TMDL: Salt Creek Watershed, Porter County, Indiana
Date: October 15, 2012 (revised)

DECISION DOCUMENT
FOR THE SALT CREEK 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 <u>a</u> and phosphorus loadings for excess algae; length of riparian buffer; or number of acres of best management practices.

<u>Comment:</u>
Location Description/Spatial Extent:
The Salt Creek Watershed (SCW) is located in northwest Indiana in Porter County. The SCW is approximately 77.46 square miles in size (approx. 49,573 acres) and within the Lake Michigan watershed. Salt Creek begins south of the City of Valparaiso, Indiana and flows north and west through Valparaiso and parts of unincorporated Porter County. Salt Creek eventually joins the Little Calumet River in the City of Portage, Indiana. The SCW TMDLs address impaired reaches on approximately 101-miles of streams within the SCW and target impaired segments in tributaries to the main stem of Salt Creek. These segments have been identified as violating water quality standards (WQS) for bacteria (*Escherichia coli* (*E. coli*)) and impaired biotic communities (IBC). To address the impaired biotic communities, TMDLs were completed for total suspended solids (TSS) and total phosphorus (TP). Implementation efforts designed to reduce TSS and TP inputs to surface waters will address the aquatic life use impairment within the identified impaired biotic communities.

IDEM formally requested that EPA withdraw the TMDL request for the Lake Louise Outlet subwatershed (segment INC0312_T1011) for total nitrogen. EPA suspends any decision action related to total nitrogen for the INC0312_T1011 segment. IDEM explained that they included the total nitrogen discussion in the SCW for informational purposes.[1]

For the purposes of the SCW TMDL, the project area was subdivided into three Hydrologic Unit Code (HUC) twelve (HUC-12) watersheds.

- Sagers Lake (04040001-03-01)
- Clark Ditch (04040001-03-02)
- Squirrel Creek (04040001-03-03)

Impaired segments within the boundaries of the three HUC-12 subwatersheds are listed in Table 1 of this Decision Document.

Table 1: Summary of Impairments in the Salt Creek Watershed

Assessment Unit	2010 AUID	Narrative Description	Impaired Beneficial Use	Action
Sagers Lake (04040001-03-01)				
04040001-03-01	INC0131_01	Salt Creek	Aquatic Life Use (IBC)	TSS & TP TMDLs
	INC0131_02			
04040001-03-01	INC0131_T1001	Sagers Lake	Aquatic Life Use (IBC)	TSS & TP TMDLs
	INC0131_T1002			
Clark Ditch (04040001-03-02)				
04040001-03-02	INC0132_01	Salt Creek	Aquatic Life Use (IBC)	TSS TMDLs
	INC0132_02			TSS TMDLs
	INC0132_03			TSS TMDLs
04040001-03-02	INC0132_T1007	Beauty Creek	Aquatic Life Use (IBC)	TSS & TP TMDLs
04040001-03-02	INC0132_T1009	Clark Ditch	Recreational Use (Bacteria)	Bacteria TMDL

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

04040001-03-02	INC0132_T1010	Clark Ditch	Recreational Use (Bacteria) & Aquatic Life Use (IBC)	Bacteria & TSS TMDLs
04040001-03-02	INC0132_T1011	Lake Louise Outlet	Recreational Use (Bacteria) & Aquatic Life Use (IBC)	Bacteria & TSS TMDLs
04040001-03-02	INC0132_T1012	Salt Creek - Unnamed Tributary	Recreational Use (Bacteria) & Aquatic Life Use (IBC)	Bacteria, TSS & TP TMDLs
Squirrel Creek (04040001-03-03)				
04040001-03-03	INC0133_T1021	Mallards Landing	Recreational Use (Bacteria)	Bacteria TMDL
04040001-03-03	INC0133_T1022	Damon Run	Recreational Use (Bacteria)	Bacteria TMDL
04040001-03-03	INC0133_T1023	Swanson Lamporte Ditch	Recreational Use (Bacteria)	Bacteria TMDL
04040001-03-03	INC0133_T1024	Damon Run - South Branch	Recreational Use (Bacteria)	Bacteria TMDL
04040001-03-03	INC0133_T1025	Damon Run - East Branch	Recreational Use (Bacteria)	Bacteria TMDL
04040001-03-03	INC0133_T1026	Squirrel Creek	Recreational Use (Bacteria) & Aquatic Life Use (IBC)	Bacteria, TSS & TP TMDLs
04040001-03-03	INC0133_T1027	Salt Creek - Unnamed Tributary	Recreational Use (Bacteria) & Aquatic Life Use (IBC)	Bacteria, TSS & TP TMDLs
04040001-03-03	INC0133_T1028	Gustafson Ditch	Recreational Use (Bacteria) & Aquatic Life Use (IBC)	Bacteria, TSS & TP TMDLs
04040001-03-03	INC0133_T1029	Robbins Ditch	Aquatic Life Use (IBC)	TSS & TP TMDLs
04040001-03-03	INC0133_T1030	Salt Creek	Aquatic Life Use (IBC)	TSS TMDLs

IBC = Impaired biotic community
TSS = Total suspended solids
TP = Total phosphorus

Water quality within the SCW has been monitored via efforts from a local not for profit, Save The Dunes Conservation Fund (STDCF), and by the Indiana Department of Environmental Management (IDEM). Water quality sampling efforts involved measuring the health of the stream environments by collected field data to monitor the quality of; aquatic biological communities, sediment, and the chemical, physical and habitat characteristics within each stream environment. IDEM determined that twelve segments within the SCW exceeded bacteria water quality standards and sixteen segments showed impairments related to biotic communities. IDEM determined that the likely cause for impaired biotic communities was linked to elevated concentrations of total suspended solids and total phosphorus. Reaches addressed in the Salt Creek watershed were listed on Indiana's 2008 303(d) list as: four segments within 04040001-03-01, eight segments within 04040001-03-02, and ten segments within 04040001-03-03 (Table 1 of this Decision Document).

Land Use:
The Salt Creek watershed encompasses approximately 49,573 acres within northwest Indiana. Land use in the SCW is comprised of; developed lands, cultivated crop lands, forested lands, grasslands & herbaceous lands, and wetlands. Land use coverage from the 2006 National Land Cover Dataset (NLCD) was utilized to calculate the percentages of land cover within the SCW. Cultivated crop lands (28.5%) and forested lands (16.7%) accounted for two of the largest land cover categories. High intensity developed areas, medium intensity developed areas, low intensity developed areas, and open space developed areas were combined, into a general 'Developed' land use category (27.6%). The distribution of land uses within the SCW are found in Table 2 of this Decision Document.

Table 2: Land use in the Salt Creek (IN) Watershed

Land Use Category Description	Acreage	Distribution (% of the total area in the Salt Creek Watershed)
Agriculture	14,128	28.5%
Developed	13,669	27.6%
Forest	8,285	16.7%
Grassland / Herbaceous / Other	8,138	16.4%
Wetlands	5,337	10.8%
TOTAL	49,557	

Problem Identification:

IDEM identified the water body segments of Salt Creek and its tributaries on the 303(d) list of impaired waters. Waters impaired for excessive *E. coli* concentrations were first listed on the 1998 303(d) list and waters which demonstrated impaired biotic communities were first listed on the 2002 303(d) list. In 2004, IDEM completed a TMDL for *E. coli* in the main stem of Salt Creek.[2]

Water quality sampling from 2006-2011, conducted by IDEM and STDCF, included the analysis of TSS, bacteria (*E. coli*), nitrate, TP, turbidity, conductivity and flow. These sampling events detected exceedances of water quality standards for bacteria and stressed conditions for biotic communities within sampling reaches. Impaired reaches were listed on Indiana's 303(d) list for recreational use impairments (due to bacteria exceedances of the numeric WQS) and aquatic life use impairments (due to IBC exceedances of the narrative WQS). 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. flow alterations or organic enrichment) can negatively impact aquatic life use. TMDLs were completed for TSS and TP to address the aquatic life use impairments related to IBC. 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. In some instances, degradations in aquatic habitats or water quality have reduced fish populations or altered fish communities from those communities supporting sport fish species to communities which support rough fish species.

Excess siltation and flow alteration in streams may impact aquatic life by altering habitats. Excess sediment can fill pools, embed substrates, and reduce connectivity between different stream habitats. The result is a decline in habitat types that in healthy streams support diverse macroinvertebrate communities. Excess sediment can also reduce spawning and rearing habitats for certain fish species. In addition, excess suspended sediment can clog the gills of fish and thus reduce fish health. Flow alterations within the SCW due to drainage improvements on or near agricultural lands, have in some instances resulted in increased peak flows from impervious surfaces, and other land use changes within the SCW. Higher peak flows in stream environments, which typically occur during storm events, can

[2] IDEM, 2004. Salt Creek *E. coli* TMDL. http://www.in.gov/idem/nps/files/tmdl_saltcrk_report.pdf

carry increased sediment loads to streams and erode streambanks. In the SCW, IDEM has noted that deposited fine sediments have embedded substrates leading to habitat loss. Similar to the nutrient effects discussed above, this may result in reduced fish populations or altered fish communities from those communities supporting sport fish species to communities which support rough fish species.

Priority Ranking:
The SCW 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 there is no water quality guidance 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 sediment (TSS) and excess nutrients (TP).

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

National Pollutant Discharge Elimination System (NPDES) permit holders: NPDES permitted facilities may contribute pollutant loads (bacteria, nutrients or TSS) to surface waters through facility discharges of treated wastewater. Permitted facilities discharge treated wastewater according to their NPDES permit. IDEM identified eight NPDES permit holders in the SCW which were assigned a portion of the wasteload allocation (WLA) (Table 3 in this Decision Document).

Table 3: Permitted NPDES dischargers in the Salt Creek watershed

NPDES ID	Facility Name	AUID	Receiving Water
IN0042021	Elmwood Mobile Home Park	INC0133_T1024	Damon Run - South Branch
IN0039659	Forest Oaks WWTP	INC0133_T1023	Swanson Lamporte Ditch
IN0038709	Liberty Farm Mobile Home Park	INC0133_T1025	Damon Run - East Branch
IN0059064	Mallard's Pointe	INC0133_T1021	Mallards Landing
IN0058475	Nature Works Conservancy District	INC0132_T1009	Clark Ditch
IN0031119	Shorewood Forest Utilities WWTP	INC0132_T1011	Lake Louise Outlet
IN0030651	South Haven Sewer Works	INC0133_T1030	Salt Creek
IN0024660	Valparaiso WWTP	INC0132_01	Salt Creek

Municipal Separate Storm Sewer Systems (MS4): There are seven MS4 communities within the boundaries of the SCW (Table 4 of this Decision Document). Stormwater from MS4s can transport bacteria, nutrients and sediment to surface water bodies during or shortly after storm events. Each of the MS4 communities within Table 4 of this Decision Document was assigned a portion of the WLA based on the jurisdictional area of the MS4 community or the percentage of developed land relative to the area of the entire AUID.

Table 4: Permitted MS4 communities in the Salt Creek watershed

NPDES ID	Facility Name	Area (square mile)
INR040036	Town of Chesterton	1.54
INR040079	Twin Creeks Conservancy District (South Haven)	0.99
INR040090	City of Portage	0.56
INR040115	Town of Porter	0.28
INR040140	Porter County	61.07*
INR040149	Nature Works Conservancy District (Aberdeen)	0.94
INR04073	City of Valparaiso/Valparaiso University	11.76

* = Total area of unincorporated Porter County. For purposes of identifying TMDL allocations, only the developed land portion of Porter County, defined by NLCD, was used to set MS4 WLA.

Combined Sewer Overflows (CSOs): There is one CSO community in the SCW, the City of Valparaiso. CSOs may deliver bacteria, nutrients and sediment 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.

Concentrated Animal Feeding Operations (CAFOs): There are no CAFO facilities in the SCW and there are no Confined Feeding Operations (CFOs) within the SCW.

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

Urban runoff: Runoff from urban areas (urban, residential, commercial or industrial land uses) can contribute various pollutants (bacteria, nutrients and sediments) 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 SCW. 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, nutrients and sediments) which may lead to impairments in the SCW. 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. Sediment and nutrients can be mobilized in a similar fashion to bacteria. Tile lined fields and channelized ditches enable particles to move more efficiently into surface waters.

Unrestricted livestock access to streams: Livestock with access to stream environments may add bacteria and nutrients directly to the surfaces 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. Smaller animal facilities may add bacteria and nutrients to surface waters via wastewater from these facilities or stormwater runoff from near-stream pastures.

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 also 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.

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

Future Growth:
Population estimates compiled in 2006 determined that Porter County's population increased by approximately 14% since 1990. Population estimates for Porter County are expected to increase in the future. The Indiana Business Research Center (IBRC) projects a population of 191,835 in Porter County in 2030, an increase of 19% from 2006.[3] Currently the population within Porter County is clustered around the cities of Valparaiso, South Haven, Portage, and Lake Louise areas.

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, nutrient or sediment 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.

[3] IBRC, 2012, Indiana Business Research Center. Indiana University Kelley School of Business. Indiana population projections- Porter County total: 2030. *STATS Indiana*. Retrieved 6/29/12 from http://www.stats.indiana.edu/pop_proj/.

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 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.

Comment:

Designated Uses:

The designated uses for water bodies identified in the SCW TMDL are for total body contact recreation use and aquatic life use.

Recreational use: 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 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 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 SCW TMDL *E. coli* target is: from April 1 through October 31, *E. coli* shall not exceed **125 cfu per 100 mL** (125 cfu/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.

Aquatic Life Use: 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)).

Currently IDEM has not developed numeric criteria for TSS and TP. Water quality target (WQT) values were established by IDEM to improve water quality within water bodies to support well balanced aquatic communities. In several tributaries to Salt Creek, 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 TSS and or TP targets are impacting biological communities within the SCW. Impaired biological community segments identified during IDEM’s water quality assessments in 2006-2011 are thought to be influenced by increased concentrations of TSS and or TP. IDEM employed water quality target values for TSS and TP in order to evaluate which of the two parameters were affecting the biology of the segment. For certain IBC segments within the SCW it was determined, based on the water quality data collected in that segment, that the biology within that segment was impacted by both parameters (TSS and TP) (Table 1 of this Decision Document). The baselines which IDEM used to determine which parameters were impacting IBC segments were water quality target values for TSS and TP.

IDEM utilized a WQT of 30 mg/L for TSS. The TSS WQT of 30 mg/L was chosen to interpret the narrative sediment criteria (327 IAC 2-1-6). IDEM employed a WQT of 0.3 mg/L for TP for assessing stream segments which may be contributing nutrient inputs to those reaches with impaired biological communities. The TP WQT 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 5: Water quality standards and targets utilized within the Salt Creek watershed TMDL

Parameter	Units	Water Quality Criteria	TMDL Targets
Numeric Water Quality Standards for addressing the Bacteria (E. coli) impaired segments within the Salt Creek watershed			
E. Coli [1]	#/100 mL	Numeric	235 single sample maximum
		Numeric	Geometric mean < 125 [2]
Narrative Water Quality Targets for addressing the Impaired Biotic Communities (IBC) segments within the Salt Creek watershed			
Total Suspended Solids (TSS)	mg/L	Narrative	30
Total Phosphorus (TP)	mg/L	Narrative	0.3

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.

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 SCW based on the water quality standards and water quality target values. The Load Duration Curve (LDC) approach was selected by IDEM to calculate TMDLs for bacteria, nutrients and sediments. The LDC approach assigns loadings based on flow.

Bacteria (E. coli) TMDLs: For all *E. coli* TMDLs addressed by the SCW TMDL, 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). However, for *E. coli* loading capacity calculations, 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 SCW, 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 approached the SCW TMDLs by calculating loading capacity values for individual impaired segments within the three HUC-12 watersheds (04040001-03-01, 04040001-03-02 and 04040001-03-03). For example, impaired reaches (ex. INC0131_01 or INC0132_T1007) were assigned to their respective HUC-12 watershed based on the location of each impaired reach within the SCW.

There was one unique case contained within the SCW TMDL. For the Clark Ditch segment, one load for bacteria was calculated for two individual impaired reaches (INC0132_T1009 and INC0132_T1010). Each segment was not assigned an individual bacteria load (Table 6 of this Decision Document). IDEM explained that a singular load calculated for both of these segments would satisfy the TMDLs for each of the individual segment. IDEM determined that assigning a load to cover two reaches, instead of individual loads for each reach, was appropriate because land use characteristics were consistent across the subwatershed containing both INC0132_T1009 and INC0132_T1010. The consistency in land use within the watershed provided assurance that implementation efforts within the watershed would meet the TMDL loads assigned at the subwatershed outlet point.

Besides the Clark Ditch segment (covering INC0132_T1009 and INC0132_T1010), all other impaired reaches received individual loads for bacteria, TSS or TP. Flow duration curves (FDC) were created for each of subwatersheds within the SCW. The FDC were developed from flow frequency tables based on recorded and scaled flow volumes measured at a USGS gage on Little Calumet River, Indiana (USGS gage ID #04094000). The flow data focused on dates within the recreation season (April 1 to October 31). Dates outside of the recreation season were excluded from the flow record. Flows at this location were utilized to characterize the flows within other subwatersheds in the SCW. Daily stream flows were necessary to implement the load duration curve approach. These were estimated using the observed flows available at the USGS gage on the Little Calumet River and drainage area weighting using 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, in the case of the SCW (#04094000)
$A_{ungaged}$ = Drainage area of the ungaged location
A_{gaged} = Drainage area of the gaged location, in the case of the SCW (#04094000)

In this procedure, the drainage area of each monitoring stations (or impaired segment) was divided by the drainage area (66 square miles) of USGS gage #04094000. The flows for each of the stations were then calculated by multiplying the USGS gage #04094000 flows by the drainage area ratios. Additional flows were added to certain locations to account for WWTF and CSOs that discharge upstream and are not directly accounted for using the drainage area weighting method.

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 SCW 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 SCW 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 SCW basin in 2006-2011 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.

TMDLs were calculated for each subwatershed in the SCW. 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 6: Bacteria (*E. coli*) TMDLs for the Salt Creek 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 - 5 %	5 - 40 %	40 - 80 %	80 - 95 %	95 - 100 %
03-02	**TMDL Clark Ditch: (INC0132_T1009 & INC0132_T1010)**					
	Bacteria TMDL (billions of bacteria/day)	**24.900**	**8.600**	**5.700**	**4.000**	**2.800**
	Wasteload Allocation (WLA): Total	15.40	5.80	4.00	3.00	2.30
	WLA: Nature Works Conservancy District (IN0058475)	1.70	1.70	1.60	1.60	1.60
	WLA: MS4 Nature Works Conservancy District (INR040149)	5.93	1.78	1.04	0.61	0.30
	WLA: MS4 Porter County (INR040140)	7.77	2.32	1.36	0.79	0.40
	Load Allocation (LA)	7.01	1.94	1.13	0.60	0.22
	Margin Of Safety (MOS) (10%)	2.49	0.86	0.57	0.40	0.28
03-02	**TMDL Lake Louise Outlet: (INC0132_T1011)**					
	Bacteria TMDL (billions of bacteria/day)	**41.00**	**14.20**	**9.40**	**6.60**	**4.60**
	Wasteload Allocation (WLA): Total	11.75	5.11	3.93	3.23	2.74
	WLA: Shorewood Forest Utilities (IN0031119)	2.15	2.11	2.13	2.13	2.14
	WLA: MS4 Porter County (INR040140)	9.60	3.00	1.80	1.10	0.60
	Load Allocation (LA)	25.15	7.67	4.53	2.71	1.40
	Margin Of Safety (MOS) (10%)	4.10	1.42	0.94	0.66	0.46
03-02	**TMDL Salt Creek Unnamed Tributary: (INC0132_T1012)**					
	Bacteria TMDL (billions of bacteria/day)	**27.80**	**9.60**	**6.40**	**4.50**	**3.10**
	Wasteload Allocation (WLA): Total	0.77	0.26	0.18	0.12	0.09
	WLA: MS4 Porter County (INR040140)	0.77	0.26	0.18	0.12	0.09
	Load Allocation (LA)	24.25	8.38	5.58	3.93	2.70
	Margin Of Safety (MOS) (10%)	2.78	0.96	0.64	0.45	0.31
03-03	**TMDL Mallards Landing: (INC0133_T1021)**					
	Bacteria TMDL (billions of bacteria/day)	**36.700**	**12.700**	**8.400**	**5.900**	**4.100**
	Wasteload Allocation (WLA): Total	2.900	1.100	0.700	0.500	0.400
	WLA: Mallards Pointe (IN0059064)	0.100	0.100	0.100	0.100	0.100
	WLA: MS4 Porter County (INR040140)	2.800	1.000	0.600	0.400	0.300
	Load Allocation (LA)	30.130	10.330	6.860	4.810	3.290
	Margin Of Safety (MOS) (10%)	3.670	1.270	0.840	0.590	0.410
03-03	**TMDL Damon Run: (INC0133_T1022)**					
	Bacteria TMDL (billions of bacteria/day)	**144.50**	**49.90**	**33.10**	**23.20**	**16.20**
	Wasteload Allocation (WLA): Total	19.86	7.51	5.31	4.03	3.12
	WLA: Forest Oaks WWTP (IN0039659)	0.520	0.420	0.380	0.380	0.350
	WLA: Liberty Farm Mobile Home Park (IN0038709)	0.130	0.120	0.160	0.170	0.210
	WLA: Elmwood Mobile Home Park (IN0042021)	0.510	0.570	0.570	0.580	0.560

	WLA: City of Valparaiso/Valparaiso University (INR04073)	0.075	0.026	0.017	0.012	0.008
	WLA: MS4 Town of Chesterton (INR040036)	0.524	0.179	0.118	0.081	0.056
	WLA: MS4 Porter County (INR040140)	18.102	6.195	4.066	2.807	1.936
	Load Allocation (LA)	110.19	37.40	24.48	16.85	11.46
	Margin Of Safety (MOS) (10%)	14.45	4.99	3.31	2.32	1.62
03-03	**TMDL Swanson Lamporte Ditch: (INC0133_T1023)**					
	Bacteria TMDL (billions of bacteria/day)	**49.200**	**17.000**	**11.300**	**7.900**	**5.500**
	Wasteload Allocation (WLA): Total	9.120	3.320	2.280	1.680	1.250
	WLA: Forest Oaks WWTP (IN0039659)	0.520	0.420	0.380	0.380	0.350
	WLA: MS4 Town of Chesterton (INR040036)	0.688	0.232	0.152	0.104	0.072
	WLA: MS4 Porter County (INR040140)	7.912	2.668	1.748	1.196	0.828
	Load Allocation (LA)	35.160	11.980	7.890	5.430	3.700
	Margin Of Safety (MOS) (10%)	4.920	1.700	1.130	0.790	0.550
03-03	**TMDL Damon Run - South Branch: (INC0133_T1024)**					
	Bacteria TMDL (billions of bacteria/day)	**77.900**	**26.900**	**17.800**	**12.500**	**8.800**
	Wasteload Allocation (WLA): Total	9.110	3.470	2.470	1.880	1.460
	WLA: Elmwood Mobile Home Park (IN0042021)	0.510	0.570	0.570	0.580	0.560
	WLA: City of Valparaiso/Valparaiso University (INR04073)	0.060	0.020	0.013	0.009	0.006
	WLA: MS4 Town of Chesterton (INR040036)	0.009	0.003	0.002	0.001	0.001
	WLA: MS4 Porter County (INR040140)	8.531	2.877	1.885	1.290	0.893
	Load Allocation (LA)	61.000	20.740	13.550	9.370	6.460
	Margin Of Safety (MOS) (10%)	7.790	2.690	1.780	1.250	0.880
03-03	**TMDL Damon Run - East Branch: (INC0133_T1025)**					
	Bacteria TMDL (billions of bacteria/day)	**30.900**	**10.700**	**7.100**	**5.000**	**3.500**
	Wasteload Allocation (WLA): Total	3.390	1.340	0.970	0.760	0.610
	WLA: Liberty Farm Mobile Home Park (IN0038709)	0.290	0.240	0.270	0.260	0.310
	WLA: MS4 Town of Chesterton (INR040036)	0.003	0.001	0.001	0.001	0.000
	WLA: MS4 Porter County (INR040140)	3.097	1.099	0.699	0.500	0.300
	Load Allocation (LA)	24.420	8.290	5.420	3.740	2.540
	Margin Of Safety (MOS) (10%)	3.090	1.070	0.710	0.500	0.350
03-03	**TMDL Squirrel Creek: (INC0133_T1026)**					
	Bacteria TMDL (billions of bacteria/day)	**28.80**	**10.00**	**6.60**	**4.60**	**3.20**
	Wasteload Allocation (WLA): Total	15.60	5.40	3.60	2.50	1.80
	WLA: MS4 City of Portage (INR040090)	2.09	0.72	0.48	0.34	0.24
	WLA: MS4 Twin Creeks Conservancy District (South Haven) (INR040079)	2.31	0.80	0.53	0.37	0.27
	WLA: MS4 Porter County (INR040140)	11.20	3.88	2.58	1.80	1.29
	Load Allocation (LA)	10.32	3.60	2.34	1.64	1.08
	Margin Of Safety (MOS) (10%)	2.88	1.00	0.66	0.46	0.32
03-03	**TMDL Salt Creek - Unnamed Tributary: (INC0133_T1027)**					
	Bacteria TMDL (billions of bacteria/day)	**8.50**	**2.90**	**1.90**	**1.40**	**1.00**
	Wasteload Allocation (WLA): Total	3.88	1.34	0.89	0.62	0.44

	WLA: MS4 Town of Chesterton (INR040036)	0.38	0.13	0.09	0.06	0.04
	WLA; MS4 City of Portage (INR040090)	1.23	0.42	0.28	0.20	0.14
	WLA: MS4 Porter County (INR040140)	2.27	0.78	0.52	0.36	0.26
	Load Allocation (LA)	3.77	1.27	0.82	0.64	0.46
	Margin Of Safety (MOS) (10%)	0.85	0.29	0.19	0.14	0.10
03-03	**TMDL Gustafson Ditch: (INC0133_T1028)**					
	Bacteria TMDL (billions of bacteria/day)	**29.70**	**10.20**	**6.80**	**4.80**	**3.30**
	Wasteload Allocation (WLA): Total	18.29	6.32	4.19	2.94	2.06
	WLA: MS4 Town of Chesterton (INR040036)	7.11	2.46	1.63	1.14	0.80
	WLA: MS4 Town of Porter (IN040115)	1.98	0.68	0.45	0.32	0.22
	WLA: MS4 Porter County (INR040140)	9.20	3.18	2.11	1.48	1.04
	Load Allocation (LA)	8.44	2.86	1.93	1.38	0.91
	Margin Of Safety (MOS) (10%)	2.97	1.02	0.68	0.48	0.33

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

IBC TMDLs (addressed via TSS and TP LDCs): IBC segments addressed by TMDLs for TSS and TP were developed in a similar fashion to the bacteria TMDLs. For the TSS and TP TMDLs, the WQT for each parameter was used to set the loading capacity of the TMDL. These targets are TSS (30 mg/L) and TP (0.3 mg/L). IDEM incorporated the LDC approach to calculate pollutant loadings for each of these parameters at the outlet points of subwatersheds (HUC-12 scale) within the SCW. Impaired reaches were assigned to their respective subwatershed based on the location of the reach within the SCW.

IDEM approached the SCW TMDLs by calculating loading capacity values for the various impaired segments within subwatersheds in HUC-12 watersheds (04040001-03-01, 04040001-03-02 and 04040001-03-03). Impaired reaches (ex. INC0131_01 or INC0132_T1007) were assigned to their respective HUC-12 subwatershed based on the location of each impaired reach within the SCW. For the Clark Ditch segment, two impaired reaches (INC0132_T1009 and INC0132_T1010) were combined and assigned loads for TSS. IDEM explained the singular load calculated for both of these segments would satisfy the TMDL for TSS. IDEM determined that assigning a load to cover two reaches, instead of individual loads for each reach, was appropriate because land use characteristics were consistent across the subwatershed containing both INC0132_T1009 and INC0132_T1010. The consistency in land use within the watershed provided assurance that implementation efforts within the watershed would meet the TMDL loads assigned at the subwatershed outlet point.

Flow measurements from the Little Calumet USGS gage were incorporated to develop FDC and the Drainage Area Weighting Equation was utilized to estimate flows in ungaged subwatersheds. IDEM completed water quality monitoring in the SCW basin in 2006-2011 and measured TSS and TP concentrations at specific sampling points within the watershed. TSS and TP values from these efforts were converted to individual sampling loads by multiplying the sample concentration by the

[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.

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 violations of the WQT 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 WQT.

TMDLs were calculated for each subwatershed in the SCW. 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, urban stormwater runoff etc.). Instead, load allocations were represented as one value for each TMDL. EPA is approving the load(s) expressed in the current TMDLs.

Table 7: Impaired Biotic Community (IBC) TMDLs for the Salt Creek Watershed

HUC Code 12-digit	Flow Regime TMDL analysis Total Suspended Solids (tons/day) or Total Phosphorus (lbs/day)	High	Moist Conditions	Normal Flows	Dry Conditions	Low Flows
	Duration Interval	0 - 5 %	5 - 40 %	40 - 80 %	80 - 95 %	95 - 100 %
03-01	**TMDL Salt Creek: (INC0131_01)**					
	Total Suspended Solids (tons/day)	**1.690**	**0.580**	**0.390**	**0.270**	**0.190**
	Wasteload Allocation (WLA): Total	0.096	0.033	0.022	0.015	0.011
	WLA: MS4 Porter County (INR040140)	0.096	0.033	0.022	0.015	0.011
	Load Allocation (LA)	1.425	0.489	0.329	0.228	0.160
	Margin Of Safety (MOS) (10%)	0.169	0.058	0.039	0.027	0.019
	Total Phosphorus (lbs/day)	**33.86**	**11.70**	**7.75**	**5.44**	**3.81**
	Wasteload Allocation (WLA): Total	1.92	0.66	0.44	0.31	0.22
	WLA: MS4 Porter County (INR040140)	1.92	0.66	0.44	0.31	0.22
	Load Allocation (LA)	28.55	9.87	6.53	4.59	3.21
	Margin Of Safety (MOS) (10%)	3.39	1.17	0.78	0.54	0.38
03-01	**TMDL Salt Creek: (INC0131_02)**					
	Total Suspended Solids (tons/day)	**5.010**	**1.730**	**1.150**	**0.810**	**0.560**
	Wasteload Allocation (WLA): Total	1.906	0.658	0.436	0.306	0.214
	WLA: City of Valparaiso/Valparaiso University (INR04073)	1.904	0.657	0.436	0.306	0.214
	WLA: MS4 Porter County (INR040140)	0.002	0.001	0.0004	0.0003	0.0002
	Load Allocation (LA)	2.603	0.899	0.599	0.423	0.290
	Margin Of Safety (MOS) (10%)	0.501	0.173	0.115	0.081	0.056
	Total Phosphorus (lbs/day)	**100.29**	**34.64**	**22.96**	**16.11**	**11.28**
	Wasteload Allocation (WLA): Total	38.12	13.17	8.73	6.12	4.29

	WLA: City of Valparaiso/Valparaiso University (INR04073)	38.08	13.16	8.72	6.11	4.29
	WLA: MS4 Porter County (INR040140)	0.04	0.01	0.01	0.01	0.004
	Load Allocation (LA)	52.14	18.01	11.93	8.38	5.86
	Margin Of Safety (MOS) (10%)	10.03	3.46	2.30	1.61	1.13
03-01	**TMDL Sagers Lake: (INC0131_T1001)**					
	Total Suspended Solids (tons/day)	**1.840**	**0.640**	**0.420**	**0.300**	**0.210**
	Wasteload Allocation (WLA): Total	1.554	0.537	0.356	0.250	0.175
	WLA: City of Valparaiso/Valparaiso University (INR04073)	1.242	0.429	0.285	0.200	0.140
	WLA: MS4 Porter County (INR040140)	0.312	0.108	0.071	0.050	0.035
	Load Allocation (LA)	0.102	0.039	0.022	0.020	0.014
	Margin Of Safety (MOS) (10%)	0.184	0.064	0.042	0.030	0.021
	Total Phosphorus (lbs/day)	**36.81**	**12.44**	**8.43**	**5.91**	**4.14**
	Wasteload Allocation (WLA): Total	31.09	10.47	7.12	4.99	3.50
	WLA: City of Valparaiso/Valparaiso University (INR04073)	24.84	8.37	5.69	3.99	2.80
	WLA: MS4 Porter County (INR040140)	6.25	2.10	1.43	1.00	0.70
	Load Allocation (LA)	2.04	0.70	0.47	0.33	0.23
	Margin Of Safety (MOS) (10%)	3.68	1.27	0.84	0.59	0.41
03-01	**TMDL Sagers Lake: (INC0131_T1002)**					
	Total Suspended Solids (tons/day)	**2.150**	**0.740**	**0.490**	**0.340**	**0.240**
	Wasteload Allocation (WLA): Total	1.752	0.605	0.401	0.281	0.197
	WLA: City of Valparaiso/Valparaiso University (INR04073)	1.284	0.443	0.294	0.206	0.144
	WLA: MS4 Porter County (INR040140)	0.468	0.162	0.107	0.075	0.053
	Load Allocation (LA)	0.183	0.061	0.040	0.025	0.019
	Margin Of Safety (MOS) (10%)	0.215	0.074	0.049	0.034	0.024
	Total Phosphorus (lbs/day)	**42.92**	**14.83**	**9.83**	**6.90**	**4.83**
	Wasteload Allocation (WLA): Total	35.03	12.10	8.02	5.63	3.94
	WLA: City of Valparaiso/Valparaiso University (INR04073)	25.68	8.87	5.88	4.13	2.89
	WLA: MS4 Porter County (INR040140)	9.35	3.23	2.14	1.50	1.05
	Load Allocation (LA)	3.60	1.25	0.83	0.58	0.41
	Margin Of Safety (MOS) (10%)	4.29	1.48	0.98	0.69	0.48
03-02	**TMDL Salt Creek: (INC0132_01)**					
	Total Suspended Solids (tons/day)	**5.130**	**1.770**	**1.170**	**0.820**	**0.580**
	Wasteload Allocation (WLA): Total	3.345	1.281	0.914	0.699	0.522
	WLA: Valparaiso WWTP (IN0024660)	0.501	0.500	0.500	0.501	0.475
	WLA: City of Valparaiso/Valparaiso University (INR04073)	1.271	0.349	0.185	0.089	0.021
	WLA: MS4 Porter County (INR040140)	1.573	0.432	0.229	0.109	0.026
	Load Allocation (LA)	1.272	0.312	0.139	0.039	0.000
	Margin Of Safety (MOS) (10%)	0.513	0.177	0.117	0.082	0.058
03-02	**TMDL Salt Creek: (INC0132_02)**					
	Total Suspended Solids (tons/day)	**8.620**	**2.980**	**1.970**	**1.390**	**0.970**
	Wasteload Allocation (WLA): Total	4.413	1.694	1.210	0.927	0.727

	WLA: Valparaiso WWTP (IN0024660)	0.501	0.501	0.500	0.501	0.501
	WLA: City of Valparaiso/Valparaiso University (INR04073)	1.009	0.308	0.183	0.110	0.058
	WLA: MS4 Porter County (INR040140)	2.903	0.885	0.527	0.316	0.168
	Load Allocation (LA)	3.345	0.988	0.563	0.324	0.146
	Margin Of Safety (MOS) (10%)	0.862	0.298	0.197	0.139	0.097
03-02	**TMDL Salt Creek: (INC0132_03)**					
	Total Suspended Solids (tons/day)	**11.060**	**3.820**	**2.530**	**1.780**	**1.240**
	Wasteload Allocation (WLA): Total	5.488	2.068	1.460	1.103	0.852
	WLA: Valparaiso WWTP (IN0024660)	0.501	0.500	0.501	0.500	0.501
	WLA: City of Valparaiso/Valparaiso University (INR04073)	1.476	0.464	0.284	0.178	0.104
	WLA: MS4 Porter County (INR040140)	3.511	1.104	0.675	0.425	0.247
	Load Allocation (LA)	4.466	1.370	0.817	0.499	0.264
	Margin Of Safety (MOS) (10%)	1.106	0.382	0.253	0.178	0.124
03-02	**TMDL Beauty Creek: (INC0132_T1007)**					
	Total Suspended Solids (tons/day)	**1.020**	**0.350**	**0.230**	**0.160**	**0.110**
	Wasteload Allocation (WLA): Total	0.757	0.261	0.173	0.122	0.085
	WLA: City of Valparaiso/Valparaiso University (INR04073)	0.513	0.177	0.117	0.083	0.058
	WLA: MS4 Porter County (INR040140)	0.244	0.084	0.056	0.039	0.027
	Load Allocation (LA)	0.161	0.054	0.034	0.022	0.014
	Margin Of Safety (MOS) (10%)	0.102	0.035	0.023	0.016	0.011
	Total Phosphorus (lbs/day)	**20.44**	**7.06**	**4.68**	**3.28**	**2.30**
	Wasteload Allocation (WLA): Total	15.14	5.23	3.47	2.43	1.70
	WLA: City of Valparaiso/Valparaiso University (INR04073)	10.26	3.55	2.35	1.65	1.15
	WLA: MS4 Porter County (INR040140)	4.88	1.68	1.12	0.78	0.55
	Load Allocation (LA)	3.26	1.12	0.74	0.52	0.37
	Margin Of Safety (MOS) (10%)	2.04	0.71	0.47	0.33	0.23
03-02	**TMDL Clark Ditch: (INC0131_T1010)**					
	Total Suspended Solids (tons/day)	**0.660**	**0.230**	**0.150**	**0.110**	**0.070**
	Wasteload Allocation (WLA): Total	0.506	0.186	0.129	0.096	0.063
	WLA: Nature Works Conservancy District (IN0058475)	0.156	0.091	0.079	0.072	0.058
	WLA: MS4 Porter County (INR040140)	0.198	0.054	0.028	0.014	0.003
	WLA: MS4 Nature Works Conservancy District (INR040149)	0.152	0.041	0.022	0.010	0.002
	Load Allocation (LA)	0.088	0.021	0.006	0.003	0.000
	Margin Of Safety (MOS) (10%)	0.066	0.023	0.015	0.011	0.007
03-02	**TMDL Lake Louise Outlet: (INC0132_T1011)**					
	Total Suspended Solids (tons/day)	**1.080**	**0.370**	**0.250**	**0.170**	**0.120**
	Wasteload Allocation (WLA): Total	0.332	0.156	0.125	0.107	0.094
	WLA: Shorewood Forest Utilities ((IN0031119)	0.084	0.084	0.084	0.085	0.085
	WLA: MS4 Porter County (INR040140)	0.248	0.072	0.041	0.022	0.009
	Load Allocation (LA)	0.640	0.177	0.100	0.046	0.014

	Margin Of Safety (MOS) (10%)	0.108	0.037	0.025	0.017	0.012
03-02	**TMDL Salt Creek Unnamed Tributary: (INC0132_T1012)**					
	Total Suspended Solids (tons/day)	**0.740**	**0.250**	**0.170**	**0.120**	**0.080**
	Wasteload Allocation (WLA): Total	0.020	0.007	0.005	0.003	0.002
	WLA: MS4 Porter County (INR040140)	0.020	0.007	0.005	0.003	0.002
	Load Allocation (LA)	0.646	0.218	0.148	0.105	0.070
	Margin Of Safety (MOS) (10%)	0.074	0.025	0.017	0.012	0.008
	Total Phosphorus (lbs/day)	**14.70**	**5.08**	**3.37**	**2.36**	**1.65**
	Wasteload Allocation (WLA): Total	0.40	0.14	0.09	0.07	0.05
	WLA: MS4 Porter County (INR040140)	0.40	0.14	0.09	0.07	0.05
	Load Allocation (LA)	12.83	4.43	2.94	2.05	1.43
	Margin Of Safety (MOS) (10%)	1.47	0.51	0.34	0.24	0.17
03-03	**TMDL Squirrel Creek: (INC0133_T1026)**					
	Total Suspended Solids (tons/day)	**0.760**	**0.260**	**0.170**	**0.120**	**0.090**
	Wasteload Allocation (WLA): Total	0.413	0.143	0.095	0.066	0.046
	WLA: MS4 City of Portage (INR040090)	0.055	0.019	0.013	0.009	0.006
	WLA: MS4 Twin Creeks Conservancy District (South Haven) (INR040079)	0.061	0.021	0.014	0.010	0.007
	WLA: MS4 Porter County (INR040140)	0.297	0.103	0.068	0.047	0.033
	Load Allocation (LA)	0.271	0.091	0.058	0.042	0.035
	Margin Of Safety (MOS) (10%)	0.076	0.026	0.017	0.012	0.009
	Total Phosphorus (lbs/day)	**15.26**	**5.27**	**3.49**	**2.45**	**1.72**
	Wasteload Allocation (WLA): Total	8.27	2.86	1.89	1.33	0.93
	WLA: MS4 City of Portage (INR040090)	1.11	0.38	0.25	0.18	0.12
	WLA: MS4 Twin Creeks Conservancy District (South Haven) (INR040079)	1.22	0.42	0.28	0.20	0.14
	WLA: MS4 Porter County (INR040140)	5.94	2.05	1.36	0.95	0.67
	Load Allocation (LA)	5.46	1.88	1.25	0.87	0.62
	Margin Of Safety (MOS) (10%)	1.53	0.53	0.35	0.25	0.17
03-03	**TMDL Salt Creek - Unnamed Tributary: (INC0133_T1027)**					
	Total Suspended Solids (tons/day)	**0.220**	**0.080**	**0.050**	**0.040**	**0.030**
	Wasteload Allocation (WLA): Total	0.103	0.035	0.024	0.017	0.012
	WLA: MS4 Town of Chesterton (INR040036)	0.010	0.003	0.002	0.002	0.001
	WLA; MS4 City of Portage (INR040090)	0.033	0.011	0.008	0.005	0.004
	WLA: MS4 Porter County (INR040140)	0.060	0.020	0.014	0.010	0.007
	Load Allocation (LA)	0.095	0.037	0.021	0.019	0.015
	Margin Of Safety (MOS) (10%)	0.022	0.008	0.005	0.004	0.003
	Total Phosphorus (lbs/day)	**4.50**	**1.55**	**1.03**	**0.72**	**0.51**
	Wasteload Allocation (WLA): Total	2.06	0.71	0.47	0.33	0.23
	WLA: MS4 Town of Chesterton (INR040036)	0.20	0.07	0.05	0.03	0.02
	WLA; MS4 City of Portage (INR040090)	0.65	0.23	0.15	0.10	0.07
	WLA: MS4 Porter County (INR040140)	1.21	0.42	0.27	0.19	0.13
	Load Allocation (LA)	1.99	0.68	0.46	0.32	0.23
	Margin Of Safety (MOS) (10%)	0.45	0.16	0.10	0.07	0.05

03-03	**TMDL Gustafson Ditch: (INC0133_T1028)**					
	Total Suspended Solids (tons/day)	**0.780**	**0.270**	**0.180**	**0.130**	**0.090**
	Wasteload Allocation (WLA): Total	0.484	0.167	0.111	0.078	0.054
	WLA: MS4 Town of Chesterton (INR040036)	0.188	0.065	0.043	0.030	0.021
	WLA: MS4 Town of Porter (IN040115)	0.052	0.018	0.012	0.008	0.006
	WLA: MS4 Porter County (INR040140)	0.243	0.084	0.056	0.039	0.027
	Load Allocation (LA)	0.218	0.076	0.051	0.039	0.027
	Margin Of Safety (MOS) (10%)	0.078	0.027	0.018	0.013	0.009
	Total Phosphorus (lbs/day)	**15.70**	**5.42**	**3.59**	**2.52**	**1.77**
	Wasteload Allocation (WLA): Total	9.68	3.34	2.21	1.55	1.09
	WLA: MS4 Town of Chesterton (INR040036)	3.77	1.30	0.86	0.60	0.42
	WLA: MS4 Town of Porter (IN040115)	1.05	0.36	0.24	0.17	0.12
	WLA: MS4 Porter County (INR040140)	4.87	1.68	1.11	0.78	0.55
	Load Allocation (LA)	4.45	1.54	1.02	0.72	0.50
	Margin Of Safety (MOS) (10%)	1.57	0.54	0.36	0.25	0.18
03-03	**TMDL Robbins Ditch: (INC0133_T1029)**					
	Total Suspended Solids (tons/day)	**0.880**	**0.300**	**0.200**	**0.140**	**0.100**
	Wasteload Allocation (WLA): Total	0.737	0.255	0.169	0.118	0.083
	WLA; MS4 City of Portage (INR040090)	0.649	0.224	0.149	0.104	0.073
	WLA: MS4 Porter County (INR040140)	0.088	0.031	0.020	0.014	0.010
	Load Allocation (LA)	0.055	0.015	0.011	0.008	0.007
	Margin Of Safety (MOS) (10%)	0.088	0.030	0.020	0.014	0.010
	Total Phosphorus (lbs/day)	**17.51**	**6.05**	**4.01**	**2.81**	**1.97**
	Wasteload Allocation (WLA): Total	14.75	5.09	3.38	2.37	1.66
	WLA; MS4 City of Portage (INR040090)	12.98	4.48	2.97	2.09	1.46
	WLA: MS4 Porter County (INR040140)	1.77	0.61	0.41	0.28	0.20
	Load Allocation (LA)	1.01	0.36	0.23	0.16	0.11
	Margin Of Safety (MOS) (10%)	1.75	0.60	0.40	0.28	0.20
03-03	**TMDL Salt Creek: (INC0133_T1030)**					
	Total Suspended Solids (tons/day)	**15.490**	**5.350**	**3.550**	**2.490**	**1.740**
	Wasteload Allocation (WLA): Total	6.868	2.684	1.939	1.503	1.195
	WLA: Valparaiso WWTP (IN0024660)	0.500	0.500	0.500	0.500	0.500
	WLA: South Haven Sewer Works (IN0030651)	0.311	0.311	0.310	0.311	0.311
	WLA: City of Valparaiso/Valparaiso University (INR04073)	1.393	0.431	0.260	0.159	0.088
	WLA: MS4 Twin Creeks Conservancy District (INR040079)	0.073	0.022	0.014	0.008	0.005
	WLA: MS4 Porter County (INR040140)	4.591	1.420	0.856	0.525	0.291
	Load Allocation (LA)	7.073	2.131	1.256	0.738	0.371
	Margin Of Safety (MOS) (10%)	1.549	0.535	0.355	0.249	0.174

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 Salt Creek watershed TMDLs. 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 calculated in the TMDL development process, along with the calculations for the load assigned to the WLA and the margin of safety. IDEM determined the load allocation calculations for each of the subwatershed TMDLs based on the *E. coli* WQS (125 cfu/100 mL) and the WQT for TSS (30 mg/L) and TP (0.3 mg/L). The WQS and WQT were applicable across all flow conditions in the subwatershed (Tables 6 and 7 of this Decision Document).

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.

The implementation strategies outlined by IDEM in the SCW TMDL will aid local partners in determining appropriate mitigation strategies for these nonpoint source inputs. Additional sources of information which may be called upon by IDEM to aid in setting mitigation strategies, are field observations made during the collection of water quality monitoring data in 2006-2011. 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. 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.

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[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.

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 eight NPDES permit holders (Table 3 of this Decision Document) within the SCW which received a portion of the WLA assigned to mitigate bacteria, nutrient (TP) and sediment (TSS) 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.

Facilities identified as discharging TSS to IBC impacted reaches within the SCW were assigned a WLA based on the design flow and the water quality target for TSS (30 mg/L) (Table 7 of this Decision Document). IDEM explained that TSS discharges from NPDES permitted facilities in the SCW would have to meet the WQT of 30 mg/L and therefore, water quality within the receiving reach would not be negatively impacted.

Those facilities discharging TP to IBC impacted reaches within the SCW were assigned a WLA based on the design flow of the facility and a TP concentration value of 1.0 mg/L (Table 7 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 for lakes of 1.0 mg/L. TP discharges from permitted facilities in the SCW would have to meet an anticipated TP permit limit of 1.0 mg/L.

MS4s within the SCW (Table 4 of this Decision Document) were assigned a portion of the WLA based on the area of the particular MS4 community which is within the boundaries of the subwatershed in question. For example, for reach INC0132_01 (Salt Creek), there are two MS4 communities with lands within the boundaries of the subwatershed which includes reach INC0132_01. Each of the two MS4 communities was assigned a portion of the WLA based on the percentage of each individual MS4 community's land area within the boundary of INC0132_01's subwatershed. The City of Valparaiso/Valparaiso University, via their MS4 permit (INR04073), received approximately 44.7% of the MS4 assigned stormwater load. Porter County, via their MS4 permit (INR040140), received approximately 55.3% of the MS4 assigned stormwater load. Actual loading numbers for this example are reflected within Table 7 of this Decision Document. This practice of assigning MS4 responsibilities was duplicated in other subwatersheds within the SCW TMDL. MS4 contributions for the MS4 for unincorporated Porter County were calculated from the percentage of developed land relative to the area of the entire AUID.

There is one CSO community within the SCW, the City of Valparaiso. The CSO, was not assigned a portion of the WLA for CSO inputs (WLA = 0 cfu per 100 mL). There are no CAFOs or CFOs in the watershed boundaries of the SCW. Therefore, WLA attributed to contributions from CAFOs and CFOs 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 IDEM'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, nutrient and sediment TMDLs, incorporated an explicit Margin of Safety (MOS) into the development of the SCW 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 sources (Tables 6 & 7 of this Decision Document). The use of the LDC approach minimized variability associated with the development of the SCW 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 WQT. A 10% MOS was considered appropriate, because the target values used in this TMDL had a firm technical basis and the estimated flows are believed to be relatively accurate because they were estimated based on a USGS gage located within the watershed. IDEM did not translate the explicit MOS into reduced WLAs and LAs (concentration based allocations were set equal to the *E. coli* WQS).

The MOS for the SCW 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 SCW 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 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 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)).

<u>Comment:</u>
The bacteria (*E. coli*) and nutrient (TP) and sediment (TSS) TMDLs incorporated seasonal variation into the development of the SCW TMDLs via the following methods:

<u>Bacteria (E. coli) TMDLs:</u> 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 a 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 SCW and thereby accounted for seasonal variability over the recreation season. TMDL loads were based on sampling that occurred during the recreational season in 2006-2011. 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).

Nutrient and Sediment TMDLs: Given the amount of agricultural land use in the watershed, nutrient (phosphorus) and sediment loadings in the SCW vary with agricultural activity. Nutrient and sediment inputs to surface waters typically occur primarily through wet weather events. Critical conditions that impact the response of SCW water bodies to nutrients and sediments occur in periods of low flow. During low flow periods, nutrients and sediment can accumulate, there is less assimilative capacity within the water body, and generally nutrients and sediment are not transported through the water body at the same rate they are 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 SCW TMDL provides a very thorough discussion of reasonable assurance in Section 11 of the final TMDL document. Many of the activities and actions identified in the implementation strategy will be applied to attain the loading capacities and allocations calculated for the impaired reaches within the

SCW. The recommendations made by IDEM will be successful at improving water quality if appropriate 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. The SCW is unique because already it has a very active local stakeholder group, Save the Dunes Conservation Fund, which has been operating within the SCW for the previous 60 years.

Continued water quality monitoring within the basin is supported by IDEM. Additional water quality monitoring results will provide understanding of the success or failure of BMP systems designed to reduce bacteria, nutrient, and sediment loading into the surface waters of the watershed. Local watershed managers will be able to reflect on the progress or lack of progress of the various pollutant removal strategies and will have the opportunity to change course if observed progress is unsatisfactory. STDCF monitors water quality within the SCW on an annual basis, normally in the summer months. Their efforts will provide valuable information to local watershed managers on the performance of various BMP efforts within the basin.

Reasonable assurance that the WLA set forth 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, NPDES permit program, and CSO program are the main implementing programs for ensuring WLA are consistent with the TMDL. The Valparaiso City Utilities Water Reclamation Department is responsible for the operation and maintenance of their wastewater collection system and wastewater treatment plant. The City of Valparaiso has taken strides to maximize flow at the plant and reduce CSOs through various efforts; construction of CSO storage tanks, WWTP upgrades and improvements, elimination of CSOs, separation of combined sewer systems, and updating of the CSO Long Term Control Plan for the City of Valparaiso.

Local stormwater efforts can also provide reasonable assurance that stormwater inputs are being targeted by local MS4 partners. The Town of Chesterton, the Nature Works Conservancy District, the Twin Creeks Conservancy District, the City of Portage, Porter County, the Town of Porter, and the City of Valparaiso have entered into a memorandum of understanding (MOU) with the Northwestern Indiana Regional Plan Commission (NIRPC) to perform the requirements of a Stormwater Quality Management Plan (SQMP). The SQMP involves public education and outreach activities and installation of BMPs within the SCW. Examples of BMP installation include; the Town of Chesterton converted a traditional detention pond to a wetland at Dogwood Park in 2008, the Valparaiso Department of Water Works developed a rain garden at the north end of their main parking lot to control and treat stormwater runoff, and the Valparaiso Parks Department installed rain gardens adjacent to Beauty Creek at Forest Park Municipal Golf Course.

Reasonable assurances that nonpoint source reductions will be achieved for bacteria (*E. coli*), TP, and sediment are described in Section 11 of the TMDL. The STDCF has been awarded three grants funded through IDEM Section 319 grants with non-federal matching funds contributed by local partners and other grant programs. STDCF has utilized this funding to develop a comprehensive Salt Creek Watershed Management Plan (SCWMP). The SCWMP focused on developing and installing appropriate BMPs within the SCW. STDCF worked with members of the Salt Creek Watershed Committee and stakeholders to identify potential partners and sites for BMP demonstration projects. Installation of bio-swales, impervious pavement, rain gardens and restoring riparian areas were all BMP projects which

STDCF was able to install in and around Valparaiso. Educational signs were installed at each of these projects. Other grant programs and agencies, such as the Department of Natural Resources (DNR) Lake and River Enhancement (LARE) Program, Indiana DNR Lake Michigan Coastal Program, and the Great Lakes Restoration Initiative (GLRI), have provided funding toward BMP efforts within the SCW.

The SCWMP plan outlines practices designed to reduce pollutant inputs through the implementation of BMPs. STDCF has demonstrated its commitment to improving water quality within the SCW via discussions of past, present and future BMP installation efforts in the City of Valparaiso (Section11 of the final TMDL document). The main efforts of the SCWMP include; the identification and mitigation of riparian erosional areas within the urban/suburban areas in the SCW, reducing soil erosion from agricultural areas, stormwater peak flow reduction, and wetland restoration or construction. The SCWMP focuses on reducing sediment, nutrient and bacteria loads, while aiming to decrease flow volumes to local surface water bodies during storm events. IDEM and STDCF 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 SCW 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. STDCF has received Section 319 grant funding to support a variety of BMPs installation and other watershed efforts (ex. education and outreach) within the SCW. Other state led efforts will be via NPDES permit enforcement, 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 SCW in 2006-2011 as part of its basin monitoring schedule. Water quality data were collected at various locations within the SCW and those assessments were utilized to develop the TMDLs in this report. Water quality monitoring in the SCW will also continue via efforts from a local group, STDCF. Future monitoring in the SCW will also occur on IDEM's nine-year rotating basin schedule or once TMDL implementation BMPs are incorporated in the watershed. The IDEM monitoring efforts are designed to assess water quality improvements with respect to bacteria (*E. coli*), nutrient and sediment 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 SCW. The monitoring schedule will be adjusted, as needed, to improve source identification and source elimination efforts. IDEM will monitor whether bacteria (*E. coli*), nutrient and sediment targets are being achieved and adjust the SCW BMP strategy accordingly to meet these water quality targets. When results indicate that the water body is meeting the appropriate WQS and targets, 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.

<u>Comment:</u>
The focus of implementation strategies will be the reduction of bacterial, nutrient, and sediment inputs to the surface waters in the SCW. Local partners, such as STDCF, will bear the responsibility for assisting in the management of public lands and waters within the SCW. These partners will also be tasked with finding creative adaptive management strategies to meet changing water quality conditions within the watershed. The focus of all of the implementation strategies will be to reduce bacterial, nutrient, and sediment inputs to the surface waters in the SCW The main bacterial, nutrient and sediment reduction strategies include:

<u>Bacteria (E. coli TMDLs):</u>
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 SCW.

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 ensure that minimal 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 SCW.

Agricultural Land Management Practices: Runoff from cropland and pastures combined with the application of manure to fields in the late summer 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.

Nutrient (TP) 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 nutrient inputs to the SCW.

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

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 SCW. Local watershed partners (ex. STDCF, along with others) could assume addition responsibilities in communicating nutrient reduction strategies to stakeholders, via mailing annual newsletters or updating their website with nutrient reduction strategies.

Sediment (TSS) TMDLs:

Reducing stormwater peak flows within surface water bodies in the SCW is the primary recommendation for reducing sediment loads in the watershed. Streamside buffering, particularly via wetland restoration or construction, is a recommended practice that would reduce both sediment 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 SCW 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.

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 SCW. 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 sediment inputs into surface waters of the SCW and minimize or eliminate degradation of habitat.

Improved Agricultural Drainage Practices: A review of local agricultural drainage networks should be completed to examine how improving drainage ditches and drainage channels could be reorganized to reduce the influx of sediments to the surface waters in the SCW. 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 sediments to surface waters.

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 12 of the final TMDL document. The IDEM has been in contact with local groups and municipal officials throughout the development of these TMDLs. Public kickoff meetings were held on August 7, 2010 and on November 10, 2010 at the Porter County United Way Community Room where the public was invited to submit any additional data and information to the Salt Creek watershed TMDL process. A public meeting on the draft TMDL was held on February 29, 2012 at the Porter County United Way Community Room. The public was invited to submit formal comments on the draft document and informed of the findings of the document. Press releases were sent for each meeting and the Salt Creek watershed Group was notified by e-mail.

The draft TMDL report was available for public comment from February 29, 2012 to March 29, 2012. IDEM posted the draft report online at (http://www.in.gov/idem/nps/3871.htm). IDEM received 1 public comment on the draft SCW TMDL. IDEM adequately answered the public comment submitted during the public comment period. IDEM submitted the final TMDL and submittal letter to the U.S. EPA on July 17, 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 SCW TMDL document and submittal letter from the IDEM on July 17, 2012. The transmittal letter explicitly stated that enclosed was the final TMDL report detailing the SCW TMDLs which address recreational use and aquatic life use impairments due to bacteria and nutrient and sediment inputs. The SCW TMDLs include impaired reaches within the following HUC-12 subwatersheds within the SCW:

- 04040001-03-01 (Sagers Lake);
- 04040001-03-02 (Clark Ditch); &
- 04040001-03-03 (Squirrel Creek).

TMDLs within these subwatersheds were being 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 Lake Louise Outlet subwatershed (segment INC0312_T1011) for total nitrogen. EPA suspends any decision action related to total nitrogen for the INC0312_T1011 segment. IDEM explained that they included the total nitrogen discussion in the SCW for informational purposes.

The U.S. EPA finds that the TMDL transmittal letter submitted for SCW 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 SCW satisfy all of the elements of approvable TMDLs. This approval is for **thirty-eight (38) TMDLs (12 bacteria TMDLs, 16 TSS TMDLs & 10 TP TMDLs, Appendix 1 of this Decision Document)**, addressing water bodies in three HUC-12 subwatersheds (04040001-03-01, 04040001-03-02, & 04040001-03-03) for recreational use and aquatic life use impairments, for the SCW. The water bodies within the three subwatersheds include:

- Salt Creek (INC0131_01, INC0131_02, INC0132_01, INC0132_02, INC0132_03 & INC0133_T1030);
- Sagers Lake (INC0131_T1001 & INC0131_T1002);
- Beauty Creek (INC0132_T1007);
- Clark Ditch (INC0132_T1009 & INC0132_T1010);
- Lake Louise Outlet (INC0132_T1011);
- Salt Creek Unnamed Tributary (INC0132_T1012 & INC0133_T1027);
- Mallards Landing (INC0133_T1021);
- Damon Run (INC0133_T1022);
- Swanson Lamporte Ditch (INC0133_T1023);
- Damon Run – South Branch (INC0133_T1024);
- Damon Run – East Branch (INC0133_T1025);
- Squirrel Creek (INC0133_T1026);
- Gustafson Ditch (INC0133_T1028); &
- Robbins Ditch (INC0133_T1029)

The U.S. EPA's approval of these TMDLs extend to the water bodies which are identified within the SCW, 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 Salt Creek Watershed and TMDL Count

2010 AUID	Narrative Description	Action	Bacteria TMDL	TSS TMDL	TP TMDL
Sagers Lake (04040001-03-01)					
INC0131_01	Salt Creek	TSS & TP TMDLs		1	1
INC0131_02				1	1
INC0131_T1001	Sagers Lake	TSS & TP TMDLs		1	1
INC0131_T1002				1	1
Clark Ditch (04040001-03-02)					
INC0132_01	Salt Creek	TSS TMDLs		1	
INC0132_02		TSS TMDLs		1	
INC0132_03		TSS TMDLs		1	
INC0132_T1007	Beauty Creek	TSS & TP TMDLs		1	1
INC0132_T1009	Clark Ditch	Bacteria TMDL	1		
INC0132_T1010		Bacteria & TSS TMDLs	1	1	
INC0132_T1011	Lake Louise Outlet	Bacteria & TSS TMDLs	1	1	
INC0132_T1012	Salt Creek - Unnamed Tributary	Bacteria, TSS & TP TMDLs	1	1	1
Squirrel Creek (04040001-03-03)					
INC0133_T1021	Mallards Landing	Bacteria TMDL	1		
INC0133_T1022	Damon Run	Bacteria TMDL	1		
INC0133_T1023	Swanson Lamporte Ditch	Bacteria TMDL	1		
INC0133_T1024	Damon Run - South Branch	Bacteria TMDL	1		
INC0133_T1025	Damon Run - East Branch	Bacteria TMDL	1		
INC0133_T1026	Squirrel Creek	Bacteria, TSS & TP TMDLs	1	1	1
INC0133_T1027	Salt Creek - Unnamed Tributary	Bacteria, TSS & TP TMDLs	1	1	1
INC0133_T1028	Gustafson Ditch	Bacteria, TSS & TP TMDLs	1	1	1
INC0133_T1029	Robbins Ditch	TSS & TP TMDLs		1	1
INC0133_T1030	Salt Creek	TSS TMDLs		1	
		Totals:	**12**	**16**	**10**
			Bacteria	**TSS**	**TP**