poor	7	7	Poor
VRGRA029.97	4/13/2012	9	12	Fair	13	7	Good
VRGRA033.51	4/21/2008	7	18	Good	19	19	Good
VRGRA033.51	4/7/2009	5	15	Good	13	13	Good
VRMAN000.52	4/11/2011	6	6	Poor	10	10	Poor
VRMAN000.52	4/22/2012	6	12	Fair	8	10	Poor
VRMIL000.22	4/20/2008	5	3	Poor	5	5	Poor
VRMIL000.22	4/7/2009	4	3	Poor	8	8	Poor
VRMIL000.22	4/16/2011	7	12	Fair	11	9	Poor
VRMIL000.22	4/13/2012	8	15	Good	12	9	Good
VRMIL006.07	4/20/2008	8	24	Good	23	22	Good
VRMIL006.07	4/6/2009	7	21	Good	22	20	Good
VRMIL006.07	4/13/2010	5	9	Poor	13	13	Good
VRMIL006.07	4/14/2011	5	3	Poor	13	13	Good
VRMIL006.07	4/21/2012	6	6	Poor	14	13	Good

Appendix G: Box and whisker plots of various macroinvertebrate metrics tested for ability to discriminate between reference and stressed samples in intermittent streams of Arizona, 2008-2011.