

B. Utilization of Minimum Stream Flows ~~Streamflow~~

IC 14-25-7-14 authorizes the Natural Resources Commission to determine and establish the minimum flow of streams. While the statute does not define minimum ~~stream flows~~ **streamflow** it suggests that in establishing such values, consideration should be given to the varying low flow characteristics of the streams of the state and the importance of instream and withdrawal uses, including established water quality standards and public water supply needs. In determining a minimum ~~stream-flow~~ **streamflow**, perhaps the most critical determination is the amount of flow needed to sustain the instream uses on a given stream. Historically, in Indiana the ~~stream-flow~~ **streamflow** equivalent to the 7Q10 (lowest seven (7) day average flow having a ten (10) year recurrence interval) could be considered to be the minimum ~~stream-flow~~ **streamflow**. This value is a critical factor in determining the level of treatment required for discharges into the state's rivers and streams. Since this criteria is critical to protecting water quality and little attention has been directed at assessing the minimum flow needed to sustain other instream uses in Indiana, the 7Q10 is commonly looked at as the minimum acceptable ~~stream-flow~~ **streamflow**.

Numerous methods exist to evaluate the instream flow requirements for other purposes such as fisheries or recreation. While much work has been done on this issue, particularly in other states, none appears to be clearly applicable to Indiana.

In 1990, the Department entered into a contract with Purdue University to assist in the development of instream flow criteria for Indiana. Instream flow requirements in Indiana include the flow required to maintain fish habitat, recreation, water quality and hydropower generation. The Purdue study concluded that the instream flow requirements sufficient to maintain fish habitat are usually the highest of all instream flows in Indiana. For instream flow requirements for waste assimilation and water quality maintenance it was concluded that: (1) a flow corresponding to 7Q10 is satisfactory to meet water quality standards at all but four of 25 locations analyzed; (2) a low flow statistic of 61Qmed is satisfactory to meet water quality standards at all twenty five (25) stations; (3) during the summer season ammonia toxicity is more important than dissolved oxygen in determining instream low flow required to maintain water quality; and (4) during the winter season ammonia toxicity alone dictates the minimum instream low flow required to maintain water quality.

The Purdue study offered the following recommendations:

(1) To maintain a satisfactory fish habitat it is recommended that the Indiana Department of Natural Resources evaluate and implement the following instream flow criteria: (1) net withdrawal from the stream may be permitted if the flow is higher than the highest instream flow required for fish survival. From streams with basin areas exceeding 1500 square miles, withdrawal may be permitted if flows are greater than 61Qmed (May-October) (or Q80%); (2) If flows less than 61Qmed (May-October) (or Q80%) occur, net withdrawals may be restricted but not prohibited. From streams receiving low

groundwater contributions and with basin areas less than 1500 square miles, net withdrawals may not be permitted if flows are less than 61Qmed (May-October) (or Q80%); (3) No net withdrawals are acceptable if the flow is less than annual 7Q10.

(2) To maintain water quality it is recommended that the Indiana Department of Natural Resources implement the following instream flow criteria: (1) Net withdrawal from a stream may be permitted if the flow is higher than the highest instream flow required for maintenance of water quality. Withdrawal may be permitted if flows are greater than 61Qmed (May-October); (2) If flows are less than 61Qmed (May-October), withdrawal may be restricted but not prohibited; (3) If flows are less than 7Q10, withdrawals may be permitted, but are not recommended.

The report refers to 61Qmed (May-October) which is the median flow estimated by using the lowest 61-day flows occurring over the May to October period of each year. These flows are approximately equal to the flows which are exceeded 80% of the time, referred to as Q80%. The Q80% value is easier to determine based on existing data and has therefore been substituted for 61Qmed.

Based on the Purdue Study the following conclusions can be reached:

- (1) A ~~stream-flow~~ **streamflow** equivalent to Q80% seems to be the desirable minimum flow to be kept in streams to maintain the instream flow requirements in Indiana. Net withdrawal from a stream should perhaps be restricted but not prohibited when ~~stream-flows are~~ **streamflow is** lower than Q80%.
- (2) A ~~stream-flow~~ **streamflow** equivalent to 7Q10 (lowest seven (7) day average flow having a ten (10) year recurrence interval) seems to be the absolute minimum flow to be kept in streams to maintain instream flow requirements in Indiana. Net withdrawal from the stream should be prohibited when ~~stream-flows are~~ **streamflow is** lower than 7Q10 unless absolutely necessary to protect the public health, welfare or safety.
- (3) In streams receiving low ground water contributions and with drainage areas less than 1500 square miles and when water quality is an issue (presence of a significant amount of effluents in the stream reach), it may be necessary to adopt a stricter threshold value than 7Q10 as the absolute minimum ~~stream-flow~~ **streamflow**.
- (4) It is important to note that the instream flow criteria purposefully refer to net withdrawals and not necessarily to total withdrawals. This means that water users may withdraw water from a stream at any time so long as they return the same amount of water to the stream in close proximity to its intake point without a significant degradation in its water quality. Such a scenario can occur only in the event the user has a supplementary source of water (such as an offstream reservoir) so that the consumptive uses can be compensated for. Therefore, before imposing restrictions, users should be encouraged and given the chance to plan

and develop standby offstream water sources if they cannot tolerate restrictions or possible shutdown of their water withdrawals.