Section 9

Instream Flow

Instream flow resources are a significant part of the overall information needed to develop a comprehensive watershed plan. Although an optional element under the original language of the 1998 Watershed Planning Act (Ch. 90.82 RCW), instream flows represent an integral part of the ecological balance that must be preserved when developing such plans. Instream flow resources provide the water required to support beneficial uses such as fish and wildlife habitat and propagation, pollutant load assimilation, navigation, recreation and agriculture. The WRIA 35 Planning Unit has determined that it will set instream flows through the watershed planning process.

Adequate instream flows are especially important in those stream systems with one or more species listed as threatened or endangered under the federal Endangered Species Act (ESA). Several salmonid species exist within WRIA 35 that are currently listed or proposed for listing under the federal ESA. Washington's *Statewide Strategy to Recover Salmon* includes a goal of retaining and providing for adequate instream flows to enhance fish habitat.

To date, instream flows have not been formally adopted into rule in WRIA 35. This responsibility falls on the Washington State Department of Ecology (Ecology) with assistance from the Washington Department of Fish and Wildlife (WDFW). Ecology and WDFW often use the "Instream Flow Incremental Methodology" (IFIM) or toe-width method for determining adequate instream flow levels. However, other methods can be used as well. A summary of the various instream flow determination methods discussed in the Ecology Guidance Manual for Setting Instream Flows is provided in Appendix B.

This section provides a description of the available instream flow studies in two of the WRIA 35 subbasins (Tucannon River and Asotin Creek subbasins); a discussion of data gaps related to the instream flow studies; an analysis of gauging station data; and identification of instream flow needs.

9.1 General Instream Flow Background

In Washington State, the legal and administrative definition of "instream flows" refers to a volume of water needed to support instream uses (e.g., fish habitat), and is developed by considering existing data, the hydrology of a stream and its natural variations over the course of a year, studying the need for fish habitat, as well as many other factors. Instream flows are usually established in legal form, such as adoption into a state rule. Such flows set into rule then become a water right under the law and are a limitation or condition on subsequently issued water rights (Ecology, 2000).

Under the Water Resources Act of 1971 (Chapter 90.54 RCW) stream flow management was generally approached through two planning tools. The first was through a "basin plan" approach where a comprehensive view of water resources management was taken, which included setting instream flows. The second tool was through the Instream Resources Protection Program (IRPP), which focused on setting instream flows in specific streams in the basin. In WRIA 35, neither a basin plan nor IRPP have been established. However, there have been administrative stream closures and low flow restrictions established throughout WRIA 35 (discussed in Section 2.9). There have also been instream flows recommended by WDFW and Ecology for the Tucannon River, although these have not been adopted into rule.

The administrative low flows and closures and the recommended instream flows on the Tucannon River can be a condition on a new water right even though they have not been adopted by rule. The reason is that Ecology must solicit comments from WDFW regarding any water right application that may affect fish. Based on WDFW comments, Ecology may deny the application or may condition the permit, if issued, with the recommended instream flows or the administrative closures/low flows.

The benefit of actually adopting the instream flows into rule is that the process involves a formal public review and establishes the instream flows as a regulation for enforcement. Furthermore, changing the instream flow values would again require a formal public review process.

9.2 Setting Instream Flows

Ecology ultimately has the sole authority to set instream flows into rule. The two primary statutes affecting flow setting are Chapter 90.22 RCW, the Minimum Water Flows and Levels Act, and 90.54 RCW, the Water Resources Act of 1971. An additional option is included under Section 90.82.080(1)(ii)(b) of the Watershed Planning Act, which describes an alternative process using public hearings and notice provided by the county legislative authority (Ecology 2002).

Under the Watershed Planning Act, the local planning units work with Ecology to develop instream flows and a stream flow management regime based on the water management goals for the watershed. All parties agree to the instream flows and then Ecology initiates rule making to adopt the instream flow as a regulation. It should be noted that Ecology and other stakeholders (e.g. WDFW and the Nez Perce and Umatilla Tribes) need to be actively engaged in the development of flow recommendations, since Ecology has the responsibility for rule development. Under the watershed planning law, a planning unit cannot commit an agency to do something if it has not concurred with the action. If the Planning Unit cannot come to a final recommendation on flows, then Ecology may initiate rule making for setting flows that would complete the watershed plan.

Once adopted, an instream flow rule acquires a priority date similar to that associated with a water right. Any water rights subsequently approved are considered “junior” to the instream flow and is conditioned by the instream flow levels. Instream flows do not affect senior rights, i.e. water rights with priority dates before the instream flow rule adoption.

The Water Resources Act of 1971 (Ch. 90.54 RCW, subsection [3][b] of §020), states that in essence, the waters of the state cannot be degraded “except in those situations where it is clear that overriding considerations of the public interest will be served." This statement would allow an out-of-stream use to be permitted without regard to established instream flows only under exceptional circumstances. Thus, instream flows are essentially considered higher priority than future out-of-stream use.

9.2.1 Instream Flow Incremental Methodology

Generally, IFIM is recognized as the standard for modeling fish habitat flow needs and is typically the basis for developing recommended instream flows in Washington State (Ecology 2000). IFIM is a series of computer-based models that consider habitat preferences including flow, velocity, and gravel (substrate) for different species and lifestages of fish. It shows how changes in available habitat will result from increases or decreases in stream flow. IFIM studies begin with a review of the history of a river regarding fish presence and their life histories. Field studies are conducted at selected locations where depth and velocity measurements are made, as well as other habitat conditions. The field data is used in the models to develop values known as "weighted useable area" (WUA) which expresses how the availability of fish habitat is affected by changes in flow levels for different species and lifestages. No single flow level simultaneously maximizes habitat for all species. Thus, the IFIM results are used in combination with other information to develop a final "flow regime" that involves some negotiation and clarification of management priorities. In any case, IFIM does not address all stream flow-related variables that may affect fish production, and its limitations should be kept in mind or considered during the instream flow development process.

9.2.2 Factors to Consider for Setting Instream Flows

Some of the key factors to consider when addressing flows include:

- Climate – the amount and timing of precipitation and other climate factors greatly affect the flow patterns in streams.
- Land Use – the type of land cover greatly influences the flow patterns of basins by controlling the infiltration and detention patterns of runoff.
- Ground Water – ground water inflow to streams is the primary contribution to stream flow during dry periods.
- Water use – ground water withdrawals (when hydraulically connected to surface streams) and stream diversions directly impact the available flow discharging through streams.
- Storage – storage facilities can control the volume and timing of flows in rivers.
- Fish species and life stages – indicates the optimum flow conditions for habitat needs.
- Stream Hydrology – indicates the types of flows historically present in the streams.
- Temperature – a key water quality parameter and habitat factor affected by the amount of flow in the stream.

Besides these environmental or watershed factors, the future management approach will greatly influence the amount of flows in streams (Ecology 2000). Therefore, it is important to consider the full range of available management techniques prior to recommendation of an instream flow. It is important to note that the goal of watershed planning is not necessarily to determine and recommend instream flows for all streams in need of protection or enhancement; rather the task is to identify those streams where such an approach can be used to effectively manage and protect the existing resource. Stream flow management consists of evaluating and utilizing a suite of tools, only one of which is adoption of instream flows by rule.

Another complicating issue is the range of optimal stream flows often determined for various species and life stages of fish. Managing stream flows to support the rearing of one species may result in flows too high to support spawning of the same or different species.

9.3 Existing Instream Flow Studies

This section summarizes the instream flow studies conducted within the WRIA 35 basin. All of the instream flow studies relied on the IFIM methodology, and two of the studies were conducted on the Tucannon River. One recent IFIM study was conducted in Asotin Creek.

9.3.1 Tucannon River IFIM – 1993 and 1995

The initial IFIM study conducted on the Tucannon River was used to develop two sets of recommended instream flows. The habitat preference curves used in the initial 1993 recommendations from Ecology were updated in 1995 by WDFW and used to develop a new set of recommended flows. The actual minimum instream flow recommendations from Ecology and WDFW are summarized in Section 9.4. The following discussion provides a summary of the IFIM study completed in 1993.

IFIM field measurements were taken in May and September 1992 and in April 1993. The study was located at river mile 5.8 on the Tucannon River (including seven additional transects upstream of this point). The model was calibrated using the field measured flow velocities and depths. It was determined that the hydraulic model was adequate for an extrapolation range of 25 to 500 cfs.

For the original modeling work completed in 1993, fish preference curves for the Tucannon River were agreed to by Ecology and WDFW at an August 12, 1993 meeting. Using these fish preference curve values, the HABTAT model of the IFIM method was used to calculate WUAs for a range of flows. Flows that yielded the maximum WUAs were then determined. Based on the initial IFIM study results and preference curves, Ecology proposed minimum flows for the Tucannon River at Starbuck Dam.

In 1995, site-specific preference curves were modified from the 1993 values and the HABTAT model was run again using the same hydraulic data and model as used in 1993. In 1995, the site-specific preference curves used were for Chinook and steelhead juvenile for depth and velocity, while existing agency preference curves were used for Chinook and steelhead juvenile substrate and cover, Chinook and steelhead spawning, and all life stages of bull trout. Flows yielding maximum WUAs were again identified and used to recommend minimum flows at the same location.

The full report of the 1995 IFIM study on the Tucannon River is documented in the report *"Tucannon River Fish Habitat Analysis Using the Instream Flow Incremental Methodology"* (Ecology, 1995).

Table 9.3-1 summarizes the key results of the 1995 IFIM study for the Tucannon River. As the table shows, there is a wide range of optimum flows for spawning and juvenile habitat. A copy of the 1995 IFIM study report is included in Appendix B.

Table 9.3-1
Summary of Optimum Flows Based on
1995 Tucannon River IFIM Study (cfs)

Species	Spawning Habitat	Juvenile Habitat
Chinook	85	40
Steelhead	105	90
Bull Trout	55	160

9.3.2 Tucannon River IFIM Study – 2004

While flow requirements at the mouth of the watershed may protect threatened and endangered fish species (except for Fall Chinook) most of the actual usable spawning habitat on the Tucannon River is considerably upstream of the Starbuck location. A new gauge has been installed on the Tucannon River at River Mile 24 immediately downstream of the Turner Road Bridge near Marengo, Washington. This gauge is thought to be a better management point for the upper portion of the Tucannon since the Starbuck gauge includes potentially significant inflows from the Pataha Creek basin. As a result, an assessment of flow requirements was conducted near this new gage location in 2003. The study was conducted by the Washington Water Research Center, and is documented in the report *"Minimum Instream Flow Study of the Tucannon River at Marengo"* (WWRC, 2004).

Table 9.3-2 summarizes the key results of the 2004 IFIM study for the Tucannon River. A copy of the 2004 IFIM study report is included in Appendix B. The results of the PHABSIM investigation were relatively consistent with the results found by Caldwell (1995) at the mouth of the Tucannon. Caldwell found that steelhead spawning potential was highest at 105 cfs versus the 120 cfs found in this study. Similarly, Caldwell found that 85 cfs was needed to maximize Chinook spawning versus 100 cfs in this study. Given the change in channel characteristics between the mouth and the reach at Marengo, this small variation appears to be a reasonable expectation. However, the same changes in channel characteristics are likely the cause of the large difference between the 1995 and more recent study's values for the optimum juvenile habitat flows.

Table 9.3-2 Summary of Optimum Flows Based on 2004 Tucannon River IFIM Study (cfs)			
Species	**Spawning Habitat**	**Juvenile Habitat**	**Other Habitat**
Chinook	100	250	N/A
Steelhead	120	250	30 (Fry)
Bull Trout	100	N/A	135 (Adult)

9.3.3 Asotin Creek IFIM Study

The Department of Ecology conducted an IFIM study in Asotin Creek in 1992 and 1993. The report is pending from Ecology and will be integrated into the Level 2 instream flow assessment and watershed plan if the report is available.

9.4 Instream Flow Administrative Requirements

As mentioned previously in this section, there are no legal requirements adopted into state rule regarding minimum instream flows for the WRIA 35 basin. Historically, however, there have been four instream flow administrative requirements associated with the Tucannon River. Ecology in the process of reviewing water rights application on the Tucannon River are required to consult with WDFW on any potential impacts that a water right may have on instream flows. The following recommendations from WDFW are considered by Ecology in the approval of water rights applications on the Tucannon River

- In 1972, the Washington Department of Fisheries recommended a minimum instream flow of 50 cfs at the mouth of the Tucannon River.

- An IFIM study conducted in 1993 by the Washington Department of Ecology used the USGS gauging data at Starbuck (River Mile 7.9) as the basis for a recommended 65 cfs minimum instream flow requirement from 6/15 to 8/14 and 70 cfs from 8/15 to 9/30 (Covert *et al.* 1995).

- A subsequent study by Caldwell (1995) performed updated the results of the 1993 IFIM study for the same location at River Mile 5.8 of the Tucannon River approximately 500 feet upstream of the Starbuck dam. The study recommended + flow requirements of 40 to 160 cfs to maximize weighted usable area (WUA) estimates depending of fish species and life stage.

Consequently, surface water rights issued between 1972 and 1993 are subject to the 50 cfs low flow recommendation while rights after 1993 are subject to the higher flow requirements from the 1993 study. Finally, water rights issued after 1995 are subject to the 1995 flow recommendations from WDFW. A summary of the flow requirements are listed in Table 9.4-1.

Table 9.4-1 Summary of Flow Legal Requirements in Tucannon River			
Time Period	**Recommended Flow**	**Measurement Point**	**Basis for Flow**
Year round	50 cfs low flow	Confluence of Tucannon and Snake Rivers	Letter from Dept. of Fisheries, Dec. 12, 1972
Year Round	Closure	Above Cummings Creek	Letter from Dept. of Fisheries, Dec. 12, 1972
Oct. 1 – Feb. 28 Mar. 1 – Jun. 14 Jun. 15 – Aug. 14 Aug. 15 – Sep. 30	65 cfs 100 cfs 65 cfs 70 cfs	Starbuck Dam	IFIM Study; Letter from Ecology, Aug. 24, 1993
Jun. 15 – Aug. 14 Aug. 15 – Nov. 30 Dec. 1 – Feb. 28/29 Mar. 1 – Jun 14	75 cfs 85 cfs 75 cfs 105 cfs	Starbuck Dam	IFIM Study; Letter from WDFW, April 12, 1995

9.5 Surface Water Source Limitations

The Department of Ecology and its predecessor agencies (Ecology) have established administrative low flow restrictions and closures on several surface water sources in the state. These are sometimes referred to by Ecology as Surface Water Source Limitations (SWSL). These SWSL have been established largely as a result of letters of recommendation received by Ecology from the Washington Department of Fish and Wildlife or their predecessor agencies (WDFW), in response to applications for water rights filed with Ecology. The Ecology regional offices have each developed these SWSL listings for each of the counties within their jurisdiction. The Eastern Regional Office of Ecology (Spokane) is the regional office with jurisdiction for the Middle Snake River Basin (WRIA 35).

The majority of the letters from WDFW and the resulting SWSL occurred in the 1950s and 1960s, with some as early as the 1940s, and some as late as the 1980s. The administrative low flows and closures that were established by Ecology as a result of these letters in most instances have been in place since the letters were received by Ecology. This means that some of these SWSL have been in place for over 50 years. In most instances there is no additional documentation or basis for the establishment of these SWSL other than the initial letter received from WDFW.

The water right application filed that resulted in the SWSL being established has a specific location for the point of diversion. Accordingly, the resulting SWSL is typically shown as the location of the proposed point of diversion for the water right application. In nearly all instances where an administrative low flow is established, there is no stream gauge or other means of measurement of the stream flow at that specific location. In many of the instances there also has never been a stream gauge located on the stream, so there are no historic records of the stream flow for the stream.

Another complicating factor related to SWSL is the length of stream reach that the particular SWSL applies. For example, the WDFW letter and the resulting Ecology SWSL, will show the location of the proposed point of diversion by Section, Township, and Range, however it will not say whether the SWSL applies to the entire length of stream or whether it is only applicable to all reaches of the stream upstream or downstream of the proposed point of diversion.

In addition to these SWSL being applicable to the specific water right application and the resulting water right associated with this application, these SWSL are used by Ecology in their decision-making process for all subsequent applications for water rights filed on the same stream or stream system. Table 2.9-2 includes a list of the SWSLs in WRIA 35. The SWSLs are mapped and listed in Appendix C.