



Watershed Protection Development Review

Action Plan Items Related to EII Site Scores - Fiscal Year 2005

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Abstract

The Environmental Integrity Index (EII) was used to identify sites with at least a 13% decrease in environmental health in recent years. City of Austin teams with the potential to reverse the recent degradation in five problem areas, aquatic life, habitat, nutrients plus bacteria, nutrients alone, and litter, through structural and non-structural BMPs were identified. Program areas or teams addressing these areas are the surface water evaluation team, masterplan committee, community education, Austin Clean Water Program, and Keep Austin Beautiful programs. Primary and secondary site lists are provided for each of the teams.

Introduction

As a measure to address developing environmental problems, the Watershed Protection and Development Review Department (WPDRD) has initiated a process to identify watersheds with declining environmental health and recommend solutions to stop or reverse the observed degradation. Determination of degrading creeks conditions is based on EII scores, and is applied to EII scores from 1996 – 2004.

The Development of Action Plans from Changes in EII Scores

In an effort to tie Department action plans to sites and watersheds which are exhibiting declines in environmental integrity as measured by the EII, the Watershed Protection and Development Review Department has proposed a 3-5 planning cycle to:

- Identify sites with decreasing health using the Environmental Integrity Index (EII) and documentation of the selection process.
- Isolate probable causes by comparing sub-index scores and raw data components.
- Identify opportunities for reversing/mitigating the decrease or partnering with other ongoing efforts to address specific causes of degradation.
- Develop plans for program, regulation, or CIP project to take advantage of opportunities within the watershed(s) of concern.

EII scores have been calculated for the 45 sampled watersheds. Phase I and Phase II watersheds have been sampled 3 times while Phase III watersheds have only been sampled twice. The initial EII sampling was conducted during 1996-1999, the second round of EII sampling from 2000-

2002, and the third round is currently being conducted (2003-2005). Parameter values/scores from the initial EII samples were compared to those from the most recent sampling events. Only major changes, defined as a decline of > 12.5 points out of a possible 100 and equivalent to a change in EII category, were identified. City of Austin (COA) program areas or teams have been identified to respond to evaluate the recent degradation and recommend appropriate actions for remediation. The 5 problem areas which seemed most amenable to change with an existing City program in place are listed in Table 1. For each problem area, the primary sites with major declines in all of the listed parameters/scores are identified for referral to the specified team (Table 2). Secondary problem sites with major declines in one or more parameters/scores but without major declines in all parameters/scores are also identified (Table 3).

Table 1. Problem Areas with Recent Declines in EII Parameters/Scores

| Problem Area | Parameters/EII components Involved in Determination of Degradation | COA Team to Evaluate and Recommend Solution |
|--|---|--|
| Decline in aquatic life scores | Diatom and benthic macroinvertebrate scores | Surface Water Team |
| Declines in physical integrity and non-contact recreation EII sub-indices | Physical Integrity and Non-Contact Recreation EII sub-indices | Master Plan Committee |
| Nutrient levels and bacteria increased indicating potential sewer line problems | Nitrate, ammonia, orthophosphorus, and e-coli | Austin Clean Water Program |
| Nutrient levels increased but bacteria levels did not indicating potential fertilizer problems | Nitrate, ammonia, orthophosphorus | Community Education |
| Non-contact recreation litter scores decreased | Litter score | Keep Austin Beautiful |

Table 2. Primary degradation sites and designated evaluation teams

A. EII sites with major (>12.5 points) decreases in both benthic macroinvertebrate and diatom scores for evaluation by the surface water team.

Table 2 EII sites with major decreases in both benthic macroinvertebrate (bug) and diatom scores

| COA Site # | Site Name | Change in Diatom Score | Change in Bug Score |
|------------|---|------------------------|---------------------|
| 1197 | Decker Creek @ FM973 | -83 | -74 |
| 125 | Fort Branch Creek Above Manor Rd | -18 | -12 |
| 1193 | Gilleland Creek @ South Railroad Avenue | -24 | -39 |
| 1083 | Slaughter Creek @ River Oaks Drive | -20 | -24 |
| 503 | Walnut Creek @ SP Railroad Bridge | -20 | -17 |
| 223 | Williamson Creek @ McKinney Falls (Will1) | -31 | -34 |
| 492 | Williamson Creek @ Pleasant Valley (W2) | -32 | -31 |

B. EII Sites with major decreases in both physical integrity and non-contact recreation scores for recommendation to the masterplan committee.

Table 3. EII sites with major decreases in both physical integrity (PI) and non-contact recreation (NCR) scores

| COA Site # | Site Name | Change in NCR Score | Change in PI Score |
|------------|-----------------------------------|---------------------|--------------------|
| 1208 | Dry Creek @ FM 812 | -38 | -38 |
| 1085 | Slaughter Creek @ Escarpment Blvd | -25 | -25 |
| 1197 | Decker Creek @ FM973 | -14 | -25 |

C. EII Sites where nutrient component scores decreased and bacteria scores decreased for recommendation to the ACWP.

Table 4. EII sites where nutrient scores decreased and bacteria scores decreased.

| COA Site # | Site Name |
|------------|---|
| 1081 | South Boggy Creek @ W. Dittmar Rd |
| 1048 | Common Ford Tributary in Common Ford Metro Park |
| 1085 | Slaughter Creek @ Escarpment Blvd |
| 1208 | Dry Creek @ FM 812 |
| 1105 | Little Bee Creek @ Red Bud Trail |

D. EII sites where both NO₃ and orthophosphorus scores decreased without substantial decrease in bacteria (potential fertilizer application problems).

Table 5. EII sites where both NO₃ and orthophosphorus scores decreased without substantial decrease in bacteria scores.

| COA Site # | Site Name | Watershed | EII Phase | First Year | Most Recent | Change in NO ₃ Score | Change in OP Score | Change in WQ bacteria score |
|------------|--|-----------------|-----------|------------|-------------|---------------------------------|--------------------|-----------------------------|
| 151 | Tributary 6 @ Bull Creek (EG) | Bull Creek | 2 | 1996 | 2004 | -40 | -8 | 20 |
| 232 | Marble Creek @ Thaxton Road (M2) | Marble Creek | 3 | 1999 | 2002 | -36 | -12 | 12 |
| 1224 | Bear Creek (West) @ Fritz Hughes Park Road | Lake Austin | 3 | 1999 | 2002 | -35 | -14 | 2 |
| 1084 | Slaughter Creek Branch @ Hwy 45 West | Slaughter Creek | 2 | 1998 | 2004 | -15 | -50 | -8 |
| 1223 | Panther Hollow Creek @ Big View Road | Lake Austin | 3 | 1999 | 2002 | -14 | -42 | 14 |

E. EII sites with major decreases in non-contact recreation litter scores for KAB.

Table 6. EII sites that have degrading (by more than one EII category) non-contact recreation litter scores

| COA Site # | Site Name | Watershed | EII Phase | First Year | Most Recent | Change in Litter Score | Previous Litter Score | Current Litter Score |
|------------|---|-----------------------|-----------|------------|-------------|------------------------|-----------------------|----------------------|
| 117 | Shoal Creek @ Shoal Edge Court (EII) | Shoal Creek | 1 | 1996 | 2003 | -65 | Excellent | Bad |
| 1197 | Decker Creek @ FM973 | Decker Creek | 3 | 1999 | 2002 | -55 | Excellent | Poor |
| 232 | Marble Creek @ Thaxton Road (M2) | Marble Creek | 3 | 1999 | 2002 | -50 | Good | Bad |
| 897 | Johnson Creek @ Woodmont Avenue | Johnson Creek | 1 | 1996 | 2003 | -45 | Excellent | Marginal |
| 1211 | Dry Creek @ Pearce Road | Dry Creek (East) | 3 | 1999 | 2002 | -40 | Very Good | Marginal |
| 1091 | Taylor Slough North @ Old Bull Creek Rd | Taylor Slough (North) | 2 | 1998 | 2004 | -40 | Very Good | Marginal |
| 888 | Harris Branch Creek @ Cameron Road | Harris Branch | 3 | 1999 | 2002 | -40 | Marginal | Very Bad |
| 492 | Williamson Creek @ Pleasant Valley (W2) | Williamson Creek | 1 | 1996 | 2003 | -30 | Very Good | Marginal |
| 1106 | Eanes Creek @ Camp Craft Road | Eanes Creek | 2 | 1998 | 2004 | -30 | Very Good | Marginal |
| 1083 | Slaughter Creek @ River Oaks Drive | Slaughter Creek | 2 | 1998 | 2004 | -30 | Very Good | Marginal |
| 1201 | Harris Branch Creek @ Boyce Lane | Harris Branch | 3 | 1999 | 2002 | -30 | Good | Marginal |
| 1476 | Tannehill Creek @ Desirable Drive | Tannehill Branch | 1 | 2000 | 2003 | -25 | Poor | Very Bad |

| COA Site # | Site Name | Watershed | EII Phase | First Year | Most Recent | Change in Litter Score | Previous Litter Score | Current Litter Score |
|------------|---|----------------------|-----------|------------|-------------|------------------------|-----------------------|----------------------|
| 1208 | Dry Creek @ FM 812 | Dry Creek (East) | 3 | 1999 | 2002 | -25 | Good | Marginal |
| 118 | Shoal Creek Downstream of Crosscreek Drive | Shoal Creek | 1 | 1996 | 2003 | -25 | Good | Marginal |
| 1105 | Little Bee Creek @ Red Bud Trail | Little Bee Creek | 2 | 1998 | 2004 | -25 | Fair | Poor |
| 1030 | Cow Fork Bull Creek @ Standing Rock Trail | West Bull Creek | 2 | 1998 | 2004 | -25 | Excellent | Good |
| 1205 | Cottonmouth Creek @ Colton-Bluff Springs Rd | Cottonmouth Creek | 3 | 1999 | 2002 | -25 | Excellent | Good |
| 878 | West Bouldin Creek @ Jewell | West Bouldin Creek | 1 | 1996 | 2003 | -20 | Marginal | Bad |
| 780 | Waller Creek @ 51st Street | Waller Creek | 1 | 1996 | 2003 | -20 | Good | Marginal |
| 491 | Williamson Creek @ IH35 (EII) | Williamson Creek | 1 | 1996 | 2003 | -20 | Good | Marginal |
| 1215 | South Fork Dry Creek @ US183 | South Fork Dry Creek | 3 | 1999 | 2002 | -20 | Good | Marginal |
| 1120 | Lake Creek @ Robinson Ranch | Lake Creek | 2 | 1998 | 2004 | -20 | Excellent | Very Good |
| 1224 | Bear Creek (West) @ Fritz Hughes Park Road | Lake Austin | 3 | 1999 | 2002 | -20 | Excellent | Very Good |
| 847 | Johnson Creek @ South Tarrytown | Johnson Creek | 1 | 1996 | 2003 | -15 | Very Good | Good |
| 1081 | South Boggy Creek @ W. Dittmar Rd | South Boggy Creek | 2 | 1998 | 2004 | -15 | Good | Fair |
| 122 | Shoal Creek Above 1st St. | Shoal Creek | 1 | 1996 | 2003 | -15 | Bad | Very Bad |
| 1207 | Cottonmouth Creek @ Colton Road | Cottonmouth Creek | 3 | 1999 | 2002 | -15 | Bad | Very Bad |

Table 3. Secondary Problem Sites

AA. EII sites with major decreases in either benthic macroinvertebrate or diatom scores

Table 7. EII sites with major decreases in either benthic macroinvertebrate (bug) or diatom scores

| COA Site # | Site Name | Watershed | Phase | First Year | Most Recent Year | DIATOM | BUG |
|------------|--|-----------------------|-------|------------|------------------|--------|-----|
| 88 | Barton Creek 350m Downstream of Lost Creek Blvd | Barton Creek | 1 | 1996 | 2003 | 4 | -15 |
| 116 | Shoal Creek @ 24th Street | Shoal Creek | 1 | 1996 | 2003 | -8 | -23 |
| 117 | Shoal Creek @ Shoal Edge Court (EII) | Shoal Creek | 1 | 1996 | 2003 | 2 | -37 |
| 118 | Shoal Creek Downstream of Crosscreek Drive | Shoal Creek | 1 | 1996 | 2003 | -38 | 9 |
| 123 | Fort Branch Creek @ North Boggy Creek | Fort Branch | 1 | 1996 | 2003 | -66 | -11 |
| 125 | Fort Branch Creek Above Manor Rd | Fort Branch | 1 | 1996 | 2003 | -18 | -12 |
| 223 | Williamson Creek @ McKinney Falls (Will1) | Williamson Creek | 1 | 1996 | 2003 | -31 | -34 |
| 233 | Rinard Creek @ Bradshaw Road | Rinard Creek | 3 | 1999 | 2002 | 37 | -28 |
| 255 | Onion Creek @ McKinney Falls Below Lower Falls | Onion Creek | 2 | 1996 | 2004 | -33 | 7 |
| 318 | Taylor Slough South @ Reed Park (TSS) | Taylor Slough (South) | 2 | 1998 | 2004 | 23 | -31 |
| 322 | Bee Creek @ Road Runner Road | Bee Creek | 2 | 1998 | 2004 | -6 | -22 |
| 343 | West Bull Creek Above Bull Creek (EK) | West Bull Creek | 2 | 1998 | 2004 | 14 | -13 |
| 362 | Blunn Creek @ Long Bow (Preserve at Little Bridge) | Blunn Creek | 1 | 1996 | 2003 | -14 | 7 |
| 484 | Harpers Branch Creek @ Riverside Dr | Harper's Branch | 1 | 1996 | 2003 | -11 | -18 |
| 492 | Williamson Creek @ Pleasant Valley (W2) | Williamson Creek | 1 | 1996 | 2003 | -32 | -31 |
| 493 | North Boggy Creek @ Delwau Lane | Boggy Creek | 1 | 1996 | 2003 | -28 | 4 |
| 503 | Walnut Creek @ SP Railroad Bridge | Walnut Creek | 1 | 1996 | 2003 | -20 | -17 |

| COA Site # | Site Name | Watershed | Phase | First Year | Most Recent Year | DIATOM | BUG |
|------------|--|---------------------|-------|------------|------------------|--------|-----|
| 839 | Little Walnut Creek @ Hermitage Drive | Little Walnut Creek | 1 | 1996 | 2003 | -17 | 3 |
| 840 | Little Walnut Creek @ US290 | Little Walnut Creek | 1 | 1996 | 2003 | -34 | -1 |
| 843 | Tannehill Creek @ Lovell Drive | Tannehill Branch | 1 | 1996 | 2003 | -5 | -20 |
| 847 | Johnson Creek @ South Tarrytown | Johnson Creek | 1 | 1996 | 2003 | -20 | 26 |
| 851 | Buttermilk Creek @ Little Walnut Creek | Buttermilk Branch | 1 | 1996 | 2003 | -21 | |
| 886 | Gilleland Creek @ FM 969 | Gilleland Creek | 3 | 1999 | 2002 | -26 | -8 |
| 888 | Harris Branch Creek @ Cameron Road | Harris Branch | 3 | 1999 | 2002 | -14 | 6 |
| 1030 | Cow Fork Bull Creek @ Standing Rock Trail | West Bull Creek | 2 | 1998 | 2004 | 6 | -13 |
| 1081 | South Boggy Creek @ W. Dittmar Rd | South Boggy Creek | 2 | 1998 | 2004 | 24 | -22 |
| 1082 | Slaughter Creek @ Pine Valley Drive | Slaughter Creek | 2 | 1998 | 2004 | 5 | -25 |
| 1083 | Slaughter Creek @ River Oaks Drive | Slaughter Creek | 2 | 1998 | 2004 | -20 | -24 |
| 1087 | Bear Creek @ Twin Creeks Road | Bear Creek | 2 | 1998 | 2004 | -38 | 2 |
| 1094 | Carson Creek @ Shady Spring Subdivision | Carson Creek | 2 | 1998 | 2004 | -12 | 4 |
| 1108 | Dry Creek (North) @ Mt Bonnel Rd | Dry Creek (North) | 2 | 1998 | 2004 | -17 | 7 |
| 1119 | Davis Spring Branch Creek @ Robinson Ranch | Lake Creek | 2 | 1998 | 2004 | -12 | 7 |
| 1120 | Lake Creek @ Robinson Ranch | Lake Creek | 2 | 1998 | 2004 | -13 | -10 |
| 1191 | Gilleland Creek @ West Parsons St | Gilleland Creek | 3 | 1999 | 2002 | 8 | -29 |
| 1192 | Gilleland Creek @ FM 973 | Gilleland Creek | 3 | 1999 | 2002 | 23 | -20 |
| 1193 | Gilleland Creek @ South Railroad Avenue | Gilleland Creek | 3 | 1999 | 2002 | -24 | -39 |
| 1197 | Decker Creek @ FM973 | Decker Creek | 3 | 1999 | 2002 | -83 | -74 |
| 1199 | Harris Branch Creek @ Crystal Bend Drive | Harris Branch | 3 | 1999 | 2002 | -49 | 18 |

BB. EII Sites with major decreases in either physical integrity or non-contact recreation scores for recommendation to the masterplan committee.

Table 8. EII sites with major decreases in either physical integrity (PI) or non-contact recreation (NCR) scores

| COA Site # | Site Name | Watershed | Phase | First Year | Most Recent Year | NCR | PI |
|------------|---|----------------------|-------|------------|------------------|-----|-----|
| 1208 | Dry Creek @ FM 812 | Dry Creek (East) | 3 | 1999 | 2002 | -38 | -38 |
| 1219 | Rinard Creek @ FM1327 and Bradshaw Road | Rinard Creek | 3 | 1999 | 2002 | 10 | -37 |
| 1084 | Slaughter Creek Branch @ Hwy 45 West | Slaughter Creek | 2 | 1998 | 2004 | 32 | -31 |
| 1100 | Lake Creek Below Meadowheath Drive | Lake Creek | 2 | 1998 | 2004 | 4 | -26 |
| 1214 | South Fork Dry Creek @ Rodriguez Rd | South Fork Dry Creek | 3 | 1999 | 2002 | 30 | -26 |
| 1085 | Slaughter Creek @ Escarpment Blvd | Slaughter Creek | 2 | 1998 | 2004 | -25 | -25 |
| 1197 | Decker Creek @ FM973 | Decker Creek | 3 | 1999 | 2002 | -14 | -25 |
| 851 | Buttermilk Creek @ Little Walnut Creek | Buttermilk Branch | 1 | 1996 | 2003 | -4 | -25 |
| 122 | Shoal Creek Above 1st St. | Shoal Creek | 1 | 1996 | 2003 | -3 | -23 |
| 121 | East Bouldin Creek Downstream of W. Alpine Rd | East Bouldin Creek | 1 | 1996 | 2003 | 13 | -22 |
| 126 | Fort Branch Creek @ Glencrest Drive | Fort Branch | 1 | 1996 | 2003 | 14 | -22 |
| 1212 | Dry Creek @ River Road | Dry Creek (East) | 3 | 1999 | 2002 | -2 | -20 |
| 1101 | Little Bear Creek @ Bear Creek | Little Bear Creek | 2 | 1998 | 2004 | -1 | -20 |
| 364 | Blunn Creek Above Big Stacy Pool | Blunn Creek | 1 | 1996 | 2003 | -4 | -19 |
| 116 | Shoal Creek @ 24th Street | Shoal Creek | 1 | 1996 | 2003 | -2 | -19 |
| 125 | Fort Branch Creek Above Manor Rd | Fort Branch | 1 | 1996 | 2003 | 16 | -19 |
| 839 | Little Walnut Creek @ Hermitage Drive | Little Walnut Creek | 1 | 1996 | 2003 | 8 | -18 |
| 886 | Gilleland Creek @ FM 969 | Gilleland Creek | 3 | 1999 | 2002 | 11 | -18 |
| 1115 | Little Barton Creek @ Hamilton Pool Rd | Little Barton Creek | 2 | 1998 | 2004 | -2 | -17 |
| 1193 | Gilleland Creek @ South Railroad Avenue | Gilleland Creek | 3 | 1999 | 2002 | 4 | -17 |

| COA Site # | Site Name | Watershed | Phase | First Year | Most Recent Year | NCR | PI |
|-------------------|--|----------------------|--------------|-------------------|-------------------------|------------|-----------|
| 1215 | South Fork Dry Creek @ US183 | South Fork Dry Creek | 3 | 1999 | 2002 | 13 | -17 |
| 1114 | Little Barton Creek @ Great Divide Dr | Little Barton Creek | 2 | 1998 | 2004 | 3 | -16 |
| 1097 | Rattan Creek @ Shadowbrook Circle | Rattan Creek | 2 | 1998 | 2004 | 12 | -15 |
| 1216 | South Fork Dry Creek @ FM812 | South Fork Dry Creek | 3 | 1999 | 2002 | 25 | -15 |
| 838 | Little Walnut Creek @ Golden Meadow Rd | Little Walnut Creek | 1 | 1996 | 2003 | -10 | -13 |
| 783 | Buttermilk Creek @ Cameron Road | Buttermilk Branch | 1 | 1996 | 2003 | -4 | -13 |
| 1222 | Cuernavaca Creek @ River Hills Road | Lake Austin | 3 | 1999 | 2002 | 1 | -13 |
| 1191 | Gilleland Creek @ West Parsons St | Gilleland Creek | 3 | 1999 | 2002 | 16 | -13 |
| 782 | Buttermilk Creek @ Providence Ave | Buttermilk Branch | 1 | 1996 | 2003 | 2 | -12 |
| 846 | West Bouldin Creek @ South Austin Park | West Bouldin Creek | 1 | 1996 | 2003 | 3 | -12 |
| 1220 | Rinard Creek @ FM1327 | Rinard Creek | 3 | 1999 | 2002 | 7 | -12 |
| 1095 | Carson Creek @ US 183 | Carson Creek | 2 | 1998 | 2004 | -25 | -9 |
| 878 | West Bouldin Creek @ Jewell | West Bouldin Creek | 1 | 1996 | 2003 | -14 | -7 |
| 1089 | Bear Creek Below FM 1826 (North Fork) | Bear Creek | 2 | 1998 | 2004 | -30 | -4 |
| 780 | Waller Creek @ 51st Street | Waller Creek | 1 | 1996 | 2003 | -15 | -2 |
| 38 | Waller Creek Below Cesar Chavez | Waller Creek | 1 | 1996 | 2003 | -14 | -1 |
| 1087 | Bear Creek @ Twin Creeks Road | Bear Creek | 2 | 1998 | 2004 | -19 | 3 |
| 117 | Shoal Creek @ Shoal Edge Court (EII) | Shoal Creek | 1 | 1996 | 2003 | -14 | 5 |
| 1476 | Tannehill Creek @ Desirable Drive | Tannehill Branch | 1 | 2000 | 2003 | -21 | 7 |
| 492 | Williamson Creek @ Pleasant Valley (W2) | Williamson Creek | 1 | 1996 | 2003 | -16 | 9 |
| 484 | Harpers Branch Creek @ Riverside Dr | Harper's Branch | 1 | 1996 | 2003 | -27 | 12 |
| 850 | West Country Club Creek @ East Oltorf St | Country Club Creek | 1 | 1996 | 2003 | -21 | 14 |
| 1366 | Onion Creek @ South Austin Regional WWTP (SAR) | Onion Creek | 2 | 2001 | 2004 | -12 | 16 |
| 844 | Harpers Branch Creek @ Woodland Ave | Harper's Branch | 1 | 1996 | 2003 | -19 | 21 |

CC. EII sites with a major decrease in at least one nutrient component (NO₃, NH₃, orthophosphorus) and in the water quality bacteria score for recommendation to the ACWP.

Table 9 EII sites with a major decrease in at least one nutrient component (NO₃, NH₃, orthophosphorus) and in the water quality bacteria score. (Also included are two sites on Bear Creek that had decreases in all nutrient components and the bacteria component although the decrease in nutrient scores were not a major decrease).

| COA Site # | Site Name | Watershed | Phase | First Year | Most Recent Year | Change in Score from first to most recent year | | | |
|------------|--|--------------------|-------|------------|------------------|--|-----|-----|----------|
| | | | | | | NH3 | NO3 | OP | Bacteria |
| 364 | Blunn Creek Above Big Stacy Pool | Blunn Creek | 1 | 1996 | 2003 | 38 | -29 | 23 | -70 |
| 1474 | West Country Club @ Krieg Fields | Country Club Creek | 1 | 2000 | 2003 | 20 | -20 | 6 | -29 |
| 316 | Unnamed Trib @ Running Deer Trail (AST) | Lake Austin | 3 | 1999 | 2002 | 15 | 4 | -34 | -21 |
| 319 | Bee Creek @ Lake Austin | Bee Creek | 2 | 1998 | 2004 | 7 | -12 | -14 | -19 |
| 1206 | Cottonmouth Creek @ Dee Gabriel Collins Rd | Cottonmouth Creek | 3 | 1999 | 2002 | 2 | 2 | -17 | -37 |
| 1009 | Rattan Creek Above Parmer Lane | Rattan Creek | 2 | 1998 | 2004 | 0 | 12 | -17 | -30 |
| 1119 | Davis Spring Branch Creek @ Robinson Ranch | Lake Creek | 2 | 1998 | 2004 | 0 | -12 | 1 | -37 |
| 231 | Marble Creek Above Onion Creek (M#1) | Marble Creek | 3 | 1999 | 2002 | -4 | -13 | 6 | -12 |
| 1086 | Slaughter Creek @ Young Lane | Slaughter Creek | 2 | 1998 | 2004 | -5 | 6 | -30 | -25 |
| 1219 | Rinard Creek @ FM1327 and Bradshaw Road | Rinard Creek | 3 | 1999 | 2002 | -13 | 0 | -11 | -12 |

| COA Site # | Site Name | Watershed | Phase | First Year | Most Recent Year | Change in Score from first to most recent year | | | |
|------------|--|-----------------------|-------|------------|------------------|--|-----|-----|----------|
| | | | | | | NH3 | NO3 | OP | Bacteria |
| 1218 | North Fork Dry Creek @ US183 | North Fork Dry Creek | 3 | 1999 | 2002 | -17 | 14 | -5 | -15 |
| 1114 | Little Barton Creek @ Great Divide Dr | Little Barton Creek | 2 | 1998 | 2004 | -17 | 4 | -1 | -24 |
| 1091 | Taylor Slough North @ Old Bull Creek Rd | Taylor Slough (North) | 2 | 1998 | 2004 | -17 | 26 | 20 | -41 |
| 1081 | South Boggy Creek @ W. Dittmar Rd | South Boggy Creek | 2 | 1998 | 2004 | -18 | -18 | -2 | -25 |
| 1214 | South Fork Dry Creek @ Rodriguez Rd | South Fork Dry Creek | 3 | 1999 | 2002 | -25 | 9 | 8 | -15 |
| 347 | Bull Creek Above West Bull Creek | Bull Creek | 2 | 1996 | 2004 | -25 | -22 | 2 | -18 |
| 1215 | South Fork Dry Creek @ US183 | South Fork Dry Creek | 3 | 1999 | 2002 | -25 | 25 | 23 | -18 |
| 1222 | Cuernavaca Creek @ River Hills Road | Lake Austin | 3 | 1999 | 2002 | -25 | 1 | -25 | -21 |
| 1083 | Slaughter Creek @ River Oaks Drive | Slaughter Creek | 2 | 1998 | 2004 | -27 | 8 | -31 | -27 |
| 177 | Taylor Slough North @ Pecos St (TSN) | Taylor Slough (North) | 2 | 1998 | 2004 | -29 | 26 | 11 | -14 |
| 117 | Shoal Creek @ Shoal Edge Court (EII) | Shoal Creek | 1 | 1996 | 2003 | -32 | -28 | 2 | -12 |
| 350 | Bull Creek @ Loop 360 First Crossing | Bull Creek | 2 | 1996 | 2004 | -37 | -4 | 12 | -17 |
| 255 | Onion Creek @ McKinney Falls Below Lower Falls | Onion Creek | 2 | 1996 | 2004 | -44 | 23 | -1 | -39 |

| COA Site # | Site Name | Watershed | Phase | First Year | Most Recent Year | Change in Score from first to most recent year | | | |
|--|---|------------------|-------|------------|------------------|--|-----|-----|----------|
| | | | | | | NH3 | NO3 | OP | Bacteria |
| 1048 | Common Ford Tributary in Common Ford Metro Park | Lake Austin | 3 | 1999 | 2002 | -50 | -15 | -21 | -18 |
| 1085 | Slaughter Creek @ Escarpment Blvd | Slaughter Creek | 2 | 1998 | 2004 | -50 | -45 | -19 | -24 |
| 1208 | Dry Creek @ FM 812 | Dry Creek (East) | 3 | 1999 | 2002 | -50 | -14 | -12 | -28 |
| 1105 | Little Bee Creek @ Red Bud Trail | Little Bee Creek | 2 | 1998 | 2004 | -63 | -3 | -8 | -13 |
| 1087 | Bear Creek @ Twin Creeks Road | Bear Creek | 2 | 1998 | 2004 | -5 | -11 | -6 | -23 |
| 1089 | Bear Creek Below FM 1826 (North Fork) | Bear Creek | 2 | 1998 | 2004 | -8 | -9 | -6 | -22 |
| Potential Problems - some decrease in all nutrient and bacteria scores | | | | | | | | | |
| Problems - dropped at least one category in all nutrient and bacteria scores | | | | | | | | | |

DD. EII sites with a major decrease in either orthophosphorus or NO₃ component scores without a major decrease in bacteria scores as a list of sites with potential fertilizer application problems.

Table 10. EII sites with a major decrease in nutrient scores with a major decrease in bacteria scores as potential fertilizer application problems.

| COA Site # | Site Name | Watershed | EII Phase | First Year | Most Recent Year | Change in NO ₃ Score | Change in OP Score | Change in WQ bacteria score |
|------------|---|--------------------|-----------|------------|------------------|---------------------------------|--------------------|-----------------------------|
| 88 | Barton Creek 350m Downstream of Lost Creek Blvd | Barton Creek | 1 | 1996 | 2003 | -14 | -2 | 19 |
| 180 | Blunn Creek @ Riverside Drive | Blunn Creek | 1 | 1996 | 2003 | -15 | 23 | 13 |
| 837 | North Boggy Creek @ Nile Street | Boggy Creek | 1 | 1996 | 2003 | -16 | 15 | 3 |
| 920 | Bull Creek @ St. Edwards Park above dam | Bull Creek | 2 | 1996 | 2004 | -18 | 4 | 33 |
| 151 | Tributary 6 @ Bull Creek (EG) | Bull Creek | 2 | 1996 | 2004 | -40 | -8 | 20 |
| 783 | Buttermilk Creek @ Cameron Road | Buttermilk Branch | 1 | 1996 | 2003 | -20 | -9 | -8 |
| 851 | Buttermilk Creek @ Little Walnut Creek | Buttermilk Branch | 1 | 1996 | 2003 | -16 | 25 | 0 |
| 782 | Buttermilk Creek @ Providence Ave | Buttermilk Branch | 1 | 1996 | 2003 | -26 | 14 | 7 |
| 1207 | Cottonmouth Creek @ Colton Road | Cottonmouth Creek | 3 | 1999 | 2002 | -29 | 2 | 5 |
| 850 | West Country Club Creek @ East Oltorf St | Country Club Creek | 1 | 1996 | 2003 | -19 | 23 | -2 |
| 1196 | Decker Creek @ Lindell Lane | Decker Creek | 3 | 1999 | 2002 | -6 | -24 | 13 |
| 1109 | Dry Creek (North) @ FM 2222 | Dry Creek (North) | 2 | 1998 | 2004 | -7 | -19 | -11 |
| 1110 | Dry Creek (North) @ Highland Pass | Dry Creek (North) | 2 | 1998 | 2004 | -15 | -5 | 1 |
| 1106 | Eanes Creek @ Camp Craft Road | Eanes Creek | 2 | 1998 | 2004 | -14 | 16 | -5 |
| 119 | East Bouldin Creek @ Elizabeth St | East Bouldin Creek | 1 | 1996 | 2003 | -14 | 2 | -7 |
| 121 | East Bouldin Creek Downstream of W. Alpine Rd | East Bouldin Creek | 1 | 1996 | 2003 | 29 | -13 | 41 |

| COA Site # | Site Name | Watershed | EII Phase | First Year | Most Recent Year | Change in NO₃ Score | Change in OP Score | Change in WQ bacteria score |
|-------------------|--|----------------------|------------------|-------------------|-------------------------|---------------------------------------|---------------------------|------------------------------------|
| 898 | Fort Branch Creek @ Single Shot Road | Fort Branch | 1 | 1996 | 2003 | -30 | 22 | 0 |
| 125 | Fort Branch Creek Above Manor Rd | Fort Branch | 1 | 1996 | 2003 | -2 | -18 | -6 |
| 1224 | Bear Creek (West) @ Fritz Hughes Park Road | Lake Austin | 3 | 1999 | 2002 | -35 | -14 | 2 |
| 1223 | Panther Hollow Creek @ Big View Road | Lake Austin | 3 | 1999 | 2002 | -14 | -42 | 14 |
| 1221 | Turkey Creek @ City Park Road | Lake Austin | 3 | 1999 | 2002 | -5 | -30 | 20 |
| 839 | Little Walnut Creek @ Hermitage Drive | Little Walnut Creek | 1 | 1996 | 2003 | -8 | -23 | 20 |
| 634 | Little Walnut Creek @ US183 | Little Walnut Creek | 1 | 1996 | 2003 | -5 | -15 | 1 |
| 232 | Marble Creek @ Thaxton Road (M2) | Marble Creek | 3 | 1999 | 2002 | -36 | -12 | 12 |
| 231 | Marble Creek Above Onion Creek (M#1) | Marble Creek | 3 | 1999 | 2002 | -13 | 6 | -12 |
| 1217 | North Fork Dry Creek @ FM812 | North Fork Dry Creek | 3 | 1999 | 2002 | 27 | -13 | 13 |
| 1220 | Rinard Creek @ FM1327 | Rinard Creek | 3 | 1999 | 2002 | -16 | -8 | 15 |
| 117 | Shoal Creek @ Shoal Edge Court (EII) | Shoal Creek | 1 | 1996 | 2003 | -28 | 2 | -12 |
| 118 | Shoal Creek Downstream of Crosscreek Drive | Shoal Creek | 1 | 1996 | 2003 | 3 | -45 | 19 |
| 1082 | Slaughter Creek @ Pine Valley Drive | Slaughter Creek | 2 | 1998 | 2004 | -4 | -30 | -6 |
| 1084 | Slaughter Creek Branch @ Hwy 45 West | Slaughter Creek | 2 | 1998 | 2004 | -15 | -50 | -8 |
| 1216 | South Fork Dry Creek @ FM812 | South Fork Dry Creek | 3 | 1999 | 2002 | -32 | 17 | -4 |
| 843 | Tannehill Creek @ Lovell Drive | Tannehill Branch | 1 | 1996 | 2003 | -14 | 23 | -1 |
| 148 | West Bull Creek @ Bell Mt. Road (ED) | West Bull Creek | 2 | 1998 | 2004 | -15 | -2 | 6 |
| 492 | Williamson Creek @ Pleasant Valley (W2) | Williamson Creek | 1 | 1996 | 2003 | -16 | 19 | 27 |

Conclusion

EII data were used to identify degrading sites in Austin creeks for recommendation to designated teams for remediation. Although potential solutions have been identified for each group (Table 4), solution options must be continually evaluated and developed. Solution implementation must be documented, so that as additional EII data becomes available the effectiveness of solutions can be evaluated effectively.

Table 4. Potential solution options to identified degradation problems.

| Problem | COA Team | Potential Solution |
|----------------------------|----------------------------|--|
| Aquatic Life Impairments | Surface Water Evaluation | Direct short-term monitoring to identify impairment source |
| Physical Integrity Decline | Masterplan Committee | CIP structural BMP in problem area |
| Sewer Leaks | Austin Clean Water Program | Remove sewer line from creek |
| Fertilizer Application | Community Education | Targeted public education campaign |
| Litter | Keep Austin Beautiful | Volunteer creek clean-up efforts |