



APPENDIX Z: Fish, Unionid, and Crayfish Report

Tier 2 Environmental Impact Statement

I-69 Section 6

Martinsville to Indianapolis

FINAL FISH, MUSSEL, AND CRAYFISH SURVEY REPORT

**I-69 EVANSVILLE TO INDIANAPOLIS
SECTION 6
MORGAN, JOHNSON, AND MARION COUNTIES, INDIANA**

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FINAL FISH, MUSSEL, AND CRAYFISH SURVEY REPORT

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1.0 INTRODUCTION

1.1 *Project Description*

On March 24, 2004, the Federal Highway Administration issued a Record of Decision (ROD) approving a corridor for I-69 between Evansville and Indianapolis. This corridor, designated as Alternative 3C in the Tier 1 Environmental Impact Statement (EIS) for I-69, is approximately 2,000 feet in width. The northern terminus of the project is I-465 on the south side of Indianapolis and the southern terminus is I-64 just north of Evansville. The project is part of a larger, national proposal to connect the three North American trading partners of Canada, Mexico, and the United States with an Interstate highway traversing the states of Michigan, Indiana, Kentucky, Tennessee, Mississippi, Arkansas, Louisiana, and Texas. In its entirety, the National I-69 corridor will extend from the Canadian border to the Mexican border, for a distance of more than 2,100 miles. This corridor was designated by Congress in the Intermodal Surface Transportation Act of 1991 (ISTEA).

To comply with the ROD, the Federal Highway Administration and the Indiana Department of Transportation are preparing a separate Tier 2 EIS for six sections of I-69 between Evansville and Indianapolis. These reports will determine the alignment, interchange locations, and design characteristics of I-69 within the selected corridor, as well as develop more detailed mitigation measures. The Tier 2 sections range in length from 13 to 29 miles. Based on consultation with the U.S. Fish and Wildlife Service (USFWS), the Indiana Department of Natural Resources (IDNR), and other environmental resource agencies, it was determined that surveys for fish, mussels, and crayfish will be required as part of the Tier 2 EIS for two of the aforementioned sections.

J.F. New & Associates, Inc. (JFNew) was contracted by HNTB Corporation (HNTB) to conduct surveys for endangered, threatened, and rare fish, mussel, and crayfish species within the Section 6 corridor. The following report provides descriptions of the methodologies used during the surveys, a discussion of results, and an analysis of potential impacts to federal and state-listed threatened and endangered fish, mussel, and crayfish species resulting from implementation of I-69 between Martinsville and Indianapolis.

1.2 Survey Locations

Eleven sites in Morgan, Johnson, and Marion Counties were surveyed within the Section 6 corridor for fish, mussels, and crayfish (Table 1 and Figure 1). Additionally, qualitative stream habitat assessments were conducted at each of the eleven sites. The eleven survey sites included: Indian Creek, the West Fork of Clear Creek, Clear Creek, Stott's Creek, Crooked Creek, Bluff Creek, North Bluff Creek, Honey Creek, Pleasant Run Creek, Orme Ditch, and Little Buck Creek. With the exceptions of Indian Creek and the West Fork of Clear Creek, all survey locations occurred at the intersection of each tributary and State Road (SR) 37. Due to site accessibility, Indian Creek was surveyed upstream of SR 37 at Low Gap Road. The West Fork of Clear Creek was surveyed near the County Road (CR) 200 North intersection. All eleven sites are tributary streams of the West Fork of the White River.

Table 1. Streams Surveyed for Fish, Mussels, and Crayfish

Site Number	Stream	County
1	Indian Creek	Morgan
2	W. Fork of Clear Creek	Morgan
3	Clear Creek	Morgan
4	Stott's Creek	Morgan
5	Crooked Creek	Morgan
6	Bluff Creek	Johnson
7	North Bluff Creek	Johnson
8	Honey Creek	Johnson
9	Pleasant Run Creek	Marion
10	Orme Ditch	Marion
11	Little Buck Creek	Marion

No previous I-69 fish, mussel, or crayfish survey data was available for these sites. The only known record of sampling for fishes in this area was by Gerking (1945). Gerking collected fishes in Indian Creek (Site 400-Gerking), the West Fork of the White River (Site 401-Gerking), Little Buck Creek (Site 421-Gerking), and a nameless creek (Site 500-Gerking) which is located five miles north of Martinsville in Morgan County. To the best of JFNew's knowledge, no published information exists for mussel or crayfish collections from these streams.

2.0 FISH, CRAYFISH, AND STREAM HABITAT SURVEYS

The I-69 Section 6 Tier 2 fish and crayfish surveys were conducted on September 2 and 3, 2004 at Sites 2-11. Indian Creek (Site 1) was added as an additional survey site in January of 2005 based on draft report comments. Indian Creek was surveyed on May 3, 2005. For Sites 2-11, the sampling crew consisted of Joe Exl (field crew leader), John Richardson, and Jason Babcock-Stiner. For Site 1, the sampling crew consisted of Joe Exl (field crew leader) and John Richardson. Common names of fishes in this report follow Robins et al (1991).

2.1 Methodology

Fish Surveys

JFNew surveyed the fish community at each of the eleven sites (Table 1) using a Coffelt Mark 10 backpack electrofishing unit following the Indiana Department of Environmental Management (IDEM) protocol for Fish Community Assessment (IDEM, 2002). The sample reach surveyed at each site was 15 times the wetted width of the stream at the time of sampling. Regardless of stream width, at least 50 meters and no more than 500 meters was sampled. Table 2 lists the length of the sample reach, as well as the sample time for each stream surveyed. This length of the sample reach ensured that all representative habitats within the stream were sampled. Stunned fish were captured by two dip netters and placed into a livewell for processing at the completion of the survey reach. Captured fish were identified to species; measured for total length to determine length ranges (millimeters); and examined for deformities, eroded fins, lesions, and tumors (DELT). Voucher specimen(s) of unidentified fish were returned to the laboratory for positive identification. All other fish were returned to the stream after processing. Additionally, the fish community of each site was assessed using the Shannon-Wiener Diversity Index (base 2). Please note that no samples were collected from Site 9 since the stream was dry during the time of the survey.

Table 2. Fish Survey Effort

Site	Stream	Date	Sample Time (seconds)	Sample Length (feet)
1	Indian Creek	5/2005	1068	675
2	W. Fork of Clear Creek	9/2/2004	737	450
3	Clear Creek	9/2/2004	876	225
4	Stott's Creek	9/2/2004	854	450
5	Crooked Creek	9/3/2004	206	225
6	Bluff Creek	9/3/2004	145	150
7	North Bluff Creek	9/3/2004	217	150
8	Honey Creek	9/3/2004	936	300
9	Pleasant Run Creek	9/3/2004	971	600
10	Orme Ditch	9/3/2004	--	--
11	Little Buck Creek	9/2/2004	987	450

Crayfish Surveys

A combination of collection methods were used to survey the aquatic crayfish community at each of the eleven sites. Sampling generally followed methodology described by Simon and Thoma (2003). As crayfish sampling occurred concurrently with fish electrofishing, the sample reach surveyed at each site was 15 times the wetted width of the stream at the time of sampling. Additionally, crayfish sampling occurred within the same reach (location) in which the fishery survey was conducted for a given site.

Crayfish exposed by the backpack electrofisher during the fishery survey were collected for identification. In addition, crayfish were collected from various habitats with a dip net or by hand.

Stream flows and substrate were not conducive to using the 1-m² seine net as originally outlined in the proposal therefore this methodology was not utilized. Up to ten specimens from each species were retained for laboratory identification. The remaining specimens were returned to the stream following processing.

Stream Habitat Surveys

JFNew performed qualitative habitat surveys at each site using IDEM's Qualitative Habitat Evaluation Index (QHEI) protocol (IDEM, 2002). While the Ohio EPA originally developed the QHEI to evaluate fish habitat in streams, IDEM and other agencies routinely utilize the QHEI as a measure of general "habitat" health. Various attributes of habitat within the survey reach were scored based on the overall importance of each to the maintenance of viable, diverse, and functional aquatic faunas. The type(s) and quality of substrate; amount and quality of in-stream cover; channel morphology; extent and quality of riparian vegetation; pool, riffle, and run development and quality; and gradient are the metrics used to determine the QHEI score. Each metric was scored individually then summed to provide the total QHEI score. QHEI scores typically range from 20 to 100.

2.2 Survey Results

Fish Results

A complete list of species identified during the electrofishing surveys can be found in Table 3. This information was used to calculate the Shannon-Wiener Diversity Index results for each site (Table 4). A more detailed discussion of the diversity index results can be found below. Copies of the fish survey datasheets can be found in Appendix A.

A total of 1,423 fish representing 30 species (plus a hybrid bluegill) and six families were collected during the surveys (Table 3). One species, originally considered to be Silverband shiner (*Notropis shumardi*), was potentially collected at Site 3. However, no voucher was retained to confirm the identification of this species. A second collection effort was attempted on May 3, 2005 to confirm the presence of this species. None were collected possibly due to negative impacts associated with the removal of an abandoned bridge abutment within the sampling reach. The sampling reach was significantly altered since the first collection. Large amounts of sand had covered significant riffle habitat within the sampling reach. This species has been changed to *Notropis* sp. since no voucher specimen was retained. This species of minnow is not State or Federally listed. Minnows were the most dominant taxa with 729 individuals (52% of the total catch) and 12 species being collected between all sites. Darters were the second most abundant fish species by number with 421 individuals (30% of the total catch) being collected between all sites.

The remaining sculpin, sucker, sunfish, and livebearers families represented 8%, 6%, 3%, and 1% of the total catch, respectively. None of the fish species collected are listed as State or Federally endangered, threatened, rare, or special concern species.

A review of the fishes collected during the survey showed that 9 of the 30 species (12% of individuals collected) collected are categorized as tolerant to a wide variety of environmental disturbances including water quality and habitat degradation or temporarily unavailable or stressed habitats (Barbour et al, 1999). Seventeen species (87% of individuals collected) are considered moderately tolerant, and two species (1% of individuals collected) are considered intolerant to a wide variety of environmental disturbances including water quality and habitat degradation (Barbour et al, 1999). There appears to be more tolerant species present today than when Gerking collected fish in these streams nearly 60 years ago (Gerking, 1945). Poor pool and riffle development coupled with historical stream channelization has apparently had significant negative impacts on these stream's fish communities. Further discussion on stream habitat can be found below in the Stream Habitat Results section.

Table 3. Fish Survey Results

Species Name	Common Name	Survey Site Locations											Total
		1	2	3	4	5	6	7	8	9	10	11	
Cyprinidae	Minnow Family												
<i>Campostoma anomalum</i>	Central stoneroller	--	--	--	215	144	8	--	88	83	--	19	557
<i>Carassius auratus</i>	Goldfish	--	--	2	--	--	--	--	--	--	--	--	2
<i>Cyprinella spiloptera</i>	Spotfin shiner	1	--	--	--	--	--	--	1	1	--	--	3
<i>Cyprinus carpio</i>	Common carp	--	--	--	--	--	--	--	--	1	--	--	1
<i>Notropis atherinoides</i>	Emerald shiner	--	--	--	6	--	--	--	--	--	--	--	6
<i>Notropis buccatus</i>	Silverjaw minnow	--	17	--	4	3	--	--	--	--	--	--	24
<i>Notropis stramineus</i>	Sand shiner	--	--	--	2	--	--	--	--	--	--	1	3
<i>Notropis sp.</i>	Shiner species	--	--	--	22	--	--	--	--	--	--	--	22
<i>Phenacobius mirabilis</i>	Suckermouth minnow	--	--	--	17	1	--	--	--	1	--	--	19
<i>Pimephales notatus</i>	Bluntnose minnow	1	--	--	14	3	--	--	--	--	--	--	18
<i>Pimephales promelas</i>	Fathead minnow	--	1	--	--	--	--	--	--	--	--	--	1
<i>Rhinichthys atratulus</i>	Blacknose dace	--	3	--	--	--	2	--	--	1	--	--	6
<i>Semotilus atromaculatus</i>	Creek chub	--	5	3	3	12	5	14	8	32	--	9	91
Cottidae	Sculpin Family												
<i>Cottus bairdi</i>	Mottled sculpin	--	8	--	--	--	--	--	103	--	--	--	111
Percidae	Perch Family												
<i>Etheostoma blennioides</i>	Greenside darter	17	--	--	26	--	--	--	--	--	--	--	43
<i>Etheostoma caeruleum</i>	Rainbow darter	4	--	1	78	6	28	--	13	23	--	--	153
<i>Etheostoma nigrum</i>	Johnny darter	4	4	--	21	15	1	--	7	10	--	--	62
<i>Etheostoma spectabile</i>	Orangethroat darter	--	--	--	--	--	--	64	79	18	--	--	161
<i>Percina sciera</i>	Dusky darter	1	--	1	--	--	--	--	--	--	--	--	2

Table 3. Fish Survey Results - Continued

Species Name	Common Name	Survey Site Locations											Total
		1	2	3	4	5	6	7	8	9	10	11	
Poeciliidae	Livebearer Family												
<i>Gambusia affinis</i>	Mosquito fish	--	--	--	--	--	--	8	--	--	--	--	8
Catostomidae	Sucker Family												
<i>Catostomus commersoni</i>	White sucker	--	--	5	8	1	--	--	8	3	--	--	25
<i>Hypentelium nigricans</i>	Northern hog sucker	2	--	1	48	1	--	--	2	7	--	1	62
<i>Moxostoma duquesnei</i>	Black redbhorse	3	--	--	--	--	--	--	--	--	--	--	3
<i>Moxostoma erythrumum</i>	Golden redbhorse	--	--	--	1	--	--	--	--	--	--	--	1
Centrarchidae	Sunfish Family												
<i>Lepomis cyanellus</i>	Green sunfish	--	1	3	--	--	--	--	--	1	--	2	7
<i>Lepomis macrochirus</i>	Bluegill	1	2	2	--	--	--	1	--	3	--	4	13
<i>Lepomis megalotis</i>	Longear sunfish	2	--	--	--	--	--	--	--	--	--	--	2
<i>Micropterus dolomieu</i>	Smallmouth bass	--	--	--	2	--	--	--	--	--	--	--	2
<i>Micropterus punctulatus</i>	Spotted bass	1	--	1	1	--	--	--	--	5	--	1	9
<i>Pomoxis annularis</i>	White crappie	--	--	1	--	--	--	--	--	--	--	--	1
--	Hybrid bluegill	--	4	1	--	--	--	--	--	--	--	--	5
Total Number of Species		11	8*	10	16	9	5	4	9	14	0	7	30
Total Number of Individuals		37	45	21	468	186	44	87	309	189	0	37	1,423

* Does not include hybrid bluegill

The Shannon-Wiener Diversity Index (H') is a popular measure of heterogeneity and effective species number. This index is also used to measure habitat quality which may be degraded by human activities. Similar to the Simpson's index, this measurement takes into account species richness and the proportion of each species within the local aquatic community. The Shannon-Wiener Diversity Index ranges from 0.0 to approximately 4.6. A community with high species diversity would have many nearly equally abundant species present, resulting in a higher H' value. A value of 0.0 denotes that every organism in the sample is the same species, while a value of 4.6 indicates the number of individuals is evenly distributed among numerous species. It must be noted that mid-range H' values are not particularly descriptive and must be interpreted with care.

Based on the results of the diversity index, H' values for the ten streams that yielded fish (Orme Ditch was dry at the time of the survey and yielded no fish) range between 1.14 and 3.20, while the median H' value for these streams was 2.22 (Honey Creek). The fish community received H' values below the median in four of the eleven streams surveyed. These include North Bluff Creek, Crooked Creek, Bluff Creek, and Little Buck Creek. All other streams received H' values that were above the median.

Table 4. Shannon-Wiener Diversity Index (H') Results for Each Site

Site	Stream	H'
1	Indian Creek	2.66
2	W. Fork of Clear Creek	2.65
3	Clear Creek	3.20
4	Stott's Creek	2.64
5	Crooked Creek	1.31
6	Bluff Creek	1.54
7	North Bluff Creek	1.14
8	Honey Creek	2.21
9	Pleasant Run Creek	2.58
10	Orme Ditch	--
11	Little Buck Creek	1.99
Median H' Value		2.22

Table 5 lists the fish taken from the maps found in Gerking (1945). Site 400 is Indian Creek, Site 401 is the West Fork of the White River, Site 421 is Little Buck Creek, and Site 500 is a nameless creek located five miles north of Martinsville in Morgan County, Indiana. Twenty six species are listed of which 17 were found in this study (highlighted in yellow). In total, twenty nine species were collected by JFNew.

Table 5. List of Fishes Taken from the Maps in Gerking (1945)

Scientific Name	Common Name	Site			
		400	401	421	500
Cyprinidae	Minnow Family				
<i>Campostoma anomalum</i> (2)	Central stoneroller	X	X	X	X
<i>Cyprinella spiloptera</i>	Spotfin shiner	X	X	X	X
<i>Cyprinella whipplei</i>	Steelcolor shiner	X	X		
<i>Hybognathus nuchalis</i>	Western silvery minnow	X			
<i>Lythrurus umbratilis</i>	Redfin shiner	X	X	X	
<i>Notropis buccatus</i> (2)	Silverjaw minnow		X	X	
<i>Notropis cornutus</i>	Common shiner	X	X	X	X
<i>Notropis stramineus</i>	Sand shiner	X	X	X	X
<i>Notropis volucellus</i>	Mimic shiner	X			
<i>Phenacobuis mirabilis</i>	Suckermouth minnow		X	X	
<i>Phoxinus erythrogaster</i>	Southern redbelly dace		X		
<i>Pimephales notatus</i> (1, 2)	Bluntnose minnow	X	X	X	X
<i>Pimephales vigilax</i>	Bullhead minnow	X	X		
<i>Rhinichthys atratulus</i> (1)	Blacknose dace		X		
<i>Semolitis atromaculatus</i> (1,2)	Creek chub	X	X		
Esocidae	Pike Family				
<i>Esox americanus</i>	Grass Pickerel	X			

Table 5. List of Fishes Taken from the Maps in Gerking (1945) - Continued

Scientific Name	Common Name	Site			
		400	401	421	500
Percidae	Perch Family				
<i>Etheostoma blennioides</i>	Greenside darter			X	
<i>Etheostoma caeruleum</i>	Rainbow darter	X	X	X	X
<i>Etheostoma nigrum</i> (2)	Johnny darter	X	X		
<i>Etheostoma spectabile</i> (2)	Orangethroat darter	X	X	X	X
Ictaluridae	Bullhead Catfish Family				
<i>Ictalurus punctatus</i>	Channel catfish		X		
Catostomidae	Sucker Family				
<i>Catostomus commersoni</i> (1)	White sucker		X	X	X
<i>Hypentelium nigricans</i>	Northern hog sucker		X	X	
<i>Moxostoma erythrum</i>	Golden redbhorse		X		X
Centrarchidae	Sunfish Family				
<i>Micropterus punctulatus</i>	Spotted bass	X			
<i>Micropterus salmoides</i>	Largemouth bass			X	
Total Number of Species		16	20	14	9

(1)- Highly tolerant to a wide variety of environmental disturbances including water quality and habitat degradation (Simon and Dufour, 1997).

(2)- Indicator of temporarily unavailable or stressed habitats (Larimore and Smith, 1963; Smith, 1971).

Eleven fish species found in 2004 and 2005 were not collected by Gerking in 1943. They are:

- *Carassius auratus* (Goldfish) Highly tolerant to a wide variety of environmental disturbances including water quality and habitat degradation (Simon and Dufour, 1997).
- *Cottus bairdi* (Mottled sculpin) Found in riffles and pools in spring branches and streams that receive much of their flow from springs (Pflieger, 1997).
- *Cyprinus carpio* (Common carp) Highly tolerant to a wide variety of environmental disturbances including water quality and habitat degradation (Simon and Dufour, 1997).
- *Gambusia affinis* (Mosquitofish) Backwaters and adjacent oxbows of warm, sluggish, lowland streams are favorite habitats (Pflieger, 1997).

- *Lepomis cyanellus* (Green sunfish) Highly tolerant to a wide variety of environmental disturbances including water quality and habitat degradation (Simon and Dufour, 1997) and are an indicator of temporarily unavailable or stressed habitats (Larimore and Smith, 1963; Smith, 1971).
- *Lepomis macrochirus* (Bluegill) Occurs in deeper pools and backwaters of streams (Pflieger, 1997).
- *Micropterus dolomieu* (Smallmouth bass) Occurs in clear, gravelly, or rocky rivers that have moderate to fast current and remain relatively cool during the summer months (Smith, 1979).
- *Notropis atherinoides* (Emerald shiner) Typically a large river minnow and occurs only in streams near their mouths (Smith, 1979).
- *Percina sciera* (Dusky darter) Occupies deep raceways and riffles over a predominately gravel bottom in medium to large sized rivers (Smith, 1979).
- *Pimephales promelas* (Fathead minnow) Highly tolerant to a wide variety of environmental disturbances including water quality and habitat degradation (Simon and Dufour, 1997).
- *Pomoxis annularis* (White crappie) Most abundant in well-vegetated lakes and large rivers (Smith, 1979).
- Hybrid bluegill

Crayfish Results

Only one species of crayfish, Northern Crayfish (*Orconectes virilis*), was collected from eight of the eleven sites during the survey (Table 5). No crayfish were collected at Site 6, 7, or 10 during the survey. Additionally, no adult male (Form 1) crayfish were collected at Sites 1, 4, or 9. As adult males are required for positive identification, females that were collected from these sites were released after general inspection. However, given the fact that *O. virilis* were so prevalent at the other sites, the female crayfish released were likely *O. virilis*. *Orconectes virilis* are not considered endangered, threatened, or rare within Indiana and their populations are listed as currently stable (Crandall and Fetzner, 2004).

Table 6. Crayfish Survey Results

Site	Stream	Date	Species Name	Common Name	Male		Female	
					Mature	Immature	Mature	Immature
1	Indian Creek	5/3/2005	<i>Orconectes virilis</i>	Northern crayfish	0	3	0	1
2	W. Fork of Clear Creek	9/2/2004	<i>Orconectes virilis</i>	Northern crayfish	4	6	0	0
3	Clear Creek	9/2/2004	<i>Orconectes virilis</i>	Northern crayfish	2	0	1	2
4	Stott's Creek	9/2/2004	<i>Orconectes virilis</i>	Northern crayfish	0	3	3	4
5	Crooked Creek	9/3/2004	<i>Orconectes virilis</i>	Northern crayfish	1	9	0	0
6	Bluff Creek	9/3/2004	None Collected	--	--	--	--	--
7	North Bluff Creek	9/3/2004	None Collected	--	--	--	--	--
8	Honey Creek	9/3/2004	<i>Orconectes virilis</i>	Northern crayfish	3	7	0	0
9	Pleasant Run Creek	9/3/2004	<i>Orconectes virilis</i>	Northern crayfish	0	8	0	0
10	Orme Ditch	9/3/2004	None Collected	--	--	--	--	--
11	Little Buck Creek	9/2/2004	<i>Orconectes virilis</i>	Northern crayfish	2	2	0	4
SURVEY TOTALS					12	38	4	11

Stream Habitat Results

The QHEI is used to evaluate the characteristics of a stream segment, as opposed to the characteristics of a single sampling site. As such, individual sites may have poorer physical habitat due to a localized disturbance yet still support aquatic communities closely resembling those sampled at adjacent sites with better habitat, provided water quality conditions are similar. The IDEM indicates that QHEI scores above 64 suggest that the habitat is capable of supporting a balanced warmwater community; streams with scores between 51 and 64 suggest these streams are partially supportive of a stream's aquatic life use designation. Streams that score less than 51 suggest they are non-supporting of their aquatic life use designation (IDEM, 2000).

Table 6 contains the results for the qualitative habitat survey. Copies of the QHEI field datasheets can be found in Appendix B. Only two of the survey sites (Sites 5 and 8) were considered capable of supporting balanced warmwater fish communities. Sites 6, 7, and 10 had QHEI scores less than 51 and are considered non-supporting of their aquatic life use designation. Five sites (Sites 1, 2, 3, 4, 9, and 11) were considered partially supportive of their aquatic life use designation.

Each of the study streams had substrates that were primarily composed of sand within the survey reach. Indian Creek (Site 1), Crooked Creek (Site 5), Bluff Creek (Site 6), and Little Buck Creek (Site 11) had minor components of gravel substrate. Bluff Creek (Site 6), North Bluff Creek (Site 7), and Orme Ditch (Site 10) lacked pool development. Riffle development was poor to fair for all study streams due to shifting sand substrates. The poor riffle/run/pool development in these streams is likely due to past channelization events and watershed development. Each of the eleven streams surveyed showed signs of historical channelization activity (spoil piles, low to moderate channel sinuosity, etc.).

Table 7. Habitat Survey Results

Site Number	Stream	Substrate Score	Cover Score	Channel Score	Riparian Score	Pool Score	Riffle Score	Gradient Score	Total Score
	Maximum Possible Score	20	20	20	10	12	8	10	100
1	Indian Creek	15	13	12	5	8	2	6	61
2	W. Fork of Clear Creek	13	10	9	9	4	0	8	53
3	Clear Creek	14	11	11	7	7	3	8	61
4	Stott's Creek	12	11	12	8	8	2	6	59
5	Crooked Creek	14	13	13	4	9	5	10	68
6	Bluff Creek	13	10	8	5	0	2	8	46
7	North Bluff Creek	13	10	7	5	0	3	8	46
8	Honey Creek	14	10	11	8	9	3	10	65
9	Pleasant Run Creek	14	11	9	9	4	3	10	60
10	Orme Ditch	13	5	7	6	0	0	8	39
11	Little Buck Creek	14	13	11	4	7	1	10	60

3.0 MUSSEL SURVEYS

A survey for endangered, threatened, and rare unionid mussels was completed for ten tributaries to the West Fork of the White River along the proposed I-69 extension corridor. In cooperation with JFNew, two biologists from Commonwealth Biomonitoring, Inc. performed the mussel surveys on August 16 and 17, 2004. They were Melody Myers-Kinzie (primary federal and state permit holder) and Greg Bright (Director of Commonwealth Biomonitoring, Inc.).

3.1 Methodology

Ten sites (excludes Orme Ditch) in Morgan, Johnson, and Marion Counties (Table 1) were surveyed for mussels. These sites are tributary streams of the West Fork of the White River and no previous mussel survey data was available for them.

At each site, a 2,000-foot length of stream was examined for mussels using visual and tactile searching. Living mussels and shells of dead individuals were collected by hand from the survey areas. Those collected were identified and counted and living mussels were returned immediately to their original habitat. Shells were classified as either fresh dead, weathered dead, or sub-fossil. Fresh dead shells are those with the periostracum (outer shell covering) largely intact; weathered dead have partially intact periostracum; and sub-fossil shells are chalky.

3.2 Survey Results

Only live mussels or fresh dead shells are considered evidence that a mussel population exists at a given site. Weathered dead or sub-fossil shells indicate that mussels were formerly present somewhere in a stream, possibly far upstream from where they are currently found.

No live mussels or fresh dead shells were identified during the survey effort. However, at Sites 2, 4, and 11 (Table 6), weathered dead or sub-fossil shells were present. Pleasant Run Creek (Site 9) contained only long-dead unionid fragments that were impossible to identify to species. All species identified are common to small streams in Indiana. Note that at the time of the surveys, Orme Ditch was totally dry and two other streams, Little Buck Creek and Crooked Creek, were partially dry.

Table 8. Mussel Survey Results

Site Number	Stream	Species	Condition
1	Indian Creek	No Captures	--
2	W. Fork of Clear Creek	<i>Lampsilis siliquoidea</i>	Weathered dead
		<i>Anodontooides ferussacianus</i>	Weathered dead
3	Clear Creek	No Captures	--
4	Stott's Creek	<i>Pyganodon grandis</i>	Weathered dead
5	Crooked Creek	No Captures	--
6	Bluff Creek	No Captures	--
7	North Bluff Creek	No Captures	--
8	Honey Creek	No Captures	--
9	Pleasant Run Creek	Unknown	Fragment
10	Orme Ditch	No Captures	--
11	Little Buck Creek	<i>Pyganodon grandis</i>	Sub-fossil

4.0 SUMMARY AND CONCLUSIONS

Based on the results of the electrofishing surveys and Shannon-Wiener Diversity Index calculations, the ten streams (excludes Orme Ditch) possess a moderate level of diversity and thus are now typical of many central Indiana waterbodies. There has been an apparent loss in fish diversity from these streams since Gerking's field studies. Stream habitat analysis indicates that this loss in diversity can be partially attributed to habitat degradation through historical stream channel modification and watershed development. Nine of the 30 fish species (12% of individuals) collected are categorized as tolerant to a wide variety of environmental disturbances including water quality and habitat degradation or temporarily unavailable or stressed habitats. Seventeen species (87% of individuals collected) are considered moderately tolerant, and two species (1% of individuals collected) are considered intolerant to a wide variety of environmental disturbances including water quality and habitat degradation (Barbour et al, 1999).

No endangered, threatened, rare, or special concern fish, crayfish, or mussel species were identified within the eleven streams during the field survey efforts. Considering the prevalence of tolerant and moderately tolerant aquatic species currently found in these streams, it is the opinion of JFNew that the proposed extension of I-69 along the existing SR 37 corridor will not significantly impact existing fish, crayfish, or unionid mussel populations.

5.0 REFERENCES

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FIGURES

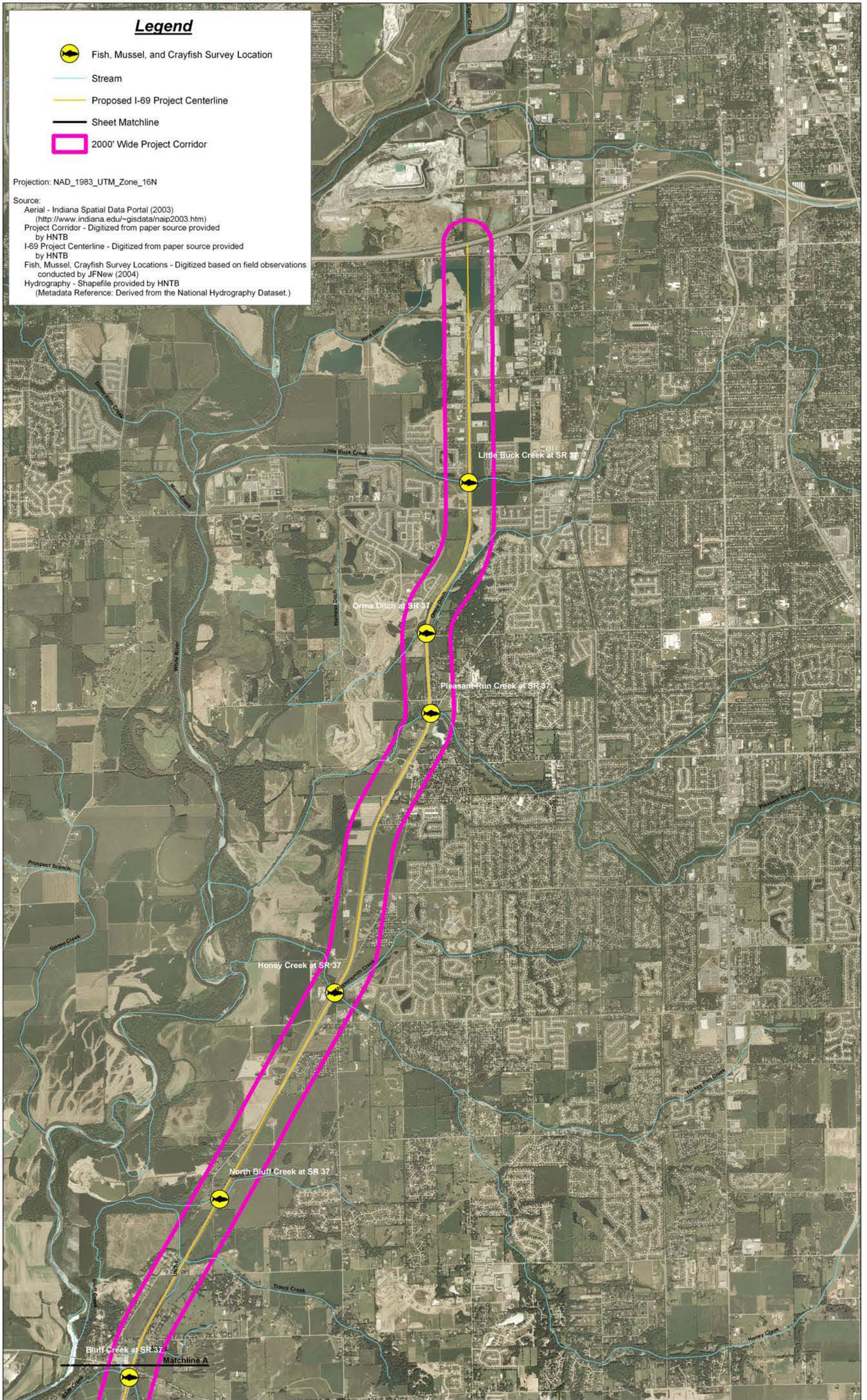
**FINAL FISH, MUSSEL, AND CRAYFISH SURVEY REPORT
I-69 EVANSVILLE TO INDIANAPOLIS
SECTION 6
MORGAN, JOHNSON, AND MARION COUNTIES, INDIANA**

Legend

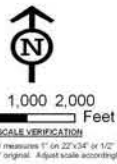
-  Fish, Mussel, and Crayfish Survey Location
-  Stream
-  Proposed I-69 Project Centerline
-  Sheet Matchline
-  2000' Wide Project Corridor

Projection: NAD_1983_UTM_Zone_16N

Source:
 Aerial - Indiana Spatial Data Portal (2003)
 (<http://www.indiana.edu/~gisdata/naip2003.htm>)
 Project Corridor - Digitized from paper source provided by HNTB
 I-69 Project Centerline - Digitized from paper source provided by HNTB
 Fish, Mussel, Crayfish Survey Locations - Digitized based on field observations conducted by JFNew (2004)
 Hydrography - Shapefile provided by HNTB
 (Metadata Reference: Derived from the National Hydrography Dataset.)








961 - 2004



1.0 FISH, MUSSEL, AND CRAYFISH SURVEY LOCATIONS
 SHEET 1 OF 3
 I-69 EVANSVILLE TO INDIANAPOLIS
 SECTION 6
 ENVIRONMENTAL OVERVIEW REPORT

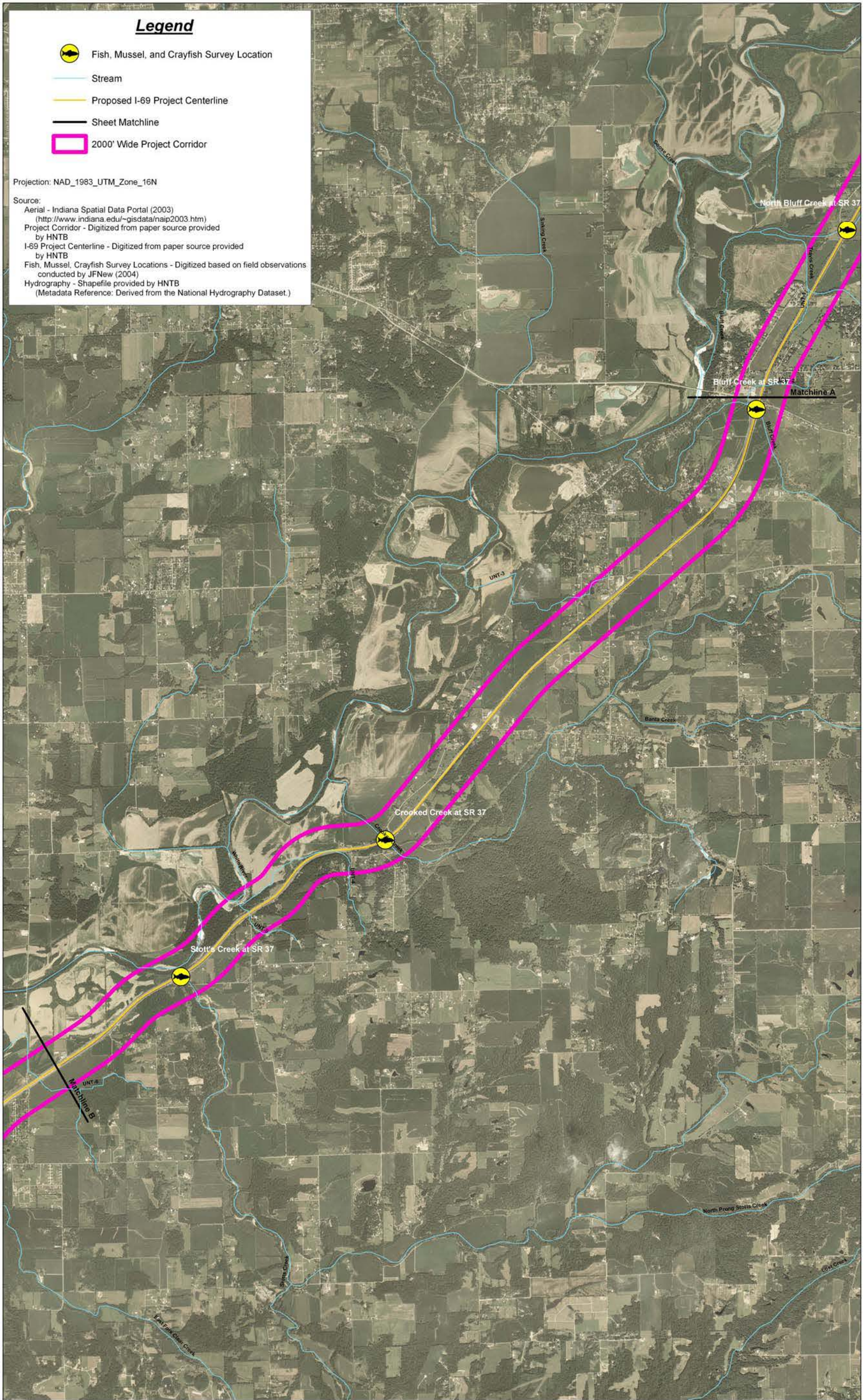


Legend

-  Fish, Mussel, and Crayfish Survey Location
-  Stream
-  Proposed I-69 Project Centerline
-  Sheet Matchline
-  2000' Wide Project Corridor

Projection: NAD_1983_UTM_Zone_16N

Source:
 Aerial - Indiana Spatial Data Portal (2003)
 (<http://www.indiana.edu/~gisdata/naip2003.htm>)
 Project Corridor - Digitized from paper source provided by HNTB
 I-69 Project Centerline - Digitized from paper source provided by HNTB
 Fish, Mussel, Crayfish Survey Locations - Digitized based on field observations conducted by JFNew (2004)
 Hydrography - Shapefile provided by HNTB
 (Metadata Reference: Derived from the National Hydrography Dataset.)








396 - 2004



1.0 FISH, MUSSEL, AND CRAYFISH SURVEY LOCATIONS
 SHEET 2 OF 3
 I-69 EVANSVILLE TO INDIANAPOLIS
 SECTION 6
 ENVIRONMENTAL OVERVIEW REPORT

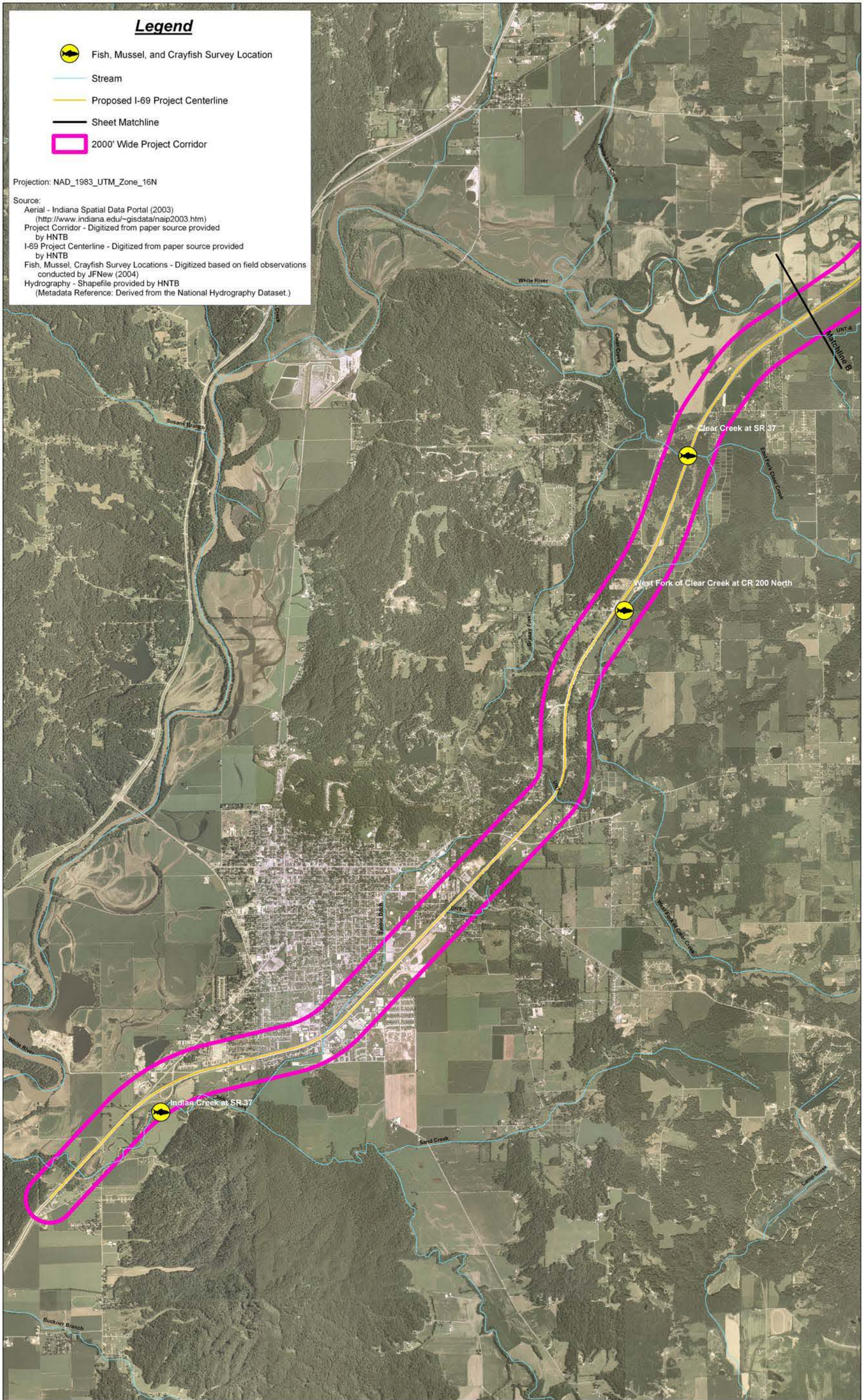


Legend

-  Fish, Mussel, and Crayfish Survey Location
-  Stream
-  Proposed I-69 Project Centerline
-  Sheet Matchline
-  2000' Wide Project Corridor

Projection: NAD_1983_UTM_Zone_16N

Source:
 Aerial - Indiana Spatial Data Portal (2003)
 (<http://www.indiana.edu/~gisdata/naip2003.htm>)
 Project Corridor - Digitized from paper source provided by HNTB
 I-69 Project Centerline - Digitized from paper source provided by HNTB
 Fish, Mussel, Crayfish Survey Locations - Digitized based on field observations conducted by JFNW (2004)
 Hydrography - Shapefile provided by HNTB
 (Metadata Reference: Derived from the National Hydrography Dataset.)



96 - 204



0 1,000 2,000
 Feet
 SCALE VERIFICATION
This bar measures 1" on 22"x34" or 10" on 11"x17" original. Adjust scale accordingly.

1.0 FISH, MUSSEL, AND CRAYFISH SURVEY LOCATIONS
 SHEET 3 OF 3
 I-69 EVANSVILLE TO INDIANAPOLIS
 SECTION 6
 ENVIRONMENTAL OVERVIEW REPORT



APPENDIX A

FISH SURVEY DATA SHEETS

**FINAL FISH, MUSSEL, AND CRAYFISH SURVEY REPORT
I-69 EVANSVILLE TO INDIANAPOLIS
SECTION 6
MORGAN, JOHNSON, AND MARION COUNTIES, INDIANA**

**FISH NUMBER AND LENGTH
FIELD DATA SHEET**

DATE: 9/2/04 RUN 1 of 1 TIME: 876 (min:sec)

METHOD: Buck back LENGTH: 225 (ft)

Species <u>White Sucker</u>		^{Northern} Hog <u>Sucker</u>		<u>Spotted Bass</u>		<u>Gold fish</u>		<u>Creek Chub</u>	
Number	Length	Number	Length	Number	Length	Number	Length	Number	Length
<u>111</u>	790 <u>95</u> <u>290</u>	<u>1</u>	<u>275</u>	<u>1</u>	<u>150</u>	<u>11</u>	<u>145</u> <u>135</u>	<u>111</u>	<u>130</u> <u>125</u>

<u>Green Sunfish</u>		<u>Bluegill</u>		<u>White Crappie</u>		<u>Dusky</u> <u>hark</u> <u>Darter</u>		<u>Rainbow Darter</u>	
Number	Length	Number	Length	Number	Length	Number	Length	Number	Length
<u>111</u>	<u>110</u> <u>65</u>	<u>11</u>	<u>60</u>	<u>1</u>	<u>70</u>	<u>1</u> <u>kept</u>		<u>1</u>	<u>55</u>

Green x Bluegill
1 85

**FISH NUMBER AND LENGTH
FIELD DATA SHEET**

DATE: 9/2/04 RUN 1 of 1 TIME: 854 (min:sec)

METHOD: Backpack LENGTH: 450 (ft) Sheet 1 of 2

Species <u>Johnny Darter</u>		<u>Rainbow Darter</u>		<u>White Sucker</u>		^{Northern} Hecamata <u>Sucker</u>		<u>Stoneroller</u>	
Number	Length	Number	Length	Number	Length	Number	Length	Number	Length
<u> </u>	<u>40-57</u>	<u> </u>	<u>34-47</u>	<u> </u>	<u>85</u>	<u> </u>	<u>60</u>	<u> </u>	<u>80-95</u>
<u> </u>		<u> </u>			<u>80</u>	<u> </u>	<u>110</u>	<u> </u>	
<u>1</u>		<u> </u>				<u> </u>		<u> </u>	
		<u> </u>				<u> </u>		<u> </u>	
		<u> </u>				<u> </u>		<u> </u>	
		<u> </u>				<u> </u>		<u> </u>	
		<u> </u>				<u> </u>		<u> </u>	
		<u> </u>				<u> </u>		<u> </u>	
		<u> </u>				<u> </u>		<u> </u>	
		<u> </u>				<u> </u>		<u> </u>	
		<u> </u>				<u> </u>		<u> </u>	
		<u> </u>				<u> </u>		<u> </u>	
		<u> </u>				<u> </u>		<u> </u>	
		<u> </u>				<u> </u>		<u> </u>	
		<u> </u>				<u> </u>		<u> </u>	
		<u> </u>				<u> </u>		<u> </u>	
		<u> </u>				<u> </u>		<u> </u>	
		<u> </u>				<u> </u>		<u> </u>	

<u>Silverjaw Minnow</u>		<u>Bluntnose Minnow</u>		<u>Creek Chub</u>		<u>Greensided Darter</u>		<u>Smallmouth Bass</u>	
<u> </u>	<u>35-60</u>	<u> </u>	<u>56-67</u>	<u> </u>	<u>45-65</u>	<u> </u>	<u>54</u>	<u> </u>	<u>170</u>
		<u> </u>				<u> </u>			<u>60</u>
						<u> </u>			
<u>1</u>	<u>65</u>								

Spotted Bass

APPENDIX B

QHEI DATA SHEETS

**FINAL FISH, MUSSEL, AND CRAYFISH SURVEY REPORT
I-69 EVANSVILLE TO INDIANAPOLIS
SECTION 6
MORGAN, JOHNSON, AND MARION COUNTIES, INDIANA**

STREAM: Indian Creek RIVER MILE Low Gap Rd. DATE: 5/3/05 QHEI SCORE 61

1) SUBSTRATE: (Check ONLY Two Substrate Type Boxes: Check all types present)

SUBSTRATE SCORE 15

TYPE		POOL	RIFFLE	POOL		RIFFLE	SUBSTRATE ORIGIN (all)		SILT COVER (one)						
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/>	BLDER/SLAB(10)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	LIMESTONE(1)	<input type="checkbox"/>	RIP/RAP(0)	<input type="checkbox"/>	SILT-HEAVY(-2)	<input checked="" type="checkbox"/>	SILT-MOD(-1)
<input type="checkbox"/>	BOULDER(9)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	TILLS(1)	<input type="checkbox"/>	HARDPAN(0)	<input type="checkbox"/>	SILT-NORM(0)	<input type="checkbox"/>	SILT-FREE(1)
<input type="checkbox"/>	COBBLE(8)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	SANDSTONE(0)	Extent of Embeddedness (check one)					
<input type="checkbox"/>	HARDPAN(4)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SHALE(-1)	<input type="checkbox"/>	EXTENSIVE(-2)	<input type="checkbox"/>	MODERATE(-1)		
<input type="checkbox"/>	MUCK/SILT(2)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	COAL FINES(-2)	<input type="checkbox"/>	LOW(0)	<input checked="" type="checkbox"/>	NONE(1)		

TOTAL NUMBER OF SUBSTRATE TYPES: >4(2) <4(0)
 NOTE: (Ignore sludge that originates from point sources: score is based on natural substrates)

COMMENTS:

2) INSTREAM COVER:

COVER SCORE 13

TYPE (Check all that apply)			AMOUNT (Check only one or Check 2 and AVERAGE)		
<input checked="" type="checkbox"/>	UNDERCUT BANKS(1)	<input checked="" type="checkbox"/>	DEEP POOLS(2)	<input type="checkbox"/>	EXTENSIVE >75%(11)
<input type="checkbox"/>	OVERHANGING VEGETATION(1)	<input checked="" type="checkbox"/>	ROOTWADS(1)	<input checked="" type="checkbox"/>	MODERATE 25-75%(7)
<input checked="" type="checkbox"/>	SHALLOWS (IN SLOW WATER)(1)	<input type="checkbox"/>	BOULDERS(1)	<input type="checkbox"/>	SPARSE 5-25%(3)
<input type="checkbox"/>		<input type="checkbox"/>	OXBOWS(1)	<input type="checkbox"/>	NEARLY ABSENT <5%(1)
<input type="checkbox"/>		<input type="checkbox"/>	AQUATIC MACROPHYTES(1)		
<input type="checkbox"/>		<input checked="" type="checkbox"/>	LOGS OR WOODY DEBRIS(1)		

COMMENTS:

3) CHANNEL MORPHOLOGY: (Check ONLY ONE per Category or Check 2 and AVERAGE)

CHANNEL SCORE 12

SINUOSITY		DEVELOPMENT		CHANNELIZATION		STABILITY		MODIFICATION/OTHER			
<input type="checkbox"/>	HIGH(4)	<input type="checkbox"/>	EXCELLENT(7)	<input type="checkbox"/>	NONE(6)	<input type="checkbox"/>	HIGH(3)	<input type="checkbox"/>	SNAGGING	<input type="checkbox"/>	IMPOUND
<input checked="" type="checkbox"/>	MODERATE(3)	<input checked="" type="checkbox"/>	GOOD(5)	<input type="checkbox"/>	RECOVERED(4)	<input checked="" type="checkbox"/>	MODERATE(2)	<input checked="" type="checkbox"/>	RELOCATION	<input type="checkbox"/>	ISLAND
<input type="checkbox"/>	LOW(2)	<input checked="" type="checkbox"/>	FAIR(3)	<input checked="" type="checkbox"/>	RECOVERING(3)	<input type="checkbox"/>	LOW(1)	<input type="checkbox"/>	CANOPY REMOVAL	<input type="checkbox"/>	LEVEED
<input type="checkbox"/>	NONE(1)	<input type="checkbox"/>	POOR(1)	<input type="checkbox"/>	RECENT OR NO RECOVERY(1)			<input checked="" type="checkbox"/>	DREDGING	<input type="checkbox"/>	BANK SHAPING
								<input type="checkbox"/>	ONE SIDE CHANNEL MODIFICATION		

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION: (Check ONE box or Check 2 and AVERAGE per bank)

RIPARIAN SCORE 5

River Right Looking Downstream

RIPARIAN WIDTH (per bank)		EROSION/RUNOFF-FLOODPLAIN QUALITY				BANK EROSION	
L	R (per bank)	L	R (most predominant per bank)	L	R (per bank)	L	R (per bank)
<input checked="" type="checkbox"/>	WIDE >150 ft.(4)	<input type="checkbox"/>	FOREST, SWAMP(3)	<input type="checkbox"/>	URBAN OR INDUSTRIAL(0)	<input type="checkbox"/>	NONE OR LITTLE(3)
<input type="checkbox"/>	MODERATE 30-150 ft.(3)	<input checked="" type="checkbox"/>	OPEN PASTURE/ROW CROP(0)	<input type="checkbox"/>	SHRUB OR OLD FIELD(2)	<input checked="" type="checkbox"/>	MODERATE(2)
<input type="checkbox"/>	NARROW 15-30 ft.(2)	<input type="checkbox"/>	RESID.,PARK,NEW FIELD(1)	<input type="checkbox"/>	CONSERV. TILLAGE(1)	<input type="checkbox"/>	HEAVY OR SEVERE(1)
<input type="checkbox"/>	VERY NARROW 3-15 ft.(1)	<input type="checkbox"/>	FENCED PASTURE(1)	<input type="checkbox"/>	MINING/CONSTRUCTION(0)		
<input type="checkbox"/>	NONE(0) <u>25</u>						

COMMENTS:

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

NO POOL = 0

POOL SCORE 8

MAX. DEPTH (Check 1)		MORPHOLOGY (Check 1)		POOL/RUN/RIFFLE CURRENT VELOCITY (Check all that Apply)			
<input type="checkbox"/>	>4 ft.(6)	<input type="checkbox"/>	POOL WIDTH>RIFFLE WIDTH(2)	<input type="checkbox"/>	TORRENTIAL(-1)	<input checked="" type="checkbox"/>	EDDIES(1)
<input checked="" type="checkbox"/>	2.4-4 ft.(4)	<input checked="" type="checkbox"/>	POOL WIDTH=RIFFLE WIDTH(1)	<input type="checkbox"/>	FAST(1)	<input type="checkbox"/>	INTERSTITIAL(-1)
<input type="checkbox"/>	1.2-2.4 ft.(2)	<input type="checkbox"/>	POOL WIDTH<RIFFLE WIDTH(0)	<input checked="" type="checkbox"/>	MODERATE(1)	<input type="checkbox"/>	INTERMITTENT(-2)
<input type="checkbox"/>	<1.2 ft.(1)			<input checked="" type="checkbox"/>	SLOW(1)		
<input type="checkbox"/>	<0.6 ft.(Pool=0)(0)						

COMMENTS:

RIFFLE SCORE 2

RIFFLE/RUN DEPTH		RIFFLE/RUN SUBSTRATE		RIFFLE/RUN EMBEDDEDNESS			
<input type="checkbox"/>	GENERALLY >4 in. MAX.>20 in.(4)	<input type="checkbox"/>	STABLE (e.g., Cobble,Boulder)(2)	<input type="checkbox"/>	EXTENSIVE(-1)	<input type="checkbox"/>	NONE(2)
<input type="checkbox"/>	GENERALLY >4 in. MAX.<20 in.(3)	<input checked="" type="checkbox"/>	MOD.STABLE (e.g., Pea Gravel)(1)	<input checked="" type="checkbox"/>	MODERATE(0)	<input type="checkbox"/>	NO RIFFLE(0)
<input checked="" type="checkbox"/>	GENERALLY 2-4 in.(1)	<input checked="" type="checkbox"/>	UNSTABLE (Gravel, Sand)(0)	<input type="checkbox"/>	LOW(1)		
<input type="checkbox"/>	GENERALLY <2 in.(Riffle=0)(0)	<input type="checkbox"/>	NO RIFFLE(0)				

COMMENTS:

6) GRADIENT (FEET/MILE): 5/100 % POOL 35 % RIFFLE 15 % RUN 50 GRADIENT SCORE 6

STREAM: JFW #19 W. Fork Clear Cr. RIVER MILE _____

DATE: 12/14/04

QHEI SCORE 53

1) SUBSTRATE: (Check ONLY Two Substrate Type Boxes: Check all types present)

SUBSTRATE SCORE 13

TYPE		POOL		RIFFLE		POOL		RIFFLE		SUBSTRATE ORIGIN (all)		SILT COVER (one)	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	BLDER/SLAB(10)	<input type="checkbox"/>		<input type="checkbox"/>		<input checked="" type="checkbox"/>	GRAVEL(7)	<input checked="" type="checkbox"/>		<input type="checkbox"/>	LIMESTONE(1)	<input type="checkbox"/>	RIP/RAP(0)
<input type="checkbox"/>	BOULDER(9)	<input type="checkbox"/>		<input type="checkbox"/>		<input checked="" type="checkbox"/>	SAND(6)	<input checked="" type="checkbox"/>		<input type="checkbox"/>	TILLS(1)	<input type="checkbox"/>	HARDPAN(0)
<input type="checkbox"/>	COBBLE(8)	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	BEDROCK(5)	<input type="checkbox"/>		<input type="checkbox"/>	SANDSTONE(0)	<input type="checkbox"/>	SILT-HEAVY(-2)
<input type="checkbox"/>	HARDPAN(4)	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	DETRITUS(3)	<input checked="" type="checkbox"/>		<input type="checkbox"/>	SHALE(-1)	<input type="checkbox"/>	SILT-NORM(0)
<input type="checkbox"/>	MUCK/SILT(2)	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input type="checkbox"/>	ARTIFIC(0)	<input checked="" type="checkbox"/>		<input type="checkbox"/>	COAL FINES(-2)	<input type="checkbox"/>	SILT-FREE(1)

TOTAL NUMBER OF SUBSTRATE TYPES: >4(2) <4(0)
NOTE: (Ignore sludge that originates from point sources: score is based on natural substrates)

COMMENTS: _____

2) INSTREAM COVER:

COVER SCORE 10

TYPE (Check all that apply)			AMOUNT (Check only one or Check 2 and AVERAGE)		
<input type="checkbox"/>	UNDERCUT BANKS(1)	<input type="checkbox"/>	DEEP POOLS(2)	<input type="checkbox"/>	EXTENSIVE >75%(11)
<input checked="" type="checkbox"/>	OVERHANGING VEGETATION(1)	<input type="checkbox"/>	ROOTWADS(1)	<input checked="" type="checkbox"/>	MODERATE 25-75%(7)
<input checked="" type="checkbox"/>	SHALLOWS (IN SLOW WATER)(1)	<input type="checkbox"/>	BOULDERS(1)	<input type="checkbox"/>	SPARSE 5-25%(3)
<input type="checkbox"/>		<input type="checkbox"/>	OXBOWS(1)	<input type="checkbox"/>	NEARLY ABSENT <5%(1)
<input type="checkbox"/>		<input type="checkbox"/>	AQUATIC MACROPHYTES(1)		
<input type="checkbox"/>		<input checked="" type="checkbox"/>	LOGS OR WOODY DEBRIS(1)		

COMMENTS: _____

3) CHANNEL MORPHOLOGY: (Check ONLY ONE per Category or Check 2 and AVERAGE)

CHANNEL SCORE 9

SINUOSITY		DEVELOPMENT		CHANNELIZATION		STABILITY		MODIFICATION/OTHER	
<input type="checkbox"/>	HIGH(4)	<input type="checkbox"/>	EXCELLENT(7)	<input type="checkbox"/>	NONE(6)	<input type="checkbox"/>	HIGH(3)	<input type="checkbox"/>	SNAGGING
<input type="checkbox"/>	MODERATE(3)	<input type="checkbox"/>	GOOD(5)	<input type="checkbox"/>	RECOVERED(4)	<input type="checkbox"/>	MODERATE(2)	<input type="checkbox"/>	RELOCATION
<input checked="" type="checkbox"/>	LOW(2)	<input checked="" type="checkbox"/>	FAIR(3)	<input checked="" type="checkbox"/>	RECOVERING(3)	<input checked="" type="checkbox"/>	LOW(1)	<input type="checkbox"/>	CANOPY REMOVAL
<input type="checkbox"/>	NONE(1)	<input type="checkbox"/>	POOR(1)	<input type="checkbox"/>	RECENT OR NO RECOVERY(1)			<input checked="" type="checkbox"/>	LEVEED
								<input type="checkbox"/>	BANK SHAPING
								<input type="checkbox"/>	ONE SIDE CHANNEL MODIFICATION

COMMENTS: _____

4) RIPARIAN ZONE AND BANK EROSION: (Check ONE box or Check 2 and AVERAGE per bank)

RIPARIAN SCORE 9

River Right Looking Downstream

RIPARIAN WIDTH (per bank)		EROSION/RUNOFF-FLOODPLAIN QUALITY				BANK EROSION	
L	R (per bank)	L	R (most predominant per bank)	L	R (per bank)	L	R (per bank)
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	WIDE >150 ft.(4)		FOREST, SWAMP(3)		URBAN OR INDUSTRIAL(0)		NONE OR LITTLE(3)
<input checked="" type="checkbox"/>	MODERATE 30-150 ft.(3)		OPEN PASTURE/ROW CROP(0)	<input checked="" type="checkbox"/>	SHRUB OR OLD FIELD(2)		MODERATE(2)
	NARROW 15-30 ft.(2)		RESID.,PARK,NEW FIELD(1)		CONSERV. TILLAGE(1)		HEAVY OR SEVERE(1)
	VERY NARROW 3-15 ft.(1)		FENCED PASTURE(1)		MINING/CONSTRUCTION(0)		
	NONE(0)						

COMMENTS: _____

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

NO POOL = 0

POOL SCORE 4

MAX. DEPTH (Check 1)		MORPHOLOGY (Check 1)		POOL/RUN/RIFFLE CURRENT VELOCITY (Check all that Apply)			
<input type="checkbox"/>	>4 ft.(6)	<input type="checkbox"/>	POOL WIDTH>RIFFLE WIDTH(2)	<input type="checkbox"/>	TORRENTIAL(-1)	<input type="checkbox"/>	EDDIES(1)
<input type="checkbox"/>	2.4-4 ft.(4)	<input type="checkbox"/>	POOL WIDTH=RIFFLE WIDTH(1)	<input type="checkbox"/>	FAST(1)	<input type="checkbox"/>	INTERSTITIAL(-1)
<input checked="" type="checkbox"/>	1.2-2.4 ft.(2)	<input checked="" type="checkbox"/>	POOL WIDTH<RIFFLE WIDTH(0)	<input checked="" type="checkbox"/>	MODERATE(1)	<input type="checkbox"/>	INTERMITTENT(-2)
<input type="checkbox"/>	<1.2 ft.(1)			<input checked="" type="checkbox"/>	SLOW(1)		
<input type="checkbox"/>	<0.6 ft.(Pool=0)(0)						

COMMENTS: _____

RIFFLE/RUN DEPTH

RIFFLE/RUN SUBSTRATE

RIFFLE/RUN EMBEDDEDNESS

RIFFLE SCORE 0

<input type="checkbox"/>	GENERALLY >4 in. MAX.>20 in.(4)	<input type="checkbox"/>	STABLE (e.g., Cobble,Boulder)(2)	<input type="checkbox"/>	EXTENSIVE(-1)	<input checked="" type="checkbox"/>	NONE(2)
<input type="checkbox"/>	GENERALLY >4 in. MAX.<20 in.(3)	<input type="checkbox"/>	MOD.STABLE (e.g., Pea Gravel)(1)	<input type="checkbox"/>	MODERATE(0)	<input checked="" type="checkbox"/>	NO RIFFLE(0)
<input type="checkbox"/>	GENERALLY 2-4 in.(1)	<input checked="" type="checkbox"/>	UNSTABLE (Gravel, Sand)(0)	<input type="checkbox"/>	LOW(1)		
<input checked="" type="checkbox"/>	GENERALLY <2 in.(Riffle=0)(0)	<input checked="" type="checkbox"/>	NO RIFFLE(0)				

COMMENTS: _____

6) GRADIENT (FEET/MILE): 18 % POOL 10 % RIFFLE 30 % RUN 90 GRADIENT SCORE 8

Checked by Spottelmay

STREAM: JFW# 18 Clear Creek RIVER MILE _____ DATE: 12/14/04 ^{JE} QHEI SCORE 60.3

1) SUBSTRATE: (Check ONLY Two Substrate Type Boxes: Check all types present)

TYPE		POOL		RIFFLE		SUBSTRATE ORIGIN (all)		SILT COVER (one)	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	BLDER/SLAB(10)	<input type="checkbox"/>		<input checked="" type="checkbox"/>		<input type="checkbox"/>	LIMESTONE(1)	<input type="checkbox"/>	SILT-HEAVY(-2)
<input type="checkbox"/>	BOULDER(9)	<input type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	TILLS(1)	<input checked="" type="checkbox"/>	SILT-NORM(0)
<input type="checkbox"/>	COBBLE(8)	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	SANDSTONE(0)	<input type="checkbox"/>	SILT-FREE(1)
<input type="checkbox"/>	HARDPAN(4)	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	SHALE(-1)	Extent of Embeddedness (check one)	
<input type="checkbox"/>	MUCK/SILT(2)	<input type="checkbox"/>		<input checked="" type="checkbox"/>		<input type="checkbox"/>	COAL FINES(-2)	<input type="checkbox"/>	EXTENSIVE(-2)
								<input type="checkbox"/>	LOW(0)
								<input checked="" type="checkbox"/>	MODERATE(-1)
								<input type="checkbox"/>	NONE(1)

TOTAL NUMBER OF SUBSTRATE TYPES: >4(2) <4(0)

NOTE: (Ignore sludge that originates from point sources: score is based on natural substrates)

COMMENTS: _____

2) INSTREAM COVER:

TYPE (Check all that apply)			COVER SCORE <u>11</u>
<input checked="" type="checkbox"/> UNDERCUT BANKS(1)	<input type="checkbox"/> DEEP POOLS(2)	<input type="checkbox"/> OXBOWS(1)	AMOUNT (Check only one or Check 2 and AVERAGE)
<input checked="" type="checkbox"/> OVERHANGING VEGETATION(1)	<input checked="" type="checkbox"/> ROOTWADS(1)	<input type="checkbox"/> AQUATIC MACROPHYTES(1)	
<input checked="" type="checkbox"/> SHALLOWS (IN SLOW WATER)(1)	<input type="checkbox"/> BOULDERS(1)	<input checked="" type="checkbox"/> EXTENSIVE >75%(11)	
		<input type="checkbox"/> MODERATE 25-75%(7)	
			<input type="checkbox"/> SPARSE 5-25%(3)
			<input type="checkbox"/> NEARLY ABSENT <5%(1)

COMMENTS: _____

3) CHANNEL MORPHOLOGY: (Check ONLY ONE per Category or Check 2 and AVERAGE)

SINUOSITY		DEVELOPMENT		CHANNELIZATION		STABILITY		MODIFICATION/OTHER		CHANNEL SCORE <u>11</u>	
<input type="checkbox"/>	HIGH(4)	<input type="checkbox"/>	EXCELLENT(7)	<input type="checkbox"/>	NONE(6)	<input type="checkbox"/>	HIGH(3)	<input type="checkbox"/>	SNAGGING	<input type="checkbox"/>	IMPOUND
<input checked="" type="checkbox"/>	MODERATE(3)	<input type="checkbox"/>	GOOD(5)	<input type="checkbox"/>	RECOVERED(4)	<input checked="" type="checkbox"/>	MODERATE(2)	<input type="checkbox"/>	RELOCATION	<input type="checkbox"/>	ISLAND
<input type="checkbox"/>	LOW(2)	<input checked="" type="checkbox"/>	FAIR(3)	<input checked="" type="checkbox"/>	RECOVERING(3)	<input type="checkbox"/>	LOW(1)	<input type="checkbox"/>	CANOPY REMOVAL	<input type="checkbox"/>	LEVEED
<input type="checkbox"/>	NONE(1)	<input type="checkbox"/>	POOR(1)	<input type="checkbox"/>	RECENT OR NO RECOVERY(1)			<input type="checkbox"/>	DREDGING	<input type="checkbox"/>	BANK SHAPING
								<input type="checkbox"/>	ONE SIDE CHANNEL MODIFICATION		

COMMENTS: _____

4) RIPARIAN ZONE AND BANK EROSION: (Check ONE box or Check 2 and AVERAGE per bank)

River Right Looking Downstream

RIPARIAN WIDTH (per bank)		EROSION/RUNOFF-FLOODPLAIN QUALITY				RIPARIAN SCORE <u>6.5</u>	
L	R (per bank)	L	R (most predominant per bank)	L	R (per bank)	L	R (per bank)
<input checked="" type="checkbox"/>	WIDE >150 ft.(4)	<input checked="" type="checkbox"/>	FOREST, SWAMP(3)	<input checked="" type="checkbox"/>	URBAN OR INDUSTRIAL(0)	<input type="checkbox"/>	NONE OR LITTLE(3)
<input type="checkbox"/>	MODERATE 30-150 ft.(3)	<input type="checkbox"/>	OPEN PASTURE/ROW CROP(0)	<input type="checkbox"/>	SHRUB OR OLD FIELD(2)	<input checked="" type="checkbox"/>	MODERATE(2)
<input type="checkbox"/>	NARROW 15-30 ft.(2)	<input type="checkbox"/>	RESID., PARK, NEW FIELD(1)	<input type="checkbox"/>	CONSERV. TILLAGE(1)	<input type="checkbox"/>	HEAVY OR SEVERE(1)
<input checked="" type="checkbox"/>	VERY NARROW 3-15 ft.(1)	<input type="checkbox"/>	FENCED PASTURE(1)	<input type="checkbox"/>	MINING/CONSTRUCTION(0)		
<input type="checkbox"/>	NONE(0)						

COMMENTS: _____

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

NO POOL = 0

MAX. DEPTH (Check 1)		MORPHOLOGY (Check 1)		POOL/RUN/RIFFLE CURRENT VELOCITY (Check all that Apply)		POOL SCORE <u>7</u>	
<input type="checkbox"/>	>4 ft.(6)	<input type="checkbox"/>	POOL WIDTH > RIFFLE WIDTH(2)	<input type="checkbox"/>	TORRENTIAL(-1)	<input checked="" type="checkbox"/>	EDDIES(1)
<input checked="" type="checkbox"/>	2.4-4 ft.(4)	<input type="checkbox"/>	POOL WIDTH = RIFFLE WIDTH(1)	<input type="checkbox"/>	FAST(1)	<input type="checkbox"/>	INTERSTITIAL(-1)
<input type="checkbox"/>	1.2-2.4 ft.(2)	<input checked="" type="checkbox"/>	POOL WIDTH < RIFFLE WIDTH(0)	<input checked="" type="checkbox"/>	MODERATE(1)	<input type="checkbox"/>	INTERMITTENT(-2)
<input type="checkbox"/>	<1.2 ft.(1)			<input checked="" type="checkbox"/>	SLOW(1)		
<input type="checkbox"/>	<0.6 ft. (Pool=0)(0)						

COMMENTS: _____

RIFFLE/RUN DEPTH

<input type="checkbox"/>	GENERALLY >4 in. MAX. >20 in.(4)	RIFFLE/RUN SUBSTRATE		RIFFLE/RUN EMBEDDEDNESS		RIFFLE SCORE <u>3</u>	
<input type="checkbox"/>	GENERALLY >4 in. MAX. <20 in.(3)	<input type="checkbox"/>	STABLE (e.g., Cobble, Boulder)(2)	<input type="checkbox"/>	EXTENSIVE(-1)	<input checked="" type="checkbox"/>	NONE(2)
<input checked="" type="checkbox"/>	GENERALLY 2-4 in.(1)	<input type="checkbox"/>	MOD. STABLE (e.g., Pea Gravel)(1)	<input type="checkbox"/>	MODERATE(0)	<input type="checkbox"/>	NO RIFFLE(0)
<input type="checkbox"/>	GENERALLY <2 in. (Riffle=0)(0)	<input checked="" type="checkbox"/>	UNSTABLE (Gravel, Sand)(0)	<input type="checkbox"/>	LOW(1)		
		<input type="checkbox"/>	NO RIFFLE(0)				

COMMENTS: _____

6) GRADIENT (FEET/MILE): 18 % POOL 15 % RIFFLE 15 % RUN 70 GRADIENT SCORE 8

checked by SP10/16/04

STREAM: JFW #16 State Cr. RIVER MILE _____ DATE: 12/14/04 JS QHEI SCORE 59

1) SUBSTRATE: (Check ONLY Two Substrate Type Boxes: Check all types present)

SUBSTRATE SCORE 12

TYPE		POOL	RIFFLE	SUBSTRATE ORIGIN (all)		SILT COVER (one)	
<input type="checkbox"/>	<input type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

TOTAL NUMBER OF SUBSTRATE TYPES: >4(2) <4(0)
NOTE: (Ignore sludge that originates from point sources: score is based on natural substrates)

COMMENTS: _____

2) INSTREAM COVER:

COVER SCORE 11

TYPE (Check all that apply)			AMOUNT (Check only one or Check 2 and AVERAGE)
<input type="checkbox"/> UNDERCUT BANKS(1)	<input checked="" type="checkbox"/> DEEP POOLS(2)	<input type="checkbox"/> OXBOWS(1)	<input type="checkbox"/> EXTENSIVE >75%(11)
<input type="checkbox"/> OVERHANGING VEGETATION(1)	<input type="checkbox"/> ROOTWADS(1)	<input type="checkbox"/> AQUATIC MACROPHYTES(1)	<input checked="" type="checkbox"/> MODERATE 25-75%(7)
<input checked="" type="checkbox"/> SHALLOWS (IN SLOW WATER)(1)	<input type="checkbox"/> BOULDERS(1)	<input checked="" type="checkbox"/> LOGS OR WOODY DEBRIS(1)	<input type="checkbox"/> SPARSE 5-25%(3)
			<input type="checkbox"/> NEARLY ABSENT <5%(1)

COMMENTS: _____

3) CHANNEL MORPHOLOGY: (Check ONLY ONE per Category or Check 2 and AVERAGE)

CHANNEL SCORE 12

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATION/OTHER
<input checked="" type="checkbox"/> HIGH(4)	<input type="checkbox"/> EXCELLENT(7)	<input type="checkbox"/> NONE(6)	<input type="checkbox"/> HIGH(3)	<input type="checkbox"/> SNAGGING
<input checked="" type="checkbox"/> MODERATE(3)	<input checked="" type="checkbox"/> GOOD(5)	<input type="checkbox"/> RECOVERED(4)	<input checked="" type="checkbox"/> MODERATE(2)	<input type="checkbox"/> RELOCATION
<input type="checkbox"/> LOW(2)	<input checked="" type="checkbox"/> FAIR(3)	<input checked="" type="checkbox"/> RECOVERING(3)	<input type="checkbox"/> LOW(1)	<input checked="" type="checkbox"/> CANOPY REMOVAL
<input type="checkbox"/> NONE(1)	<input type="checkbox"/> POOR(1)	<input type="checkbox"/> RECENT OR NO RECOVERY(1)		<input type="checkbox"/> DREDGING
				<input type="checkbox"/> ONE SIDE CHANNEL MODIFICATION

COMMENTS: _____

4) RIPARIAN ZONE AND BANK EROSION: (Check ONE box or Check 2 and AVERAGE per bank)

RIPARIAN SCORE 8

River Right Looking Downstream

RIPARIAN WIDTH (per bank)	EROSION/RUNOFF-FLOODPLAIN QUALITY	BANK EROSION
L R (per bank)	L R (most predominant per bank)	L R (per bank)
<input type="checkbox"/> WIDE >150 ft.(4)	<input checked="" type="checkbox"/> FOREST, SWAMP(3)	<input type="checkbox"/> NONE OR LITTLE(3)
<input checked="" type="checkbox"/> MODERATE 30-150 ft.(3)	<input type="checkbox"/> OPEN PASTURE/ROW CROP(0)	<input checked="" type="checkbox"/> MODERATE(2)
<input type="checkbox"/> NARROW 15-30 ft.(2)	<input type="checkbox"/> RESID., PARK, NEW FIELD(1)	<input type="checkbox"/> HEAVY OR SEVERE(1)
<input type="checkbox"/> VERY NARROW 3-15 ft.(1)	<input type="checkbox"/> FENCED PASTURE(1)	
<input type="checkbox"/> NONE(0)		

COMMENTS: _____

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

NO POOL = 0

POOL SCORE 8

MAX DEPTH (Check 1)	MORPHOLOGY (Check 1)	POOL/RUN/RIFFLE CURRENT VELOCITY (Check all that Apply)
<input type="checkbox"/> >4 ft.(6)	<input type="checkbox"/> POOL WIDTH > RIFFLE WIDTH(2)	<input type="checkbox"/> TORRENTIAL(-1)
<input checked="" type="checkbox"/> 2.4-4 ft.(4)	<input checked="" type="checkbox"/> POOL WIDTH = RIFFLE WIDTH(1)	<input checked="" type="checkbox"/> EDDIES(1)
<input type="checkbox"/> 1.2-2.4 ft.(2)	<input type="checkbox"/> POOL WIDTH < RIFFLE WIDTH(0)	<input type="checkbox"/> FAST(1)
<input type="checkbox"/> <1.2 ft.(1)		<input checked="" type="checkbox"/> MODERATE(1)
<input type="checkbox"/> <0.6 ft. (Pool=0)(0)		<input checked="" type="checkbox"/> SLOW(1)
		<input type="checkbox"/> INTERSTITIAL(-1)
		<input type="checkbox"/> INTERMITTENT(-2)

COMMENTS: _____

RIFFLE/RUN DEPTH

RIFFLE/RUN SUBSTRATE

RIFFLE/RUN EMBEDDEDNESS

RIFFLE SCORE 2

<input type="checkbox"/> GENERALLY >4 in. MAX. >20 in.(4)	<input type="checkbox"/> STABLE (e.g., Cobble, Boulder)(2)	<input type="checkbox"/> EXTENSIVE(-1)	<input type="checkbox"/> NONE(2)
<input type="checkbox"/> GENERALLY >4 in. MAX. <20 in.(3)	<input type="checkbox"/> MOD. STABLE (e.g., Pea Gravel)(1)	<input type="checkbox"/> MODERATE(0)	<input type="checkbox"/> NO RIFFLE(0)
<input checked="" type="checkbox"/> GENERALLY 2-4 in.(1)	<input checked="" type="checkbox"/> UNSTABLE (Gravel, Sand)(0)	<input checked="" type="checkbox"/> LOW(1)	
<input type="checkbox"/> GENERALLY <2 in. (Riffle=0)(0)	<input type="checkbox"/> NO RIFFLE(0)		

COMMENTS: _____

6) GRADIENT (FEET/MILE): 37 % POOL 20 % RIFFLE 20 % RUN 60 GRADIENT SCORE 6

Checked by SP 12/16/04

9

STREAM: JFA#2 Crooked Creek RIVER MILE _____ DATE: 12/13/04 QHEI SCORE 68

1) SUBSTRATE: (Check ONLY Two Substrate Type Boxes: Check all types present)

SUBSTRATE SCORE 14

TYPE		POOL		RIFFLE		SUBSTRATE ORIGIN (all)		SILT COVER (one)	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	BLDER/SLAB(10)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	LIMESTONE(1)	<input type="checkbox"/>	RIP/RAP(0)
<input type="checkbox"/>	BOULDER(9)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	TILLS(1)	<input checked="" type="checkbox"/>	SILT-NORM(0)
<input type="checkbox"/>	COBBLE(8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SANDSTONE(0)	<input type="checkbox"/>	SILT-FREE(1)
<input type="checkbox"/>	HARDPAN(4)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SHALE(-1)	<input type="checkbox"/>	EXTENSIVE(-2)
<input type="checkbox"/>	MUCK/SILT(2)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	COAL FINES(-2)	<input checked="" type="checkbox"/>	LOW(0)
TOTAL NUMBER OF SUBSTRATE TYPES: <input type="checkbox"/> >4(2)		<input checked="" type="checkbox"/> <4(0)							

NOTE: (Ignore sludge that originates from point sources: score is based on natural substrates)

COMMENTS: _____

2) INSTREAM COVER:

COVER SCORE 13

TYPE (Check all that apply)			AMOUNT (Check only one or Check 2 and AVERAGE)		
<input type="checkbox"/>	UNDERCUT BANKS(1)	<input checked="" type="checkbox"/>	DEEP POOLS(2)	<input type="checkbox"/>	EXTENSIVE >75%(11)
<input checked="" type="checkbox"/>	OVERHANGING VEGETATION(1)	<input checked="" type="checkbox"/>	ROOTWADS(1)	<input checked="" type="checkbox"/>	MODERATE 25-75%(7)
<input checked="" type="checkbox"/>	SHALLOWS (IN SLOW WATER)(1)	<input type="checkbox"/>	BOULDERS(1)	<input type="checkbox"/>	SPARSE 5-25%(3)
		<input type="checkbox"/>	OXBOWS(1)	<input type="checkbox"/>	NEARLY ABSENT <5%(1)
		<input type="checkbox"/>	AQUATIC MACROPHYTES(1)		
		<input checked="" type="checkbox"/>	LOGS OR WOODY DEBRIS(1)		

COMMENTS: _____

3) CHANNEL MORPHOLOGY: (Check ONLY ONE per Category or Check 2 and AVERAGE)

CHANNEL SCORE 13

SINUOSITY		DEVELOPMENT		CHANNELIZATION		STABILITY		MODIFICATION/OTHER	
<input type="checkbox"/>	HIGH(4)	<input type="checkbox"/>	EXCELLENT(7)	<input type="checkbox"/>	NONE(6)	<input type="checkbox"/>	HIGH(3)	<input type="checkbox"/>	SNAGGING
<input checked="" type="checkbox"/>	MODERATE(3)	<input checked="" type="checkbox"/>	GOOD(5)	<input type="checkbox"/>	RECOVERED(4)	<input checked="" type="checkbox"/>	MODERATE(2)	<input type="checkbox"/>	RELOCATION
<input type="checkbox"/>	LOW(2)	<input type="checkbox"/>	FAIR(3)	<input checked="" type="checkbox"/>	RECOVERING(3)	<input type="checkbox"/>	LOW(1)	<input type="checkbox"/>	CANOPY REMOVAL
<input type="checkbox"/>	NONE(1)	<input type="checkbox"/>	POOR(1)	<input type="checkbox"/>	RECENT OR NO RECOVERY(1)			<input type="checkbox"/>	DREDGING
								<input type="checkbox"/>	IMPOUND
								<input type="checkbox"/>	ISLAND
								<input type="checkbox"/>	LEVEED
								<input type="checkbox"/>	BANK SHAPING
								<input type="checkbox"/>	ONE SIDE CHANNEL MODIFICATION

COMMENTS: _____

4) RIPARIAN ZONE AND BANK EROSION: (Check ONE box or Check 2 and AVERAGE per bank)

RIPARIAN SCORE 4

River Right Looking Downstream				RIPARIAN SCORE <u>4</u>			
RIPARIAN WIDTH (per bank)		EROSION/RUNOFF-FLOODPLAIN QUALITY				BANK EROSION	
L	R (per bank)	L	R (most predominant per bank)	L	R (per bank)	L	R (per bank)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	WIDE >150 ft.(4)	<input checked="" type="checkbox"/>	FOREST, SWAMP(3)	<input type="checkbox"/>	URBAN OR INDUSTRIAL(0)	<input type="checkbox"/>	NONE OR LITTLE(3)
<input type="checkbox"/>	MODERATE 30-150 ft.(3)	<input checked="" type="checkbox"/>	OPEN PASTURE/ROW CROP(0)	<input type="checkbox"/>	SHRUB OR OLD FIELD(2)	<input checked="" type="checkbox"/>	MODERATE(2)
<input checked="" type="checkbox"/>	NARROW 15-30 ft.(2)	<input type="checkbox"/>	RESID., PARK, NEW FIELD(1)	<input type="checkbox"/>	CONSERV. TILLAGE(1)	<input type="checkbox"/>	HEAVY OR SEVERE(1)
<input type="checkbox"/>	VERY NARROW 3-15 ft.(1)	<input type="checkbox"/>	FENCED PASTURE(1)	<input type="checkbox"/>	MINING/CONSTRUCTION(0)		
<input type="checkbox"/>	NONE(0)						

COMMENTS: _____

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

NO POOL = 0

POOL SCORE 9

MAX. DEPTH (Check 1)		MORPHOLOGY (Check 1)		POOL/RUN/RIFFLE CURRENT VELOCITY (Check all that Apply)			
<input type="checkbox"/>	>4 ft.(6)	<input type="checkbox"/>	POOL WIDTH > RIFFLE WIDTH(2)	<input type="checkbox"/>	TORRENTIAL(-1)	<input checked="" type="checkbox"/>	EDDIES(1)
<input checked="" type="checkbox"/>	2.4-4 ft.(4)	<input checked="" type="checkbox"/>	POOL WIDTH = RIFFLE WIDTH(1)	<input checked="" type="checkbox"/>	FAST(1)	<input type="checkbox"/>	INTERSTITIAL(-1)
<input type="checkbox"/>	1.2-2.4 ft.(2)	<input type="checkbox"/>	POOL WIDTH < RIFFLE WIDTH(0)	<input checked="" type="checkbox"/>	MODERATE(1)	<input type="checkbox"/>	INTERMITTENT(-2)
<input type="checkbox"/>	<1.2 ft.(1)			<input checked="" type="checkbox"/>	SLOW(1)		
<input type="checkbox"/>	<0.6 ft. (Pool=0)(0)						

COMMENTS: _____

RIFFLE SCORE 5

RIFFLE/RUN DEPTH		RIFFLE/RUN SUBSTRATE		RIFFLE/RUN EMBEDDEDNESS	
<input type="checkbox"/>	GENERALLY >4 in. MAX. >20 in.(4)	<input type="checkbox"/>	STABLE (e.g., Cobble, Boulder)(2)	<input type="checkbox"/>	EXTENSIVE(-1)
<input checked="" type="checkbox"/>	GENERALLY >4 in. MAX. <20 in.(3)	<input checked="" type="checkbox"/>	MOD. STABLE (e.g., Pea Gravel)(1)	<input type="checkbox"/>	MODERATE(0)
<input type="checkbox"/>	GENERALLY 2-4 in.(1)	<input type="checkbox"/>	UNSTABLE (Gravel, Sand)(0)	<input checked="" type="checkbox"/>	LOW(1)
<input type="checkbox"/>	GENERALLY <2 in. (Riffle=0)(0)	<input type="checkbox"/>	NO RIFFLE(0)	<input type="checkbox"/>	NONE(2)
				<input type="checkbox"/>	NO RIFFLE(0)

COMMENTS: _____

6) GRADIENT (FEET/MILE): 13-2 % POOL 15 % RIFFLE 35 % RUN 50 GRADIENT SCORE 10

6

STREAM: JENKINS BLUFF C. RIVER MILE _____ DATE: 12/13/04 ^{JE} QHEI SCORE 45.3

1) SUBSTRATE: (Check ONLY Two Substrate Type Boxes: Check all types present)

SUBSTRATE SCORE 13

TYPE		POOL	RIFFLE	SUBSTRATE ORIGIN (all)		SILT COVER (one)	
<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	BLDER/SLAB(10)			<input type="checkbox"/>	GRAVEL(7)	<input type="checkbox"/>	SILT-HEAVY(-2)
<input type="checkbox"/>	BOULDER(9)			<input checked="" type="checkbox"/>	SAND(6)	<input type="checkbox"/>	SILT-NORM(0)
<input type="checkbox"/>	COBBLE(8)		<input checked="" type="checkbox"/>	<input type="checkbox"/>	BEDROCK(5)	<input checked="" type="checkbox"/>	SILT-MOD(-1)
<input type="checkbox"/>	HARDPAN(4)			<input type="checkbox"/>	DETRITUS(3)	<input type="checkbox"/>	SILT-FREE(1)
<input type="checkbox"/>	MUCK/SILT(2)			<input type="checkbox"/>	ARTIFIC(0)	<input checked="" type="checkbox"/>	EXTENSIVE(-2)
				<input type="checkbox"/>	LIMESTONE(1)	<input type="checkbox"/>	MODERATE(-1)
				<input type="checkbox"/>	TILLS(1)	<input type="checkbox"/>	NONE(1)
				<input type="checkbox"/>	HARDPAN(0)	Extent of Embeddedness (check one)	
				<input type="checkbox"/>	SANDSTONE(0)	<input type="checkbox"/>	EXTENSIVE(-2)
				<input type="checkbox"/>	SHALE(-1)	<input checked="" type="checkbox"/>	LOW(0)
				<input type="checkbox"/>	COAL FINES(-2)	<input type="checkbox"/>	NONE(1)

TOTAL NUMBER OF SUBSTRATE TYPES: >4(2) <4(0)
NOTE: (Ignore sludge that originates from point sources: score is based on natural substrates)

COMMENTS: _____

2) INSTREAM COVER:

COVER SCORE 10

TYPE (Check all that apply)			AMOUNT (Check only one or Check 2 and AVERAGE)		
<input checked="" type="checkbox"/>	UNDERCUT BANKS(1)	<input type="checkbox"/>	DEEP POOLS(2)	<input type="checkbox"/>	EXTENSIVE >75%(11)
<input checked="" type="checkbox"/>	OVERHANGING VEGETATION(1)	<input type="checkbox"/>	ROOTWADS(1)	<input checked="" type="checkbox"/>	MODERATE 25-75%(7)
<input checked="" type="checkbox"/>	SHALLOWS (IN SLOW WATER)(1)	<input type="checkbox"/>	BOULDERS(1)	<input type="checkbox"/>	SPARSE 5-25%(3)
		<input type="checkbox"/>	OXBOWS(1)	<input type="checkbox"/>	NEARLY ABSENT <5%(1)
		<input type="checkbox"/>	AQUATIC MACROPHYTES(1)		
		<input type="checkbox"/>	LOGS OR WOODY DEBRIS(1)		

COMMENTS: _____

3) CHANNEL MORPHOLOGY: (Check ONLY ONE per Category or Check 2 and AVERAGE)

CHANNEL SCORE 7.5

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATION/OTHER			
<input type="checkbox"/>	HIGH(4)	<input type="checkbox"/>	NONE(6)	<input type="checkbox"/>	SNAGGING	<input type="checkbox"/>	IMPOUND
<input type="checkbox"/>	MODERATE(3)	<input type="checkbox"/>	RECOVERED(4)	<input checked="" type="checkbox"/>	MODERATE(2)	<input type="checkbox"/>	ISLAND
<input checked="" type="checkbox"/>	LOW(2)	<input checked="" type="checkbox"/>	RECOVERING(3)	<input checked="" type="checkbox"/>	LOW(1)	<input checked="" type="checkbox"/>	CANOPY REMOVAL
<input type="checkbox"/>	NONE(1)	<input type="checkbox"/>	RECENT OR NO RECOVERY(1)	<input type="checkbox"/>	DREDGING	<input type="checkbox"/>	BANK SHAPING
				<input type="checkbox"/>	ONE SIDE CHANNEL MODIFICATION		

COMMENTS: _____

4) RIPARIAN ZONE AND BANK EROSION: (Check ONE box or Check 2 and AVERAGE per bank)

RIPARIAN SCORE 5

River Right Looking Downstream

RIPARIAN WIDTH (per bank)		EROSION/RUNOFF-FLOODPLAIN QUALITY				BANK EROSION	
L	R (per bank)	L	R (most predominant per bank)	L	R (per bank)	L	R (per bank)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	WIDE >150 ft.(4)	<input type="checkbox"/>	FOREST, SWAMP(3)	<input type="checkbox"/>	URBAN OR INDUSTRIAL(0)	<input checked="" type="checkbox"/>	NONE OR LITTLE(3)
<input type="checkbox"/>	MODERATE 30-150 ft.(3)	<input type="checkbox"/>	OPEN PASTURE/ROW CROP(0)	<input checked="" type="checkbox"/>	SHRUB OR OLD FIELD(2)	<input checked="" type="checkbox"/>	MODERATE(2)
<input type="checkbox"/>	NARROW 15-30 ft.(2)	<input type="checkbox"/>	RESID., PARK, NEW FIELD(1)	<input type="checkbox"/>	CONSERV. TILLAGE(1)	<input type="checkbox"/>	HEAVY OR SEVERE(1)
<input checked="" type="checkbox"/>	VERY NARROW 3-15 ft.(1)	<input type="checkbox"/>	FENCED PASTURE(1)	<input type="checkbox"/>	MINING/CONSTRUCTION(0)		
<input type="checkbox"/>	NONE(0)						

COMMENTS: R. bank road ~ 40' away

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

NO POOL = 0

POOL SCORE 0

MAX. DEPTH (Check 1)	MORPHOLOGY (Check 1)	POOL/RUN/RIFFLE CURRENT VELOCITY (Check all that Apply)	
<input type="checkbox"/>	>4 ft.(6)	<input type="checkbox"/>	TORRENTIAL(-1)
<input type="checkbox"/>	2.4-4 ft.(4)	<input type="checkbox"/>	FAST(1)
<input type="checkbox"/>	1.2-2.4 ft.(2)	<input checked="" type="checkbox"/>	MODERATE(1)
<input type="checkbox"/>	<1.2 ft.(1)	<input checked="" type="checkbox"/>	SLOW(1)
<input type="checkbox"/>	<0.6 ft. (Pool=0)(0)	<input type="checkbox"/>	EDDIES(1)
		<input type="checkbox"/>	INTERSTITIAL(-1)
		<input type="checkbox"/>	INTERMITTENT(-2)

COMMENTS: No Pools

RIFFLE SCORE 2

RIFFLE/RUN DEPTH	RIFFLE/RUN SUBSTRATE	RIFFLE/RUN EMBEDDEDNESS	
<input type="checkbox"/>	GENERALLY >4 in. MAX. >20 in.(4)	<input type="checkbox"/>	EXTENSIVE(-1)
<input type="checkbox"/>	GENERALLY >4 in. MAX. <20 in.(3)	<input type="checkbox"/>	MODERATE(0)
<input checked="" type="checkbox"/>	GENERALLY 2-4 in.(1)	<input checked="" type="checkbox"/>	LOW(1)
<input type="checkbox"/>	GENERALLY <2 in. (Riffle=0)(0)	<input type="checkbox"/>	NONE(2)
		<input type="checkbox"/>	NO RIFFLE(0)

COMMENTS: _____

6) GRADIENT (FEET/MILE): 20.3 % POOL 0 % RIFFLE 30 % RUN 70 GRADIENT SCORE 8

Checked by SP 12/16/04

7

STREAM: JEWELL N. Bluff Cr. RIVER MILE _____ DATE: 12/13/04 QHEI SCORE 45.5

1) SUBSTRATE: (Check ONLY Two Substrate Type Boxes: Check all types present)

SUBSTRATE SCORE 13

TYPE		POOL	RIFFLE	SUBSTRATE ORIGIN (all)		SILT COVER (one)	
<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	BLDER/SLAB(10)			<input type="checkbox"/>	LIMESTONE(1)	<input type="checkbox"/>	SILT-HEAVY(-2)
<input type="checkbox"/>	BOULDER(9)			<input checked="" type="checkbox"/>	TILLS(1)	<input type="checkbox"/>	SILT-NORM(0)
<input type="checkbox"/>	COBBLE(8)			<input type="checkbox"/>	SANDSTONE(0)	<input type="checkbox"/>	EXTENSIVE(-2)
<input type="checkbox"/>	HARDPAN(4)			<input type="checkbox"/>	SHALE(-1)	<input type="checkbox"/>	LOW(0)
<input type="checkbox"/>	MUCK/SILT(2)			<input type="checkbox"/>	COAL FINES(-2)	<input checked="" type="checkbox"/>	NONE(1)
<input checked="" type="checkbox"/>				<input type="checkbox"/>	RIP/RAP(0)	<input checked="" type="checkbox"/>	SILT-MOD(-1)
<input checked="" type="checkbox"/>				<input type="checkbox"/>	HARDPAN(0)	<input type="checkbox"/>	SILT-FREE(1)
<input checked="" type="checkbox"/>				<input type="checkbox"/>	GRAVEL(7)	Extent of Embeddedness (check one)	
<input checked="" type="checkbox"/>				<input type="checkbox"/>	SAND(6)	<input type="checkbox"/>	MODERATE(-1)
<input checked="" type="checkbox"/>				<input type="checkbox"/>	BEDROCK(5)	<input checked="" type="checkbox"/>	NONE(1)
<input checked="" type="checkbox"/>				<input type="checkbox"/>	DETRITUS(3)		
<input checked="" type="checkbox"/>				<input type="checkbox"/>	ARTIFIC(0)		

TOTAL NUMBER OF SUBSTRATE TYPES: >4(2) <4(0)
NOTE: (Ignore sludge that originates from point sources: score is based on natural substrates)

COMMENTS: _____

2) INSTREAM COVER:

COVER SCORE 10

TYPE (Check all that apply)			AMOUNT (Check only one or Check 2 and AVERAGE)		
<input type="checkbox"/>	UNDERCUT BANKS(1)	<input type="checkbox"/>	DEEP POOLS(2)	<input type="checkbox"/>	EXTENSIVE >75%(11)
<input checked="" type="checkbox"/>	OVERHANGING VEGETATION(1)	<input type="checkbox"/>	ROOTWADS(1)	<input checked="" type="checkbox"/>	MODERATE 25-75%(7)
<input checked="" type="checkbox"/>	SHALLOWS (IN SLOW WATER)(1)	<input type="checkbox"/>	BOULDERS(1)	<input type="checkbox"/>	SPARSE 5-25%(3)
		<input type="checkbox"/>	OXBOWS(1)	<input type="checkbox"/>	NEARLY ABSENT <5%(1)
		<input type="checkbox"/>	AQUATIC MACROPHYTES(1)		
		<input checked="" type="checkbox"/>	LOGS OR WOODY DEBRIS(1)		

COMMENTS: _____

3) CHANNEL MORPHOLOGY: (Check ONLY ONE per Category or Check 2 and AVERAGE)

CHANNEL SCORE 7

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATION/OTHER	
<input type="checkbox"/>	EXCELLENT(7)	<input type="checkbox"/>	HIGH(3)	<input type="checkbox"/>	SNAGGING
<input type="checkbox"/>	GOOD(5)	<input type="checkbox"/>	MODERATE(2)	<input type="checkbox"/>	RELOCATION
<input checked="" type="checkbox"/>	FAIR(3)	<input checked="" type="checkbox"/>	LOW(1)	<input checked="" type="checkbox"/>	CANOPY REMOVAL
<input type="checkbox"/>	POOR(1)	<input type="checkbox"/>		<input type="checkbox"/>	DREDGING
		<input type="checkbox"/>		<input type="checkbox"/>	ONE SIDE CHANNEL MODIFICATION
		<input type="checkbox"/>		<input type="checkbox"/>	IMPOUND
		<input type="checkbox"/>		<input type="checkbox"/>	ISLAND
		<input type="checkbox"/>		<input type="checkbox"/>	LEVEED
		<input type="checkbox"/>		<input type="checkbox"/>	BANK SHAPING

COMMENTS: _____

4) RIPARIAN ZONE AND BANK EROSION: (Check ONE box or Check 2 and AVERAGE per bank)

RIPARIAN SCORE 4.5

RIPARIAN WIDTH (per bank)		EROSION/RUNOFF-FLOODPLAIN QUALITY		BANK EROSION	
L	R (per bank)	L	R (most predominant per bank)	L	R (per bank)
<input type="checkbox"/>	WIDE >150 ft.(4)	<input type="checkbox"/>	FOREST, SWAMP(3)	<input type="checkbox"/>	URBAN OR INDUSTRIAL(0)
<input type="checkbox"/>	MODERATE 30-150 ft.(3)	<input type="checkbox"/>	OPEN PASTURE/ROW CROP(0)	<input checked="" type="checkbox"/>	SHRUB OR OLD FIELD(2)
<input type="checkbox"/>	NARROW 15-30 ft.(2)	<input checked="" type="checkbox"/>	RESID., PARK, NEW FIELD(1)	<input type="checkbox"/>	CONSERV. TILLAGE(1)
<input checked="" type="checkbox"/>	VERY NARROW 3-15 ft.(1)	<input type="checkbox"/>	FENCED PASTURE(1)	<input type="checkbox"/>	MINING/CONSTRUCTION(0)
<input type="checkbox"/>	NONE(0)				

COMMENTS: _____

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

NO POOL = 0

POOL SCORE 0

MAX. DEPTH (Check 1)	MORPHOLOGY (Check 1)	POOL/RUN/RIFFLE CURRENT VELOCITY (Check all that Apply)	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	TORRENTIAL(-1)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	FAST(1)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	MODERATE(1)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SLOW(1)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	EDDIES(1)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	INTERSTITIAL(-1)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	INTERMITTENT(-2)

COMMENTS: no pools

RIFFLE SCORE 3

RIFFLE/RUN DEPTH	RIFFLE/RUN SUBSTRATE	RIFFLE/RUN EMBEDDEDNESS
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	

COMMENTS: _____

6) GRADIENT (FEET/MILE): 18.2 % POOL 0 % RIFFLE 15 % RUN 85 GRADIENT SCORE 8

Checked by SP 12/13/04

8

STREAM: JFWHS Honey Cr. RIVER MILE _____ DATE: 12/13/04 JF QHEI SCORE 64.5

1) SUBSTRATE: (Check ONLY Two Substrate Type Boxes: Check all types present)

SUBSTRATE SCORE 14

TYPE		POOL		RIFFLE		SUBSTRATE ORIGIN (all)		SILT COVER (one)	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	BLDER/SLAB(10)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	LIMESTONE(1)	<input type="checkbox"/>	RIP/RAP(0)
<input type="checkbox"/>	BOULDER(9)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	TILLS(1)	<input checked="" type="checkbox"/>	SILT-HEAVY(-2)
<input type="checkbox"/>	COBBLE(8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	HARDPAN(0)	<input type="checkbox"/>	SILT-NORM(0)
<input type="checkbox"/>	HARDPAN(4)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SANDSTONE(0)	<input type="checkbox"/>	EXTENSIVE(-2)
<input type="checkbox"/>	MUCK/SILT(2)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SHALE(-1)	<input type="checkbox"/>	LOW(0)
<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	COAL FINES(-2)	<input checked="" type="checkbox"/>	MODERATE(-1)
TOTAL NUMBER OF SUBSTRATE TYPES: <input type="checkbox"/> >4(2)		<input checked="" type="checkbox"/> <4(0)						<input checked="" type="checkbox"/> NONE(1)	

NOTE: (Ignore sludge that originates from point sources: score is based on natural substrates)

COMMENTS: _____

2) INSTREAM COVER:

COVER SCORE 10

TYPE (Check all that apply)			AMOUNT (Check only one or Check 2 and AVERAGE)		
<input type="checkbox"/>	UNDERCUT BANKS(1)	<input type="checkbox"/>	DEEP POOLS(2)	<input type="checkbox"/>	EXTENSIVE >75%(11)
<input checked="" type="checkbox"/>	OVERHANGING VEGETATION(1)	<input type="checkbox"/>	ROOTWADS(1)	<input checked="" type="checkbox"/>	MODERATE 25-75%(7)
<input checked="" type="checkbox"/>	SHALLOWS (IN SLOW WATER)(1)	<input type="checkbox"/>	BOULDERS(1)	<input type="checkbox"/>	SPARSE 5-25%(3)
<input type="checkbox"/>		<input type="checkbox"/>	OXBOWS(1)	<input type="checkbox"/>	NEARLY ABSENT <5%(1)
<input type="checkbox"/>		<input type="checkbox"/>	AQUATIC MACROPHYTES(1)		
<input type="checkbox"/>		<input checked="" type="checkbox"/>	LOGS OR WOODY DEBRIS(1)		

COMMENTS: _____

3) CHANNEL MORPHOLOGY: (Check ONLY ONE per Category or Check 2 and AVERAGE)

CHANNEL SCORE 11

SINUOSITY		DEVELOPMENT		CHANNELIZATION		STABILITY		MODIFICATION/OTHER	
<input type="checkbox"/>	HIGH(4)	<input type="checkbox"/>	EXCELLENT(7)	<input type="checkbox"/>	NONE(8)	<input type="checkbox"/>	HIGH(3)	<input type="checkbox"/>	SNAGGING
<input checked="" type="checkbox"/>	MODERATE(3) ²	<input type="checkbox"/>	GOOD(5)	<input type="checkbox"/>	RECOVERED(4)	<input checked="" type="checkbox"/>	MODERATE(2)	<input type="checkbox"/>	RELOCATION
<input type="checkbox"/>	LOW(2)	<input checked="" type="checkbox"/>	FAIR(3)	<input checked="" type="checkbox"/>	RECOVERING(3)	<input type="checkbox"/>	LOW(1)	<input type="checkbox"/>	CANOPY REMOVAL
<input type="checkbox"/>	NONE(1)	<input type="checkbox"/>	POOR(1)	<input type="checkbox"/>	RECENT OR NO RECOVERY(1)			<input type="checkbox"/>	DREDGING
								<input type="checkbox"/>	ONE SIDE CHANNEL MODIFICATION
								<input type="checkbox"/>	IMPOUND
								<input checked="" type="checkbox"/>	ISLAND
								<input type="checkbox"/>	LEVEED ^{8/11}
								<input type="checkbox"/>	BANK SHAPING

COMMENTS: lg sand/gravel pt bars

4) RIPARIAN ZONE AND BANK EROSION: (Check ONE box or Check 2 and AVERAGE per bank)

RIPARIAN SCORE 7.5

RIPARIAN WIDTH (per bank)				EROSION/RUNOFF-FLOODPLAIN QUALITY				BANK EROSION				
L	R	(per bank)		L	R	(most predominant per bank)		L	R	(per bank)		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	WIDE >150 ft.(4)		<input checked="" type="checkbox"/>	<input type="checkbox"/>	FOREST, SWAMP(3)		<input type="checkbox"/>	<input type="checkbox"/>	URBAN OR INDUSTRIAL(0)		
<input type="checkbox"/>	<input checked="" type="checkbox"/>	MODERATE 30-150 ft.(3)		<input type="checkbox"/>	<input type="checkbox"/>	OPEN PASTURE/ROW CROP(0)		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	SHRUB OR OLD FIELD(2)	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	NARROW 15-30 ft.(2)		<input type="checkbox"/>	<input checked="" type="checkbox"/>	RESID., PARK, NEW FIELD(1)		<input type="checkbox"/>	<input type="checkbox"/>	CONSERV. TILLAGE(1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	VERY NARROW 3-15 ft.(1)		<input type="checkbox"/>	<input type="checkbox"/>	FENCED PASTURE(1)		<input type="checkbox"/>	<input type="checkbox"/>	MINING/CONSTRUCTION(0)	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	NONE(0)									<input type="checkbox"/>	<input type="checkbox"/>

COMMENTS: _____

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

NO POOL = 0

POOL SCORE 9

MAX. DEPTH (Check 1)		MORPHOLOGY (Check 1)		POOL/RUN/RIFFLE CURRENT VELOCITY (Check all that Apply)			
<input type="checkbox"/>	>4 ft.(6)	<input type="checkbox"/>	POOL WIDTH > RIFFLE WIDTH(2)	<input type="checkbox"/>	TORRENTIAL(-1)	<input checked="" type="checkbox"/>	EDDIES(1)
<input checked="" type="checkbox"/>	2.4-4 ft.(4)	<input checked="" type="checkbox"/>	POOL WIDTH = RIFFLE WIDTH(1)	<input checked="" type="checkbox"/>	FAST(1)	<input type="checkbox"/>	INTERSTITIAL(-1)
<input type="checkbox"/>	1.2-2.4 ft.(2)	<input type="checkbox"/>	POOL WIDTH < RIFFLE WIDTH(0)	<input checked="" type="checkbox"/>	MODERATE(1)	<input type="checkbox"/>	INTERMITTENT(-2)
<input type="checkbox"/>	<1.2 ft.(1)			<input checked="" type="checkbox"/>	SLOW(1)		
<input type="checkbox"/>	<0.6 ft.(Pool=0)(0)						

COMMENTS: _____

RIFFLE SCORE 3

RIFFLE/RUN DEPTH		RIFFLE/RUN SUBSTRATE		RIFFLE/RUN EMBEDDEDNESS	
<input type="checkbox"/>	GENERALLY >4 in. MAX. >20 in.(4)	<input type="checkbox"/>	STABLE (e.g., Cobble, Boulder)(2)	<input type="checkbox"/>	EXTENSIVE(-1)
<input type="checkbox"/>	GENERALLY >4 in. MAX. <20 in.(3)	<input type="checkbox"/>	MOD. STABLE (e.g., Pea Gravel)(1)	<input type="checkbox"/>	MODERATE(0)
<input checked="" type="checkbox"/>	GENERALLY 2-4 in.(1)	<input checked="" type="checkbox"/>	UNSTABLE (Gravel, Sand)(0)	<input type="checkbox"/>	LOW(1)
<input type="checkbox"/>	GENERALLY <2 in.(Riffle=0)(0)	<input type="checkbox"/>	NO RIFFLE(0)	<input checked="" type="checkbox"/>	NONE(2)
				<input type="checkbox"/>	NO RIFFLE(0)

COMMENTS: _____

6) GRADIENT (FEET/MILE): 7.5 % POOL 2.0 % RIFFLE 15 % RUN 65 GRADIENT SCORE 10

checked by SP 12/16/04

STREAM: JF23 Pleasant Run RIVER MILE _____ DATE: 12/13/04 QHEI SCORE 59.5

1) SUBSTRATE: (Check ONLY Two Substrate Type Boxes: Check all types present)

SUBSTRATE SCORE 14

TYPE		POOL		RIFFLE		SUBSTRATE ORIGIN (all)		SILT COVER (one)					
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/>	BLDER/SLAB(10)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	LIMESTONE(1)	<input type="checkbox"/>	SILT-HEAVY(-2)	<input type="checkbox"/>	SILT-MOD(-1)		
<input type="checkbox"/>	BOULDER(9)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	TILLS(1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	SILT-NORM(0)	<input type="checkbox"/>	SILT-FREE(1)
<input type="checkbox"/>	COBBLE(8)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SANDSTONE(0)	<input type="checkbox"/>	Extent of Embeddedness (check one)				
<input type="checkbox"/>	HARDPAN(4)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SHALE(-1)	<input type="checkbox"/>	<input type="checkbox"/>	EXTENSIVE(-2)	<input checked="" type="checkbox"/>	MODERATE(-1)	
<input type="checkbox"/>	MUCK/SILT(2)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	COAL FINES(-2)	<input type="checkbox"/>	<input type="checkbox"/>	LOW(0)	<input checked="" type="checkbox"/>	NONE(1)	

TOTAL NUMBER OF SUBSTRATE TYPES: >4(2) <4(0)

NOTE: (Ignore sludge that originates from point sources: score is based on natural substrates)

COMMENTS: _____

2) INSTREAM COVER:

COVER SCORE 11

TYPE (Check all that apply)			AMOUNT (Check only one or Check 2 and AVERAGE)		
<input type="checkbox"/>	UNDERCUT BANKS(1)	<input type="checkbox"/>	DEEP POOLS(2)	<input type="checkbox"/>	EXTENSIVE >75%(11)
<input checked="" type="checkbox"/>	OVERHANGING VEGETATION(1)	<input checked="" type="checkbox"/>	ROOTWADS(1)	<input checked="" type="checkbox"/>	MODERATE 25-75%(7)
<input checked="" type="checkbox"/>	SHALLOWS (IN SLOW WATER)(1)	<input type="checkbox"/>	BOULDERS(1)	<input type="checkbox"/>	SPARSE 5-25%(3)
		<input type="checkbox"/>	OXBOWS(1)	<input type="checkbox"/>	NEARLY ABSENT <5%(1)
		<input type="checkbox"/>	AQUATIC MACROPHYTES(1)		
		<input checked="" type="checkbox"/>	LOGS OR WOODY DEBRIS(1)		

COMMENTS: _____

3) CHANNEL MORPHOLOGY: (Check ONLY ONE per Category or Check 2 and AVERAGE)

CHANNEL SCORE 8.5

SINUOSITY		DEVELOPMENT		CHANNELIZATION		STABILITY		MODIFICATION/OTHER			
<input type="checkbox"/>	HIGH(4)	<input type="checkbox"/>	EXCELLENT(7)	<input type="checkbox"/>	NONE(6)	<input checked="" type="checkbox"/>	HIGH(3)	<input type="checkbox"/>	SNAGGING	<input type="checkbox"/>	IMPOUND
<input type="checkbox"/>	MODERATE(3)	<input type="checkbox"/>	GOOD(5)	<input type="checkbox"/>	RECOVERED(4)	<input type="checkbox"/>	MODERATE(2)	<input type="checkbox"/>	RELOCATION	<input type="checkbox"/>	ISLAND
<input checked="" type="checkbox"/>	LOW(2)	<input checked="" type="checkbox"/>	FAIR(3)	<input checked="" type="checkbox"/>	RECOVERING(3)	<input type="checkbox"/>	LOW(1)	<input type="checkbox"/>	CANOPY REMOVAL	<input checked="" type="checkbox"/>	LEVEED <i>Spill piles</i>
<input checked="" type="checkbox"/>	NONE(1)	<input checked="" type="checkbox"/>	POOR(1)	<input type="checkbox"/>	RECENT OR NO RECOVERY(1)			<input type="checkbox"/>	DREDGING	<input type="checkbox"/>	BANK SHAPING
								<input type="checkbox"/>	ONE SIDE CHANNEL MODIFICATION		

COMMENTS: _____

4) RIPARIAN ZONE AND BANK EROSION: (Check ONE box or Check 2 and AVERAGE per bank)

RIPARIAN SCORE 9

River Right Looking Downstream

RIPARIAN WIDTH (per bank)		EROSION/RUNOFF-FLOODPLAIN QUALITY				BANK EROSION	
L	R (per bank)	L	R (most predominant per bank)	L	R (per bank)	L	R (per bank)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	WIDE >150 ft.(4)		FOREST, SWAMP(3)		URBAN OR INDUSTRIAL(0)		NONE OR LITTLE(3)
	MODERATE 30-150 ft.(3)		OPEN PASTURE/ROW CROP(0)	<input checked="" type="checkbox"/>	SHRUB OR OLD FIELD(2)		MODERATE(2)
	NARROW 15-30 ft.(2)		RESID.,PARK,NEW FIELD(1)		CONSERV. TILLAGE(1)		HEAVY OR SEVERE(1)
	VERY NARROW 3-15 ft.(1)		FENCED PASTURE(1)		MINING/CONSTRUCTION(0)		
	NONE(0)						

COMMENTS: _____

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

NO POOL = 0

POOL SCORE 4

MAX. DEPTH (Check 1)		MORPHOLOGY (Check 1)		POOL/RUN/RIFFLE CURRENT VELOCITY (Check all that Apply)			
<input type="checkbox"/>	>4 ft.(6)	<input type="checkbox"/>	POOL WIDTH > RIFFLE WIDTH(2)	<input type="checkbox"/>	TORRENTIAL(-1)	<input type="checkbox"/>	EDDIES(1)
<input type="checkbox"/>	2.4-4 ft.(4)	<input type="checkbox"/>	POOL WIDTH = RIFFLE WIDTH(1)	<input type="checkbox"/>	FAST(1)	<input type="checkbox"/>	INTERSTITIAL(-1)
<input checked="" type="checkbox"/>	1.2-2.4 ft.(2)	<input checked="" type="checkbox"/>	POOL WIDTH < RIFFLE WIDTH(0)	<input checked="" type="checkbox"/>	MODERATE(1)	<input type="checkbox"/>	INTERMITTENT(-2)
<input type="checkbox"/>	<1.2 ft.(1)			<input checked="" type="checkbox"/>	SLOW(1)		
<input type="checkbox"/>	<0.6 ft.(Pool=0)(0)						

COMMENTS: _____

RIFFLE/RUN DEPTH

RIFFLE/RUN SUBSTRATE

RIFFLE/RUN EMBEDDEDNESS

RIFFLE SCORE 3

<input type="checkbox"/>	GENERALLY >4 in. MAX. >20 in.(4)	<input type="checkbox"/>	STABLE (e.g., Cobble, Boulder)(2)	<input type="checkbox"/>	EXTENSIVE(-1)	<input checked="" type="checkbox"/>	NONE(2)
<input type="checkbox"/>	GENERALLY >4 in. MAX. <20 in.(3)	<input type="checkbox"/>	MOD. STABLE (e.g., Pea Gravel)(1)	<input type="checkbox"/>	MODERATE(0)	<input type="checkbox"/>	NO RIFFLE(0)
<input checked="" type="checkbox"/>	GENERALLY 2-4 in.(1)	<input checked="" type="checkbox"/>	UNSTABLE (Gravel, Sand)(0)	<input type="checkbox"/>	LOW(1)		
<input type="checkbox"/>	GENERALLY <2 in.(Riffle=0)(0)	<input type="checkbox"/>	NO RIFFLE(0)				

COMMENTS: bedrock sand

6) GRADIENT (FEET/MILE): 8.8 % POOL 5 % RIFFLE 10 % RUN 85 GRADIENT SCORE 10

checked by SP 12/16/04

STREAM: JFN#2 Olme Ditch RIVER MILE _____ DATE: 12/10/04 QHEI SCORE 39

1) SUBSTRATE: (Check ONLY Two Substrate Type Boxes: Check all types present) SUBSTRATE SCORE 13

TYPE		POOL		RIFFLE		SUBSTRATE ORIGIN (all)		SILT COVER (one)	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	BLDER/SLAB(10)	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	LIMESTONE(1)	<input type="checkbox"/>	SILT-HEAVY(-2)
<input type="checkbox"/>	BOULDER(9)	<input type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	TILLS(1)	<input checked="" type="checkbox"/>	SILT-NORM(0)
<input type="checkbox"/>	COBBLE(8)	<input type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	SANDSTONE(0)	<input type="checkbox"/>	SILT-FREE(1)
<input type="checkbox"/>	HARDPAN(4)	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	SHALE(-1)	Extent of Embeddedness (check one)	
<input type="checkbox"/>	MUCK/SILT(2)	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	COAL FINES(-2)	<input type="checkbox"/>	EXTENSIVE(-2)
TOTAL NUMBER OF SUBSTRATE TYPES: <input type="checkbox"/> >4(2)		<input checked="" type="checkbox"/> <4(0)						<input type="checkbox"/>	MODERATE(-1)
								<input checked="" type="checkbox"/>	NONE(1)

NOTE: (Ignore sludge that originates from point sources: score is based on natural substrates)

COMMENTS: _____

2) INSTREAM COVER: COVER SCORE 5

TYPE (Check all that apply)			AMOUNT (Check only one or Check 2 and AVERAGE)		
<input type="checkbox"/>	UNDERCUT BANKS(1)	<input type="checkbox"/>	DEEP POOLS(2)	<input type="checkbox"/>	EXTENSIVE >75%(11)
<input checked="" type="checkbox"/>	OVERHANGING VEGETATION(1)	<input type="checkbox"/>	ROOTWADS(1)	<input type="checkbox"/>	MODERATE 25-75%(7)
<input checked="" type="checkbox"/>	SHALLOWS (IN SLOW WATER)(1)	<input type="checkbox"/>	BOULDERS(1)	<input checked="" type="checkbox"/>	SPARSE 5-25%(3)
		<input type="checkbox"/>	OXBOWS(1)	<input type="checkbox"/>	NEARLY ABSENT <5%(1)
		<input type="checkbox"/>	AQUATIC MACROPHYTES(1)		
		<input type="checkbox"/>	LOGS OR WOODY DEBRIS(1)		

COMMENTS: _____

3) CHANNEL MORPHOLOGY: (Check ONLY ONE per Category or Check 2 and AVERAGE) CHANNEL SCORE 7

SINUOSITY		DEVELOPMENT		CHANNELIZATION		STABILITY		MODIFICATION/OTHER	
<input type="checkbox"/>	HIGH(4)	<input type="checkbox"/>	EXCELLENT(7)	<input type="checkbox"/>	NONE(6)	<input type="checkbox"/>	HIGH(3)	<input type="checkbox"/>	SNAGGING
<input type="checkbox"/>	MODERATE(3)	<input type="checkbox"/>	GOOD(5)	<input type="checkbox"/>	RECOVERED(4)	<input type="checkbox"/>	MODERATE(2)	<input type="checkbox"/>	RELOCATION
<input checked="" type="checkbox"/>	LOW(2)	<input type="checkbox"/>	FAIR(3)	<input checked="" type="checkbox"/>	RECOVERING(3)	<input checked="" type="checkbox"/>	LOW(1)	<input type="checkbox"/>	CANOPY REMOVAL
<input type="checkbox"/>	NONE(1)	<input checked="" type="checkbox"/>	POOR(1)	<input type="checkbox"/>	RECENT OR NO RECOVERY(1)			<input type="checkbox"/>	DREDGING
								<input type="checkbox"/>	IMPOUND
								<input checked="" type="checkbox"/>	ISLAND
								<input type="checkbox"/>	LEVEED <i>spal piles</i>
								<input type="checkbox"/>	BANK SHAPING
								<input type="checkbox"/>	ONE SIDE CHANNEL MODIFICATION

COMMENTS: _____

4) RIPARIAN ZONE AND BANK EROSION: (Check ONE box or Check 2 and AVERAGE per bank) RIPARIAN SCORE 6

RIPARIAN WIDTH (per bank)				EROSION/RUNOFF-FLOODPLAIN QUALITY				BANK EROSION	
L	R	L	R	L	R	L	R	L	R
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	WIDE >150 ft.(4)	<input type="checkbox"/>	FOREST, SWAMP(3)	<input type="checkbox"/>	URBAN OR INDUSTRIAL(0)	<input type="checkbox"/>	NONE OR LITTLE(3)	<input checked="" type="checkbox"/>	NONE OR LITTLE(3)
<input type="checkbox"/>	MODERATE 30-150 ft.(3)	<input type="checkbox"/>	OPEN PASTURE/ROW CROP(0)	<input checked="" type="checkbox"/>	SHRUB OR OLD FIELD(2)	<input type="checkbox"/>	MODERATE(2)	<input type="checkbox"/>	MODERATE(2)
<input checked="" type="checkbox"/>	NARROW 15-30 ft.(2)	<input checked="" type="checkbox"/>	RESID., PARK, NEW FIELD(1)	<input type="checkbox"/>	CONSERV. TILLAGE(1)	<input type="checkbox"/>	HEAVY OR SEVERE(1)		
<input type="checkbox"/>	VERY NARROW 3-15 ft.(1)	<input type="checkbox"/>	FENCED PASTURE(1)	<input type="checkbox"/>	MINING/CONSTRUCTION(0)				
<input type="checkbox"/>	NONE(0)								

COMMENTS: _____

5) POOL/GLIDE AND RIFFLE/RUN QUALITY NO POOL = 0 POOL SCORE 0

MAX. DEPTH (Check 1)		MORPHOLOGY (Check 1)		POOL/RUN/RIFFLE CURRENT VELOCITY (Check all that Apply)			
<input type="checkbox"/>	>4 ft.(6)	<input type="checkbox"/>	POOL WIDTH > RIFFLE WIDTH(2)	<input type="checkbox"/>	TORRENTIAL(-1)	<input type="checkbox"/>	EDDIES(1)
<input type="checkbox"/>	2.4-4 ft.(4)	<input type="checkbox"/>	POOL WIDTH = RIFFLE WIDTH(1)	<input type="checkbox"/>	FAST(1)	<input type="checkbox"/>	INTERSTITIAL(-1)
<input type="checkbox"/>	1.2-2.4 ft.(2)	<input type="checkbox"/>	POOL WIDTH < RIFFLE WIDTH(0)	<input type="checkbox"/>	MODERATE(1)	<input type="checkbox"/>	INTERMITTENT(-2)
<input type="checkbox"/>	<1.2 ft.(1)			<input type="checkbox"/>	SLOW(1)		
<input checked="" type="checkbox"/>	<0.6 ft. (Pool=0)(0)						

COMMENTS: No Pool

RIFFLE SCORE 6

RIFFLE/RUN DEPTH		RIFFLE/RUN SUBSTRATE		RIFFLE/RUN EMBEDDEDNESS	
<input type="checkbox"/>	GENERALLY >4 in. MAX. >20 in.(4)	<input type="checkbox"/>	STABLE (e.g., Cobble, Boulder)(2)	<input type="checkbox"/>	EXTENSIVE(-1)
<input type="checkbox"/>	GENERALLY >4 in. MAX. <20 in.(3)	<input type="checkbox"/>	MOD. STABLE (e.g., Pea Gravel)(1)	<input type="checkbox"/>	MODERATE(0)
<input type="checkbox"/>	GENERALLY 2-4 in.(1)	<input checked="" type="checkbox"/>	UNSTABLE (Gravel, Sand)(0)	<input type="checkbox"/>	LOW(1)
<input checked="" type="checkbox"/>	GENERALLY <2 in. (Riffle=0)(0)	<input checked="" type="checkbox"/>	NO RIFFLE(0)	<input checked="" type="checkbox"/>	NONE(2)
				<input checked="" type="checkbox"/>	NO RIFFLE(0)

COMMENTS: _____

6) GRADIENT (FEET/MILE): 12 % POOL 0 % RIFFLE 0 % RUN 100 GRADIENT SCORE 8

Checked by SP12/16/04

STREAM: JFN 1 - Little Back Cr. RIVER MILE DATE: 12/13/04 QHEI SCORE 60

1) SUBSTRATE: (Check ONLY Two Substrate Type Boxes: Check all types present)

TYPE		POOL	RIFFLE	POOL		RIFFLE	SUBSTRATE ORIGIN (all)		SILT COVER (one)					
<input type="checkbox"/>	<input type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	LIMESTONE(1)	<input type="checkbox"/>	RIP/RAP(0)	<input type="checkbox"/>	SILT-HEAVY(-2)	<input type="checkbox"/>	SILT-MOD(-1)
<input type="checkbox"/>	<input type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	TILLS(1)	<input type="checkbox"/>	HARDPAN(0)	<input checked="" type="checkbox"/>	SILT-NORM(0)	<input type="checkbox"/>	SILT-FREE(1)
<input type="checkbox"/>	<input type="checkbox"/>							SANDSTONE(0)				Extent of Embeddedness (check one)		
<input type="checkbox"/>	<input type="checkbox"/>							SHALE(-1)			<input checked="" type="checkbox"/>	EXTENSIVE(-2)	<input checked="" type="checkbox"/>	MODERATE(-1)
<input type="checkbox"/>	<input type="checkbox"/>							COAL FINES(-2)			<input checked="" type="checkbox"/>	LOW(0)	<input type="checkbox"/>	NONE(1)
TOTAL NUMBER OF SUBSTRATE TYPES:		<input type="checkbox"/>	>4(2)	<input checked="" type="checkbox"/>	<4(0)									

NOTE: (Ignore sludge that originates from point sources: score is based on natural substrates)

COMMENTS: _____

2) INSTREAM COVER:

TYPE (Check all that apply)			COVER SCORE <u>13</u>		
<input type="checkbox"/>	UNDERCUT BANKS(1)	<input checked="" type="checkbox"/>	DEEP POOLS(2)	<input type="checkbox"/>	EXTENSIVE >75%(11)
<input checked="" type="checkbox"/>	OVERHANGING VEGETATION(1)	<input checked="" type="checkbox"/>	ROOTWADS(1)	<input type="checkbox"/>	MODERATE 25-75%(7)
<input checked="" type="checkbox"/>	SHALLOWS (IN SLOW WATER)(1)	<input type="checkbox"/>	BOULDERS(1)	<input checked="" type="checkbox"/>	SPARSE 5-25%(3)
		<input type="checkbox"/>	OXBOWS(1)	<input type="checkbox"/>	NEARLY ABSENT <5%(1)
		<input type="checkbox"/>	AQUATIC MACROPHYTES(1)		
		<input checked="" type="checkbox"/>	LOGS OR WOODY DEBRIS(1)		

COMMENTS: _____

3) CHANNEL MORPHOLOGY: (Check ONLY ONE per Category or Check 2 and AVERAGE)

SINUOSITY		DEVELOPMENT		CHANNELIZATION		STABILITY		MODIFICATION/OTHER		CHANNEL SCORE <u>11</u>	
<input type="checkbox"/>	HIGH(4)	<input type="checkbox"/>	EXCELLENT(7)	<input type="checkbox"/>	NONE(6)	<input type="checkbox"/>	HIGH(3)	<input type="checkbox"/>	SNAGGING	<input type="checkbox"/>	IMPOUND
<input checked="" type="checkbox"/>	MODERATE(3)	<input type="checkbox"/>	GOOD(5)	<input type="checkbox"/>	RECOVERED(4)	<input checked="" type="checkbox"/>	MODERATE(2)	<input type="checkbox"/>	RELOCATION	<input type="checkbox"/>	ISLAND
<input type="checkbox"/>	LOW(2)	<input checked="" type="checkbox"/>	FAIR(3)	<input checked="" type="checkbox"/>	RECOVERING(3)	<input type="checkbox"/>	LOW(1)	<input checked="" type="checkbox"/>	CANOPY REMOVAL	<input type="checkbox"/>	LEVEED
<input type="checkbox"/>	NONE(1)	<input type="checkbox"/>	Poor(1)	<input type="checkbox"/>	RECENT OR NO RECOVERY(1)			<input type="checkbox"/>	DREDGING	<input type="checkbox"/>	BANK SHAPING
								<input type="checkbox"/>	ONE SIDE CHANNEL MODIFICATION		

COMMENTS: _____

4) RIPARIAN ZONE AND BANK EROSION: (Check ONE box or Check 2 and AVERAGE per bank)

River Right Looking Downstream		EROSION/RUNOFF-FLOODPLAIN QUALITY		BANK EROSION		RIPARIAN SCORE <u>4</u>	
RIPARIAN WIDTH (per bank)		L	R (most predominant per bank)	L	R (per bank)	L	R (per bank)
<input type="checkbox"/>	WIDE >150 ft.(4)	<input type="checkbox"/>	FOREST, SWAMP(3)	<input type="checkbox"/>	URBAN OR INDUSTRIAL(0)	<input type="checkbox"/>	NONE OR LITTLE(3)
<input type="checkbox"/>	MODERATE 30-150 ft.(3)	<input type="checkbox"/>	OPEN PASTURE/ROW CROP(0)	<input checked="" type="checkbox"/>	SHRUB OR OLD FIELD(2)	<input type="checkbox"/>	MODERATE(2)
<input type="checkbox"/>	NARROW 15-30 ft.(2)	<input checked="" type="checkbox"/>	RESID., PARK, NEW FIELD(1)	<input type="checkbox"/>	CONSERV. TILLAGE(1)	<input checked="" type="checkbox"/>	HEAVY OR SEVERE(1)
<input checked="" type="checkbox"/>	VERY NARROW 3-15 ft.(1)	<input type="checkbox"/>	FENCED PASTURE(1)	<input type="checkbox"/>	MINING/CONSTRUCTION(0)		
<input type="checkbox"/>	NONE(0)						

COMMENTS: _____

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH (Check 1)		MORPHOLOGY (Check 1)		POOL/RUN/RIFFLE CURRENT VELOCITY (Check all that Apply)		POOL SCORE <u>7</u>	
<input type="checkbox"/>	>4 ft.(6)	<input type="checkbox"/>	POOL WIDTH > RIFFLE WIDTH(2)	<input type="checkbox"/>	TORRENTIAL(-1)	<input checked="" type="checkbox"/>	EDDIES(1)
<input checked="" type="checkbox"/>	2.4-4 ft.(4)	<input type="checkbox"/>	POOL WIDTH = RIFFLE WIDTH(1)	<input type="checkbox"/>	FAST(1)	<input type="checkbox"/>	INTERSTITIAL(-1)
<input type="checkbox"/>	1.2-2.4 ft.(2)	<input checked="" type="checkbox"/>	POOL WIDTH < RIFFLE WIDTH(0)	<input checked="" type="checkbox"/>	MODERATE(1)	<input type="checkbox"/>	INTERMITTENT(-2)
<input type="checkbox"/>	<1.2 ft.(1)			<input checked="" type="checkbox"/>	SLOW(1)		
<input type="checkbox"/>	<0.6 ft. (Pool=0)(0)						

COMMENTS: _____

RIFFLE/RUN DEPTH

<input type="checkbox"/>	GENERALLY >4 in. MAX. >20 in.(4)	RIFFLE/RUN SUBSTRATE		RIFFLE/RUN EMBEDDEDNESS		RIFFLE SCORE <u>1</u>	
<input type="checkbox"/>	GENERALLY >4 in. MAX. <20 in.(3)	<input type="checkbox"/>	STABLE (e.g., Cobble, Boulder)(2)	<input type="checkbox"/>	EXTENSIVE(-1)	<input type="checkbox"/>	NONE(2)
<input checked="" type="checkbox"/>	GENERALLY 2-4 in.(1)	<input checked="" type="checkbox"/>	UNSTABLE (Gravel, Sand)(0)	<input checked="" type="checkbox"/>	MODERATE(0)	<input type="checkbox"/>	NO RIFFLE(0)
<input type="checkbox"/>	GENERALLY <2 in. (Riffle=0)(0)	<input type="checkbox"/>	NO RIFFLE(0)	<input type="checkbox"/>	LOW(1)		

COMMENTS: _____

6) GRADIENT (FEET/MILE): 12.6 % POOL 15 % RIFFLE 10 % RUN 75 GRADIENT SCORE 10

Checked SP 12/16/04

STREAM: JFN#23 Indian Creek RIVER MILE _____

DATE: 12/14/04 JE

QHEI SCORE 61

1) SUBSTRATE: (Check ONLY Two Substrate Type Boxes: Check all types present)

SUBSTRATE SCORE 13

TYPE		POOL		RIFFLE		SUBSTRATE ORIGIN (all)		SILT COVER (one)	
<input type="checkbox"/>	BLDER/SLAB(10)	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	LIMESTONE(1)	<input type="checkbox"/>	SILT-HEAVY(-2)
<input type="checkbox"/>	BOULDER(9)	<input type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	TILLS(1)	<input type="checkbox"/>	SILT-NORM(0)
<input type="checkbox"/>	COBBLE(8)	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	SANDSTONE(0)	<input checked="" type="checkbox"/>	SILT-MOD(-1)
<input type="checkbox"/>	HARDPAN(4)	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	SHALE(-1)	<input type="checkbox"/>	SILT-FREE(1)
<input type="checkbox"/>	MUCK/SILT(2)	<input checked="" type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	COAL FINES(-2)	<input type="checkbox"/>	EXTENSIVE(-2)
		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	RIP/RAP(0)	<input type="checkbox"/>	MODERATE(-1)
		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	HARDPAN(0)	<input checked="" type="checkbox"/>	NONE(1)

TOTAL NUMBER OF SUBSTRATE TYPES: >4(2) <4(0)

NOTE: (Ignore sludge that originates from point sources: score is based on natural substrates)

COMMENTS: _____

2) INSTREAM COVER:

COVER SCORE 12

TYPE (Check all that apply)			AMOUNT (Check only one or Check 2 and AVERAGE)		
<input type="checkbox"/>	UNDERCUT BANKS(1)	<input checked="" type="checkbox"/>	DEEP POOLS(2)	<input type="checkbox"/>	EXTENSIVE >75%(11)
<input checked="" type="checkbox"/>	OVERHANGING VEGETATION(1)	<input type="checkbox"/>	ROOTWADS(1)	<input checked="" type="checkbox"/>	MODERATE 25-75%(7)
<input checked="" type="checkbox"/>	SHALLOWS (IN SLOW WATER)(1)	<input type="checkbox"/>	BOULDERS(1)	<input type="checkbox"/>	SPARSE 5-25%(3)
		<input type="checkbox"/>	OXBOWS(1)	<input type="checkbox"/>	NEARLY ABSENT <5%(1)
		<input type="checkbox"/>	AQUATIC MACROPHYTES(1)		
		<input checked="" type="checkbox"/>	LOGS OR WOODY DEBRIS(1)		

COMMENTS: _____

3) CHANNEL MORPHOLOGY: (Check ONLY ONE per Category or Check 2 and AVERAGE)

CHANNEL SCORE 11

SINUOSITY		DEVELOPMENT		CHANNELIZATION		STABILITY		MODIFICATION/OTHER	
<input type="checkbox"/>	HIGH(4)	<input type="checkbox"/>	EXCELLENT(7)	<input type="checkbox"/>	NONE(6)	<input type="checkbox"/>	HIGH(3)	<input type="checkbox"/>	SNAGGING
<input checked="" type="checkbox"/>	MODERATE(3)	<input type="checkbox"/>	GOOD(5)	<input type="checkbox"/>	RECOVERED(4)	<input checked="" type="checkbox"/>	MODERATE(2)	<input type="checkbox"/>	RELOCATION
<input type="checkbox"/>	LOW(2)	<input checked="" type="checkbox"/>	FAIR(3)	<input checked="" type="checkbox"/>	RECOVERING(3)	<input type="checkbox"/>	LOW(1)	<input checked="" type="checkbox"/>	CANOPY REMOVAL
<input type="checkbox"/>	NONE(1)	<input type="checkbox"/>	POOR(1)	<input type="checkbox"/>	RECENT OR NO RECOVERY(1)			<input type="checkbox"/>	DREDGING
								<input type="checkbox"/>	ONE SIDE CHANNEL MODIFICATION
								<input type="checkbox"/>	IMPOUND
								<input type="checkbox"/>	ISLAND
								<input type="checkbox"/>	LEVEED
								<input type="checkbox"/>	BANK SHAPING

COMMENTS: _____

4) RIPARIAN ZONE AND BANK EROSION: (Check ONE box or Check 2 and AVERAGE per bank)

RIPARIAN SCORE 5

River Right Looking Downstream

RIPARIAN WIDTH (per bank)		EROSION/RUNOFF-FLOODPLAIN QUALITY				BANK EROSION	
L	R (per bank)	L	R (most predominant per bank)	L	R (per bank)	L	R (per bank)
<input type="checkbox"/>	WIDE >150 ft.(4)	<input type="checkbox"/>	FOREST, SWAMP(3)	<input checked="" type="checkbox"/>	URBAN OR INDUSTRIAL(0)	<input type="checkbox"/>	NONE OR LITTLE(3)
<input checked="" type="checkbox"/>	MODERATE 30-150 ft.(3)	<input type="checkbox"/>	OPEN PASTURE/ROW CROP(0)	<input checked="" type="checkbox"/>	SHRUB OR OLD FIELD(2)	<input checked="" type="checkbox"/>	MODERATE(2)
<input checked="" type="checkbox"/>	NARROW 15-30 ft.(2)	<input type="checkbox"/>	RESID.,PARK,NEW FIELD(1)	<input type="checkbox"/>	CONSERV. TILLAGE(1)	<input checked="" type="checkbox"/>	HEAVY OR SEVERE(1)
<input type="checkbox"/>	VERY NARROW 3-15 ft.(1)	<input type="checkbox"/>	FENCED PASTURE(1)	<input type="checkbox"/>	MINING/CONSTRUCTION(0)		
<input type="checkbox"/>	NONE(0)						

COMMENTS: _____

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

NO POOL = 0

POOL SCORE 9

MAX. DEPTH (Check 1)		MORPHOLOGY (Check 1)		POOL/RUN/RIFFLE CURRENT VELOCITY (Check all that Apply)	
<input checked="" type="checkbox"/>	>4 ft.(6)	<input type="checkbox"/>	POOL WIDTH>RIFFLE WIDTH(2)	<input type="checkbox"/>	TORRENTIAL(-1)
<input type="checkbox"/>	2.4-4 ft.(4)	<input type="checkbox"/>	POOL WIDTH=RIFFLE WIDTH(1)	<input type="checkbox"/>	FAST(1)
<input type="checkbox"/>	1.2-2.4 ft.(2)	<input checked="" type="checkbox"/>	POOL WIDTH<RIFFLE WIDTH(0)	<input checked="" type="checkbox"/>	MODERATE(1)
<input type="checkbox"/>	<1.2 ft.(1)			<input checked="" type="checkbox"/>	SLOW(1)
<input type="checkbox"/>	<0.6 ft.(Pool=0)(0)			<input type="checkbox"/>	EDDIES(1)
				<input type="checkbox"/>	INTERSTITIAL(-1)
				<input type="checkbox"/>	INTERMITTENT(-2)

COMMENTS: _____

RIFFLE/RUN DEPTH

RIFFLE/RUN SUBSTRATE

RIFFLE/RUN EMBEDDEDNESS

RIFFLE SCORE 3

<input type="checkbox"/>	GENERALLY >4 in. MAX.>20 in.(4)	<input type="checkbox"/>	STABLE (e.g., Cobble,Boulder)(2)	<input type="checkbox"/>	EXTENSIVE(-1)	<input checked="" type="checkbox"/>	NONE(2)
<input type="checkbox"/>	GENERALLY >4 in. MAX.<20 in.(3)	<input type="checkbox"/>	MOD.STABLE (e.g., Pea Gravel)(1)	<input type="checkbox"/>	MODERATE(0)	<input type="checkbox"/> NO RIFFLE(0)	
<input checked="" type="checkbox"/>	GENERALLY 2-4 in.(1)	<input checked="" type="checkbox"/>	UNSTABLE (Gravel, Sand)(0)	<input type="checkbox"/>	LOW(1)		
<input type="checkbox"/>	GENERALLY <2 in.(Riffle=0)(0)	<input type="checkbox"/>	NO RIFFLE(0)				

COMMENTS: _____

6) GRADIENT (FEET/MILE): 6 % POOL 25 % RIFFLE 15 % RUN 60 GRADIENT SCORE 8

Checked by SP 12/16/04

STREAM: Jenny Holm Sental Ditch RIVER MILE _____ DATE: 12/14/04 QHEI SCORE 38.5

1) SUBSTRATE: (Check ONLY Two Substrate Type Boxes: Check all types present)

TYPE		POOL		RIFFLE		SUBSTRATE ORIGIN (all)		SILT COVER (one)	
<input type="checkbox"/>	BLDER/SLAB(10)	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	LIMESTONE(1)	<input type="checkbox"/>	SILT-HEAVY(-2)
<input type="checkbox"/>	BOULDER(9)	<input type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	TILLS(1)	<input type="checkbox"/>	SILT-NORM(0)
<input type="checkbox"/>	COBBLE(8)	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	SANDSTONE(0)	<input checked="" type="checkbox"/>	SILT-MOD(-1)
<input type="checkbox"/>	HARDPAN(4)	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	SHALE(-1)	<input type="checkbox"/>	SILT-FREE(1)
<input type="checkbox"/>	MUCK/SILT(2)	<input type="checkbox"/>		<input checked="" type="checkbox"/>		<input type="checkbox"/>	COAL FINES(-2)	<input type="checkbox"/>	EXTENSIVE(-2)
								<input checked="" type="checkbox"/>	MODERATE(-1)
								<input type="checkbox"/>	LOW(0)
								<input checked="" type="checkbox"/>	NONE(1)

TOTAL NUMBER OF SUBSTRATE TYPES: >4(2) <4(0)

NOTE: (Ignore sludge that originates from point sources: score is based on natural substrates)

COMMENTS: _____

2) INSTREAM COVER:

TYPE (Check all that apply)			AMOUNT (Check only one or Check 2 and AVERAGE)		
<input type="checkbox"/>	UNDERCUT BANKS(1)	<input type="checkbox"/>	DEEP POOLS(2)	<input type="checkbox"/>	EXTENSIVE >75%(11)
<input checked="" type="checkbox"/>	OVERHANGING VEGETATION(1)	<input type="checkbox"/>	ROOTWADS(1)	<input type="checkbox"/>	MODERATE 25-75%(7)
<input checked="" type="checkbox"/>	SHALLOWS (IN SLOW WATER)(1)	<input type="checkbox"/>	BOULDERS(1)	<input checked="" type="checkbox"/>	SPARSE 5-25%(3)
		<input type="checkbox"/>	OXBOWS(1)	<input type="checkbox"/>	NEARLY ABSENT <5%(1)
		<input type="checkbox"/>	AQUATIC MACROPHYTES(1)		
		<input type="checkbox"/>	LOGS OR WOODY DEBRIS(1)		

COMMENTS: _____

3) CHANNEL MORPHOLOGY: (Check ONLY ONE per Category or Check 2 and AVERAGE)

SINUOSITY		DEVELOPMENT		CHANNELIZATION		STABILITY		MODIFICATION/OTHER	
<input type="checkbox"/>	HIGH(4)	<input type="checkbox"/>	EXCELLENT(7)	<input type="checkbox"/>	NONE(6)	<input checked="" type="checkbox"/>	HIGH(3)	<input type="checkbox"/>	SNAGGING
<input type="checkbox"/>	MODERATE(3)	<input type="checkbox"/>	GOOD(5)	<input type="checkbox"/>	RECOVERED(4)	<input type="checkbox"/>	MODERATE(2)	<input type="checkbox"/>	RELOCATION
<input checked="" type="checkbox"/>	LOW(2)	<input type="checkbox"/>	FAIR(3)	<input type="checkbox"/>	RECOVERING(3)	<input type="checkbox"/>	LOW(1)	<input checked="" type="checkbox"/>	CANOPY REMOVAL
<input type="checkbox"/>	NONE(1)	<input checked="" type="checkbox"/>	POOR(1)	<input checked="" type="checkbox"/>	RECENT OR NO RECOVERY(1)			<input type="checkbox"/>	DREDGING
								<input type="checkbox"/>	ONE SIDE CHANNEL MODIFICATION
								<input type="checkbox"/>	IMPOUND
								<input type="checkbox"/>	ISLAND
								<input type="checkbox"/>	LEVEED
								<input type="checkbox"/>	BANK SHAPING

COMMENTS: _____

4) RIPARIAN ZONE AND BANK EROSION: (Check ONE box or Check 2 and AVERAGE per bank)

RIPARIAN WIDTH (per bank)		EROSION/RUNOFF-FLOODPLAIN QUALITY				BANK EROSION	
L	R (per bank)	L	R (most predominant per bank)	L	R (per bank)	L	R (per bank)
<input type="checkbox"/>	WIDE >150 ft.(4)	<input type="checkbox"/>	FOREST, SWAMP(3)	<input checked="" type="checkbox"/>	URBAN OR INDUSTRIAL(0)	<input checked="" type="checkbox"/>	NONE OR LITTLE(3)
<input type="checkbox"/>	MODERATE 30-150 ft.(3)	<input type="checkbox"/>	OPEN PASTURE/ROW CROP(0)	<input type="checkbox"/>	SHRUB OR OLD FIELD(2)	<input type="checkbox"/>	MODERATE(2)
<input type="checkbox"/>	NARROW 15-30 ft.(2)	<input type="checkbox"/>	RESID.,PARK,NEW FIELD(1)	<input type="checkbox"/>	CONSERV. TILLAGE(1)	<input type="checkbox"/>	HEAVY OR SEVERE(1)
<input checked="" type="checkbox"/>	VERY NARROW 3-15 ft.(1)	<input type="checkbox"/>	FENCED PASTURE(1)	<input type="checkbox"/>	MINING/CONSTRUCTION(0)		
<input checked="" type="checkbox"/>	NONE(0)						

COMMENTS: _____

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX DEPTH (Check 1)		MORPHOLOGY (Check 1)		POOL/RUN/RIFFLE CURRENT VELOCITY (Check all that Apply)	
<input type="checkbox"/>	>4 ft.(6)	<input type="checkbox"/>	POOL WIDTH>RIFFLE WIDTH(2)	<input type="checkbox"/>	TORRENTIAL(-1)
<input type="checkbox"/>	2.4-4 ft.(4)	<input type="checkbox"/>	POOL WIDTH=RIFFLE WIDTH(1)	<input type="checkbox"/>	FAST(1)
<input type="checkbox"/>	1.2-2.4 ft.(2)	<input type="checkbox"/>	POOL WIDTH<RIFFLE WIDTH(0)	<input type="checkbox"/>	MODERATE(1)
<input type="checkbox"/>	<1.2 ft.(1)			<input type="checkbox"/>	SLOW(1)
<input type="checkbox"/>	<0.6 ft.(Pool=0)(0)			<input type="checkbox"/>	EDDIES(1)
				<input type="checkbox"/>	INTERSTITIAL(-1)
				<input type="checkbox"/>	INTERMITTENT(-2)

COMMENTS: no Pools

RIFFLE/RUN DEPTH

RIFFLE/RUN DEPTH		RIFFLE/RUN SUBSTRATE		RIFFLE/RUN EMBEDDEDNESS	
<input type="checkbox"/>	GENERALLY >4 in. MAX.>20 in.(4)	<input type="checkbox"/>	STABLE (e.g., Cobble,Boulder)(2)	<input type="checkbox"/>	EXTENSIVE(-1)
<input type="checkbox"/>	GENERALLY >4 in. MAX.<20 in.(3)	<input type="checkbox"/>	MOD.STABLE (e.g., Pea Gravel)(1)	<input type="checkbox"/>	MODERATE(0)
<input type="checkbox"/>	GENERALLY 2-4 in.(1)	<input type="checkbox"/>	UNSTABLE (Gravel, Sand)(0)	<input type="checkbox"/>	LOW(1)
<input type="checkbox"/>	GENERALLY <2 in.(Riffle=0)(0)	<input type="checkbox"/>	NO RIFFLE(0)	<input checked="" type="checkbox"/>	NONE(2)
				<input type="checkbox"/>	NO RIFFLE(0)

COMMENTS: no Riffles

6) GRADIENT (FEET/MILE): 18 % POOL 0 % RIFFLE 0 % RUN 100 GRADIENT SCORE 10

Checked by SP 12/16/04

STREAM: JEN#17 U. Tib RIVER MILE _____ DATE: 12/14/04 ^{JE} QHEI SCORE 39

1) SUBSTRATE: (Check ONLY Two Substrate Type Boxes: Check all types present) SUBSTRATE SCORE 13

TYPE		POOL		RIFFLE		SUBSTRATE ORIGIN (all)		SILT COVER (one)	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	BLDER/SLAB(10)	<input type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	LIMESTONE(1)	<input type="checkbox"/>	SILT-HEAVY(-2)
<input type="checkbox"/>	BOULDER(9)	<input type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	TILLS(1)	<input type="checkbox"/>	SILT-NORM(0)
<input type="checkbox"/>	COBBLE(8)	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	SANDSTONE(0)	<input type="checkbox"/>	SILT-FREE(1)
<input type="checkbox"/>	HARDPAN(4)	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	SHALE(-1)	Extent of Embeddedness (check one)	
<input type="checkbox"/>	MUCK/SILT(2)	<input type="checkbox"/>		<input checked="" type="checkbox"/>		<input type="checkbox"/>	COAL FINES(-2)	<input type="checkbox"/>	EXTENSIVE(-2)
						<input type="checkbox"/>	RIP/RAP(0)	<input checked="" type="checkbox"/>	MODERATE(-1)
						<input type="checkbox"/>	HARDPAN(0)	<input checked="" type="checkbox"/>	NONE(1)

TOTAL NUMBER OF SUBSTRATE TYPES: >4(2) <4(0)

NOTE: (Ignore sludge that originates from point sources: score is based on natural substrates)

COMMENTS: _____

2) INSTREAM COVER: COVER SCORE 10

TYPE (Check all that apply)			AMOUNT (Check only one or Check 2 and AVERAGE)		
<input type="checkbox"/>	UNDERCUT BANKS(1)	<input type="checkbox"/>	DEEP POOLS(2)	<input type="checkbox"/>	EXTENSIVE >75%(11)
<input checked="" type="checkbox"/>	OVERHANGING VEGETATION(1)	<input type="checkbox"/>	ROOTWADS(1)	<input checked="" type="checkbox"/>	MODERATE 25-75%(7)
<input checked="" type="checkbox"/>	SHALLOWS (IN SLOW WATER)(1)	<input type="checkbox"/>	BOULDERS(1)	<input type="checkbox"/>	SPARSE 5-25%(3)
		<input type="checkbox"/>	OXBOWS(1)	<input type="checkbox"/>	NEARLY ABSENT <5%(1)
		<input checked="" type="checkbox"/>	AQUATIC MACROPHYTES(1)		
		<input type="checkbox"/>	LOGS OR WOODY DEBRIS(1)		

COMMENTS: _____

3) CHANNEL MORPHOLOGY: (Check ONLY ONE per Category or Check 2 and AVERAGE) CHANNEL SCORE 6

SINUOSITY		DEVELOPMENT		CHANNELIZATION		STABILITY		MODIFICATION/OTHER	
<input type="checkbox"/>	HIGH(4)	<input type="checkbox"/>	EXCELLENT(7)	<input type="checkbox"/>	NONE(6)	<input checked="" type="checkbox"/>	HIGH(3)	<input type="checkbox"/>	SNAGGING
<input type="checkbox"/>	MODERATE(3)	<input type="checkbox"/>	GOOD(5)	<input type="checkbox"/>	RECOVERED(4)	<input type="checkbox"/>	MODERATE(2)	<input type="checkbox"/>	RELOCATION
<input type="checkbox"/>	LOW(2)	<input type="checkbox"/>	FAIR(3)	<input type="checkbox"/>	RECOVERING(3)	<input type="checkbox"/>	LOW(1)	<input checked="" type="checkbox"/>	CANOPY REMOVAL
<input checked="" type="checkbox"/>	NONE(1)	<input checked="" type="checkbox"/>	POOR(1)	<input checked="" type="checkbox"/>	RECENT OR NO RECOVERY(1)			<input checked="" type="checkbox"/>	DREDGING
								<input type="checkbox"/>	IMPOUND
								<input type="checkbox"/>	ISLAND
								<input type="checkbox"/>	LEVEED
								<input type="checkbox"/>	BANK SHAPING
								<input type="checkbox"/>	ONE SIDE CHANNEL MODIFICATION

COMMENTS: _____

4) RIPARIAN ZONE AND BANK EROSION: (Check ONE box or Check 2 and AVERAGE per bank) RIPARIAN SCORE 4

RIPARIAN WIDTH (per bank)		EROSION/RUNOFF-FLOODPLAIN QUALITY				BANK EROSION	
L	R (per bank)	L	R (most predominant per bank)	L	R (per bank)	L	R (per bank)
<input type="checkbox"/>	WIDE >150 ft.(4)	<input type="checkbox"/>	FOREST, SWAMP(3)	<input type="checkbox"/>	URBAN OR INDUSTRIAL(0)	<input checked="" type="checkbox"/>	NONE OR LITTLE(3)
<input type="checkbox"/>	MODERATE 30-150 ft.(3)	<input checked="" type="checkbox"/>	OPEN PASTURE/ROW CROP(0)	<input type="checkbox"/>	SHRUB OR OLD FIELD(2)	<input type="checkbox"/>	MODERATE(2)
<input type="checkbox"/>	NARROW 15-30 ft.(2)	<input type="checkbox"/>	RESID.,PARK,NEW FIELD(1)	<input type="checkbox"/>	CONSERV. TILLAGE(1)	<input type="checkbox"/>	HEAVY OR SEVERE(1)
<input checked="" type="checkbox"/>	VERY NARROW 3-15 ft.(1)	<input type="checkbox"/>	FENCED PASTURE(1)	<input type="checkbox"/>	MINING/CONSTRUCTION(0)		
<input checked="" type="checkbox"/>	NONE(0)						

COMMENTS: _____

5) POOL/GLIDE AND RIFFLE/RUN QUALITY NO POOL = 0 POOL SCORE 0

MAX. DEPTH (Check 1)		MORPHOLOGY (Check 1)		POOL/RUN/RIFFLE CURRENT VELOCITY (Check all that Apply)			
<input type="checkbox"/>	>4 ft.(6)	<input type="checkbox"/>	POOL WIDTH>RIFFLE WIDTH(2)	<input type="checkbox"/>	TORRENTIAL(-1)	<input type="checkbox"/>	EDDIES(1)
<input type="checkbox"/>	2.4-4 ft.(4)	<input type="checkbox"/>	POOL WIDTH=RIFFLE WIDTH(1)	<input type="checkbox"/>	FAST(1)	<input type="checkbox"/>	INTERSTITIAL(-1)
<input type="checkbox"/>	1.2-2.4 ft.(2)	<input type="checkbox"/>	POOL WIDTH<RIFFLE WIDTH(0)	<input type="checkbox"/>	MODERATE(1)	<input type="checkbox"/>	INTERMITTENT(-2)
<input type="checkbox"/>	<1.2 ft.(1)			<input type="checkbox"/>	SLOW(1)		
<input type="checkbox"/>	<0.6 ft.(Pool=0)(0)						

COMMENTS: No Pools

RIFFLE SCORE 0

RIFFLE/RUN DEPTH		RIFFLE/RUN SUBSTRATE		RIFFLE/RUN EMBEDDEDNESS	
<input type="checkbox"/>	GENERALLY >4 in. MAX.>20 in.(4)	<input type="checkbox"/>	STABLE (e.g., Cobble,Boulder)(2)	<input type="checkbox"/>	EXTENSIVE(-1)
<input type="checkbox"/>	GENERALLY >4 in. MAX.<20 in.(3)	<input type="checkbox"/>	MOD.STABLE (e.g., Pea Gravel)(1)	<input type="checkbox"/>	MODERATE(0)
<input type="checkbox"/>	GENERALLY 2-4 in.(1)	<input type="checkbox"/>	UNSTABLE (Gravel, Sand)(0)	<input checked="" type="checkbox"/>	NONE(2)
<input checked="" type="checkbox"/>	GENERALLY <2 in.(Riffle=0)(0)	<input checked="" type="checkbox"/>	NO RIFFLE(0)	<input type="checkbox"/>	NO RIFFLE(0)
				<input type="checkbox"/>	LOW(1)

COMMENTS: No Riffles

6) GRADIENT (FEET/MILE): 8 % POOL 0 % RIFFLE 0 % RUN 100 GRADIENT SCORE 6

Checked by SP 12/16/04

STREAM: JF2#14 Unnamed Trib RIVER MILE _____

DATE: 12/14/04 JE

QHEI SCORE 56

1) SUBSTRATE: (Check ONLY Two Substrate Type Boxes: Check all types present)

SUBSTRATE SCORE 17

TYPE		POOL		RIFFLE		SUBSTRATE ORIGIN (all)		SILT COVER (one)	
<input type="checkbox"/>	BLDER/SLAB(10)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	LIMESTONE(1)	<input type="checkbox"/>	SILT HEAVY(-2)
<input type="checkbox"/>	BOULDER(9)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	TILLS(1)	<input checked="" type="checkbox"/>	SILT-NORM(0)
<input type="checkbox"/>	COBBLE(8)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SANDSTONE(0)	<input type="checkbox"/>	SILT-FREE(-1)
<input type="checkbox"/>	HARDPAN(4)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	SHALE(-1)	<input type="checkbox"/>	EXTENSIVE(-2)
<input type="checkbox"/>	MUCK/SILT(2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	COAL FINES(-2)	<input checked="" type="checkbox"/>	LOW(0)
								<input type="checkbox"/>	MODERATE(-1)
								<input type="checkbox"/>	NONE(1)

TOTAL NUMBER OF SUBSTRATE TYPES: >4(2) <4(0)
NOTE: (Ignore sludge that originates from point sources: score is based on natural substrates)

COMMENTS: _____

2) INSTREAM COVER:

COVER SCORE 11

TYPE (Check all that apply)			AMOUNT (Check only one or Check 2 and AVERAGE)		
<input type="checkbox"/>	UNDERCUT BANKS(1)	<input type="checkbox"/>	DEEP POOLS(2)	<input type="checkbox"/>	EXTENSIVE >75%(11)
<input checked="" type="checkbox"/>	OVERHANGING VEGETATION(1)	<input checked="" type="checkbox"/>	ROOTWADS(1)	<input checked="" type="checkbox"/>	MODERATE 25-75%(7)
<input checked="" type="checkbox"/>	SHALLOWS (IN SLOW WATER)(1)	<input type="checkbox"/>	BOULDERS(1)	<input type="checkbox"/>	SPARSE 5-25%(3)
<input type="checkbox"/>		<input type="checkbox"/>	OXBOWS(1)	<input type="checkbox"/>	NEARLY ABSENT <5%(1)
<input type="checkbox"/>		<input type="checkbox"/>	AQUATIC MACROPHYTES(1)		
<input type="checkbox"/>		<input checked="" type="checkbox"/>	LOGS OR WOODY DEBRIS(1)		

COMMENTS: _____

3) CHANNEL MORPHOLOGY: (Check ONLY ONE per Category or Check 2 and AVERAGE)

CHANNEL SCORE 14

SINUOSITY		DEVELOPMENT		CHANNELIZATION		STABILITY		MODIFICATION/OTHER	
<input type="checkbox"/>	HIGH(4)	<input type="checkbox"/>	EXCELLENT(7)	<input checked="" type="checkbox"/>	NONE(6)	<input type="checkbox"/>	HIGH(3)	<input type="checkbox"/>	SNAGGING
<input checked="" type="checkbox"/>	MODERATE(3)	<input type="checkbox"/>	GOOD(5)	<input type="checkbox"/>	RECOVERED(4)	<input checked="" type="checkbox"/>	MODERATE(2)	<input type="checkbox"/>	RELOCATION
<input type="checkbox"/>	LOW(2)	<input checked="" type="checkbox"/>	FAIR(3)	<input type="checkbox"/>	RECOVERING(3)	<input type="checkbox"/>	LOW(1)	<input type="checkbox"/>	CANOPY REMOVAL
<input type="checkbox"/>	NONE(1)	<input type="checkbox"/>	POOR(1)	<input type="checkbox"/>	RECENT OR NO RECOVERY(1)			<input type="checkbox"/>	DREDGING
								<input type="checkbox"/>	ONE SIDE CHANNEL MODIFICATION
								<input type="checkbox"/>	IMPOUND
								<input type="checkbox"/>	ISLAND
								<input type="checkbox"/>	LEVEED
								<input type="checkbox"/>	BANK SHAPING

COMMENTS: no Pools

4) RIPARIAN ZONE AND BANK EROSION: (Check ONE box or Check 2 and AVERAGE per bank)

RIPARIAN SCORE 7

River Right Looking Downstream				RIPARIAN SCORE <u>7</u>			
RIPARIAN WIDTH (per bank)		EROSION/RUNOFF-FLOODPLAIN QUALITY				BANK EROSION	
L	R (per bank)	L	R (most predominant per bank)	L	R (per bank)	L	R (per bank)
<input checked="" type="checkbox"/>	WIDE >150 ft.(4)	<input checked="" type="checkbox"/>	FOREST, SWAMP(3)	<input type="checkbox"/>	URBAN OR INDUSTRIAL(0)	<input type="checkbox"/>	NONE OR LITTLE(3)
<input type="checkbox"/>	MODERATE 30-150 ft.(3)	<input type="checkbox"/>	OPEN PASTURE/ROW CROP(0)	<input type="checkbox"/>	SHRUB OR OLD FIELD(2)	<input checked="" type="checkbox"/>	MODERATE(2)
<input type="checkbox"/>	NARROW 15-30 ft.(2)	<input checked="" type="checkbox"/>	RESID., PARK, NEW FIELD(1)	<input type="checkbox"/>	CONSERV. TILLAGE(1)	<input type="checkbox"/>	HEAVY OR SEVERE(1)
<input type="checkbox"/>	VERY NARROW 3-15 ft.(1)	<input type="checkbox"/>	FENCED PASTURE(1)	<input type="checkbox"/>	MINING/CONSTRUCTION(0)		
<input type="checkbox"/>	NONE(0)						

COMMENTS: _____

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

NO POOL = 0

POOL SCORE 0

MAX. DEPTH (Check 1)		MORPHOLOGY (Check 1)		POOL/RUN/RIFFLE CURRENT VELOCITY (Check all that Apply)	
<input type="checkbox"/>	>4 ft.(6)	<input type="checkbox"/>	POOL WIDTH > RIFFLE WIDTH(2)	<input type="checkbox"/>	TORRENTIAL(-1)
<input type="checkbox"/>	2.4-4 ft.(4)	<input type="checkbox"/>	POOL WIDTH = RIFFLE WIDTH(1)	<input type="checkbox"/>	FAST(1)
<input type="checkbox"/>	1.2-2.4 ft.(2)	<input type="checkbox"/>	POOL WIDTH < RIFFLE WIDTH(0)	<input type="checkbox"/>	MODERATE(1)
<input type="checkbox"/>	<1.2 ft.(1)			<input checked="" type="checkbox"/>	SLOW(1)
<input type="checkbox"/>	<0.6 ft.(Pool=0)(0)			<input type="checkbox"/>	EDDIES(1)
				<input type="checkbox"/>	INTERSTITIAL(-1)
				<input type="checkbox"/>	INTERMITTENT(-2)

COMMENTS: no Pools

RIFFLE/RUN DEPTH

RIFFLE/RUN SUBSTRATE

RIFFLE/RUN EMBEDDEDNESS

RIFFLE SCORE 3

<input type="checkbox"/>	GENERALLY >4 in. MAX. >20 in.(4)	<input type="checkbox"/>	STABLE (e.g., Cobble, Boulder)(2)	<input type="checkbox"/>	EXTENSIVE(-1)	<input type="checkbox"/>	NONE(2)
<input type="checkbox"/>	GENERALLY >4 in. MAX. <20 in.(3)	<input checked="" type="checkbox"/>	MOD. STABLE (e.g., Pea Gravel)(1)	<input type="checkbox"/>	MODERATE(0)	<input type="checkbox"/>	NO RIFFLE(0)
<input checked="" type="checkbox"/>	GENERALLY 2-4 in.(1)	<input type="checkbox"/>	UNSTABLE (Gravel, Sand)(0)	<input checked="" type="checkbox"/>	LOW(1)		
<input type="checkbox"/>	GENERALLY <2 in.(Riffle=0)(0)	<input type="checkbox"/>	NO RIFFLE(0)				

COMMENTS: _____

6) GRADIENT (FEET/MILE): 211 % POOL 0 % RIFFLE 40 % RUN 60 GRADIENT SCORE 4

Checked by 8/10/16/04

STREAM: JFN #7 Travis Creek RIVER MILE _____ DATE: 12/13/04 QHEI SCORE 51

1) SUBSTRATE: (Check ONLY Two Substrate Type Boxes: Check all types present)

SUBSTRATE SCORE 13

TYPE		POOL		RIFFLE		SUBSTRATE ORIGIN (all)		SILT COVER (one)	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	BLDER/SLAB(10)	<input type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	LIMESTONE(1)	<input type="checkbox"/>	SILT-MOD(-1)
<input type="checkbox"/>	BOULDER(9)	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	TILLS(1)	<input type="checkbox"/>	SILT-FREE(1)
<input type="checkbox"/>	COBBLE(8)	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	SANDSTONE(0)	<input type="checkbox"/>	EXTENSIVE(-2)
<input type="checkbox"/>	HARDPAN(4)	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	SHALE(-1)	<input type="checkbox"/>	LOW(0)
<input type="checkbox"/>	MUCK/SILT(2)	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	COAL FINES(-2)	<input checked="" type="checkbox"/>	NONE(1)
<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	RIP/RAP(0)		
<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	HARDPAN(0)		

TOTAL NUMBER OF SUBSTRATE TYPES: >4(2) <4(0)
 NOTE: (Ignore sludge that originates from point sources: score is based on natural substrates)

COMMENTS: _____

2) INSTREAM COVER:

COVER SCORE 11

TYPE (Check all that apply)			AMOUNT (Check only one or Check 2 and AVERAGE)		
<input type="checkbox"/>	UNDERCUT BANKS(1)	<input type="checkbox"/>	DEEP POOLS(2)	<input type="checkbox"/>	EXTENSIVE >75%(11)
<input checked="" type="checkbox"/>	OVERHANGING VEGETATION(1)	<input checked="" type="checkbox"/>	ROOTWADS(1)	<input checked="" type="checkbox"/>	MODERATE 25-75%(7)
<input checked="" type="checkbox"/>	SHALLOWS (IN SLOW WATER)(1)	<input type="checkbox"/>	BOULDERS(1)	<input type="checkbox"/>	SPARSE 5-25%(3)
		<input type="checkbox"/>	OXBOWS(1)	<input type="checkbox"/>	NEARLY ABSENT <5%(1)
		<input type="checkbox"/>	AQUATIC MACROPHYTES(1)		
		<input checked="" type="checkbox"/>	LOGS OR WOODY DEBRIS(1)		

COMMENTS: _____

3) CHANNEL MORPHOLOGY: (Check ONLY ONE per Category or Check 2 and AVERAGE)

CHANNEL SCORE 8

SINUOSITY		DEVELOPMENT		CHANNELIZATION		STABILITY		MODIFICATION/OTHER	
<input type="checkbox"/>	HIGH(4)	<input type="checkbox"/>	EXCELLENT(7)	<input type="checkbox"/>	NONE(6)	<input type="checkbox"/>	HIGH(3)	<input type="checkbox"/>	SNAGGING
<input checked="" type="checkbox"/>	MODERATE(3)	<input type="checkbox"/>	GOOD(5)	<input type="checkbox"/>	RECOVERED(4)	<input type="checkbox"/>	MODERATE(2)	<input type="checkbox"/>	RELOCATION
<input type="checkbox"/>	LOW(2)	<input type="checkbox"/>	FAIR(3)	<input checked="" type="checkbox"/>	RECOVERING(3)	<input checked="" type="checkbox"/>	LOW(1)	<input checked="" type="checkbox"/>	CANOPY REMOVAL
<input type="checkbox"/>	NONE(1)	<input checked="" type="checkbox"/>	POOR(1)	<input type="checkbox"/>	RECENT OR NO RECOVERY(1)			<input type="checkbox"/>	DREDGING
								<input type="checkbox"/>	IMPOUND
								<input type="checkbox"/>	ISLAND
								<input type="checkbox"/>	LEVEED
								<input type="checkbox"/>	BANK SHAPING
								<input type="checkbox"/>	ONE SIDE CHANNEL MODIFICATION

COMMENTS: _____

4) RIPARIAN ZONE AND BANK EROSION: (Check ONE box or Check 2 and AVERAGE per bank)

RIPARIAN SCORE 6

River Right Looking Downstream

RIPARIAN WIDTH (per bank)		EROSION/RUNOFF-FLOODPLAIN QUALITY				BANK EROSION	
L	R (per bank)	L	R (most predominant per bank)	L	R (per bank)	L	R (per bank)
<input type="checkbox"/>	WIDE >150 ft.(4)	<input type="checkbox"/>	FOREST, SWAMP(3)	<input type="checkbox"/>	URBAN OR INDUSTRIAL(0)	<input type="checkbox"/>	NONE OR LITTLE(3)
<input type="checkbox"/>	MODERATE 30-150 ft.(3)	<input type="checkbox"/>	OPEN PASTURE/ROW CROP(0)	<input checked="" type="checkbox"/>	SHRUB OR OLD FIELD(2)	<input checked="" type="checkbox"/>	MODERATE(2)
<input checked="" type="checkbox"/>	NARROW 15-30 ft.(2)	<input checked="" type="checkbox"/>	RESID., PARK, NEW FIELD(1)	<input type="checkbox"/>	CONSERV. TILLAGE(1)	<input checked="" type="checkbox"/>	HEAVY OR SEVERE(1)
<input type="checkbox"/>	VERY NARROW 3-15 ft.(1)	<input type="checkbox"/>	FENCED PASTURE(1)	<input type="checkbox"/>	MINING/CONSTRUCTION(0)		
<input type="checkbox"/>	NONE(0) <u>2.5</u>						

COMMENTS: _____

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

NO POOL = 0

POOL SCORE 3

MAX. DEPTH (Check 1)		MORPHOLOGY (Check 1)		POOL/RUN/RIFFLE CURRENT VELOCITY (Check all that Apply)			
<input type="checkbox"/>	>4 ft.(6)	<input type="checkbox"/>	POOL WIDTH > RIFFLE WIDTH(2)	<input type="checkbox"/>	TORRENTIAL(-1)	<input type="checkbox"/>	EDDIES(1)
<input type="checkbox"/>	2.4-4 ft.(4)	<input type="checkbox"/>	POOL WIDTH = RIFFLE WIDTH(1)	<input type="checkbox"/>	FAST(1)	<input type="checkbox"/>	INTERSTITIAL(-1)
<input checked="" type="checkbox"/>	1.2-2.4 ft.(2)	<input checked="" type="checkbox"/>	POOL WIDTH < RIFFLE WIDTH(0)	<input checked="" type="checkbox"/>	MODERATE(1)	<input type="checkbox"/>	INTERMITTENT(-2)
<input checked="" type="checkbox"/>	<1.2 ft.(1)			<input checked="" type="checkbox"/>	SLOW(1)		
<input type="checkbox"/>	<0.6 ft. (Pool=0)(0)						

COMMENTS: _____

RIFFLE SCORE 0

RIFFLE/RUN DEPTH		RIFFLE/RUN SUBSTRATE		RIFFLE/RUN EMBEDDEDNESS	
<input type="checkbox"/>	GENERALLY >4 in. MAX. >20 in.(4)	<input type="checkbox"/>	STABLE (e.g., Cobble, Boulder)(2)	<input type="checkbox"/>	EXTENSIVE(-1)
<input type="checkbox"/>	GENERALLY >4 in. MAX. <20 in.(3)	<input type="checkbox"/>	MOD. STABLE (e.g., Pea Gravel)(1)	<input type="checkbox"/>	MODERATE(0)
<input type="checkbox"/>	GENERALLY 2-4 in.(1)	<input checked="" type="checkbox"/>	UNSTABLE (Gravel, Sand)(0)	<input type="checkbox"/>	LOW(1)
<input checked="" type="checkbox"/>	GENERALLY <2 in. (Riffle=0)(0)	<input checked="" type="checkbox"/>	NO RIFFLE(0)	<input checked="" type="checkbox"/>	NONE(2)
				<input checked="" type="checkbox"/>	NO RIFFLE(0)

COMMENTS: _____

6) GRADIENT (FEET/MILE): 26.4 % POOL 5 % RIFFLE 0 % RUN 95 GRADIENT SCORE 10

Checked by SP11/16/10

STREAM: JW #4 Massachusetts RIVER MILE DATE: 12/13/04 QHE! SCORE 38

1) SUBSTRATE: (Check ONLY Two Substrate Type Boxes: Check all types present)

SUBSTRATE SCORE 13

TYPE		POOL		RIFFLE		SUBSTRATE ORIGIN (all)				SILT COVER (one)			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
<input type="checkbox"/>	BLDER/SLAB(10)					GRAVEL(7)		LIMESTONE(1)	<input type="checkbox"/>	RIP/RAP(0)	SILT HEAVY(-2)	<input checked="" type="checkbox"/>	SILT-MOD(-1)
<input type="checkbox"/>	BOULDER(9)					SAND(6)		TILLS(1)	<input type="checkbox"/>	HARDPAN(0)	<input type="checkbox"/>	<input type="checkbox"/>	SILT-FREE(1)
<input type="checkbox"/>	COBBLE(8)					BEDROCK(5)		SANDSTONE(0)			Extent of Embeddedness (check one)		
<input type="checkbox"/>	HARDPAN(4)					DETRITUS(3)		SHALE(-1)			<input type="checkbox"/>	<input checked="" type="checkbox"/>	MODERATE(-1)
<input type="checkbox"/>	MUCK/SILT(2)			<input checked="" type="checkbox"/>		ARTIFIC(0)		COAL FINES(-2)			<input type="checkbox"/>	<input type="checkbox"/>	NONE(1)

TOTAL NUMBER OF SUBSTRATE TYPES: >4(2) <4(0)

NOTE: (Ignore sludge that originates from point sources: score is based on natural substrates)

COMMENTS:

2) INSTREAM COVER:

COVER SCORE 5

TYPE (Check all that apply)			AMOUNT (Check only one or Check 2 and AVERAGE)		
<input type="checkbox"/>	UNDERCUT BANKS(1)	<input type="checkbox"/>	DEEP POOLS(2)	<input type="checkbox"/>	EXTENSIVE >75%(11)
<input type="checkbox"/>	OVERHANGING VEGETATION(1)	<input checked="" type="checkbox"/>	ROOTWADS(1)	<input type="checkbox"/>	MODERATE 25-75%(7)
<input checked="" type="checkbox"/>	SHALLOWS (IN SLOW WATER)(1)	<input type="checkbox"/>	BOULDERS(1)	<input checked="" type="checkbox"/>	SPARSE 5-25%(3)
		<input type="checkbox"/>	OXBOWS(1)	<input type="checkbox"/>	NEARLY ABSENT <5%(1)
		<input type="checkbox"/>	AQUATIC MACROPHYTES(1)		
		<input type="checkbox"/>	LOGS OR WOODY DEBRIS(1)		

COMMENTS:

3) CHANNEL MORPHOLOGY: (Check ONLY ONE per Category or Check 2 and AVERAGE)

CHANNEL SCORE 8

SINUOSITY		DEVELOPMENT		CHANNELIZATION		STABILITY		MODIFICATION/OTHER			
<input type="checkbox"/>	HIGH(4)	<input type="checkbox"/>	EXCELLENT(7)	<input type="checkbox"/>	NONE(8)	<input type="checkbox"/>	HIGH(3)	<input type="checkbox"/>	SNAGGING	<input type="checkbox"/>	IMPOUND
<input checked="" type="checkbox"/>	MODERATE(3)	<input type="checkbox"/>	GOOD(5)	<input type="checkbox"/>	RECOVERED(4)	<input checked="" type="checkbox"/>	MODERATE(2)	<input type="checkbox"/>	RELOCATION	<input type="checkbox"/>	ISLAND
<input type="checkbox"/>	LOW(2)	<input type="checkbox"/>	FAIR(3)	<input checked="" type="checkbox"/>	RECOVERING(3)	<input type="checkbox"/>	LOW(1)	<input checked="" type="checkbox"/>	CANOPY REMOVAL	<input type="checkbox"/>	LEVEED
<input type="checkbox"/>	NONE(1)	<input checked="" type="checkbox"/>	POOR(1)	<input type="checkbox"/>	RECENT OR NO RECOVERY(1)			<input type="checkbox"/>	DREDGING	<input type="checkbox"/>	BANK SHAPING
								<input type="checkbox"/>	ONE SIDE CHANNEL MODIFICATION		

COMMENTS: No Pools

4) RIPARIAN ZONE AND BANK EROSION: (Check ONE box or Check 2 and AVERAGE per bank)

RIPARIAN SCORE 4

RIPARIAN ZONE AND BANK EROSION: (Check ONE box or Check 2 and AVERAGE per bank)				RIPARIAN SCORE <u>4</u>							
River Right Looking Downstream				RIPARIAN SCORE <u>4</u>							
RIPARIAN WIDTH (per bank)				EROSION/RUNOFF-FLOODPLAIN QUALITY				BANK EROSION			
L	R	(per bank)		L	R	(most predominant per bank)		L	R	(per bank)	
<input type="checkbox"/>	<input type="checkbox"/>	WIDE >150 ft.(4)		<input type="checkbox"/>	<input type="checkbox"/>	FOREST, SWAMP(3)		<input type="checkbox"/>	<input type="checkbox"/>	URBAN OR INDUSTRIAL(0)	
<input type="checkbox"/>	<input type="checkbox"/>	MODERATE 30-150 ft.(3)		<input type="checkbox"/>	<input type="checkbox"/>	OPEN PASTURE/ROW CROP(0)		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	SHRUB OR OLD FIELD(2)	
<input type="checkbox"/>	<input type="checkbox"/>	NARROW 15-30 ft.(2)		<input checked="" type="checkbox"/>	<input type="checkbox"/>	RESID., PARK, NEW FIELD(1)		<input type="checkbox"/>	<input type="checkbox"/>	CONSERV. TILLAGE(1)	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	VERY NARROW 3-15 ft.(1)		<input type="checkbox"/>	<input type="checkbox"/>	FENCED PASTURE(1)		<input type="checkbox"/>	<input type="checkbox"/>	MINING/CONSTRUCTION(0)	
<input type="checkbox"/>	<input type="checkbox"/>	NONE(0)									

COMMENTS:

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

NO POOL = 0

POOL SCORE 0

MAX. DEPTH (Check 1)		MORPHOLOGY (Check 1)		POOL/RUN/RIFFLE CURRENT VELOCITY (Check all that Apply)			
<input type="checkbox"/>	>4 ft.(6)	<input type="checkbox"/>	POOL WIDTH > RIFFLE WIDTH(2)	<input type="checkbox"/>	TORRENTIAL(-1)	<input type="checkbox"/>	EDDIES(1)
<input type="checkbox"/>	2.4-4 ft.(4)	<input type="checkbox"/>	POOL WIDTH = RIFFLE WIDTH(1)	<input type="checkbox"/>	FAST(1)	<input type="checkbox"/>	INTERSTITIAL(-1)
<input type="checkbox"/>	1.2-2.4 ft.(2)	<input type="checkbox"/>	POOL WIDTH < RIFFLE WIDTH(0)	<input checked="" type="checkbox"/>	MODERATE(1)	<input type="checkbox"/>	INTERMITTENT(-2)
<input type="checkbox"/>	<1.2 ft.(1)			<input checked="" type="checkbox"/>	SLOW(1)		
<input type="checkbox"/>	<0.6 ft. (Pool=0)(0)						

COMMENTS: No Pools

RIFFLE SCORE 0

RIFFLE/RUN DEPTH		RIFFLE/RUN SUBSTRATE		RIFFLE/RUN EMBEDDEDNESS			
<input type="checkbox"/>	GENERALLY >4 in. MAX. >20 in.(4)	<input type="checkbox"/>	STABLE (e.g., Cobble, Boulder)(2)	<input type="checkbox"/>	EXTENSIVE(-1)	<input type="checkbox"/>	NONE(2)
<input type="checkbox"/>	GENERALLY >4 in. MAX. <20 in.(3)	<input type="checkbox"/>	MOD. STABLE (e.g., Pea Gravel)(1)	<input checked="" type="checkbox"/>	MODERATE(0)	<input checked="" type="checkbox"/>	NO RIFFLE(0)
<input type="checkbox"/>	GENERALLY 2-4 in.(1)	<input checked="" type="checkbox"/>	UNSTABLE (Gravel, Sand)(0)	<input type="checkbox"/>	LOW(1)		
<input checked="" type="checkbox"/>	GENERALLY <2 in. (Riffle=0)(0)	<input checked="" type="checkbox"/>	NO RIFFLE(0)				

COMMENTS:

6) GRADIENT (FEET/MILE): 10.56 % POOL 0 % RIFFLE 0 % RUN 100 GRADIENT SCORE 8

Checked by SP 12/16/04