

EII (Sediment) Quality Assurance Project Plan

Project #17

Introduction

The Environmental Integrity Index (EII) is a tool to monitor and assess the ecological integrity and the degree of impairment of Austin's watersheds. The EII combines biological and physical criteria with chemical and toxicity data to provide a comprehensive assessment of the structure and integrity of the aquatic ecosystem. The mission of the City of Austin's Environmental Resource Management Division is to protect the water quality in Austin area watersheds. The EII is used in the Department's master plan process to evaluate the current water quality conditions of Austin's watersheds. Because the EII is a cost-effective, comprehensive and direct means of monitoring the health of Austin's receiving waters, it was also incorporated into the City of Austin's National Pollution Discharge Elimination System (NPDES) permit program as a Reasonable and Prudent Measure (RPM) activity. Additional documentation is available in the Environmental Integrity Index Methodology Report.

The goal of the developers of the EII was to produce a quantifiable method for assessing the water quality condition of Austin's urban and non-urban streams and to provide a baseline from which to evaluate our water resources in order to target protective measures. The scoring system is listed below.

EII Scoring System		
Narrative Score	EII Score Range	
	Lower	Upper
Excellent	89	100
Very Good	76	88
Good	64	75
Fair	51	63
Marginal	39	50
Poor	26	38
Bad	13	25
Very Bad	0	12

The EII consists of 6 sub-indices. Methodology for the collection and calculation of the sediment sub-index is presented in this QAPP.

Project Management

- Who is the project manager?
Ellen Geismar
- Who is the WMA team representative?
Chris Herrington

3. What other WPDRD staff are on the committee for this project?
Andrew Clamann, Martha Turner, Mateo Scoggins
4. When will the annual WMA review be completed?
January
5. When will the project begin/end?
The project began in 1994, with the first complete sampling of phase I watersheds in 1996.
The project is on-going.

Data Objectives

6. What are the study objective(s)?
Monitor watershed health with a comprehensive index to identify watersheds with decreasing health and isolate probable causes of degradation (in compliance with current fiscal year business plan).
7. In addition to the project committee, who else is interested in the data?
WP&DRD administration.
8. What decision(s) will be made from the information obtained? When will the decision(s) be made?
Impaired watersheds will be identified.

Decisions will be made annually in January for current phase, or as soon as all data is available.
9. What has been done in the past? Describe project history, list previous related reports or available data.

Previous Reports:

Annual reports (Water Watchdog, etc)

Online watershed fact sheets (http://www.ci.austin.tx.us/watershed/learn_ws.htm)

SR-03-06: Change in EII values in Austin (1996-2002)

COA-ERM 1999-05: Environmental Integrity Index Methodology.

COA-ERM/WRE 1997-03: Environmental Integrity Index Water Quality Assessment
Methodology

10. What could be done in the future? List and prioritize potential special studies.
Reduction of detection limits for sediment parameters can result in a decrease in sediment score values if previous results were non-detect. Investigation and resolution of this phenomena should occur prior to the calculation of 2005 scores.

Data generation

11. Describe the sampling. What sites will be sampled? In addition to the core parameter list in the SOP manual, what other parameters will be collected? When will sampling occur?

Sites will be sampled on a rotating 3-year cycle. Sediment will be sampled from the most downstream EII site in each watershed once per year approximately during the same time period as the EII-Aquatic Life sampling.

Bottles Needed

- One 1-L Glass

Sediment Parameters

Parameter	Analysis Method	DHL Cost
Metals (As, Cd, Cu, Pb, Zn)	EPA 6020	80.00
Metals (Hg)	EPA 7471 A	15.00
PAHs ¹	EPA 8270 C	100.00
Chlorinated Pesticides (Chlordane, DDD, DDE, DDT)	EPA 8081 A	75.00
PCBs	EPA 8082	60.00
Total Organic Carbon ²	SM 5310 B	80.00
Total Petroleum Hydrocarbons ²	TX 1005	50.00
Grain Size/Texture ²	EPA 600/2 Hydrometer	80.00
Dry Weight Percent ²	MSA 9	0.00
Supplementary Metals (Fe, Ni, Cr, Ag) ²	EPA 6020	?
Ammonia in Sediment ²	EPA 350.1	40

1. Refer to FSDB for complete list of PAHs to be analyzed.
2. Non-scoring supplementary parameter

Phase I - (sites monitored in Year 2003, 2006, 2009, etc)

Watershed	Site Name	FSDB #
Barton	Barton Creek Between Dams Above Pool	879
Blunn	Blunn Creek @ Riverside Drive	180
North Boggy	North Boggy Creek @ Delwau Dr.	493
Buttermilk	Buttermilk Creek @ Little Walnut	851
Country Club East	East Country Club @ ACC	1475
Country Club West	West Country Club @ Krieg Fields	1474
East Bouldin	East Bouldin Creek @ Post Oak Dr	1338
Fort Branch	Fort Branch Creek @ North Boggy Creek	123
Harper's Branch	Harper's Branch Creek @ Woodland Ave	844
Johnson Creek	Johnson Creek @ Woodmont	897
Little Walnut Creek	Little Walnut Creek @ US183	634
Shoal Creek	Shoal Creek Above 1st St.	122
Tannehill Creek	Tannehill Creek @ Desirable Drive	1476
Waller Creek	Waller Creek Below Cesar Chavez	38
Walnut Creek	Walnut Creek @ SP Railroad Bridge	503
West Bouldin Creek	West Bouldin Creek @ Jewell	878
Williamson Creek	Williamson Creek @ McKinney Falls (Will1)	223

Phase II - (sites monitored in Year 2004, 2007, 2010, etc)

Watershed	Reach	Site Name	FSDB #
Bear Creek	BER1	Bear Creek @ Twin Creeks Road	1087
Bee Creek	BEE1	Bee Creek @ Lake Austin	319
Bull Creek	BULL1	Bull Creek Above West Bull Creek	347
Carson Creek	CAR1	Carson Creek @ Shady Spring Subdivision	1094
Dry Creek (North)	DRN1	Dry Creek (North) @ Mt Bonnel Rd	1108
Eanes Creek	EAN2	Eanes Creek @ Camp Craft Road	1106
Lake Creek	LKC1	Lake Creek @ Sugar Berry Cove	1098
Little Barton Creek	LBA1	Little Barton Creek @ Barton Creek (LBC)	77
Little Bear Creek	LBR1	Little Bear Creek @ Bear Creek	1101
Little Bee Creek	LBE1	Little Bee Creek @ Red Bud Trail	1105
Onion Creek	ONI1	Onion Creek @ South Austin Regional WWTP (SAR)	1366
Rattan Creek	RAT1	Rattan Creek @ Shadowbrook Circle	1097
Slaughter Creek	SLA1	Slaughter Creek @ Pine Valley Drive	1082
South Boggy Creek	SBO1	South Boggy Creek @ Bluff Springs Road (BO1)	227
Taylor Slough (North)	TSN1	Taylor Slough North @ Mayfield Park	3969
Taylor Slough (South)	TSS1	Taylor Slough South @ Reed Park (TSS)	318
West Bull Creek	WBL1	West Bull Creek Above Bull Creek (EK)	343

Phase III - (sites monitored in Year 2002, 2005, 2008, etc)

Watershed	Site Name	FSDB #
Cottonmouth Creek	Cottonmouth Creek @ Dee Gabriel Collins Rd.	1206
Decker Creek	Decker Creek @ Gilbert	1974
Dry Creek (South)	Dry Creek (South) @ Wolf Lane	1210
Elm	Elm Creek @ Austin Colony	3614
Gilleland	Gilleland Creek @ FM 969	886
Harris	Harris Branch Creek @ Boyce Lane	1201
	Turkey Creek @ City Park Road	1221
	Cuernavaca Creek @ River Hills Road	1222
Lake Austin	Panther Hollow Creek @ Big View Road	1223
	Common Ford Trib. in Common Ford Metro Park	1048
	Unnamed Trib. @ Running Deer Trail (AST)	316
	Bear Creek (West) @ Fritz Hughes Park Rd.	1224
Marble	Marble Creek above Onion Creek (M1)	231
North Fork Dry	North Fork Dry Creek @ FM 812	1217
South Fork Dry	South Fork Dry Creek @ FM 812	1216
Rinard	Rinard Creek @ Bradshaw	233

12. Describe special sample conditions. List only deviations from routine non-storm conditions as described in the SOP manual.

Samples will be collected under non-storm conditions as defined by the SOP manual.

13. Describe special collection methods. List only deviations from routine sample collection methods as listed in the SOP manual.

N/A

14. List special laboratory analytical methods. Include details on CRP requirements, non-EPA approved methods and in-house analyses (Ohmicron).

N/A

15. Where will the samples be analyzed?

DHL

16. How much will samples cost?

Each sediment sample submitted to DHL will cost \$580.00.

EII Phase	Annual DHL Cost (Sediment)
I	\$9,280.00
II	\$9,860.00
III	\$9,280.00

17. What possible problems may arise in sample collection and what actions can be taken to mitigate their impact?

Sites may be dry at time of sample collection. If dry, the site will not be sampled. If site is dry for all events during a collection year, the site may be dropped or moved as determined during the annual review.

Validation

18. What type, how often and where will QA/QC samples will be collected? Include QA/QC samples names in the FSDB if applicable.

N/A

19. In addition to the automated data flagging process, how will QA/QC results be used to validate data quality?

N/A

20. In case of QA/QC failure, what corrective action will be taken?

N/A

Assessment

21. By what specific methods will the data be analyzed?

Scores will be calculated on a 100-point scale using SAS, and stored as integer values in the Field Sampling Database. Measured values will be compared to q-curves for each component of the sub-indices to generate a score from 0 to 100. Weighted component scores

will be combined to generate the individual sub-index scores for each site. Values of the six sub-indices for each site will be averaged to generate a total site EII score for a given sampling year. The individual sub-index scores for each watershed will be averaged to generate the total sub-index scores for each watershed in a given sampling year. Values of the watershed sub-index scores will be averaged to generate the total watershed EII score for each watershed in a given sampling year. Average site scores will NOT be averaged to generate the total watershed score. More information on calculation methodology can be found in the EII Methodology Report.

Overall Sediment Quality Sub-index scores are calculated by a slightly different method than other sub-indices. Although individual parameters have unique q-curves, the values for each of the parameters are combined into three groups by parameter type (metals, pesticides, PAHs) which are then averaged equally to generate the total Sediment Quality Sub-index score.

Q-curve values for sediment parameters are presented below.

Table 11. Sediment Quality Sub-index q-curve breakpoints.

Group Weighting	Parameter	Individual Weighting	100	75 (NOEL)	50 (ERL)	25 (ERM)	0 (AET)
Metals (0.333)	Arsenic	0.167	0	5.90	9.79	33.0	85.0
	Cadmium	0.167	0	0.58	0.99	4.98	10.0
	Copper	0.167	0	16.0	31.6	149.0	390.0
	Lead	0.167	0	31.0	35.8	128.0	250.0
	Mercury	0.167	0	0.15	0.18	1.06	2.00
	Zinc	0.167	0	98.0	121.0	459.0	820.0
Pesticides (0.333)	PCBs	0.2	0	32.0	59.8	676.0	5300.0
	DDD	0.2	0	2.00	4.88	28.0	60.0
	DDE	0.2	0	1.42	3.16	31.30	190.0
	DDT	0.2	0	1.00	4.16	62.90	710.0
	Chlordane	0.2	0	0.50	3.24	17.6	60.0
PAHs (0.333)	PAHs	1.0	0	260.0	1610.0	22800.0	100000.0

22. What hypotheses will be tested?
All individual component, sub-index or index scores for every site and watershed have not changed from previous scores by more than one EII category.
23. When and/or how often will the data be analyzed?
Data will be analyzed annually in January, or as soon as all data has been received from laboratory.
24. How will it be determined that the study objectives have been met?
Successful collection of sediment samples at all sites with flow.

Reporting

25. When and what type of reports will be generated? Who will generate the report?
Data will be included in annual State of the Environment Report.

A major review will be conducted once every third year (2006) by WMA representative.

Annual data reports will be completed by Andrew Clamann.

26. Who will review the reports prior to publication?
Mateo Scoggins, Ed Peacock, Martha Turner

References

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