Snapshot Assessment of Hammer Creek and Tributaries – Phase I Portion to Downstream Limit of Barry Property, Lebanon County

Final Report for Technical Assistance Provided through the Trout Unlimited Nonpoint Source Technical Assistance Program

April 2020

Background

Doc Fritchey TU Chapter (DFTU), in partnership with Donegal Chapter of TU (DTU) requested technical assistance from Trout Unlimited for a snapshot assessment of the main stem of Hammer Creek and portions of its tributaries in southern Lebanon County. In the planning of this work, DFTU divided the 20.4 miles of 2nd-order and higher streams in the watershed into 3 distinct 'Phases' of assessment in order to streamline the work. This report covers findings of Phase 1 (9.4 miles) from the headwaters upstream of SR 419 to the downstream limit of the Barry property (about 1,200 feet downstream of the Obie Road bridge). The segment from South Market Street in Schaefferstown downstream to the SR 501 crossing was also included. The purpose of the snapshot assessment was to identify streambank stabilization and riparian restoration opportunities along the Hammer Creek and its tributaries.

The assessment includes preliminary estimates of potential sediment yield reduction at each site to help inform the prioritization process. These preliminary estimates are based on average streambank dimensions derived from field observations and a limited number of field measurements used to capture 'typical' condition of each erosion site.

Summary of Technical Assistance Activities and Recommendations

Streambank Stabilization / Channel Restoration

TU staff walked the Phase 1 portion of Hammer Creek and its tributaries from June 2019 through November 2019 to inventory areas of bank erosion, impaired channel morphology and degraded riparian vegetation. Coordination with landowners to gain permission to access made it difficult or impossible to assess some areas within the Phase 1 reach. These areas were assessed remotely, as best as possible, to provide a comprehensive list of potential project locations. TU recorded notes and GPS locations for streambank erosion, impaired channel and degraded riparian buffer locations along the reach. This data is summarized in the attached table.

TU identified 21 actively eroding streambank sites. At some of these, multiple contiguous sections of eroding streambanks were group together as an individual "Site", with the understanding that these would most effectively be addressed in the future as a single restoration or stabilization project. Based upon this initial snapshot assessment, it is recommended that 13 of these sites could be stabilized through installation of GP-1 structures and/or re-grading of streambanks to reconnect floodplains and reduce bank height, bank angle and erosion potential. These would account for 9,268 feet of streambank stabilization and a preliminary estimated sediment yield reduction of 520,584 pounds (260.29 tons) annually. The remaining 8 sites should be considered for full-scale channel restoration, given the extent of impaired channel morphology as a principal driver of channel/ and streambank instability and subsequent erosion. These would account for 8,793 feet of channel / bank stabilization and a preliminary estimated sediment yield reduction of 1,056,637 pounds (528.32 tons) annually.

Of the 21 active erosion sites, TU prioritized 5 stream restoration / streambank stabilization project locations across a total of 4 private landowners, all of whom have been contacted by DFTU to discuss their level of interest. Priority landowner location maps are attached. The prioritized list was developed taking into consideration length of stream on

property, access for machinery, estimated sediment reduction calculations, and current degree of landowner interest. Connectivity of each site to others upstream and downstream was also considered, in terms of how erosion or channel impairment at that site might be influencing, or contributing to, issues at others. For example, prioritizing a site where bank erosion and resulting sediment load directly affects erosion of the next downstream site provides benefit not only to that priority site, but to the next one downstream. Given the scale of active streambank erosion at these locations, stabilization efforts would address a significant portion of the total sediment load being delivered from the stream network assessed in Phase 1. Below is a list and brief description of the 5 priority stream restoration / streambank stabilization sites, with landowner contact information provided for each.

Priority Location 1 – Upper Barry Property – Hammer Creek Channel Restoration Project (Sites #14 and 15)

Stephen Barry, Jr. (property parcel address 303 Distillery Road) has been approached about the potential of working on his property by DFTU and is in support of the project. This project site extends along the main stem of Hammer Creek from the upstream limit of the parcel boundary downstream to the confluence with the unnamed tributary (locally known as and referred to in this report as Distillery Run). A concrete bridge bisects this potential project reach. The stream segment is severely impaired, actively downcutting in some locations and aggressively shifting laterally in others. A sustainable and successful remedy to ongoing bed and bank erosion would need to address the severely-impaired channel morphology through this reach. As such, a systemic- and process-based natural channel design approach will be necessary. Channel restoration through this priority reach would address erosion along approximately 2,446 feet of Hammer Creek and would result in eliminating an estimated 323,507 pounds (161.75 tons) of sediment per year. Stabilization of this reach would likely enhance the benefit and success of subsequent restoration work through adjoining downstream portions of Hammer Creek.

Priority Location 2 –Walmer Property - Distillery Run Channel Restoration Project (Sites #7 and 8)

Steven and Tisha Walmer (property parcel address 220 Distillery Road) have been approached about the potential of working on this property by DFTU and are in support of the project. This project site extends along Distillery Run from the bridge at Distillery Road upstream a distance of 591 feet. Through field observations and discussions with the landowners, this stream reach was straightened to maximize agricultural use of the adjoining land. Consequently, the stream channel is attempting to re-establish a stable meander geometry through this reach, adjusting both laterally and downward. This has resulted in significant undermining and lateral erosion of streambanks through the reach. High, steep banks with ever-increasing potential for erosion have developed through much of this stream segment as a result of the channel downcutting. The entrenched (laterally confined) character of this reach leads to elevated flood velocities, compounding channel impairment and erosion of bed and banks downstream of Distillery Road (Priority Location 3). To restore this reach, a systemic- and process-based restoration approach such as natural channel design is recommended. Channel restoration through this priority reach would address erosion along approximately 591 feet of Hammer Creek and would result in eliminating an estimated 40,907 pounds (20.45 tons) of sediment per year. Restoration of this site would improve the success of similar restoration work done through the adjoining downstream reach (Priority Location 3) by reducing the impacts associated with elevated flood velocity and reducing sediment load.

Priority Location 3 – Barry Property – Distillery Run Channel Restoration Project (Sites #9 thru #11)

Stephen Barry, Jr. (property parcel address 303 Distillery Road) has been approached about the potential of working on his property by DFTU and is in support of the project. This project site extends along Distillery Run from the bridge at Distillery Road downstream to the confluence with Hammer Creek. There is an exposed pipeline (WP 10) crossing the stream 675 feet downstream of the bridge that should be considered in the restoration design. As with the adjoining reaches of Hammer Creek, morphology of this stream segment is severely impaired, actively downcutting in some locations and aggressively shifting laterally in others. Tight, highly-erosive meander bends contribute a large amount of sediment through bed and bank erosion. To maximize long-term success, a systemic- and process-based restoration approach such as natural channel design is recommended. Channel restoration through this priority reach would address erosion along approximately 1,766 feet of Hammer Creek and would result in eliminating an estimated 175,653 pounds (87.83 tons) of sediment per year. Successful restoration of stable and appropriate channel morphology through

this reach would greatly benefit the success and longevity of similar stabilization and restoration work downstream of the confluence with Hammer Creek.

Priority Location 4 – Lower Barry Property – Hammer Creek Channel Restoration Project (Sites #16 and 17)
Stephen Barry, Jr. (property parcel address 303 Distillery Road) has been approached about the potential of working on his property by DFTU and is in support the project. This project site extends along the main stem of Hammer Creek from confluence with Distillery Run downstream to the wood line at the lower end of the Barry Property parcel. There is an exposed pipeline (WP 24) crossing Hammer Creek 170 feet from the downstream site boundary that should be considered in the restoration design. Similar to the adjoining reach of Hammer Creek upstream of Distillery Run, morphology of this stream segment is severely impaired, actively downcutting in some locations and aggressively shifting laterally in others. Given the contribution (both in drainage area and sediment load) of Distillery Run upstream, channel dimensions differ from the adjoining upstream reach. Multiple mid-channel bars and tight, highly-erosive meander bends contribute a large amount of sediment through bed and bank erosion. To maximize long-term success, a systemic- and process-based restoration approach such as natural channel design is recommended. Channel restoration through this priority reach would address erosion along approximately 2,172 feet of Hammer Creek and would result in eliminating an estimated 386,133 pounds (193.07 tons) of sediment per year.

Priority Location 5 – Barry and Shuey Streambank Stabilization Project (Site #19)
The Barry family, on behalf of Stephen Barry Sr. (property parcel address 101 Barry Lane), and Shawn Shuey (246 Michters Road) have been approached about the potential of working on their properties by DFTU and are in support of the project. This potential project reach extends along the main stem of Hammer Creek from the wood line downstream of the bridge at Obie Road to the lower limit of the Phase I snapshot Assessment area (WP 32 near mouth of tributary entering from right bank). This project reach consists of a series of eroding outside meander bends. Installation of GP-1 structures is recommended to address stabilization of these sediment sources. If completed this project has the potential to stabilize 572 feet of stream and eliminate approximately 29,627 pounds (14.81 tons) of sediment a year.

If completed, the restoration and stabilization of these top 5 priority projects would address streambank erosion along approximately 7,547 feet of stream and eliminate at least 955,827 pounds (477.91 tons) of sediment annually. These sediment reduction quantities are preliminary and additional site visits to these locations would be needed to develop detailed project plans and gather more accurate erosion measurements.

Riparian Restoration
Overall, riparian buffers adjacent to the portions of Hammer Creek and tributaries included in this snapshot are severely depleted or altogether absent. Most of the assessed stream network would benefit from riparian buffer work, either through establishment of robust, native riparian buffers where they do not currently exist, or from enhancement of buffers where thin, marginally-effective strips of woody vegetation currently line some sections of the stream corridor.

The recommendations below for prioritization of Riparian Buffer Sites *strongly considers* the type of instream- and/or streambank restoration work necessary to stabilize the stream channel and maximize sediment reduction. Riparian buffer work should initially be pursued in locations where no streambank stabilization work is currently recommended, or where the type and scale of instream work proposed (such as stabilizing the streambanks using GP-1 habitat enhancement structures) can occur with minimal impact to a newly-installed riparian buffer. This is due to the very nature of this channel restoration work, including the need for access and use of heavy construction equipment, stockpiling and placement of construction materials, and potential for significant adjustments to the alignment and configuration of the stream channel itself.

During the snapshot assessment TU identified a total of 6 priority riparian buffer sites where buffers could be installed with the most immediate benefit to the stream corridor, without risk of future disruption or damage as described above. Below is a list and brief description of each priority riparian buffer restoration site and landowner contact information.

Riparian Site #1 – Lentz, Zuck, J. Krall & T. Krall Properties (1,760 feet of stream corridor)

This riparian buffer planting site encompasses the following properties:

Ronald W. Lentz – 448 Schaeffer Road

J. Norman Zuck – 444 Schaeffer Road

Joel Krall – 480 Schaeffer Road

Thomas Krall – 490 Schaeffer Road

The existing riparian buffer along the upper 450' of this corridor (Lentz and Zuck properties) is extremely narrow and lacks species and structural diversity. The functionality and benefit of this buffer could be enhanced by increasing buffer width and composition. The remaining 1,310 feet of this stream corridor currently lacks an intact, well-vegetated buffer. Re-establishing buffer width to 50 feet along each streambank through the entirety of this site would increase riparian buffer area by 3.73 acres.

Riparian Site #2 – Wenger, Martin, Martin, King, Arnold, & Patches Properties (9,097 feet of stream corridor)

This riparian buffer planting site encompasses the following properties:

Steven J. Wenger - 549 Schaeffer Road

Alvin M. Martin – 575 Schaeffer Road

Wesley D. Martin – 605 Schaeffer Road

David L. King - 579 Schaeffer Road

Jame F. Arnold – 618 Rexmont Road

Christopher S. Patches – 640 Schaeffer Road

This riparian buffer planting site includes the Hammer Creek corridor and a network of tributaries entering from the south downstream of Rexmont Road. Historically, the stream channels through the majority of this reach have been straightened to maximize agricultural use of the adjoining land. In a few locations, a very thin and sparse tree line borders the stream channel. In remaining areas the stream corridor lacks an intact, well-vegetated buffer. Re-establishing a robust native riparian buffer through the entire length of this site with a width of 50 feet along each streambank would increase riparian buffer area by 20.88 acres.

Due to issues securing landowner permission and difficulties coordinating with ongoing livestock operations, much of this riparian buffer planting site was assessed from afar from public property (roadways and bridges).

Riparian Site #3 – Lantz, Petry, Baker, Zimmerman, Good, Musser, Musser & Martin Properties (4,266 feet of stream corridor)

This riparian buffer planting site encompasses the following properties:

Benjamin K. Lantz – 901 Schaeffer Road

William C. Petry – 381 Distillery Road

Wade G. Baker – 375 Distillery Road

Jared A. Zimmerman – 369 Distillery Road

Clifford M. Good – 361 Distillery Road

Jerry L. Musser – 353 Distillery Road

Phares Z. Musser – 2 Ridge Lane

Jason L. Martin – 345 Distillery Road

This riparian buffer planting site extends along the main stem of Hammer Creek, from the confluence with the unnamed tributary (spring creek) southwest of the Distillery Road / Schaeffer Road (SR 419) intersection downstream approximately 0.8 mile. The stream through this reach is influenced by multiple spring seeps and the riparian buffer is mostly comprised of herbaceous vegetation. Some areas of localized streambank erosion exist, and these are recommended to be treated with GP-1 streambank structures, which would not significantly interfere with riparian plantings. Re-establishing a robust native riparian buffer through the entire length of this site with a width of 50 feet along each streambank would increase riparian buffer area by 9.41 acres.

Riparian Site #4 – Nye, Musser & Martin Properties (935 feet of stream corridor)

This riparian buffer planting site encompasses the following properties:

Dale A. Nye – 327 Distillery Road

Jerry L. Musser – 353 Distillery Road

Jason L. Martin – 345 Distillery Road

This riparian buffer planting site extends along the main stem of Hammer Creek, from the upper Barry property boundary upstream approximately 935 feet. The stream through this reach is relatively well-connected to its floodplain, and only minimal streambank erosion was observed in a few, very isolated locations during the snapshot assessment. While streambank erosion is not a significant issue through this reach, the resource would benefit from the introduction of structural instream habitat and the addition of large wood. This stream corridor segment exhibits a well-forested riparian buffer along the right bank (facing downstream). Along the left bank, streamside vegetation is dominated by herbaceous species such as reed canarygrass. Re-establishing a robust native riparian buffer along the left bank 50 feet in width through the entire length of this site would increase riparian buffer area by 1.07 acres.

Riparian Site #5 – Shuey Property (240 feet of stream corridor)

This riparian buffer planting site is located entirely on the property of Shawn L. Shuey at 246 Michters Road.

The site begins immediately downstream of the Obie Road bridge spanning Hammer Creek, extending downstream approximately 240 feet. Re-establishing a robust native riparian buffer through the entire length of this site with a width of 50 feet along each streambank would increase riparian buffer area by 0.55 acre.

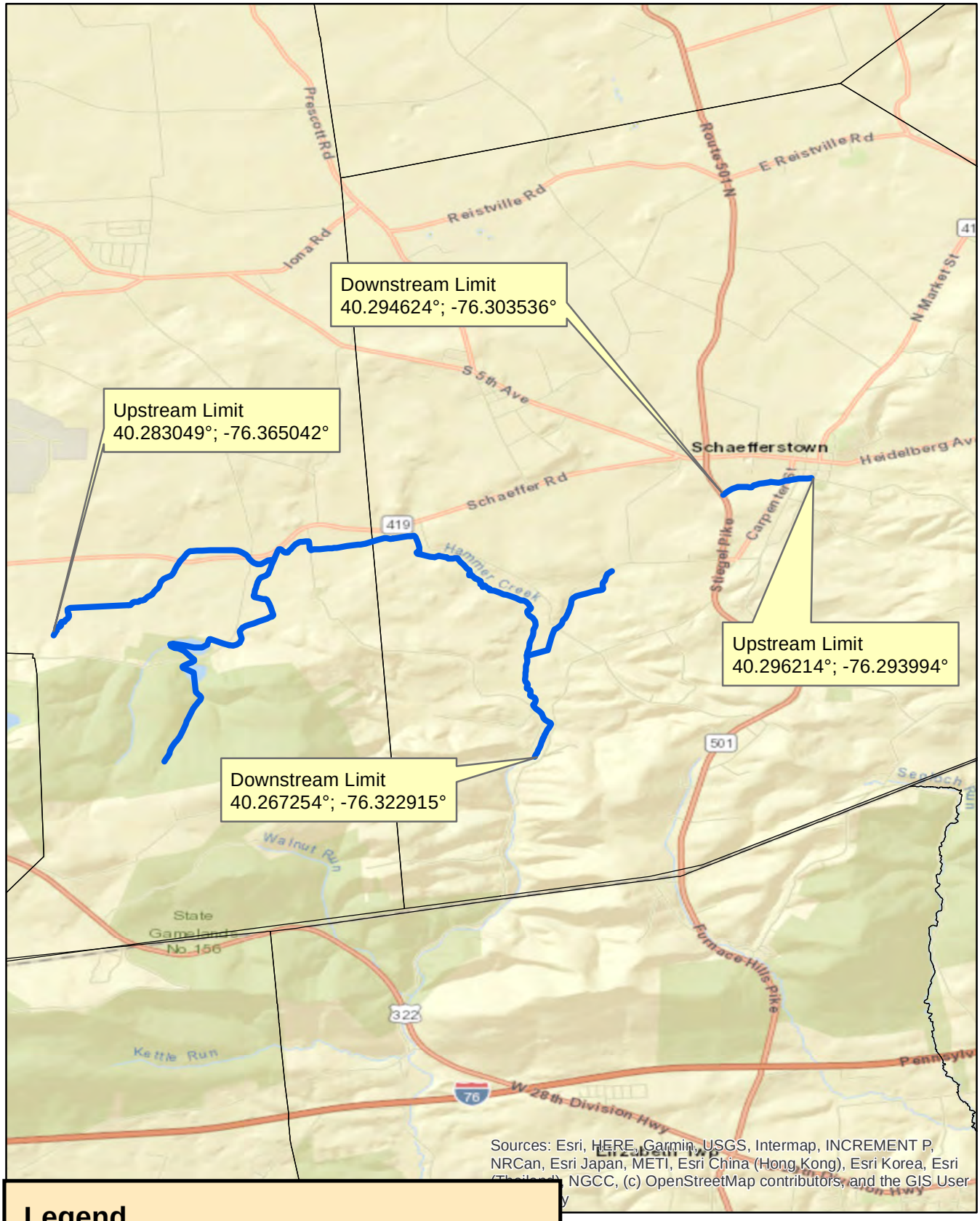
Riparian Site #6 – Barry Property (1,046 feet of stream corridor)

This riparian buffer planting site is located entirely on the property of Stephen Barry at 101 Barry Lane.

The site parallels Pumping Station Road from the downstream boundary of the Phase I snapshot assessment area upstream approximately 1,000 feet. Streambank erosion occurring along this reach can be adequately addressed using GP-1 streambank structures, which can be installed with minimal impact to an installed riparian buffer. Much of the existing buffer is dominated by reed canarygrass, particularly along the right bank. Riparian buffer plantings at this site should emphasize reed canarygrass removal along the right bank and establishment of a diverse native buffer. Plantings along the left bank can be focused more toward increasing species and structural composition of the partial buffer already present. Re-establishing a robust native riparian buffer along the right bank through this site with a width of 50 feet would increase riparian buffer area by 1.20 acre.

Attachments

Doc Fritchey Chapter Trout Unlimited Snapshot Assessment Location Map



Legend

- Hammer Creek Phase 1 Snapshot Assessment
- PA Municipalities

1" = 1 mile

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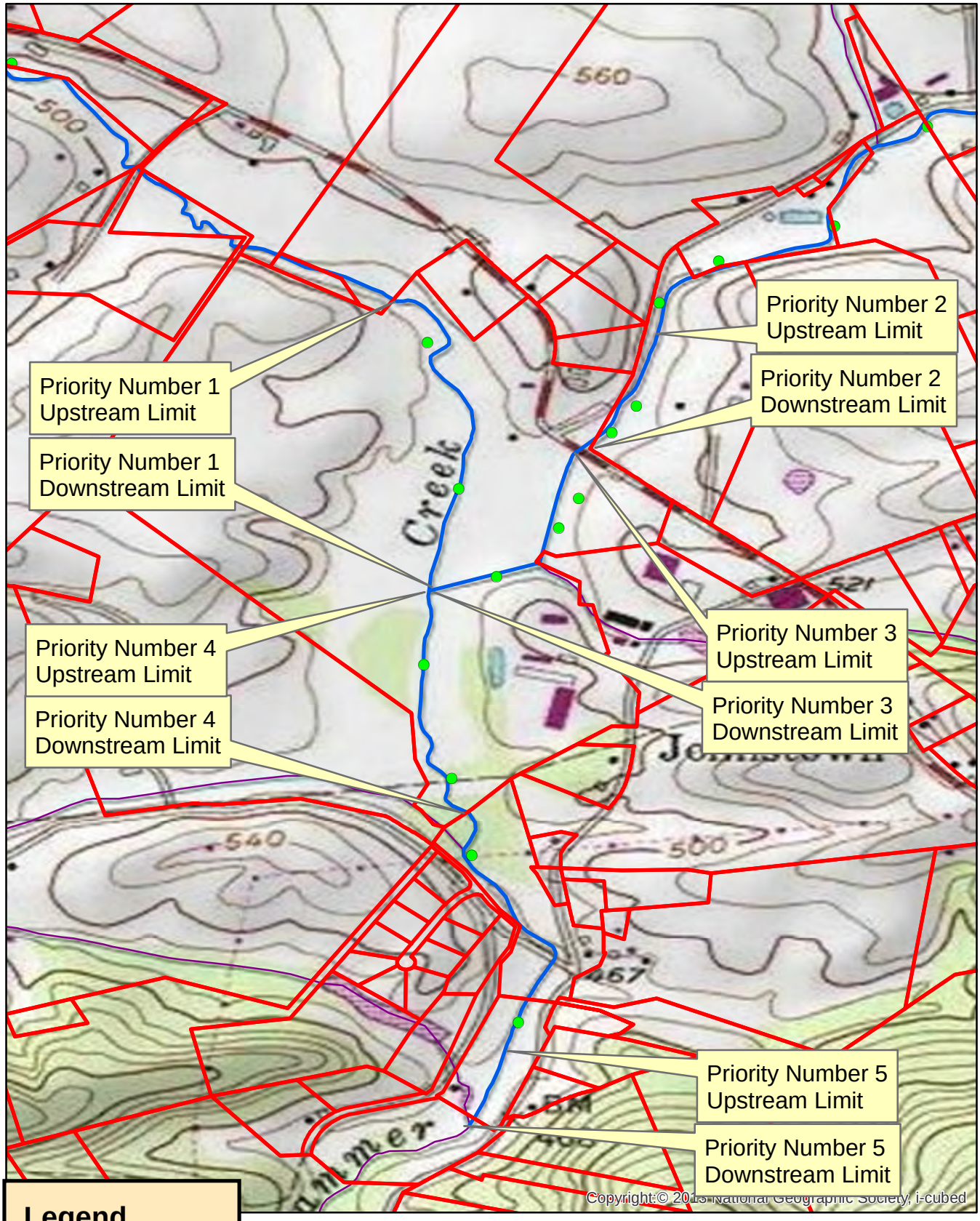
Hammer Creek Watershed Priority Restoration Sites



Legend

- Erosion Sites
- Parcels

1" = 1000 feet

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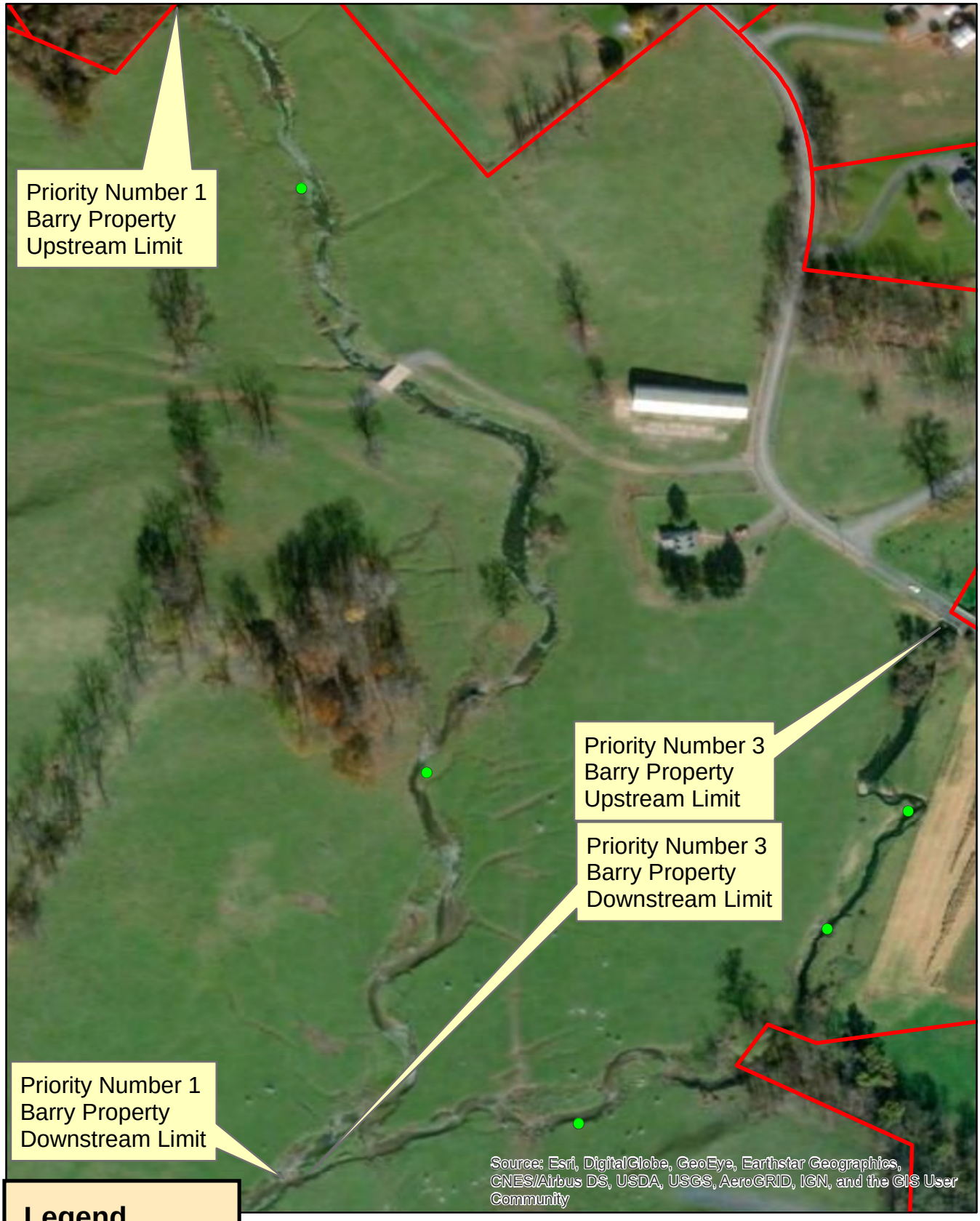
TROUT UNLIMITED

Hammer Creek Watershed Priority Restoration Sites #1 & #3 (Barry Property)



Legend

- Erosion Sites
- Parcels

1" = 250 feet

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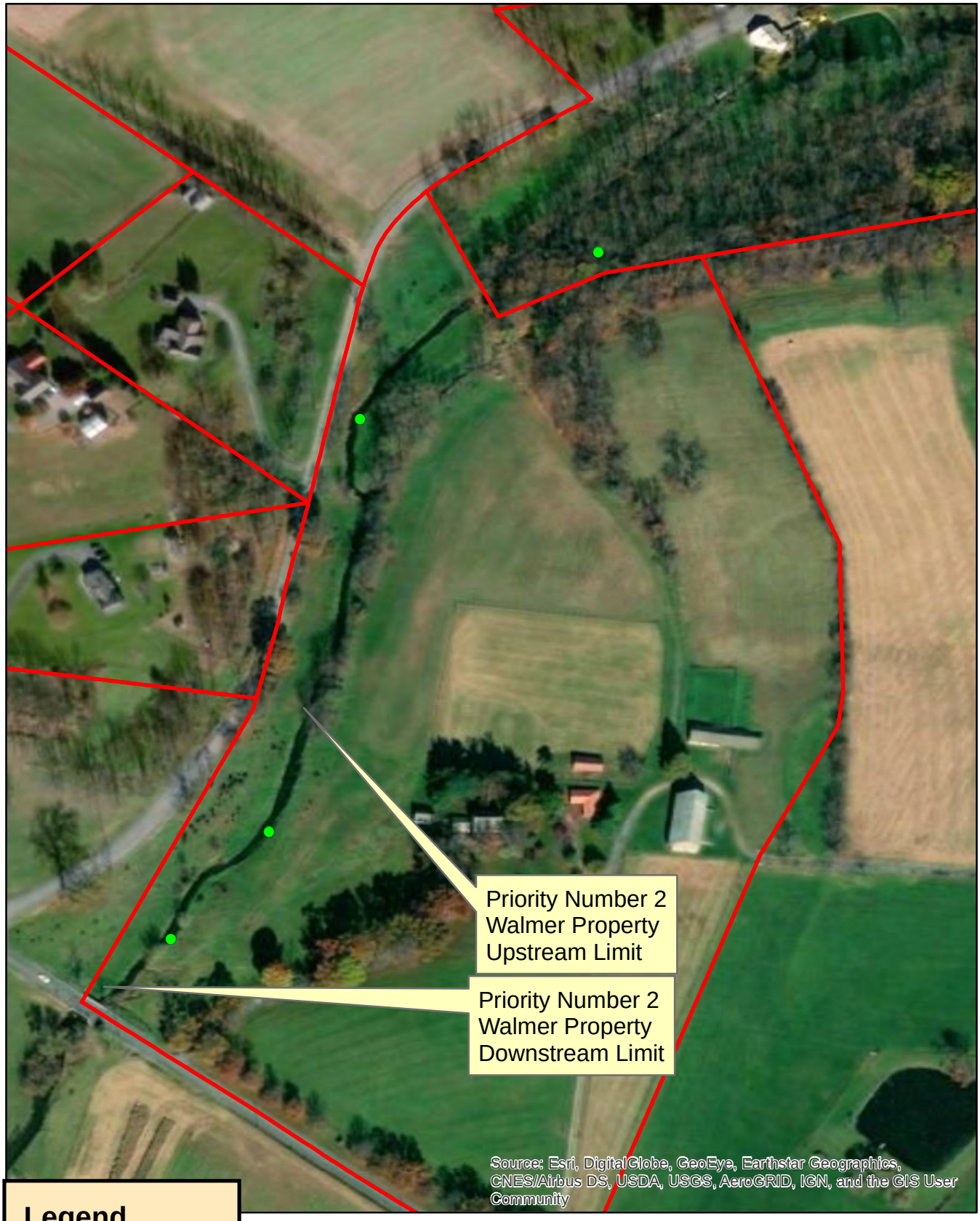
Hammer Creek Watershed Priority Restoration Site #2 (Walmer Property)



Legend

- Erosion Sites
- Parcels

1" = 250 feet

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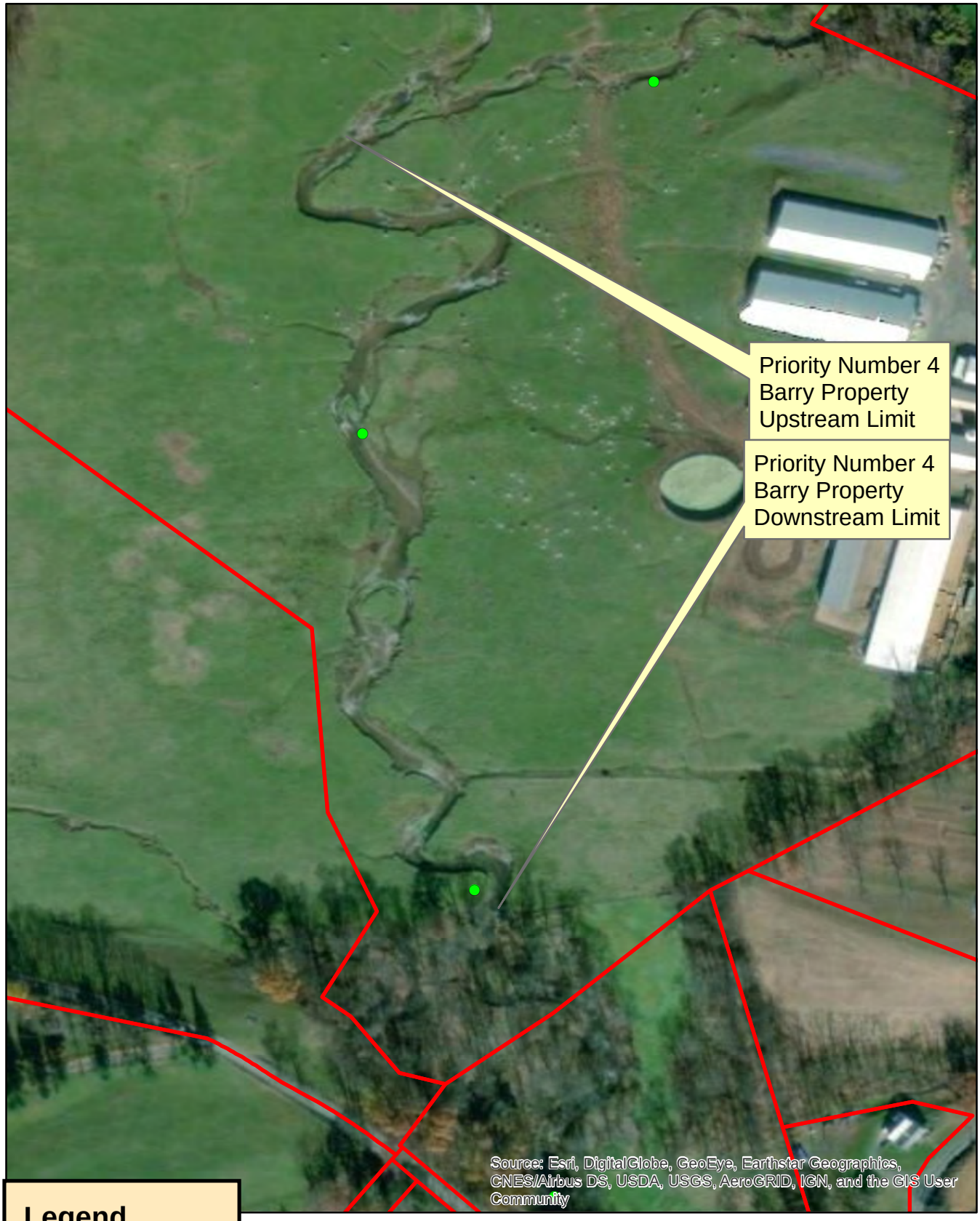
Hammer Creek Watershed Priority Restoration Site #4 - Barry Property



Legend

- Erosion Sites
- Parcels

1" = 250 feet

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TROUT UNLIMITED

Hammer Creek Watershed Priority Restoration Site #5 (Shuey & Barry Properties)

Legend

- Erosion Sites
- Parcels

1" = 250 feet

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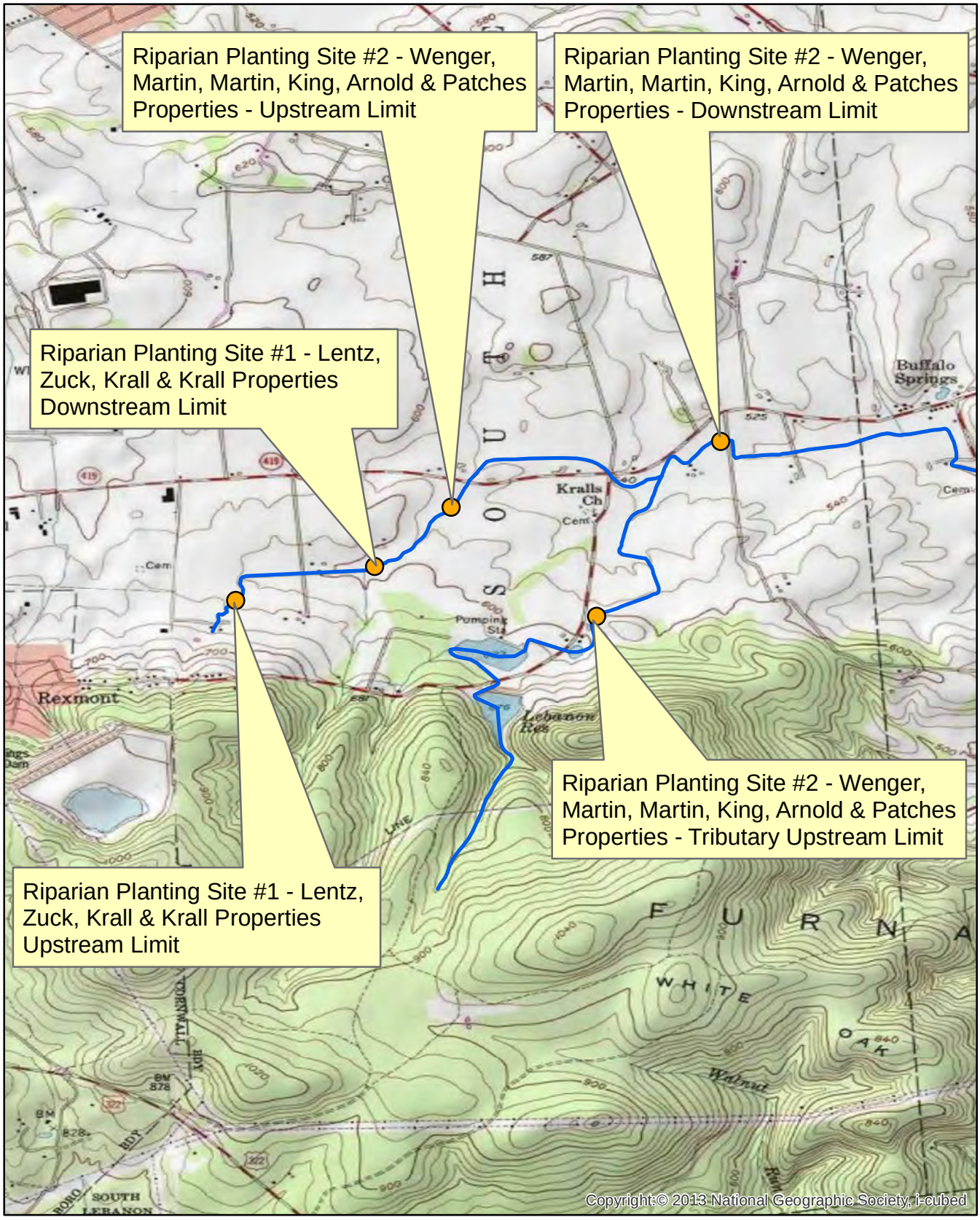
Hammer Creek Watershed Riparian Buffer Planting Site Locations (Map #1)



Legend

Streams

1" = 0.5 mile

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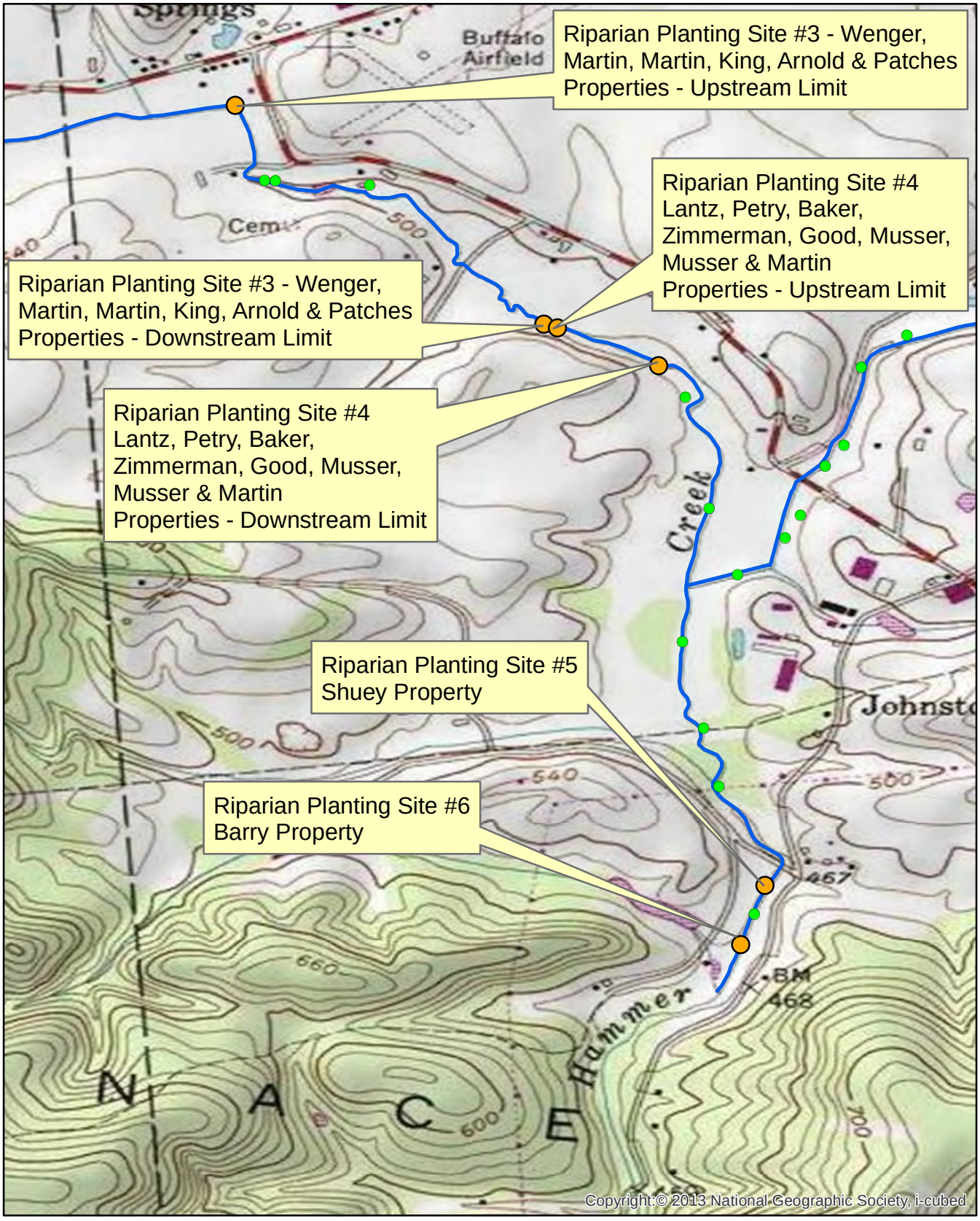
TROUT UNLIMITED

Hammer Creek Watershed Riparian Buffer Planting Site Locations (Map #2)



Legend

Streams

1 in = 0.25 miles

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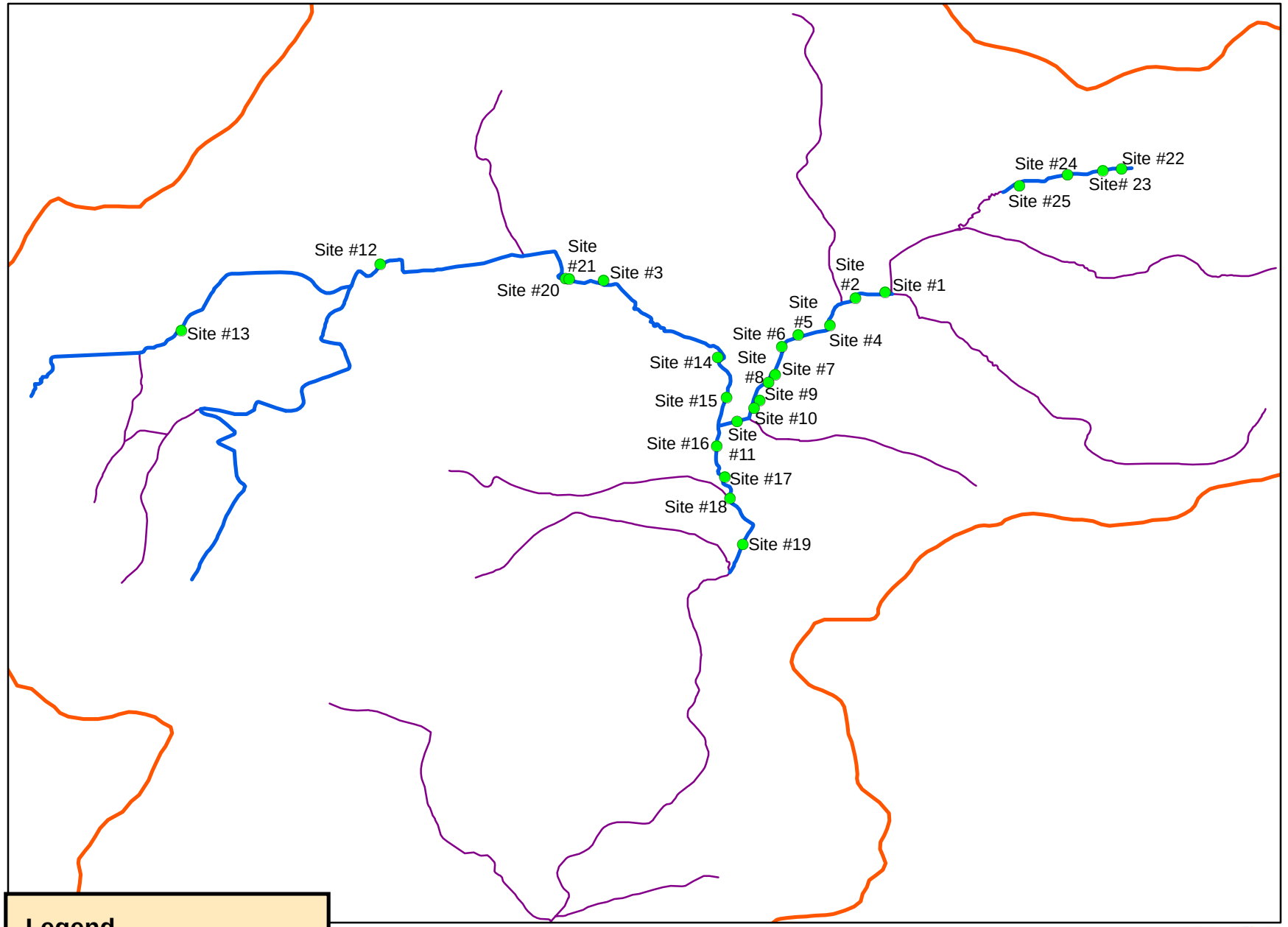
Hammer Creek Erosion Sites



SITE #	WP#	LAT	LONG	PHOTO #	COMMENTS	LANDOWNER	ADDRESS	BANK LENGTH	SEDIMENT (LBS)
1	42	40.287428	-76.311381	203	Start Site #1 at bridge on Old Mill Rd.	L. Bachman	301 Old Mill Road	354	6293
	43	40.287321	-76.311850	204-208	Site #1. GP-1s	L. Bachman	301 Old Mill Road		
	44	40.287314	-76.313033	209-215	concrete bridge	L. Bachman	301 Old Mill Road		
	45	40.287382	-76.313467	216, 219	foot bridge. End Site #1	L. Bachman	301 Old Mill Road		
2	45	40.287382	-76.313467		foot bridge. Begin Site #2	L. Bachman	301 Old Mill Road	670	5956
	46	40.287085	-76.314081	218, 220	remains of old mill machinery act as grade control	A. Maurer	304 Old Mill Road		
	47	40.286931	-76.313974	217, 221-223	midpoint Site #2. GP-1s	A. Maurer	304 Old Mill Road		
	48	40.286757	-76.314952	224-225	Limestone spring creek trib enters from RB	A. Maurer	304 Old Mill Road		
	49	40.286606	-76.315165	226-228	Wood plank bridge. Good AOP, encroaches bankfull width.	A. Maurer	304 Old Mill Road		
	50	40.286146	-76.315594	229	DS end Site #2	D. Henry, Jr.	327 Old Mill Road		
3	12	40.287981	-76.333319	124	robust grade control. Start Site #3. GP-1s	C. Good	361 Distillery Road	1230	54667
	13	40.288171	-76.331954	126-130	middle of Site #3.	C. Good	361 Distillery Road		
	14	40.287189	-76.330087	131	Channel splits in DS direction. End Site #3	C. Good	361 Distillery Road		
4	51	40.285327	-76.315996	237-239	Start Site #4 DS of dam on Henry property. Crest of concrete ~3 feet above streambed. No AOP, significant barrier. Channel overwidened / bank erosion downstream	D. Henry, Jr.	327 Old Mill Road	815	16300
	52	40.284980	-76.315792	231-236, 238	midpoint Site #4. GP-1s	D. Henry, Jr.	327 Old Mill Road		
	53	40.284232	-76.317768		End Site #4. Channel split to raceway of old dam (removed). Sandbag dam in place blocking left channel that leads to Walmer's arch bridge.	D. Henry, Jr.	327 Old Mill Road		
5	53	40.284232	-76.317768	115-117, 240-242	Start Site #5 at channel split / sandbag dam	D. Henry, Jr.	327 Old Mill Road	500	23611
	54	40.284289	-76.318064	118, 243-245	midpoint site #5. GP-1s or NCD (depending on Walmer's arch)	D. Henry, Jr.	327 Old Mill Road		
	55	40.284088	-76.318654	107, 109-111	bridge on gravel lane, leading to Walmer's arch bridge	S. Walmer	220 Distillery Road		
	56	40.283799	-76.318512	108, 112-114	Walmer's stone arch bridge. Dry side channel (old mill raceway?) from upstream sandbag dam, reconnects main channel ~175' DS	S. Walmer	220 Distillery Road		
	57	40.283643	-76.319129		End Site #5 at confluence main stem and old raceway / dry channel. Long continuous run of erosion along RB.	S. Walmer	220 Distillery Road		
6	57	40.283643	-76.319129		Start Site #6 at confluence main stem and old raceway / dry channel	S. Walmer	220 Distillery Road	208	18027
	58	40.283469	-76.319236	103, 105-106	Site #6 - GP-1s or NCD (depends on Walmer's arch)	S. Walmer	220 Distillery Road		
	59	40.283119	-76.319223	101-102, 104	DS End Site #6 at riffle feature	S. Walmer	220 Distillery Road		
7 & 8	60	40.281977	-76.319490	97-100	US start Site #7 wood line on Walmer property.	S. Walmer	220 Distillery Road	591	40906
	61	40.281444	-76.319684	91-96	Midpoint Site #7. NCD restoration	S. Walmer	220 Distillery Road		
	62	40.280918	-76.320165	56, 88-90	Site #8. Combine with Site #7 as one continuous project reach.	S. Walmer	220 Distillery Road		
	63	40.280580	-76.320552	87	End Site #7/8 at bridge on Distillery Road.	S. Walmer	220 Distillery Road		

SITE #	WP#	LAT	LONG	PHOTO #	COMMENTS	LANDOWNER	ADDRESS	BANK LENGTH	SEDIMENT (LBS)
9 - 11	63	40.280580	-76.320552	57-60	Start Site #9-11 DS of bridge on Distillery Road. NCD restoration	S. Barry, Jr.	303 Distillery Road	1766	175633
	64	40.279633	-76.320814	61-74	Large scarp on eroding LB. Bank 110' L x 5' H	S. Barry, Jr.	303 Distillery Road		
	65	40.279055	-76.321211	70-71, 86	Pipeline crossing exposed above streambed and water surface.	S. Barry, Jr.	303 Distillery Road		
	66	40.278511	-76.321457	75-82	Tributary enters from LB. Bank erosion along RB. Include in Site #9-11.	JJC Investments LP	215 Michters Road		
	67	40.278100	-76.322431	83-85	Lower reach of Distillery Run, meanders migrating laterally and downstream. Multiple meander scrolls and terraces in floodplain	S. Barry, Jr.	303 Distillery Road		
12	5	40.289598	-76.346531		observe channel US of Obie Rd. Site #12 - regrade banks	C. Patches	901 Shaeffer Road	890	43511
13	1	40.283485	-76.364415	5-8	confluence of tribs. US end of Site #13 - regrade banks	T. Krall	490 Schaeffer Rd.	944	59787
	2	40.284592	-76.362084	6-14	Site #13 - midpoint	J. Zimmerman	549 Shaeffer Road		
14	17	40.283668	-76.324344	141-143	End riparian buffer site (LB) at upper Barry Property line	D. Nye	327 Distillery Road	788	102440
	18	40.282689	-76.323791	144-146, 149-150	Site #14 - midpoint. Dynamic channel, no riparian veg. Overwidening and accelerated bed scour in pools. No physical habitat. NCD restoration	S. Barry, Jr.	303 Distillery Road		
	19	40.281738	-76.323323	147-148	End Site #14 at concrete bridge. Less than bankfull width. Extensive erosion on RB before inlet where spring seep / tributary enters.	S. Barry, Jr.	303 Distillery Road		
15	20	40.281664	-76.323222	151-152	Site #15 - begin DS of bridge. Similar conditions as above. More sinuous channel. Lower bank height than above but higher annual erosion rate.	S. Barry, Jr.	303 Distillery Road	1658	221067
	21	40.279822	-76.323176	153-158, 162-168, 170-174	Site #15 - midpoint - NCD restoration	S. Barry, Jr.	303 Distillery Road		
	22	40.277993	-76.323651	175-176	End Site #15 at confluence with UNT (Distillery Run). Mid-channel bar, channel braiding and bank erosion at confluence	S. Barry, Jr.	303 Distillery Road		
16 & 17	22	40.277993	-76.323651	177	Begin Site #16 downstream of confluence with Distillery Run	S. Barry, Jr.	303 Distillery Road	2172	386133
	23	40.276371	-76.323862	178-181	Site #16 - midpoint - NCD restoration	S. Barry, Jr.	303 Distillery Road		
	24	40.274232	-76.323313	180	Exposed pipeline crossing. End Site #16 DS of pipeline.	S. Barry, Jr.	303 Distillery Road		
	25	40.274131	-76.323312	182	End Site #16. Site #17 downstream of exposed pipeline in vicinity of tributary confluence RB.	S. Barry, Jr.	303 Distillery Road		
18	25	40.274131	-76.323312		Begin Site #18 downstream	S. Barry, Jr.	303 Distillery Road	1204	58193
	26	40.272626	-76.322920	183-187	Site #18 - midpoint - GP-1s	S. Shuey	246 Michters Road		
	27	40.271106	-76.321749	189	End Site #18 at Obie Road bridge.	S. Shuey	246 Michters Road		
19	29	40.269889	-76.321367	191	Meander bend / erosion LB then RB - GP-1s	S. Shuey	246 Michters Road	572	29626
	30	40.269487	-76.321762	192-195	2 meander bends, LB then RB erosion - GP 1s	S. Barry	101 Barry Lane		
	31	40.269342	-76.322009	196-198	Eroding RB, reed canarygrass very abundant. GP-1s	S. Barry	101 Barry Lane		
	32	40.268834	-76.322155	199-202	2 meander bends, LB then RB erosion just upstream of small tributary entering from RB. GP-1s	S. Barry	101 Barry Lane		

SITE #	WP#	LAT	LONG	PHOTO #	COMMENTS	LANDOWNER	ADDRESS	BANK LENGTH	SEDIMENT (LBS)
20	7	40.288738	-76.334850	119	driveway bridge. Spans bankfull channel. AOP adequate. Site #20.	J. Zimmerman	369 Distillery Road	215	9584
	8	40.288297	-76.334670	120-121	midpoint Site #20. GP-1s	J. Zimmerman	369 Distillery Road		
	9	40.288461	-76.334578	122	Eroded left bank @ meander / pool bend (part of Site #20).	J. Zimmerman	369 Distillery Road		
21	10	40.288285	-76.334391	123	Site #21 - US limit. GP-1s	J. Zimmerman	369 Distillery Road	290	11117
	11	40.288125	-76.333441		spring seep / trib enters LB. End Site #21	J. Zimmerman	369 Distillery Road		
22	33	40.296214	-76.293994	15	Start Schaefferstown trib at Maket Street bridge (newly replaced)	A. Ginder	209 S. Market Street	410	7517
	34	40.296126	-76.294965	16-23	mid point Site #22 - regrade banks & GP-1s	A. Mock A. Ginder J. Ashby K. Noll	219 S. Market Street 209 S. Market Street 223 S. Market Street 220 S. Lancaster Ave.		
	35	40.296108	-76.295441	24	Bridge at S. Lancaster Avenue. End Site #22	K. Noll	220 S. Lancaster Avenue		
23	35	40.296108	-76.295441		Bridge at S. Lancaster Avenue. Start Site #23	K. Noll	220 S. Lancaster Avenue	347	8097
	36	40.296021	-76.296315		midpoint Site #23. GP-1s	Historic Shaefferstown, Inc.	213 S. Carpenter Street		
	37	40.296035	-76.296683		Bridge at Carpenter Street. End Site #23.	Historic Shaefferstown, Inc.	213 S. Carpenter Street		
24	37	40.296035	-76.296683		Bridge at Carpenter Street. Start Site #24.	Historic Shaefferstown, Inc.	213 S. Carpenter Street	1110	88800
	38	40.295692	-76.298836	25-38	mid-point Site #24. NCD restoration	Historic Shaefferstown, Inc.	213 S. Carpenter Street		
	39	40.295451	-76.300275	39	Farm lane bridge. End Site #24	Historic Shaefferstown, Inc.	213 S. Carpenter Street		
25	39	40.295451	-76.300275		Farm lane bridge. Begin Site #25	Historic Shaefferstown, Inc.	213 S. Carpenter Street	1687	209938
	40	40.294940	-76.302279	40-54	midpoint Site #25. C channel evolving to E. Regrade banks & buffer	Historic Shaefferstown, Inc.	213 S. Carpenter Street		
	41	40.294630	-76.303514	55	Culvert under SR 501. Full AOP. End Site #25	Historic Shaefferstown, Inc.	213 S. Carpenter Street		
	3	40.287488	-76.359806		observe channel DS of Rexmont Road - riparian buffer	S. Wenger	605 Shaeffer Road		
	4	40.287721	-76.352558		observe channel US/DS of SR 419	W. Martin	502 Shaeffer Road		
	6	40.290341	-76.335360		confluence w/ spring creek from north.	B. Lantz	504 Shaeffer Road		
	15	40.286194	-76.329413	132-134	farm lane bridge. Overwidened channel downstream at outlet pool, banks stable.	J. Musser	353 Distillery Road		
	16	40.284561	-76.326983	135-140	Tributary / side channel enters from right bank. Stream meets toe of hillslope to west. Robust forested buffer along RB.	J. Martin	345 Distillery Road		
	27	40.271106	-76.321749	189	Begin riparian buffer planting site downstream of bridge.	S. Shuey	246 Michters Road		
	28	40.270498	-76.321550	190	Downstream end of riparian buffer site at woods.	S. Shuey	246 Michters Road		