

# **Pigeon Creek Channel Review**

**Warrick County, Heim Road to  
Vanderburgh County, Green River Road**

**Indiana Department of Natural Resources**

**Division of Water**

October, 2000



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Executive Summary

This is a reconnaissance level report concerning the condition of the channel for Pigeon Creek near the Warrick / Vanderburgh County line in Southwestern Indiana. It has been prepared by the IDNR, Division of Water, Project Development Section in response to a July 2000 letter from Representative Russell Stilwell requesting IDNR review of a flood prone area along Pigeon Creek.

In response to Representative Stilwell's request IDNR, Division of Water Staff:

- Conducted a meeting with some of the concerned citizens to identify the reach in question and their specific concerns,
- Reviewed aerial photography and Flood Insurance Studies along the reach in question,
- Conducted a float trip to evaluate potential channel obstructions,
- Coordinated preliminary findings with IDNR, Fish and Wildlife along with USF&W, and
- Prepared this summary document of findings and recommended corrective actions.

It appears that Pigeon Creek contains several channel obstructions in the reach in question. Some areas of potentially problematic bank erosion also exist. Most of the problems lie in a tight meander section approximately 3 miles long near the county line. This problematic area lies from river mile 13 to river mile 16 on the Flood Insurance Studies, seen as figures 1 and 2 in this report. Other less significant sites were identified both upstream and downstream of this problematic area. Each site observed on the float trip has been identified and described in this report. Several of the sites do not require attention. However, on several sites corrective action is recommended to prevent additional erosion, improve flow, and improve recreational access to the stream.

An IDNR project to correct all the problematic sites noted in this report is estimated to cost less than \$50,000. If the IDNR project were limited to only the most problematic 3-mile reach the estimated cost would likely be less than \$35,000. These estimates do allow for changes in the problem areas over the anticipated time period of 8 to 14 months required to start a project after funding is acquired.

## Background

This is a reconnaissance level report concerning the condition of the channel for Pigeon Creek near the Warrick / Vanderburgh County line. The purpose of this report is to convey an understanding of the location and condition of logjams and associated bank erosion along the reach in question. This report will also offer some recommendations for corrective actions at locations where significant problems are observed. Observations contained within this report are not fully quantified and approximate location information is used. Logjams and bank erosion are not static processes they change over time. Therefore any project arising from this report would need to be further quantified prior to permitting.

This report has been prepared as part of a process initiated by a July 25, 2000 letter (Attachment 1) from State Representative Russell Stilwell addressed to Spence Schnaitter, Legislative Liaison for the Indiana Department of Natural Resources. In that letter Representative Stilwell expressed the concern of his constituents related to flooding along Pigeon Creek. He requested in the letter that IDNR staff investigate the problem and recommend the appropriate action and feasibility of cleaning Pigeon Creek in Warrick County. Representative Stilwell also requested that Representative Vaneta Becker and Senator Server be invited to attend any scheduled meetings.

Mr. Schnaitter made contact with representatives from Vanderburgh and Warrick County government. Contact information and the letter of request was passed to the Division of Water for response and follow up. Division of Water, Project Development Section was assigned to the Pigeon Creek Project.

### **Site Visit**

On August 30, 2000 Staff from the Project Development Section and IDNR, Fish and Wildlife met with Mr. Tim Mosbey, County Councilman for Warrick County along with three area residents. Mr. Mosbey provided background information and location information as to the reach in question. The area residents had expressed concern about logjams in the vicinity of the Warrick / Vanderburgh County lines, in an area where the creek makes multiple county line crossing in a tight meander system. The local citizens took IDNR staff near the area of concern for a visual inspection. At the time the creek was bank full making it difficult to observe channel conditions.

### **Site Review**

After the site visit the investigation of the reach in question focused on aerial photography, previous channel surveys, floodway studies, and geologic information investigation. The 1985 photography available from the State Land Office was compared to 1972 images used in the Soil Studies and to 1998 photographs taken by the USGS. These images indicated a relatively stable meander system in the area of concern. However the recent images indicated a potential logjam near the center of the north half of Section 6, Township 6 South, Range 9 West. Additional areas of concern were identified on the photographs.

**Floodway studies** (figure 1 and 2)

The Federal Emergency Management Agency (FEMA) Flood Insurance Study (FIS) for the unincorporated areas of Vanderburgh County, dated August 5, 1991, (community number - 180256) and Warrick County, dated February 3, 1993, (community number - 180418) were reviewed. In combination these studies provide information on the stream reach in question. Detailed mapping for the FIS in Warrick County along Pigeon Creek extends from the Vanderburgh County line approximately 6 river miles upstream to Warrick County Road 250 North. Streambed profiles and projected flood stages for the 10, 50, 100 and 500 year events can be found in these studies. The reach currently in question lies from approximately river mile 10.9, Green River Road, to river mile 19.4, County Road 50 North or Heim Road. Considerable variability in streambed elevation can be seen on these studies.

### Geology

Geologically the area is on the northern extent of the Ohio River ancestral flood plain. This is an area of past embayment during periods when the Ohio River system carried vast amounts of glacial meltwaters. During these prolonged periods of inundation thick deposits of clay and silt filled the mouth of the preexisting drainage systems. Subsequent stream formation through these deposits formed the present streams. Streams in this setting exhibit a lower gradient at a distance upstream from the mouth and downstream from the portion of the watershed that drains upland areas. Pigeon Creek is in just such a geological setting. Near the mouth, the channel down cuts through the silts and the fine sands near the river, thus forming an increasingly incised channel and increased channel gradient (see figures 1 and 2). Approximately six miles upstream from the Ohio River the stream gradient is reduced to approximately one third of the lower segment. This reduced gradient continues for several miles upstream through the section of naturally meandering stream. The gradient increases in the ditched section partially due to the reduction in profile by shortening of length through the ditching process (figure 1, 2 and 4).

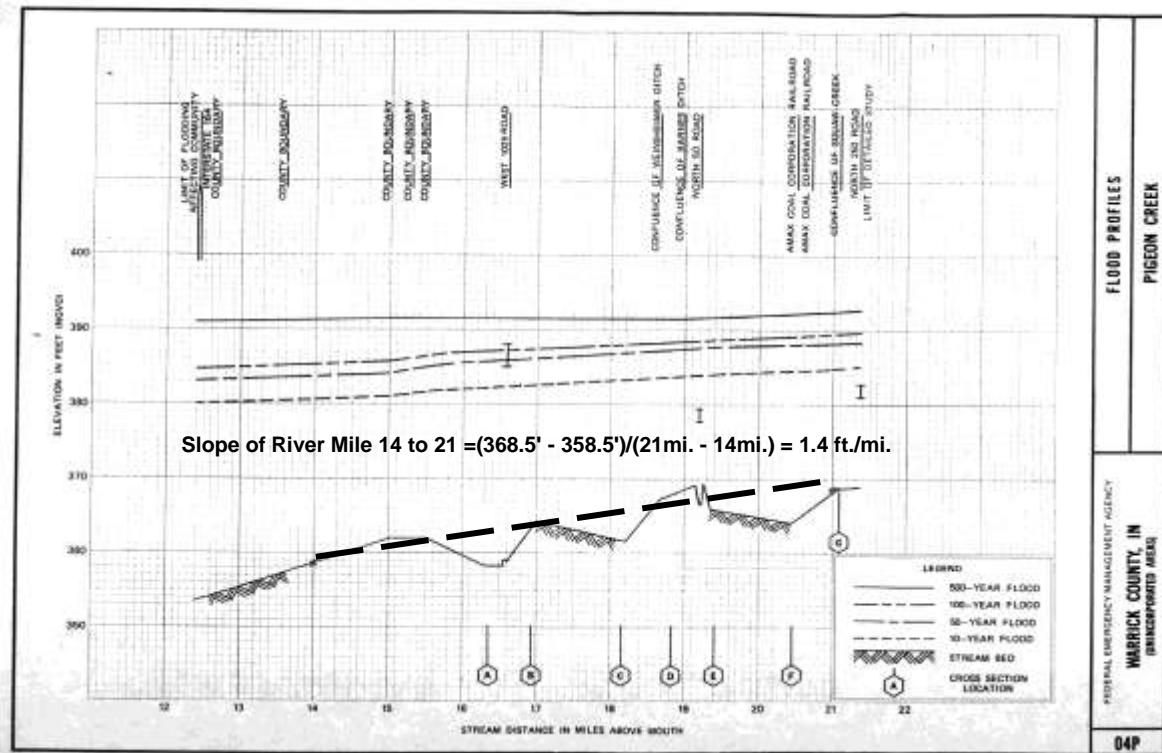


Figure 1: FIS, Warrick County, 1993

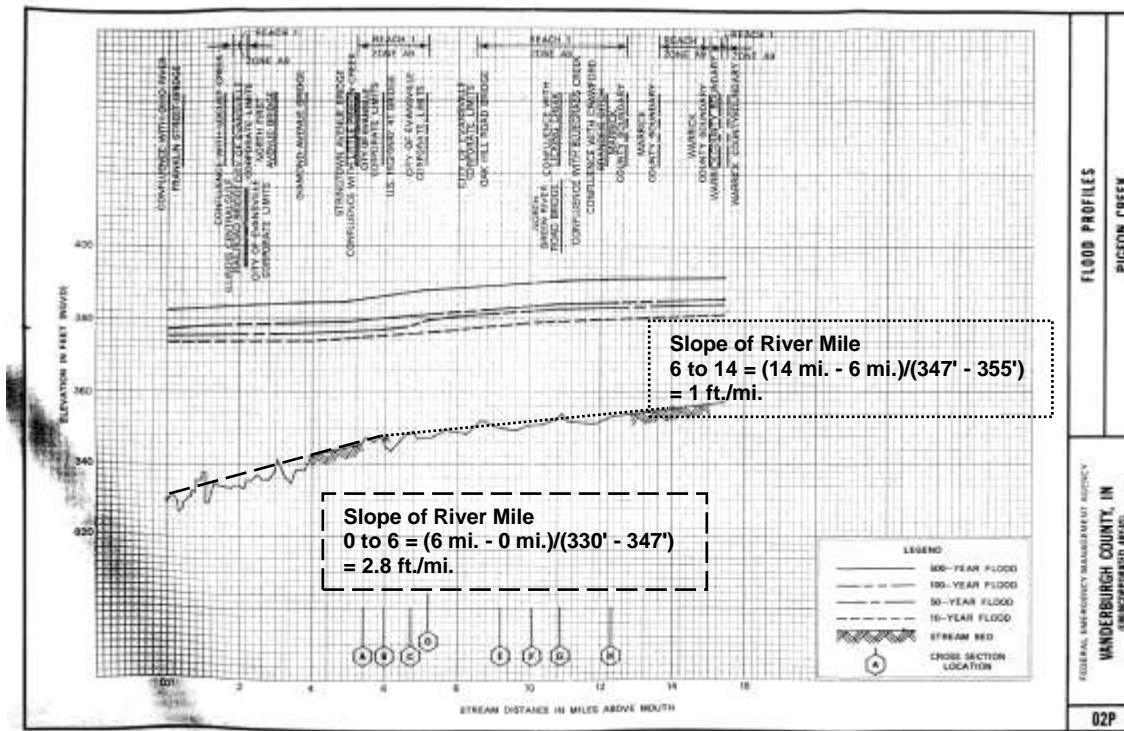


Figure 2: FIS, Vanderburgh County, 1991

Typically ditching increases drainage from a specific area while increasing downstream flood volume and velocity. The problematic area along Pigeon Creek lies at the downstream extent of ditching as the stream returns to a normal meander channel. The meander system further reduces flow velocity in an area with decreasing gradient. The reduction in velocity associated with the problematic area will assist in reduction of downstream channel erosion and the resulting bank instability, but will also add to the probability of logjam formation.

Throughout the area in question the steep banks of the stream are made of the clays deposited during glacial floods and more recent re-deposition or re-working of the fine sediment. Some areas of bedrock bottom stream were noted upstream of Stevenson Station Road in Warrick County.

### Float Trip Scheduling

A channel reconnaissance float trip was scheduled for October 2, 2000. Staff contacted Mr. Mosbey to discuss the planned entry and exit points and extend an invitation for local participation in the trip. Mr. Mosbey expressed agreement with the reach under review and the entry / exit points for the float trip. He indicated that local participation would be unlikely due to the harvest time for the farmers.

On Monday October 2, IDNR, Division of Water, staff members Mr. David Nance, Engineering Geologist, Project Development Section was joined by Mr. Sean Gorman, Water Planner, Flood Plain Management Section for the float trip. They entered the stream at the

Heim Road crossing in Warrick County at 11:00 AM and exited the stream at the Green River Road crossing at 4:00 P.M.

At the time of the trip Pigeon Creek was in a recession from a bank full level the previous

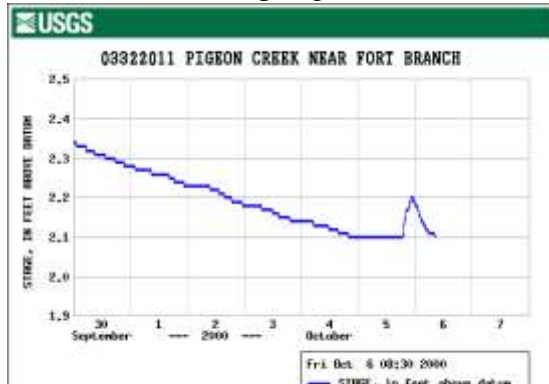


Figure 3, USGS Stream Gage Upstream of Site  
The graph indicates the decline in the stage at a gage several miles upstream from the area of concern.

week (figure 3). The stream was at approximately 30 to 40 percent of bank full stage with 3 to 5 feet of water in the channel and a level 4 to 7 feet below bank full.

A lightweight canoe was used for the trip due to the likely need for partial and full portages.

The banks were found consist of very fine clay with only one area of exposed bedrock observed along the trip. The slope of the banks was between 1:1 and 2:1 on both banks with the cut bank occasionally near vertical. The point

bar banks were not found to be the typical well-developed lower or sloping surfaces, but instead remained rather steep and at near the same elevation as the cut bank.

## Float Trip Observations

The observations contained in this report are referenced numerically by areas designated on figure 4. The specific location of an area may be slightly shifted off the location as marked. Specific locations will need to be confirmed by GPS or other means such as bank side entry observation. Some location areas designate site specific features such as logjams that may occupy only 20 to 40 feet of channel length while others designate more general areas of brush or logs in the channel that may exceed 200 feet in length.

Partial Portage: Canoe was carried over an obstruction by hand without actually going onto the bank.

Full Portage: Canoe was carried by hand over land around an obstructed area of the stream.

### Site 1                      Figure 5                      Partial Portage

This site is located approximately ¼ mile downstream of the Heim Road bridge. A significant logjam was found at this location. The material consisted of smaller structural logs with a considerable amount of smaller debris. The site was less than 15 feet thick parallel to flow. Stream flow appeared to be passing through the material with little resistance. No significant bank erosion was observed. Some downstream debris was found associated with the site. Removal and reorientation of the debris is recommended for this site.

### Site 2                      Figure 5                      Partial Portage

This site is located in the first bend of the ditched section of the stream, a 200 to 300 feet downstream and within sight of Site 1. It consists of debris much like Site 1 with larger structural logs and less small debris. Removal and reorientation of the debris is recommended for this site.

Site 3                      Figure 5                      Partial Portage

This site is located approximately 300 feet downstream of Site 2. It consists of a few structural logs and a considerable amount of smaller woody debris. Included in the debris is a refrigerator cabinet as can be seen on the photographs. Flow was passing through the logjam mostly along the left bank. Some logs and woody debris are located in channel for a distance of 50 to 100 feet downstream of the site along with a mud bar along the left bank. This debris does not appear to be hindering flow, however the channel meander associated with the area and mud bar could be a result of channel diversion and erosion associated with the logjam. The logjam was about 2 to 3 feet above water level. Removal and reorientation of the debris is recommended for this site.

Site 4                      Figure 6                      No Portage

This site is located in the first significant bend in the stream. It consists of a minor amount of woody debris along the right bank of the stream. The debris is located along the point bar portion of the stream but does not appear to be causing left, cut bank erosion. No corrective action should be required for this site.

Site 5                      Figure 6                      No Portage

This site is located downstream of site 4 along the right bank of the stream. It consists of a significant amount of woody debris in channel for a distance of up to 100 feet. No evidence of bank erosion was observed. No corrective action should be required.

Site 6                      Figure 7                      No Portage

This site is located just upstream of the first county line crossing. It consists of a minor amount of woody debris captured by a cluster of trees that have slid into the channel on the left, cut bank side of the stream in a significant meander loop. The bank failure and debris appears to be increasing the rate of erosion of the cut bank in an area where the meander loop may be less than 300 feet from the downstream channel. Although presently minor in appearance and size, corrective action is recommended to stabilize this section of cut bank and decrease the chance for a meander loop cut off.

Site 7                      Figure 7                      No Portage

This site is located just downstream of the first county line crossing in Vanderburgh County. It consists of a considerable amount of logs and woody debris in the channel and may be more than 300 feet long. Most of the debris is located along the cut bank side and appears to be assisting in bank protection. However, two problematic areas exist along this site. The upstream end of this site contains a rather large tree extending from the right, cut bank side. Some left bank erosion is associated with this log. Reorientation of this log / tree should prevent any further erosion or problems. The second area is near the downstream end of the site and consists of a few larger logs extending across the stream from the right, cut bank side, directing flow into the left bank. Considerable left bank erosion is associated with the site resulting in a bank failure 20 to 30 feet long and greater than 10 feet into the wall of the bank. Reorientation of the debris along the right bank and minor left bank stabilization is recommended.

Site 8                      Figure 7                      Partial Portage

This site is located just north and downstream of a power line crossing. It consists of a few structural logs extending from the right bank onto the left bank. No cut bank erosion was observed at the site. Minimal flow restriction was observed. Reorientation and or partial removal of the logs from the right bank is recommended.

Site 9                      Figure 7                      Partial Portage

This site is located just downstream of the next power line crossing. It consists of a few structural logs and some associated woody debris. No bank erosion and minimal flow restriction was observed at the site. Reorientation of the logs and partial removal from the right bank is recommended.

Site 10                      Figure 7                      No Portage

This site is located along the right, cut bank side of a large meander. The site is potentially greater than 300 feet long consisting of a considerable amount of logs and woody debris mostly located along the right bank. No significant erosion was noted along the site and the debris may assist in stabilization of the right bank. Further observation of the area may be warranted at a lower stream stage. Possible reorientation or partial removal may be needed.

Site 11                      Figure 7                      Full Portage

This site is located just north of a residential structure as seen on the figure. It consists of a large logjam containing many structural logs extending across the channel and extensive smaller woody debris. Flow restriction was observed with the structure. No visible bank erosion was noted. The logjam extends to approximately full bank height of 6 to 8 feet and is 10 to 40 feet thick. Removal of most of the debris is recommended from the right bank.

Site 12                      Figure 8                      No Portage

This site is located just downstream of the Interstate 164 bridge. It consists of extensive logs and woody debris mostly orientated along the right, cut bank side of the stream. No associated left bank erosion was noted at this site. The site is approximately 200 feet in length. Partial removal or reorientation may not be warranted due to the risk of destabilization of the mass. One large tree was observed just downstream of the site lying across the stream extending from the left bank. Removal of this tree lying near the top of bank height is recommended due to the ease of removal and potential for building a large logjam site.

Site 13                      Figure 8                      No Portage

This site is located approximately ½ to ¾ mile upstream of the Green River Road bridge. It consists of an area approximately 150 feet long where rather extensive logs exist in various positions of the stream. Some significant bank erosion is associated with portions of the site. Partial removal, reorientation, and bank stabilization is recommended for the area.

Site 14                      Figure 8                      No Portage



This site is located just upstream of a power line crossing, approximately ¼ mile upstream from the Green River Road Bridge. It consists of a minor amount of woody debris associated with a fallen, small tree on the right bank. No corrective action is recommended.

Site 15                      Figure 8                      No Portage

This site is located just downstream of the power line crossing, approximately ¼ mile upstream of the Green River Bridge. It consists of an area 100 to 150 feet in length along the right bank where some logs and woody debris have collected. No bank erosion was noted at the site and no corrective action is recommended.

### **Coordination with other Divisions and Agencies**

Several agencies were contacted for informal comment after processing of the information outlined above. These agencies included the U.S. Fish and Wildlife Service (USF&WS), Natural Resource Conservation Service (NRCS), and the U.S. Army Corps of Engineers (USACE) along with the IDNR, Divisions of Fish and Wildlife, Outdoor Recreation, and Soil Conservation.

The two fish and wildlife biologists contacted for comment had one primary recommendation, leave as much woody debris in-channel as possible. Therefore a targeted and limited project has been recommended. The lack of upstream public access was also noted and discussed.

The USF&WS, USACE, and the NRCS may have in place funding programs to address some aspects of the problems noted. However neither will have a program to address all the sites. Federal funding is most likely available for bank stabilization with secondary debris removal. These mechanisms can be both limited and highly application targeted, thus difficult to address in this report.

### **Conclusion**

During the October 2, 2000 float trip, Pigeon Creek was observed to contain several channel obstructions in the reach in question. Some areas of potentially problematic bank erosion also exist. Most of the problems lie in a tight meander section approximately 3 miles long near the county line. This problematic area lies from river mile 13 to river mile 16 on the Flood Insurance Studies or in the NE ¼ of section 6 and the NW ¼ of the NW ¼ of section 5, Township 6 South, Range 9 West. Other less significant sites were identified both upstream and downstream of this problematic area. Each site observed on the float trip has been identified and described in this report. Several of the areas do not require attention. However, on several sites corrective action is recommended to prevent additional erosion, improve flow, and improve recreational access to the stream. Overall the problems appear relatively minor.

Several options are available to remedy all or portions of the problems sited in this report. Two project approaches, both funded by a line item inclusion in the 2002 Indiana State Budget were considered:

- 1) IDNR conducts a project that removes the 8 to 10 cross-channel obstructions and repairs the 3 areas of bank erosion noted in this report;
- 2) IDNR conducts a project to address only the most impacted section of the stream Sites 6 through 11 on Figures 4 and 7, removing 4 cross-channel obstructions and correcting 2 areas of bank erosion.

Both of these approaches would seek to improve channel flow, improve recreational access, and decrease bank erosion in the areas addressed. The project will also be very considerate of fish and wildlife habitat and bank protection provided by woody debris. To that end, much of the woody debris will be allowed to remain in the channel undisturbed and some will be reoriented to provide positive function without causing flow obstruction.

Recreational access to the reach in question has been cited as one of the benefits to removing relatively minor cross-channel obstructions. However, public access to this reach is limited by the lack of public access sites along this section of the stream. Justification for removal of some of these obstructions would be facilitated by the addition of another public access site.

An IDNR project to correct all the problematic sites noted in this report, option 1, is estimated to cost less than \$50,000. If the IDNR project were limited to only the most problematic 3-mile reach, option 2, the cost would likely be less than \$35,000. These estimates are based on one observation, discussion with local colleagues experienced with local contractors, and our direct experience with more extensive projects in other areas of the state. Several variables related to access, specific design specifications, and permitting must be resolved prior to construction. After funding is acquired, a period of 8 to 14 months will be required to actually initiate a project. These estimates do allow for some changes in the obstructions and problems associated with the final design and the permitting process over this anticipated time period.

Additional funding options do exist for partial correction of the noted problematic sites. These include mechanisms through NRCS and the USF&WS. However, local funding solutions for the removal of the most problematic logjams would be the most expedient method of correction.

Due to the local geology and hydrology, the area in question, four to eight miles either side of the Vanderburgh / Warrick County line has been, and will likely continue to be, an area of recurring logjams. The current geomorphic condition of the stream appears quite good except for a few cross-channel logjams and some isolated bank erosion. Some corrective action is recommended for these areas. Periodic removal of problematic woody debris will need to be addressed in the future, regardless of the present actions. It is to that end that IDNR recommends a cooperative relationship between the two counties be established for channel maintenance. This maintenance should not be extensive, but rather the periodic removal of small cross-channel logjams. It should be emphasized that much of the in-channel woody debris observed on the float trip functioned to provide some bank protection along with cover for fish and wildlife. Removal of debris in these settings would have a detrimental effect on the stream.

## Pigeon Creek, Upper Section,

Figure 6

### Between Weinsheimer Ditch and Stevenson Station Road,

W 1/2 of the SE 1/4 of Section 33, T. 5 S., R. 9 W.

Site 4 consists of a minor amount of brush and small trees along the north bank.

Site 5 has minor amounts of brush and logs in the water.

Neither site appears to be causing any erosion, flow reduction, or access problems.



#### Pigeon Creek Channel Review

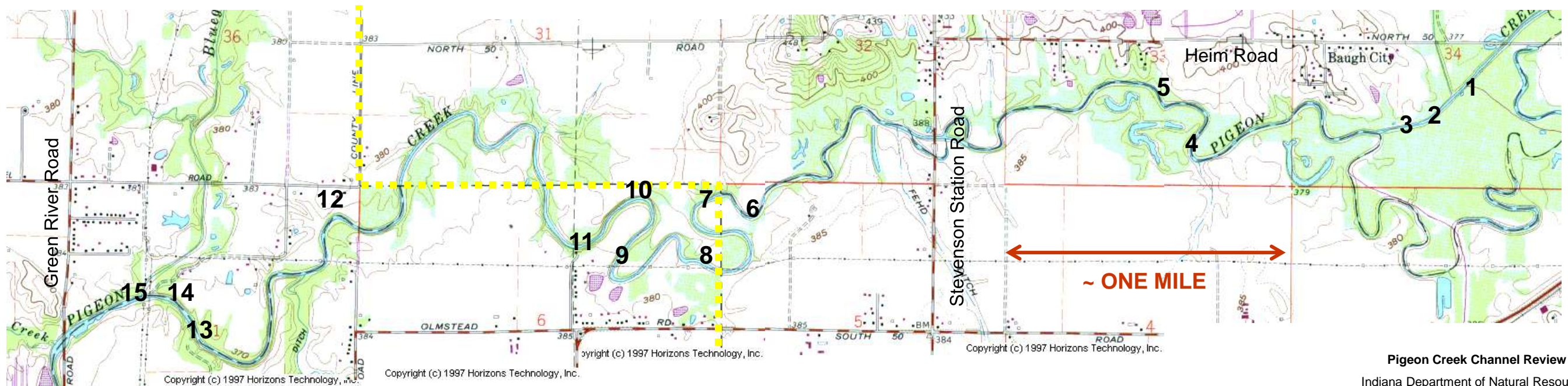
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October 2, 2000

# Aerial Photograph and Topographic Map of the Stream Segment Under Review

Figure 4

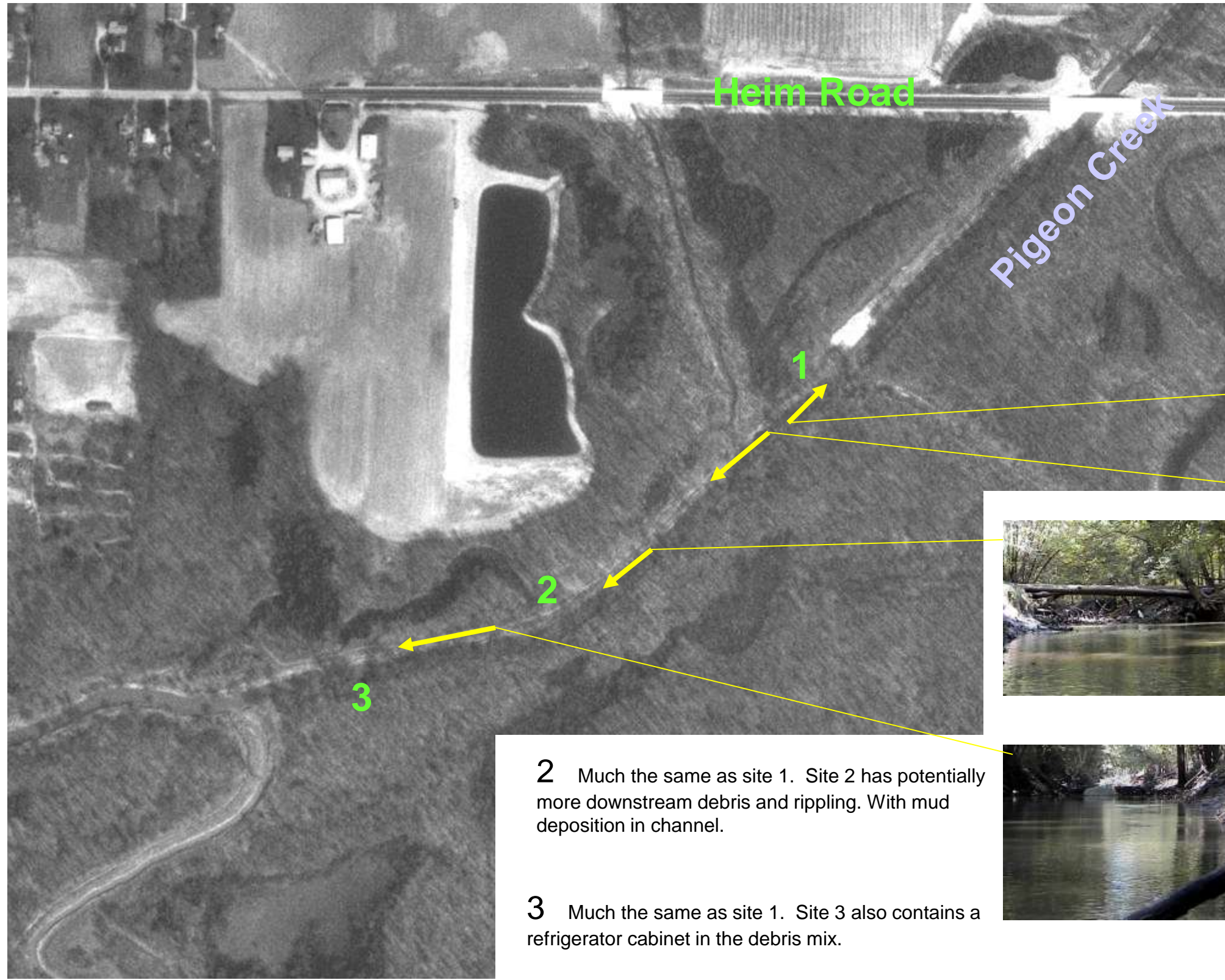
Numbers 1 through 15 indicate points of interest. The scale is very approximate, 1 inch = 2000 to 2200 feet.



# Pigeon Creek, Upper Section, Heim Road to Weinsheimer Ditch,

Figure 5

W 1/2 of the SW 1/4 and the E 1/2 of the SE 1/4 of Section 34, T. 5 S., R. 9 W., Warrick County



**1** Site 1 consists of a cross channel log jam containing several logs, brush and debris. No associated erosion was observed. Water was moving effectively through or under the pile and the pile was only 1 to 3 feet above water level in a channel 4 to 5 feet above water level. The water depth exceeded 4 feet. Heim Road bridge was observed from the log jam. Crossed by dragging the canoe over the log jam.



**2** Much the same as site 1. Site 2 has potentially more downstream debris and rippling. With mud deposition in channel.



**3** Much the same as site 1. Site 3 also contains a refrigerator cabinet in the debris mix.

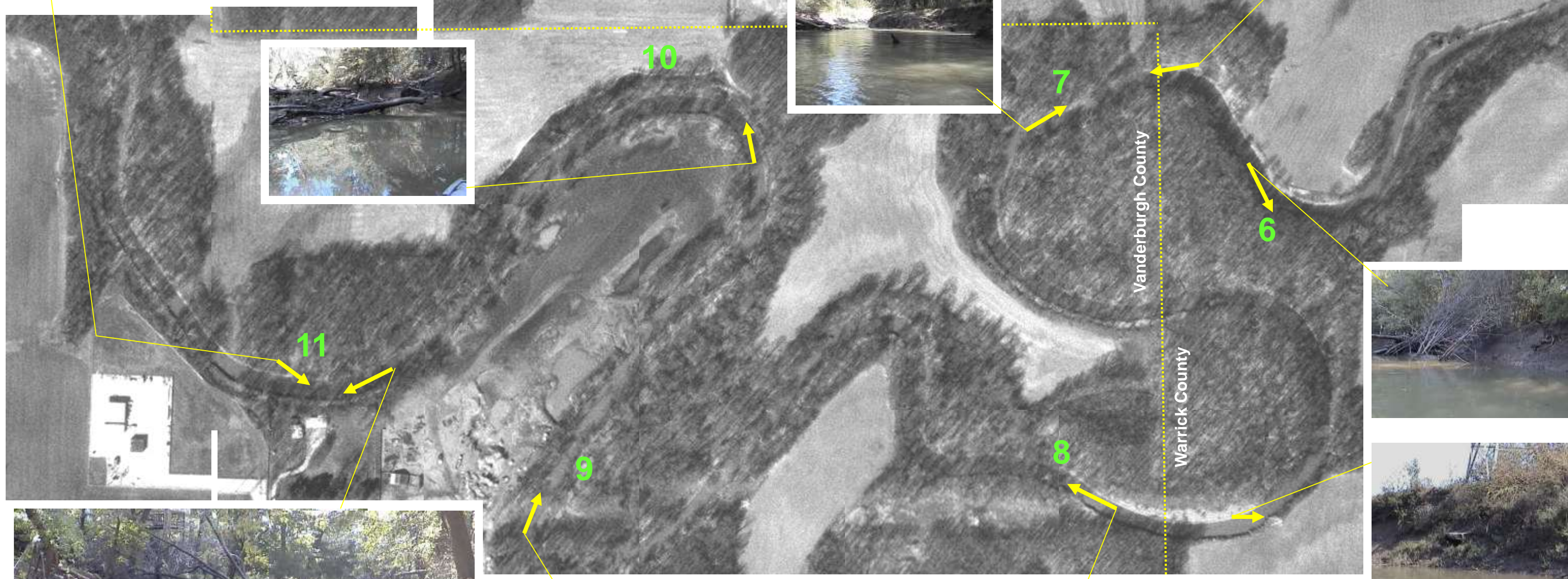
# Pigeon Creek Center Section Warrick and Vanderburgh Counties

Figure 7

NE 1/4 of Section 6 and the NW 1/4 of the NW 1/4 of Section 5, T. 6 S., R. 9 W.

- Site 6 has a bank failure on the left, cut bank side.
- Site 7 has some bank erosion associated with logs in channel.
- Site 8 is a minor log jam that is blocking the channel but not flow.
- Site 9 is much like 8 with more brush associated with the log jam.

- Site 10 is an area 100 to 200 feet long with extensive logs and brush. Some bank erosion is associated with the site.
- Site 11 contains an extensive log jam. Flow is partially blocked with the channel fully blocked to boating.

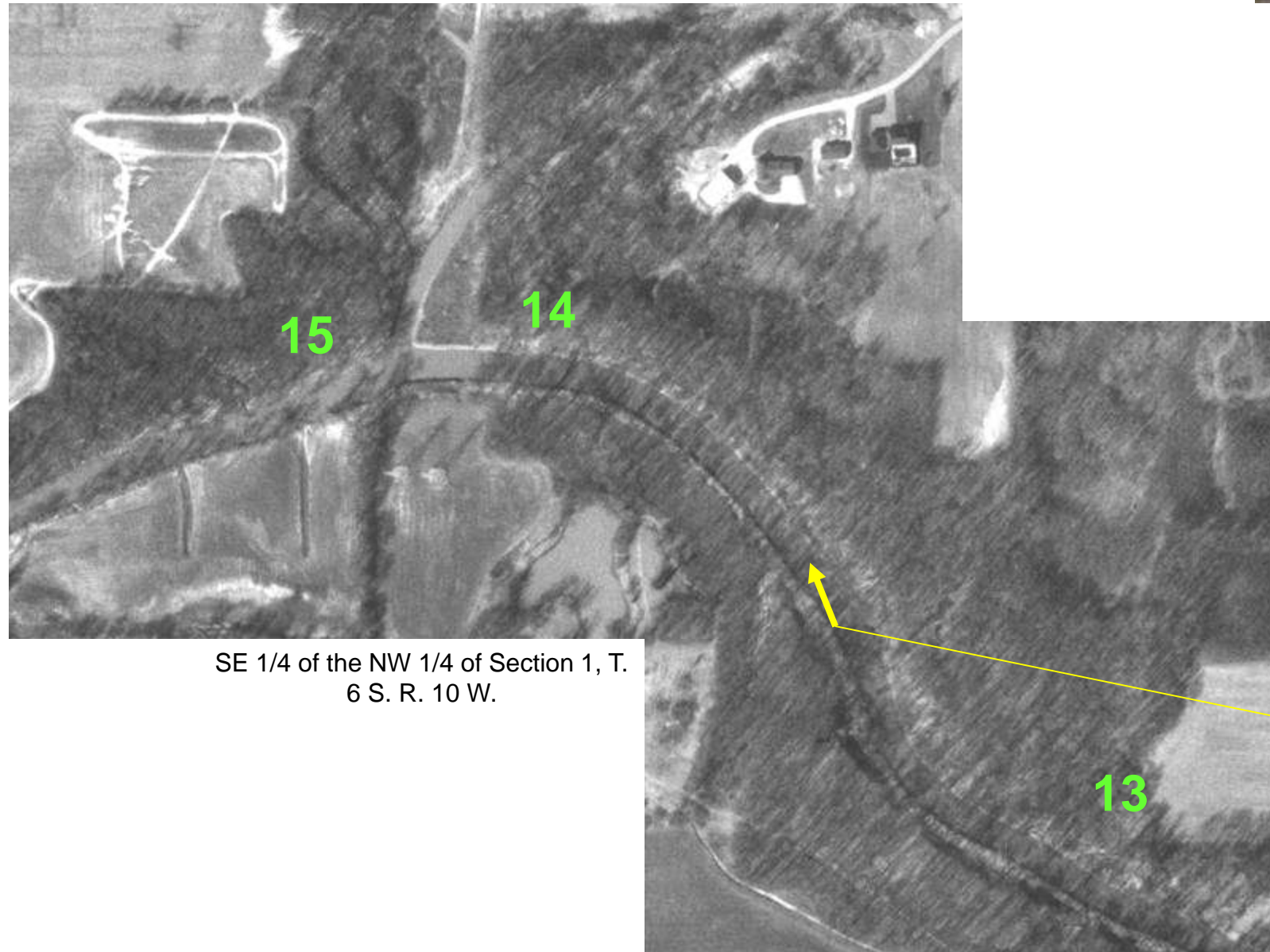


# Pigeon Creek, Lower Section Interstate 164 to Green River Road Vanderburgh County

Site 13 contains extensive brush and logs in the stream with some significant bank erosion. The site is 100 to 150 feet long.

Site 14 is a minor tree in the stream.

Site 15 has some logs and brush along the right bank of the channel. No significant flow blockage.



SE 1/4 of the NW 1/4 of Section 1, T. 6 S. R. 10 W.



NE 1/4 of the NE 1/4 of Section 1, T. 6 S., R. 10 W.

Site 12 contains extensive brush and logs along the right, cut bank. One tree lies across channel just downstream of the site.

