Agricultural Working Group - 1st Formal Meeting - 12/13/10 @2pm

James River and Tributaries – Richmond TMDL Implementation Plan Development

Goochland, Powhatan, Henrico, Chesterfield Counties and City of Richmond, VA

Facilitator: _____

Recorder: _____Next WG Meeting:_____

_____

Agenda

1. **Introductions & Sign-In**
2. **Steering Committee (select yes or no on sign-in if you'd like to join)**
3. **Review of 11/16/10 Brainstorming Session – Questions**
4. **Goals of Meeting**

- Review the pollutant reductions that the implementation plan must meet (Table 1).
- Discuss preliminary estimates of implementation measures that will result in reductions in Agricultural bacterial loads (Tables 4 and 5).
- Document existing efforts underway to address bacteria in Agricultural and Residential areas of the impaired watersheds (Table 3).
- Identify additional/alternative measures to reduce the bacteria load that the implementation plan can address.

5. **Set next Agriculture WG meeting date/time with 2 back-up dates (must be an evening meeting) for late January**
6. ***Open discussion (as time allows)***

Total Maximum Daily Load (TMDL) Study Results

Almond, Bernards, Falling, Gillie, Goode, No Name, Powhite, and Reedy Creeks and the James River riverine and tidal do not meet water quality standards for bacteria. These standards are designed to identify waters that are not suitable for "primary contact recreation" (swimming) because of the risk of illness. The TMDL study identified the sources of bacteria and how much each source category needs to be reduced so that the stream is safe for swimming and other recreational activities. Only Bernards Creek, Powhite Creek, Almond Creek, and the James River (riverine) required reductions to agricultural bacteria sources in the TMDL. Of these streams, Bernards Creek and Almond Creek only required agricultural reductions to direct livestock bacteria loads.

The implementation plan will outline a staged approach to meet the reductions to human, pet, and agricultural sources determined in the TMDL study. Wildlife is considered a background condition and reductions to wildlife bacteria loads are not explicitly addressed in the TMDL implementation plan.

Table 1. Allocation scenarios for reducing current bacteria in JR-Richmond area impairments.

	Percent Reductions to Existing Bacteria Loads						
Impairment	Wildlife Direct	Wildlife Land Based	**Livestock Direct**	**Agricultural Land Based**	**Human Direct**	**Human and Pet Land Based**	**City of Richmond CSO Program Project Plan Scenario**
Almond	0	0	91	0	100	85	Alternative E and a 52% reduction
Bernards	0	38	99	93	100	96	NA
Falling	0	0	0	0	100	13	NA
Gillie	0	0	0	0	100	94	Alternative E and a 95% reduction
Goode	0	0	0	0	100	96	NA
No Name	0	0	0	0	100	94.5	NA
Powhite	0	0	40	0	100	86	NA
Reedy	0	0	0	0	100	0	NA
All upstream Impairments Allocated:							
JR (riverine)	0	63	96	99	100	99	Alternative E
JR (tidal)	0	0	0	0	100	0	Alternative E

Reductions to Wildlife loads will not be specifically addressed in the implementation plan.

Table 2 shows the total livestock animal populations estimated in each impaired watershed. These numbers are cumulative (the columns are not supposed to add to a total, the total is the James River (tidal) value which includes all the other watersheds).

Table 2. Estimated livestock populations for 2006 in the James River – City of Richmond study area (cumulative).

Impaired Segment	Beef Adult	Beef Calves	Dairy Calves	Dairy Dry	Dairy Milkers	Hogs	Horse	Sheep	Deer Zoo	Bison Zoo
Almond Creek	28	27	0	0	0	1	30	6	0	0
Bernards Creek	86	60	9	9	19	5	77	4	0	0
Falling Creek	113	70	0	0	0	31	188	10	0	0
Gillie Creek	40	38	0	0	0	2	42	9	0	0
Goode Creek	0	0	0	0	0	0	0	0	0	0
James River (lower)	1,738	1,626	170	170	343	45	1,329	108	29	3
James River (tidal)	2,538	2,275	170	170	347	149	2,324	254	29	3
No Name Creek	0	0	0	0	0	0	0	0	0	0
Powhite Creek	12	7	0	0	0	3	20	1	0	0
Reedy Creek	0	0	0	0	0	0	0	0	0	0
Watershed Total	**2,538**	**2,275**	**170**	**170**	**347**	**149**	**2,324**	**254**	**29**	**3**

Accounting for Agricultural BMPs Installed

It is recognized that the SWCDs/NRCS have been working in these watersheds to establish Best Management Practices (BMPs) that are both cost-effective and beneficial to the farmer and the environment. Table 3 was created from the DCR Ag BMP database website. All of the Buffer Land and Streamside Fencing BMPs were installed in the Norwood Creek (JM81) and Genito Creek/Dover Creek (JM82) subwatersheds. These are the BMPs most efficient in removal/prevention of bacteria within this list. The streamside fencing values were accounted for in Table 4.

To estimate fencing requirements, the stream network was overlaid with land use. Stream segments that flowed through or adjacent to pasture were identified. If the stream segment flowed through the land-use area, it was assumed that fencing was required on both sides of the stream, while if a stream segment flowed adjacent to the pasture area, it was assumed that fencing was required on only one side of the stream. These assumptions were further refined to examine size of resultant pasture and existing BMPs. Due to limitations with the available GIS hydrology stream layers only perennial streams were included in this process. Not every land-use area identified as pasture has livestock on it at any given point in time. However, it is assumed that all pasture areas have the potential for livestock access.

Table 3. Agricultural BMPs Already Installed.

BMP name	BMP Code	Units	# Units Installed	Average Acres Benefited	Average System Cost
Continuous No-till System	SL-15A	Acres	4,771.5	21.5	$2,106.17
CREP Riparian Forest Buffer	CP-22	Acres	33.5	6.7	$477.10
Grazing Land Protection*	SL-6	Lin. Feet	17,397	36.5	$8,854.83
Permanent Veg. Cover on Cropland	SL-1	Acres	39.4	6.6	$1,144.03
Protective Cover for Specialty Crops	SL-8	Acres	2.9	2.9	$101.50
Reforest. of Erodible Crop/Pasture	FR-1	System	1	8.0	$2,400.00
Riparian Forest Buffer	CRFR-3	Acres	20.4	4.1	$3,434.04
Stream Protection*	WP-2	Lin. Feet	600	2.4	$5,103.78

*Accounted for in Table 2

Streamside Fencing for Cattle

In order to reduce direct bacteria from livestock, some form of livestock stream exclusion is necessary. Streamside fencing eliminates direct livestock bacteria loads, prevents livestock from eroding the stream bank, provides a buffer for capturing pollutants in runoff from pasture, and establishes (with the growth of streamside vegetation) one of the foundations for clean water. The inclusion of a buffer helps to reduce bacteria, as well as other possible pollutants, in runoff. The incorporation of effective buffers could reduce the need for more costly control measures.

- The SL-6 and LE-1T systems include streamside fencing, interior fencing, alternative watering system, and require a 35-ft buffer from the stream. The SL-6 practice offers a cost-share up to 75%, whereas the LE-1T practice offers a maximum of 85%.
- The LE-2T system is similar to the LE-1T, except that it only requires a 10-ft buffer and offers a maximum of 50% cost-share.
- The WP-2T system includes streamside fencing, hardened access/crossing options, requires a 35-ft buffer, and offers a 75% cost-share. In cases where a watering system already exists, a WP-2T system is a more appropriate choice.
- 7% of the total fencing needed was calculated as fence maintenance needed during the project.

Table 4. Estimated Stream Fencing Installed and Needed.

Stream Name	Estimated Fence Length Needed (ft)	Cost-Share Fence installed (ft)*	Total Fence Length Needed (ft)	Fence Maintenance (ft)	Streamside Fencing Systems Needed (LE-1T, LE-2T, SL-6 or WP-2T)
Almond Creek	73	0	73	5	1
Bernards Creek	14,770	0	14,770	1,034	12
James River (riverine)**	186,134	17,997	168,137	11,770	136
Powhite Creek	550	0	550	39	1
Project Totals	**201,527**	**17,997**	**183,530**	**12,848**	**150**

*Values estimated from BMPs already installed (as shown in Table 1)
**Values for the James River (riverine) are not double counting Bernards Creek and Powhite Creek values

Questions for the group:

- What is the breakdown of exclusion systems that are expected to be SL-6, LE-1T, LE-2T or WP-2T?
    - Lynchburg IP used 90% SL-6/LE-1T and 10% WP-2T and 0% LE-2T; is that breakdown accurate for this watershed?
    - From 1st meeting, we know there is 1 horse farm in Bernards that would need a WP-2T.

NPS BMPs Needed

In order to meet the water quality standards, additional BMPs are needed that treat or prevent bacteria from traveling to surface waters. Table 5 shows the estimated needs in Bernards Creek and the James River (riverine) impairments. (Almond Creek and Powhite Creek did not require land-based reductions to agricultural bacteria loads.)

Table 5. Estimated Agricultural land-based BMPs Needed.

Control Measure	Unit	Bernards Creek	James River (riverine)
Improved Pasture Management	Acres	963	18,997
Loafing Lot Management	System	1	1
Manure Incorporation – Crop	Acre	239	3,661
Retention Ponds – Pasture	Acres - Treated	414	10,033

Agricultural BMP Cost Estimates

The streamside fencing system costs shown in Table 6 were increased due to 1st meeting conversation. All other costs are now consistent with the Lynchburg IP and other IPs in Virginia.

Table 6. Estimated Costs of Agricultural BMPs.

Agricultural Control Measure	Unit	Cost per Unit
Grazing Land Protection System (LE-1T)	System	$25,000
Stream Protection System (LE-2T)	System	$25,000
Grazing Land Protection System (SL-6)	System	$25,000
Streamside Protection (WP-2)	System	$8,000
Streamside Fence Maintenance	Foot	$3.50
Improved Pasture Management	Acre	$150
Loafing Lot Management	System	$10,000
Manure Incorporation – Cropland	Acre	$18
Vegetated Buffers – Cropland	Acre	$360
Retention Ponds – Pasture	Acres – Treated	$140

Questions for the group:

- The local average cost of an SL-6 system was $8,854. Due to discussion in the 1st meeting the system costs were increased to $25,000. Do these updated values apply?
- Are the cost estimates in Table 4 valid for this watershed?

Possible Scenario to meet Stages I and II– Almond Creek

This scenario returns a 0.1% reduction to bacteria loads to Almond Creek. To implement the final TMDL, the total load reduction required is 52.9% (no wildlife load reductions). The remaining reductions will come from Residential and Urban BMPs.

Almond Creek BMPs	Unit	Cost per unit	Units Needed	Total Cost
Agricultural Control Measures: Grazing Land Protection System (LE-1T/SL-6/LE-2T)	System	$25,000	1	$25,000

Possible Scenario to meet Stages I and II – Powhite Creek

This scenario returns a 0.1% reduction to bacteria loads to Powhite Creek, and includes reductions from the BMPs currently installed. To implement the final TMDL, the total load reduction required is 69.7% (no wildlife load reductions). The remaining reductions will come from Residential BMPs.

Powhite Creek BMPs	Unit	Cost per unit	Units Needed	Total Cost
Agricultural Control Measures:				
Grazing Land Protection System (LE-1T/SL-6/LE-2T)	System	$25,000	1	$25,000

Possible Scenario to meet Stages I and II – Bernards Creek

This final Stage II scenario returns a 40.7% reduction to bacteria loads to Bernards Creek, and includes reductions from the BMPs currently installed. To implement the final TMDL, the total load reduction required is 64.6% (no wildlife load reductions). The remaining reductions will come from Residential BMPs.

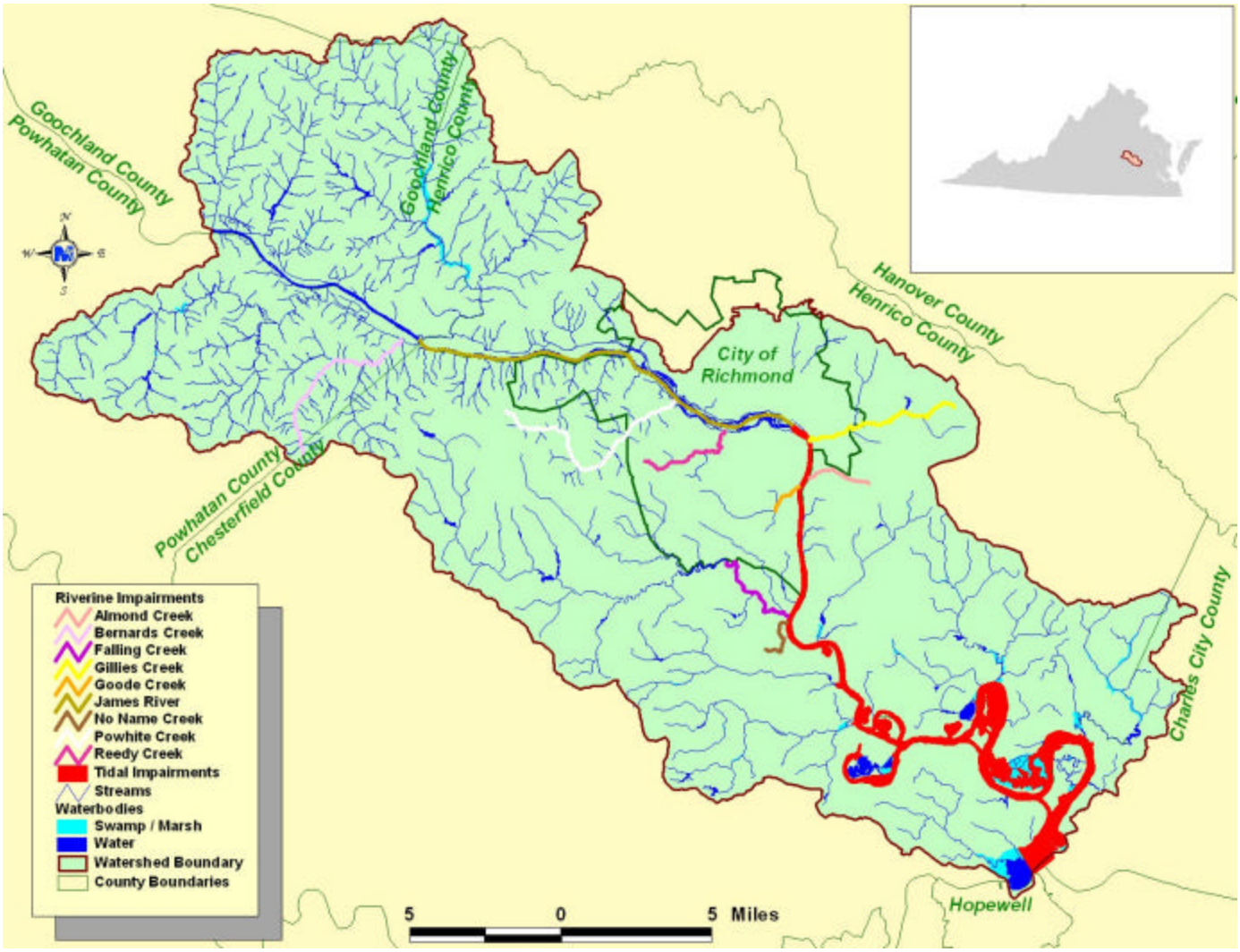
Bernards Creek BMPs	Unit	Cost per unit	Units Needed	Total Cost
Agricultural Control Measures:				
STAGE I				
Grazing Land Protection System (LE-1T/SL-6/LE-2T)	System	$25,000	11	$275,000
Improved Pasture Management	Acre	$150	963	$144,450
Stream Protection System (WP-2T)	System	$8,000	1	$8,000
Streamside Fence Maintenance	Feet	$3.50	517	$1,810
Loafing Lot Management System (WP-4B)	System	$10,000	1	$10,000
Manure Incorporation	Acre	$18	239	$4,302
Stage I Agricultural Subtotal				*$443,562*
STAGE II				
Farm Retention Ponds	Acre-Treated	$140	414	$57,960
Streamside Fence Maintenance Payment (with WP-2T)	Feet	$3.50	517	$1,810
Stage II Agricultural Subtotal				*$59,770*
Agricultural Total				**$503,331**

Possible Scenario to meet Stages I and II – James River (riverine)

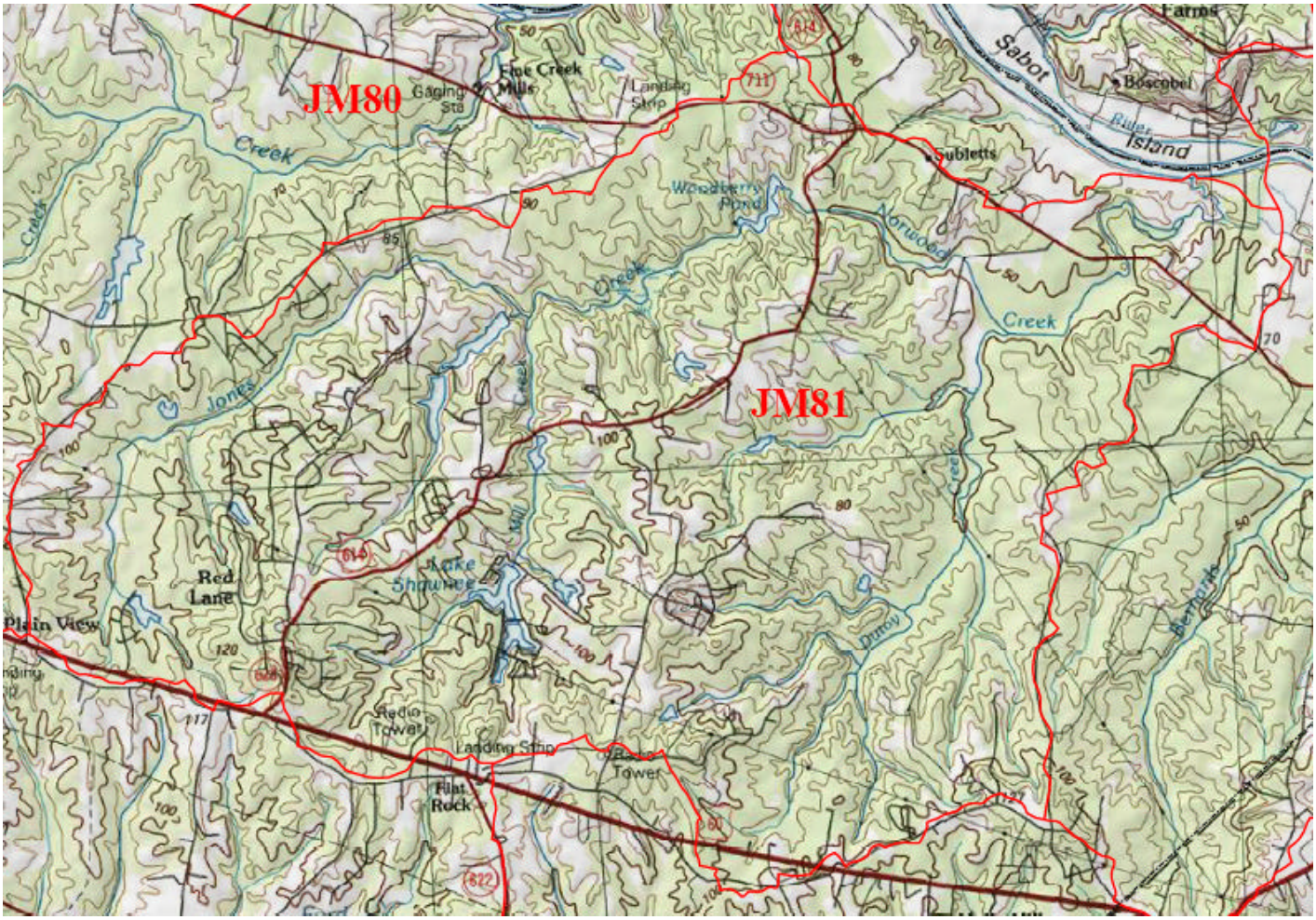
The current BMPs installed equals approximately a 0.39% reduction in bacteria load to the James River (riverine). This final Stage II scenario returns a 33.2% reduction to bacteria loads to the James River (riverine), and includes reductions from the BMPs currently installed. To implement the final TMDL, the total load reduction required is 73.7% (no wildlife load reductions). The remaining reductions will come from Residential and Urban BMPs.

James River (riverine) BMPs	Unit	Cost per unit	Units Needed	Total Cost
Agricultural Control Measures:				
STAGE I				
Grazing Land Protection System (LE-1T/SL-6/LE-2T)	System	$25,000	122	$3,050,000
Improved Pasture Management	Acre	$150	18,997	$2,849,550
Stream Protection System (WP-2T)	System	$8,000	14	$112,000
Streamside Fence Maintenance Payment (with WP-2T)	Feet	$3.50	5885	$20,598
Loafing Lot Management System (WP-4B)	System	$10,000	1	$10,000
Manure Incorporation	Acre	$18	3,661	$65,898
Stage I Agricultural Subtotal				*$6,108,046*
STAGE II				
Farm Retention Ponds	Acre-Treated	$140	10,033	$1,404,620
Streamside Fence Maintenance Payment (with WP-2T)	Feet	$3.50	5885	$20,598
Stage II Agricultural Subtotal				*$1,425,218*
Agricultural Total				**$7,533,263**

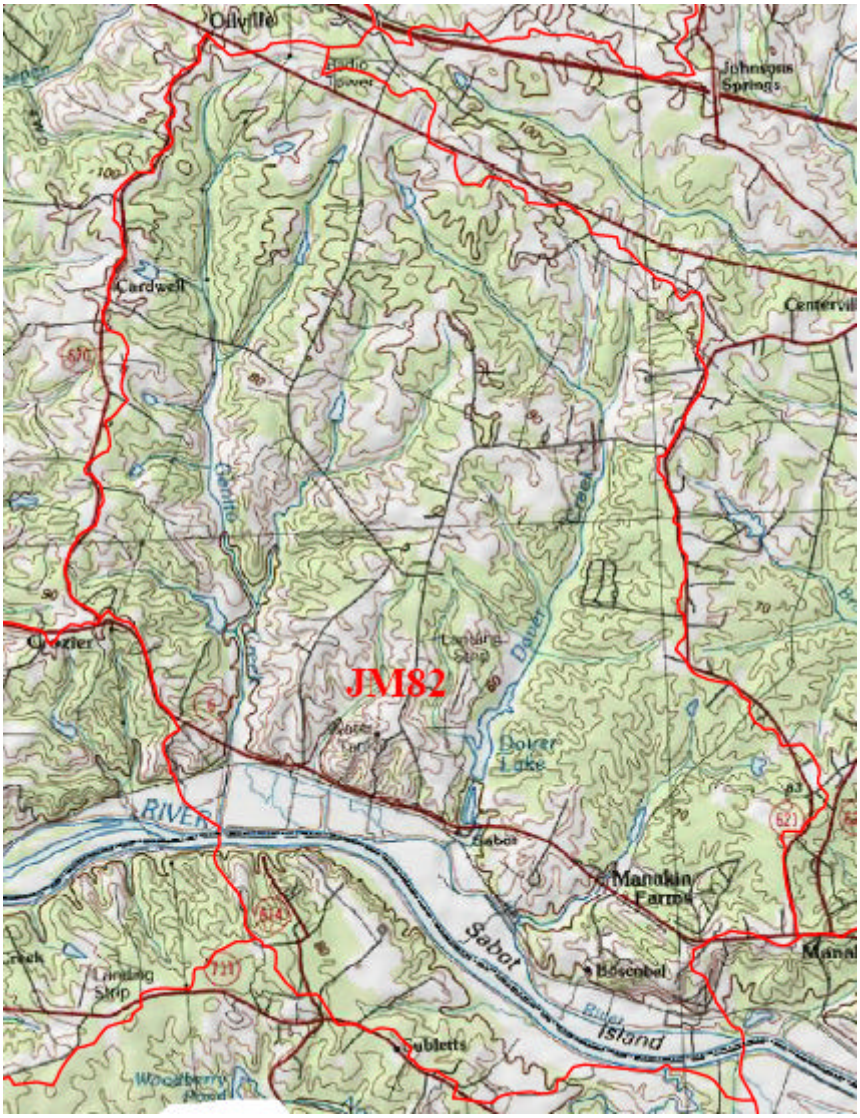
Maps



Impaired stream segments in the James River – City of Richmond study area.



Topo map and boundary of JM81, Norwood Creek, where some livestock stream exclusion fencing is installed.



Topo map and boundary of JM82, Genito Creek/Dover Creek, where some livestock stream exclusion fencing is installed.