

## **AGENCY PROCEDURE FOR DETERMINING ACCEPTABLE MINIMUM STREAM FLOWS**

**July 14, 1993**

### **Introduction**

It is the policy of the State of Vermont to protect and enhance the quality, character and usefulness of its surface waters, prevent the degradation of high quality waters, and prevent, abate or control all activities harmful to water quality. It is further the policy to assure the maintenance of water quality necessary to sustain existing aquatic communities and seek over the long term to upgrade the quality of waters and to reduce existing risks to water quality.

At the same time, it is the policy of the State of Vermont to promote a healthy and prosperous agricultural community, to maintain the purity of drinking water and assure the public health, to decrease Vermont's dependence on non-renewable energy sources, and to allow beneficial and environmentally sound development. (10 V.S.A. §1250 and State of Vermont Executive Order regarding the State Energy Policy)

The procedures described below are applicable to Agency determinations of acceptable minimum stream flow, made pursuant to a) permits issued under 10 V.S.A. Chapter 43 (Dams); b) issuance of water quality certificates pursuant to Section 401 of the Federal Clean Water Act and FERC licensing or relicensing actions; c) stream alteration permits or stream flow regulation under 10 V.S.A. Chapter 41; d) authorization by the Commissioner of Fish and Wildlife to obstruct streams pursuant to 10 V.S.A. Section 4607, and e) positions taken before Act 250 district environmental commissions with respect to projects affecting stream flow.

The foundation of state statutes protecting the natural flow of Vermont's rivers and streams is that the natural flow should be protected and maintained in the public interest. All reasonable alternatives to altering stream flow and water conservation measures should be thoroughly considered before reduction of the natural flow rate is considered. Only when a comprehensive analysis of such measures is completed can a reasoned and rational balance be defined between legitimate but competing users of the stream.

The intent of this procedure is to assure a consistent process is used in determining acceptable minimum stream flows when there are existing or potential competing uses of the water. This does not necessarily mean that a uniform minimum stream flow number will be reached in every case. What it does mean is that the minimum stream flow numbers will be derived using a consistent procedure.

### **General Procedure**

Determination of acceptable conservation flows are made to assure the passage of adequate water to maintain fisheries interests, aesthetic qualities, recreational and potable water supply uses appropriate to the body of water in question. In general, minimum flows adequate to maintain fisheries interests are sufficient to simultaneously maintain acceptable aesthetic qualities and recreational uses. The procedures below therefore focus primarily on determining fisheries related minimum flow requirements. The Agency reserves the right to require, or to recommend to other regulatory bodies, maintenance of minimum low flows in excess of or less than fisheries requirements where specific facts of the proposed project clearly show such higher or lower flows are needed to properly balance the many competing water uses at the site consistent with applicable statutes or rules. Where the Agency needs additional information to make a determination of flow needs for non-fisheries issues the Agency may request that water users perform special studies.

This procedure may be viewed in three (3) simplified steps. First, the Agency will accept the U.S. Fish and Wildlife Service recommended minimum flows of 0.5 csm (cubic feet per second per square mile) (summer), 1.0 csm (fall and winter), and 4.0 csm (spring) as a presumption that stream values and

uses are protected with little or no further field examination of the water in question or hydrologic computations.

Secondly, applicants may conduct flow gaging of the subject stream to establish a valid statistical relationship with a long-term stream gage station, which relationship would then be used to compute applicable stream flow statistics as used in the U.S. Fish and Wildlife Service policy.

Finally, where an applicant wishes to seek Agency approval for lower conservation flows, applicant may conduct site specific studies such as the U.S. Fish and Wildlife Service's Instream Flow Incremental Methodology (IFIM) protocols, or other approved habitat assessment methods. Results of valid evaluations, while costly and time consuming, may provide specific habitat information on which to make minimum flow judgements. Where Agency approved evaluations are available, the Agency will use this information to make judgements on acceptable low flows, which judgements may be greater or lesser than the U.S. Fish and Wildlife Service presumptive flow recommendation. It should be noted that some streams are not physically conducive to IFIM analysis, other evaluation methods may be necessary, and that IFIM analysis conducted to date tend to support conservation flows at the February median flow value for the fall/winter period.

Permits and decisions issued pursuant to this procedure shall provide opportunity for the Agency to reopen permits to review and modify conservation flow requirements at anytime after the initial five years when the Agency demonstrates that conflicting uses exist which require a balancing of those uses or that existing environmental problems require a review. Where the conservation flow requirements are contained in permits or approvals issued by other governmental authorities, the Agency will recommend inclusion of similar reopening conditions. In the event Agency rules governing determination of acceptable minimum stream flow change during the term of any permit, the Agency will not reopen the permit for that reason until it has made an affirmative finding that environmental damage or harm is resulting from the permitted minimum flows.

## **Procedure**

### **A. U.S. Fish and Wildlife Threshold**

The Agency will accept minimum stream flows described in the U.S. Fish and Wildlife Service "Interim Regional Policy for New England Stream Flow Recommendations" dated February 13, 1981, subject to the exceptions and modifications described later in this procedure. That policy (attached) calls for year-round release of 0.5 csm unless superseded by spawning and incubation flow requirements, in which case a flow of 1.0 csm for fall/winter spawning and incubation and/or 4.0 csm for spring spawning and incubation shall be required.

The Agency shall assume that fall/winter and spring spawning and incubation requirements exist within a stream unless a site specific determination is made that such requirements do not exist. The Agency may at its own initiative and with available information, or with information provided by the applicant, determine that significant spawning and incubation are not indigenous to the impacted stream segment. The impacted stream segment shall be that reach which extends downstream of the project to a point where 95% of the spawning/incubation flows have been restored by other flows of the drainage basin.

Alternatively, the Agency will use a determination of the median flow for a river or stream segment based upon continuous gage data over a ten year period from a gage located on the same river as the river segment in question and where that gage station and data are acceptable to the Agency. The gage data must be unregulated with defined accuracy and precision, and be from a hydrologically similar watershed region in the river basin as the river segment. The median flow shall be taken as the median of all days of record for that period. The applicable record for hydrological analysis and the periods defining the seasons for the purposes of issuing permits are shown in the following table.

Season	Period	Record for Hydrologic Analysis
Summer	June 1 - Sept. 30	August
Fall/winter	October 1 - March 31	February
Spring	April 1 - May 31	April/May

## B. Stream Hydrologic Analysis

When the stream segment is not suited to a habitat assessment or when the applicant elects to conduct stream gaging, a hydrologic evaluation of the stream may be used to determine the appropriate stream flow statistics.

The applicant shall gage the stream for a period of not less than 3 months for the summer or fall/winter spawning and incubation seasons of interest. Applicants shall gage for not less than 2 1/2 months during the spring spawning and incubation period.

The highest 10% of the average daily flows measured at the study stream shall be eliminated and the remaining flows contained in this record shall be regressed against contemporaneous data from a suitable long-term gage to derive an equation that can reliably predict flows at the study site from gaged flows at the long-term gage. The long-term gage must be effectively unregulated, located in a similar basin and acceptable to the Agency.

The analysis shall be considered successful if a correlation coefficient of 0.9 or greater is attained. The equation can then be used to estimate monthly median flows for the study site for the long-term gage statistics. If the gaging period is doubled over a period of at least two years, then the minimum acceptable correlation coefficient shall be 0.8.

Alternatively, the regression equation can be used to estimate monthly median flows for the study site from the long-term gage statistics through the use of confidence intervals. The value used as a flow standard shall be the higher +95% confidence interval value corresponding to the median value for the long-term gage.

The gaging data set shall be furnished to the Agency on 3 1/2 or 5 1/4 inch disc, and the statistical analysis shall be provided.

Acceptable gaging periods are shown in the following table.

Season	Period
Summer	July 1 - Sept. 30
Fall/winter	December 15 - March 15
Spring	March 15 - May 31

## C. Instream Flow Incremental Method (IFIM)

The Instream Flow Incremental Methodology (IFIM) is a problem-solving framework and set of comprehensive procedures for making decisions regarding stream flow. The methodology provides a basis for describing the relationship between stream flow and habitat for fish and other aquatic organisms.

The method does not generate a single solution, but predicts the impacts of different alternatives. Professional judgement on the part of applicants and the Agency plays a critical role in determining an acceptable stream flow regime.

The Agency will accept use of the IFIM as a basis for establishing conservation flows. Applicants should recognize that IFIM evaluations provide a basis for conservation flow determination which is more site specific than the U.S. Fish and Wildlife Service policy approach, and that the resulting Agency judgement as to conservation flows may be greater or less than the U.S. Fish and Wildlife Service policy flows or low median monthly flows.

The Agency will accept conservation flows that provide a high level of aquatic habitat protection, except where compelled to reduce standards to properly balance against other competing water uses which apply to the stream segment.

The results of an IFIM evaluation may support a conclusion that acceptable minimum flows are less than the median monthly flow for the time period of interest. Where IFIM results support such a conclusion, the Agency will approve such lower flows provided the approved fall/winter minimum flow is not less than two-thirds of the median monthly flow for the period of interest unless a valid study approved by the Agency demonstrates that ice formation would not be exacerbated. The latter restraint is included to help assure that no undue damage to fisheries will result from exacerbated ice conditions.

The Agency recognizes that there are certain streams which by reason of their size, basin areas, channel shape or other characteristics are not susceptible to IFIM analysis. The stream hydrologic analysis described in B above or another acceptable method as described below may be accepted in such cases in lieu of an IFIM evaluation.

#### **D. Other Methods**

The Agency will consider other methods of determining required conservation flows which applicants may wish to propose. In general, the Agency will accept alternative methods of analysis where it concludes the new method is of equal or greater reliability than the methods outlined above. An applicant is encouraged to seek Agency approval of such alternative methods before commencing such investigations.

#### **E. Offstream Uses of Water - Special Policies**

##### **Domestic Water Supplies**

Many municipalities throughout Vermont draw most or all of their drinking water from surface streams or lakes, and have done so for a number of years, sometimes dating back to the last century. For new water supply systems or for existing water supply systems which are beginning the planning and engineering phase of modifying their systems, it is the policy of the Agency to encourage municipalities to institute water conservation measures and evaluate alternative sources. The Agency will request that all reasonable water conservation measures be evaluated as part of the studies and that all economically reasonable conservation measures be instituted in order to reduce water consumption demands prior to the Agency considering approval of minimum stream flows below those prescribed by the procedure. Possible conservation measures include water metering, system flushing during high stream flow periods, repairing leaks in distribution systems, requiring industrial users to recycle water or take process water from a non-potable source for which minimum flows can be maintained.

Where minimum flows cannot be achieved through conservation, additional water sources and/or storage should be explored. It is recognized that some options such as storage required to provide minimum stream flows may in some cases be extremely expensive. The economic stress to a municipality must be defined and based on engineering studies before reduced instream quality will be considered as part of a balancing process.

It is the purpose of this procedure to recognize that while all legitimate uses of the water body are to be protected to the extent possible, the bias is in favor of public water supply systems only after all water conservation and feasible alternatives have been explored.

### **Hydroelectric and Hydromechanical**

Vermont rivers have served as a source for the production of hydroelectricity for over a century and have provided water to power our mills since the early settlement period. Population increases and the demand for on-peak energy production have resulted in utilities operating some of their projects in a manner which is incompatible with environmental goals with respect to flow maintenance (*Hydropower in Vermont: An Assessment of Environmental Problems and Opportunities*, 1988).

This minimum flow procedure makes a distinction between the river reach downstream of the project tailrace and the bypassed reach between the intake and the tailrace. Flow released at the tailrace of a project can be used to produce energy while water spilled at a dam and passed through a bypass reach may not be usable to produce energy.

Hydropower facilities shall be encouraged to operate in a true run-of-the-river mode to reduce conflicts with other uses and values. For run-of-the-river projects, the General Procedure shall be used to set flows for river management during special conditions after storage depletion (i.e. flashboard replacement, maintenance drawdown, power audits). During extended periods of non-operation, all inflows shall be required to be spilled over the project dam. For projects not operating in a run-of-the-river mode the General Procedure shall be applied to flow setting for the downstream river reach.

Bypasses shall be analyzed case-by-case. Generally, the Agency shall recommend bypass flows of at least 7Q10 in order to protect aquatic habitat and maintain dissolved oxygen concentration in the bypass and below the project. Higher or lower amounts of bypass flows shall be prescribed as a function of the uses and values to be restored or protected in the bypassed reach. In assessing values, consideration shall be given to the length of the bypass; wildlife and fish habitat potential; the aesthetic and recreational values; the relative supply of the bypass resource values in the project area; the public demand for these resources; and any additional impacts of such flows upon citizens of the State of Vermont. Bypass flows shall be at least sufficient to maintain dissolved oxygen standards and wastewater assimilative capacity. Where there are exceptional resource values in need of restoration or protection, the general procedure shall be followed. In most cases, a portion or all of the bypass flows must be spilled over the crest of the dam to reoxygenate water, provide aquatic habitat at the base of the dam and assure aesthetics are maintained.

In order to fulfill Agency responsibilities to strike a balance between competing water uses in the public interest, any deviations from minimum flow requirements as defined by the General Procedure will require an assessment of water and energy conservation alternatives.

### **Snowmaking**

[This section has been removed. Snowmaking water withdrawals are now subject to a separate procedure dated March 4, 1994.]

### ***De Minimis* Withdrawals**

It is recognized that certain withdrawals are so small in relation to the stream flow even during periods of drought, that the resultant impact on the natural stream values is negligible. In such cases, it is the Agency's policy to permit such withdrawals of water regardless of the natural instantaneous stream flow. For the purposes of this procedure, a withdrawal rate equal to or less than .005 cubic feet per second times the drainage area in square miles at the proposed withdrawal site, or 5% of the 7Q10 stream flow is considered a *de minimis* impact on the stream flow.

Permittees are not entitled to extract *de minimis* withdrawal flows in addition to flows specified in a project specific permit or certificate. In the case where there may be cumulative impacts of *de minimis* withdrawals, the Agency may require a site specific review.

#### **F. Prior Permits/Approvals/Practices**

Applicants may seek permits, approvals or Agency positions to modify existing projects for which earlier permits or approvals were granted and where such permits specified acceptable conservation flows less than would be determined by this procedure. Where the conservation flows specified in earlier permits do not correspond with the conservation flows determined under this procedure, or where earlier operating practices resulted in release of substandard low flows, the Agency will generally require that the flows determined under this procedure be restored as of the earliest practical date. The Agency will negotiate a schedule of actions and mitigating measures which will restore acceptable flows at the earliest practical date. The Agency shall consider any public benefits or detriment realized by restoration of acceptable conservation flows compared to any public benefit or detriment realized by the continued release of less than acceptable conservation flows. The Agency may conclude that the greatest public benefits are realized by continued release of less than acceptable conservation flows determined under this interim procedure.

#### **G. Decision Authority**

Decision authority for permits issued under V.S.A. Chapter 43 (Dams); water quality certificates issued pursuant to Section 401 of the Federal Clean Water Act; and stream alteration permits issued under 10 V.S.A. Chapter 41 shall rest with the Commissioner of Environmental Conservation or his designee. Decision authority for approvals of fish passage obstructions issued under 10 V.S.A. Section 4607 shall rest with the Commissioner of Fish and Wildlife or his designee. Decision authority for positions taken before Act 250 district commissions or subsequent appeals shall rest with the Secretary of the Agency of Natural Resources or his designee.