Ministry of Forests, Lands, Natural Resource Operations and Rural Development
Ministry of Environment and Climate Change Strategy

NAME OF POLICY:	Environmental Flow Needs Policy
APPLICATION:	Review of applications for a water authorization administered by Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD) or the Oil and Gas Commission (OGC), and for certain amendments of existing authorizations.
ISSUANCE:	Executive Director, Water Protection and Sustainability Branch, Ministry of Environment and Climate Change Strategy, and Director, Water Management Branch, Ministry of Forests, Lands, Natural Resource Operations and Rural Development.
IMPLEMENTATION:	Water authorization program personnel in FLNRORD and the OGC. External consultants
LEGISLATIVE REFERENCES:	*Water Sustainability Act* (Ch. 15, S.B.C. 2014) Water Sustainability Regulation (B.C. Reg. 36/2016).
RELATED POLICIES:	Water Authorization Assessment and Processing Guide (May 17, 2019) EFN Policy Implementation Guide [under development]
RELATIONSHIP TO PREVIOUS POLICIES:	This policy updates the Environmental Flow Needs Policy effective February 29, 2016.
POLICY AMENDMENT PROCESS:	To amend this policy a request must be made in writing to the Executive Director, Water Protection and Sustainability Branch, Ministry of Environment and Climate Change Strategy and the Director, Water Management Branch, Ministry of Forests, Lands, Natural Resource Operations and Rural Development.

Ted Zimmerman
Executive Director
Water Protection and Sustainability Branch
Ministry of Environment and Climate Change Strategy

Date: January 11, 2022

Ted White
Director and Comptroller of Water Rights
Water Management Branch
Ministry of Forests, Lands, Natural Resource Operations and Rural Development

Date: January 11, 2022

APPROVED AMENDMENTS:		
Effective date	Approval date	Description/Summary of Changes:
March 1, 2014	January 2014	New policy
June 15, 2015	June 15, 2015	Administrative changes; additional detail for greater clarity
February 29, 2016	February 16, 2016	Administrative changes to align the policy with the Water Sustainability Act and its regulations
February 11, 2022	January 11, 2022	Updated to distinguish between EFN risk assessment, formal EFN determination, supplemental analysis, and risk management; reorganize content and amalgamate similar content; add new definitions.

TABLE OF CONTENTS

1. POLICY STATEMENT

This policy describes a recommended procedure for evaluating the likelihood that an application for a water authorization, if granted, would affect the environmental flow needs (EFN) – defined as the volume and timing of water flow required for the proper functioning of the aquatic ecosystem of the stream – of the proposed water source. It also recommends additional analytical activities for applications identified as medium or high risk and provides examples of risk management measures. Completion of a EFN risk assessment and supplemental activities does not constitute EFN risk management.

2. REASON FOR POLICY

Water Sustainability Act (WSA) s. 15 requires that the decision maker – except where exempted – consider the EFN of a stream when deciding on an application for a water authorization and for certain amendments of existing authorizations. In situations where a water allocation decision would likely have a negative impact on EFN the decision maker may refuse the application or specify conditions for water use.

This policy recommends that decision makers implement a risk-based approach in considering EFN. Such an approach can streamline the application review and decision-making process and ensure that applications posing a greater risk to EFN receive greater scrutiny. It can also help authorization-holders understand the rationale for any authorization terms and conditions designed to protect stream health.

The policy presents a screening tool that can be used to assess the likelihood that an application, if granted, will affect the EFN of the proposed water source. It is intended to be applied where there is limited site-specific hydrological and/or biological data. The trade-off for its simplicity however, is that the screening tool provides a conservative risk estimate. Where a scientifically credible EFN study(s) relevant to the proposed water source already exists, it may provide more accurate information about potential impacts on EFN.

This policy does not apply to all ‘streams’ as defined in the WSA. It applies to the technical review and determination of applications to divert and use water from flowing sources (i.e., rivers, creeks, lakes, ponds, springs), or aquifers that are reasonably likely to be hydraulically connected to such sources. It is not applicable to proposed diversions from hydraulically isolated lakes, ponds, springs, ravines, gulches, wetlands or glaciers. Water program staff are advised to consult an expert for advice on how to consider EFN when evaluating applications to divert and use water from such sources.

This policy applies to applications for authorization amendments if the proposed amendment has the potential to affect the EFN of the water source e.g., if a change of works changes the point of diversion from the water source or the amendment will result in a change in the volume or timing of flow in the water source.

Note that this policy does not include a methodology for *determining* the EFN of a stream – that is, the volume and timing of water flow required for the proper functioning of the aquatic ecosystem of the stream. Hatfield *et al.* (2003) describes methods for determining instream flow thresholds to protect aquatic habitat. The companion document Lewis *et al.* (2004) describes detailed methods for assessing the potential impacts of water diversion and use on aquatic ecosystems.

3. DEFINITIONS

Relevant terms defined under WSA s. 1 *[definitions]* are:

> **"environmental flow needs"**, in relation to a stream, means the volume and timing of water flow required for the proper functioning of the aquatic ecosystem of the stream.

Other terms used in this document are defined as follows:

> **Point of interest (POI)** – The location within the watershed of interest (WOI) at which flow modifications by the proposed water use will likely have little or no effect on environmental flows, aquatic organisms, or downstream water rights. An EFN risk assessment (and a formal EFN determination) will typically consider flows at this location. The POI will typically be different from the proposed Point of Diversion (POD).
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> **Stream** – The EFN Policy uses the term 'stream' more narrowly than as defined in the WSA. Specifically, the EFN Policy applies to the technical review and determination of new applications to divert and use water from flowing sources (i.e., rivers, creeks, lakes, ponds, springs) or from aquifers that are reasonably likely to be hydraulically connected to such sources.
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> **Watershed of interest (WOI)** is the area to be considered in an EFN risk assessment. This area typically extends upstream from the point of diversion (POD) proposed in an application and downstream from the EFN point of interest (POI).

WSA s. 14 provides the comptroller and the water manager with powers respecting an application for a water licence. These include but are not limited to:

- Refusing an application;
- Requiring additional plans or other information; or
- Issuing one or more conditional or final licences 'subject to the prescribed terms and conditions and on the terms and conditions the decision maker considers advisable.'

WSA s. 15 (1) states that, except in relation to an application exempted under the regulations, the decision maker must consider the environmental flow needs of a stream in deciding an application in relation to the stream or an aquifer the decision maker considers is reasonably likely to be hydraulically connected to that stream.

WSA s. 15 (2) authorizes the decision maker to direct applicants 'to provide to the decision maker the information and reports of assessments the decision maker directs' for the purpose of determining the EFN of the applicable stream.

WSA s. 15 (4) specifies that 'Despite subsection (1), a decision maker may take into account the environmental flow needs of any stream the decision maker considers may be affected by granting the application.'

4. PROCEDURES

It is recommended that during the technical review of an application to divert and use water from a stream (as defined above), or aquifer reasonably likely to be hydraulically connected to a stream, the reviewer initially conduct an EFN risk assessment to determine the potential risk to the EFN of the proposed source, should the application be granted.

Section 5.1 describes the recommended EFN risk assessment methodology. This methodology uses information about aquatic ecosystem values within a watershed of interest (WOI), long-term mean annual discharge (lt MAD) and mean monthly discharge (MMD) at the point of interest (POI), and cumulative monthly withdrawals above the POI to characterize the EFN risk associated with an application as: 1 (low); 2 (medium); or 3 (high), and to identify applications that require 'special consideration.'

Section 5.2 describes supplemental analytical activities that decision makers may wish to specify for each risk level to better understand potential impacts to EFN. Such additional analysis may be completed prior to a decision on the application or specified in authorization terms and conditions. Where a scientifically credible EFN study(s) relevant to the proposed source already exists, additional analysis may not be necessary. Section 5.2 also provides examples of risk management measures that could be included in authorization terms and conditions at the discretion of the decision maker.

The screening tool and supplemental analytical activities complement existing practices for gathering information on water availability, such as a background scan for water restrictions and water development plan requirements. The EFN Policy does not limit the discretion of the decision maker to ask an applicant for additional relevant information.

4.1 Environmental Flow Needs Risk Assessment Framework

Figure 1 illustrates the steps in the Environmental Flow Needs Risk Assessment Framework. It is recommended that this framework be used to assess EFN risk for each of the months during which the applicant proposes to divert and use water.

Data inputs to this framework are described below. Note that the generic quantitative thresholds identified in the framework were developed at a provincial level. Regions may choose to develop and use their own scientifically defensible thresholds that reflect regional and/or site-specific hydrological and ecological sensitivities.

Decision makers are advised to check the quality of the hydrological data and other information used in the EFN risk assessment process (e.g., whether or not data collection met Resources Information Standards Council (RISC) standards) and to document any concerns.

Species Sensitivity

The EFN risk assessment process considers the presence or absence of fish and 'sensitive species or ecosystems' (as described below) for each of the months during which the applicant proposes to divert and use water. A key question is 'does the watershed of interest include aquatic values that might be affected by water withdrawals?'

With respect to fish, it is recommended that for the purpose of EFN risk assessment, the watershed of interest be considered fish-bearing by default. Confirmation of fish absence should reflect regional expertise or be demonstrated by qualified individuals using approved methods and standards.

For the purpose of EFN risk assessment 'sensitive species or ecosystems' may include, but are not limited to:

- Species designated as 'threatened' or 'endangered' under the provincial *Wildlife Act* or the federal *Species at Risk Act (*see *BC Conservation Data Centre* for a current list*)*;
- Regionally important aquatic species that may include red or blue-listed species or populations that are considered vulnerable in B.C. because they are rare and/ or have limited distributions; or
- Species or habitats important for ecosystem function.

It is recommended in addition that for the purpose of EFN risk assessment the following be interpreted as indicating the presence of sensitive species or ecosystems:

- Sensitive stream designation under the WSA and Water Sustainability Regulation;
- Presence of a Wildlife Management Area with a flow-related objective(s);
- A site-specific report identifying species or aquatic habitat with flow related concerns. (Such reports may be found in Cross-Linked Information Resources (CLIR) or EcoCat Ecological Reports Catalogue); and
- Cultural sensitivities e.g., ceremonial sites; culturally important aquatic species.

Flow Sensitivity

EFN risk assessment considers the sensitivity of the proposed water source to water withdrawals for each month during which the applicant proposes to divert and use water. A key question in EFN risk assessment is: 'How sensitive is the stream to changes in flow?'

Ptolemy & Lewis (2002), in a review of habitat-flow studies completed in British Columbia, found that flows of 20% lt MAD or more (based on natural streamflow) are

required to conserve adequate summer and winter rearing flows for juvenile fish and to maintain insect production in riffle habitats.

For EFN risk assessment, flow sensitivity is based on long-term mean monthly discharge (lt MMD) as a percentage of long-term mean annual discharge (lt MAD) at the Point of Interest, and is represented by the equation:

(lt MMD/lt MAD) x 100%

The EFN Risk Assessment Framework assumes that mean monthly discharge:

- Greater than 20% lt MAD represent *low* flow sensitivity;
- Between 10 and 20% lt MAD represent *moderate* flow sensitivity; and
- Less than 10% of lt MAD represent *high* flow sensitivity.

The EFN risk assessment methodology distinguishes between flow-sensitive streams that are 'moderately' and 'highly' flow sensitive.

In applying the EFN Risk Assessment Framework regions may make scientifically defensible adjustments to these flow sensitivity parameters to better reflect regional conditions. For example, although lt MAD for many streams on the east side of Vancouver Island is greater than $10m^3/s$ these streams are highly flow sensitive in summer.

In addition, in some regions monthly means (lt MMD) may mask significant variability in the timing of the freshet and the start and end of low flow periods. Where this is known to be the case, regions may choose to select – for key portions of the year – time intervals (e.g., weekly; 15^{th} to 14^{th} of each month) that will likely generate more representative hydrometric statistics.

Where existing and/or proposed consumptive water use modifies natural streamflow patterns, regions will likely need to adjust measured discharge data before they can generate appropriate lt MAD and lt MMD statistics for use in implementing the EFN Risk Assessment Framework.

Stream Size

The EFN Risk Assessment Framework categorizes stream size according to lt MAD. The categories are:

- Small: less than $10m^3/s$ lt MAD
- Medium-Large: equal to or greater than $10m^3/s$ lt MAD

'Stream size' is assumed to be the same throughout the year, with the exception – for medium-large streams – of ice-covered months. The period during which a stream is ice-covered is considered more ecologically sensitive than the period with open water

conditions.[1] For months in which the proposed water source is ice-covered, it is recommended that EFN risk assessment consider the source to be 'small' – regardless of its actual lt MAD.

Stream size parameters can be adjusted to regional differences. For example, in regions with an abundance of streams with lt MAD smaller than $10m^3/s$ it may be appropriate to define a 'small' stream – for the purpose of EFN risk assessment – as one in which lt MAD is less than 5 m^3/s or even $1m^3/s$.

Cumulative Withdrawals

The last step in the EFN risk assessment considers cumulative withdrawals – including withdrawals from hydraulically-connected aquifers – above the Point of Interest (POI). Cumulative withdrawals includes existing authorized demand and demand proposed in the application – as a percent of flow for each of the months (or other time interval used in the risk assessment) weeks or days) during which the applicant proposes to divert and use water. This can be represented as the equation:

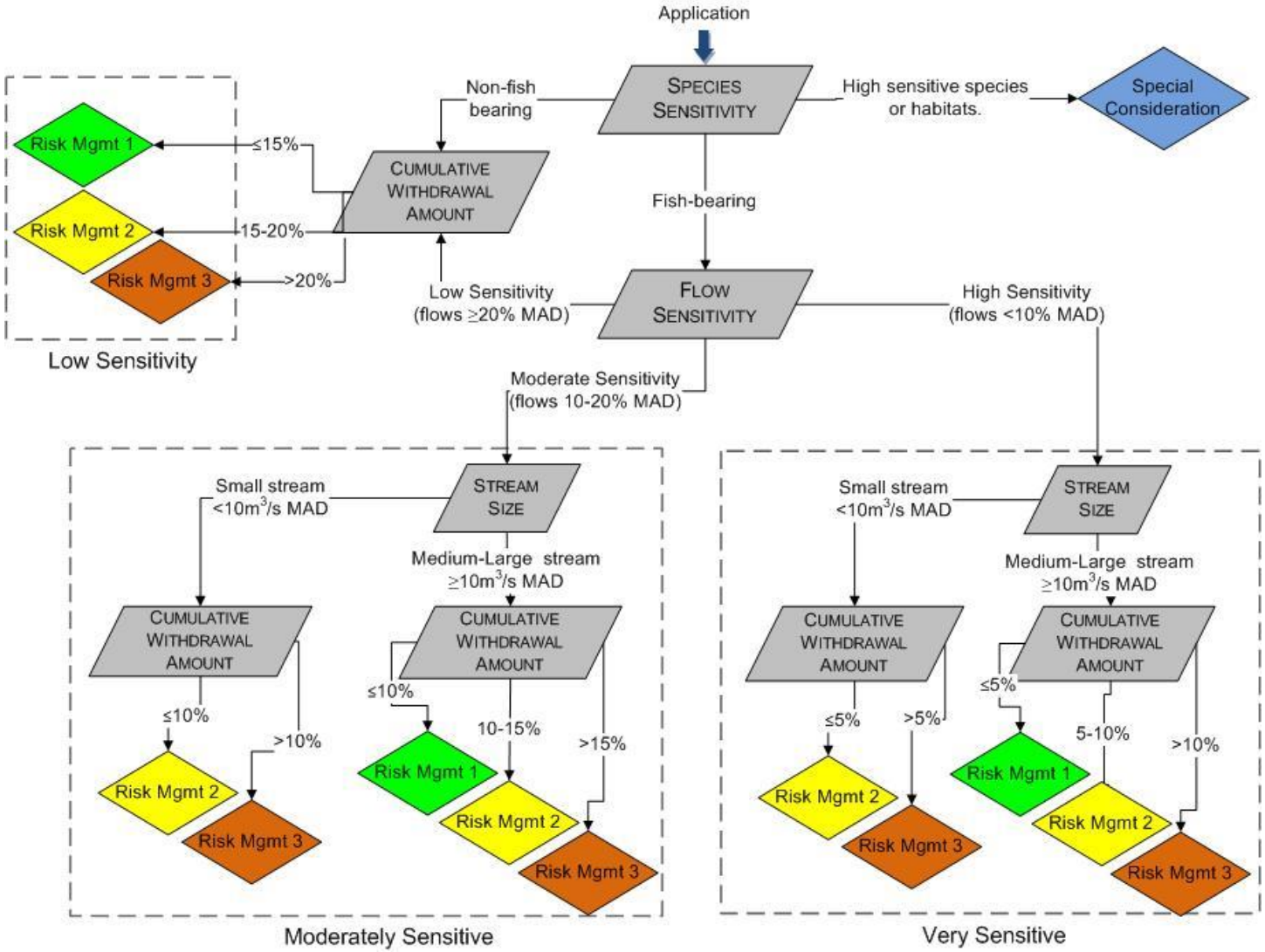
((Authorized diversion + Proposed Diversion)/MMD) x 100%.

The final step in the EFN Risk Assessment Framework uses the result of this equation to identify the EFN risk level associated with the application. In general, the greater the percent of flow, the greater the risk. The percent thresholds specified in the EFN Risk Assessment Framework vary, however, depending on stream sensitivity and size. More conservative thresholds apply to streams that are smaller and/or to naturally flow sensitive periods.

In highly flow sensitive streams (i.e., those with MMD significantly less than 10% of lt MAD during the proposed period of diversion and use) it is recommended that the EFN risk assessment consider information about instantaneous or peak daily demand, where available. For example, whether or not water diversion and use are constant throughout the month or concentrated during smaller time periods will potentially influence the likelihood of impacts on EFN during those time periods.

[1] Hatfield (2012)

Figure 1. Environmental Flow Needs (EFN) Risk Assessment Framework



4.2 Supplemental Analysis and Risk Management Measures

The EFN risk assessment process identifies low risk (Level 1) applications that, if granted, are unlikely to affect EFN and medium (Level 2) and high risk (Level 3) applications for which more information may be needed before a decision can be made. The risk levels identified through the EFN risk assessment process may vary from month to month during the period of diversion and use proposed in the application.

A finding of medium or high risk related to potential impacts on EFN does not mean that an application is automatically refused; it does suggest the need for additional information, analysis and/or risk management. Supplemental analytical activities can increase understanding of the potential influence of proposed water diversion and use on EFN and inform the selection of appropriate risk management measures.

Table 1 provides examples of supplemental analytical activities and risk management measures relevant to each risk level. The decision maker has the discretionary authority to implement additional or alternative supplemental analytical activities and/or measures.

The analytical activities and risk management measures identified in this section may be implemented by government or may be required of the applicant (prior to a decision on an application) or licensee (as authorization terms and conditions) at the discretion of the statutory decision maker. The choice of analytical activities and risk management measures may be based on the quantity of water to be withdrawn, whether the application is for a licence or use approval, or other factors.

Special Consideration

If ‘sensitive species or habitats’ (as defined in this policy) are present within the watershed of interest it is recommended that the review of the application, consider information about these sensitive values in addition to information relevant to the identified risk level. This may involve development or review of an existing regional fish periodicity table.

Risk Level 1

Where the EFN risk assessment process results in Risk Level 1, for that specific flow period (i.e., monthly) there is sufficient water available to provide for EFN as well as for proposed water diversion and use.

While Level 1 does not mean ‘no risk’ (i.e., lower risk of negatively influencing EFN), it indicates that supplementary information may not be required, unless the presence of sensitive species or habitats suggests the need for Special Considerations (Figure 1 and see above).

Risk Level 2
Risk Level 2 means that the aquatic environment is flow-limited for the proposed withdrawal period or that cumulative water withdrawals are greater than a specified threshold of concern.

A result of Risk Level 2 suggests that more information may be required prior to a decision to grant or decline an application, or that the authorization (if granted) may include terms and conditions to minimize potential impacts to EFN.

Risk Level 3
Risk Level 3 means that the aquatic environment may be severely flow-limited for the proposed period of withdrawal, or cumulative water withdrawals would be greater than a specified threshold of concern, that varies depending on flow sensitivity.

A result of Risk Level 3 suggests that more extensive analysis of the potential impacts of the proposed application on EFN may be appropriate prior to the decision to grant or decline the application; and/or the inclusion of comprehensive terms and conditions in the authorization (if granted).

Table 1. Supplemental measures to assess potential impacts on EFN and examples of risk management measures in authorization terms and conditions

Special Considerations (Reflecting presence of sensitive species or ecosystems, cultural sensitivities, etc.; see description of 'Species Sensitivity' above.)
Supplemental measures *to assess potential effects on high value species or habitats:* • Create and/or apply a fish periodicity table that is relevant to the WOI and identifies minimum flows for different life phases of species of significance (e.g., Lewis *et al.* 2004)
Level 1
Supplemental measures *to assess potential effects on EFN:* • Review relevant available information related to the WOI (e.g., water and fish reports on EcoCat) and summarize it for the decision maker • Consider potential impacts of proposed diversion and use on downstream values (e.g., authorized water users, riparian owners, species and habitats)
Level 2
In addition to Level 1 measures: ***Supplemental measures*** *to assess potential effects on EFN:* • Establish adequate baseline hydrological data (i.e., data representing flow conditions prior to water diversion and use proposed in the application) • Prepare reconnaissance-level fish and fish habitat impact assessment (e.g., RISC, 2001) • Conduct an audit of actual water use within the basin use or a beneficial use review *Examples of authorization terms and conditions that may mitigate potential negative effects on EFN:*

- Issue seasonal licence, or restrict diversion and use during low flow or other relevant period(s)
- Require authorization-holder to develop storage
- Include a daily maximum quantity or instantaneous withdrawal rate, e.g., greater consideration of instantaneous demand over averages
- Limit pump intake size
- Require authorization-holder to monitor (e.g., install flow gauge) and report water use during specified periods,
- Require authorization-holder to monitor flows and limit withdrawals when flows drop below a certain level

Level 3

In addition to Level 1 and Level 2 measures:

Supplemental measures *to assess potential effects on EFN:*

- Prepare a detailed habitat assessment (e.g., Lewis *et al.* 2004; Hatfield *et al.* 2007). Note that this includes development of a periodicity table.

Examples of authorization terms and conditions that may mitigate potential negative effects on EFN:

- Issue limited licence term (e.g., five years), allowing for review and potential adjustment

5. APPENDICES

5.1 References

DFO. 2013. *Framework for Assessing the Ecological Flow Requirements to Support Fisheries in Canada*. DFO Can. Sci. Advis. Rep. 2013/017.

Hatfield, T. 2012. *BC Ministry of Environment Winter Flows Project. Final Report.* Consultant's report prepared for the Ministry of Environment, British Columbia by Ecofish Research Ltd., April 2012.

Hatfield, T., A. Lewis, D. Ohlson and M. Bradford. 2003. *Development of instream flow thresholds as guidelines for reviewing proposed water uses*. Report prepared for British Columbia Ministry of Sustainable Resource Management, and British Columbia Ministry of Water, Land, and Air Protection, Victoria, BC.

Hatfield, T., A. Lewis, and S. Babakaiff. 2007. *Guidelines for the collection and analysis of fish and fish habitat data for the purpose of assessing impacts from small hydropower projects in British Columbia*.

Lewis, A., T. Hatfield, B. Chilibeck, and C. Roberts. 2004. *Assessment methods for aquatic habitat and instream flow characteristics in support of applications to dam, divert, or extract water from streams in British Columbia*. Prepared for Ministry of Water, Land & Air Protection and Ministry of Sustainable Resource Management.

Resource Inventory Standards Committee (RISC), 2001. *Reconnaissance (1:20,000) fish and fish habitat inventory standards and procedures - version 2.0*. Prepared by B.C. Fisheries Information Services Branch. 170 pages.

5.2 Background on the EFN Risk Screening Approach

The EFN risk screening approach described in this policy is derived from methods currently used in B.C. and other jurisdictions, scientific literature, and expert opinion. The principles considered in developing the EFN risk assessment process include:

- Key aspects of the natural flow regime can be maintained by restricting hydrologic alterations to within a percentage-based range around natural (flow regime) or historic flow variability (DFO, 2013);
- Smaller streams are more sensitive than larger streams to water withdrawals;
- Use of mean annual discharge for characterizing flow sensitivity is already used in B.C. (e.g., B.C. Modified Tennant method, described in Hatfield *et al.* 2003) and is supported by other B.C. studies; and
- Hydrology information using natural or naturalized flow regime data is used as a proxy for biological performance because historic flows are typically easier to measure or synthesize than ecological metrics like fish abundance.