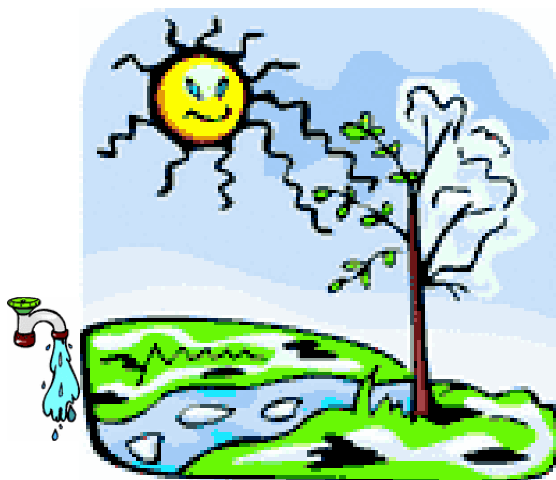


# Guidelines and considerations For the Assessment of Instream Flow Proposals



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## Assessment of Instream Flow Proposals

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These guidelines were developed to provide general assistance in reviewing and evaluating the potential benefits of project proposals associated with instream flow restoration. While it is difficult to identify and assess all of the biological, physical, cultural, and political factors that must be considered when prioritizing water acquisition and instream flow restoration, it is hoped that these guidelines will serve to provide a check list of considerations in determining whether or not it is prudent to expend funds to acquire, lease, or conserve, water within a particular stream reach.

The guidelines are complimentary to the existing broader strategic *Workplan for Instream Flow Setting Through 2010*, and the *Washington Water Acquisition Program* goals in the identified priority watersheds. These guidelines are specific to the evaluation of a particular water right or project proposal within a stream. It is assumed that proposed instream flow restoration projects are targeted within the context of the above plans.

While it would be preferable to prioritize instream flow restoration entirely from a biological perspective to ensure maximum benefits to fish life, the opportunities to acquire water where it is most limiting to salmon restoration is rare. Therefore, prioritizing instream flow restoration where flow benefits to fish are defined within ranges of priority (low, moderate, or high) is a practical means of implementing the program. If priorities are defined too narrowly opportunities to acquire water and restore instream flow, may be limited.

These guidelines do not discuss the processes involved in determining the extent and validity of a water right prior to acquisition, although this is of highest priority when assessing potential fish benefits. It is impossible to determine potential fish benefit of a project until a determination has been made regarding the extent, validity, and seniority of a water right. Once some idea of the  $Q_a$  and  $Q_i$  of the water to be acquired or leased is, the following additional considerations can be used in an assessment. It is important that only valid water rights, or "wet water" be acquired for instream flow, such that it can be measured and accounted for. Invalid water rights cannot be protected in public trust for instream flow.

### **Instream Flow Rules**

While it is not necessary to acquire water in stream where regulatory flows have been established through 90.82 RCW or 90.54 RCW, it would not be prudent to acquire water rights where water right certificates are still being issued, regulatory flows have not been set, or on streams not closed to further appropriation. Likewise, it is not a requirement that water rights be adjudicated prior to acquisition, although there is more certainty and less risk in acquiring water rights that have been recently adjudicated.

Where regulatory flows have been established, it is implied that the methodology used considered the biological flow needs of fish life present. An established regulatory flow provides a target for how much water must be acquired to achieve the regulatory flow.

### **Is there a strategy to focus flow restoration efforts on certain streams?**

It is assumed that stream flow restoration projects will be located on a stream, or a tributary of a stream, within one of the 16 flow critical basins designated in the *Washington Water Acquisition Program*. The stream should also be identified as being of medium or high priority for restoration.

The instream flow restoration prioritization within the *Washington Water Acquisition Program* was created to function as a guide to prioritize instream flow restoration efforts statewide. The prioritization matrix was developed using data from the Limiting Factor Analysis conducted by the Washington Conservation Commission and other sub-basin planning and restoration efforts. The priorities are based on a formula which uses: 1) salmonid stock status and species diversity, 2) off-channel habitat diversity and condition, 3) riparian condition, 4) substrate condition, 5) passage condition, 6) the extent that flow is limiting, and 7) the mean monthly flow of the stream during summer months, as well as other factors. Thus, small streams supporting a diversity of species that are of concern (depressed, or ESA listed species), with acceptable habitat and passage conditions, would receive the highest ranking, as the likelihood of success would be greater.

If there are no limiting factors to salmonid production other than flow, improving flow should result in a reasonable likelihood of success. Conversely, large streams with poor habitat conditions and other limiting factors ranked lowest in priority for restoration, as significant flow would be required to effect measurable change, and other limiting factors would need to be addressed before increased salmonid productivity could be expected.

Note that the stream flow restoration priorities identified in the *Washington Water Acquisition Program* reflect a snapshot of conditions that existed at the time the inventories took place. Thus, a review should be conducted to determine if there have been any recent salmonid enhancement projects, or other recent changes in habitat condition, or new fish species found, within the sub-basin that might affect the priority of the streams in the *Washington Water Acquisition Program*.

It is recognized that with the limited funding sources available, focusing instream flow restoration efforts on relatively small streams with functional habitat will likely provide the greatest cost/benefit ratios. The likelihood that sufficient funds, or opportunities exist, to measurably improve flow on large rivers is low. Exceptions would include opportunities to acquire stored water in a reservoir and provide temporary pulse flows during critical periods of the freshwater life history of salmonids. In instances where tributary flow can also be protected in main stem streams, cumulative long-term benefits to instream flow may eventually be realized.

## **Flow Benefits**

### **What is the Minimum flow increase that should be considered?**

It is generally assumed that a minimum flow increase of at least five (5) percent over the mean monthly low flow is needed to provide a measurable increase that can be accounted for on a stream gage with a reasonable time period (5 years or less). Flow increases less than this are generally lost in the natural intra- and inter-annual flow variability. Biological benefits of flow increases smaller than this are even more difficult to account for.

Thus, the largest and most senior water diversions of small streams, are generally of highest priority for acquisition.

It may not be prudent to acquire a water right if insufficient water could be acquired to result in a measurable benefit to fish life unless the water could be acquired at a very reasonable cost. The likelihood of acquiring the additional water needed to achieve measurable benefit should be considered. In some cases, it may not be available at any reasonable cost. If multiple instream flow restoration opportunities in the sub-basin are expected or probable, and would cumulatively result in a five (5) percent change in stream flow, then acquiring smaller quantities of water would be justified.

The cross sectional characteristics and features of a stream channel, the gradient, and flow are important components in determining habitat quality and quantity. If *PHABSIM* or other instream flow assessment tools have been applied, they can provide valuable data in determining the expected benefits of flow acquisition. The available habitat under various flow conditions can then be determined for the fish species expected to be present during specific times in their life history. While there may be insufficient time available to conduct an instream flow assessment, a visual observation of the stream cross section may provide some sense of how a specific flow increase may benefit the stream. Streams with lower gradient banks and multiple braids will generally experience greater increases in surface area per incremental unit of flow increase, while streams with more vertical banks will experience greater increases in depth.

In some instances, some minimum threshold of increase in flow quantity and reliability might be necessary prior to considering an acquisition. Unintentionally creating unreliable or fluctuating flow that could compound the likelihood of stranding, poaching, or predation, although perhaps infrequently encountered, should be avoided.

It is important to note that instream flow tools do not address limiting factors such as temperature, passage barriers, altered hydrographs, sediment and LWD loading and other important factors. Therefore, they

should not be used exclusively when assessing potential instream flow restoration benefits.

### **Are Short Term or Long Term Benefits preferred?**

In most instances, instream flow restoration is unlikely to occur within short time periods. A biological response in fish populations to a change in flow may take even longer. It usually took decades or centuries for the existing low flow conditions to develop. However, funding entities are often impatient, and seek a reasonable return of their investment within a reasonable time period. Projects that provide fish benefits in a relatively short time period, or those that provide both short and long term benefits, are generally preferred over those which have only long horizon benefits. This again focuses restoration efforts on relatively small streams, as greater opportunities exist to provide measurable benefit. Exceptions might include pulse flows where storage opportunities exist. In addition, multiple, selective acquisitions in several small streams may result in greater benefits than acquiring year-round water rights in one stream.

Some have advocated that any amount of flow increase in a stream in which instream flow is limiting is acceptable. However, benefits of instream flow restoration are not necessarily lineal and benefits should be measurable and within acceptable time limits.

### **Should Selective Acquisition be considered?**

It is important that any acquired water be available when most needed by the fish. While it would be desirable to achieve increased perennial flow in all streams where flow is limiting, greater benefits might be realized with limited funds by strategically acquiring water during critical times periods, such as during juvenile or adult migration. Split season leases or acquisitions may result in greater fish benefits.

Purchasing options on water for drought years is another possibility to provide water during years when flow is exceptionally low or during critical time periods.

In some instances there may be flexibility in the Qi of the water right that would provide opportunity to use more water during periods when fish would most benefit. In general, the greater the flexibility in the Qi of the water right, the greater the potential benefit to fish life. Water rights purchased in storage have perhaps the greatest flexibility for use.

### **Alternative Water Sources**

In instances where surface water right holders are not interested in selling or leasing their water, there may be opportunity to provide them with alternative sources in order to improve instream flow.

**Wheeling** - This involves a change of the point of diversion of a water right and having another irrigation district or company use their system to transport water to another user. The entity wheeling the water does not own it, the water right holder retains it's priority, and a wheeling cost is usually charged to convey the water. The point of diversion of the water right is changed from a stream where flow is limiting to a source that is not limiting to salmonids.

**Share Acquisition** - In some instances shares of water can be purchased from an irrigation district to provide an alternative water source. Public funds might be used to acquire water shares, then trade them for the instream flow rights where flows are limiting. This typically requires that the water right holder be within the irrigation district and within reasonable proximity to the delivery system.

**Wells**- Drilling wells could be used to provide an alternative water source for all or part of an irrigation season. Changing to a groundwater source may, or may not, result in a loss of seniority of surface water depending on the extent of continuity. Wells with limited continuity to surface water may buffer the impact to instream flow to the extent that instream flow benefits are sufficient to justify the project.

**Conservation** - There are various mechanisms to fund water conservation measures, especially with respect to improvements to delivery or conveyance systems, which generally save more water than changes in application methodology.

**Change of Point of Diversion** - Instream flow in small tributaries can sometimes be improved through changing the point of diversion to a larger stream, or one in which flow is less limiting. Pump back systems have been employed to pump water from downstream areas back up to upper reaches to extend instream flow benefits through greater stream reaches. Provided the pumping distance isn't too great, this can be a cost-effective, alternative water source.

It is important to assess the potential before and after conditions associated with water conservation proposals. In some instances, a instream flow restoration project may actually lead to more adverse flow conditions for fish than the status quo, even though the total amount of water annually diverted is reduced. The "Qa" might be reduced, but the instantaneous "Qi" of the diversion could be increased at a critical time period of the life history of a fish species, that could lead to reduced salmonid productivity.

In other instances, infrastructure improvements to more efficient irrigation systems may allow for water to be economically diverted, when under the previous or existing conditions it is not practical or cost-effective.

## **Ancillary Benefits**

Ancillary benefits, other than flow, should also be considered when evaluating instream flow restoration. Although all projects funded with flow restoration funds usually must provide instream flow benefits for fish life, the ancillary benefits associated with the project are important and can sometimes provide greater benefit to fish life than instream flow. Flow restoration projects that concurrently provide access to previously



inaccessible habitat, while also improving local habitat quantity and quality, are typically of highest priority.

Other benefits that might be realized from instream flow restoration include increased: 1) wildlife diversity and migration corridors, 2) recreational opportunities, 3) aesthetics, 4) ecological connectivity, and 5) preservation of riparian communities.

**Community support and education** - Fostering local support and educational opportunities for instream flow restoration is an important factor to consider. Some communities are more amenable to restoration efforts than others. Local support for comprehensive, sub-basin planning processes, which address all limiting factors, increase the likelihood of success for salmon restoration efforts. If a significant proportion of the limiting factors are located on private lands, and there is little support for restoration of salmonids, success may be limited. Therefore, in some instances, it is perhaps prudent to locate projects where biological benefits may be secondary relative to fostering local support and educational opportunity. Local support may act as an important catalyst in encouraging other cooperators to participate in joining the program. However, these demonstration projects should be geographically limited to avoid over application.

### **Affected Reach**

The length of the reach that the water right may be protected must be evaluated and considered. While senior water rights are always preferred, they may not always be available or necessary if the reach of concern is located in a tributary stream, or if there is little risk of a senior water right holder appropriating the water. In some instances, water may be of most importance during a particular life stage of a particular salmonid species. However, benefits realized should be measurable to the extent possible.

Only the consumptive portion of a water right can likely be protected through an entire stream to the mouth (beyond the primary reach). Consumptive use is often considerably less than the total amount of the

water right measured at the point of diversion. However, many of the benefits of a water right acquisition may occur in the upper reaches of a basin, and while it would be preferred that the water be protected to the stream mouth, it may not be necessary for considerable fish benefit to occur.

In some instances, the stream reach benefiting from instream flow restoration may be quite short, but of high priority, such as where sufficient flow is needed to provide passage over a riffle, or "losing" reach of stream. When considering the appropriate flow necessary to provide fish passage over shallow riffles, the distance upstream to the next available holding cover must be considered, as well as the depth of flow over the riffle. While fish may be able to physically pass through relatively shallow water for short distances, they may not pass through shallow reaches that extend several hundred feet upstream.

## **Fish Species Present**

### **How do Fish species diversity, status, and life History affect instream flow restoration priorities?**

It is important to understand the freshwater life histories of the fish species present, and which habitats are utilized by these species throughout the year. This will help ensure that fish are present and will benefit from proposed instream flow improvements.

In general, the greater the number of fish species present and the more at risk their populations are the greater the priority for instream flow restoration. Therefore, it is important to review species inventories and any changes in the status of the fish species present. Additional, or recent changes in the listings of species under protection of ESA may have occurred.

### **Are there ways to Accelerate Recovery?**

In some instances there may be opportunity to "jump start" the recovery of salmonids in a stream where under natural conditions it may take years or

decades for salmonids to recolonize a stream where flow restoration has occurred. Watersheds with native broodstock or kelt reconditioning programs may be used to accelerate salmonid recovery in some streams. Inquiries could be made to state, federal, and tribal fish resources programs to determine if these opportunities exist.

Streams with existing populations of wild spawning fish should be of higher priority than streams without any fish present (all else being equal) because the likelihood of utilization would be expected to be increased.

**How do Limiting Factors other than flow affect instream flow restoration priorities?**

The extent that limiting factors other than flow affect salmonid productivity should be considered. The extent that these other limiting factors, are limiting, and the likelihood that that will, or can, be addressed in the near future should be considered. In some instances, plans may already be in place or in the process of being implemented to address some of these limiting factors; such as the scheduled removal of a passage barrier. Thus, if current limiting factors, other than flow, are expected to be addressed within a reasonable time period, a flow restoration project might be elevated in status. The quantity and condition of the important habitat parameters necessary for salmonid productivity should be known and considered when evaluating instream flow projects.

Typical limiting factors other than flow which are commonly encountered are: 1) fine sediment loading, 2) temperature, 3) limited rearing due to lack of LWD or disconnected floodplain and off-channel rearing habitat, 4) flood scour, 5) riparian condition and bank stability, and 6) limited fish passage and access.

**Temperature** - Stream temperature is a limiting factor commonly encountered, especially in eastern Washington. Providing additional instream flow to a stream where temperature is a limiting factor may not be prudent if there are no plans to address water temperatures within an acceptable time frame. Example; if stream temperatures are in excess of 74 degrees Fahrenheit during the period that additional

water is provided instream, there would be no direct benefit to salmonids, as the temperature exceeds their threshold of tolerance.

The likelihood of acquiring sufficient water to address temperature problems might also be considered. In some instances it may be prudent to increase flows despite excessive temperatures that exceed thresholds for salmonid tolerance. Preservation of riparian vegetation and production of aquatic invertebrates that provide important cover and food for salmonids may be important, despite the fact that temperature thresholds are exceeded.

**Predation and Poaching** - There is the potential for stream flow restoration projects to create predation or poaching problems that it did not previously exist. Providing fish access into small tributaries could make some fish species more, or less, vulnerable to these sources of mortality.

**Stranding** - flow restoration projects could also result in reducing or compounding the stranding of fish. While it is generally assumed that flow improvements will always reduce stranding, it can occasionally provide fish access into small streams which have fluctuating or seasonal flows. Thus, the incidence of stranding could be increased as a result. There should be some certainty regarding whether the amount of flow available is sufficient, stable, and reliable to ensure a net benefit to salmonids.

**Barriers** - an assessment of potential downstream barriers is necessary to determine the extent that fish benefit from the flow restoration project located upstream. It is important to determine if a fish passage barrier has recently been removed, or if there are plans, funding, and target dates for barrier removal in the near future.

**Other** - In some instances there may be opportunity to use acquired water in conjunction with other salmonid restoration efforts that focus on other limiting factors.

Projects involving excavation of old side channels, spring brooks, or other off channel rearing habitat may also benefit from use of additional water. Irrigation delivery systems may be able to convey water to remote locations along a stream.

### **Expected Future Condition**

The expected future condition of the stream or reach must also be considered. County or city zoning ordinances should be reviewed to determine the risk of increased development pressure that could hamper or void instream flow restoration efforts. It would not be prudent to implement instream flow restoration in locations where other limiting factors are likely to develop in the foreseeable future.

Also, some watersheds may be experiencing increasing numbers of exempt wells, which indirectly affect surface flows. If intensive well development is occurring to the extent that surface flow will be further diminished, close scrutiny may be needed to determine the efficacy of restoring instream flow with these watersheds.

### **Innovation**

It is important to not focus too narrowly when assessing potential flow restoration opportunities. There may be several other alternatives that may be worthy of consideration at a site, or there may be opportunity to improve the efficiency of an existing proposal. Look at each proposal as an opportunity to visit the site and thoroughly examine the instream flow restoration possibilities as well as other habitat restoration alternatives, in addition to the review of the specific project proposal, which led to a site visit. In some instances, it may be determined that the initial proposal is not viable, but other salmon restoration opportunities may be discovered.

Good projects are not always intuitive and may first appear to conflict with orthodox wisdom. Irrigation diversions can provide great habitat enhancement opportunities between the point of diversion and the fish

screen. The fish bypass between the fish screen and river can also provide rearing habitat. In some instance acquired water could be carried down an irrigation ditch until the ditch bisects a tributary stream in which flow is limiting. Water could then be spilled from the ditch into the stream, or the water (already screened) could be used to serve an irrigator who would otherwise divert surface water from the smaller creek.

### **Lost Opportunity**

In some instances, the window of opportunity should be considered. Even though a water right acquisition may not rank particularly high at the time, the idea of lost opportunity should be considered. There are instances where an acquisition may be prudent because of the potential risk to fish life by not acquiring the water right. For example, acquiring the water rights appurtenant to agricultural land that is about to be subdivided may be reasonable, as it is not likely that the opportunity for acquisition will exist in the future if the water right is divided among 20-50 lot holders, especially if flow is limiting in the stream from which the water is diverted. Other limiting factors which may have led to the low initial priority of the stream could be then be addressed at a later date, but if the opportunity to acquire the water is lost, all other restoration opportunities become moot.

The following are a few initial questions that may be of use in the initial assessment of an instream flow restoration project.

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**Initial Questions**

Is flow moderately to highly limiting in the stream or reach (refer to prioritization identified in the Water Acquisition Program)?

Is the extent and validity of the water right sufficient to protect it through the reach in question?

Is there sufficient opportunity to acquire enough water so as to result in a measurable benefit to fish life? Will available habitat be measurably increased or passage improved?

Will the acquired water be present during a critical life stage of the fish species that will benefit?

Are there other limiting factors such as passage barriers, temperature, or other habitat parameters, and are they being addressed?

Are there any listed, threatened, or sensitive species present or which would benefit from increased flow?

Are there ancillary benefits, or opportunities to improve or change the project such that even greater benefits to fish life may result?