

Town Lake Sediment Study Quality Assurance Project Plan

Project #6

Introduction

In addition to causing increased turbidity and potential filling of the river Basin, sediments are an important storage compartment for many toxins released into surface waters. Because of their ability to sequester toxic compounds, sediments can reflect water quality and record the effects of anthropogenic emissions. As these toxins move through the water column and settle on the bottom, fish and other aquatic life may be exposed to them both through suspended sediments and in the benthic habitat. Because of these impacts and observed toxins in fish tissue, the 1992 Town Lake Report (COA 1992) set a goal of reducing the toxin concentrations in sediment by 50%.

The recently adopted Watershed Protection Master Plan (COA 2001) set goals in terms of maintaining the beneficial uses of the lake. A beneficial use affected by the toxins associated with the sediment is Aquatic Life Support (ALS), in terms of benthic and fish populations. To assess impacts to the benthic populations for this report, sediment concentrations are compared to two sets of sediment quality guidelines (SQGs) from a recent evaluation of guidelines for freshwater ecosystems, and those used by TCEQ. Fish accumulate toxins through water, plant and sediment pathways. Thus, their health and the use of the water body for fishing may also be negatively impacted by these toxins. The fish tissue concentrations of the toxins and fish consumption advisories are discussed in Section 10 of the Town Lake Report (COA 2004).

The Watershed Protection Master Plan (COA 2001) also used a sub-goal to address the continued input rather than the level of toxins to the lake. The overall goal for toxic sediments, in assessing problem levels for the plan, was “to maintain existing toxic loads being discharged to Town Lake, represented by total organic carbon (TOC), chemical oxygen demand (COD), copper, lead and zinc loads, as well as by the Spills Risk Index.” This goal will be assessed in future years to gauge the success of the Master Plan programs.

Project Management

1. Who is the project manager?
Mary Gilroy
2. Who is the WMA team representative?
Chris Herrington
3. What other WPDRD staff are on the committee for this project?
Leila Gosselink, Ellen Geismar, Martha Turner
4. When will the annual WMA review be completed?
November

5. When will the project begin/end?
Sediment sampling by this protocol began in November 2003, and will continue at some frequency throughout the duration of the Town Lake Study.

Data Objectives

6. What are the study objective(s)?
 - To insure the health of Town Lake for aquatic life and recreation:**
Are Town Lake sediment concentrations above screening levels/standards?
 - To gauge success of master plan programs (goal of maintaining existing loads):**
Are Town lake sediment concentrations changing over time?
 - To compare Town Lake seasons for temporal differences:**
Are mean values different between release and non-release seasons.
7. In addition to the project committee, who else is interested in the data?
LCRA and TCEQ (through the Clean Rivers Program)
8. What decision(s) will be made from the information obtained? When will the decision(s) be made?
Are Town Lake sediment concentrations of concern or toxic? Mean parameter values greater than screening levels, then TCEQ and TDH will be notified and additional sampling may be undertaken.

9. What has been done in the past? Describe project history, list previous related reports or available data.

Sampling Dates	Reference
<i>Town Lake Study Data (1981-1991)</i>	
March 1, 1981	Final Report of the National Urban Runoff Program (NURP) in Austin, Texas (City of Austin and Engineering Science, 1983)
May 14, 1985	Sampling for study on "Effects of Urbanization on Toxic Organics Concentrations in Lake Austin and Town Lake, Texas" (Wallace and Armstrong 1986)
1987-1991	COA/USGS annual sediment monitoring data
February 1, 1988	The Lower Colorado River Pesticides Study: Pesticide and Heavy Metal Residues in Surface Water, Sediment, and Fish Tissue (Clear Clean Colorado (CCC) et al. 1990)
June 6, 1990	Texas Water Commission (TWC), unpublished data 1990
September 25-27, 1991	City of Austin Clean Lakes Study, creek mouths
<i>Additional Historical Data (1980-1991)</i>	
November 5, 1980	Texas Natural Resource Conservation Commission (current name), lab not known. Data obtained from TNRCC database.
August 8, 1981	Texas Natural Resource Conservation Commission (current name), lab not known. Data obtained from TNRCC database.
May 1, 1982	Environmental Resources Management data, laboratory not known. Referenced in Wallace and Armstrong (1986).
February 1, 1988	The Lower Colorado River Pesticides Study: Pesticide and Heavy Metal Residues in Surface Water, Sediment, and Fish Tissue (Clear Clean Colorado (CCC) et al. 1990), additional data from low flow sampling analyzed at the Texas Department of Agriculture – Pesticide laboratories
May 15, 1990	Texas Water Commission (TWC), unpublished data 1990
<i>Recent Town Lake Sediment Sampling (1992-2000)</i>	
February 1, 1988	The Lower Colorado River Pesticides Study: Pesticide and Heavy Metal Residues in Surface Water, Sediment, and Fish Tissue (Clear Clean Colorado (CCC) et al. 1990)
June 6, 1990	Texas Water Commission (TWC), unpublished data 1990
September 25-27, 1991	City of Austin Clean Lakes Study, creek mouths
1992-2000	Ongoing sampling, Environmental Resources Management Division, City of Austin
1992-2000	COA/USGS annual sediment monitoring data

10. What could be done in the future? List and prioritize potential special studies.
Sediment core sampling.

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?

- Sediment will be collected from the bottom of the Basin twice per year at the routine sampling site. At least three sediment grabs will be collected using the Ponar Dredge and

composited during each sampling event. Each year, one sample should be collected during the release period and once during the non-release period with a regular non-storm sampling run.

- The sediment sample will be analyzed for NH₃, Total Solids, TOC, TPH (by 1005), As, Cd, Cr, Cu, Fe, Pb, Zn, Hg, Ni, Ag, PAHs (by 8270C to get lower detection limits) PCBs, OC pesticides, chlorophenoxy acid herbicides, organophosphate pesticides, and texture.
- The sample will be collected in a glass 1-liter container and preserved on ice until delivery to DHL for analysis.

Parameter	Method	Lab	Cost
Ammonia	EPA 350.1	Sub-contract*	\$40
Percent Moisture	ASTM D2216	DHL	\$0
TOC (%)	EPA 9060	DHL	\$80
TPH	Tx 1005	DHL	\$50
Arsenic	EPA 6020	DHL	\$100
Cadmium			
Chromium			
Copper			
Iron			
Lead			
Zinc			
Silver			
Nickel			
Mercury	EPA 7471A	DHL	\$15
PAHs	EPA 8270C	DHL	\$100
PCB	EPA 8080	DHL	\$60
Organochlorine pesticides	EPA 8081	DHL	\$75
Chlorophenoxy acid herbicides	EPA 8151	DHL	\$205
Organophosphate pesticides	EPA 8141	Sub-contract*	\$205
Texture	Hydrometer	Sub-contract*	\$80

*current sub-contract lab is LCRA-ELS

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

Sampling immediately following scouring flood events should be avoided. One sample per year will be collected during non-release (Oct 15-Mar 15) and one sample per year will be collected during release (Mar 15-Oct 15).

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

Sediment grab samples should be collected from using a petite ponar dredge from the WRE boat.

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

Sediment samples should be analyzed by CRP-approved methods.

15. Where will the samples be analyzed?

Sediment samples will be analyzed at DHL.

16. How much will samples cost?

The per sample cost is approximately \$1,010. The estimated total annual cost is \$2,020.

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

Multiple dredges may be required to generate sufficient sediment. Too much water content in samples may inflate reporting limits, and excessive water in sample should be avoided.

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.

None.

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?

Mean parameter values will be compared to current TCEQ screening levels for organic substances in sediment and versus consensus-based sediment quality guidelines for freshwater ecosystems (MacDonald et al 2000).

Seasons will be compared by ANOVA.

Temporal trends will be analyzed by regression as specified in the WRE SOP manual.

22. What hypotheses will be tested?

Mean parameter values are less than guidelines/screening levels.

There are no differences between seasons (release, non-release).

There are no trends over time.

23. When and/or how often will the data be analyzed?

Data will be analyzed once every two years in conjunction with the biannual Town Lake data report.

24. How will it be determined that the study objectives have been met?

Successful data collection to satisfy the requirements of the specified analyses.

Reporting

25. When and what type of reports will be generated? Who will generate the report?
Analysis results will be included in the bi-annual Town Lake data report, with next report scheduled in 2006.
26. Who will review the reports prior to publication?
Project committee and Ed Peacock.

References

- City of Austin. 1992a. Diagnostic Study of Water Quality Conditions in Town Lake, Austin, Texas, Volume I. Water Quality Report Series. COA-ERM/WRE 1992-01. City of Austin Environmental and Conservation Services Department, Environmental Resources Management Division.
- City of Austin. 2001b. Watershed Protection Master Plan Phase I Watersheds Report, Volume 1. Watershed Protection Report Series COA-WPD-2001-02. City of Austin Watershed Protection Department.
- City of Austin. 2004. The Town Lake Report, volume I. City of Austin Watershed Protection & Development Review Department, Environmental Resources Management Division.
- MacDonald, D.D., and C.G. Ingersoll, T.A. Berger. 2000. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems. Environmental Contamination and Toxicology 39:20-31.