Appendix A – Stroubles Creek Corridor Assessment (SCCA) Survey Data Sheets

Stroubles Creek - *Visual Survey* Data Sheets

Map number: ______________________________

Date (mm/dd/yy): ________________________ **Time:** __________________________________

Stream Name: ______________________________ **County**: ______________ **State**: __________

Investigators: ____

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Site (description): ____

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Upper Site Boundary

Latitude: _______________________________ **Longitude:** _____________________________

Lower Site Boundary

Latitude: _______________________________ **Longitude:** _____________________________

Weather in the past 24 hours:

- ☐ Storm (heavy Rain)
- ☐ Rain (steady rain)
- ☐ Shower (intermittent rain)
- ☐ Overcast
- ☐ Clear/Sunny
- ☐ Other: __________________________________

Weather now:

- ☐ Storm (heavy Rain)
- ☐ Rain (steady rain)
- ☐ Shower (intermittent rain)
- ☐ Overcast
- ☐ Clear/Sunny
- ☐ Other: __________________________________

Special Notes: ____

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In-Stream Characteristics

1) Check which stream habitats are present: ***(Mark all that apply)***

☐ Pool(s) ☐ Riffle(s) ☐ Run(s)

2) Nature of particles in the stream bottom at site:

	None/Little	**Some**	**Most**
Silt/Clay/Mud	☐	☐	☐
Sand (up to 0.1" in diam.)	☐	☐	☐
Gravel (0.1 – 2" in diam.)	☐	☐	☐
Cobbles (2 – 10" in diam.)	☐	☐	☐
Boulders (over 10" in diam.)	☐	☐	☐
Bedrock (solid)	☐	☐	☐

3) Pick the category that best describes the extent to which gravel, cobbles, and boulders on the stream bottom are embedded (sunk) in silt, sand, or Mud.

☐ Somewhat/not embedded (0-25%)
☐ Halfway embedded (50%)
☐ Mostly embedded (75%)
☐ Completely embedded (100%)

4) Presence of logs or large woody debris in stream:

☐ None ☐ Occasional ☐ Plentiful

5) Presence of naturally occurring organic material (i.e., leaves and twigs, etc.) in stream:

☐ None ☐ Occasional ☐ Plentiful

6) Water appearance:

☐ Clear
☐ Milky
☐ Foamy
☐ Turbid
☐ Light Brown
☐ Dark Brown
☐ Oily sheen
☐ Orange
☐ Greenish
☐ Others: ______________

7) Water odor:

☐ Sewage
☐ Chlorine
☐ Fishy
☐ Rotten eggs
☐ None
☐ Others: ______________

Streambank and Channel Characteristics

8) (a) Average depth of run(s):

☐ < 1 ft ☐ 1-2 ft ☐ >2 ft

(b) Average depth of pool(s):

☐ < 1 ft ☐ 1-2 ft ☐ >2 ft

9) Average width of stream channel:

________ : ft

10) Description of stream from upstream looking 200 ft downstream:

(a) Stream bank:

Left		Right
☐	Vertical/undercut	☐
☐	Steeply sloping (>30%)	☐
☐	Graduate/no slope (<30%)	☐

(b) Extent of artificial bank modification:

Left		Right
☐	Bank 0-25% covered	☐
☐	Bank 25-50% covered	☐
☐	Bank 50-75% covered	☐
☐	Bank 75-100% covered	☐

(c) Shape of channel:

☐ Narrow, deep
☐ Narrow, shallow
☐ Others: ________________
☐ Wide, deep
☐ Wide, shallow

11) Percent of vegetation that shades the stream *(pick best category)*

☐ 0% ☐ 25% ☐ 50% ☐ 75% ☐ 100%

12) Streamside Cover identification. Mark "1" if present or mark "2" if common.

(a) Along the water's edge and stream bank only:

Left 1	Left 2		Right 1	Right 2
☐	☐	Trees	☐	☐
☐	☐	Bushes/shrubs	☐	☐
☐	☐	Tall grasses, ferns, etc.	☐	☐
☐	☐	Lawn	☐	☐
☐	☐	Boulders/rocks	☐	☐
☐	☐	Gravel/sand	☐	☐
☐	☐	Bare soil	☐	☐
☐	☐	Pavement, structure	☐	☐

(b) From the top of the streambank out to 25 yards

Left 1	Left 2		Right 1	Right 2
☐	☐	Trees	☐	☐
☐	☐	Bushes/shrubs	☐	☐
☐	☐	Tall grasses, ferns, etc.	☐	☐
☐	☐	Lawn	☐	☐
☐	☐	Boulders/rocks	☐	☐
☐	☐	Gravel/sand	☐	☐
☐	☐	Bare soil	☐	☐
☐	☐	Pavement, structure	☐	☐

13) Identifying severe problem area(s)

Left	**Stream Banks**	Right
☐	Natural Streamside plant cover degraded	☐
☐	Banks collapsed/eroded	☐
☐	Garbage/junk adjacent to the stream	☐
☐	Foam or sheen on bank	☐
	Stream Channel	
☐	Mud, silt, or sand in or entering the stream	☐
☐	Garbage /junk in the stream	☐
	Other	
☐	Yard waste on bank (grass, clipping, etc.)	☐
☐	Livestock in or with unrestricted access to stream	☐
☐	Actively discharging the stream	☐
☐	Other pipe(s) entering the stream	☐
☐	Ditches entering the stream	☐

Local Watershed Characteristics

14) Land uses identification: (*Mark all that apply)*

Residential:	Streamside	Within ¼ mile of stream
Single-family housing	☐	☐
Apartment building	☐	☐
Lawns	☐	☐
Playground	☐	☐
Parking lot	☐	☐
Other: _______________	☐	☐

Forest/Parkland	Streamside	Within ¼ mile of stream
Recreational park	☐	☐
National/State Forest	☐	☐
Woods/Greenway	☐	☐
Other: _______________	☐	☐

Agricultural/Rural	Streamside	Within ¼ mile of stream
Grazing land	☐	☐
Cropland	☐	☐
Animal feedlot	☐	☐
Isolated farm	☐	☐
Old (abandoned) field	☐	☐
Fish hatchery	☐	☐
Tree Farm	☐	☐
Other: _______________	☐	☐

Commercial/Industrial/Institution	Streamside	Within ¼ mile of stream
Commercial development (stores, restaurants)	☐	☐
Auto repair/gas station	☐	☐
Factory/Power plant	☐	☐
Sewage treatment facility	☐	☐
Water treatment facility	☐	☐
Institution (e.g. school, offices)	☐	☐
Landfill	☐	☐
Automobile graveyard	☐	☐
Bus or taxi depot	☐	☐
Other: _______________	☐	☐

Visual Biological Survey

15) Wildlife in or around the stream? ***(Mark all that apply)***

☐ Amphibians ☐ Waterfowl ☐ Reptiles ☐ Mammals

16) Fish in the stream? ***(Mark all that apply)***

☐ No	☐ Yes, but rare	☐ Yes, abundant
☐ Small (1-2 in)	☐ Medium (3-6 in)	☐ Large (7 in. and above)

Are there any barriers to fish movement? ***(Mark all that apply)***

☐ Beaver dams	☐ Waterfalls > 1’	☐ None
☐ Dams	☐ Road barriers	☐ Other: _______________

17) Aquatic plants in the stream? ***(Mark all that apply)***

☐ None	☐ Occasional	☐ Plentiful
☐ Attached	☐ Free-floating	☐ Stream margin
☐ Pools	☐ Near riffle	

18) Extent of algae in the stream. ***(Mark all that apply)***

(a) Are the submerged stones, twigs, or other material in the stream coated with a layer of algal “slime”?

☐ None	☐ Occasional	☐ Plentiful
☐ Light coating	☐ Heavy coating	☐ Brownish
☐ Greenish	☐ Other: _______________	

(b) Are there any filamentous (string-like) algae?

☐ None	☐ Occasional	☐ Plentiful
☐ Greenish	☐ Brownish	☐ Other: _______________

(c) Are any detached “clumps” or “mats” of algae floating on the water’s surface?

☐ None	☐ Occasional	☐ Plentiful
☐ Greenish	☐ Brownish	☐ Other: _______________

Channel Alteration (CA)

Map number: ______________________ **Site number:** ____________________________
Date (mm/dd/yy): ______________________ **Time:** ______________ **Photo ID:** ___________

Type: ☐ Concrete ☐ Gabion ☐ Rip-Rap ☐ Earth Channel ☐ Other: _______

Bottom width: _________ **ft** **length:** _________ **ft**

Is sediment deposition occurring in the channel? ☐ No ☐ Yes

Is vegetation growing in the channel? ☐ No ☐ Yes

Is it part of a road crossing? ☐ No ☐ Above ☐ Below ☐ Both

Channelized length above road crossing _______________ ft

Channelized length below road crossing _______________ ft

Severity
Severe ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 Minor ☐ Unknown (-1)

Correctability
Best ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 Worst ☐ Unknown (-1)

Access
Best ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 Worst ☐ Unknown (-1)

Comments

Erosion Site (ES)

Map number: ____________________ **Site number:** ____________________
Date (mm/dd/yy): ____________________ **Time:** ____________ **Photo ID:** __________

Type: ☐ Downcutting ☐ Widening ☐ Headcutting

Cause: ☐ Bend at sleep slope ☐ Pipe Outfall ☐ Bellow Channelization ☐ Livestock
☐ Bellow Road Cutting ☐ Natural ☐ Other: ____________

Length: __________ **ft** **Average exposed bank height:** ____________ **ft**

Left Side	**Present Land Use Downstream**	Right Side
☐	Crop Field	☐
☐	Pasture	☐
☐	Lawn	☐
☐	Paved	☐
☐	Shrubs & Small Trees	☐
☐	Forest	☐
☐	Multiflora Rose	☐
☐	Other: ________________	☐

Is Infrastructure Threatened: ☐ Yes ☐ No ☐ Unknown
If Yes describe: ____

Severity
Severe ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 Minor ☐ Unknown (-1)

Correctability
Best ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 Worst ☐ Unknown (-1)

Access
Best ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 Worst ☐ Unknown (-1)

Comments

Exposed Pipe (EP)

Map number: ____________________ **Site number:** ____________________
Date (mm/dd/yy): ____________________ **Time:** ____________ **Photo ID:** __________

Pipe is: ☐ Exposed across bottom of stream ☐ Exposed along stream bank
☐ Exposed manhole ☐ Above stream ☐ Other: ____________________

Type of Pipe: ☐ Concrete ☐ Smooth metal ☐ Corrugated metal ☐ Plastic
☐ Others ________________

Pipe Diameter: ____________ in **Length exposed:** ____________ ft

Purpose of Pipe: ☐ Sewage ☐ Water Supply ☐ Stormwater ☐ Unknown
☐ Other: ________________

Evidence of Discharge? ☐ Yes ☐ No

Color: ☐ Clear ☐ Medium Brown ☐ Dark Brown ☐ Green brown ☐ Yellow Brown
☐ Green ☐ Others: ____________

Odor: ☐ Sewage ☐ Oily ☐ Musky ☐ Fishy ☐ Rotten Eggs ☐ Chorine
☐ None ☐ Others: ____________

Severity
Severe ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 Minor ☐ Unknown (-1)

Correctability
Best ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 Worst ☐ Unknown (-1)

Access
Best ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 Worst ☐ Unknown (-1)

Comments

Pipe Outfall (PO)

Map number: ______________________ **Site number:** ____________________________
Date (mm/dd/yy): ____________________ **Time:** ____________ **Photo ID:** __________

Type of Outfall: ☐ Stormwater ☐ Sewage Overflow ☐ Industrial ☐ Pumping Station
☐ Agricultural ☐ Other: ____________________

Type of Pipe: ☐ Earth Channel ☐ Concrete Channel ☐ Concrete Pipe ☐ Metal Pipe
☐ Corrugated Metal ☐ Other: ____________________

Location **(Facing Downstream):** ☐ Left Bank ☐ Right Bank ☐ Head of Stream
☐ Other: ____________________

Pipe Diameter: ____________ **in** **Channel Width:** ____________ **ft**

Purpose of Pipe: ☐ Sewage ☐ Water Supply ☐ Stormwater ☐ Unknown
☐ Other: ________________

Evidence of Discharge? ☐ **Yes** ☐ **No**

Color: ☐ Clear ☐ Medium Brown ☐ Dark Brown ☐ Green brown ☐ Yellow Brown
☐ Green ☐ Others: ____________

Odor: ☐ Sewage ☐ Oily ☐ Musky ☐ Fishy ☐ Rotten Eggs ☐ Chorine
☐ None ☐ Others: ____________

Severity
Severe ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 Minor ☐ Unknown (-1)

Correctability
Best ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 Worst ☐ Unknown (-1)

Access
Best ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 Worst ☐ Unknown (-1)

Comments

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Fish Barrier (FB)

Map number: ____________________ **Site number:** ____________________
Date (mm/dd/yy): ____________________ **Time:** ____________ **Photo ID:** __________

Fish Blockage: ☐ Total ☐ Partial ☐ Temporary ☐ Unknown

Type of Barrier: ☐ Dam ☐ Road Crossing ☐ Pipe Crossing ☐ Natural Falls
☐ Beaver Dam ☐ Channelized ☐ In-stream Pond ☐ Other: _______

Blockage because: ☐ Too High ☐ Too Shallow ☐ Too Fast

Water Drop: ________ Inches (if too high) **Water depth:** ________ Inches (if too shallow)

Severity
Severe ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 Minor ☐ Unknown (-1)

Correctability
Best ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 Worst ☐ Unknown (-1)

Access
Best ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 Worst ☐ Unknown (-1)

Comments

Inadequate Buffer (IB)

Map number: ____________________ **Site number:** ____________________
Date (mm/dd/yy): ____________________ **Time:** ____________ **Photo ID:** __________

Buffer inadequate (looking downstream): ☐ Left ☐ Right ☐ Both ☐ Neither
Stream Unshaded (looking downstream): ☐ Left ☐ Right ☐ Both ☐ Neither

Buffer width left side: __________ Ft **Buffer width right side:** __________ ft
Length left side: __________ Ft **Length right side:** __________ ft

Left Side	**Present Land Use Downstream**	Right Side
☐	Crop Field	☐
☐	Pasture	☐
☐	Lawn	☐
☐	Paved	☐
☐	Shrubs & Small Trees	☐
☐	Forest	☐
☐	Multiflora Rose	☐
☐	Other: ________________	☐

Buffer recently established: ☐ Yes ☐ No

Presence of Livestock: ☐ Yes ☐ No
If yes, what type: ☐ Cattle ☐ Horses ☐ Pig ☐ Other: __________

Severity
Severe ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 Minor ☐ Unknown (-1)

Correctability
Best ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 Worst ☐ Unknown (-1)

Access
Best ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 Worst ☐ Unknown (-1)

Wetland Potential
Best ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 Worst ☐ Unknown (-1)
(Good wetland potential = low slope, low bank height)

Comments

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In or Near Stream Construction (SC)

Map number: ____________________ **Site number:** ____________________
Date (mm/dd/yy): ____________________ **Time:** ____________ **Photo ID:** __________

Type of Activity: ☐ Road ☐ Road Crossing ☐ Utility ☐ Logging ☐ Bank Stability
☐ Residential Development ☐ Industrial Development
☐ Other: ______________

Sediment Control: ☐ Adequate ☐ Inadequate ☐ Unknown

If inadequate, why? ____
____

Is stream bottom below site laden with excess sediment? ☐ Yes ☐ No

Length of steam affected: ______________ ft

Company doing construction: ____

Location: ____

Severity
Severe ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 Minor ☐ Unknown (-1)

Comments

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Trash Dumping (TD)

Map number: ____________________ **Site number:** ________________________
Date (mm/dd/yy): ____________________ **Time:** ____________ **Photo ID:** __________

Type of Trash: ☐ Residential ☐ Industrial ☐ Yard Waste ☐ Floatables
☐ Tires ☐ Construction ☐ Other: ______________

Amount of Trash: __________________ Pick-up truck loads
Other Measure: ____________________

Confinement of Trash: ☐ Single Site ☐ Large Area

Possible cleanup sites for volunteers? ☐ Yes ☐ No

Land Ownership: ☐ Public ☐ Private ☐ Unknown
If public, name: ____________________________________

Severity
Severe ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 Minor ☐ Unknown (-1)

Correctability
Best ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 Worst ☐ Unknown (-1)

Access
Best ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 Worst ☐ Unknown (-1)

Comments

Unusual Condition or Comments (UC)

Map number: ______________________ **Site number:** _____________________________
Date (mm/dd/yy): _____________________ **Time:** _____________ **Photo ID:** __________

Describe:

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Observations:

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Severity
Severe ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 Minor ☐ Unknown (-1)

Correctability
Best ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 Worst ☐ Unknown (-1)

Access
Best ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 Worst ☐ Unknown (-1)

Comments

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Appendix B – Uses of the New Tools in Applications Outside of Environmental Management

The growing demand for data is not unique to the environmental management field. Agencies in fields ranging from emergency services to utility construction and maintenance face similar problems with an unprecedented demand for data and inadequate funding and personnel to meet that demand. Searching for a faster and more effective way to collect important information, several of them have turned to the technological advances described earlier for solutions. Their creative applications of these technologies have radically changed the face of data collection in their respective fields. Many have seen vast improvement in the quality and turnaround time associated with data collection efforts, which has allowed them to focus on other aspects of their profession. Several examples of these applications are presented below.

Hydrant Mapping in Euless, Texas

The Fire Department of Euless, Texas used GPS and GIS technology to develop an accurate digital map of the city's fire hydrants. Information such as the GPS position of the hydrant, its ID number, the year of manufacture, the hydrant model, its condition, and the closest street were collected for each hydrant using a GPS unit. The author noted that "training the firemen to use the GPS proved to be extremely simple." In fact, after collecting data points on as few as three hydrants with the GIS staff, the firemen were comfortable with the use and operation of the system. The GIS was used to add additional information to the hydrant database, such as size of the main line supplying water to the hydrant, the fire response zone, and nearest station. The availability of a detailed and up-to-date GIS database on existing hydrants allows the department to quickly determine hydrants that may require maintenance or locate hydrants that will be affected by work on the water distribution system. The success of the hydrant mapping application has excited the entire Fire Department of Euless and they have been eagerly searching for future applications of the technology (Allen 2000).

Water Distribution System Maintenance in Cookeville, Tennessee

The Water Quality Control Department for the city of Cookeville, Tennessee has also integrated GPS and GIS technology into its operation. The GPS was used to collect the locations of water and sewer features in the field, including water valves, hydrants, manholes and pump stations. The unit also allowed the user to input data related to the features using an integrated PDA-like interface. For example, the surveyor would position the GPS unit over a recently installed manhole to take a position. As the unit was recording the position, the user answered several questions concerning the manhole. What type of manhole is it? How big is it? How deep is it? Who manufactured it?

Through this process, the city was able to develop a database showing the location of every line, valve, hydrant, meter, manhole, and pump station in the drinking water distribution and sanitary sewer collection systems of the city. The database also contained information on the sizes, ages, and conditions of these features. Using the GIS, development and maintenance projects were prioritized and detailed maps of the city's water and sewer systems were developed for use by field crews.

Flood Damage Assessment in Iowa

At the Federal level, the Iowa section United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) has converted its field data collection protocols to a digital format through the use of GIS, GPS, and PDAs. Their integration of the technology began as desk-bound data input applications related to the National Resource Inventory survey in 1997.

In the early summer of 1998, widespread flooding provided an opportunity to test the new method of data collection by using it to document the flood damage. Accurate and timely information was necessary to prioritize repairs and estimate the costs of the flood damage. Upon arrival at the site, evaluators georeference the position of any significant damage "through a simple series of key commands" using a GPS unit. They then input information about the damage into digital replicas of the standard evaluation forms that have been loaded into the PDA. The software prevents any errors of omission or incorrect data type. A digital camera is used to document the nature and extent of the damage.

Once in the office, the data was electronically transferred to the database through a synchronization operation. Reports on the damage and applications for repair, including images, important information and geographic coordinates, could be produced quickly. The improvements in the efficiency and effectiveness of their operations in Iowa has prompted the NRCS to expand the use of the PDA/GPS combination into engineering inspections of flood control structures and the data intensive National Resource Inventory (NRI) field survey (Brockman and Betts 2000).

Wildfire Mapping in California

Fighting wildfires is definitely not a one-person job. It requires the coordination of ground personnel and equipment, as well as any aerial support that may be part of the fight. Coordination of such a large effort over such a large area requires up-to-date and reliable information on the status of the blaze and the locations of everyone involved. Consequently, the command station established to lead the effort is often supported by a group of GIS technical specialists. These individuals work from a mobile office to gather data and produce maps on the progression of the blaze. Command personnel rely on these maps to effectively place crews and equipment in order to contain the fire.

Several technical specialists working in San Diego County, California felt that recent developments in PDA and GPS technology had a promising future as a tool for the technical specialist profession. A wildfire in San Diego County provided a prime opportunity to test the functionality of the new GPS/PDA technology in a real time situation. After establishing a mobile office near the command center, the specialist boarded a helicopter to fly the perimeter of the fire. In less than an hour, a map showing the current fire perimeter was in the hands of command personnel, who could then decide how to approach the problem. Prior to the GPS/PDA, this was typically a 1.5-2 hour process. In a job where seconds count, shaving 30 minutes off of map production provided a significant advantage to the firefighting effort.

Based on the success of this application of GPS/PDA technology, the technology has a bright future in wildfire fighting applications. The author envisions a time when a technical specialist observing the fire from a helicopter can wirelessly update the GIS database at the command station, which is then wirelessly transmitted to firefighters in the field. He concludes that the advantages gained in response time with the new technology will "be essential in providing a safe working environment for firefighters, emergency workers and the citizens of our communities" (Appleton 2001).