TMDL: Pigeon River Watershed, Steuben, LaGrange, Elkhart, Noble, and DeKalb, Counties, Indiana
Date: October 15, 2012 (revised)

DECISION DOCUMENT
FOR THE PIGEON RIVER WATERSHED TMDL, INDIANA

Section 303(d) of the Clean Water Act (CWA) and EPA's implementing regulations at 40 C.F.R. Part 130 describe the statutory and regulatory requirements for approvable TMDLs. Additional information is generally necessary for EPA to determine if a submitted TMDL fulfills the legal requirements for approval under Section 303(d) and EPA regulations, and should be included in the submittal package. Use of the verb "must" below denotes information that is required to be submitted because it relates to elements of the TMDL required by the CWA and by regulation. Use of the term "should" below denotes information that is generally necessary for EPA to determine if a submitted TMDL is approvable. These TMDL review guidelines are not themselves regulations. They are an attempt to summarize and provide guidance regarding currently effective statutory and regulatory requirements relating to TMDLs. Any differences between these guidelines and EPA's TMDL regulations should be resolved in favor of the regulations themselves.

1. Identification of Water body, Pollutant of Concern, Pollutant Sources, and Priority Ranking

The TMDL submittal should identify the water body as it appears on the State's/Tribe's 303(d) list. The water body should be identified/georeferenced using the National Hydrography Dataset (NHD), and the TMDL should clearly identify the pollutant for which the TMDL is being established. In addition, the TMDL should identify the priority ranking of the water body and specify the link between the pollutant of concern and the water quality standard (see Section 2 below).

The TMDL submittal should include an identification of the point and nonpoint sources of the pollutant of concern, including location of the source(s) and the quantity of the loading, e.g., lbs/per day. The TMDL should provide the identification numbers of the NPDES permits within the water body. Where it is possible to separate natural background from nonpoint sources, the TMDL should include a description of the natural background. This information is necessary for EPA's review of the load and wasteload allocations, which are required by regulation.

The TMDL submittal should also contain a description of any important assumptions made in developing the TMDL, such as:

(1) the spatial extent of the watershed in which the impaired water body is located;
(2) the assumed distribution of land use in the watershed (e.g., urban, forested, agriculture);
(3) population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources;
(4) present and future growth trends, if taken into consideration in preparing the TMDL (e.g., the TMDL could include the design capacity of a wastewater treatment facility); and
(5) an explanation and analytical basis for expressing the TMDL through *surrogate measures*, if applicable. *Surrogate measures* are parameters such as percent fines and turbidity for sediment

impairments; chlorophyll a and phosphorus loadings for excess algae; length of riparian buffer; or number of acres of best management practices.

Comment:

Location Description/Spatial Extent:

The Pigeon River watershed (PRW), within the boundaries of the Lake Michigan watershed, is located in northeast Indiana in Steuben, LaGrange, Elkhart, Noble and DeKalb Counties. The PRW also extends into the State of Michigan and occupies parts of St. Joseph and Cass Counties in Michigan. This TMDL report only addresses the Indiana portion of the watershed. The PRW is approximately 253,000 acres (approximately 395.31square miles (mi^2)) in size. The Pigeon River begins near Freemont, Indiana and flows in a northwesterly direction until it joins the St. Joseph River near Mottville, Michigan. The St. Joseph River eventually empties into Lake Michigan in the City of St. Joseph, Michigan.

This TMDL addressed impaired surface water segments within the PRW. These segments have been identified as exceeding water quality standards (WQS) for bacteria (*Escherichia coli* (*E. coli*)) and biological narrative standards, which in Indiana are evaluated with fish community index of biotic integrity (IBI) scores. The PRW TMDLs include impaired reaches within the following HUC-12 subwatersheds within the PRW:

- 04050001-10-01 (Pigeon Lake – Pigeon Creek);
- 04050001-10-02 (Mud Creek – Pigeon Creek);
- 04050001-10-03 (Long Lake – Pigeon Creek);
- 04050001-10-04 (Headwaters Turkey Creek);
- 04050001-10-05 (Big Turkey Lake – Turkey Creek);
- 04050001-10-06 (Silver Lake – Pigeon Creek);
- 04050001-10-07 (Otter Lake – Pigeon Creek);
- 04050001-10-08 (Little Turkey Lake – Turkey Creek);
- 04050001-10-09 (Green Lake – Pigeon Creek);
- 04050001-10-10 (Mongo Millpond – Pigeon Creek);
- 04050001-11-01 (East Fly Creek);
- 04050001-11-02 (Fly Creek);
- 04050001-11-03 (Cline Lake – Pigeon River);
- 04050001-11-04 (Buck Lake – Buck Creek);
- 04050001-11-05 (Page Ditch);
- 04050001-11-06 (Van Natta Ditch – Pigeon River); &
- 04050001-11-07 (Stag Lake – Pigeon River).

Impairments identified within each individual 12-digit HUC are listed in Table 1 of this Decision Document.

IDEM formally requested that EPA withdraw the TMDL request for the Mud Creek subwatershed (segment INJ01A2_T1004) for total nitrogen. EPA suspends any decision action related to total nitrogen for segment INJ01A2_T1004. IDEM explained that they included the total nitrogen discussion in the PRW for informational purposes.[1]

[1] Personal Communication (phone call), between Staci Goodwin (IDEM) and Peter Swenson, Dave Werbach and Paul Proto (EPA, R5), on 9/5/12.

Water quality within the PRW was monitored in 2010 via efforts from the Indiana Department of Environmental Management (IDEM). Water quality sampling efforts involved measuring the health of the stream environments by collecting field data to monitor the quality of aquatic biological communities, and the chemical, physical and habitat characteristics within each stream environment. In the PRW, IDEM determined that forty-seven (47) segments exceeded bacteria water quality standards, and one segment (INJ01A2_T1004, Mud Creek) exceeded the water quality concentration target (WQCT) for phosphorus and the fish community IBI score (i.e. one segment, two impairments). IDEM determined that the likely cause for not achieving the fish community IBI score was linked to elevated concentrations of phosphorus from nonpoint sources and effluent discharges from a wastewater treatment plant. Reaches addressed in the Pigeon River watershed were listed on Indiana's 2008 303(d) list.

Table 1: Summary of Impairments in the Pigeon River watershed

Narrative Description	2010 AUID	Impaired Beneficial Use	Action
Pigeon Lake – Pigeon Creek (04050001-10-01)			
Pigeon Creek	INJ01A1_01	Recreational Use	Bacteria TMDL
Ryan Ditch	INJ01A1_T1001	Recreational Use	Bacteria TMDL
Metz Ditch	INJ01A1_T1002	Recreational Use	Bacteria TMDL
Berlien Ditch	INJ01A1_T1004	Recreational Use	Bacteria TMDL
Mud Creek – Pigeon Creek (04050001-10-02)			
Pigeon Creek	INJ01A2_01	Recreational Use	Bacteria TMDL
Jack Ditch	INJ01A2_T1001	Recreational Use	Bacteria TMDL
Pigeon Creek - Unnamed Tributary	INJ01A2_T1003	Recreational Use	Bacteria TMDL
Mud Creek	INJ01A2_T1004	Recreational Use & Aquatic Life Use	Bacteria TMDL & Phosphorus TMDL
Long Lake – Pigeon Creek (04050001-10-03)			
Pigeon Creek	INJ01A3_01	Recreational Use	Bacteria TMDL
Pigeon Creek - Unnamed Tributary	INJ01A3_T1001	Recreational Use	Bacteria TMDL
Pigeon Creek - Unnamed Tributary	INJ01A3_T1003	Recreational Use	Bacteria TMDL
Johnson Ditch	INJ01A3_T1004	Recreational Use	Bacteria TMDL
Johnson Ditch - Unnamed Tributary	INJ01A3_T1005	Recreational Use	Bacteria TMDL
Headwaters Turkey Creek (04050001-10-04)			
Turkey Creek	INJ01A4_02	Recreational Use	Bacteria TMDL
Turkey Creek - Unnamed Tributary	INJ01A4_T1003	Recreational Use	Bacteria TMDL
Deetz Ditch	INJ01A4_T1005	Recreational Use	Bacteria TMDL
Big Turkey Lake – Turkey Creek (04050001-10-05)			
Turkey Creek	INJ01A5_01	Recreational Use	Bacteria TMDL
Mud Creek	INJ01A5_T1001	Recreational Use	Bacteria TMDL
Mud Creek - Unnamed Tributary	INJ01A5_T1002	Recreational Use	Bacteria TMDL
Silver Lake – Pigeon Creek (04050001-10-06)			
Inlet to Golden Lake	INJ01A6_T1002	Recreational Use	Bacteria TMDL
Otter Lake – Pigeon Creek (04050001-10-07)			
Pigeon Creek	INJ01A7_01	Recreational Use	Bacteria TMDL
Inlet to Otter Lake	INJ01A7_T1001	Recreational Use	Bacteria TMDL
Little Turkey Lake – Turkey Creek (04050001-10-08)			
Maumee Ditch	INJ01A8_T1001	Recreational Use	Bacteria TMDL

Inlet to Mud Lake	INJ01A8_T1002	Recreational Use	Bacteria TMDL
Inlet to Taylor Lake	INJ01A8_T1002A	Recreational Use	Bacteria TMDL
Inlet to Little Turkey Lake	INJ01A8_T1008	Recreational Use	Bacteria TMDL
Green Lake – Pigeon Creek (04050001-10-09)			
Pigeon Creek	INJ01A9_01	Recreational Use	Bacteria TMDL
Mongo Millpond – Pigeon Creek (04050001-10-10)			
Turkey Creek	INJ01AA_02	Recreational Use	Bacteria TMDL
Turkey Creek	INJ01AA_03	Recreational Use	Bacteria TMDL
East Fly Creek (04050001-11-01)			
Fly Creek, East	INJ01B1_02	Recreational Use	Bacteria TMDL
Stoner Ditch	INJ01B1_T1004	Recreational Use	Bacteria TMDL
Fly Creek (04050001-11-02)			
Fly Creek	INJ01B2_01	Recreational Use	Bacteria TMDL
Fly Creek	INJ01B2_02	Recreational Use	Bacteria TMDL
Cline Lake – Pigeon River (04050001-11-03)			
Pigeon River	INJ01B3_01	Recreational Use	Bacteria TMDL
Ontario Millpond Inlet / Pigeon River	INJ01B3_02	Recreational Use	Bacteria TMDL
Pigeon River	INJ01B3_03	Recreational Use	Bacteria TMDL
Pigeon River - Unnamed Tributary	INJ01B3_T1002	Recreational Use	Bacteria TMDL
Buck Lake – Buck Creek (04050001-11-04)			
Buck Creek	INJ01B4_01	Recreational Use	Bacteria TMDL
Buck Creek Ditch, East	INJ01B4_T1002	Recreational Use	Bacteria TMDL
Buck Creek Ditch, East	INJ01B4_T1003	Recreational Use	Bacteria TMDL
Page Ditch (04050001-11-05)			
Page Ditch	INJ01B5_01	Recreational Use	Bacteria TMDL
Page Ditch - Unnamed Tributary	INJ01B5_T1002	Recreational Use	Bacteria TMDL
Trusdale Ditch	INJ01B5_T1003	Recreational Use	Bacteria TMDL
Van Natta Ditch – Pigeon River (04050001-11-06)			
Pigeon River	INJ01B6_01	Recreational Use	Bacteria TMDL
Pigeon River	INJ01B6_02	Recreational Use	Bacteria TMDL
Van Natta Ditch	INJ01B6_T1002	Recreational Use	Bacteria TMDL
Stag Lake – Pigeon River (04050001-11-07)			
Fetch Ditch	INJ01B7_T1001	Recreational Use	Bacteria TMDL

Land Use:

The Pigeon River Watershed encompasses approximately 253,000 acres within northeast Indiana. Land use in the PRW is comprised of; cultivated crops, hay/pasture, woody wetlands, deciduous forests, developed open space, developed low intensity lands, open water, herbaceous lands, developed medium intensity lands, evergreen forests, developed high intensity lands, emergent herbaceous wetlands, shrub/scrub, mixed forests, and barren lands. Land use coverage from the 2006 National Land Cover Dataset (NLCD) was utilized to calculate the percentages of land cover within the PRW. Cultivated crop lands (47.3%) and hay/pasture lands (17.5%) accounted for two of the largest land cover categories. High, medium and low intensity developed areas, and open space developed areas were subdivided into individual land coverages. Combined, these four land uses account for approximately 8.9% of the land area. IDEM provided land use distribution values which were based on land use percentages of the total

PRW area. The distribution values of each land use within the PRW are found in Table 2 of this Decision Document.

Table 2: Land use in the Pigeon River (IN) watershed

Description	Area (acres)	Distribution (% of the total area in the Pigeon River watershed)
Cultivated Crops	119,795	47.3%
Hay / Pasture	44,157	17.5%
Woody Wetlands	41,654	16.5%
Deciduous Forest	12,968	5.1%
Developed, Open Space	12,233	4.8%
Developed, Low Intensity	7,822	3.1%
Open Water	5,513	2.2%
Herbaceous	3,721	1.5%
Developed, Medium Intensity	1,840	0.7%
Evergreen Forest	1,273	0.5%
Developed, High Intensity	764	0.3%
Emergent Herbaceous Wetlands	575	0.2%
Shrub / Scrub	457	0.2%
Mixed Forest	131	0.1%
Barren Land	102	0.0%

Source: 2006 National Land Cover Dataset

Problem Identification:
IDEM identified water body segments within the PCW on the 303(d) list of impaired waters as impaired for excessive *E. coli* concentrations, phosphorus concentrations and fish community IBI impairments. Water quality sampling in 2010, conducted by IDEM, included the analysis of bacteria (*E. coli*), total phosphorus (TP), and fish community IBI scores. Sampling events completed in 2010 found exceedances of water quality standards for bacteria and WQCT for TP and fish community IBI values in reaches within the PRW.

Impaired reaches were listed on the 2008 Indiana 303(d) list for recreational use impairments (due to bacteria exceedances of numeric WQS) and aquatic life use impairments (due to total phosphorus WQCT exceedances and fish community IBI scores). Bacteria exceedances can negatively impact recreational uses (fishing, swimming, wading, boating etc.) and public health. At elevated levels, bacteria may cause illness within humans who have contact with or ingest bacteria laden water. Recreation-based contact can lead to ear, nose, and throat infections, and stomach illness. *E. coli* is used as an indicator of the presence of bacteria.

Degradations in aquatic habitats or water quality (ex. organic enrichment) can negatively impact aquatic life use. A TMDL was completed for total phosphorus to address the aquatic life use impairments related to fish community IBI scores. Nutrient enrichment, by phosphorus, can increase turbidity and support algal growth. Increased turbidity and algal growth can reduce dissolved oxygen in the water column, and cause large shifts throughout the day in dissolved oxygen and pH. Shifting chemical conditions within the water column may stress aquatic biota. Degradations in aquatic habitats or water quality may result in reduced fish populations or altered fish communities from communities supporting sport fish species to communities supporting rough fish species.

Priority Ranking:
The PRW TMDL was prioritized to be completed at this time based on the IDEM rotating basin approach. In this approach available assessment resources are concentrated or targeted in defined watersheds for a specified period of time, thus allowing for water quality data to be collected and assessed in a spatially and temporally "focused" manner. Over time, every portion of the state is targeted for monitoring and assessment.

IDEM utilizes a rotating basin approach to monitor water quality unless there is a significant reason to deviate from the rotating basin schedule. Deviations can lead to water bodies being upgraded or downgraded in priority depending on: the specified designated use and whether water quality standards are being met, the magnitude of the impairment, deviations to allow an appropriate amount of time for implementation practices to take hold, and instances where no water quality guidance is available or guidance is currently being developed.

Pollutants of Concern:
Recreational Use: The pollutant of concern for total body contact recreational use impairment is *E. coli* which is an indicator for pathogenic bacteria.

Aquatic Community Support: 327 IAC 2-1-3(a)(2)(A) states that all surface waters should be capable of supporting a well-balanced, warm water aquatic community. The pollutants of concern for aquatic life use impairment are excess nutrients (total phosphorus) as well as effluent contributions from wastewater treatment plants.

Source Identification (point and nonpoint sources):
Point Source Identification: The potential point sources to the PRW are:

National Pollutant Discharge Elimination System (NPDES) permit holders: NPDES permitted facilities may contribute pollutant loads (bacteria or nutrients) to surface waters through facility discharges of treated wastewater. Permitted treatment facilities are authorized to discharge treated wastewater according to their NPDES permits. IDEM identified several NPDES permit holders in the PRW. Table 3 in this Decision Document identifies those facilities within the PRW which were assigned a portion of the wasteload allocation (WLA).

Table 3: Permitted NPDES dischargers in the Pigeon River watershed

NPDES ID	Facility Name	Facility Type	Receiving Water
IN0021296	Angola Municipal STP	WWTP	04050001-10-02
IN0022292	Ashley Municipal STP	WWTP	04050001-10-03
IN0061557	Steuben Lakes RWD	WWTP	04050001-10-07
IN0060097	LaGrange Region B WWTP	WWTP	04050001-10-10
IN0058505	Fish and Royer Lake WWTP	WWTP	04050001-11-01
IN0020478	LaGrange Municipal STP	WWTP	04050001-11-02
IN0040622	Shipshewana Municipal STP	WWTP	04050001-11-05

Municipal Separate Storm Sewer Systems (MS4): There is one MS4 community within the boundaries of the PRW, the City of Angola and Trine University (INR040005). Stormwater from MS4s can transport bacteria and nutrients to surface water bodies during or shortly after storm events. All of the MS4 communities within Table 4 of this Decision Document were assigned a portion of the WLA.

Table 4: MS4 Communities in the Pigeon River watershed

NPDES ID	Facility Name	Type	Receiving Waters (acres within MS4 boundary)
INR040005	City of Angola and Trine University	MS4	04050001-10-01 (398 acres), 04050001-10-02 (1,308 acres) & 04050001-10-03 (192 acres)

Combined Sewer Overflows (CSOs): There is one CSO location within the PRW (Table 5 of this Decision Document), the Angola Municipal Wastewater Treatment Plant (WWTP) (IN0021296). CSOs may deliver bacteria and nutrients to waterways during or shortly after storm events. IAC Article 15, Industrial Wastewater Pretreatment Programs and NPDES includes regulations specific to communities experiencing CSOs and/or sanitary sewer overflows (SSOs). CSOs are defined (327 IAC 5-1.5-7) as, a sewer designed and employed to receive both (1) water-carried or liquid wastes; and, (2) storm or surface water.

Table 5: Combined Sewer Overflows in the Pigeon River watershed

NPDES ID	Facility Name	Type	Receiving Water
IN0021296	Angola Municipal WWTP (Pipe ID 002)	CSO	04050001-10-02
IN0021296	Angola Municipal WWTP (Pipe ID 003)	CSO	04050001-10-02

Sanitary Sewer Overflows (SSOs): The LaGrange WWTP (IN0020478) has one registered SSO (Table 6 of this Decision Document). SSOs are unintentional and illegal discharges of raw sewage from sanitary sewer systems. SSOs may deliver bacteria and nutrients to waterways during or shortly after storm events.

Table 6: Sanitary Sewer Overflows in the Pigeon River watershed

NPDES ID	Facility Name	Description	Type	Receiving Water
IN0020478	Lagrange WWTP	Next to WWTP	SSO	04050001-11-02

Concentrated Animal Feeding Operations (CAFOs): There is one registered CAFO facility in the PRW, the Toll Tail Dairy LLC (ID #6464) facility (Table 14 of the final TMDL document). The Toll Tail Dairy LLC facility impacts water within the 04050001-10-10 subwatershed. CAFOs generally are facilities which have greater than 1,000 animal units on site. By rule, CAFOs and other large feedlots are generally not allowed to discharge to waters of the State. Manure from these lots is spread on nearby fields and can be a source of phosphorus found in nonpoint derived watershed runoff. However, runoff from manure spread onto fields in accordance with federal and state requirements is unregulated, and included in the watershed runoff portion of the load allocation (LA).

Nonpoint Source Identification: The potential nonpoint sources to the PRW are:

Urban runoff: Runoff from urban areas (urban, residential, commercial or industrial land uses) can contribute various pollutants (bacteria and nutrients) to local water bodies. Stormwater from urban areas, which drain impervious surfaces, may introduce pollutants to surface waters. Potential urban sources of bacteria and nutrients can also include wildlife or pet wastes.

Septic systems: Septic systems generally do not discharge directly into a water body, but their effluents may leach into groundwater or pond at the surface where they can be washed into surface waters via stormwater runoff events. The impacts of stormwater flushing of ponded surface waters due to failing septic systems would be greatest during dry or low-flow conditions. Failing septic systems are a potential source of bacteria and nutrients within the PRW. All the counties in the watershed follow the state IAC 16-1-4-9 and IAC 36-1-6-2 rules regarding septic systems. Failures are typically identified through public complaints and through the sale of older properties that have not passed inspection.

Stormwater runoff from agricultural land use practices: Runoff from agricultural lands may contain significant amounts of pollutants (bacteria and nutrients) which may lead to impairments in the PRW. Manure spread onto fields is often a source of pollutants, and can be exacerbated by tile drainage lines, which channelize the stormwater flows and reduce the time available for bacteria to die-off. Nutrients can be mobilized in a similar fashion to bacteria. Tile lined fields and channelized ditches enable particles to move into surface waters.

Unrestricted livestock access to streams: Livestock with access to stream environments may add bacteria and nutrients directly to surface waters or resuspend particles that had settled on the stream bottom. Direct deposition of animal wastes can result in very high localized bacteria and nutrient counts and may contribute to downstream impairments.

Stream channelization and stream erosion: Eroding streambanks and channelization efforts may add sediment and nutrients to local surface waters. Nutrients may be added if there is particulate phosphorus bound with eroding soils. Eroding riparian areas may be linked to soil inputs within the water column and potentially to changes in flow patterns. Changes in flow patterns may encourage down-cutting of the streambed and streambanks. Stream channelization efforts can increase the velocity of flow (via the removal of the sinuosity of a natural channel) and disturb the natural sedimentation processes of the streambed.

Confined feeding operations (CFOs): Are agricultural operations where animals are kept and raised in confined spaces. CFOs generate manure which may be spread onto fields. Runoff from fields with spread manure from CFOs can be exacerbated by tile drainage lines, which channelize the stormwater flows and reduce the time available for bacteria to die-off. Nutrients can be mobilized in a similar fashion to bacteria. CFOs can be a source of bacteria and nutrients to water bodies in the PRW via the mobilization and transportation of pollutant laden waters from feeding, holding and manure storage sites. Nutrients can be mobilized in a similar fashion to bacteria. Tile-lined fields and channelized ditches enable pollutants to move into surface waters. IDEM identified fourteen CFOs within the PRW (Table 7 of this Decision Document).

Table 7: Confined Feed Operations (CFOs) in the Pigeon River watershed

Site Name	Type	ID #	HUC-12
John D. Smith & Sons Inc.	CFO	1082	04050001-10-02
John D. Smith & Sons Inc.	CFO	1108	04050001-10-02
Stockwell Acres Inc.	CFO	6650	04050001-10-04
Twin Pines Farm Inc.	CFO	291	04050001-10-08

BLT Enterprises	CFO	659	04050001-10-08
Hilltop Dairy LLC	CFO	1005	04050001-10-08
Perkins Twin Creek Farm	CFO	6390	04050001-10-08
Springfield Swine	CFO	4004	04050001-10-09
Lowell Freed	CFO	3622	04050001-11-01
Ron Kauffman	CFO	3518	04050001-11-03
Ervin Fry	CFO	3686	04050001-11-05
Freeman Yoder	CFO	1031	04050001-11-06
Hog Finishing Site	CFO	6507	04050001-11-01
James J. Lambright	CFO	6555	04050001-11-07

Pets and horses: Uncollected horse and pet waste is a source of *E. coli* to downstream water bodies. IDEM estimated pet and horse numbers within the PRW to be approximately 10,445 dogs and 1,040 horses. Horses are often used as a primary form of transportation by the relatively large local Amish population within the PRW.

Wildlife: Deer, geese, ducks, raccoons, turkeys, and other animals are recognized as potential contributors of bacteria and nutrients to the PRW.

Future Growth:
IDEM estimated population for each of the counties within the PRW based off of 2010 U.S. Census information. Of the five counties within Indiana, Elkhart County was estimated to have the largest population and Steuben County the lowest population. Population within Steuben, LaGrange, Elkhart, Noble, and DeKalb counties is expected to increase (approx. 6.25% growth) by 2030.[2] The WLA and the load allocation (LA) were calculated for all current and future sources. Any expansion of point or nonpoint sources will need to comply with the respective WLA and LA values in the TMDL. No portion of the loading capacity for the bacteria or nutrient TMDLs, was assigned to a future growth/reserve capacity value.

The U.S. EPA finds that the TMDL document submitted by IDEM satisfies the requirements of the first criterion.

2. Description of the Applicable Water Quality Standards and Numeric Water Quality Target

The TMDL submittal must include a description of the applicable State/Tribal water quality standard, including the designated use(s) of the water body, the applicable numeric or narrative water quality criterion, and the antidegradation policy (40 C.F.R. §130.7(c)(1)). EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

The TMDL submittal must identify a numeric water quality target(s) – a quantitative value used to measure whether or not the applicable water quality standard is attained. Generally, the pollutant of

[2] IBRC, 2012, Indiana Business Research Center. Indiana University Kelley School of Business. Indiana population projections- Steuben, LaGrange, Elkhart, Noble and DeKalb population totals: 2030. *STATS Indiana*. Retrieved 7/31/12 from http://www.stats.indiana.edu/pop_proj/.

concern and the numeric water quality target are, respectively, the chemical causing the impairment and the numeric criteria for that chemical (e.g., chromium) contained in the water quality standard. The TMDL expresses the relationship between any necessary reduction of the pollutant of concern and the attainment of the numeric water quality target. Occasionally, the pollutant of concern is different from the pollutant that is the subject of the numeric water quality target (e.g., when the pollutant of concern is phosphorus and the numeric water quality target is expressed as Dissolved Oxygen (DO) criteria). In such cases, the TMDL submittal should explain the linkage between the pollutant of concern and the chosen numeric water quality target.

<u>Comment:</u>
Designated Uses:
The designated uses for the water bodies identified in the PRW TMDL are for total body contact recreation use and aquatic life use.

<u>Recreational use:</u> The total body contact recreational use *E. coli* WQS for all waters in the Great Lakes system are as follows: (from Indiana Administrative Code 327 IAC 2-1.5-8(e)(3))

(3) For full body contact recreational uses, *E. coli* bacteria shall not exceed the following:
(A) One hundred twenty-five colony forming units (cfu) per 100 milliliters as a geometric mean based on not less than five samples equally spaced over a 30 day period.
(B) Two hundred thirty-five cfu per 100 milliliters in any 1 sample in a 30 day period, except that in cases where there are at least 10 samples at a given site, up to 10 percent of the samples may exceed 235 cfu (colony forming units) or MPN (most probable number) per 100 milliliters where:

> (i) the *E. coli* exceedances are incidental and attributable solely to *E. coli* resulting from the discharge of treated wastewater from a wastewater treatment plant as defined at IC 13-11-2-258; and
> (ii) the criterion in clause (A) is met. However, a single sample shall be used for making beach notification and closure decisions.

The PRW TMDL *E. coli* target is: from April 1through October 31, *E. coli* shall not exceed **125 cfu per 100 mL**, as a geometric mean based on not less than five samples equally spaced over a 30-day period. Water bodies are held to recreation use criteria during the time of the year when people are most likely to be engaged in activities such as swimming, wading or boating. The recreation use criteria were established to protect against disease carrying organisms that may be ingested or introduced to the eyes, skin or other body parts during water recreation activities.

<u>Aquatic Life Use:</u> 327 IAC 2-1-3(a)(2)(A) states that all surface waters, except as described in subdivision (5), will be capable of supporting a well-balanced, warm water aquatic community. Furthermore, at all times, all surface waters outside of mixing zones shall be free of substances in concentrations that on the basis of available scientific data are believed to be sufficient to injure, be chronically toxic to, or be carcinogenic, mutagenic, or teratogenic to humans, animals, aquatic life, or plants (327 IAC 2-1-6(a)(2)).

Compliance with the biological narrative standards in Indiana are evaluated via fish community index of biotic integrity scores. The IDEM scoring methodology considers that the IBI score should be above 36 in order to be fully supporting of aquatic life. For IBI scores, 327 IAC 2-1-3(a)(2)(A) states that all surface waters, except as described in subdivision (5), will be capable of supporting a well-balanced, warm water aquatic community.

Currently IDEM has not developed numeric criteria for TP. WQCT values were established by IDEM to improve water quality within water bodies to support well balanced aquatic communities. In several segments of the PRW low dissolved oxygen and habitat were also identified as potential stressors contributing to biotic community impairments. Low dissolved oxygen is often the result of elevated nutrient levels (TP), while habitat problems are generally associated with higher sediment concentrations.

The state of Indiana strives to achieve waters free from substances that, "contribute to the growth of nuisance plants or algae." IDEM believes that exceedances of TP targets are impacting biological communities within the PRW (specifically the Mud Creek subwatershed, 4050001-10-02). The impaired biological community segment within Mud Creek was identified during IDEM's water quality assessment in 2010. IDEM explained that biological communities within Mud Creek were likely impacted by increased concentrations of TP.

IDEM employed the TP WQCT value of 0.3 mg/L to evaluate the extent of the TP exceedance within the Mud Creek subwatershed. The TP WQCT of 0.3 mg/L is based on a narrative nutrient criteria described in 327 IAC 2-1-6 and is intended to limit the negative effects on aquatic ecosystems that can occur due to increasing algal and aquatic plant life production associated with higher nutrient concentrations.

Table 8: Water quality standards (WQS) and water quality concentration targets (WQCT) utilized within the Pigeon River watershed TMDL

Parameter	Units	Water Quality Criteria	TMDL Targets
Numeric Water Quality Criteria for addressing the Bacteria (*E. coli*) impaired segments within the Pigeon River watershed			
E. Coli[1]	#/100 mL	Numeric WQS	235 single sample maximum
		Numeric WQS	Geometric mean < 125 [2]
Numeric targets based on the interpretation of the narrative nutrient criteria (327 IAC 2-1-6) for addressing phosphorus and fish community index of biotic integrity (IBI) impaired segments within the Pigeon River watershed			
Total Phosphorus	mg/L	Numeric Target Value	0.3
Index of Biotic Integrity (IBI)	IBI Score	Numeric Target Value	36

1 = *E. coli* standards are for the recreation season only (April 1 through October 31).
2 = Geometric mean based on minimum of 5 evenly spaced samples taken over not more than a 30-day period.

Water quality criteria: IDEM utilized the E. coli water quality criteria of 125 cfu/100 mL (Table 8 of this Decision Document).

Water quality concentration targets: The Mud Creek subwatershed (4050001-10-02) is the only subwatershed within the PRW which indicated exceedances of the biological narrative criteria. In the context of this TMDL, this impairment is addressed through a TP TMDL. Additional locations within the PRW may have impaired biological communities, but at this time, IDEM has not identified the cause of these impairments and those areas are not addressed via the PRW TMDLs. For the Mud Creek subwatershed IDEM selected a WQCT of 0.3 mg/L for total phosphorus TMDL development (Table 8 of this Decision Document). The target value was intended to not only achieve the TP WQCT, but also the IBI target score of 36.

The U.S. EPA finds that the TMDL document submitted by IDEM satisfies the requirements of the second criterion.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

A TMDL must identify the loading capacity of a water body for the applicable pollutant. EPA regulations define loading capacity as the greatest amount of a pollutant that a water can receive without violating water quality standards (40 C.F.R. §130.2(f)).

The pollutant loadings may be expressed as either mass-per-time, toxicity or other appropriate measure (40 C.F.R. §130.2(i)). If the TMDL is expressed in terms other than a daily load, e.g., an annual load, the submittal should explain why it is appropriate to express the TMDL in the unit of measurement chosen. The TMDL submittal should describe the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources. In many instances, this method will be a water quality model.

The TMDL submittal should contain documentation supporting the TMDL analysis, including the basis for any assumptions; a discussion of strengths and weaknesses in the analytical process; and results from any water quality modeling. EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

TMDLs must take into account *critical conditions* for steam flow, loading, and water quality parameters as part of the analysis of loading capacity (40 C.F.R. §130.7(c)(1)). TMDLs should define applicable *critical conditions* and describe their approach to estimating both point and nonpoint source loadings under such *critical conditions*. In particular, the TMDL should discuss the approach used to compute and allocate nonpoint source loadings, e.g., meteorological conditions and land use distribution.

Comment:

IDEM determined the loading capacities for the impaired water bodies in the PRW based on the *E. coli* WQS and the WQCT for TP (Table 8 of this Decision Document). The Load Duration Curve (LDCs) approach was selected by IDEM to calculate TMDLs for bacteria and nutrients, given that this approach identifies loading based on flow.

Bacteria (E. coli) TMDLs: For the *E. coli* TMDLs a geometric mean of **125 cfu/100 ml** for five samples equally spaced over a 30-day period was utilized to set the loading capacity of the TMDL. IDEM believes the geometric mean portion of the WQS provides the best overall characterization of the status of the watershed. The EPA agrees with this assertion, as stated in the preamble of, *"The Water Quality Standards for Coastal and Great Lakes Recreation Waters Final Rule"* (69 FR 67218-67243, November 16, 2004) on page 67224, "…the geometric mean is the more relevant value for ensuring that appropriate actions are taken to protect and improve water quality because it is a more reliable measure, being less subject to random variation, and more directly linked to the underlying studies on which the 1986 bacteria criteria were based."

Typically loading capacities are expressed as a mass per time (e.g. pounds per day). For *E. coli* loading capacity calculations, however, mass is not always an appropriate measure because *E. coli* is expressed in terms of organism counts. This approach is consistent with the EPA's regulations which define "load" as "an amount of matter that is introduced into a receiving water" (40 CFR §130.2). To establish the loading capacities for the PRW, IDEM used Indiana's water quality standards for *E. coli* (125 cfu/100 mL). A loading capacity is, "the greatest amount of loading that a water can receive without violating water quality standards." (40 CFR §130.2). Therefore, a loading capacity set at the WQS will assure that the water does not violate WQS. IDEM's *E. coli* TMDL approach is based upon the premise that all discharges (point and nonpoint) must meet the WQS when entering the water body. If all sources meet the WQS at discharge, then the water body should meet the WQS and the designated use.

IDEM used the LDC approach to calculate bacteria loading at the outlet points of subwatersheds (HUC-12 scale) within the PRW. Impaired reaches were assigned to their respective subwatershed based on the location of the reach within the PRW. Flow duration curves (FDC) were created for each of the subwatersheds within the PRW. The FDC were developed from flow frequency tables based on recorded and scaled flow volumes measured at a three USGS gages within the PRW. Daily flow data was available from USGS stations near Angola, IN (#04099510, Pigeon Creek), near Scott, IN (#04099750, Pigeon River) and Elkhart, IN (#04101000, St. Joseph River). Flow data were downscaled from the nearest downstream USGS gage. Downscaling also accounted for wastewater treatment flows, as applicable, for individual HUC-12 watersheds.

The gage stations each contain over 40 years of continuous flow data. Data from the years 1975-2010 were used in this analysis; this long record appears to contain the full range of flow conditions. The flow data focused on dates within the recreation season (April 1 – October 31). Dates outside of the recreation season were excluded from the flow record. Flows at these three locations were utilized to characterize the flows within other subwatersheds in the PRW. The flow duration analysis first estimated wastewater treatment plant flows for applicable HUC- 12 watersheds on a daily basis based on permitting records. The wastewater treatment plant flows were assigned to their respective HUC-12 watersheds. The total flow of the surrogate USGS gage was reduced by the total wastewater treatment plant flows in upstream HUC-12 watersheds. Next, the drainage area of each HUC-12 watershed was divided by the drainage area of the surrogate USGS gage.

The flows for each of the HUC-12 watersheds were then estimated by multiplying the daily flows at the surrogate gage (less the wastewater treatment plant flows) by drainage area ratios. Flows for HUC-12 watersheds having wastewater treatment plants included previously-estimated wastewater treatment plant flows plus the applicable area-weighted flows. Flows for HUC-12 watersheds without wastewater treatment plants included only the area-weighted flows. The drainage area weighting utilized the following equation:

$$Q_{ungaged} = (A_{ungaged} / A_{gaged}) * Q_{gaged}$$

where,

$Q_{ungaged}$	= Flow at the ungaged location
Q_{gaged}	= Flow at surrogate USGS gage station
$A_{ungaged}$	= Drainage area of the ungaged location
A_{gaged}	= Drainage area of the gaged location

In this procedure, the drainage area of each monitoring station (or impaired segment) was divided by the drainage area of the surrogate gage.

Downscaling flow data in this manner is typical in the absence of sufficient monitoring locations and hydrologic/hydraulic watershed modeling. IDEM explained that this approach is not as reliable as monitored or modeled flows due to the spatial variability of rainfall and the differences in hydrologic/hydraulic characteristics of each HUC-12 watershed.

The cumulative frequency of the downscaled flow data was used to develop flow duration curves for the downstream point of each HUC-12 watershed. The compiling of flow data and appropriately downscaling this data based on USGS gage location resulted in a flow duration curve for each HUC-12 watershed that relates flow values to the percent of time those flows have been met or exceeded. Thus, for each HUC-12 watershed, the full range of stream flows is considered.

FDC graphs have flow duration interval (percentage of time flow exceeded) on the X-axis and discharge (flow per unit time) on the Y-axis. The FDC were transformed into LDC by multiplying individual flow values by the WQS (125 cfu/ 100 mL) and then by a conversion factor. The resulting points are plotted onto a load duration curve graph. LDC graphs, for the PRW bacteria TMDLs, have flow duration interval (percentage of time flow exceeded) on the X-axis and *E. coli* concentrations (number of bacteria per unit time) on the Y-axis. The PRW LDC used *E. coli* measurements in billions of bacteria per day. The curved line on a LDC graph represents the TMDL of the respective flow location and the flow conditions observed at that location.

IDEM completed water quality monitoring in the PRW basin in 2010 and measured *E. coli* concentrations at specific sampling points within the watershed. *E. coli* values from these efforts were converted to individual sampling loads by multiplying the sample concentration by the instantaneous flow measurement observed/estimated at the time of sample collection. The individual sampling loads were plotted on the same figure with the created LDC.

The LDC plots were subdivided into five flow regimes; very high flows (exceeded 0–10% of the time), moist conditions (exceeded 10–40% of the time), “normal” range flows (exceeded 40–60% of the time), dry conditions (exceeded 60–90% of the time), and low flows (exceeded 90–100% of the time). LDC plots can be organized to display individual sampling loads and the calculated LDC. Watershed managers can interpret these plots (individual sampling points plotted with the LDC) to understand the relationship between flow conditions and water quality exceedances within the watershed. Individual sampling loads which plot above the LDC represent violations of the WQS and the allowable load under those flow conditions at those locations. The difference between individual sampling loads plotting above the LDC and the LDC, measured at the same flow is the amount of reduction necessary to meet WQS.

The strengths of using the LDC method are that critical conditions and seasonal variation are considered in the creation of the FDC by plotting hydrologic conditions over the flows measured during the recreation season. Additionally, the LDC methodology is relatively easy to use and cost-effective. The weaknesses of the LDC method are that nonpoint source allocations cannot be assigned to specific sources, and specific source reductions are not quantified. Overall, IDEM believes and EPA concurs that the strengths outweigh the weaknesses for the LDC method.

Implementing the results shown by the LDC requires watershed managers to understand the sources contributing to the water quality impairment and which Best Management Practices (BMPs) may be the most effective for reducing bacteria loads based on flow magnitudes. Different sources will contribute bacteria loads under varying flow conditions. For example, if exceedances are significant during high flow events this would suggest storm events are the cause and implementation efforts can target BMP that will reduce stormwater runoff and consequently bacteria loading into surface waters. This allows for a more efficient implementation effort.

IDEM approached the PRW TMDLs by calculating loading capacity values at the outlet points for each HUC-12 scale subwatershed within the PRW. There were multiple impaired stream segments within most of the individual HUC-12 subwatersheds. These individual stream segments were identified as being impaired for bacteria by IDEM field monitoring conducted in 2010. To illustrate this point there are four bacteria impaired segments (INJ01A1_01, INJ01A1_T1001, INJ01A1_T1002 and INJ01A1_T1004) in HUC-12 subwatershed '10-01'(Table 9 of this Decision Document). These segments lie upstream of the subwatershed outlet point in 10-01. IDEM explained that waters flowing through each of these individually impaired stream reaches impact the water quality at the outlet point of the 10-01 HUC-12 subwatershed.

Rather than assigning loads to each of the four impaired reaches within 10-01, IDEM completed their LDC analysis and assigned a TMDL load at the outlet point of subwatershed 10-01. IDEM explained that the loads calculated for the outlet point of the HUC-12 subwatershed would cover loads assigned to the upstream reaches (INJ01A1_01, INJ01A1_T1001, INJ01A1_T1002 and INJ01A1_T1004) (Table 9 of this Decision Document).

IDEM determined that assigning loads to the outlet points of HUC-12 subwatersheds instead of individual reaches was appropriate because land use and source characteristics were consistent across the HUC-12 subwatershed. During their field monitoring efforts in 2010, IDEM staff observed that there were not significant land use changes between the upstream reaches within HUC-12 subwatersheds and the outlet point of the HUC-12 subwatershed. The consistency in land use and sources within each HUC-12 gave IDEM assurance that implementation efforts within the HUC-12 subwatershed would be appropriate to mitigate the pollutant and ultimately meet the TMDL loads assigned at the subwatershed outlet point. Additionally, IDEM felt a greater level of confidence in estimating flows at the outlet point of the HUC-12 subwatershed, rather than trying to estimate flows for individual reaches on a scale smaller than HUC-12.

WLA were assigned to NPDES permitted facilities and MS4 communities, where appropriate, in each individual subwatershed. Load allocations were calculated after the determination of the WLA, and the Margin of Safety (10% of the loading capacity). Load allocations were not split amongst individual nonpoint contributors (ex. stormwater runoff from agricultural land use practices, failing septic systems, non-regulated urban stormwater runoff etc.). Instead, load allocations were represented as one value for each TMDL.

Table 9: Bacteria (*E. coli*) TMDLs for the Pigeon River Watershed

HUC Code 12-digit	Flow Regime TMDL analysis *E. coli* (billions of bacteria/day)	High	Moist Conditions	Normal Flows	Dry Conditions	Low Flows
	Duration Interval	0 - 10 %	10 - 40 %	40 - 60 %	60 - 90 %	90 - 100 %
10-01	**TMDL Pigeon Lake - Pigeon Creek: (INJ01A1_01, INJ01A1_T1001, INJ01A1_T1002 & INJ01A1_T1004)**	**333.4**	**138.0**	**75.5**	**42.2**	**20.0**
	Wasteload Allocation (WLA): Total	5.4	0.0	0.0	0.0	0.0
	WLA: MS4 City of Angola & Trine University (INR040005) - Contribution based on MS4 jurisdictional area (398 acres)	5.4	0.0*	0.0*	0.0*	0.0*
	Load Allocation (LA)	295.0	124.0	68.0	38.0	18.0
	Margin Of Safety (MOS) (10%)	33.0	14.0	7.5	4.2	2.0
10-02	**TMDL Mud Creek - Pigeon Creek (INJ01A2_01, INJ01A2_T1001, INJ01A2_T1003 & INJ01A2_T1004)**	**145.0**	**61.3**	**34.6**	**19.1**	**10.3**
	Wasteload Allocation (WLA): Total	23.0	8.0	8.0	8.0	8.0
	WLA: Angola Municipal STP (IN0021296) - WLA based on the WQS of 125 cfu/100 mL	8.0	8.0	8.0	8.0	8.0
	WLA: MS4 City of Angola & Trine University (INR040005) - Contribution based on MS4 jurisdictional area (1,308 acres)	15.0	0.0*	0.0*	0.0*	0.0*
	WLA: Angola Municipal STP (IN0021296) - CSO (Pipe ID 002)	**	**	**	**	**
	WLA: Angola Municipal STP (IN0021296) - CSO (Pipe ID 003)	**	**	**	**	**
	Load Allocation (LA)	107.0	47.0	23.0	9.0	1.1
	Margin Of Safety (MOS) (10%)	15.0	6.3	3.6	2.1	1.2
10-03	**TMDL Long Lake - Pigeon Creek: (INJ01A3_01, INJ01A3_T1001, INJ01A3_T1003, INJ01A3_T1004 & INJ01A3_T1005)**	**217.9**	**93.6**	**52.7**	**30.1**	**16.5**
	Wasteload Allocation (WLA): Total	3.9	2.8	2.4	2.2	2.0
	WLA: Ashley Municipal STP (IN022292) - WLA based on the WQS of 125 cfu/100 mL	1.9	1.9	1.9	1.9	1.9
	WLA: MS4 City of Angola & Trine University (INR040005) - Contribution based on MS4 jurisdictional area (192 acres)	2.0	0.85	0.47	0.26	0.13
	Load Allocation (LA)	192.0	79.0	43.0	23.0	11.0
	Margin Of Safety (MOS) (10%)	22.0	9.1	5.0	2.8	1.4

10-04	**TMDL Headwaters Turkey Creek: (INJ01A4_02, INJ01A4_T1003 & INJ01A4_T1005)**	**155.0**	**80.0**	**52.2**	**34.4**	**22.2**
	Wasteload Allocation (WLA): Total	0.0	0.0	0.0	0.0	0.0
	Load Allocation (LA)	139.0	72.0	47.0	31.0	20.0
	Margin Of Safety (MOS) (10%)	16.0	8.0	5.2	3.4	2.2
10-05	**TMDL Big Turkey Lake - Turkey Creek: (INJ01A5_01, INJ01A5_T1001 & INJ01A5_T1002)**	**145.0**	**75.5**	**47.8**	**32.2**	**21.1**
	Wasteload Allocation (WLA): Total	0.0	0.0	0.0	0.0	0.0
	Load Allocation (LA)	130.0	68.0	43.0	29.0	19.0
	Margin Of Safety (MOS) (10%)	15.0	7.5	4.8	3.2	2.1
10-06	**TMDL Silver Lake - Pigeon Creek: (INJ01A6_T002)**	**150.0**	**62.2**	**34.4**	**18.9**	**9.3**
	Wasteload Allocation (WLA): Total	0.0	0.0	0.0	0.0	0.0
	Load Allocation (LA)	135.0	56.0	31.0	17.0	8.4
	Margin Of Safety (MOS) (10%)	15.0	6.2	3.4	1.9	0.93
10-07	**TMDL Otter Lake - Pigeon Creek: (INJ01A7_01 & INJ01A7_T1001)**	**110.7**	**57.4**	**37.4**	**25.2**	**16.3**
	Wasteload Allocation (WLA): Total	4.7	4.7	4.7	4.7	4.7
	WLA: Steuben Lakes RWD (IN0061557) - WLA based on the WQS of 125 cfu/100 mL	4.7	4.7	4.7	4.7	4.7
	Load Allocation (LA)	95.0	47.0	29.0	18.0	10.0
	Margin Of Safety (MOS) (10%)	11.0	5.7	3.7	2.5	1.6
10-08	**TMDL Little Turkey Lake - Turkey Creek: (INJ01A8,_T1001, INJ01A8_T1002, INJ01A8_T1002A & INJ01A8_T1008)**	**162.2**	**83.3**	**54.4**	**35.6**	**23.3**
	Wasteload Allocation (WLA): Total	0.0	0.0	0.0	0.0	0.0
	Load Allocation (LA)	146.0	75.0	49.0	32.0	21.0
	Margin Of Safety (MOS) (10%)	16.2	8.3	5.4	3.6	2.3
10-09	**TMDL Green Lake - Pigeon Creek: (INJ01A9_01)**	**120.0**	**62.2**	**40.0**	**25.6**	**16.7**
	Wasteload Allocation (WLA): Total	0.0	0.0	0.0	0.0	0.0
	Load Allocation (LA)	108.0	56.0	36.0	23.0	15.0
	Margin Of Safety (MOS) (10%)	12.0	6.2	4.0	2.6	1.7
10-10	**TMDL Mongo Millpond - Pigeon Creek: (INJ01AA_02 & INJ01AA_03)**	**93.9**	**49.4**	**31.7**	**20.6**	**14.0**
	Wasteload Allocation (WLA): Total	3.5	3.5	3.5	3.5	3.5
	WLA: LaGrange Region B WWTP (IN0060097) - WLA based on the WQS of 125 cfu/100 mL	3.5	3.5	3.5	3.5	3.5
	Load Allocation (LA)	81.0	41.0	25.0	15.0	9.1
	Margin Of Safety (MOS) (10%)	9.4	4.9	3.2	2.1	1.4
11-01	**TMDL East Fly Creek: (INJ01B1_02 & INJ01B1_T1004)**	**196.24**	**101.24**	**65.84**	**43.54**	**28.04**
	Wasteload Allocation (WLA): Total	0.24	0.24	0.24	0.24	0.24
	WLA: Fish and Royer Lake WWTP (IN0058505) - WLA based on the WQS of 125 cfu/100 mL	0.24	0.24	0.24	0.24	0.24

	Load Allocation (LA)	176.0	91.0	59.0	39.0	25.0
	Margin Of Safety (MOS) (10%)	20.0	10.0	6.6	4.3	2.8
11-02	**TMDL Fly Creek: (INJ01B2_01 & INJ01B2_02)**	**157.5**	**81.7**	**52.9**	**36.1**	**23.9**
	Wasteload Allocation (WLA): Total	8.5	8.5	8.5	8.5	8.5
	WLA: LaGrange Municipal STP (IN0020478) - WLA based on the WQS of 125 cfu/100 mL	8.5	8.5	8.5	8.5	8.5
	Load Allocation (LA)	133.0	65.0	39.0	24.0	13.0
	Margin Of Safety (MOS) (10%)	16.0	8.2	5.4	3.6	2.4
11-03	**TMDL Cline Lake - Pigeon River: (INJ01B3_01, INJ01B3_02, INJ01B3_03 & INJ01B3_T1002)**	**193.0**	**98.9**	**64.4**	**42.2**	**27.8**
	Wasteload Allocation (WLA): Total	0.0	0.0	0.0	0.0	0.0
	Load Allocation (LA)	174.0	89.0	58.0	38.0	25.0
	Margin Of Safety (MOS) (10%)	19.0	9.9	6.4	4.2	2.8
11-04	**TMDL Buck Lake - Buck Creek: (INJ01B4_01, INJ01B4_T1002 & INJ01B4_T1003)**	**209.0**	**108.0**	**70.0**	**45.6**	**30.0**
	Wasteload Allocation (WLA): Total	0.0	0.0	0.0	0.0	0.0
	Load Allocation (LA)	188.0	97.0	63.0	41.0	27.0
	Margin Of Safety (MOS) (10%)	21.0	11.0	7.0	4.6	3.0
11-05	**TMDL Page Ditch: (INJ01B5_01, INJ01B5_T1002 & INJ01B5_T1003)**	**143.2**	**73.6**	**48.0**	**32.4**	**21.3**
	Wasteload Allocation (WLA): Total	1.2	1.2	1.2	1.2	1.2
	WLA: Shipshewana Municipal STP (IN0040622) - WLA based on the WQS of 125 cfu/100 mL	1.2	1.2	1.2	1.2	1.2
	Load Allocation (LA)	128.0	65.0	42.0	28.0	18.0
	Margin Of Safety (MOS) (10%)	14.0	7.4	4.8	3.2	2.1
11-06	**TMDL Van Natta Ditch - Pigeon River (INJ01B6_01, INJ01B6_02 & INJ01B6_T1002)**	**268.0**	**138.0**	**89.0**	**58.9**	**37.8**
	Wasteload Allocation (WLA): Total	0.0	0.0	0.0	0.0	0.0
	Load Allocation (LA)	241.0	124.0	80.0	53.0	34.0
	Margin Of Safety (MOS) (10%)	27.0	14.0	9.0	5.9	3.8
11-07	**TMDL Stag Lake - Pigeon River (INJ01B7_T1001)**	**240.0**	**143.0**	**101.0**	**66.7**	**43.3**
	Wasteload Allocation (WLA): Total	0.0	0.0	0.0	0.0	0.0
	Load Allocation (LA)	216.0	129.0	91.0	60.0	39.0
	Margin Of Safety (MOS) (10%)	24.0	14.0	10.0	6.7	4.3

* = IDEM communicated that discharge in these flow regimes from MS4 communities is considered as insignificant (i.e. it is small enough where it does not warrant a pollutant load assigned) [3]
** = WLAs from CSO inputs were set to the WQS for *E. coli* (125 cfu / 100 mL) across all flow conditions.

The methods used for determining the TMDL are consistent with U.S. EPA technical memos.[4]

[3] Personal communication (phone call), between Staci Goodwin (IDEM) and Paul Proto (EPA, R5), on 9/20/12.
[4] U.S. Environmental Protection Agency. August 2007. *An Approach for Using Load Duration Curves in the Development of TMDLs*. Office of Water. EPA-841-B-07-006. Washington, D.C.

EPA concurs with the data analysis and LDC approach utilized by IDEM in their calculation of wasteload allocations, load allocations and the margin of safety for the Pigeon River watershed *E. coli* TMDLs.

<u>TP TMDL (to address impaired biotic community impairment in the Mud Creek subwatershed):</u>
For the TP TMDL, the WQCT for TP (0.3 mg/L) was used to set the loading capacity of the TMDL. IDEM incorporated the LDC approach to calculate pollutant loadings at the outlet point of the Mud Creek subwatershed. Flow measurements from three USGS gages (#04099510, #04099750, and #04101000) within the PRW were incorporated to develop a FDC and the Drainage Area Weighting Equation was incorporated to estimate flows in ungaged subwatersheds. IDEM completed water quality monitoring in the PRW basin in 2010 and measured TP concentrations at specific sampling points within the watershed. TP values from these efforts were converted to individual sampling loads by multiplying the sample concentration by the instantaneous flow measurement observed/estimated at the time of sample collection. The individual sampling loads were plotted on the same figure with the created LDC.

The LDC plots were subdivided into five flow regimes; very high flows, moist conditions, “normal” range flows, dry conditions, and low flows. LDC plots can be organized to display individual sampling loads and the calculated LDC. Watershed managers can interpret these plots (individual sampling points plotted with the LDC) to understand the relationship between flow conditions and water quality exceedances within the watershed. Individual sampling loads which plot above the LDC represent exceedances of the WQCT and the allowable load under those flow conditions at those locations. The difference between individual sampling loads plotting above the LDC and the LDC, measured at the same flow is the amount of reduction necessary to meet WQCT.

A TP LDC was calculated for TP in the Mud Creek subwatershed in a similar fashion to the bacteria TMDLs. IDEM assigned loads to the outlet point of the Mud Creek subwatershed rather than assign loading values to the individual reaches (INJ01A2_01, INJ01A1_T1001, INJ01A2_T1003 & INJ01A2_T1004). A WLA was assigned to the Angola Municipal STP (IN0021296) in the Mud Creek subwatershed. The load allocation was calculated after the determination of the WLA, and the Margin of Safety (10% of the loading capacity). The load allocation was not split amongst individual nonpoint contributors (ex. stormwater runoff from agricultural land use practices, failing septic systems, urban stormwater runoff etc.). Instead, the load allocation was represented as one value for the Mud Creek TMDL.

Table 10: Total Phosphorus TMDLs for the Pigeon River Watershed

HUC Code 12-digit	Flow Regime TMDL analysis Total Phosphorus (lbs/day)	High	Moist Conditions	Normal Flows	Dry Conditions	Low Flows
	Duration Interval	0 - 10 %	10 - 40 %	40 - 60 %	60 - 90 %	90 - 100 %
10-02	**TMDL Mud Creek - Pigeon Creek (INJ01A2_01, INJ01A2_T1001, INJ01A2_T1003 & INJ01A2_T1004)**	**92.0**	**47.0**	**33.0**	**25.0**	**20.4**
	Wasteload Allocation (WLA): Total	14.0	14.0	14.0	14.0	14.0
	WLA: Angola Municipal STP (IN0021296) - WLA based on the permit limit for phosphorus (1.0 mg/L)	14.0	14.0	14.0	14.0	14.0
	Load Allocation (LA)	68.8	28.3	15.7	8.5	4.36
	Margin Of Safety (MOS) (10%)	9.2	4.7	3.3	2.5	2.04

EPA concurs with the data analysis and LDC approach utilized by IDEM in their calculation of wasteload allocations, load allocations and the margin of safety for the Pigeon River watershed TP TMDL. The methods used for determining the TMDL are consistent with U.S. EPA technical memos.[5]

The U.S. EPA finds that the TMDL document submitted by IDEM satisfies the requirements of the third criterion.

4. Load Allocations (LA)

EPA regulations require that a TMDL include LAs, which identify the portion of the loading capacity attributed to existing and future nonpoint sources and to natural background. Load allocations may range from reasonably accurate estimates to gross allotments (40 C.F.R. §130.2(g)). Where possible, load allocations should be described separately for natural background and nonpoint sources.

Comment:

LAs for nonpoint sources were back-calculated after WLA and margin of safety were allocated from the loading capacity. IDEM determined the load allocation calculations for each of the subwatershed TMDLs based on the *E. coli* WQS (125 cfu/100 mL) and the WQCT for total phosphorus (0.3 mg/L) (Tables 9 & 10 of this Decision Document). The WQS and WQCT were applicable across all flow conditions in the subwatershed.

IDEM identified several nonpoint sources in this TMDL report. Load allocations were recognized as originating from many diverse nonpoint sources including: urban stormwater runoff, failing septic systems, stormwater runoff from agricultural land use practices, livestock with access to stream areas, stream channelization and stream erosion, and wildlife (deer, geese, ducks, raccoons, turkeys and other animals). IDEM did not determine individual load allocation values for each of these potential nonpoint source considerations, but aggregated the nonpoint sources into one LA value.

[5] U.S. Environmental Protection Agency. August 2007. *An Approach for Using Load Duration Curves in the Development of TMDLs*. Office of Water. EPA-841-B-07-006. Washington, D.C.

The implementation strategies outlined by IDEM in the PRW TMDL will aid local partners in determining appropriate mitigation strategies for these nonpoint source inputs. Field observations made during the collection of water quality monitoring data in the PRW are additional sources of information which may be called upon by IDEM to aid in setting mitigation strategies. These observations (ex. land use, housing density, location of livestock facilities and proximity to sampling locations) may assist watershed managers in identifying potential nonpoint sources of bacteria and TP. EPA finds the IDEM's approach for calculating the LA to be reasonable.

The U.S. EPA finds that the TMDL document submitted by IDEM satisfies the requirements of the fourth criterion.

5. Wasteload Allocations (WLAs)

EPA regulations require that a TMDL include WLAs, which identify the portion of the loading capacity allocated to individual existing and future point source(s) (40 C.F.R. §130.2(h), 40 C.F.R. §130.2(i)). In some cases, WLAs may cover more than one discharger, e.g., if the source is contained within a general permit.

The individual WLAs may take the form of uniform percentage reductions or individual mass based limitations for dischargers where it can be shown that this solution meets WQSs and does not result in localized impairments. These individual WLAs may be adjusted during the NPDES permitting process. If the WLAs are adjusted, the individual effluent limits for each permit issued to a discharger on the impaired water must be consistent with the assumptions and requirements of the adjusted WLAs in the TMDL. If the WLAs are not adjusted, effluent limits contained in the permit must be consistent with the individual WLAs specified in the TMDL. If a draft permit provides for a higher load for a discharger than the corresponding individual WLA in the TMDL, the State/Tribe must demonstrate that the total WLA in the TMDL will be achieved through reductions in the remaining individual WLAs and that localized impairments will not result. All permittees should be notified of any deviations from the initial individual WLAs contained in the TMDL. EPA does not require the establishment of a new TMDL to reflect these revised allocations as long as the total WLA, as expressed in the TMDL, remains the same or decreases, and there is no reallocation between the total WLA and the total LA.

Comment:

IDEM identified seven NPDES permit holders (Table 3 of this Decision Document) within the PRW which received a portion of the WLA assigned to mitigate bacteria and nutrient (TP) inputs. Individual WLAs were developed as part of the TMDL development process for those permittees discharging directly to impaired reaches. WLAs for individual facilities were calculated based on each facility's design flow and the permit limit (ex. *E. coli* permit limits are set at the WQS of 125 cfu/100 mL). IDEM expects each NPDES permitted facility to meet the concentration targets assigned in the WLA across all flow conditions.

The Angola Facility (IN0021296) was assigned a WLA based on the design flow of the facility and a TP concentration value of 1.0 mg/L (Table 10 of this Decision Document). IDEM used a TP concentration of 1.0 mg/L, rather than the TP WQT value of 0.3 mg/L, because the state is aiming toward developing

TP nutrient criteria of 1.0 mg/L. TP discharges from permitted facilities in the PRW would have to meet an anticipated TP permit limit of 1.0 mg/L.

The City of Angola and Trine University MS4 community (INR040005) was assigned a portion of the WLA based on the area of the MS4 community which is within the boundaries of the subwatershed in question (Table 9 of this Decision Document). For example, reaches INJ01A3_01, INJ01A3_T1001, INJ01A3_T1003, INJ01A3_T1004 & INJ01A3_T1005 are impacted by the City of Angola and Trine University's MS4 community. This MS4 community has lands within boundaries of the Long Lake-Pigeon Creek subwatershed. The City of Angola and Trine University's MS4 community was assigned a portion of the WLA based on the percentage of the community's land area within the boundary of the subwatershed. Actual loading numbers for this example are reflected within Table 9 of this Decision Document.

There is one CSO facility, the Angola Municipal WWTP (IN0021296), in the Mud Creek subwatershed (04050001-10-02). The WLA for this CSO facility was set to the water quality standard for *E. coli* (WLA = 125 cfu/100 mL) across all flow conditions. There is one SSO located in the PRW. The SSO is confined to the Fly Creek subwatershed (04050001-11-02). The SSO was not assigned a portion of the WLA for SSO inputs (WLA = 0 cfu per 100 mL). There is one CAFO in the PRW; CAFO contributions were set to zero (WLA = 0). Runoff due to field application of manure is considered a nonpoint source by the EPA and is considered as a load allocation.

EPA finds the MPCA's approach for calculating the WLA to be reasonable.

The U.S. EPA finds that the TMDL document submitted by IDEM satisfies the requirements of the fifth criterion.

6. Margin of Safety (MOS)

The statute and regulations require that a TMDL include a margin of safety (MOS) to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1)). EPA's 1991 TMDL Guidance explains that the MOS may be implicit, i.e., incorporated into the TMDL through conservative assumptions in the analysis, or explicit, i.e., expressed in the TMDL as loadings set aside for the MOS. If the MOS is implicit, the conservative assumptions in the analysis that account for the MOS must be described. If the MOS is explicit, the loading set aside for the MOS must be identified.

Comment:

The bacteria and nutrient TMDLs, incorporated an explicit Margin of Safety (MOS) into the development of the PRW TMDLs. The explicit MOS was applied by reserving approximately 10% of the total loading capacity, and then allocating the remaining loads to point (WLA) and nonpoint (LA) sources (Tables 9 & 10 of this Decision Document). The use of the LDC approach minimized variability associated with the development of the PRW TMDLs because the calculation of the loading capacity was a function of flow multiplied by the target value. The MOS was set at 10% to account for uncertainty due to field sampling error, basing assumptions on water quality monitoring with low sample sizes, and imperfect WQCT. A 10% MOS was considered appropriate, because the target values used in this TMDL had a firm technical basis. The estimated flows are believed to be relatively accurate because they were estimated based on USGS gages located within the watershed.

The MOS for the PRW *E. coli* TMDLs also incorporated certain conservative assumptions in the calculation of the TMDLs. No rate of decay, or die-off rate of pathogen species, was used in the PRW TMDL calculations or in the creation of load duration curves for *E. coli*. Bacteria have a limited capability of surviving outside their hosts, and normally a rate of decay would be incorporated. IDEM determined that it was more conservative to use the WQS (125 cfu/100 mL) and not to apply a rate of decay, which for point sources could result in a discharge limit greater than the WQS.

As stated in *EPA's Protocol for Developing Pathogen TMDLs* (EPA 841-R-00-002), many different factors affect the survival of pathogens, including the physical condition of the water. These factors include, but are not limited to sunlight, temperature, salinity, and nutrient deficiencies. These factors vary depending on the environmental condition/circumstances of the water, and therefore it would be difficult to assert that the rate of decay caused by any given combination of these environmental variables was sufficient enough to meet the WQS of 125 cfu/100 mL and 235 cfu/100ml. Thus, it is more conservative to apply the State's WQS or WQCT (in the case of the TP TMDL) as the MOS, because this standard must be met at all times under all environmental conditions.

The U.S. EPA finds that the TMDL document submitted by IDEM contains an appropriate MOS satisfying the requirements of the sixth criterion.

7. Seasonal Variation

The statute and regulations require that a TMDL be established with consideration of seasonal variations. The TMDL must describe the method chosen for including seasonal variations. (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1)).

Comment:
The bacteria (*E. coli*) and nutrient TMDLs incorporated seasonal variation via the following methods:

Bacteria (E. coli) TMDLs: Bacterial loads vary by season, typically reaching higher numbers in the dry summer months when low flows and bacterial growth rates contribute to their abundance, and reaching relatively lower values in colder months when bacterial growth rates attenuate and loading reduces as agricultural activity slows. Bacterial WQS need to be met during the recreational season (April 1st to October 31st), regardless of the flow condition. The development of the LDCs utilized flow measurements from local USGS gages. These flow measurements were collected over a variety of flow conditions observed during the recreation season. LDCs developed from these flow records represented a range of flow conditions within the PRW and thereby accounted for seasonal variability over the recreation season. TMDL loads were based on sampling that occurred during the recreational season in 2010. Seasonal variability was accounted for by taking multiple samples per month during the recreational season.

Critical conditions for *E. coli* loading occur in the dry summer months. This is typically when stream flows are lowest, and bacterial growth rates can be high. The State of Indiana does not have an applicable full body contact *E. coli* water quality standard for the remainder of the calendar year (November 1 through March 31). By meeting the WQS during the summer recreation season, it can reasonably be assumed that the loading capacity values would be protective of water quality during the remainder of the calendar year (November through March).

TP TMDL (to address impaired biotic community impairment in the Mud Creek subwatershed):
Given the significant amount of agricultural land use in the watershed, nutrient (phosphorus) loadings in the PRW vary with agricultural activity. Nutrient inputs to surface waters typically occur primarily through wet weather events. Critical conditions that impact the response of PRW water bodies to nutrients occur in periods of low flow. During low flow periods, nutrients accumulate, there is less assimilative capacity within the water body, and generally nutrients are not transported through the water body at the same rate as under normal flow conditions.

Increased algal growth during low flow periods can deplete dissolved oxygen within the water column. Critical conditions that impact loading, or the rate that nutrients are delivered to the water body, were identified as those periods where large precipitation events coincide with periods of minimal vegetative cover on fields. Large precipitation events and minimally covered land surfaces can lead to large runoff volumes, especially to those areas which drain agricultural fields. The conditions generally occur in the spring and early summer seasons.

The U.S. EPA finds that the TMDL document submitted by IDEM satisfies the requirements of the seventh criterion.

8. Reasonable Assurances

When a TMDL is developed for waters impaired by point sources only, the issuance of a NPDES permit(s) provides the reasonable assurance that the wasteload allocations contained in the TMDL will be achieved. This is because 40 C.F.R. 122.44(d)(1)(vii)(B) requires that effluent limits in permits be consistent with “the assumptions and requirements of any available wasteload allocation” in an approved TMDL.

When a TMDL is developed for waters impaired by both point and nonpoint sources, and the WLA is based on an assumption that nonpoint source load reductions will occur, EPA’s 1991 TMDL Guidance states that the TMDL should provide reasonable assurances that nonpoint source control measures will achieve expected load reductions in order for the TMDL to be approvable. This information is necessary for EPA to determine that the TMDL, including the load and wasteload allocations, has been established at a level necessary to implement water quality standards.

EPA’s August 1997 TMDL Guidance also directs Regions to work with States to achieve TMDL load allocations in waters impaired only by nonpoint sources. However, EPA cannot disapprove a TMDL for nonpoint source-only impaired waters, which do not have a demonstration of reasonable assurance that LAs will be achieved, because such a showing is not required by current regulations.

Comment:
The PRW TMDLs provide reasonable assurances that actions identified in the implementation strategy, as discussed in the TMDL document in Section 9, will be applied to attain the loading capacities and allocations calculated for the impaired reaches within the PRW. The recommendations made by IDEM will be successful at improving water quality if the appropriate local groups work to implement these recommendations. Those mitigation suggestions, which fall outside of regulatory authority, will require commitment from state agencies and local stakeholders to carry out the suggested actions. IDEM has identified several local partners which have expressed interest in working to improve water quality within the PRW. These partners are the LaGrange County Soil and Water Conservation District (SWCD), the Steuben County SWCD, the Shipshewana Community Lake Improvement Association (SCLIA) and the LaGrange County Lakes Council (LCLC).

The LCLC and the SCLIA are active community partners in the PRW. The LCLC sponsors water quality monitoring on lakes within LaGrange County and coordinates efforts from local volunteer groups (ex. Pigeon River watershed initiative) to collect water quality information and SWCDs to address the water quality problems identified by the water quality sampling efforts. The LCLC has also encouraged local residents to stabilize lakeshore areas by planting native plants and creating a "lake buffer area" adjacent to private properties. LCLC also publishes a bi-annual newsletter which acts as a public outreach platform to inform local citizens of efforts underway by the LCLC. Like the LCLC, the SCLIA is also an active community partner within the PRW. The SCLIA has coordinated efforts amongst citizens to have their concerns over nutrient and sediment inputs into Lake Shipshewana voiced to local authorities and to the Indiana Department of Natural Resources, Division of Fish and Wildlife.

Continued water quality monitoring within the basin is supported by IDEM. Additional water quality monitoring results could provide insight into the success or failure of BMP systems designed to reduce bacteria and nutrient effluent loading into the surface waters of the watershed. Local watershed managers would be able to reflect on the progress or lack of progress of the various pollutant removal strategies and would have the opportunity to change course if observed progress is unsatisfactory.

Reasonable assurance that the WLA set forth in the PRW TMDL will be implemented is provided by regulatory actions. According to 40 CFR 122.44(d)(1)(vii)(B), NPDES permit effluent limits must be consistent with assumptions and requirements of all WLAs in an approved TMDL. IDEM's stormwater program, the NPDES permit program, and SSO program are the implementing programs for ensuring WLA are consistent with the TMDL.

Stormwater runoff associated with MS4 conveyances are regulated by 327 IAC 15-13-1 (Rule 13). There is one regulated MS4 community in the Pigeon River Watershed: the City of Angola (INR040005). Implementation of the permit will improve water quality in the PRW. CSOs in Angola (IN0021296) are regulated under a Long Term Control Plan (LTCP). The LTCP has conditions and milestones which must be met by the facility operator. IDEM explained that the LTCP has a goal of the eventual removal of the CSO outfall starting in 2012.

CFOs are permitted by the State of Indiana. Facilities are required to manage their manure, litter, and process wastewater so that they do not cause or contribute to a water quality impairment. Reasonable assurances that nonpoint source reductions will be achieved for *E. coli* and nutrients (phosphorus) are described in Section 9.1 of the final TMDL submittal. Reducing soil erosion from croplands is a primary recommendation for reducing pollutant loads in the watershed. More specifically, cover cropping and residue management is recommended to reduce erosion and thus siltation and runoff into streams. Streamside buffering, particularly via wetland restoration or construction, is a recommended practice that would reduce nutrient pollutant loadings, and in some cases may help mitigate flow alteration by maximizing infiltration rates. IDEM recommended prioritizing implementation action on areas that are actively eroding, to prevent additional sediment and degradation of habitat. Public education and outreach events may also be valuable in getting information out to stakeholders on stormwater pollution challenges and mitigation practices.

The PRW TMDL implementation efforts will be achieved through federal, state and local action. Federal funding, via the Section 319 grants program, can provide money to implement voluntary nonpoint source programs within the watershed. The Steuben and LaGrange County SWCDs have received funding from federal and state sources to support a variety of agricultural BMPs (ex. riparian corridor restoration and filter/buffer areas) within the PRW watershed. These BMPs were installed to aid in the reduction of bacteria and nutrient inputs to surface waters in the PRW watershed. Other state led efforts will be via NPDES permit enforcement, the IDEM Stormwater Program, the IDEM Nonpoint Source program, and various other land and water resource protection efforts sponsored by state agencies.

The U.S. EPA finds that this criterion has been adequately addressed.

9. Monitoring Plan to Track TMDL Effectiveness

EPA's 1991 document, *Guidance for Water Quality-Based Decisions: The TMDL Process* (EPA 440/4-91-001), recommends a monitoring plan to track the effectiveness of a TMDL, particularly when a TMDL involves both point and nonpoint sources, and the WLA is based on an assumption that nonpoint source load reductions will occur. Such a TMDL should provide assurances that nonpoint source controls will achieve expected load reductions and, such TMDL should include a monitoring plan that describes the additional data to be collected to determine if the load reductions provided for in the TMDL are occurring and leading to attainment of water quality standards.

Comment:

IDEM completed a comprehensive biological, physical and chemical survey of streams within the PRW in 2010 as part of its basin monitoring schedule. Water quality data were collected at various locations within the PRW and those assessments were utilized to develop the TMDLs in this report. In the future, water quality monitoring in the PRW will occur as part of on IDEM's five-year rotating basin schedule or once TMDL implementation BMPs are incorporated in the watershed. IDEM's monitoring efforts are designed to assess water quality improvements with respect to bacteria (*E. coli*) and nutrient concentrations. Monitoring will be adjusted as needed to assist in continued source identification and elimination and will also test the efficiency of pollution reduction strategies.

During the monitoring period, watershed managers will determine the appropriate monitoring cycle for the PRW. The monitoring schedule will be adjusted, as needed, to improve source identification and source elimination efforts. IDEM will monitor whether bacteria (*E. coli*) and nutrient water quality targets are being achieved and may adjust the PRW BMP strategy accordingly to meet water quality goals. When water quality monitoring results indicate that a water body is meeting the WQS for bacteria and water quality targets for nutrients, the water body will be removed from Indiana's List of Impaired Waters.

The U.S. EPA finds that this criterion has been adequately addressed.

10. Implementation

EPA policy encourages Regions to work in partnership with States/Tribes to achieve nonpoint source load allocations established for 303(d)-listed waters impaired by nonpoint sources. Regions may assist States/Tribes in developing implementation plans that include reasonable assurances that nonpoint source LAs established in TMDLs for waters impaired solely or primarily by nonpoint sources will in fact be achieved. In addition, EPA policy recognizes that other relevant watershed management processes may be used in the TMDL process. EPA is not required to and does not approve TMDL implementation plans.

Comment:
The focus of implementation strategies will be the reduction of bacterial and nutrient inputs to the surface waters in the PRW. Local watershed partners, such as the LaGrange and Steuben County SWCDs and the SCLIA and LCLC, will bear the responsibility for assisting in the management of public lands and waters within the PRW. These partners will also be tasked with finding creative adaptive management strategies to meet changing water quality conditions within the watershed. IDEM recommends the following bacterial and nutrient reduction strategies:

Bacteria (E. coli) TMDLs:
Septic System Improvements: Local septic management programs and educational opportunities can aid in the reduction of septic pollution. Educating the public on proper septic maintenance, finding and eliminating illicit discharges and repairing failing systems could lessen the impacts of septic derived bacterial inputs to the PRW.

Urban/Residential Nutrient Reduction Strategies: These strategies involve reducing stormwater runoff from urban areas and single family residences within the PRW. These practices could include; rain gardens, lawn fertilizer reduction, planting buffer strips near waterbodies, vegetation management and replacement of failing septic systems. Water quality educational programs could also be utilized to inform the general public on bacteria reduction efforts and their impact on water quality.

Reducing Livestock Access to Stream Environments: The installation of exclusion fencing near stream and river environments to prevent direct access for livestock, installing alternative water supplies, and installing stream crossings between pastures, would reduce the influxes of bacteria and improve water quality within the watershed.

Manure Collection and Storage Practices: Manure has been identified as a source of bacteria. Bacteria can be transported to surface water bodies via stormwater runoff. Bacteria laden water can also leach into groundwater resources. Improved strategies for the collection, storage and management of manure can minimize impacts of bacteria entering the surface and groundwater system. Repairing manure storage facilities or building roofs over manure storage areas may decrease the amount of bacteria in stormwater runoff.

Riparian Area Management Practices: Protection of streambanks within the watershed through planting of vegetated/buffer areas with grasses, legumes, shrubs or trees will mitigate bacteria inputs into surface waters. These areas will filter stormwater runoff before the runoff enters the main stem or tributaries of the PRW.

Agricultural Land Management Practices: Runoff from cropland and pastures combined with the application of manure to fields are a likely source of bacteria found in stormwater runoff from agricultural areas. Planting vegetation along riparian areas (riparian buffers) will aid to slow down water and allow it to filter through the vegetation before entering surface water environments.

TP TMDL (to address impaired biotic community impairment in the Mud Creek subwatershed):
Reducing stormwater peak flows within surface water bodies in the PRW is the primary recommendation for reducing nutrient loads in the watershed. Streamside buffering, particularly via wetland restoration or construction, is a recommended practice that would reduce nutrient and other related pollutant loads, and in some cases may help mitigate flow alteration by maximizing infiltration rates.

Urban-suburban Stormwater Mitigation Efforts: Reducing peak flow stormwater inputs within the PRW would aid in reducing erosion and streambank losses within the watershed. This practice may be accomplished via reducing impervious cover or employing other low impact development/ green technologies which allow stormwater to infiltrate, evaporate or evapotranspire before reaching the stormwater conveyance system. Efforts to reduce stormwater runoff from urban areas and single family residences within the PRW could include the following BMPs: rain gardens, lawn fertilizer reduction, planting buffer strips near water bodies, vegetation management and replacement of failing septic systems.

Identification of Stream, River, and Lakeshore Erosional Areas: An assessment of stream channel, river channel, and lakeshore erosional areas should be completed to evaluate areas where erosion control strategies could be implemented in the PRW. Implementation actions (ex. planting deep-rooted vegetation near water bodies to stabilize streambanks) could be prioritized to target areas which are actively eroding. This strategy could prevent additional nutrient inputs into surface waters of the PRW and minimize or eliminate degradation of habitat.

Septic System Improvements: Local septic management programs and educational opportunities can aid in the reduction of septic pollution. Educating the public on proper septic maintenance, finding and eliminating illicit discharges and repairing failing systems could lessen the impacts of septic derived nutrient inputs to the PRW.

Improved Agricultural Drainage Practices: A review of local agricultural drainage networks should be completed to examine how improving drainage ditches and drainage channels could reduce the influx of nutrients to the surface waters in the PRW. The reorganization of the drainage network could include the installation of drainage ditches or sediment traps to encourage particle settling during high flow events.

Additionally, cover cropping and residue management is recommended to reduce erosion and thus siltation and runoff into streams.

Reducing Livestock Access to Stream Environments: Livestock managers should be encouraged to implement measures to protect riparian areas. Managers should install exclusion fencing near stream environments to prevent direct access to these areas by livestock. Additionally, installing alternative watering locations and stream crossings between pastures may aid in reducing nutrients to surface waters.

Agricultural Reduction Strategies: These strategies involve reducing nutrient transport from fields and minimizing soil loss. Specific practices would include: planting buffer strips near streams and lakes, streambank stabilization practices (gully stabilization and installation of fencing near streams), wetland restoration, and nutrient management planning.

Public Education Efforts: Public programs will be developed to provide guidance to the general public on nutrient reduction efforts and their impact on water quality. These educational efforts could also be used to inform the general public on what they can do to protect the overall health of the PRW. Local watershed partners could assume additional responsibilities in communicating nutrient reduction strategies to stakeholders, via mailing annual newsletters or updating their website with nutrient reduction strategies.

The U.S. EPA finds that this criterion has been adequately addressed. The U.S. EPA reviews but does not approve implementation plans.

11. Public Participation

EPA policy is that there should be full and meaningful public participation in the TMDL development process. The TMDL regulations require that each State/Tribe must subject calculations to establish TMDLs to public review consistent with its own continuing planning process (40 C.F.R. §130.7(c)(1)(ii)). In guidance, EPA has explained that final TMDLs submitted to EPA for review and approval should describe the State's/Tribe's public participation process, including a summary of significant comments and the State's/Tribe's responses to those comments. When EPA establishes a TMDL, EPA regulations require EPA to publish a notice seeking public comment (40 C.F.R. §130.7(d)(2)).

Provision of inadequate public participation may be a basis for disapproving a TMDL. If EPA determines that a State/Tribe has not provided adequate public participation, EPA may defer its approval action until adequate public participation has been provided for, either by the State/Tribe or by EPA.

Comment:
The final TMDL submittal addresses public participation in Section 10. IDEM has been in contact with local groups and municipal officials throughout the development of the PRW TMDL. Public meetings were held within the PRW in 2011 and 2012. IDEM hosted meetings in LaGrange County at the LaGrange County Annex building in the City of LaGrange and in Steuben County at the Steuben County Community Center in the City of Angola. The TMDL kickoff meeting was conducted on April 6, 2011

at locations in the cities of LaGrange and Angola. At this meeting, IDEM outlined the TMDL development process and invited those in attendance to submit additional water quality data for waters within the PRW. A public meeting on the draft TMDL was held on May 23, 2012 at locations in the cities of LaGrange and Angola. The public was invited to submit formal comments on the draft document and informed of the findings of the document.

The draft TMDL report was available for public comment from May 23, 2012 to June 23, 2012. IDEM posted the draft report online at (http://www.in.gov/idem/nps/3850.htm). IDEM received five public comments on the draft PRW TMDL. Public comments were related to IDEM's decision making process and previous decisions related to discharge permits within the PRW, the TP WQCT utilized in the development of the TMDL, request for clarification on certain citations used within the final TMDL document, and water withdrawals from individual properties within the PRW. IDEM adequately answered the public comments submitted during the public comment period. IDEM submitted the final TMDL and submittal letter to the U.S. EPA on August 23, 2012.

The U.S. EPA finds that the TMDL document submitted by IDEM satisfies the requirements of this eleventh element.

12. Submittal Letter

A submittal letter should be included with the TMDL submittal, and should specify whether the TMDL is being submitted for a *technical review* or *final review and approval*. Each final TMDL submitted to EPA should be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under Section 303(d) of the Clean Water Act for EPA review and approval. This clearly establishes the State's/Tribe's intent to submit, and EPA's duty to review, the TMDL under the statute. The submittal letter, whether for technical review or final review and approval, should contain such identifying information as the name and location of the water body, and the pollutant(s) of concern.

Comment:
The U.S. EPA received the final PRW TMDL document and submittal letter from the IDEM on August 23, 2012. The transmittal letter explicitly stated that enclosed was the final TMDL report detailing the PRW TMDLs which address recreational use and aquatic life use impairments due to bacteria and nutrient inputs. One segment, Mud Creek (04050001-10-02) was also identified as having an impaired biotic community. The PRW TMDLs include impaired reaches within the following HUC-12 subwatersheds within the PRW:

- 04050001-10-01 (Pigeon Lake – Pigeon Creek);
- 04050001-10-02 (Mud Creek – Pigeon Creek);
- 04050001-10-03 (Long Lake – Pigeon Creek);
- 04050001-10-04 (Headwaters Turkey Creek);
- 04050001-10-05 (Big Turkey Lake – Turkey Creek);
- 04050001-10-06 (Silver Lake – Pigeon Creek);
- 04050001-10-07 (Otter Lake – Pigeon Creek);
- 04050001-10-08 (Little Turkey Lake – Turkey Creek);
- 04050001-10-09 (Green Lake – Pigeon Creek);
- 04050001-10-10 (Mongo Millpond – Pigeon Creek);

- 04050001-11-01 (East Fly Creek);
- 04050001-11-02 (Fly Creek);
- 04050001-11-03 (Cline Lake – Pigeon River);
- 04050001-11-04 (Buck Lake – Buck Creek);
- 04050001-11-05 (Page Ditch);
- 04050001-11-06 (Van Natta Ditch – Pigeon River); &
- 04050001-11-07 (Stag Lake – Pigeon River).

TMDLs within these subwatersheds were submitted to U.S. EPA pursuant to Section 303(d) of the Clean Water Act for U.S. EPA review and approval. The letter clearly stated that this was a final TMDL submittal under Section 303(d) of CWA. The letter also contained the name of the watershed as it appears on Indiana's 303(d) list, and the causes/pollutants of concern. This TMDL was submitted per the requirements under Section 303(d) of the Clean Water Act and 40 CFR 130.

IDEM formally requested that EPA withdraw the TMDL request for the Mud Creek subwatershed (segment INJ01A2_T1004) for total nitrogen.[6] EPA suspends any decision action related to total nitrogen for segment INJ01A2_T1004. IDEM explained that they included the total nitrogen discussion in the PRW for informational purposes.

The U.S. EPA finds that the TMDL transmittal letter submitted for PRW watershed by IDEM satisfies the requirements of this twelfth element.

13. Conclusion

After a full and complete review, the U.S. EPA finds that the TMDLs submitted for the PRW satisfy all of the elements of approvable TMDLs. This approval is for a total of **forty-eight (48) TMDLs (47 bacteria TMDLs and 1 TP TMDL, Appendix 1 of this Decision Document)** addressing water bodies in seventeen HUC-12 subwatersheds for recreational use and aquatic life use impairments, for the PRW. The names of the impaired water bodies which received a TMDL in the Pigeon River watershed TMDL include:

- Berlien Ditch (INJ01A1_T1004);
- Buck Creek (INJ01B4_01);
- Buck Creek Ditch, East (INJ01B4_T1002 & INJ01B4_T1003);
- Deetz Ditch (INJ01A4_T1005);
- Fetch Ditch (INJ01B7_T1001);
- Fly Creek (INJ01B2_01 & INJ01B2_02);
- Fly Creek, East (INJ01B1_02);
- Inlet to Golden Lake (INJ01A6_T1002);
- Inlet to Little Turkey Lake (INJ01A8_T1008);
- Inlet to Mud Lake (INJ01A8_T1002);
- Inlet to Otter Lake (INJ01A7_T1001);
- Inlet to Taylor Lake (INJ01A8_T1002A);
- Jack Ditch (INJ01A2_T1001);
- Johnson Ditch (INJ01A3_T1004);

[6] Email from Bonny Elifritz (Chief, Watershed Planning and Restoration Section) on 9/12/12.

- Johnson Ditch – Unnamed Tributary (INJ01A3_T1005);
- Maumee Ditch (INJ01A8_T1001);
- Metz Ditch (INJ01A1_T1002);
- Mud Creek (INJ01A2_T1004 & INJ01A5_T1001);
- Mud Creek – Unnamed Tributary (INJ01A5_T1002);
- Ontario Millpond Inlet (INJ01B3_02);
- Page Ditch (INJ01B5_01);
- Page Ditch – Unnamed Tributary (INJ01B5_T1002);
- Pigeon Creek (INJ01A1_01, INJ01A2_01, INJ01A3_01, INJ01A7_01, & INJ01A9_01);
- Pigeon Creek – Unnamed Tributary (INJ01A2_T1003 & INJ01A3_T1003);
- Pigeon River (INJ01B3_01, INJ01B3_02, INJ01B3_03, INJ01B6_01, & INJ01B6_02);
- Pigeon River – Unnamed Tributary (INJ01A3_T1001 & INJ01B3_T1002);
- Ryan Ditch (IN01A1_T1001);
- Stoner Ditch (IN01B1_T1004);
- Trusdale Ditch (INJ01B5_T1003);
- Turkey Creek (INJ01A4_02, INJ01A5_01, INJ01AA_02, & INJ01AA_03);
- Turkey Creek – Unnamed Tributary (INJ01A4_T1003); &
- Van Natta Ditch (INJ01B6_T1002).

The U.S. EPA's approval of these TMDLs extend to the water bodies which are identified within the PRW, with the exception of any portions of the water bodies that are within Indian Country, as defined in 18 U.S.C. Section 1151. The U.S. EPA is taking no action to approve or disapprove TMDLs for those waters at this time. The U.S. EPA, or eligible Indian Tribes, as appropriate, will retain responsibilities under the CWA Section 303(d) for those waters.

Appendix 1: Summary of Impairments in the Pigeon River Watershed and TMDL Count

Narrative Description	2010 AUID	Impaired Beneficial Use	Action	Bacteria TMDL	TP TMDL
Pigeon Lake – Pigeon Creek (04050001-10-01)					
Pigeon Creek	INJ01A1_01	Recreational Use	Bacteria TMDL	1	
Ryan Ditch	INJ01A1_T1001	Recreational Use	Bacteria TMDL	1	
Metz Ditch	INJ01A1_T1002	Recreational Use	Bacteria TMDL	1	
Berlien Ditch	INJ01A1_T1004	Recreational Use	Bacteria TMDL	1	
Mud Creek – Pigeon Creek (04050001-10-02)					
Pigeon Creek	INJ01A2_01	Recreational Use	Bacteria TMDL	1	
Jack Ditch	INJ01A2_T1001	Recreational Use	Bacteria TMDL	1	
Pigeon Creek - Unnamed Tributary	INJ01A2_T1003	Recreational Use	Bacteria TMDL	1	
Mud Creek	INJ01A2_T1004	Recreational Use & Aquatic Life Use	Bacteria TMDL & TP TMDL	1	1
Long Lake – Pigeon Creek (04050001-10-03)					
Pigeon Creek	INJ01A3_01	Recreational Use	Bacteria TMDL	1	
Pigeon Creek - Unnamed Tributary	INJ01A3_T1001	Recreational Use	Bacteria TMDL	1	
Pigeon Creek - Unnamed Tributary	INJ01A3_T1003	Recreational Use	Bacteria TMDL	1	
Johnson Ditch	INJ01A3_T1004	Recreational Use	Bacteria TMDL	1	
Johnson Ditch - Unnamed Tributary	INJ01A3_T1005	Recreational Use	Bacteria TMDL	1	
Headwaters Turkey Creek (04050001-10-04)					
Turkey Creek	INJ01A4_02	Recreational Use	Bacteria TMDL	1	
Turkey Creek - Unnamed Tributary	INJ01A4_T1003	Recreational Use	Bacteria TMDL	1	
Deetz Ditch	INJ01A4_T1005	Recreational Use	Bacteria TMDL	1	
Big Turkey Lake – Turkey Creek (04050001-10-05)					
Turkey Creek	INJ01A5_01	Recreational Use	Bacteria TMDL	1	
Mud Creek	INJ01A5_T1001	Recreational Use	Bacteria TMDL	1	
Mud Creek - Unnamed Tributary	INJ01A5_T1002	Recreational Use	Bacteria TMDL	1	
Silver Lake – Pigeon Creek (04050001-10-06)					
Inlet to Golden Lake	INJ01A6_T1002	Recreational Use	Bacteria TMDL	1	
Otter Lake – Pigeon Creek (04050001-10-07)					
Pigeon Creek	INJ01A7_01	Recreational Use	Bacteria TMDL	1	
Inlet to Otter Lake	INJ01A7_T1001	Recreational Use	Bacteria TMDL	1	
Little Turkey Lake – Turkey Creek (04050001-10-08)					
Maumee Ditch	INJ01A8_T1001	Recreational Use	Bacteria TMDL	1	
Inlet to Mud Lake	INJ01A8_T1002	Recreational Use	Bacteria TMDL	1	
Inlet to Taylor Lake	INJ01A8_T1002A	Recreational Use	Bacteria TMDL	1	
Inlet to Little Turkey Lake	INJ01A8_T1008	Recreational Use	Bacteria TMDL	1	
Green Lake – Pigeon Creek (04050001-10-09)					
Pigeon Creek	INJ01A9_01	Recreational Use	Bacteria TMDL	1	

Mongo Millpond – Pigeon Creek (04050001-10-10)					
Turkey Creek	INJ01AA_02	Recreational Use	Bacteria TMDL	1	
Turkey Creek	INJ01AA_03	Recreational Use	Bacteria TMDL	1	
East Fly Creek (04050001-11-01)					
Fly Creek, East	INJ01B1_02	Recreational Use	Bacteria TMDL	1	
Stoner Ditch	INJ01B1_T1004	Recreational Use	Bacteria TMDL	1	
Fly Creek (04050001-11-02)					
Fly Creek	INJ01B2_01	Recreational Use	Bacteria TMDL	1	
Fly Creek	INJ01B2_02	Recreational Use	Bacteria TMDL	1	
Cline Lake – Pigeon River (04050001-11-03)					
Pigeon River	INJ01B3_01	Recreational Use	Bacteria TMDL	1	
Ontario Millpond Inlet / Pigeon River	INJ01B3_02	Recreational Use	Bacteria TMDL	1	
Pigeon River	INJ01B3_03	Recreational Use	Bacteria TMDL	1	
Pigeon River - Unnamed Tributary	INJ01B3_T1002	Recreational Use	Bacteria TMDL	1	
Buck Lake – Buck Creek (04050001-11-04)					
Buck Creek	INJ01B4_01	Recreational Use	Bacteria TMDL	1	
Buck Creek Ditch, East	INJ01B4_T1002	Recreational Use	Bacteria TMDL	1	
Buck Creek Ditch, East	INJ01B4_T1003	Recreational Use	Bacteria TMDL	1	
Page Ditch (04050001-11-05)					
Page Ditch	INJ01B5_01	Recreational Use	Bacteria TMDL	1	
Page Ditch - Unnamed Tributary	INJ01B5_T1002	Recreational Use	Bacteria TMDL	1	
Trusdale Ditch	INJ01B5_T1003	Recreational Use	Bacteria TMDL	1	
Van Natta Ditch – Pigeon River (04050001-11-06)					
Pigeon River	INJ01B6_01	Recreational Use	Bacteria TMDL	1	
Pigeon River	INJ01B6_02	Recreational Use	Bacteria TMDL	1	
Van Natta Ditch	INJ01B6_T1002	Recreational Use	Bacteria TMDL	1	
Stag Lake – Pigeon River (04050001-11-07)					
Fetch Ditch	INJ01B7_T1001	Recreational Use	Bacteria TMDL	1	
			Totals:	**47**	**1**
				Bacteria	**TP**