Expectations for Element B

Aaron Wendt
Texas State Soil and Water Conservation Board

Texas Watershed Planning Short Course
January 14, 2009
Bandera, TX

From the EPA 319 Guidance

- Estimate of load reductions expected for management measures to be implemented
  - Based on existing source loads estimated (element A)
  - Determine reductions needed to meet water quality goals
  - Identify management measures (element C) to reduce pollutant loads
  - Estimate load reductions expected as a result of implementation (element B)
  - Recognize natural variability & difficulty in precisely predicting performance of management measures over time

EPA Evaluation of WPPs

- especially struggling with Element B
- not surprising, given need for complex tools & technical skills
- calculating load reductions is a time consuming procedure & inexact science at best
- necessary data is not easily accessed or a water quality model is too sophisticated for all but very highly trained users
- expected water quality impact of WPP allows for most effective utilization of resources to achieve water quality goals in most cost-effective & time-efficient manner

- Determine Load Reductions to Meet Environmental Targets
  - understand cause-and-effect relationship between pollutant loads & waterbody response
  - Related to scope
  - Do environmental targets = water quality standards? Must they? Should they?

- Where a TMDL has been adopted, must incorporate these environmental targets

- Estimates should be provided at same level (scale & scope) as Element A (e.g., total load reduction expected for dairy cattle feedlots, row crops, or eroded streambanks)
- Methods used for Elements A & B should be compatible

- Identify Relative Pollutant Reduction Efficiencies
- Consider Scale of Watershed
- Consider Synergistic Effects of Multiple Practices

Facilitated Stakeholder Decision-Making

- focus Load Reductions on dominant sources or distribute among sources
- several scenarios or combinations of source reductions will meet targets
- location of proposed reductions can affect distribution & magnitude of load reductions (critical areas)
- estimate load reductions at a few key locations in watershed to support assessing milestones & criteria

Graded Approach

- One size fits all approach does not work
- Principle of graded approach
  - Commonly applied to QAPPs
  - Vary degree of QA/QC according to specific objectives and needs of project
- As applied to WPPs
  - Degree of specificity in Elements vary according to severity and nature of water quality issues

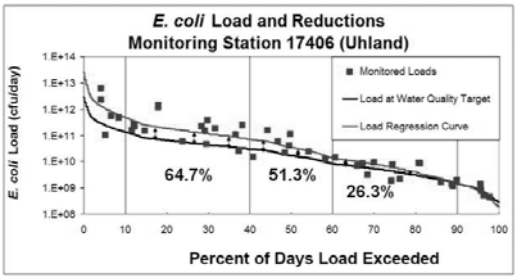

Figure 5.2. *E. coli* load duration curve for station 17406 near Uhland in Hays County.

Table 5.1. Annual load characteristics and *E. coli* reductions for each station (in billions of cfu).

Monitoring Station	Mean Annual *E. coli* Load (cfu/year)	Minimum 95% CI[1]	Maximum 95% CI[1]	Load Reduction (cfu/year)	Target Load (cfu/year)
Uhland (17406)	1.12E+05	8.74E+04	1.36E+05	7.28E+04	3.92E+04
Lockhart (12647)	4.26E+05	2.46E+05	6.06E+05	6.39E+04	3.62E+05
Luling (12640)	3.02E+07	1.04E+07	5.01E+07	1.24E+07	1.78E+07

[1] The 95% confidence interval for minimum and maximum nutrient loads.

EXHIBIT 4-1
BMP Options, Associated Removal Efficiencies, and Maximum Land Usage

BMP Option	TSS Removal Effiioency (%)	TP Removal Effiioency (%)	TN Removal Effiioency (%)	Maximum Land Usage (%)
Urban Land				75
Detention Ponds	65	60	30	20
Retention Ponds	80	60	30	0
Riparian Buffers	60	20	20	10
Treatment Ponds (Wetlands)	80	40	30	10
Vegetated Swales/Strips	80	25	40	10
Infiltration Basins	80	60	60	25
Agricultural Land				40
Grass Planting	48	19	19	5
Grading/Grassed Waterways/Filter Strips	60	20	20	25
Grade Stabilization Structures/Wet Pond	53	21	21	10
Range Land				60
Grass Planting	48	19	19	25
Grading/Grassed Waterways/Filter Strips	60	20	20	25
Grade Stabilization Structures/Wet Pond	53	21	21	0
Forest Land				30
Grass Planting	48	19	19	25
Grading/Grassed Waterways/Filter Strips	60	20	20	5
Grade Stabilization Structures/Wet Pond	53	21	21	0

Table 6-3: Summary Structural Stormwater BMPs

Non-Proprietary	Bacteria Removal	Vendor-Supplied Systems	Bacteria Removal
Infiltration Trench	~ 90%	Manufactured Wetland	97% [4]
Infiltration Basin	75% - 90%	Media Filter	47%
Wet Pond	64%, 99%	Wet Vault	No data [2]
Constructed Wetland	77%, 80% -90%	Vortex Separator	50% - 88%
Extended Detention Basin	Limited data [1]	Drain Inserts	No data [2]
Vegetated Swale/Filter Strip	-33%	Antimicrobial Filters	50%
Bioretention System	~ 90%, 88%		
Sand Filter	60%-75%, 76%, 22%		
Water Quality Inlet	No data [2]		
Screens, Nets, and Trash Racks	No data [2]		
Multiple Systems	Varies [3]		

Notes:
1. Data suggest that there is little bacteria removal in extended detention basins.
2. Unlikely to achieve good bacteria removal based on treatment mechanisms used.
3. Dependent upon combination of BMPs used.
4. Data from system manufacturer based on one pilot study.

Figure 35. Expected Reductions in Total Phosphorus from Implementation of the ACW Protection Plan

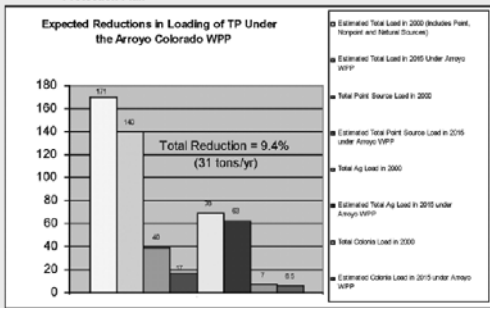

Table 17. Estimated Annual Sediment, Total Nitrogen and Total Phosphorus Reductions Resulting from Implementation of the Agricultural Component of the ACW Protection Plan in Tons

Constituent	Est. Reductions	Est. Annual Reductions From Treated Acres		
	Per Treated Acres	50,000 acres	100,000 acres	150,000 acres
Sediment*	200 lbs/acre	50,000 tons	100,000 tons	150,000 tons
Total Nitrogen	0.567 lbs/acre	14.2 tons	28.4 tons	42.5 tons
Total Phosphorus	0.0947 lbs/acre	2.4 tons	4.7 tons	7.1 tons

Adjusted for comparison to HSPF-generated loading estimates (e.g., SWAT estimate x .1)

Table 2-1: Nine Key Elements of Proposed Management Measures

(a) Source and Sources of Bacterial Impairment	(c) Management Measures and Targeted Critical Areas	(b) Estimated Potential Load Reduction (org/yr)	(d) Technical and Financial Assistance Needed for Each Measure	(e) Education Component for Each Measure (and Other Education)	(f) Schedule of Implementation for Each Measure	(g) Interim, Measurable Milestone for Each Measure	(h) Indicators to Measure Progress	(i) Monitoring Component	(j) Responsible Entity
STORM WATER RUNOFF POINT SOURCES. Existing Load = 5.55E+15 org/yr. Required Load Reduction = 1.67E+15 org/yr (30%)									
Avian fecal deposition (urban runoff)	bird feeding ban at Rose Walk and City Parks in riparian areas	1.1E+14 (7%)	$100,000	signs and exhibits, public awareness programs	2007-2009	Fewer birds observed along riparian areas	reduction in runoff-related bacteria concentrations basin-wide	routine basin monitoring	COSA
	bird exclusion/deterrent practices and devices at Rose Walk and selected riparian areas		$100,000	education of COSA Parks staff by Texas Parks and Wildlife	2007-2009	Fewer birds roosting along riparian areas	reduction in runoff-related bacteria concentrations basin-wide	routine basin monitoring	COSA
Pet fecal deposition (urban runoff)	increase awareness and enforcement of pet control ordinance	2.6E+14 (7%)	already-funded, additional funds could be used to expand public awareness campaigns and enforcement	public awareness programs at Community Link Centers (Valley View, South Park, McCombs, and Las Palmas)	2007-2009	pet owner participation, number of citations and complaints	reduction in runoff-related bacteria concentrations basin-wide	routine basin monitoring	COSA
	expand Proper Scooper program		expand existing program to all City Parks; $100,000	signs and exhibits, community education, mitt dispensers and disposal	2007-2009	pet owner participation, number of citations and complaints; increase in number of mitts used per year	reduction in runoff-related bacteria concentrations basin-wide	routine basin monitoring	COSA

Table 2-1: Summary Table for Nine Key Elements of Proposed Control Measures (continued 5/8)

(a) Source and Sources of Bacterial Impairment	(c) Management Measures and Targeted Critical Areas	(b) Estimated Potential Load Reduction (org/yr)	(d) Technical and Financial Assistance Needed for Each Measure	(e) Education Component for Each Measure (and Other Education)	(f) Schedule of Implementation for Each Measure	(g) Interim, Measurable Milestone for Each Measure	(h) Indicators to Measure Progress	(i) Monitoring Component	(j) Responsible Entity
continued: DIRECT NONPOINT SOURCES. Existing Load = 1.51E+14 org/yr. Required Load Reduction[2] = 0.74E+14 org/yr (50%)									
Human origin (homeless/ vagrant populations)	provide restroom facilities and maintenance in areas with significant vagrant populations	3.5E+12 (3.7%)	unknown	none	2007-2009	inspections to verify utilization of facilities provided	reduction in bacteria-related bacteria concentrations	routine basin monitoring	COSA
Human origin (septic systems)	Inspection and repair (if necessary) of non-chronic septic systems	3.5E+12 (3.7%)	unknown	none	2007-2009	number of failures located, number repaired	reduction in bacteria-related bacteria concentrations	routine basin monitoring	Bexar County
	Connection of 117 homes in Espada Community		currently funded	none	existing through 2007	number of homes connected to sewer	reduction in bacteria-related bacteria concentrations	routine basin monitoring	SAWS, COSA
Bat colony in Houston Street bridge	bat exclusion/ deterrent practices and devices	1.2E+14 (50%)	assistance from Texas Parks and Wildlife, $5,000	none	2007	annual inspections to verify exclusion of bats from city bridges	reduction in bacteria-related bacteria concentrations	monitoring at bridge, routine basin monitoring	COSA
Low flows	introduce new 0.45 MGD outfall at HB Gonzalez Convention Center	effective reduction: 1.7E+12 (0.7%)	already completed	none	beginning 2006	flow records	reduction in bacteria-related bacteria concentrations	basin monitoring inside and downstream of River Loop	SAWS
Avian dropping deposition[3]	bird feeding ban at Rose Walk and City Parks in riparian areas	1.77E+13 (7.3%)	$100,000	signs and exhibits, public awareness programs	2007-2009	Fewer birds observed along riparian areas	reduction in bacteria-related bacteria concentrations	routine basin monitoring	COSA
	bird exclusion/deterrent practices and devices at Rose Walk and selected riparian areas		$100,000	education of COSA Parks staff by Texas Parks and Wildlife	2007-2009	Fewer birds roosting along riparian areas	reduction in bacteria-related bacteria concentrations	routine basin monitoring	COSA

Table 10.3. Estimated regional pollutant load reductions expected upon full implementation of the Plum Creek Watershed Protection Plan.

Management Measure	Expected Load Reduction								
	Uhland			Lockhart			Luling		
	Ec[1]	N[2]	P[3]	Ec	N	P	Ec	N	P
Urban Stormwater Management Measures									
Pet Waste Collection Stations	7.2E+12	70.6	8.2	7.3E+12	159.6	17.9	3.1E+14	1.4	N/A
Comprehensive Urban Stormwater Assessment	4.3E+13	631.7	19.1	1.9E+13	929.6	32.6	9.1E+14	7.8	N/A
Retrofit Stormwater Detention Basins									
Initiate Street Sweeping Program									
Manage Urban Waterfowl Populations									
Rehabilitate Stormwater Retention Pond									
Wastewater Management Measures									
Wastewater Upgrade (TSS Reduction)	3.6E+10	N/A	N/A	2.1E+10	N/A	N/A	1.6E+12	N/A	N/A
Wastewater Upgrade (Phosphorus Removal)									
Voluntary Monthly *E. coli* Monitoring									
Voluntary Monthly Phosphorus Monitoring									
Sanitary Sewer Pipe Replacement									
Lift Station SCADA Installation									
Initiate Sanitary Sewer Inspection Program									
Septic System Inspection/Enforcement (New Position)	6.1E+12	22.7	13.3	5.0E+12	42.2	24.2	2.0E+14	0.4	N/A
Septic System Repair									
Septic System Replacement									
Septic System Connection to Sewer									

Management Measure	Expected Load Reduction								
	Uhland			Lockhart			Luling		
	Ec[1]	N[2]	P[3]	Ec	N	P	Ec	N	P
Agricultural Management Measures									
WQMP Technician (New Position)	9.6E+12	5,472	827	2.1E+13	30,427	4,772	2.9E+15	542	N/A
Livestock Water Quality Management Plans									
Cropland Water Quality Management Plans									
Non-Domestic Animal and Wildlife Management Measures									
Feral Hog Control (New Position)	7.3E+12	1,615	327	1.2E+13	5,902	1,163	2.1E+15	105	N/A
Feral Hog Control (Equipment)									

[1] Ec: *E. coli* reduction indicated in cfu/year
[2] N: Nitrogen reduction in kg/year
[3] P: Phosphorus reduction in kg/year

Remember…

- Reductions needed to meet water quality goals ≠ estimate of reductions expected from implementation
- Provide defensible & realistic estimates for Δs in parameter as a result of BMP
- Relate to Elements H & I
- Be prepared to quantify actual reductions achieved if 319 monies will later be used to implement

?s to Ask for Consistency Review Acceptable or Unacceptable

- Load reductions achieve environmental goals
- Expected load reductions are quantified for each source identified in Element A
- Expected load reductions are estimated for each management measure identified in Element C
- Data sources and/or modeling processes are accurate and verifiable, assumptions can be reasonably justified
- Uncertainty analysis that recognizes natural variability & difficulty in precisely predicting performance of BMPs over time
- Load reductions are consistent with applicable TMDLs & I-Plans