After evaluation of stakeholder concerns and completion of the watershed inventory, watershed problems can be summarized as shown in Table 3. Problems represent the condition that exists due to a particular concern or group of concerns. Table 4 details potential causes of problems identified in Table 3.

Note from IDEM guidance: **Problems** can be thought of as a condition that exists because of the concerns. In a figure, show the concerns and the problems related to them. One problem can relate to several similar concerns. Some concerns may already be phrased as a problem and in these instances may be copied verbatim in the ‘Problem’ column of your figure (see example).

Table 3. Problems identified for the Otter Creek watershed based on stakeholder and inventory concerns.

|  |  |
| --- | --- |
| **Concern(s)** | **Problem** |
| * Streambank erosion
* Livestock access to the Wabash River and tributaries
* River is muddy
* Flooding impacts, top soil loss, impacts from agricultural land
* Hardscape impacts, water quality impacts during stormwater runoff events
 | Area streams are very cloudy and turbid |
| * Impacts of impaired waterbodies on the watershed
* Septic impacts
* Livestock and manure impacts to the Wabash River and tributaries
* Fertilizers and pesticides flowing into the river
* Ntrient concentrations are elecated
* Livestock access to the Wabash River and tributaries
* Hardscape impacts, water quality impacts during stormwater runoff events
* Streambank erosion
* Flooding impacts, top soil loss, impacts from agricultural land
 | Area streams have nutrient levels exceeding the target set by this project |
| * E coli concentrations are elevated
* Manure spreading and storage
* Septic soils – too many residences are sited on unsuitable soils
* Septic system inputs to streams from straight pipes and abandoned facilities, poor maintenance
* Livestock access to the Wabash River and tributaries
* Manure impacts to the Wabash River and tributaries
 | Area streams are impaired for recreational contact by IDEM’s 303(d) list (high E. coli) |
| * Biodiversity is limited in the watershed
* General public needs educated about agricultural practice use
* Education is needed on watershed concepts, elevated nutrients, etc
* Urban residents are unaware of their impacts to the Wabash River
 | A unified education program for entire watershed does not currently exist |
| * Invasive species, especially Asian bush honeysuckle, impacts to water and soil quality
* Habitat loss along the Wabash River and its tributaries
* Redside dace occurs in three Wabash River tributaries –impacts of water quality and habitat on this endangered species
 | Habitat is insufficient to protect soil and water quality. |

Note from IDEM guidance: **The potential cause(s) for each identified problem.**

Include a figure showing the problems and their relationship to the potential **causes**. Causes of water quality problems must be defined as a specific pollutant parameter, but secondary causes may also be identified. It is appropriate that some problems and causes will be identical.

*Consider the underlying cause(s) for the problems identified. Causes may include specific pollutants, social behaviors, etc. If you cannot identify a problem’s potential cause, it may be that your problem is too broad, and you should try to narrow it.*

Table 4. Potential causes of identified problems in the Otter Creek watershed.

|  |  |
| --- | --- |
| **Problem** | **Potential Cause(s)** |
| Area streams are very cloudy and turbid | Total Suspended Sediment concentrations and turbidity levels exceed the targets set by this project |
| Area streams have nutrient levels exceeding the targets set by this project | Nutrient levels exceed the target set by this project |
| Areas streams are impaired by IDEM for recreational contact | E.coli levels exceed the water quality standard |
| A unified education program for entire watershed does not currently exist | Educational efforts targeting funders, local agencies, and the public are lacking. |
| Habitat is insufficient to protect soil and water quality. | Invasive species are negatively impacting soil and water quality; habitat and water quality is insufficient to protect endangered species. |

**Potential sources:** Nonpoint pollution sources are varied, yet common throughout almost any watershed. Several earlier sections of this document identify potential sources of the pollutants of concern in the Treaty Creek-Wabash River Watershed. A summary of potential sources identified in the Treaty Creek-Wabash River Watershed for each of our concerns was developed at the October steering committee and are listed below:

Nutrients (Nitrogen and Phosphorus):

* Conventional tillage cropping practice
* Wastewater treatment discharges
* Gully or ephemeral erosion
* Agricultural and residential fertilizer
* Poor riparian buffers
* Poor forest management
* Streambank and bed erosion
* Animal waste (livestock in streams, poor manure management, domestic and wildlife runoff)
* Confined feeding operations
* Human waste (failing septic systems, package plants, inadequately treated wastewater)

Sediment:

* Conventional tillage cropping practice
* Streambank and bed erosion
* Poor riparian buffers
* Gully or ephemeral erosion
* Cropped floodplains
* Livestock access to streams
* Altered hydrology (ditching and draining, altered stream courses)

*E. coli*:

* Human waste (failing septic systems, package plants, inadequately treated wastewater)
* Animal waste (livestock in streams, poor manure management, domestic and wildlife runoff)
* Combined Sewer Overflows

**The goal of the December 19 meeting**: Using the list of potential sources (above) identified for each parameter of concern as a base; develop a mechanism for determining critical areas for each parameter. Data available for each of these sources are provided on a subwatershed basis as are current water quality data (partial). For example, conventional tillage data are not per se available; however, agricultural row crop can be used as a surrogate for conventional tillage and thus is provided for that estimation. Streambank and bed erosion data are available from the watershed inventory, while animal waste can be estimated from animal numbers documented during the watershed inventory + CFO permitted numbers multiplied by the volume each type of animal produces.

**Critical Areas:** Critical areas are defined by the areas where sources of water quality problems occur in high density and where restoration measures can improve water quality. These areas indicate locations where best management practices should be targeted to address nonpoint sources of pollution. Priority areas are those areas of the watershed where high quality habitat is found and the aquatic biological community is classified as good or excellent. Best management practices to protect the higher quality conditions should be targeted to these areas.

What are critical areas?

Areas where implementation can remediate nonpoint sources to:

* Improve water quality
* Protect water quality by mitigating the impacts of future sources

What they cannot be:

* The entire project area
* A grouping which results in the entire project area
* A source of land use which cover 100% of the project area
* Every stream within the project area

What they should be:

* 12‐digit watershed (example: Little Deer Creek) or smaller area where a particular pollutant needs to be addressed
* Little Deer Creek is listed as impaired for E. coli and is therefore a critical area.
* A specific region within at 12‐digit watershed or smaller area where a particular source contributes to a problem
* Flora is targeted for CSO reductions and is therefore a critical area.
* Specific sources anywhere in the watershed
* Livestock have access to streams throughout the watershed and all of those areas are targeted as critical areas.