Upper Neuse River Basin Association
Technical Memorandum

To: Lick Creek Watershed Restoration Plan Stakeholders

Cc: Kimberly Nimmer, NC Division of Water Quality

From: Chris Dreps, Upper Neuse River Basin Association

Date: October 15, 2007

Re: Lick Creek Watershed Restoration Priorities

A central objective of the Lick Creek Watershed Restoration Plan is to identify and prioritize restoration projects throughout the 22 square-mile watershed. Watershed restoration projects such as stream channel repair, stream buffer establishment, wetland restoration, and stormwater retrofit are widely regarded as key approaches to improving in-stream hydrology and reducing pollutants such as sediment and nutrients. Toward this end, the Lick Creek Project Partners have conducted GIS analysis, fieldwork, and modeling to identify and prioritize a host of potential restoration projects.

This technical memorandum prioritizes the Major and Volunteer Restoration projects (stream repair, buffer restoration, and stormwater retrofit projects) recommended as a result of GIS analysis by the Upper Neuse River Basin Association (UNRBA) and Triangle J Council of Governments (TJCOG) and fieldwork led by the Center for Watershed Protection (CWP).

The draft memo is divided into four sections. The background section summarizes the analysis and fieldwork done in Lick Creek in early 2007. The second section describes the restoration project prioritization process, including the general approach used for prioritizating restoration projects. The third section presents the priority projects, dividing them into projects with potential for major restoration efforts ("Major") and projects that could be completed utilizing volunteers ("Volunteer"). The Conclusions section describes restoration projects in the context of a comprehensive watershed management approach for Lick Creek.

Background

The UNRBA, CWP, TJCOG, and NC State University Water Quality Group (NCSU) (known collectively as the Lick Creek Project Partners) received a Clean Water Act Section 319 Grant from the NC Division of Water Quality to develop a watershed restoration plan for the Lick Creek Watershed, an impaired stream in eastern Durham County, NC. In March, 2007, the UNRBA presented a technical memorandum characterizing the watershed (UNRBA 2007). The Lick Creek Project Partners then conducted fieldwork from February 26 to March 3, 2007, assessing over 27 miles of

streams and multiple upland sites. The Center for Watershed Protection summarized the fieldwork findings in a memorandum (Hoyt and Kitchell 2007).

The Hoyt and Kitchell (2007) memorandum documents the field findings and recommends twelve management strategies based upon field observations and subsequent discussions with local and state agency staff. These recommendations address:

1. Erosion and sediment control;
2. Sediment discharges from agricultural sites;
3. Post-construction stormwater management;
4. Impacts from infrastructure crossing the stream corridor;
5. Buffer and floodplain encroachment;
6. Protection of high-quality streams and wetlands;
7. Delineation of streams and wetlands;
8. Major restoration projects;
9. Volunteer restoration projects;
10. Suspicious discharges from septic systems;
11. Outreach and education targets; and
12. Municipal infrastructure repairs.

This memorandum focuses on recommendations 8 and 9, Major and Volunteer stream restoration projects. In order to provide potential project opportunities to City, County, and State agencies and other potential project funders, the Project Partners and Stakeholders have prioritized the potential Major and Volunteer restoration projects using the process described in the next section.

The remaining recommendations are addressed in separate memoranda such as CWP's Watershed Treatment Model Results (Fraley-McNeal, Hoyt, and Kitchell 2007) or will be detailed in forthcoming memoranda (e.g., the critical lands protection analysis). The Project Partners and Stakeholders will also consider these and other recommendations (for example, long-term water quality monitoring recommendations by NCSU) when writing the Lick Creek Watershed Restoration Plan.

Lick Creek Restoration Prioritization Process

During the summer of 2007, Lick Creek Project Partners and Stakeholders developed criteria for prioritizing or ranking the Major and Volunteer Restoration Projects in the Lick Creek Watershed. At the June 20 Stakeholder meeting, Stakeholders and Partners developed draft criteria for the Lick Creek Local Watershed Plan. These criteria consider each project's general need for restoration (by subwatershed), potential environmental benefits, potential benefits to the surrounding community or potential to garner community support, and overall feasibility for implementation. The meeting summary from the June 20 meeting summarizes the discussion.

After receiving guidance from the Stakeholders, the Project Partners developed a set of draft criteria for prioritizing projects. The UNRBA then began prioritizing Major and Volunteer restoration projects based upon these critieria and presented initial results to the Stakeholders at the August 15 Stakeholder meeting. The Stakeholders and Partners

edited the criteria and criteria weights and instructed the UNRBA to conduct a second run of the prioritization analysis. Table 1 lists the criteria that were used in this analysis.

Table 1: Lick Creek Project Prioritization Criteria

DRAFT Lick Creek Project Prioritization Criteria					
	Factor	**Description**	**Scoring Criteria**		**Total Weight**
Implementation Feasibility	Relative Construction Cost	Based on the Type of Practice	Low cost	2	2
			Med cost	1	
			High cost	0	
	Owner/Manager Support	Includes: Property Owner support Responsible party for long term maintenance	Highly feasible	3	3
			Moderately feasible	1-2	
			Low feasibility	0	
	Physical Constraints	Includes: Conflicts with Existing Utilities Space limitations Soils Physical Access for Construction and Maintenance	No Constraints	3	3
			Minor Constraints or Unknown	1-2	
			Major	0	
	Potential Flags*	Includes: Meets agency criteria (e.g. NC EEP) On publicly-owned land	Implementation Feasibility flagging criteria met *		None
Environmental Benefits	Water Quality Benefits	How much currently untreated impervious area is treated for WQ by this retrofit? Or, how much buffer would be added?	> 5 ac (or >2000 ft)	5	5
			2–5 ac (1000-2000 ft)	3	
			0.5–2 ac (500-1000ft)	2	
			0.1–0.5 ac (1-500ft)	1	
			None	0	
	Channel Protection	Does the practice reduce erosive velocities by providing channel protection volume (CPV)? Or protect slopes from erosion?	CPV Provided	2	2
			Channel Armored	1	
			Not Provided	0	
	Natural Areas Impacts	What is the impact to existing wetlands and forests?	Net gain	3	3
			No net loss or gain	1	
			Net loss	0	
	Potential Flags*	Includes: In high-priority subwatershed?** In or upstream of headwaters (low potential for upstream impacts)?	Environmental Benefits flagging criteria met*		None
Community Benefits/Support	Aesthetic Value	Does the practice have the potential to improve aesthetics?	Yes, in public area	1	1
			Yes, on private land	.5	
			No	0	
	Stewardship	Does the project foster long-term public involvement (e.g. monitoring/maintenance) or educates citizens?	Long-term involvement	1	1
			Educational component only	.5	
			No	0	
	Potential Flags*	Includes: Potential to remove harmful pathogens from surface water? Involves citizens in construction?	Community Benefits/Support flagging criteria met*		None
				TOTAL	20

*Flags do not affect scoring but are critical to the project feasibility, environmental benefit, or community support.
**Partners will use Subwatershed analysis to determine high-priority subwatersheds for restoration.

The highest total score a project could receive is 20. Forty (40) percent of the total score (eight points) is based upon a project's implementation feasibility, 50 percent of the total score (ten points) is based upon the project's expected environmental benefits, and 10 percent of total score (two points) is based upon the expected community benefits or support.

Restoration Priorities

Project Partners focused most of the fieldwork effort on areas with the most intensive land uses such as suburban neighborhoods, commercial areas, row crops, and animal operations. These areas comprise only 15% of the total watershed area of Lick Creek, but experience in other watersheds and pre-fieldwork GIS analysis indicate that the great majority of the stream and watershed impacts are found in these relatively heavily disturbed areas. Suburban neighborhoods comprise 6% of the watershed, row crop and pastures are 4%, commercial areas are 2%, and roads and rights-of-way are 3%. These areas are primarily in subwatersheds 1-7.

Eighty-five percent (85%) of the watershed is protected natural area, urban green space, forestry land, very low density or "rural" residential areas, unmanaged rural lands, and Falls Lake surface area. In these areas, field crews focused attention on specific sites where prior GIS analysis indicated the potential for stream and watershed impacts.

Major Restoration Projects

Major restoration projects are projects for which implementation would require professional design and construction services. These projects are typically large, require design and site assessment by a professional engineer, would introduce heavy equipment into sensitive areas, and would require environmental permitting by the state and local governments. These projects are time consuming and expensive, and they typically require funding and long-term maintenance and monitoring by state or federal agencies. Examples of Major stream restoration projects include stormwater retrofits, stream restoration, and large buffer planting projects.

There are 13 Major restoration opportunities in the Lick Creek Watershed. At most, if all 13 projects were completed, up to 25 acres of drainage area would receive water quality treatment and less than 1 linear mile of streams would receive buffer restoration or stream repair.

Appendix 1 provides a spreadsheet showing the scores of each Major restoration project opportunity and detailed maps of these potential projects. The highest scoring opportunities are summarized below with their project identification codes.

1. Wetland restoration (IB-350) on Lick Creek downstream of Olive Branch Road. CWP recommends incorporating wetland restoration and stream buffer reestablishment on 712 feet of Lick Creek (The Durham Soil and Water Conservation District is currently planning a stream restoration project at this location; however, the design differs from that recommended by CWP).

2. Stream restoration and buffer reestablishment (ER-120, ER-150, and IB-120) on Lick Creek south of Ravenstone and just upstream of IB-350 and Olive Branch Road. This project would address active bank erosion, channel widening, and actively migrating headcuts in tributary streams. This project would be a total of over 1,880 linear feet of restoration and buffer planting.
3. Six areas of impacted stream buffers on Falls Village Golf Course (IB-502–504 and IB-506–508). Collectively, this grouping of potential stream buffer projects could reestablish almost 2,000 linear feet of stream buffers.
4. Various stormwater retrofit projects (R-300–302, OT-102–104, and ER-100) around the NC Highway 70 corridor in subwatersheds 1 and 2, the most urban part of the Lick Creek watershed. Combined, these projects could treat stormwater runoff from up to 32 acres.

Volunteer Restoration Projects

As discussed in Hoyt and Kitchell (2007), some opportunities exist for small restoration projects that can utilize volunteer efforts and garner "quick wins" for on-the-ground implementation. Volunteer projects are relatively simple to design and relatively inexpensive compared to Major restoration projects. These projects can often be constructed by volunteers with the technical assistance of local government staff or extension agents. Examples include buffer plantings, small stormwater retrofits, or trash cleanups (trash cleanups were not scored in this prioritization process).

There are 14 Volunteer restoration opportunities. In total, these buffer restoration, small stream repair, or small stormwater retrofit projects represent over 7,300 linear feet (almost 1.4 miles) of opportunities, less than 1% of the total stream miles in the Lick Creek Watershed.

Appendix 2 provides a spreadsheet showing the scores of each Volunteer restoration project and detailed maps of each project. The highest scoring Volunteer restoration projects are summarized below.

1. IB-213 on an unnamed tributary of Falls Lake along Wayward Drive in Subwatershed 9. The project would reestablish a buffer along a 240-foot stretch of stream. The project scores highly on feasibility, as the owner has expressed interest in the project.
2. IB-121 and ER-121 would reestablish some form of riparian buffer along 550+ linear feet of stream and provide minor repairs to a section of stream with active headcutting in a residential neighborhood near Olive Branch Road. This project would have the potential benefit of educating an entire neighborhood and could open discussion about the onsite wastewater treatment issues in the area.
3. IB-336 would reestablish 1,032 linear feet of riparian buffer on an intermittent stream through a pasture. The environmental benefits of the project are good; however, landowner support is not clear. With landowner support, the project would score highly.

4. IB-170 is a 1,200-foot potential buffer reestablishment on a farm. Note that several buffers on farms (IB-170, IB-331–332, IB-222) could implement nearly 3,000 linear feet of buffer reestablishment in Subwatersheds 2, 6, and 7.

Conclusions and Next Steps

The Lick Creek Project Partners have identified 13 Major and 14 Volunteer restoration projects, 27 potential watershed restoration projects in all. These potential projects could treat at most 25 acres of surface runoff for water quality and reestablish buffers on or repair less than 2 linear miles of streams. The water quality and aquatic habitat benefits of these projects to Lick Creek at a watershed scale would be relatively minor. However, these projects can have significant local benefits at the small stream or subwatershed scale (1 square mile, for example). In addition, restoration projects could have educational value for Lick Creek Watershed residents, teaching them the importance and benefits of watershed stewardship.

The next steps toward implementing these restoration priorities is for the agencies identified in Appendices 1 and 2 to contact the landowners and managers, determine the level of interest in each project, and explore funding opportunities. Some opportunities already exist:

1) NC Ecosystem Enhancement Program is actively seeking stream repair, buffer repair, and possibly stormwater retrofit projects meeting its criteria, and at least 2 Major restoration projects seem to meet EEP criteria;
2) CWP, through a grant from the Home Depot Foundation, is seeking to fund volunteer-based tree planting projects like those summarized in this memorandum;
3) The Durham Soil and Water Conservation District is assisting landowners in Lick Creek in finding restoration project funding, and the District is already involved in attempting to implement several Major projects; and
4) Durham Stormwater Services (Durham City's stormwater utility) can encourage, through its stormwater fee credit program, stormwater retrofit projects on city sites.

In order to protect water quality and habitat in Lick Creek and Falls Lake, the Lick Creek Partners and Stakeholders agreed (see the May 9, 2007 meeting summary at www.unrba.org/lick) on four watershed restoration and management goals for the Lick Creek Watershed. Watershed restoration projects such as the 27 described in this memorandum are a part of the overall solution that will be needed to meet Goal 1 ("Develop a hypothesis about the causes of biological impairment in Lick Creek and recommend approaches to addressing impairment status") and Goal 3 ("Develop strategies for reducing, and maintaining at levels meeting water quality standards, the pollutants…").

There are two major reasons why strategies beyond traditional restoration efforts are needed in Lick Creek. First, these practices will only achieve a very small percent of the pollutant reductions likely needed to restore water quality in Lick Creek. The Lick Creek Watershed Treatment Model (WTM) predicts that implementing these projects would

achieve less than 4% overall reductions in total nitrogen, total phosphorous, total suspended solids, or bacteria, with the greatest reductions resulting from riparian buffer reestablishment projects. The relatively low reduction rate predictions hold true even in subwatersheds with the highest current levels (Fraley-McNeal, Hoyt, and Kitchell 2007). Additional management strategies are clearly needed to restore water quality in Lick Creek. For example, improved erosion and sediment control practices and oversight such as those recommended in the memorandum by Hoyt and Kitchell (2007) would yield much greater sediment reductions in Lick Creek (Fraley-McNeal, Hoyt, and Kitchell 2007) than could the Major or Volunteer restoration practices.

The second major reason for a comprehensive management strategy in Lick Creek is that, while the watershed is a primarily rural now, it is developing rapidly. Currently, only 15% of the land is developed to the extent allowed under zoning laws, and only 6% of the watershed lies under impervious areas such as roads or rooftops (TJCOG 2007). In fact, Lick Creek is the least developed of the eight major watersheds on the south side of Falls Lake (UNRBA 2003). Despite this fact, the state already recognizes the creek as impaired under the Federal Clean Water Act because of poor aquatic habitat, which may be related to poor water quality if it is not naturally occurring. What will happen to Lick Creek if the watershed is built to the full extent allowable under current regulations, when 70% of the land will be developed and impervious cover increases to almost 23%? The impervious cover would increase by 280% over current levels. That's almost three times more surfaces that will not allow rainfall to infiltrate and that will contribute excess runoff and pollutants to the already impaired stream via stormwater outfalls and pipes.

Watershed restoration projects of any type will not prevent additional degradation of Lick Creek. Indeed, overdependence upon restoration practices at the expense of a comprehensive watershed management strategy would prevent us from addressing the causes of Lick Creek's water quality problems and would allow negative impacts to continue. And because Lick Creek is a direct tributary to the impaired Falls Lake Reservoir, these impacts extend beyond the creek. Clearly, a comprehensive watershed management approach is needed for Lick Creek to ensure that the land use changes that have already impacted water quality are not compounded by the continuing urbanization of the watershed.

Bibliography

Fraley-McNeal, Lisa, Sally Hoyt, and Anne Kitchell (2007). Lick Creek—Watershed Treatment Model Analysis. Technical memorandum from the Center for Watershed Protection to the Upper Neuse River Basin Association. June 20.

Hoyt, Sally and Anne Kitchell (2007). Lick Creek Fieldwork—Findings and Recommendations. Technical memorandum by Center for Watershed Protection. June 7, 2007.

TJCOG (2007). Memorandum describing the process and results of the current and future land use analyses performed for the Lick Creek Watershed Restoration Plan. Technical memorandum from John Hodges-Copple (Triangle J Council of Governments) to the Upper Neuse River Basin Association.

Tetra Tech (2003). *Upper Neuse Watershed Management Plan.* Produced for the Upper Neuse River Basin Association. May.

UNRBA (2007). *Initial watershed characterization, existing water quality data, and stakeholder process.* Memorandum presented to NC Division of Water Quality. March 19.

Appendices

APPENDIX 1: MAJOR RESTORATION PROJECTS
Restoration projects requiring design by professional, permitting, construction by contractor.
Project Types: wetland creation, stream repair, stormwater retrofit, buffer creation, reforestation

						Implementation Feasibility						Environmental Benefits							
Project ID	**Name and Location**	**Project Type**	**Description**	**Agency for Follow-up**	**Size as Drainage Area (ac) or Length (ft)**	Relative Construction Cost	Owner/Manager Support	Physical Constraints****	**Total Feasibility Score** (of possible 8)	Flag: Agency Criteria*	Flag: Public Land****	Water Quality **	Channel Protection	Natural Areas Impacts****	**Total Environmental Benefits Score** (of possible 10)	Flag: High Priority Subwatershed***	Flag: Headwaters	Flag: Involves Citizens in Construction	**Total Project Score** (of possible 20)
IB-350	Downstream of Olive Branch Rd	Wetland Restoration	Area planned for stream restoration. Restoration should include signficant buffer plants. Also a possible site for wetland restoration.	Durham SWCD	712 ft	0	3	3	**6**	wetland acreage?	-	4	3	3	**10**	**3**	-		**16**
ER-120 and IB-120 and ER-150	RCH 120 South of Ravenstone (near OT 122)	Stream restoration and buffer planting	Erosion at OT122 discharge and along reach. This is upstream of planned restoration sites. Banks are eroded, channel actively widening. Buffer removed when clearing forest. Future uncertain due to extensive new development upstream. Further downstream, small tribs are all showing extensive headcutting into main channel. Recommended major buffer planting. Possibly reconnect to floodplain.	TBD	IB-120 = 1883 ft	0	1	3	**4**	✓	-	3	3	3	**9**	**3**	-		**13**
IB-502, 503, 504, 506, 508	Falls Village Golf Course	Buffer Plantings	Streams are unbuffered where crossing fairways. A no mow buffer should be established. Contact superintendent regarding buffer mowing and nutrient management.	EEP; SWCD; City SWS	1996 ft	2	2	2	**6**	✓	-	4	0	3	**7**	6	✓		**13**
IB-507	Falls Village Golf Course	Wetland Restoration	Wet area downstream of cart booth is a candidate for restoration.	EEP; SWCD; City SWS	94 ft	1	2	3	**6**	-	-	1	3	3	**7**	6	-		**13**
R-300	Pizza Hut-Burger King at Route 70 and Mineral Springs Rd	Stormwater Retrofit	Create pocket wetland in remnant forest and intermittant stream area between fast food restaurants and adjacent businesses. Forest area is degraded, with much erosion and trash. No stormwater treatment present. Drainage area includes Pizza Hut parking lot, Burger King,and portions of Mineraal Springs Road and Route 70 intersection.	NC DOT; Durham County Stormwater	6 ac	1	1	2	**4**	-	-	4	3	1	**8**	**1**	✓		**12**
R-301	Route 70 Outfall adjacent to Budget Truck Rental	Stormwater Retrofit	Create forested wetland by installing forebay downstream of 42" outfall and embankment in flat forested area. Drainage area includes commerical, residential, and highway land uses with no stormwater treatment. However, the forested floodplain provides existing benefits.	NC DOT; Durham County Stormwater	9 ac	1	1	2	**4**	-	-	4	3	0	**7**	**1**	✓		**11**
OT-102; OT-103; OT-104; ER-100	Triangle Point Apartments on Angier Rd	Stormwater Retrofit and head cut control	In additiaon to OT-101 that is addressed with R-302, approx. 6 acres of uncontrollled runoff from the Triangle Poine Apartments disconves to outfalls with scour that undermines the endsections. Rip rap along slope in fairly good condition. Significant erosion where rip rap stops. Fairly decent stream that could be protected by capture of the channel protection volume upstream. These sites are constrained by the small amount of open space, steep slopes, and utilities. Retrofitting is possible but may be expansive.	City SWS; Durham County Stomrwater	up to 6 ac	1	1	1	**3**	-	-	4	2	1	**7**	**2**	✓		**10**
IB-110	Wetland between Woodale and Alyea Ct in Brightleaf	buffer planting	This wetland buffer was completely destroyed by sewer ROW and residenital development. Either try to replant along ROW or mitigate elsewhere.	TBD	1667 ft	1	1	1	**3**	✓	✓	3	0	3	**6**	**1**	-		**9**
MI-100	Powerline Easement	Buffer Plantings	No buffers and often a lot of sediment coming off of dirt roadway/steep slopes.	TBD	100 ft	2	1	1	**4**	-	✓	1	0	3	**4**	**2**	✓		**8**
UT-401, ER-401	Power Easement west of Virgil Rd	Stream Stabilization; Buffer Plantings	Severe erosion downstream of power easement warrants stablization. This may require buffer plantings, stormwater detention in easement, wetland restorationn, and/or bank stabilization.	TBD	223 ft	0	1	2	**3**	-	?	1	2	1	**4**	5	-		**7**
ER-110	RCH-113 below Snappy's Lake at Brightleaf	Stream repair	Large headcut from new drainage channel from lake. This has occurred recently. 20ft radius 4-12 ft deep.	TBD	<100 ft	1	1	1	**3**	-	-	0	2	1	**3**	**1**	✓		**6**
R-302	Triangle Point Apartments on Angier Rd	Stormwater Retrofit	Upstream of OT-101, OT-312, ER-100. Create wet swale to treat parking lot runoff from Discovery Way and Beta Loop. Small drainage area. At least 1 utility conflict. Construction contrained by proximity of building foundations and steep slope downstream.	City SWS	1.4 ac	1	1	1	**3**	-	-	2	0	1	**3**	**2**	✓		**6**
OT-100	Fox Ridge Apartments	Stormwater Retrofit	Llots of trash from outfall. Stormwater is currently untreated. Very green grass at Apartments.	Durham County Stormwater	1.1 ac	1	1	1	**3**	-	-	2	0	1	**3**		✓		**6**

* Flag, agency criteria--assumed 1,500 feet length to meet EEP criteria
** Wetland WQ score based on area treated (same as stormwater BMP)
*** Flag, high priority subwatershed--assumed subsheds 1, 2, and 3 are highest priority for restoration
****Physical constraints, natural areas impacts and Flag, Public Land based on CWP fieldwork review, fieldwork/landowner follow-up needed
*Red font in Owner/Manager Support category = owner contacted but no response

insert pdf maps of Major restoration projects here

APPENDIX 2: VOLUNTEER RESTORATION PROJECTS
Restoration projects suitable for construction primarily by volunteers. May require some design or limited labor by contractor.
Project Types: wetland creation, stream repair, stormwater retrofit, buffer planting, reforestation

						Implementation Feasibility						Environmental Benefits							
Project ID	**Name and Location**	**Project Type**	**Description**	**Agency for Follow-up**	**Size as Length (ft)**	Relative Construction Cost	Owner / Manager Support*	Physical Constraints****	**Total Feasibility Score** (of possible 8)	Flag: Agency Criteria*	Flag: Public Land****	Water Quality**	Channel Protection	Natural Areas Impacts****	**Total Environmental Benefits Score** (of possible 10)	Flag: High Priority Subwatershed***	Flag: Headwaters	Flag: Involves Citizens in Construction	**Total Project Score** (of possible 20)
IB-213	Wayward Dr.	Buffer planting	Stream between properties is mowed to the edge. Homeowner is interested in creating a buffer to control stormwater flows.	TBD	238 ft	2	3	3	**8**	–	–	1	2	3	**6**	9	✓	✓	**14**
IB-121	Along RCH-122	Buffer planting	Assist residents to plant buffers with native vegetation.	TBD	552 ft	2	2	3	**7**	–	–	2	–	3	**5**	**3**	✓		**12**
IB-336	Off Baptist Road and Southview Rd	Buffer planting	Intermittant stream through pasture.	TBD	1032 ft	2	1	1	**4**	–	–	3	2	3	**8**	9	✓		**12**
ER-170 and IB-170	Kinard Rd at Phillips Farm	Stream repair and buffer planting	Banks actively eroding due to lack of buffer vegetation.	TBD	IB-170 = 1200 ft	1	1	3	**5**	–	–	3	3	?	**6**	**2**	–		**11**
IB-332	Triple Crown Farm	Buffer planting	Small tributary through pasture has no buffer. Hoof prints indicate that horses have access.	DSWCD-Eddie Culberson	625 ft	2	1	1	**4**	–	–	2	2	3	**7**	6	✓		**11**
R-303	Amish Barns - business on Route 70	Buffer planting	Stream through commercial property and highway ROW lacks a buffer. Plant a non-woody wetland fringe and educate owner about management.	TBD	425 ft	2	1	2	**5**	–	✓	1	2	3	**6**	**2**	–		**11**
IB-100	HWY 70 along RCH 101	Buffer planting	Section of buffer with mowed grass. The rest is nicely forested. Address with natural regeneration (stop mowing) or active planting.	TBD	414 ft	2	1	3	**6**	–	✓	1	–	3	**4**	**2**	–		**10**
IB-102	Along RCH103 North of HWY 70 at Amish Barn	Buffer planting	Cleared for timber harvesting. Remaining buffer patchy at best. Safe location for volunteer tree planting. Potential difficulty establishing vegetation due to beaver presence.	TBD	900 ft	2	1	2	**5**	–	–	2	–	3	**5**	**2**	–		**10**
IB-330	Homeowner off Kemp Rd	Buffer planting	Stream through residential property has trees but is mowed.	TBD	218 ft	2	3	1	**6**	–	–	1	–	3	**4**	6	–		**10**
ER-121	RCH 122	Stream repair	Small section of stream behind residential property with bank failure. Right bank is 4 ft high.	TBD	<100 ft	1	2	2	**5**	–	–	1	3		**4**	**3**	✓		**9**
IB-331	Triple Crown Farm	Buffer planting	Small tributary through pasture has less than 10' buffer. Horses may have access.	DSWCD-Eddie Culberson	983 ft	2	1	1	**4**	–	–	2	–	3	**5**	6	✓		**9**
IB-222	Kingsmill Farm, Kemp Rd.	Buffer planting	Lack of buffer on stream adjacent to driveway entrance.	TBD	160 ft	2	1	2	**5**	–	–	1	–	3	**4**	7	–		**9**
IB-333	Homes on 98 west of Kemp Rd	Buffer planting	Small tributary passes behind backyards. Mowed to edge in many spots.	TBD	202 ft	2	1	0	**3**	–	–	1	–	3	**4**	6	✓		**7**
IB-334	Field on 98 west of Kemp Rd	Buffer planting	Intermittant stream through small field. Outside City but just dwnstream of development in City.	TBD	284 ft	2	1	0	**3**	–	–	1	–	3	**4**	6	✓		**7**

* Flag, agency criteria--assumed 1,500 feet length to meet EEP criteria
** Wetland WQ score based on area treated (same as stormwater BMP)
*** Flag, high priority subwatershed--assumed subsheds 1, 2, and 3 are highest priority for restoration
****Physical constraints, natural areas impacts and Flag, Public Land based on CWP fieldwork review, fieldwork/landowner follow-up needed
*Red font in Owner/Manager Support category = owner contacted but no response

insert pdf maps of Volunteer restoration projects here.