Middle Snake Watershed Instream Habitat Assessment

Quality Assurance Project Plan

Watershed Resource Inventory Area No. 35

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Approvals

Background

With the passage of the Watershed Management Act of 1998, Washington State established a pathway for developing locally-based watershed enhancement plans based on Water Resource Inventory Areas, or WRIAs. This optional program is outlined in Chapter 90.82 RCW and provides a framework within which citizens, tribes, local governments and others can collaborate to develop watershed management plans. Sponsored by the Washington Department of Ecology, all watershed management plans address water supply reliability issues, while water quality, instream flows, and habitat are optional.

In the Middle Snake Watershed (WRIA 35), Asotin, Columbia, Garfield, and Whitman Counties, the City of Clarkston, and the Asotin County Public Utility District joined to initiate organization of the WRIA 35 Planning Unit in 2002. The 37-member Middle Snake Watershed Planning Unit is comprised of the initiating governments and the following stakeholder groups:

- landowners and citizens
- tribes
- conservation districts
- agricultural groups
- local governments
- environmental groups
- state and federal agencies

The watershed planning process in WRIA 35 will address water supply, instream flows, water quality, and habitat issues.[1]

Located in the southeast corner of Washington, the Middle Snake River Watershed (WRIA 35, Figure 1) occupies approximately 2,250 square miles in southeastern Washington along the Idaho border to the east and Oregon border to the south. Land use is approximately 50 percent rangeland, 33 percent agriculture, 15 percent forestland and 1 percent urban. The population is approximately 25,000.[2]

[1] Middle Snake, WRIA 35 Watershed Planning, http://www.asotinpud.org/msww/ms_watershed_planning.htm

[2] Middle Snake River Watershed, Watershed Plan, Executive Summary, http://www.asotinpud.org/msww/documents/Draft%20Plan/Sections/Executive%20Summary.pdf

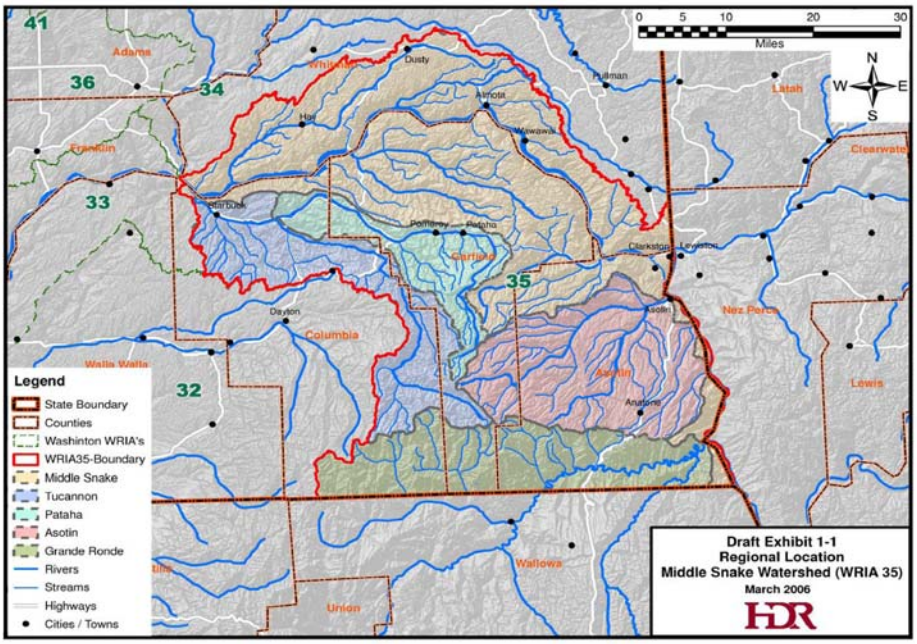

Figure 1. WRIA 35 Base Map.

Project Description

The goal of this project is to evaluate and make recommendations for instream habitat needs for Alpowa, Almota, Couse, Deadman, George, Joseph, Pataha and Tenmile Creeks within WRIA 35.

Data will be collected on stream flow, substrate and habitat characteristics and accompanying analysis will be completed. Flow levels necessary at critical locations within the eight drainage basins will be recommended. The study will also incorporate additional analyses that will provide insight into: 1) differences between methods used to determine minimum flow requirements, and 2) links between fish species presence and flow regimes.

Hydrologic and field data will be collected and analyzed and compared to current and historic gauge data from the targeted streams (as well as other streams in the area if necessary). Flow assessment methods will be compared to determine the applicability for use in small southeast Washington streams. Fish species presence in relation to instream flow will be determined for two or three streams using available data obtained from Washington Department of Fish & Wildlife (WDFW). Progress reports, a draft report, meeting presentations, and a final report to document procedures, results, and stream flow recommendations will be prepared.

A detailed survey of each reach will consist of longitudinal profiles along the reach, cross-sectional transects, stream gauging, and stream classification. Intervals of wet and dry portions of intermittent streams will be documented.

This project will focus on required *minimum* streamflows so less emphasis will be placed on high flow periods. Stage-discharge curves will also reflect the stage at zero flow for each transect. Each transect will be assigned weighting factors to represent the percent of stream reach typical (i.e., pool, riffle).

Organization and Schedule

WSU Project Team:

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John Foltz, Graduate student, Biological Systems Engineering

Project Schedule:

Because this study focuses on minimum streamflows, field measurements will occur during low flow periods of fall 2008 and late spring 2009. Work is due to be completed by June 30, 2009, in accordance with Asotin County PUD's request for proposal.

Site reconnaissance to determine the best available study points within each stream basin has occurred.

Quality Objectives

The primary objective of this study is to determine the instream habitat needs in WRIA 35. Streamflow data will be collected using the Toe-Width, Wetted Perimeter, and Tennant Methods. Hydrologic and field data will be compared to current and historic gauge data from targeted streams.

Although, these methods do not produce results that can be evaluated for bias and precision, they will be performed according to the guidelines described below.

Sampling Process Design, Procedures, and Measurement Methods

Site reconnaissance:

Site reconnaissance for this study has occurred. Sites were selected based on their suitability for surveying. Access was a limiting factor in the region due to steep and rugged terrain, impenetrable brush, lack of nearby roadways, and uncooperative landowners. Many of the study streams were characterized by intermittent flow, which further limited available survey points.

The coordinates for selected sites were recorded with a GPS unit and site locations were photographed.

Streamflow measurement:
Site streamflow will be evaluated with the Tennant (aka Montana) Method and one or both of the following, Toe-Width Method and Wetted Perimeter Method.

Tennant Method
The average annual flow of the study streams will be determined according to Tennant[3] using published data of the USGS and Ecology. Records for the streams will be studied for daily, monthly, and annual flow patterns. In the field, gages will be checked so as to view and study natural flows during low-flow periods.

Cross-sectional data on width, depth, and velocity measurements for flow regimens under study will be obtained. This information will be used to plot and compare water widths, depths, and velocities to known requirements for aquatic resources.

Average daily, monthly, and annual streamflow regimen tables and previous historic low-flow data will be studied to learn the base flow patterns of the climatic year.

Based on the average annual flows for the study streams, instream flow regimens will be determined from Table 1.

Table 1. Instream Flow Regimens from Tennant.

Narrative Description of Flow[a]	April to September	October to March
Flushing or maximum flow	200% from 48 to 72 hours	
Optimum range of flow	60-100%	60-100%
Outstanding habitat	60%	40%
Excellent habitat	50%	30%
Good habitat	40%	20%
Fair or degrading habitat	30%	10%
Poor or minimum habitat	10%	10%
Severe degradation	<10%	<10%

[a] For fish, wildlife, recreation, and related environmental resources

Cross-Section Measurement
Cross-section measurements will be performed in accordance with Bain[4]. A tape measure will be stretched across the stream perpendicular to streamflow and anchored between two stakes. The tape measure will be level and taut. Interfering brush will be cleared.

[3] Tennant, D., 1976, Instream Flow Regimens for Fish, Wildlife, Recreation and Related Environmental Resources, Fisheries 1(4): 6-10
[4] Bain, M.B., and Stevensen, N.J. (ed.), 1999, Aquatic Habitat Assessment: Common Methods 14: Streamflow, American Fisheries Society, Bethesda, MD

The width of the stream will be measured and divided into intervals. No interval will contain more than 10% of the total discharge. Generally, 12 to 15 intervals will be sought at each transect.

At each interval the following measurements will be taken:

distance from the left bank,
water depth, and
water velocity.

When depth is less than 2 feet, water velocity will be measured at 0.6 the water depth at each interval (mean velocity for a position). For depths greater than 2 feet, velocity will be measured at 0.2d and 0.8d.

Toe-Width Method

Toe-width will be determined according to Swift[5]. The bank toe will be objectively determined as the point where the streambed and bank join. After each bank toe is established, toe-width will be measured between the two points.

Wetted Perimeter Method

The wetted perimeter will be established by calculating the width of the streambed and the stream bank in contact with water at each transect. Ultimately, inflection points will be determined by comparing discharge and wetted perimeter as shown in Figure 2. These inflection points are used to determine instream habitat needs.

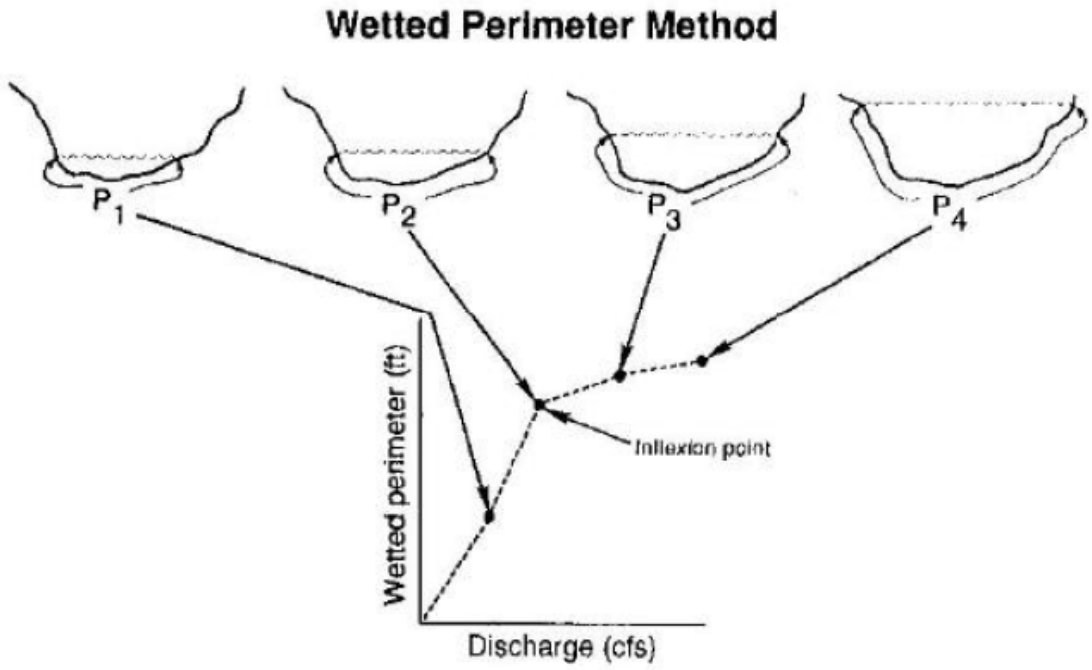

Figure 2. Wetted Perimeter Method.

[5] Swift, C.H. III, 1976, Estimation of Stream Discharges Preferred by Steelhead Trout for Spawning and Rearing in Western Washington, USGS Open-File Report 75-155, Tacoma, WA

The methods to be used and number of sampling locations for each stream are shown in Table 2.

Table 2. Proposed number of site locations and methods to be used for each stream.

Streams	Proposed Number of Sampling Locations	Methods
Alpowa Creek	8	Tennant, Toe-width & Wetted perimeter
Almota Creek	6	Tennant, Toe-width & Wetted perimeter
Couse Creek	7	Tennant, Toe-width & Wetted perimeter
Deadman Creek	8	Tennant, Toe-width & Wetted perimeter
George Creek	11	Tennant, Toe-width & Wetted perimeter
Joseph Creek	12	Tennant, Toe-width
Pataha Creek	6	Tennant, Toe-width & Wetted perimeter
Tenmile Creek	8	Tennant, Toe-width & Wetted perimeter

Historic Data:
Historic data on migratory fish corridors within the target streams will be compared with findings on available spawning and rearing habitat.

Quality Control

Streamflow data for the Toe-Width and Wetted Perimeter Methods will be collected in accordance with Bain (1999) as stated above. Cross-section sites will remain similar throughout the project for consistency. Hydrologic and field data will be compared to current and historic gauge data from targeted streams. USGS gauge data will be applied to all streams according to Tennant (1976).

Proposed sites will be submitted for approval by the Asotin County PUD.

Data Management Procedures

Field measurements and observations will be recorded on-site in a field notebook. This data will be entered into and stored in computer data files, and the originals will be stored in a project file at Washington State University, Pullman. Field notes will be copied and made available to project partners.

Reports

The WSU Project Team will provide quarterly progress reports to Asotin County PUD and Ecology, and a final report that will include:

- GPS coordinates for each site.
- Listings of the output files for discharge calculation.

- Listings of the output files from running the wetted perimeter program for each transect.
- A table showing discharges and the water surface elevations for each transect by the collection dates.
- Results and interpretation of data collected in relation to comparing flow methods.
- Discussion on fish species presence in relation to flow conditions in the respective streams.
- The following plots:
  - Transect profiles - distance (x-axis), bottom elevation (y-axis).
  - Arithmetic stage versus discharge - discharge (x-axis), water elevation (y-axis).
  - Wetted perimeter - wetted perimeter (x-axis), water elevation (y-axis).

The report will be provided in hard copy and electronically on a CD containing the input data files for the hydrologic analysis and labeled copies of all slides and/or photos.

Data Verification and Validation

Data will be made available to Asotin County PUD and Ecology and may be assessed by experts within those agencies and compared with the Quality Objectives of this study. Modifications to measuring procedures, quality control, and analysis procedures will be considered for future efforts.

Data Quality Assessment

Once the validity of the data has been established, the WSU Project Team will work with project partners at Asotin County PUD and Ecology to determine if the data has met the objective of the project in determining instream habitat needs for WRIA 35.