Appendix A: Geographic Information Systems Metadata

GIS data sources.
The following geographic information systems (GIS) data sources were used to create one or more of the maps in the Region of the Great Bend of the Wabash River Watershed Management Plan as listed below:

(City of Lafayette, 2009) WWTP_DISTRICT: Wastewater treatment plant district based on perimeter of mapped sewer pipes and manholes for the City of Lafayette. (no scale) Polygon Shapefile.

(City of West Lafayette, 2009) SANITARY_DISTRICT: Sanitary district for the City of West Lafayette. (no scale) Polygon Shapefile.

(IDEM, 2002) NPDES_FACILITY_IDEM_IN: Facilities in the National Pollutant Discharge Elimination System with assigned UTM Coordinates in Indiana. IDEM, Office of Water Quality, Data Management Section. (no scale) Point Shapefile.

(IDEM, 2003) RECREATIONAL_FACILITIES_IDNR_IN: Outdoor recreational facilities in Indiana. IDNR, Department of Outdoor Recreation (1:24,000) Point shapefile.

(IDNR, 2004) FLOODPLAINS_DFIRM_IDNR_IN: Floodplain locations. Derived from FEMA Flood Rate Insurance Maps (FIRM), Digital Flood Insurance Rate Map (DFIRM), and Flood Insurance Studies (FIS). (1:12,000) Polygon shapefile.

(IDEM, 2006) IMPAIRED_STREAMS_IDEM_IN: Impaired Streams in Indiana on the 303(d) List of 2006. Indiana Department of Environmental Management, Office of Water Quality. Line Shapefile.

(IDEM, 2007a). CONFINED_FEEDING_OPERATIONS_IDEM_IN: Confined Feeding Operation Facilities in Indiana, IDEM, Office of Land Quality, Compliance and Response Branch, Solid Waste Compliance Section. (no scale) Point Shapefile.

(IDEM, 2007b) OPEN_DUMPS_IDEM_IN: Open Dump Sites in Indiana, IDEM, Office of Land Quality, Compliance and Response Branch, Solid Waste Compliance Section. (no scale) Point Shapefile.

(IDEM, 2007c) WASTE_INDUSTRIAL_IDEM_IN: Industrial Waste Sites in Indiana, IDEM, Office of Land Quality, Compliance and Response Branch, Industrial Waste Section. (no scale) Point Shapefile.

(IDEM, 2009a) BROWNFIELDS_IDEM_IN: Defined as a parcel of real estate that is abandoned or inactive, or may not be operated at its appropriate use, and on which expansion, redevelopment, or reuse is complicated because of the presence or potential presence of a hazardous substance, a contaminant, petroleum, or a petroleum product that poses a risk to human health and the environment. IDEM, Office of Land Quality. (unknown scale) Point shapefile.

(IDEM, 2009b) CONFINED_FEEDING_OPERATIONS_IDEM_IN: Shows swine, chicken, turkey, beef or dairy agribusinesses that have large enough numbers of animals that IDEM regulates for environmental concerns, as defined by IC 13-18-10 of the Indiana Code. IDEM, Office of Land Quality. (unknown scale) Point shapefile.

(IDEM, 2009c) LUST_IDEM_IN: Leaking Underground Storage Tanks in Indiana, IDEM, Office of Land Quality, Remediation Service Branch, Leaking Underground Storage Tank Section. (no scale) Point Shapefile.

(IDEM, 2009d) OPEN_DUMPS_IDEM_IN: unregulated, illegal dump sites of solid waste as defined by IAC 10-2-28 329 and IAC 10-2-128 of the Indiana Administrative Code. IDEM, Office of Land Quality. (unknown scale) Point shapefile.

(IDEM, 2009e) SUPERFUND_IDEM_IN: locations of access points to managed, Superfund sites. IDEM, Office of Land Quality. (unknown scale) Point shapefile.

(IDNR, 2009a) IN_ETR_SPECIES: Query results for the Region of the Great Bend of the Wabash River Watershed from the Indiana Natural Heritage Database as supplied by Ron Hellmich, IDNR, Division of Nature Preserves, March 3, 2009. (unknown scale) Polygon shapefile.

(IDNR, 2009b) RECREATIONAL_FACILITIES_IDNR_IN: Outdoor recreation facilities, including facilities managed by federal, state, and local governments, as well as non-government organizations, private and commercial entities, and schools. It does not include sites that are private and not open to the public. (1:24,000) Point shapefile.

(IGS, 1998) LANDSURVEY_COUNTY_POLY_IN: County boundaries in polygon format. Derived from the U.S. Geological Survey's 1:24,000 digital raster graphic (DRG) series. (no scale) Polygon shapefile.

(IGS, 2001a). IS2001USGS_IN: Estimated Percentages of Impervious Surfaces in Indiana in 2001. Derived from the National Land Cover Database (NLCD 2001, United States Geological Survey, 30-Meter Grid), digital representation by Chris Dintaman, 2007.

(IGS, 2001b) LC2001USGS_IN: 2001 Land Cover in Indiana, Derived from the National Land Cover Database (NLCD 2001, United States Geological Survey, 30-Meter Grid), digital representation by Chris Dintaman.

(IGS, 2003) ECOREGIONS_USGS_IN: Ecoregions, Levels III and IV, Indiana. Derived from U.S. Geological Survey. (1:250,000) Polygon Shapefile.

(IGS, 2004) CENSUS_MCD_POPCHANGE_IN: Population Densities and Changes of Densities of Minor Civil Divisions in Indiana from 1890 to 2000. Derived from United States Census Bureau. (1:500,000) Polygon Shapefile, digital representation by Denver Harper, 2004.

(IGS, 2007) TC2001USGS_IN: Estimated Percentage of Tree Canopy in Indiana in 2001, Derived from the National Land Cover Database (NLCD 2001, United States Geological Survey, 30-Meter Grid), digital representation by Chris Dintaman.

(INDOT, 2001). INCORPORATED_AREAS_INDOT_IN: Incorporated Boundaries in Indiana, INDOT, Graphics and Engineering. (no scale) Polygon Shapefile.

(INDOT, 2004) HIGHWAYS_INDOTMODEL_IN: Highways in Indiana, INDOT, Graphics and Engineering. (1:24,000) Line Shapefile.

(Montgomery County, 2009) PARCELS: Parcels for Montgomery County (unknown scale) Polygon shapefile.

(NRC, 1997) RIVERS_OUTSTANDING_NRC_IN: Outstanding Rivers in Indiana, as listed by the Natural Resource Commission which identifies rivers and streams which have particular environmental or aesthetic interest. (1:100,000) Linear shapefile.

(NRCS, 2006a) SOILMU_A_IN007: Benton County SSURGO soils spatial and tabular data. (1:24,000) Polygon shapefile.

(NRCS, 2006b) SOILMU_A_IN045: Fountain County SSURGO soils spatial and tabular data. (1:24,000) Polygon shapefile.

(NRCS, 2006c) SOILMU_A_IN107: Montgomery County SSURGO soils spatial and tabular data. (1:24,000) Polygon shapefile.

(NRCS, 2006d) SOILMU_A_IN157: Tippecanoe County SSURGO soils spatial and tabular data. (1:24,000) Polygon shapefile.

(NRCS, 2006e) SOILMU_A_IN181: White County SSURGO soils spatial and tabular data. (1:24,000) Polygon shapefile.

(NRCS, 2007) SOILMU_A_IN171: Warren County SSURGO soils spatial and tabular data. (1:24,000) Polygon shapefile.

(NRCS, 2009) WBDHU_12_L_IN: 12-digit and 10-digit hydrologic accounting units. (1:24,000) Polygon shapefile.

(TCPWQ, 2005) MS4_BOUNDARY: Boundary for the municipal separate storm sewer system for the Tippecanoe Partnership for Water Quality. (unknown scale) Linear shapefile.

(Tippecanoe County, 2009) PARCELS: Parcels for Tippecanoe County (unknown scale) Polygon shapefile.

(Town of Battle Ground, 2009) STP_SERVICE_AREA: Sewage treatment plan service area for the Town of Battle Ground. (no scale) Polygon Shapefile.

(USCB, 2000a) SCHOOL_DISTRICTS_USCB_IN: School building locations Derived from U.S. Bureau tabulated data. (1:500,000) Point shapefile.

(USCB, 2000b) URBAN_AREAS_TIGER00_IN: major urban areas identified by the U.S. Bureau of the Census. Derived from U.S. Department of Commerce, U.S. Census Bureau, Census 2000 Tiger Line Files. (1:100,000) Polygon Shapefile.

(USCB, 2005) ROADS_2005_INDOT_IN: Indiana Roads from INDOT and TIGER Files, 2005. (1:100,000) Line Shapefile.

(USDA, 1994) SOILS_STATSGO_IN: Soil Associations in Indiana. U. S. Department of Agriculture, Natural Resources Conservation Service. 1994. (1:250,000) Polygon Shapefile.

(USDA, 2004) CULTIVATED_AREAS_USDA_IN: Percentage of cultivated land in homogeneous land-use areas. Derived from the National Agricultural Statistics Survey, U.S. Department of Agriculture. Ground resolution is approximately 56 meters by 56 meters. (1:100,000) Grid file.

(USDA, 2008) CROPS_2008_USDA_IN: Shows categorized land-cover data produced using satellite imagery for the purpose of providing supplemental acreage estimates for the state's major commodities. The imagery was collected between the dates of April 1, 2008 and September 30, 2008. Derived from National Agricultural Statistics Service, U.S. Department of Agriculture. Ground resolution is approximately 56 meters by 56 meters. (1:100,000) Grid file.

(USFWS, 2009) ALL_IN_NWI_CURRENT_DRAFT_09212009: Updated National Wetland Inventory dataset which was originally developed in 1979. Latest version updates 1979 dataset through the use of aerial photographs. (1:24,000) Polygon shapefile.

(USGS, 1991) WATERSHEDS_HUC08_CATALOG_UNITS_USGS_IN: 8-digit hydrologic accounting units. Derived from the 14-digit hydrologic units in Indiana created by U.S. Geological Survey and National Resources Conservation Service. (1:24,000) Polygon shapefile.

(USGS, 1996) PLACES_POINTS_USGS_IN: Shows the locations of populated places, extracted from the Geographic Names Information System (GNIS) developed by the U.S. Geological Survey. Elevations (feet above sea level) are also provided. (1:24,000) Point shapefile.

(USGS, 2002) CEMETARIES_USGS_BLA_IN: Cemetary locations. Extracted from the U.S. Geolgoical Survey’s Geographic Names Information System. (1:24,000) Point shapefile.

(USGS, 2008a) HYDROGRAPHY_HIGHRES_FLOWLINE_NHD_USGS: Streams, Rivers, Canals, Ditches, Artificial Paths, Coastlines, Connectors, and Pipelines. Derived from National Hydrography Dataset which was originally developed at 1:100,000 scale to be developed at 1:24,000-1:12,000 scale. (1:24,000) Linear shapefile.

(USGS, 2008b) HYDROGRAPHY_HIGHRES_WATERBODYLINEAR_NHD_USGS: Rivers, Inundation Areas, Canals, Submerged Streams, and Other Linear Waterbodies. Derived from National Hydrography Dataset which was originally developed at 1:100,000 scale to be developed at 1:24,000-1:12,000 scale. (1:24,000) Linear shapefile.

(USGS, 2008c) STREAMFLOW_GAUGING_STATIONS_USGS_IN: Displays 179 streamflow gaugest maintained by the U.S. Geological Survey in Indiana as part of their real-time national streamflow network. (no scale) Point shapefile.

(WREC, 2009a) CURRENT_SAMPLE_SITES: Locations of stream-road crossings where water quality samples are being collected as digitized by WREC staff based on latitude/longitude collected from field locations. (no scale) Point shapefile.

(WREC, 2009b) HISTORIC_SAMPLE_SITES: Locations of stream-road crossings where water quality samples have been previously collected as digitized by WREC staff based on stream name and road crossing name and/or latitude/longitude as provided. (no scale) Point shapefile.

(WREC, 2009c) UNREGULATED_ANIMAL_FARMS: Locations where independent, animal-based pastures or farms are located based on field observations. Contains animal type and density as observed 2009 December. (no scale) Point shapefile.

(WREC, 2009d) INVENTORY_RESULTS: Locations of water quality problem areas as inventoried by volunteers and digitized by WREC staff based on map-based filed observations. (no scale) Linear shapefile.

(WREC, 2009e) RULE_5_LOCATIONS: Locations where Rule 5 permits have been filed, Rule 5 projects implemented, and the current status of Rule 5 projects since the inception of the database (2005-present). Database provided by IDEM, Office of Water Quality. (no scale) Point shapefile.

(WREC, 2009f) RULE_6_LOCATIONS: Locations where Rule 6 permits have been filed and project implemented since the inception of the database (2005-present). Database provided by IDEM, Office of Water Quality. (no scale) Point shapefile.

(WREC, 2009g) UNSEWERED_AREAS: Locations where housing density exceeds 20 units within one square mile as based on 2009 aerial photograph observation. Observations made and digitized by WREC staff. (no scale) Point shapefile.

(WREC, 2009h) WATERSHED_BOUNDARY: Boundary of the Region of the Great Bend of the Wabash River Watershed. Based on WBDHU_12_L_IN: 12-digit and 10-digit hydrologic accounting units. (1:24,000) Polygon shapefile.

(WREC, 2010) WATER_QUALITY_IMPAIRMENTS: Locations of historic or current water quality sample collection where concentrations do not meet target concentrations. Calculation of meeting water quality made by WREC staff. (no scale) Point shapefile.

Appendix B: Stakeholder Concerns List

Stakeholder concerns listed in no particular order and with only grammatical corrections.

- Build a low head dam to maintain water levels in the Wabash River during the summer
- Concerned about low water levels during drought
- Create predictable water levels
- Make river more hospitable as it is difficult for boaters. Too much current when high, to little when low
- Partially dam the river or tributaries to flood farm land
- Reduce flooding
- Unpredictability
- Do not install dams along the river
- Increase BMP implementation
- Create a detailed implementation plan
- Educate private landowners that it is their duty to clean snags from streams
- Use demonstration sites to highlight options for individuals to improve water quality
- Improve storm drain system
- Identify appropriate handling of municipal waste
- Develop a stormwater program for individuals
- Stormwater runoff-improve quality and reduce quantity
- New sewer systems are needed in both cities to separate storm water and wastewater.
- Correct CSO issues
- Reduce CSOs
- Cap all combined sewer outfalls
- Show progress on improve CSO issues now, we can't wait any longer
- Develop constructed wetlands along the river to treat stormwater and reduce CSO issues
- Build a hydro-dam at US 231
- Harness electric power from the river
- Improve aesthetics-odor and water color and clarity
- Eliminate the odors - factory smells, sewage plant, etc.
- Clarity-I want to see my toes at the bottom of the river
- Improve air quality
- Improve the smell (stinky)
- Fix septic system issues
- Improve efficiency of septic systems
- Increase septic setback away from all streams
- Septic field locations, quality, and lack of inspections
- Restore native plants to help create a stable river
- Create a solid ecosystem
- Protect the river banks and improve tree diversity
- Create prairie to tree transition zone plantings to provide historically correct water quality improvements
- Improve the county drains and require buffers adjacent to all of them
- Require mandatory buffers as building too close to the river/streams causes erosion

- Require riparian buffers on all streams; increase width where present
- Maintain the natural, riparian buffer to prevent erosion
- Add buffers along all waterways in the watershed
- Restore/stabilize streambanks naturally and reinforce as necessary, but make it look as natural as possible.
- Involve streamside farmers/agricultural users in water quality decisions
- Find opportunities to work with agricultural landowners and farmers to improve farming practices
- Identify agricultural practices to be implemented and praise those who are already doing this
- Reduce/restrict livestock access to the Wabash River and its tributaries
- Promote no-till farming options
- Promote recycling and use of reusable bags
- Enforce trash clean up
- More clean up events more often
- Stop litter
- Continue trash pick-up efforts on the Wabash River, its tributaries, and adjacent parks
- Track and reduce waste dumping (include cities and county)
- Reduce chemical pollution from industrial inputs
- Road salts-identify where these are a problem and reduce concentrations
- Limit development within the 100 year floodplain
- Limit redevelopment or rebuilding within the floodplain
- Return the golf course to wetland habitat and move the course out of the floodplain.
- Flood control projects are needed
- Limit construction and impervious surfaces which change flow and increase fluctuation of water levels
- Respect river floodplain vegetation and maintain continuity
- Help the Heritage Trail - we're losing it to erosion
- Stabilize eroding river banks
- Stabilize streambanks
- Reduce impervious surfaces (i.e. brick streets/pathways)
- Require pervious pavement for all new roads and/or parking lots
- Reduce sediment levels that goes into streams.
- Reduce sedimentation from agriculture
- Reduce sedimentation from new developments
- Reduce sedimentation from silt and gravel roads
- Reduction in soil erosion (no till, BMP education)
- Decrease soil erosion and sedimentation
- Appropriate development-economically and environmentally sustainable
- Do not intensely develop current agricultural or non-commercial areas
- Reduce/limit development along the river
- Keep high density development north of Wea Creek in sewer serviced areas
- Wildlife habitat improvement
- Retain natural feeling (wilderness/forest)
- Subdivisions and developments are concerning
- Reduce urban sprawl

- Increase green infrastructure
- Improve education about LID options
- Use green roofs where possible in new and refab buildings
- If we're going to be sustainable, we should have several LEED certified buildings
- Introduce construction companies to green design
- Ensure good habitat diversity for wildlife
- Support wildlife-native species, eagle habitat, etc.
- Create birding and natural areas which are more hospitable to native plants and animals
- Plant only native plants
- Better management of habitats
- Improve ecological health of the watershed
- Increase habitat diversity
- Improve bird habitat
- Eliminate invasive species including Japanese honeysuckle and garlic mustard
- Protect the natural habitat along the river
- Catalog and reduce invasive species spread-trees, plants, animals
- Provide training/education about the advantages of some of the less popular animals/rodents and/or vegetation species
- Inventory birds, mammals, insects, plants in Wabash area
- Remove debris-boats, old cars, farm equipment
- Create a world-class (or at least nationally-recognized) river ecology
- Remove invasive fish species
- Grass carp are reproducing in the river
- Fish consumption advisories-should we eat fish from the river
- Have edible fish
- Use floodplains to filter runoff to clean water
- Acquire flood prone areas - developed or undeveloped - and restore them to wetland or forest.
- Flooding and erosion are causing us to lose our trees - many are leaning or already lost
- Protect the floodplain--give the river room to meander
- Address areas of suspected wetland and floodplain filling
- Use wetlands for bioremediation as necessary to treat industrial runoff
- Restore wetlands
- Restore and maintain wooded streambanks.
- Clean-up riverbank to reduce unsightliness and reduce erosion
- Provide economic incentive for private landowners to maintain their streambanks
- Revegetate or create wetlands within the floodplain
- Increase constructed wetlands
- Respect river floodplain vegetation and maintain continuity
- Stabilize streambanks
- Reduce nutrient inputs
- Reduce chemical pollution from agricultural
- Reduce the use of lawn fertilizers and pesticides in urban areas

- Reduce amount of medications/pharmaceutical concentrations entering the water
- Identify pollutants and reduce them
- Identify/understand and reduce large landowner impacts-specifically Purdue, Harrison Steel, Cat, Alcoa, TateLyle
- Look at other pollution sources
- Highlight efforts of counties/communities upstream to improve water quality and/or change land/water management practices
- Instill a sense of ownership in Lafayette/West Lafayette residents
- Increase public/community support through RiverFest, etc.
- Increase community awareness
- Education and participation are keys for being successful
- Emphasize that all of us (urban and agriculture, here and upstream) can improve the river ecology
- Educate people that the Wabash River is a drinking water source
- Educate the community about the value of water
- Improve the role of education-1) Awareness 2) Knowledge 3) Resources to implement
- Highlight river/tributary quality through local media
- Get visitors excited about the experience
- Improve public awareness of water and land conservation efforts
- Increase education for schools by improving environmental awareness
- Increase public awareness
- Promote Adopt-A-River opportunities
- Focus on the river
- The river scares the tourists away
- Provide wildlife and botanical education
- Educate citizens through interaction with river ecosystem dos and don'ts
- Increase awareness of program
- Educate urban landowners about lawn fertilizers, pesticides and animal wastes
- Post names of streams at road intersections - I would feel much more connected if I knew the name of the waterbody over which I'm driving.
- Provide various education options along the River highlighting river historic and ecology. Use interpretive signage and educational kiosks
- Native tours
- Enhance natural areas and access for people
- Increase trail development
- More natural corridor connections along the river/with Niches properties and parks
- Create unimproved or natural areas for recreation (walking, biking)
- Highlight important/concerning sites through watershed/river tour
- Create trail markers or walkways with historical and ecological information
- Improve the scenic by-way (SR 43) with trails and picnic areas
- Monitor the cleanliness of the river regularly
- Involve local schools in water quality testing to improve stewardship
- Improve monitoring efforts
- Use high school water quality monitors to instill lifelong connection

- Reutilize and repurpose runoff from various sources to improve aquifer regeneration
- Deal with draw down of wells
- Dredge the river
- Install fishing piers to increase access to stream and river fish
- Increase public awareness of the river and recreational opportunities
- Increase rowing and boating access
- Create boating facilities
- Create a public livery along the river
- Encourage outdoor businesses (canoe livery, etc.)
- Increase canoeing opportunities
- Improve/provide more sites for recreation/access to the River
- More recreation-get people on the river (hold an event)
- Recreational use (fishing and hiking) available and attained
- Improve parking picnic areas, seating, hiking, watercraft access
- Improve lack of access to the river
- Access to the river - currently don't use because of washouts
- Increase access and usage of the river without destroying the natural ecology
- Address blockage issues including lodged trees, bridge blockage, access infringements
- Provide on-the-water educational opportunities - pontoons, canoe/kayak tours, etc.
- Encourage individuals to pick up animal waste
- Enforcement of animal waste clean up
- Improve water quality and control runoff
- Improve water quality and utilize the water better
- Improve water quality of Elliot Ditch
- Improve water quality of the river and its tributaries as they flow through the county
- More quality neighborhoods would result from higher quality water
- Improve water quality
- Reduce agricultural tile drainage; hold water back or filter it before it enters the river
- Mediate drainage water going ino the river to create enhanced clean water
- Control runoff and drainage and filter water before it reaches a waterbody
- Investigate alternative energy options
- Include the industrial sector
- Team with everyone along the Wabash River to improve water quality
- Work with cities to the north to provide clean water
- Get help from SWCD
- Involve of community leaders-commissioners, city mayors, etc
- Incorporate field trips in steering committee meetings
- Partner with other conservation groups to help with stewardship
- Work with Ducks Unlimited
- Incorporate other stakeholders-Lilly, Alcoa, Cat, SIA
- Partner with Master Gardeners/Tree Lafayette
- Develop a facility to grow biofuels from algae in conjunction with

wastewater treatment facilities
- Incorporate existing groups
- Create community gardens
- Correct flooding issues created by INDOT's construction of the Brannigan Bridge (US 231)
- Investigate whether additional bridge span is available at US231 to allow for floodwater to move southwest
- Remove land from agricultural production and restore it to natural systems (wetland, forest, prairie)
- Increase implementation rate for rain barrel and rain garden usage
- Create ordinances which require developments to improve, or at a minimum, protect the quality of natural runoff
- Maintain what stands of trees remain within the cities.
- Plant many more trees in both cities
- Change the elevation of the floodplain adjacent to SR 43 through relocation and/or refoliation