

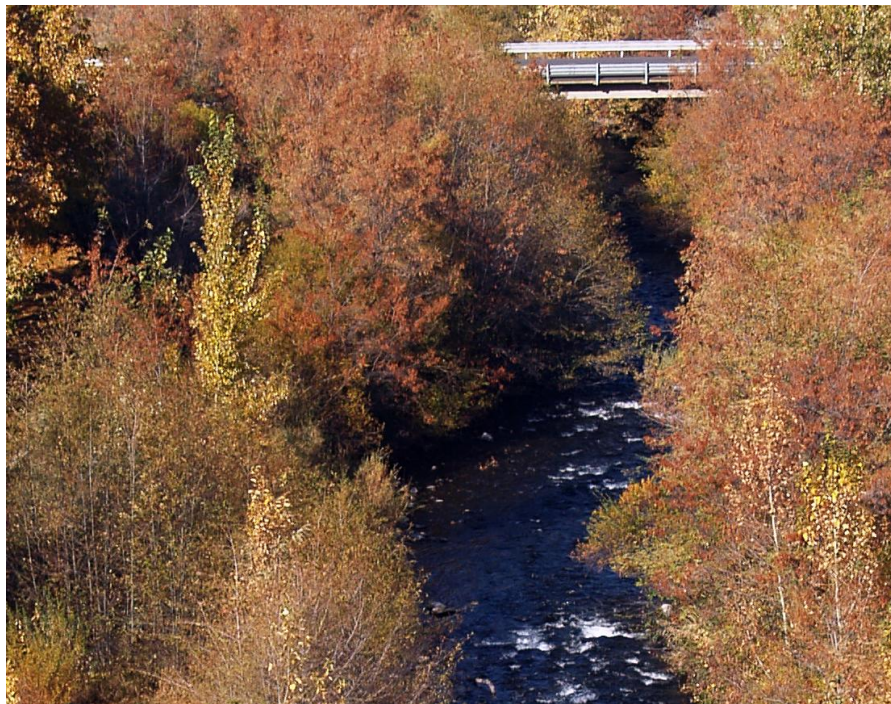


***Water Management Initiative Monitoring Program Phase II:***

***Final Report***

***Seasonal Seepage Assessments***

***(WMI Task 4.2)***



***1/29/2009***

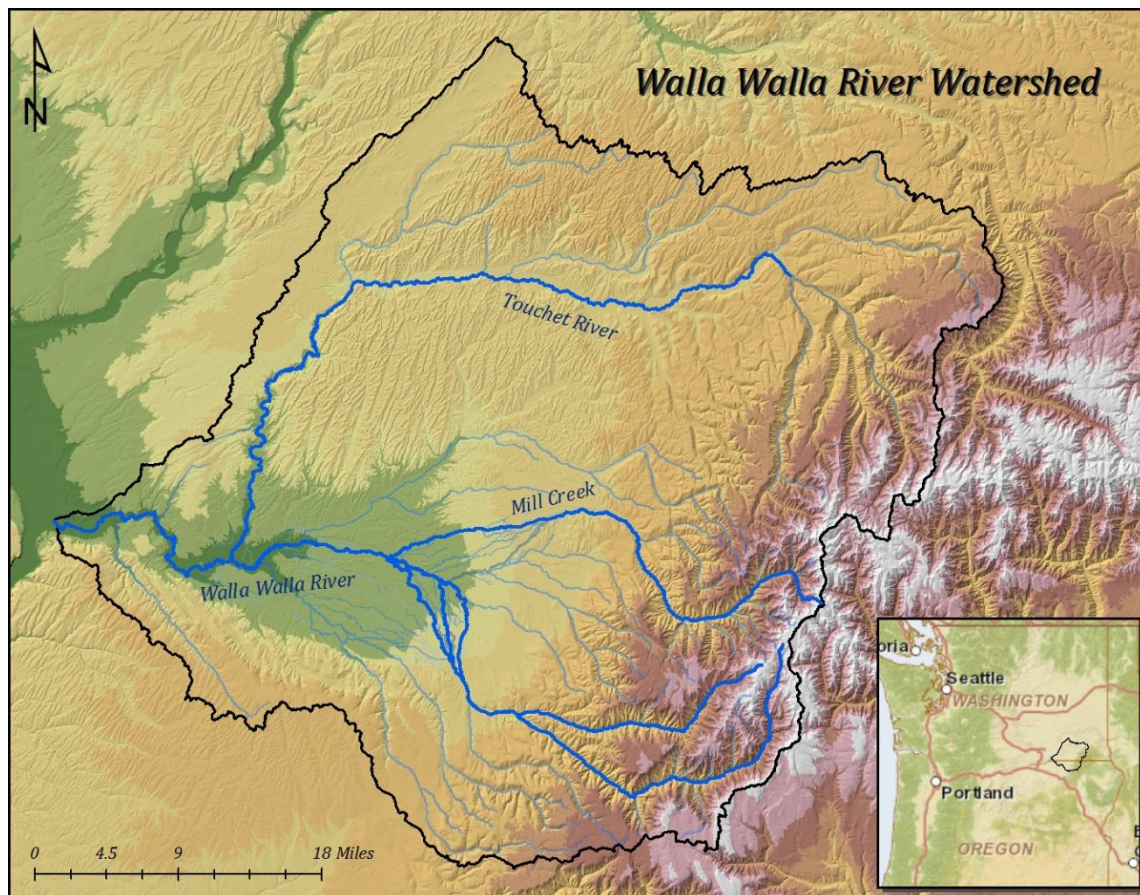
***Troy W. Baker***



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## Overview:

The Walla Walla River watershed is a bi-state watershed that originates in Oregon and passes through the state of Washington on route to its confluence with the Columbia River. (Figure A-1) As in many watersheds in the Western United States, the Walla Walla River basin's water quality and endangered species issues are heavily influenced by the timing, availability, quality and quantity of water originating from both surface and ground sources. The more obvious, seasonal variation in supply (winter-spring = higher flows, summer-fall = lower flows) is well documented in readily available annual hydrographs and continuous flow data. Historically, there's been a lack of understanding of the Walla Walla River and its tributary flows vary spatially relative to: water use, groundwater inputs, evaporation, irrigation returns, and tributary inputs. From the near-pristine headwaters of the Walla Walla River, Mill Creek, and Touchet River to near the confluence with the Columbia (Nine Mile Bridge) variations in environmental conditions help shape the various flow profiles within the watershed.



*Figure A-1. Map of the Walla Walla Watershed showing the Walla Walla River, Touchet River, Mill Creek, East Little Walla Walla River, and West Little Walla Walla River.*

Starting in 2002, WWBWC staff, local agency personnel, and volunteers from Washington and Oregon began conducting seasonal instream flow, diversion inventories, and tributary flow surveys termed “seepage assessments” as a primary first step toward quantifying the spatial variation in water volume for the Walla Walla River. Seepage assessments, at first, were conducted in two primary seasons of concern; June when ESA-listed fish species are moving from the lower to upper watershed to either spawn or rear for the summer months and August when Clean Water Act water quality issues and low flow volumes are at their most critical levels. In 2007 a

seepage run was conducted in the fall in October of 2007. By conducting a fall seepage run, an additional data set at different flow conditions was added to the growing datasets. This report shares the data collected from these bi-state cooperative seepage runs. The primary focus of the analysis presented in this report is to quantify the channel bed gains and losses.

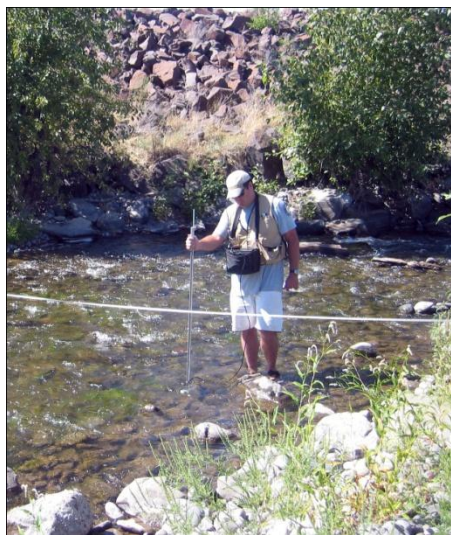
## Methodology:

### Data collection and quality

Seepage runs were typically completed over a 48-hour period with most of the measurements taken during the first 24-hour period. The QAPP (Quality Assurance Project Plan) for the Watershed Management Initiative Hydrology, Fisheries and Aquifer Recharge Monitoring-Modeling Project outlines the protocols for cross-sectional measurements (Figure A-2 ) used by the WWBWC to collect the instream flow data.<sup>1</sup>

Other groups also utilized this protocol or variations on it to conduct their flow, tributary and diversion measurements. For more information on how a particular agency or group measures flow contact the project partners directly. Data was recorded using a variety of flow methods including hand and spreadsheet calculations. Diversion measurements were made using a variety of methods including: “weir stick” (used in conjunction with a particular weir’s rating table), flow-rate meters on pump or diversion, estimate of rate of diversion using sprinkler-

head-counting method and on the larger diversions continuous flow recorders. Most diversion sites were recorded by direct measurement using weirs, meters and/or flow meters. Tributary inputs were calculated using instream flow measurements or data from the gauge station closest to the confluence of the tributary and the Walla Walla River. At each gauge the average daily flow was used to represent flow for the site.



*Figure A-2 (left). WWBWC Staff conducting a cross-sectional measurement.*

While not directly relevant to the analysis shared in this report, each field team also collected parameters such as (1) channel and riparian photographs, (2) temperature (F), (3) specific conductivity (uS) (4) cross-sectional channel profile (wetted width and depths in feet). This information is available through the Walla Walla Basin Watershed Council’s website<sup>2</sup>.

Data collected by all project partners was individually compiled by each of the collection agencies and then organized and analyzed by the WWBWC.

The data for all 10 seepage assessments for the Walla Walla River, the two seepage assessments for the Touchet River, Mill Creek, East Little Walla Walla River, and the West Little Walla Walla River can be found in *Attachments A*. Data sets include site identification or name, the digitized river mile (“actual”) and instream flow, diversion and tributary quantities. The analysis and discussion sections of this report will review the data and identify areas of net gains and losses and discuss general trends. However the main objective of this report is to present this dataset

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<sup>1</sup> WWBWC, 2008. *Watershed Management Initiative Hydrology, Fisheries and Aquifer Recharge Monitoring-Modeling Project*, Walla Walla Basin Watershed Council And the WMI Technical Review Team

<sup>2</sup> [www.wwbwc.org](http://www.wwbwc.org)

for use by our numerous project and policy-planning partners to better manage and monitor instream flows in the Walla Walla Watershed.

## Spatial Flow Model

In order to assess the longitudinal profile for each system, a spatially-oriented model was needed. The thalweg for each system was digitized using ArcView 9.2. The digitized linear feature provided the ability to break down each system into “actual river miles”. The NAIP 2006 Satellite imagery for Walla Walla County, Columbia County, and the Umatilla County was overlaid by the stream layer to then locate all diversion, tributaries, and instream flow measuring sites, providing a high resolution longitudinal framework of the systems. Watermasters from both Oregon and Washington worked with WWBWC staff to locate all diversions, tributaries and instream flow sites.

## Reach Analysis:

Analysis was conducted using a simple mass-balance approach assessing water balance values on a reach-by-reach basis. Reaches were defined by the closest upstream and downstream instream flow measurement. All water budget calculations were performed from a given instream flow site upriver to the next nearest instream flow site. The equations for net tributary inputs and diversion withdraws are mass balance of all values in a defined reach. The basic equations for water budget analysis were<sup>3</sup>:

$$(1) \quad \text{Net Channel Gains and Losses } (N_{GL}) = (\sum (T_R) - \sum (D_R)) + (Q_{DN} - Q_{UP})$$

Where:  $\sum (T_R)$  = Sum of all Tributary Inputs for given reach

$\sum (D_R)$  = Sum of all Diversion withdraws for a given reach

$Q_{DN}$  = Flow value at reach’s downstream site

$Q_{UP}$  = Flow value at reach’s upstream site

Units: cubic-feet-per-second/reach

$$(2) \quad \text{Net Rate of Channel Bed Gains and Losses } (N_{GL-R}) = (N_{GL}) / (RM_{DN} - RM_{UP})$$

Where:  $(N_{GL})$  = Net Channel Gains and Losses for a given reach

$RM_{DN}$  = River Mile at downstream flow site

$RM_{UP}$  = River Mile at upstream flow site

Units: cubic-feet-per-second/mile/reach

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<sup>3</sup> Bower, R.J. 2005. *Walla Walla River Surface Water Budget Assessment: 2002 to 2004*. Walla Walla Basin Watershed Council, [www.wwbwc.org](http://www.wwbwc.org)

## Analysis Assumptions:

In order to correctly identify possible gaining or losing trends, general assumptions must be made to identify and quantify immeasurable components of the model. The assumptions that were made as the data was analyzed are listed below.

- Instream, diversion, and tributary flow data are representative of actual conditions for a particular season: Spring, summer, and fall datasets used in conjunction provide a reasonable and representative flow profile for the river for the corresponding season of measurement.
- Spatial model data node (e.g. diversion, instream flow, and tributary) locations are +/- 25 meters of where they were originally. This assumption is likely to have remained true for a majority of the sites through the 6 field seasons of data collection on the Walla Walla River. In Washington, points of diversion (PODs) can be moved short distances without a formal permitting process while in Oregon moving a POD location is not allowed without proper POD transfer authorization. In Washington, if a particular POD was known to vary by year, a mid-point was chosen on the respective reach to represent that POD. Because reach analysis based on upstream and downstream instream-measurements, this method seemed applicable. The 2004 template for the Walla Walla River was verified by GPS in 2008. This “mid-point” technically only applied to water rights in Washington below Lowden Road Bridge.
- Total Instream Net Gains (Total  $N_{GL}$ ) can only be attributed to accretional<sup>4</sup> sum of the following sources: groundwater, hyporeic<sup>5</sup> inflow, surface irrigation returns or “tail water,” and any unmeasured springs and tributaries. Due to the inability to quantify these various sources via direct measurement  $N_{GL}$  is assumed to be a compilation of these various processes.
- Total Instream Net Losses (Total  $N_R$ ) can only be attributed to the sum of the following losses: a) direct surface evaporation from sun and wind, b) evapotranspiration through riparian plant transpiration, and c) channel bed infiltration or net loss to the underlying alluvial aquifer system. Due to the inability to quantify these various sources via direct measurement they are assumed to be implicit to the sum of Net Losses. Net Losses is used here as relative to surface water, it is understood that in a high connective aquifer-surface system, water is not truly “lost” and may show up further down gradient as net gains to the river.
- All surface diversions are accounted for in the diversion inventory fieldwork. Illegal or unappropriated diversions, if they exist, are not accounted for in this data or analysis. Through the process of conducting seven years of seasonal seepage runs on the river, the likelihood of illegal or unauthorized diversions are low due to high traffic and local knowledge that the project partners have of the system. The amount of gains and losses relative to the volume of instream flow measurements were assumed to be equal. Generally a rule of thumb for instream flow measurements is that accuracy is within (+/-) 10% of the true flow value. This would mean that a 100 cfs measurement would have a confidence range of +/- 10 cfs while a 10 measurement would be +/- 1 cfs. This crude confidence range assumption helps as we analyze and discuss the qualification of river reaches where net gains and losses are apparent as a trend.

## Results and Discussion

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<sup>4</sup> In science, accretion is a process in which the size of something gradually increases by steady addition of smaller parts

<sup>5</sup> beneath the bed of a stream, where water percolates through interstices between the rocks

The results and analysis portions of this document will focus on the Walla Walla River. The Walla Walla River seepage assessments have been conducted over the past 6 years through various conditions and seasons. The WWBWC and its agency partners and volunteers began conducting seepage assessments on the Touchet River, Mill Creek, and the East and West Little Walla Walla River systems in the fall of 2008. The initial results from the recently added systems will be included, but in-depth analysis will not be possible.

## Walla Walla River Seepage Assessment

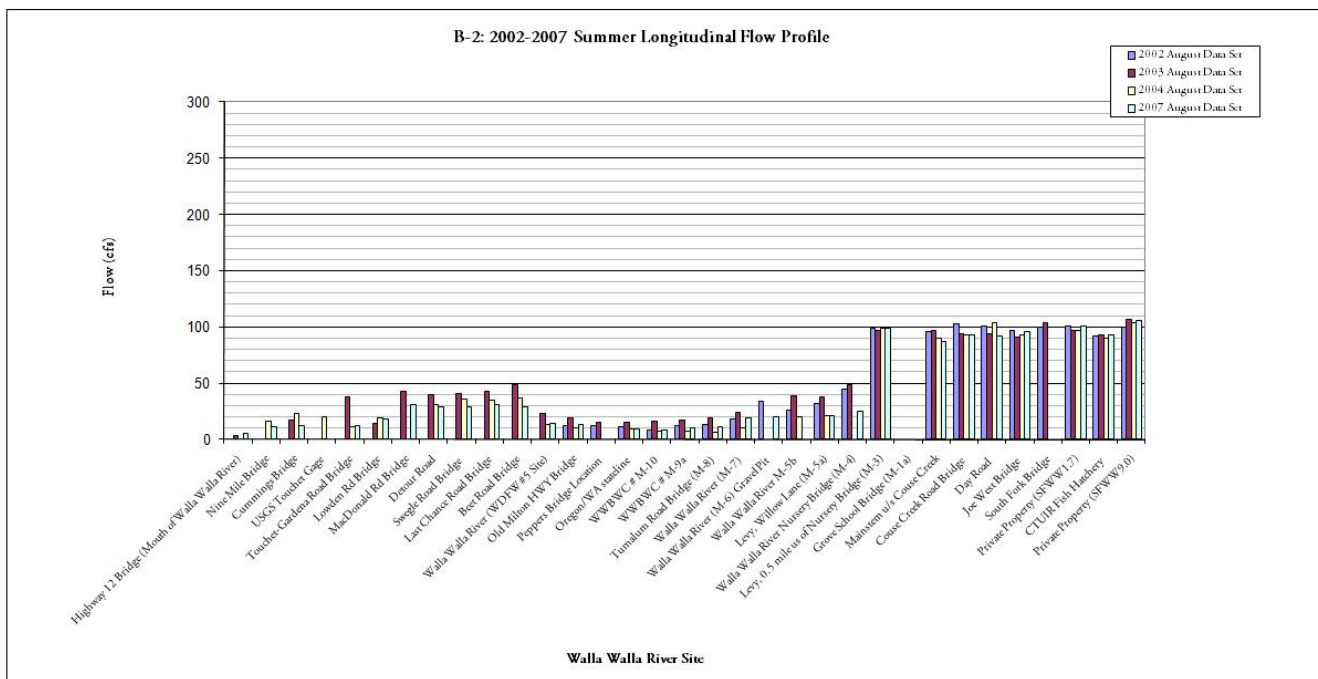
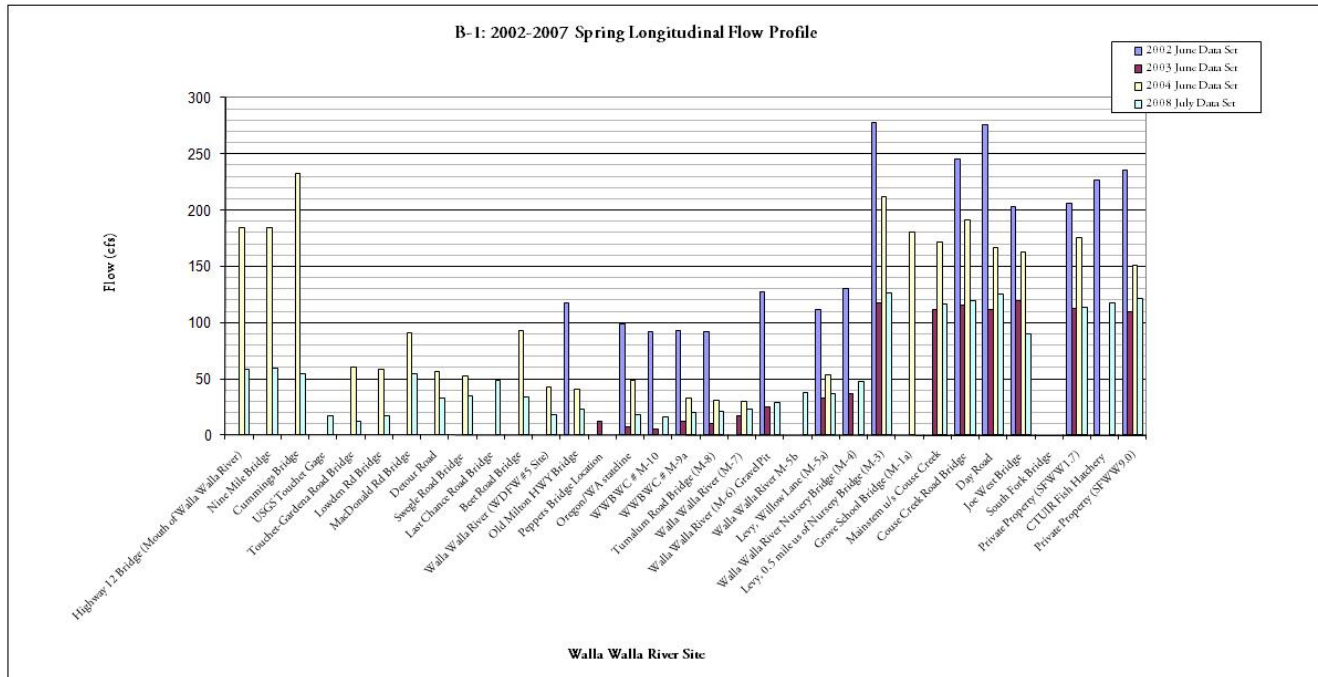
Data was first tabulated into a spreadsheet model and processed for all nine seepage runs utilizing the water budget analysis equations (*Attachments B-1 through B-5*). Analysis for each reach is applied from the downstream instream flow measurement on that particular line to the next, upriver instream flow site (see attachment). Each instream location was assigned a Walla Walla River Reach ID and the application of analysis results can be deduced from the designated “Defined Reach Data” column (Table 1). Only field-verified data was used for analysis.

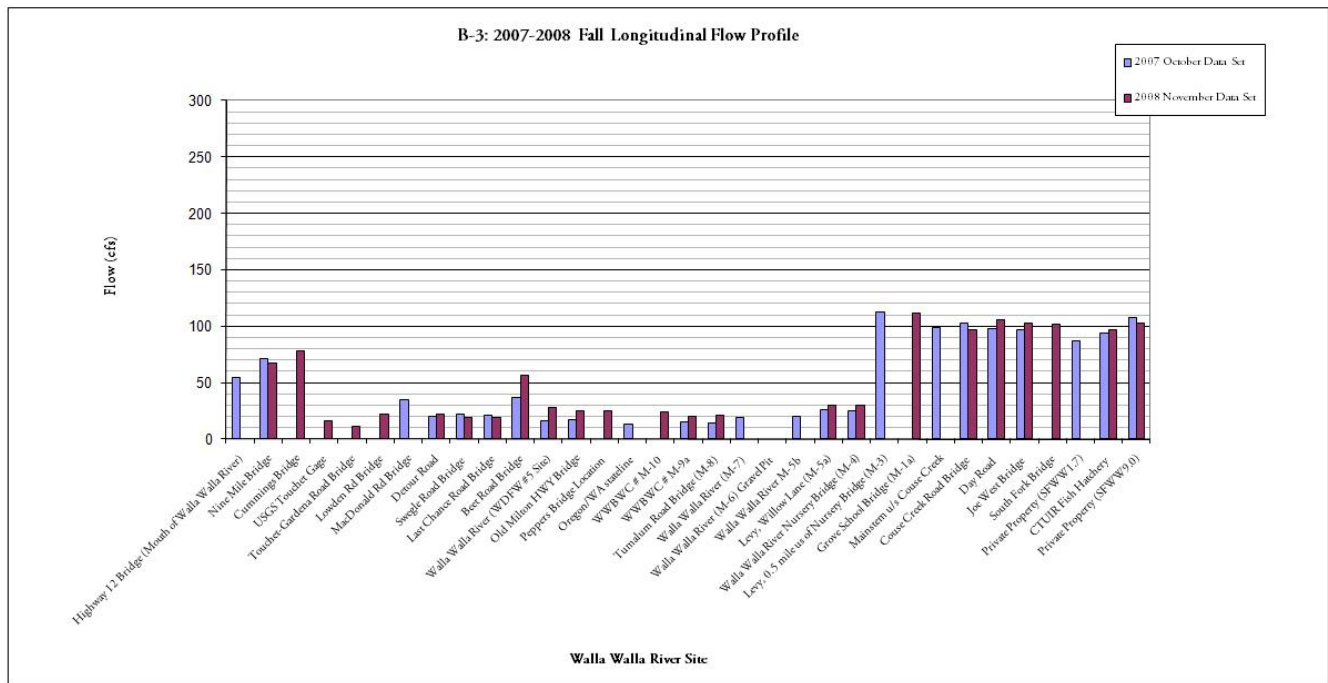
| 2008 Composite Seepage Data Set                |                   |                            |                      | 2008 July Data Set |               |                                   |                          |                     |                 |
|------------------------------------------------|-------------------|----------------------------|----------------------|--------------------|---------------|-----------------------------------|--------------------------|---------------------|-----------------|
| Flow Measurement Location                      | Actual River Mile | Walla Walla River Reach ID | Defined Reach Data * | Rate Per Mile      | Net Gain/Loss | Gross Gain/Loss Change (Instream) | 2004 Net Diversion Total | 2004 Net Trib Total | 2004 Flow (cfs) |
| Highway 12 Bridge (Mouth of Walla Walla River) | 0.0               | 1                          | 1-2                  |                    |               |                                   |                          |                     |                 |
| Nine Mile Bridge                               | 8.5               | 2                          | 2-3                  | -0.2               | -0.7          | -0.7                              | 0.0                      | 0.0                 | 58.3            |
| Cummings Bridge                                | 12.7              | 3                          | 3-4                  | 0.7                | 2.4           | 4.0                               | 1.7                      | 0.0                 | 59.0            |
| USGS Touchet Gage                              | 15.9              | 4                          | 4-5                  | -2.5               | -11.3         | 38.3                              | -1.1                     | 50.7                | 55.0            |
| Touchet-Gardens Road Bridge                    | 20.5              | 5                          | 5-6                  | 0.8                | 6.0           | 4.3                               | -3.3                     | 1.6                 | 16.7            |
| Lowden Rd Bridge                               | 27.6              | 6                          | 6-7                  | 6.7                | 13.5          | -4.5                              | -18.1                    | 0.0                 | 12.4            |
| MacDonald Rd Bridge                            | 29.7              | 7                          | 7-8                  | -7.2               | -26.0         | -37.4                             | -11.3                    | 0.0                 | 16.9            |
| Detour Road                                    | 33.3              | 8                          | 8-9                  | 14.2               | 15.4          | 21.4                              | -0.2                     | 6.2                 | 54.3            |
| Swegle Road Bridge                             | 34.4              | 9                          | 9-10                 | -1.2               | -1.8          | -1.8                              | 0.0                      | 0.0                 | 32.9            |
| Last Chance Road Bridge                        | 35.8              | 10                         | 10-11                | -7.4               | -12.5         | -14.2                             | -1.8                     | 0.0                 | 34.7            |
| Beet Road Bridge                               | 37.5              | 11                         | 11-12                | 25.2               | 14.9          | 14.9                              | 0.0                      | 0.0                 | 48.9            |
| Walla Walla River (WDFW #5 Site)               | 38.1              | 12                         | 12-13                | -1.0               | -1.3          | 15.4                              | -1.0                     | 17.6                | 34.0            |
| Old Milton HWY Bridge                          | 39.5              | 13                         | 13-14                | -3.1               | -5.0          | -5.0                              | 0.0                      | 0.0                 | 18.7            |
| Peppers Bridge Location                        | 41.1              | 14                         | 14-15                | -0.1               | 5.9           | 5.5                               | -0.4                     | 0.0                 | 23.6            |
| Oregon/WA stateline                            | 41.6              | 15                         | 15-16                | 0.0                | 0.0           |                                   |                          |                     |                 |
| WWBWC # M-10                                   | 42.3              | 16                         | 16-17                | 3.0                | 2.2           | 2.2                               | 0.0                      | 0.0                 | 18.1            |
| WWBWC # M-9a                                   | 43.0              | 17                         | 17-18                | -7.4               | -4.4          | -4.4                              | 0.0                      | 0.0                 | 15.9            |
| Tumalum Road Bridge (M-8)                      | 43.6              | 18                         | 18-19                | -0.8               | -0.5          | -0.5                              | 0.0                      | 0.0                 | 20.3            |
| Walla Walla River (M-7)                        | 44.2              | 19                         | 19-20                | -5.6               | -2.2          | -2.2                              | 0.0                      | 0.0                 | 20.8            |
| Walla Walla River (M-6) Gravel Pit             | 44.6              | 20                         | 20-21                | -8.2               | -6.0          | -6.0                              | 0.0                      | 0.0                 | 22.9            |
| Walla Walla River M-5b                         | 45.3              | 21                         | 21-22                | -184.9             | -8.7          | -8.7                              | 0.0                      | 0.0                 | 28.9            |
| Lery, Willow Lane (M-5a)                       | 45.4              | 22                         | 22-23                | 1.9                | 1.0           | 1.0                               | 0.0                      | 0.0                 | 37.6            |
| Walla Walla River Nursery Bridge (M-4)         | 45.9              | 23                         | 23-24                | -10.5              | -11.4         | -11.4                             | 0.0                      | 0.0                 | 36.6            |
| Lery, 0.5 mile us of Nursery Bridge (M-3)      | 46.7              | 24                         | 24-25                | 9.1                | 8.0           | -78.7                             | -86.7                    | 0.0                 | 47.9            |
| Grove School Bridge (M-1a)                     | 47.9              | 25                         | 25-26                | -0.2               | 10.0          | 10.0                              | 0.0                      | 0.0                 | 126.6           |
| Mainstem u/s Couze Creek                       | 48.7              | 26                         | 26-27                | 0.0                | 0.0           |                                   |                          |                     |                 |
| Couze Creek Road Bridge                        | 49.0              | 27                         | 27-28                | -0.5               | -0.5          | -3.3                              | -2.7                     | 0.0                 | 116.6           |
| Day Road                                       | 49.9              | 28                         | 28-29                | -5.9               | -5.2          | -5.3                              | -0.1                     | 0.0                 | 119.9           |
| Joe West Bridge                                | 50.8              | 29                         | 29-30                | 17.9               | 29.5          | 35.5                              | -4.7                     | 10.8                | 125.1           |
| South Fork Bridge                              | 52.5              | 30                         | 30-31                | 0.4                | -21.7         | -24.3                             | -2.6                     | 0.0                 | 89.6            |
| Private Property (SPWW1.7)                     | 53.8              | 31                         | 31-32                | 0.0                | 0.0           |                                   |                          |                     |                 |
| CTUIR Fish Hatchery                            | 57.6              | 32                         | 32-33                | -2.6               | -4.2          | -4.2                              | 0.0                      | 0.0                 | 113.8           |
| Private Property (SPWW9.0)                     | 59.3              | 33                         | 33-34                | 5.5                | 10.0          | 10.0                              | 0.0                      | 0.0                 | 118.0           |
| OWRD Gauge Station,                            | 61.1              | 34                         | 34-35                | x                  | x             | x                                 | x                        | x                   | 108.0           |

Table 1. 2008 Excel model data table for the July Walla Walla River seepage run.

## Water Year Comparison of Datasets

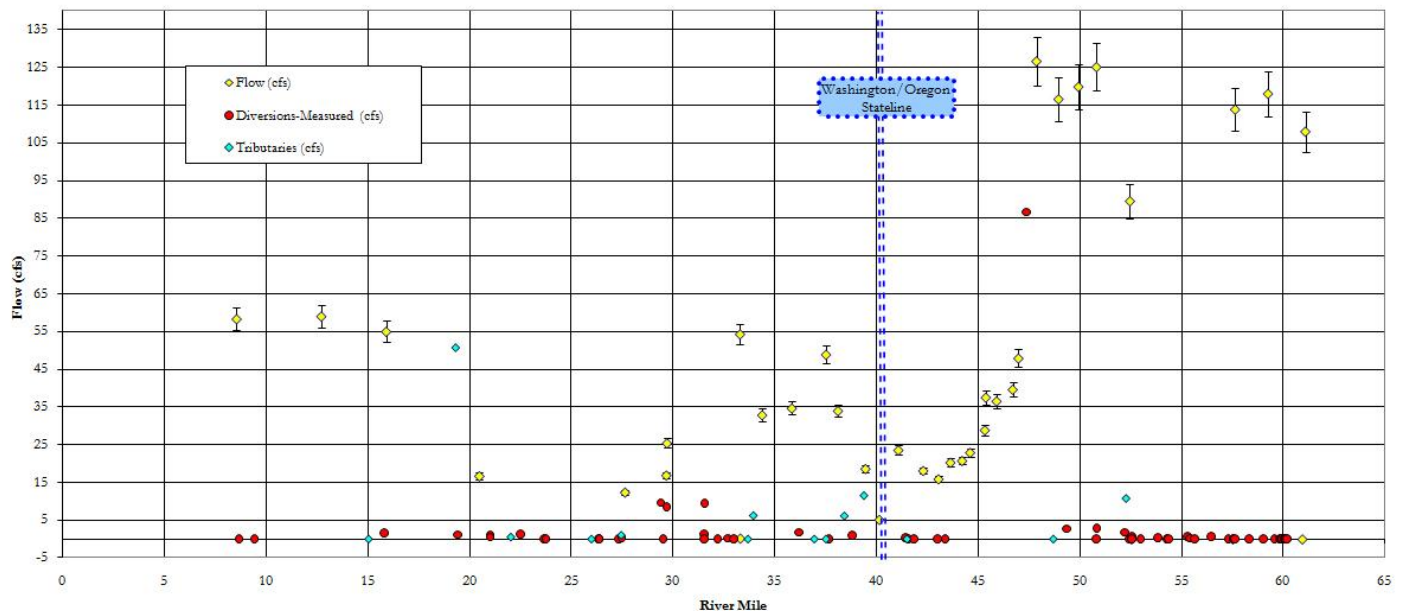
Longitudinal flow profiles (B-1 through B-3,) give a good general overview of the seasonal flow rate on the Walla Walla River. The flow profiles are based upon seasonal differences in the Walla Walla River and years of similar conditions were compiled together in each profile.





A longitudinal flow profile based on spatial locations of the measurements taken during the 2008 July Seepage run can be seen in Figure C-1. The longitudinal flow profile gives a good general overview of where water is available and/or being used on the Walla Walla River based upon river mile.

Figure C-1 2008 July Seepage Run, Walla Walla River - Mainstem



The results from the 2004 June and August net channel gains and losses ( $N_{GL}$ ) is documented in Figures D-1 and D-2. Higher June instream flows appear to be influenced by much higher inflows (gains) of groundwater in the upper mainstem portion of the river (Grove School Bridge to South Fork Bridge) with the exception of the area around the Couse Creek confluence. This gaining area during June is shown generally to be the opposite (losing) during the August seepage period. The rates of net channel gains and losses per river mile ( $N_{GL-R}$ ) are calculated in order to quantify the magnitude of these gains and losses relative to a particular reach's length. While the values only apply to a particular reach and do not reflect actual losses per reach, they do provide a better sense the magnitude of gains and losses particularly as they related to identifying areas of significant flux (Figures D-3, pg 13 and D-4, pg14). The well-documented (Metcalf, S. et. al. 2003) high channel loss rates in Oregon's Lower Flood control levee (Nursery to Tum-a-lum Bridges) is clearly shown in the August seepage analysis results.

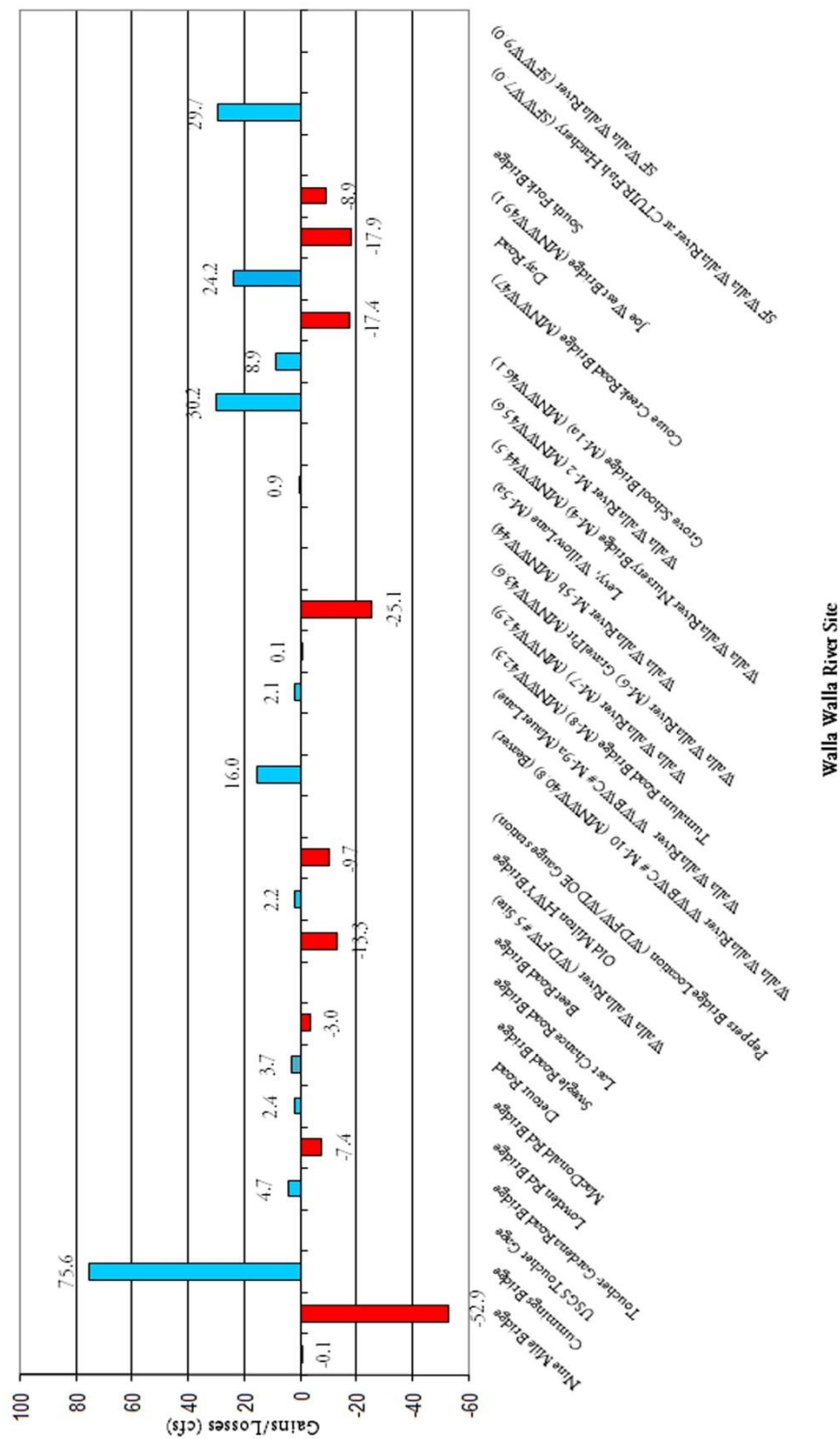
Another reach that appears to show losing tendencies is located on the upper portion of the study area from South Fork River Mile 9 to the OWRD South Fork Gauge. The area upstream of Milton-Freewater (from Grove School Bridge to Reser Creek) was generally assumed to be a gaining section of the Walla Walla River because of its geomorphology (narrow, deep canyon) and geology (Figure C-2) (relatively shallow alluvium under-laid by the Columbia River Basalts). Water management for this area upstream of Milton-Freewater has historically assumed that water diverted and consequently "lost" through the process of conveyance and/or irrigation would return relatively quickly to the river via groundwater or springs. If in fact this area is consistently losing water, the theory of a connected river-water table may not always hold true. It is also possible that a change in Walla Walla River gradient may make a river appear to loss or gain water which may be the case here.



*Figure C-2. South Fork Walla Walla River*

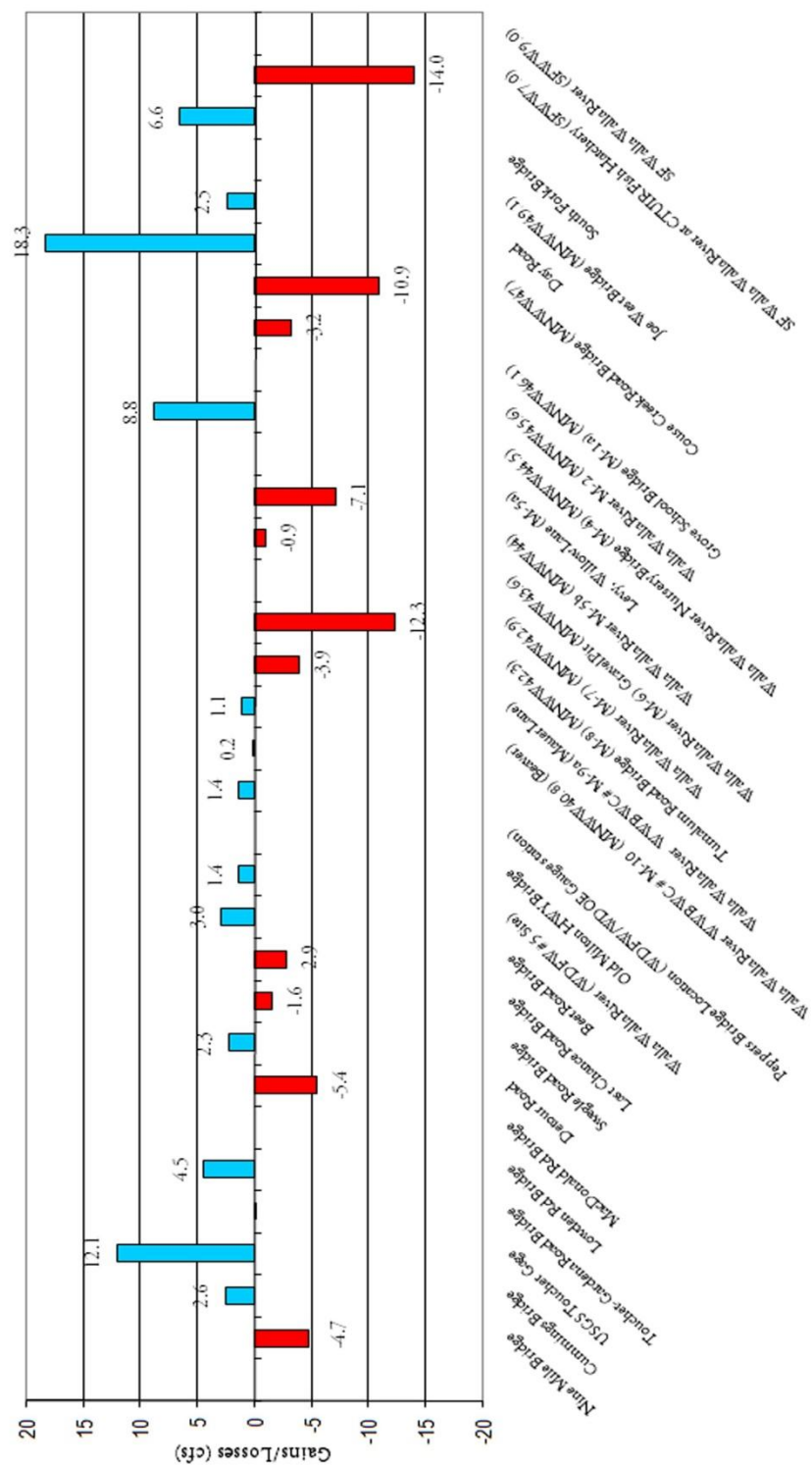
D-1: 2004 June Net Channel Bed Gains/Losses (per reach)

Figure D-1



D-2: 2004 August Net Channel Bed Gains/Losses (per reach)

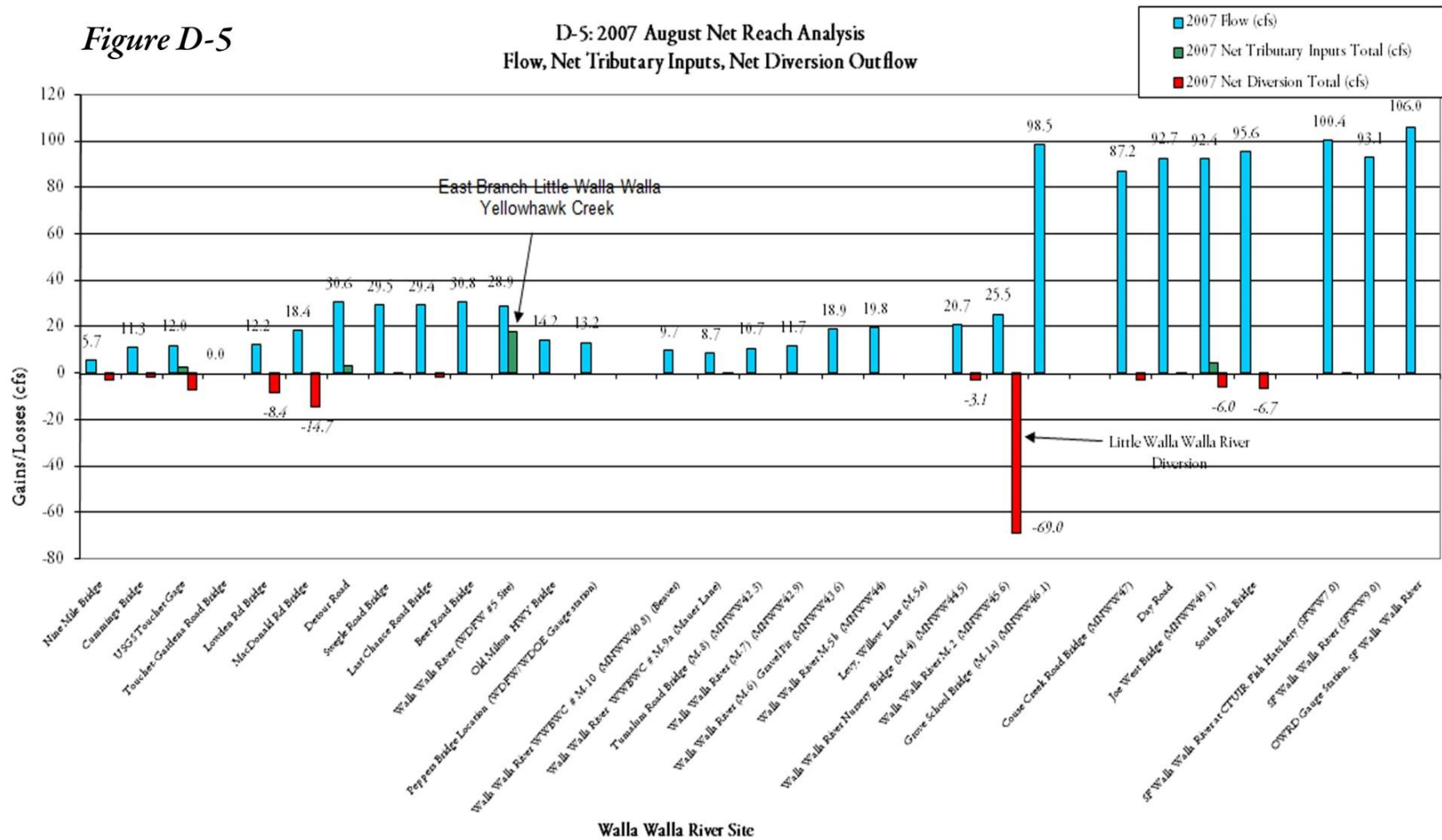
Figure D-2



Walla Walla River Site

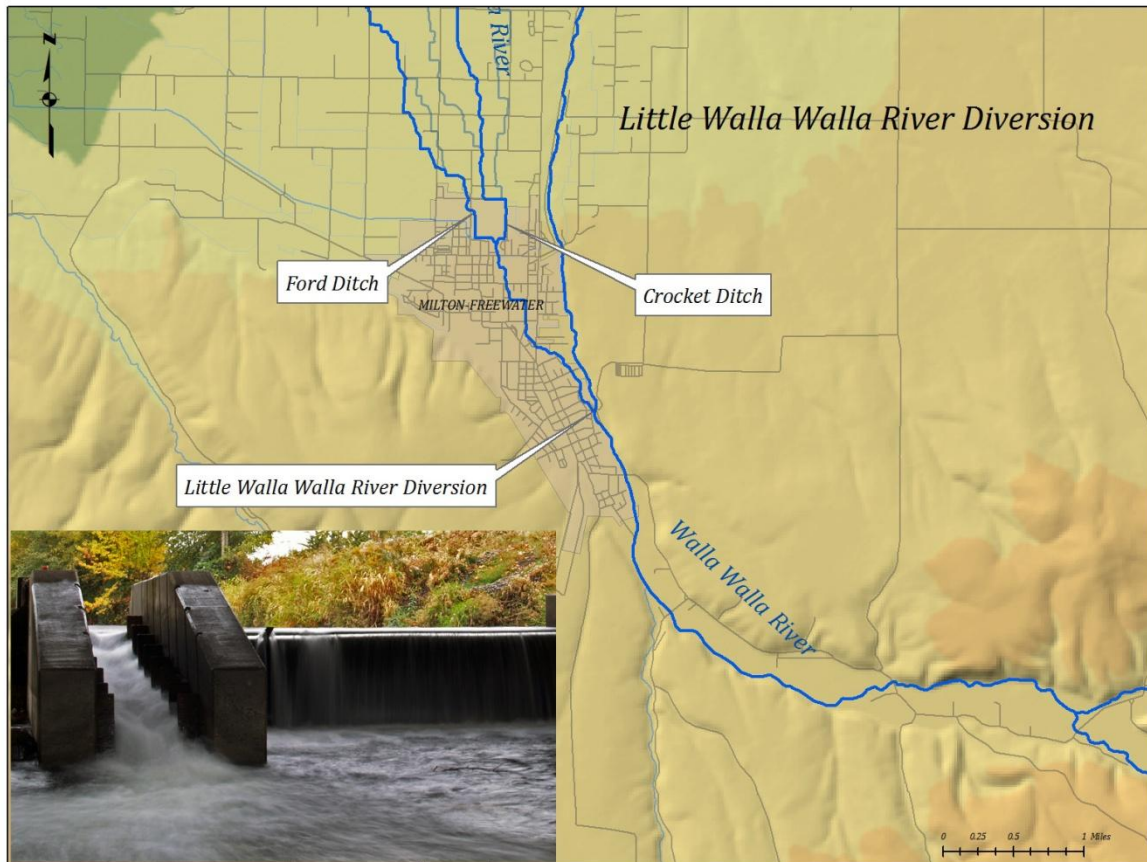


Another useful product from this analysis is the net tributary and diversion values associated with each reach of the river. This provides a useful visual tool to assess, relative to instream flow values, the location and magnitude of mainstem flow contributions and withdrawals. (Figure D-5)



In the Oregon portion of the basin, two upriver sites and the Little Walla Walla diversion are the sites most visually apparent diversions.

The Little Walla Walla River diversion is in the proximity of where the Walla Walla River historically braided into multiple channels consisting primarily of three main distributaries. (Figure D-6) The Tum-a-lum Branch (now called the mainstem), the East Little Walla Walla River (now named Crockett Ditch and East Prong of the Little Walla Walla River) and the West Little Walla Walla River (now named the Ford Ditches and West Prong of the Little Walla Walla River).



*Figure D-6: Little Walla Walla Diversion*

Other Distributaries to the west such as Mud, Dry, and Pine Creeks were most likely tied into this distributary system. Many of the historical distributaries west of the mainstem (Tum-a-lum Branch), were converted into irrigation conveyance systems for hundreds of farms. Because the Little Walla Walla system is currently used mostly for irrigation purposes, it was treated as a diversion for purposes of analysis for the Walla Walla River. It should be noted also that it is generally believed that water lost in this portion of the basin can return to the mainstem Walla Walla River as groundwater and springs (e.g. Big Spring and East Little Walla Walla River flow, and at certain times of year as West Little Walla Walla River flow).

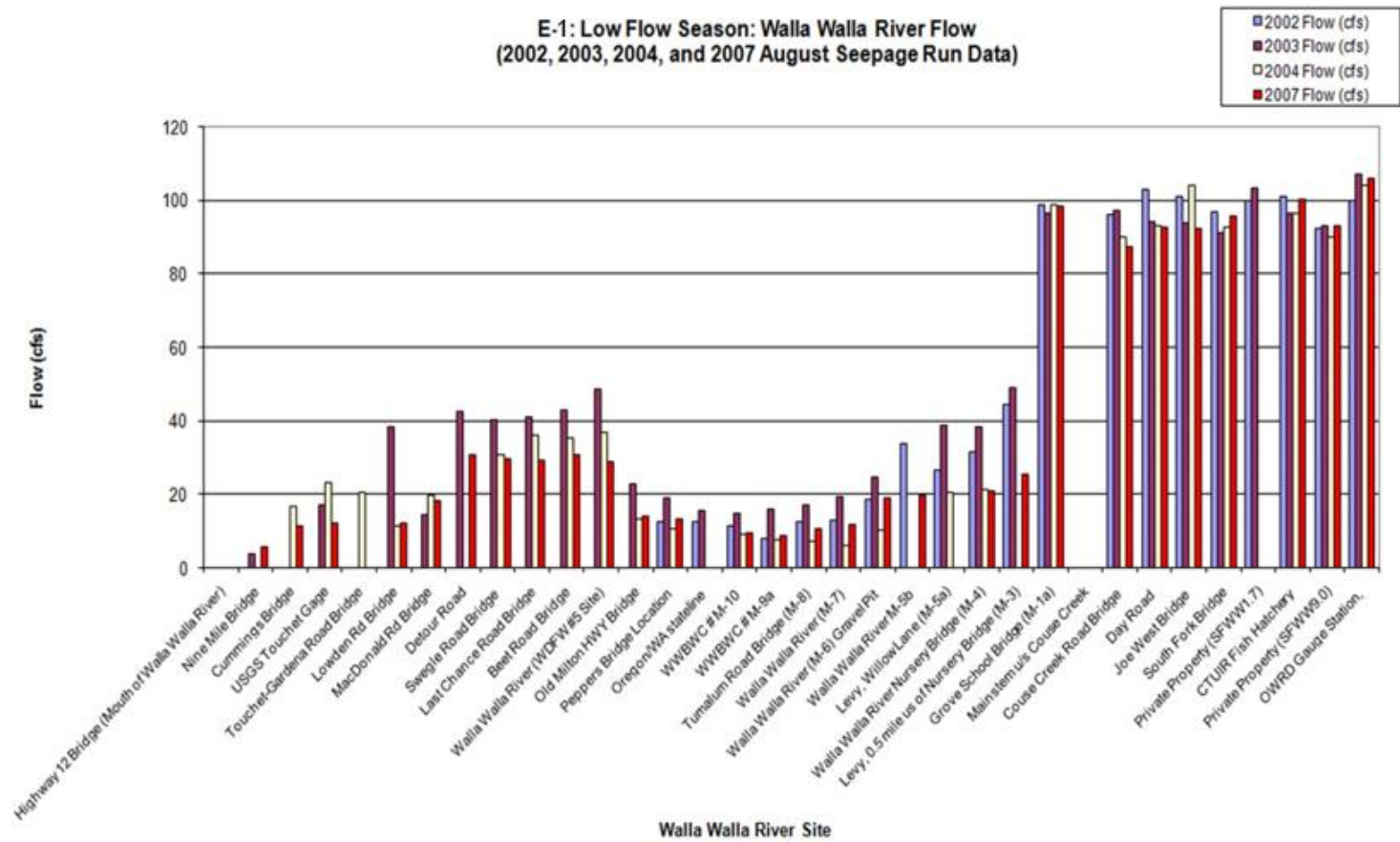
In the Washington section of the river (Pepper Bridge to the confluence with the Columbia) major tributary contributions from both the East Branch (Prong)<sup>6</sup> of the Little Walla Walla River and Yellowhawk Creek help to approximately double the instream flow volumes (Old Milton Highway Bridge (14.2 cfs) to Walla Walla River (WDFW #5) 28.9 cfs). The major diversions in Washington in August appear to be located in the lower section of the river (From the Touchet-Gardena Road Bridge to MacDonald Road Bridge). Due to the large scale for flow (y-axis) in this graph, the smaller point diversions are difficult, if not impossible, to see. A review of the data (*Attachments A-1 through A-10*) does show numerous diversions along most segments of the river in August seepage runs.

June is truly a transitional month for flow and net channel bed gains and losses. (Figure B-1, page 9) With analysis of the data sets collected, there appear to be reaches that are consistently gaining (Grove School Bridge) or losing (Lower Levee M-7 and M-6). Even though there are reaches that show consistency, there are other locations that can demonstrate both gaining and losing net channel flow (Day Road, Joe West Bridge). This is most likely due to the highly variable instream flow volumes between each June seepage run. Comparing multiple years of net tributary and diversion flows show that the major sites discussed earlier are consistently influenced by summertime conditions. In order to scale these August analyses relative to instream flow, it is useful to use the instream flow profile for August (Figure E-1). The seepage assessment conducted in August 2004 generally shows the lowest flow volumes when compared to the August data sets, which is counterintuitive to the idea that the 2004 dataset represents a 'wetter' than average year.

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<sup>6</sup> The source of this tributary water is generally thought to be from springs (primarily from the Big Springs branches and East Prong Little Walla Walla area) located in the Little Walla Walla system that convey ground water returns from the channel bed losses in Oregon's Levee section: Tum-A-Lum Bridge to Grove School Bridge.

Figure E-1



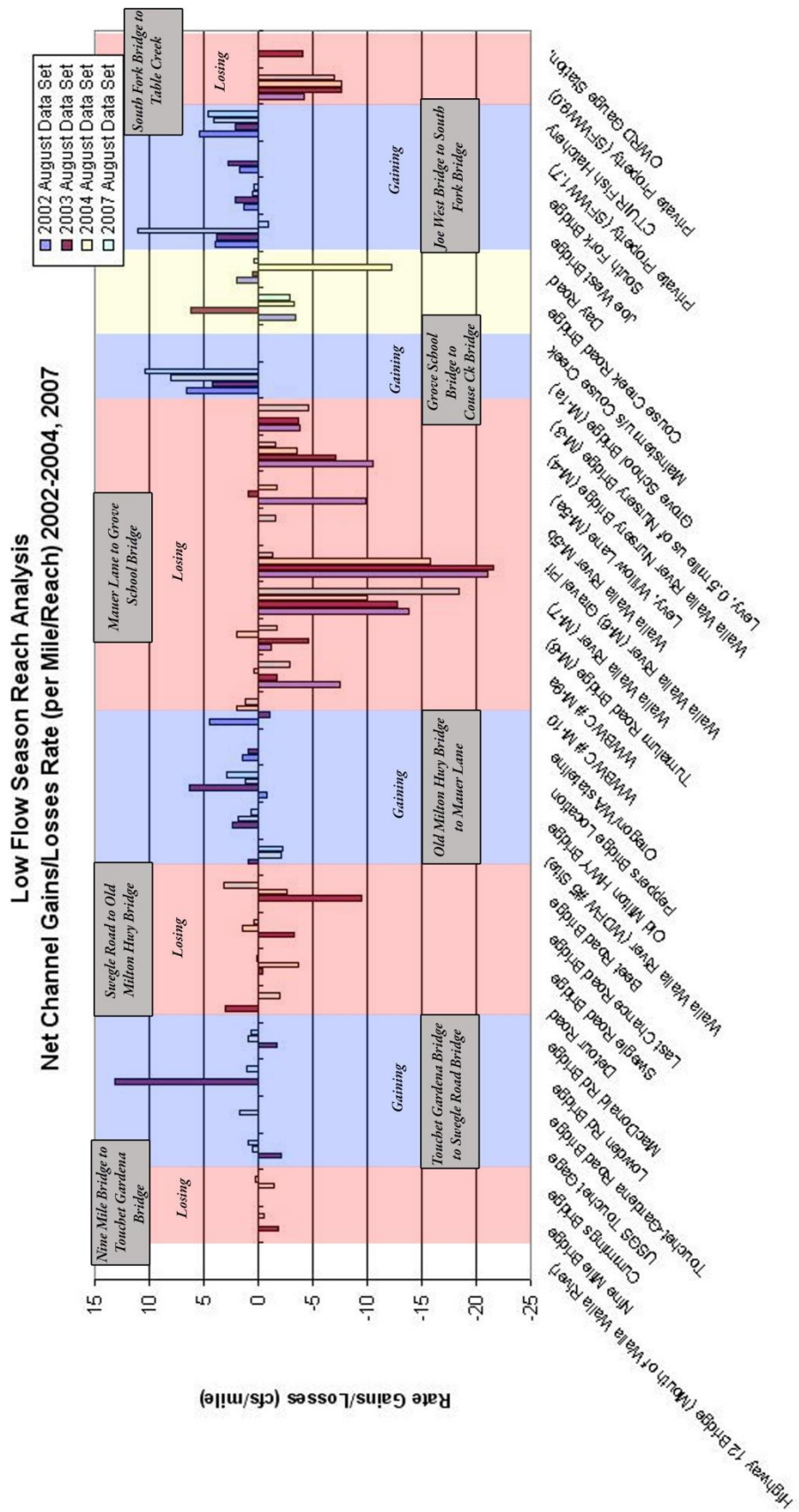
## **Water Budget Analysis and Mapping: Channel Bed Gains and Losses**

The primary purpose of calculating both the rate and total volumes for net channel gains and losses is to better understand which areas of the river may have groundwater inputs (gains) or channel bed infiltration (losses). This type of information is particularly applicable for the numerous other modeling and research efforts currently underway in the Walla Walla River system. For salmon and bull trout recovery research, the collected data provides spatial reference to potential areas for rearing habitat (groundwater gains provided cool water by volume to gaining reaches while losing reach may indicate thermal or flow barriers). Currently the WWBWC and its partners are studying the relationships between the inflow of groundwater into the Walla Walla River, temperature changes, and fish movements. (*WMI, Phase II and Fiber Optic Groundwater and Fisheries Study, WEB Grant #208-8002*) It also provides valuable information with regard to where ground water from the Little Walla Walla River may reemerge in the Walla Walla River mainstem aside from the more obvious surface tributary sources which are directly applicable to the Habitat Conservation Plan and USACE Feasibility study modeling efforts.

The rate of channel bed gains and losses for the August data set (low flow) for all six years of the study is documented in Figure F-1. Generally areas of gaining and losing reaches are done using color blocks (blue: gaining, red: losing, yellow: inconclusive). The one inconclusive reach (Couse Creek Bridge to Joe West Bridge) showed too much variability in the gain and loss rates to categorize.

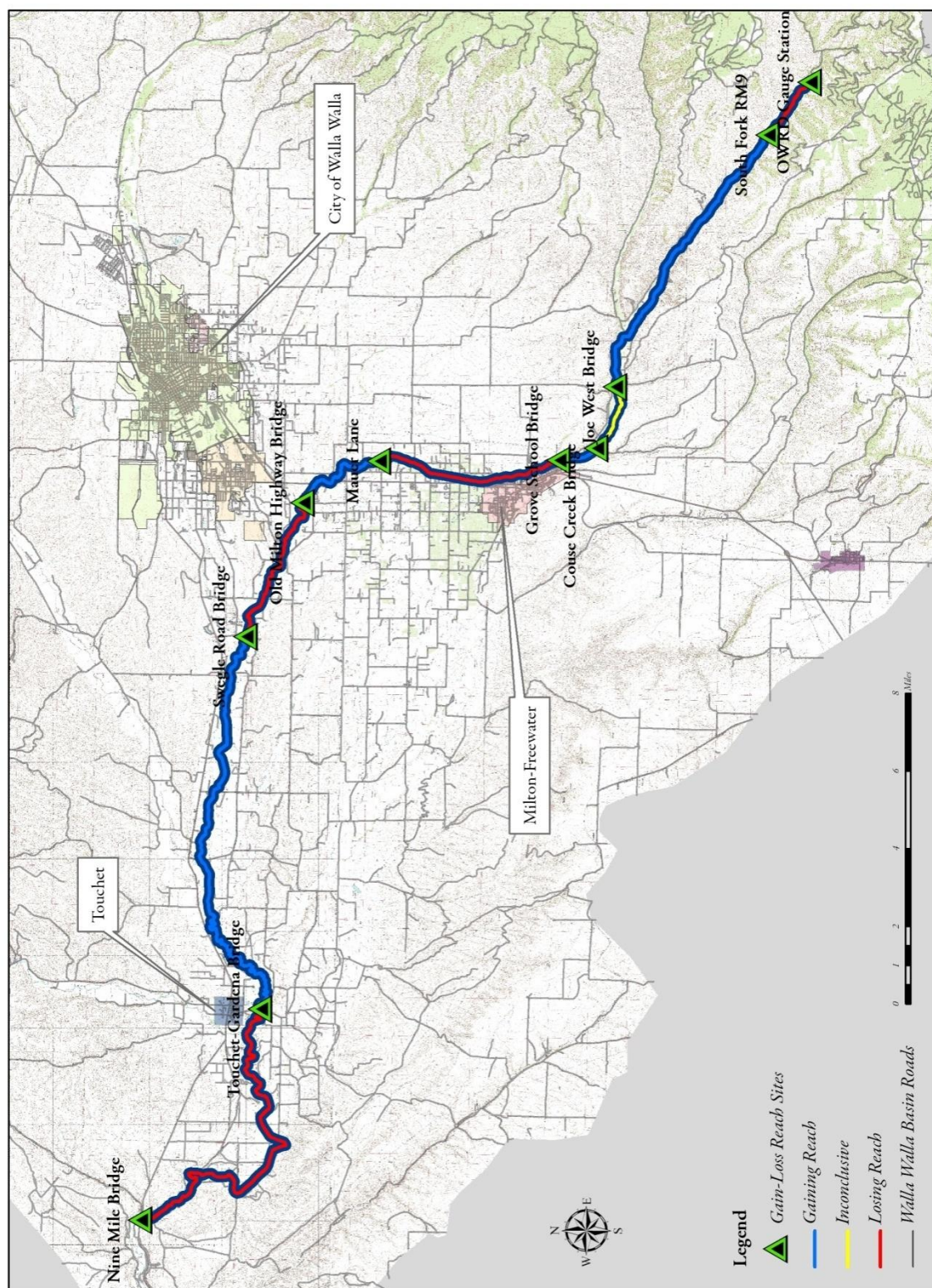
Two other areas of particular interest should be noted from this analysis. The reach from RM 9 to OWRD gauge appears to consistently show a net loss. The other area of interest is the Washington portion of the river is between the Swegle Road and Old Milton Highway Bridges. This area showed relatively high rates of loss in an area that generally was assumed to be a more stable or even a gaining reach (groundwater return from Little Walla Walla and Mill Creek systems). A water budget map depicting the results of this August net gain and loss rate analysis is shared in this report as Figure F-2.

Figure F-1



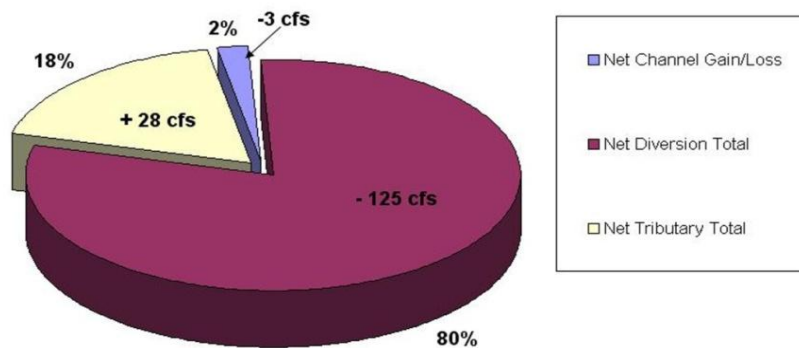
*F-2 Walla Walla River Water Budget Project:  
Channel Gaining/Losing Reaches (2002-2008 Seepage Analysis)*

*Figure F-2*



Utilizing the simple mass balance equation ( $Total\ Volume\ of\ Water\ Budget = Total\ Net\ Gains\ and\ Losses + Total\ Tributary\ Gains + Total\ Diversion\ Losses$ ) and the total of water exchanged in the designated modeled area from the August and October 2007 datasets, and the 2008 July Dataset were further quantified using percent distribution. The percentages of the total volume of water movement in the modeled area relative to distribution are displayed in *Figures G-1 and G-2*. August 2007 results show that Walla Walla River flows from the OWRD gauge on the upper South Fork to Nine Mile Bridge decline from 106 cfs to 5.7 cfs. Diversions (80%, 125 cfs), in this low flow season, make up the majority of the water budget while the tributary inputs (18%, 28 cfs) and groundwater returns are much less significant.

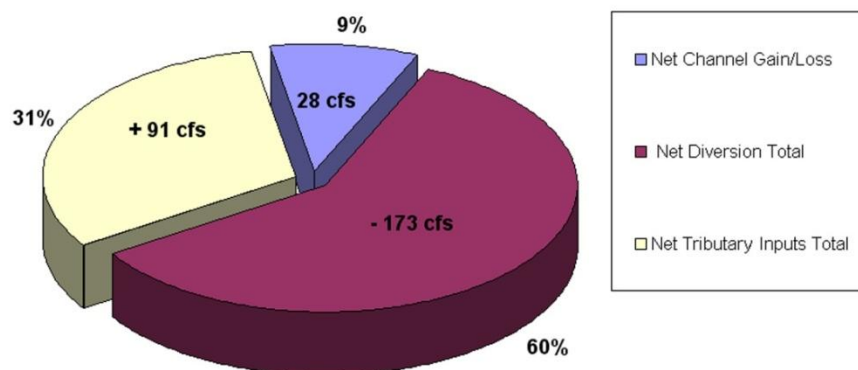
**August 2007 Walla Walla River Water Budget**



**Figure G-1**

In October there is an increase in tributary inputs (31%, 91cfs) and a relative increase in groundwater returns (9%, 28 cfs) which combine to make up 40% of the total budget. However, the net diversion total of 173 cfs is greater than in August of 2007 and the diverted water percentage of the budget is a mere 60% (20% less than August totals) (FigureG-2). The October percentages most likely show the return of seasonal rains and the decrease in diversion is due to drops in consumptive use, which shifts the Walla Walla River water budget.

**October 2007 Walla Walla River Water Budget**



**Figure G-2**

## Mill Creek Seepage Assessment

The seepage assessments on Mill Creek were conducted in the fall of 2008 and the spring of 2009. The WWBWC followed the same procedures discussed in the methodology section. The assessment area begins upstream of the USGS Realtime Gauge Station at the Oregon/Washington Stateline and continues downstream to the confluence with the Walla Walla River (Figure. Mill-1). Ten reaches were defined based upon access, proximity to the next reach, and the geomorphology of the system. The thalweg was digitized using ArcView 9.2 and the digitized layer was transformed into a linear route to allow for the ability to break the feature into 25-meter segments. From the

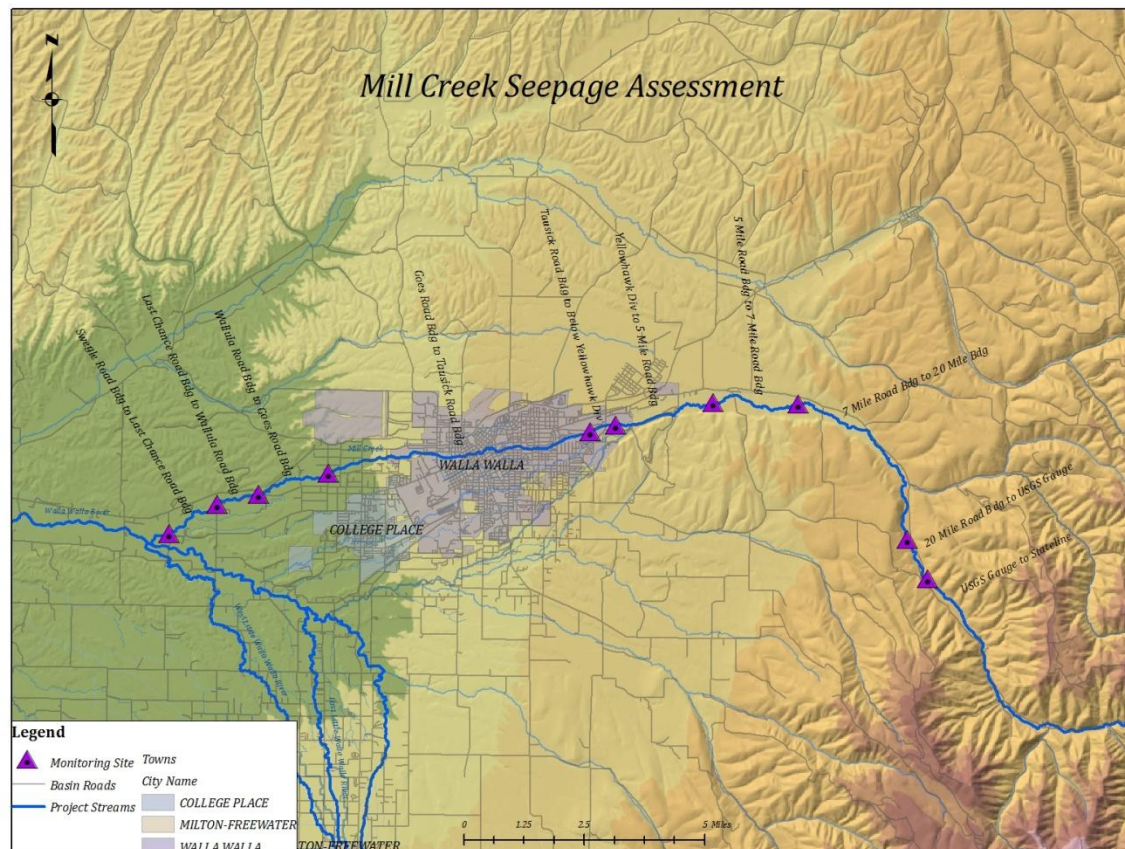


Figure Mill-1. October 2008 Seepage Assessment Net Gains and Losses and Rate of Gains and Losses per mile

initial results, Mill Creek loses water as it enters the concrete section, possibly from the weirs located downstream from the USGS gauge site which slow the water as it enters into the concrete section. The concrete section continues through the town of Walla Walla then exits back into a natural channel just downstream of Gose Street Bridge. After Mill Creek flows out of the concrete section there is a noticeable increase in flow from possible return of recharge above the concrete section (Fig. Mill-2 and 3).

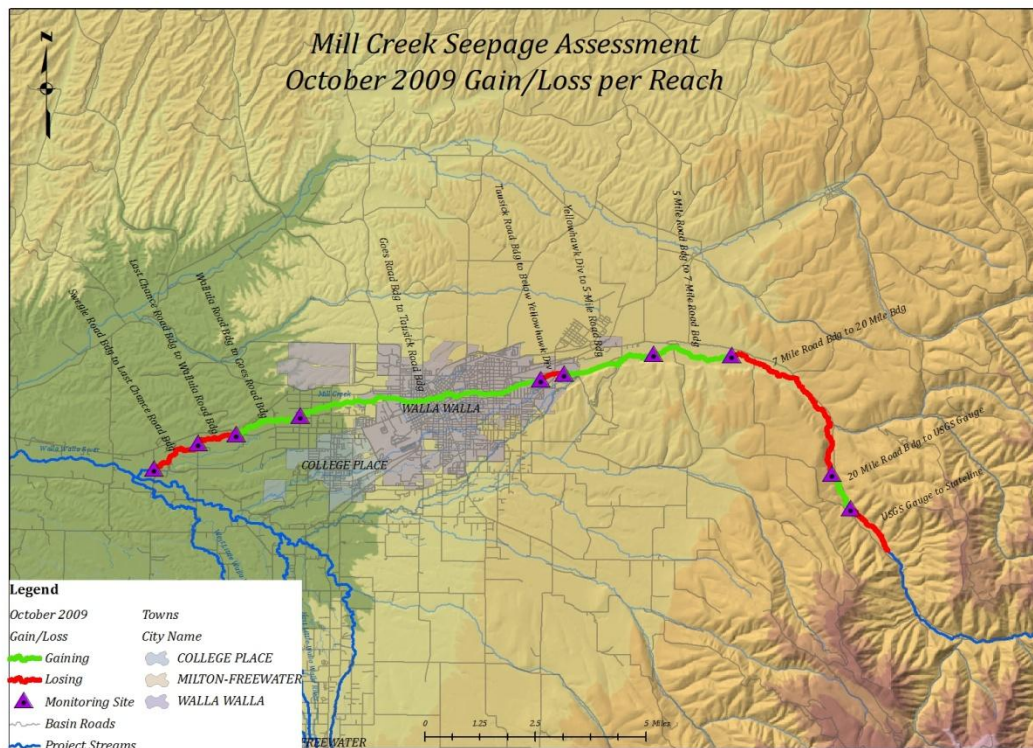


Figure Mill-2: October 2008 Mill Creek Seepage Assessment depicting the gaining and losing reaches within the assessment area

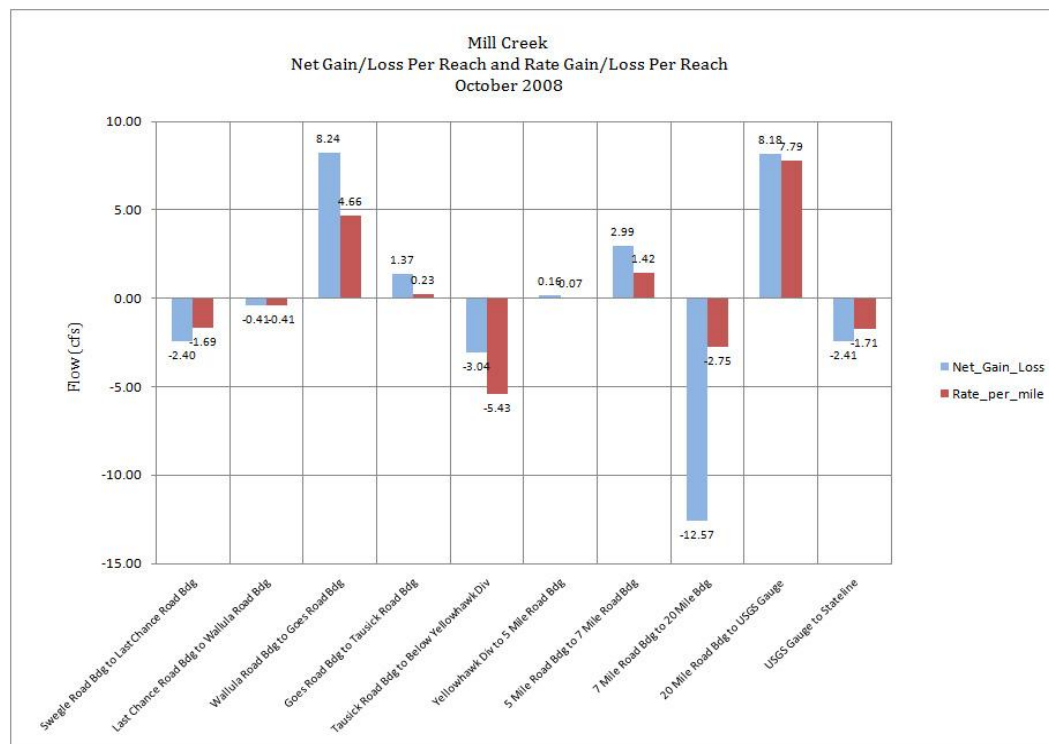


Figure Mill-3: October 2008 Seepage Assessment Net Gains and Losses and Rate of Gains and Losses per mile

The spring/early summer seepage assessment on Mill creek was completed in June of 2009. The same sites were measured and similar results to the October 2008 assessment were noticed with one exception. (Fig, Mill-4 and 5)

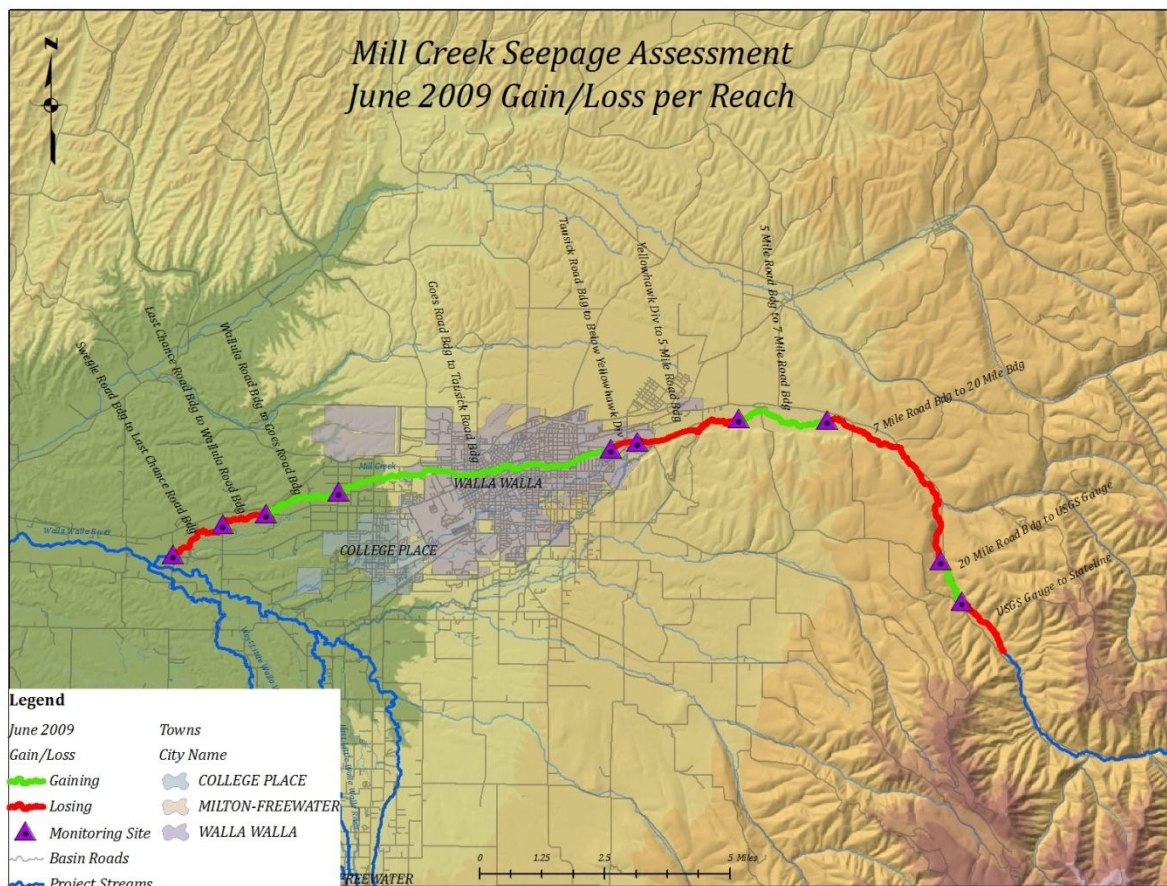
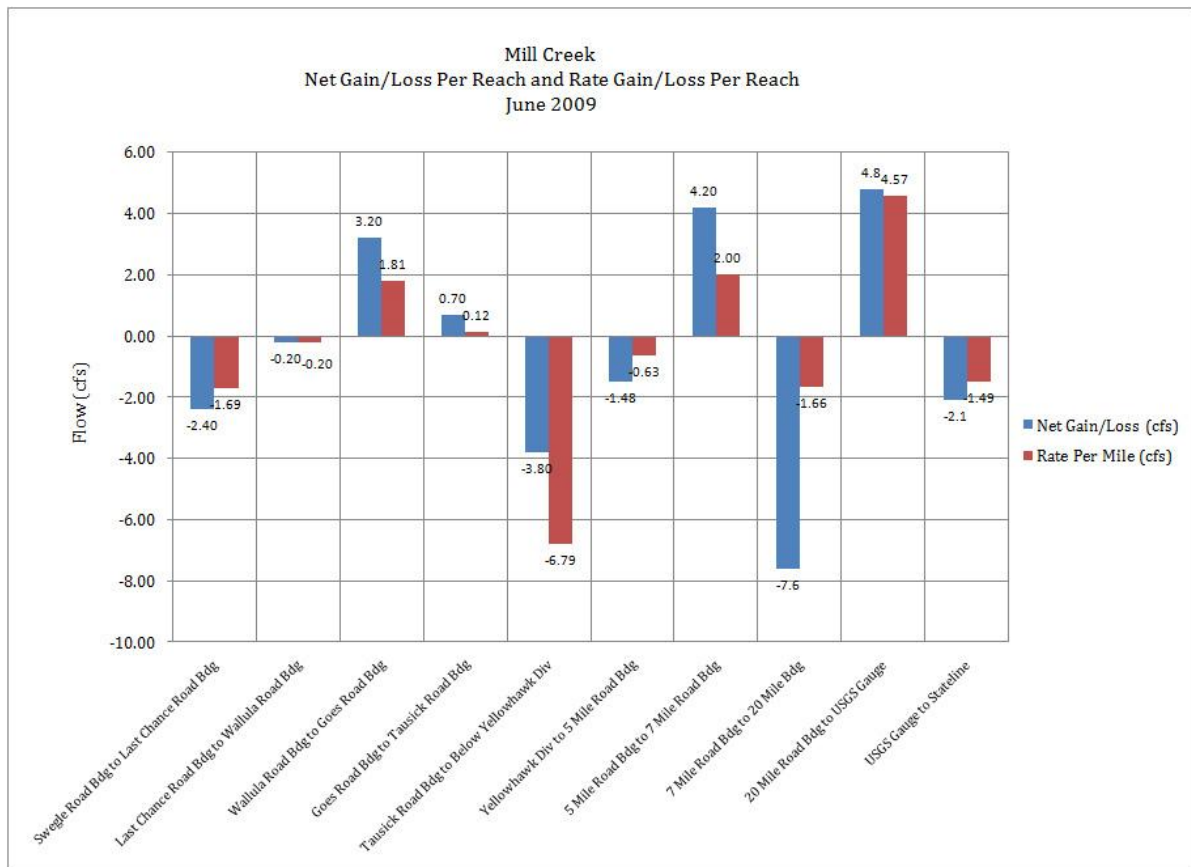


Figure Mill-4: June 2009 Mill Creek Gains / Losses per Reach

The Yellowhawk Diversion to Five Mile Road Bridge reach that was a gaining reach in October of 2008 was classified as a losing reach from the data collected from the June 2009 assessment.



*Figure Mill-5 June 2009 Net Gains and losses and Rate of Gains and Losses per mile*

The datasheets for the two Mill Creek seepage assessments can be found in Attachment B-6.

# Touchet River Seepage Assessment

The Touchet River is the largest tributary of the Walla Walla River in southeastern Washington. The river drains an area of approximately 740 square miles and is approximately 66 miles in length from the North and South Fork Touchet River confluence to the Walla Walla River.

The seepage assessments on the Touchet River were conducted in the spring/early summer of 2009 and the late summer of 2009. The WWBWC followed the same procedures discussed in the methodology section. The assessment area begins along the Dayton Levee just downstream of the North and South Forks of the Touchet River downstream to the Walla Walla River close to the town of Touchet. Twelve reaches were defined (Figure Tou-1) based upon access, proximity to the next reach, and the geomorphology of the system. The thalweg was digitized using ArcView 9.2 then the digitized layer was transformed into a linear route to allow for the ability to break the feature into uniform segments.

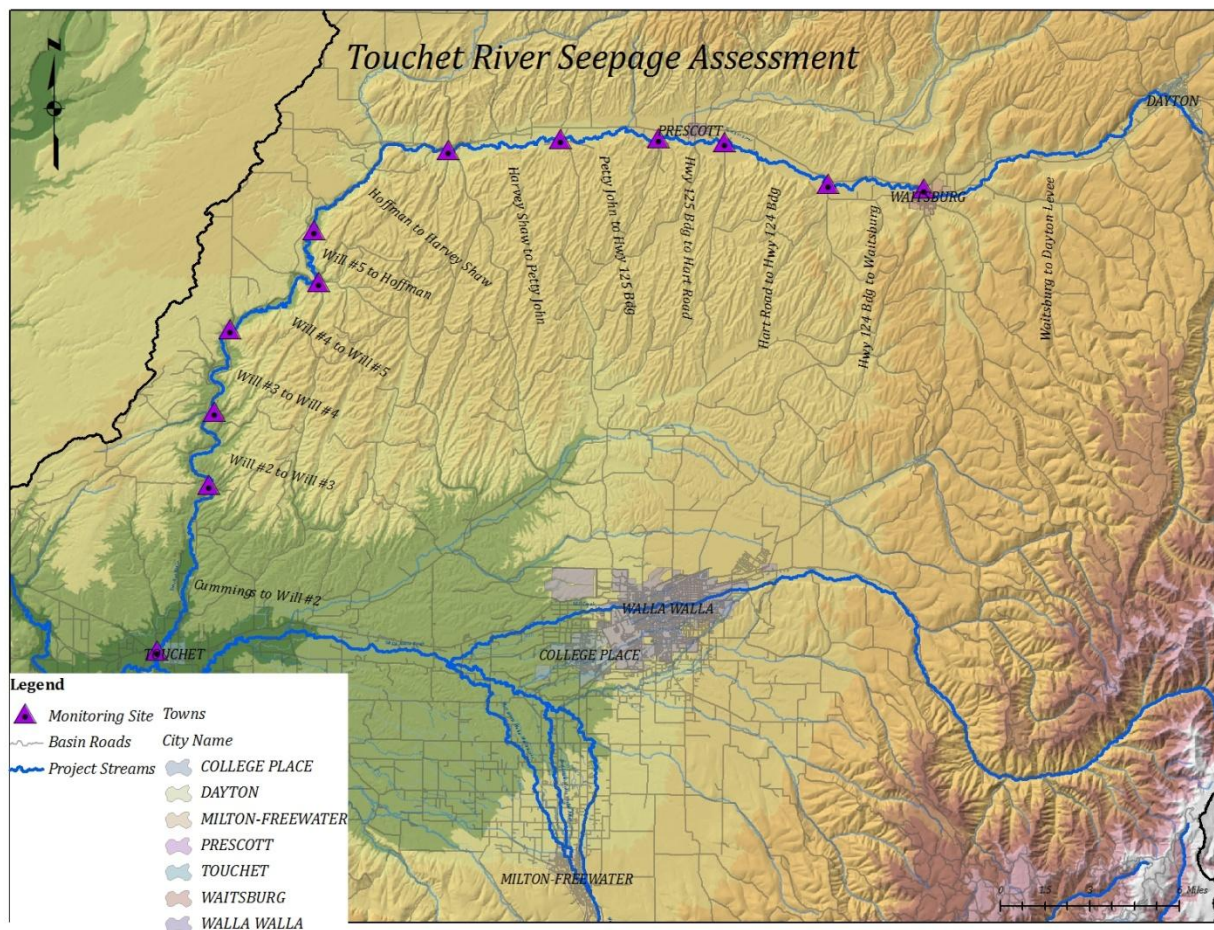


Figure Tou- 1: Touchet River Seepage Assessment Sampling Locations and Reaches

The first seepage assessment was conducted in June of 2009. From the initial assessment six reaches were defined as gaining while six reaches were defined as losing. Four of the gaining reaches were located in the “lower” part of the river downstream of Hoffman Road sampling site. (Figure. Tou-2 and 3)

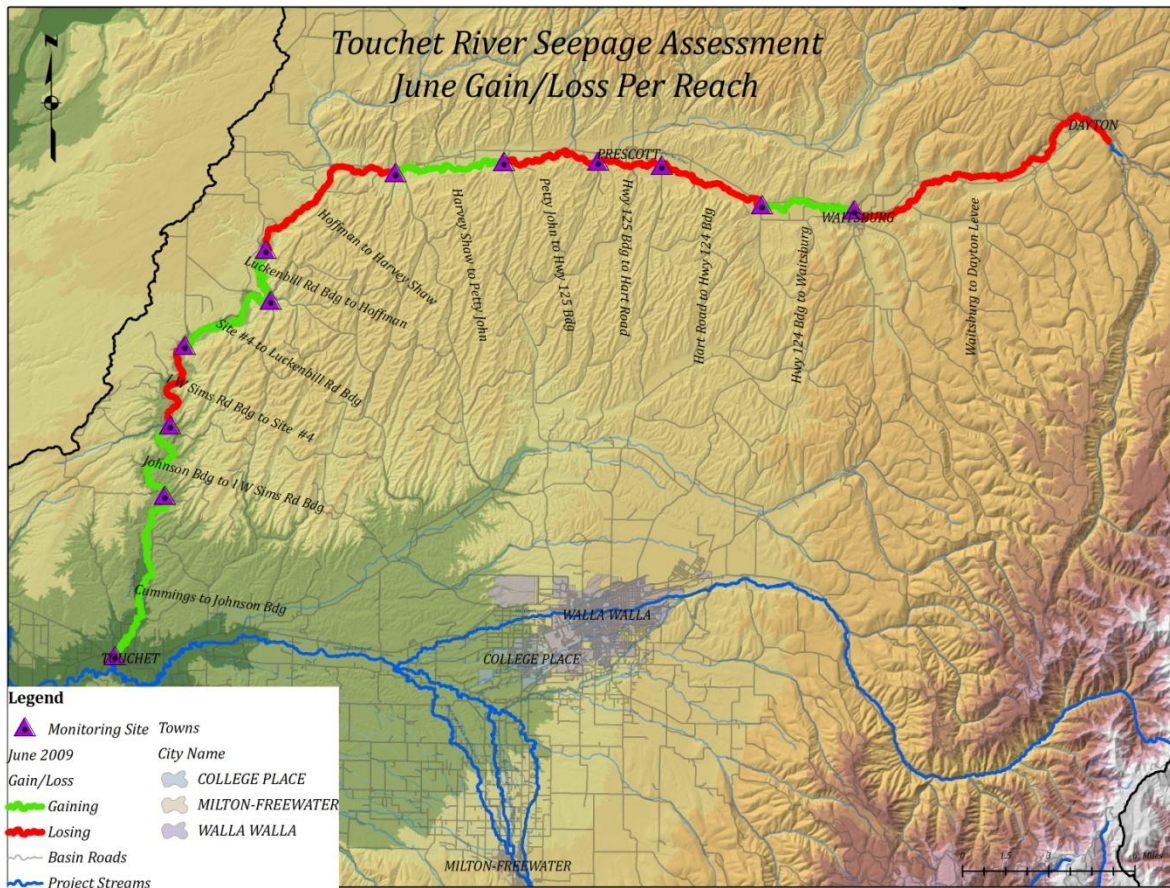
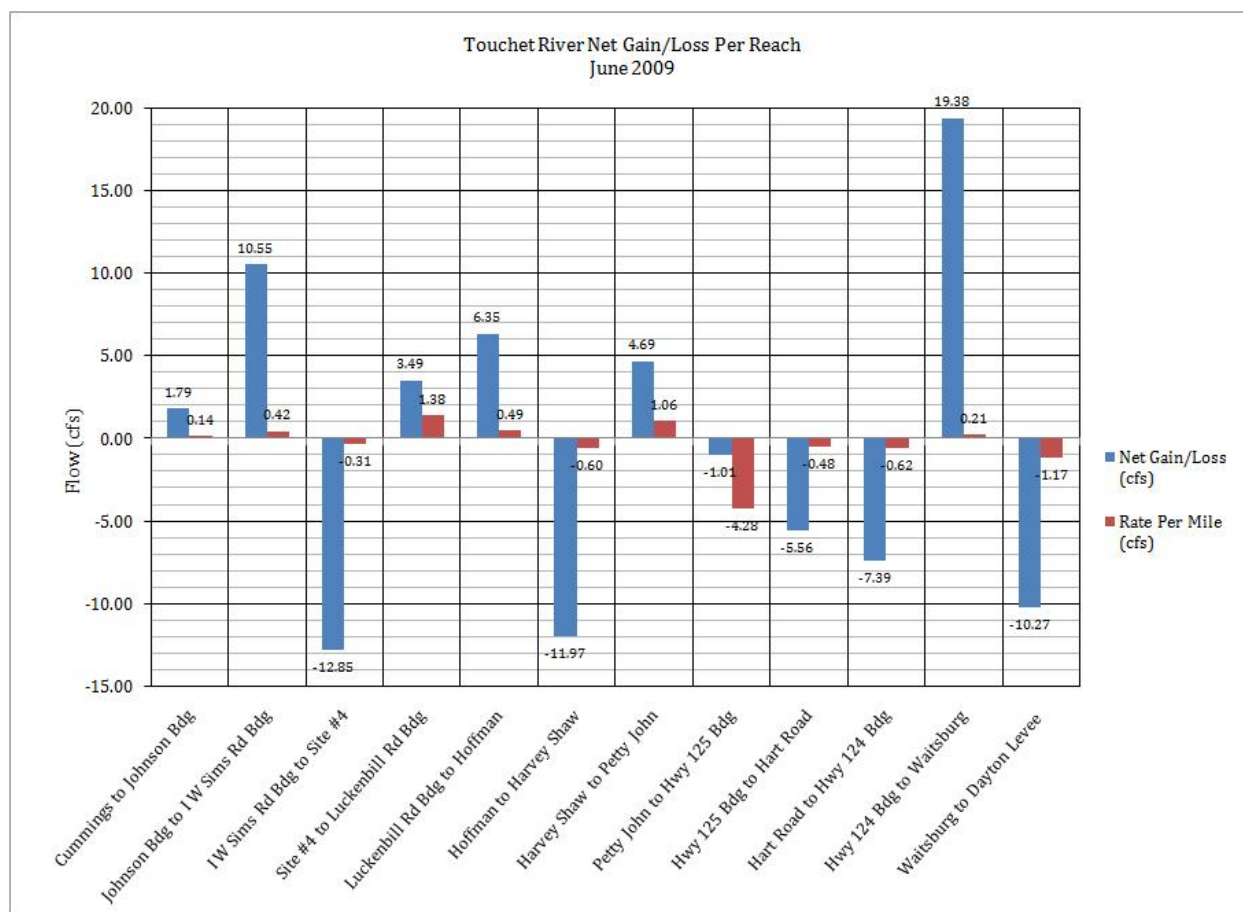


Figure Tou- 2: Touchet River Seepage Assessment June 2009 Gains and Losses per Reach



Hoffman Road Sampling Site June 2009



*Figure Tou- 3: June 2009 Net Gains and Losses per Reach and Rate of Gains and Losses per Mile*

The second seepage assessment on the Touchet River was conducted in September of 2009. Ten reaches along the same section of the Touchet River that was examined in June were assessed in the September assessment. Two of the sites measured in June were dropped from the September assessment. In the late summer assessment three of the ten reaches were identified as gaining reaches while seven were identified as losing reaches. (Fig Tou-4 and 5) From this initial assessment of the Touchet River it appears that the spring freshet influences the influx of groundwater into the Touchet River system.

The datasheets for the two Touchet River seepage assessments can be found in Attachment B-7.

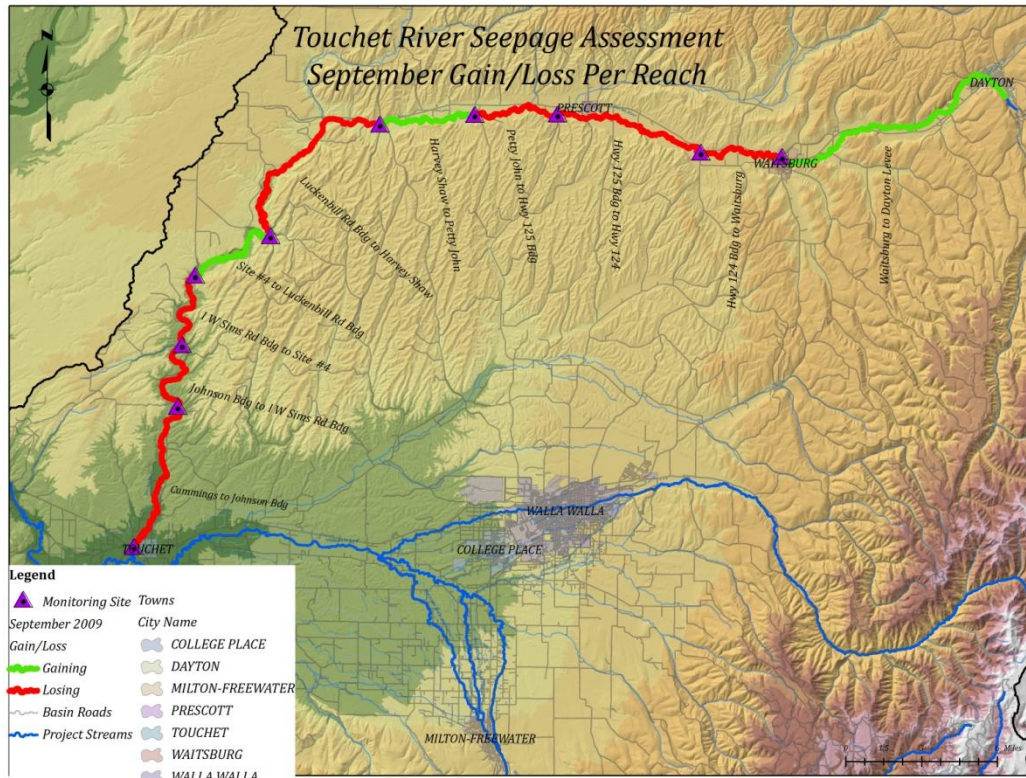


Figure Tou- 4: Touchet River Seepage Assessment September 2009 Gains and Losses per Reach

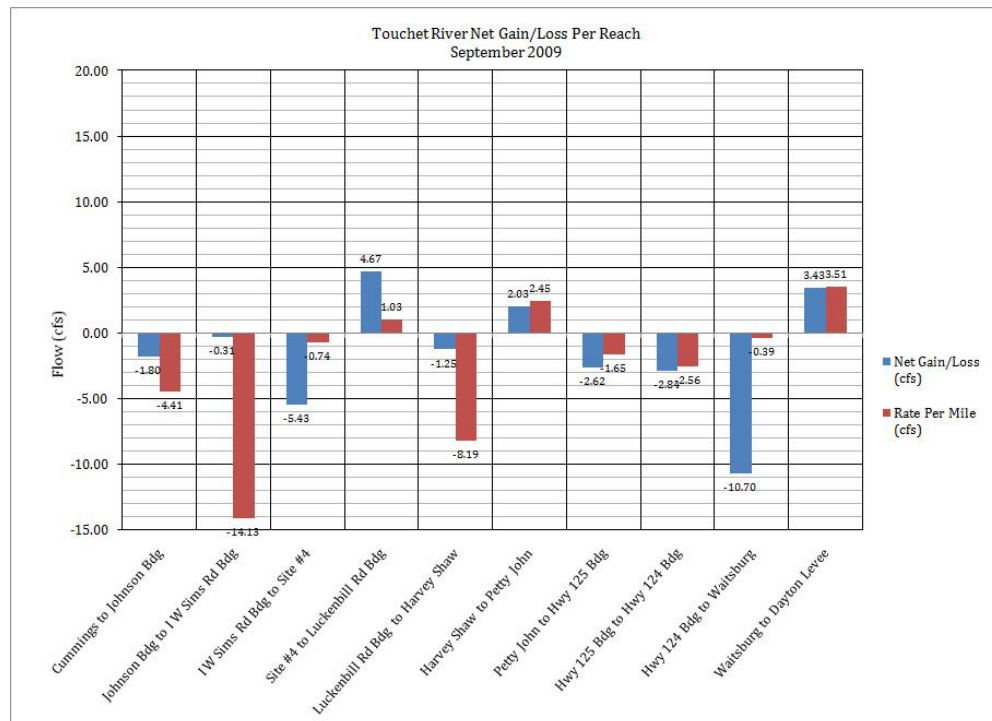


Figure Tou- 5: September 2009 Net Gains and Losses per Reach and Rate of Gains and Losses per Mile

## East and West Little Walla Walla River Seepage Assessments

The Little Walla Walla River begins at the Little Walla Walla River Diversion located on the Walla Walla River in the town of Milton-Freewater, Oregon. The Little Walla Walla River flows through a managed ditch/canal for 1.5 miles to the “Frog” Diversion where it splits into three ditches/canals. The western most ditch (White Ditch) flows out to the Hudson Bay District Irrigation Canal users. The center ditch/canal (Ford Ditch) supplies water to irrigators of the Walla Walla River Irrigation District (WWRID) and the remaining “tail” water flows into the West Little Walla Walla River which begins at the “Arc of springs”. The eastern most ditch/canal at the “Frog” Diversion is the Crockett ditch/canal. This ditch supplies water to irrigators of the WWRID with the remaining “tail” water flowing out of the district into the East Little Walla Walla River at the “Arc of springs”.

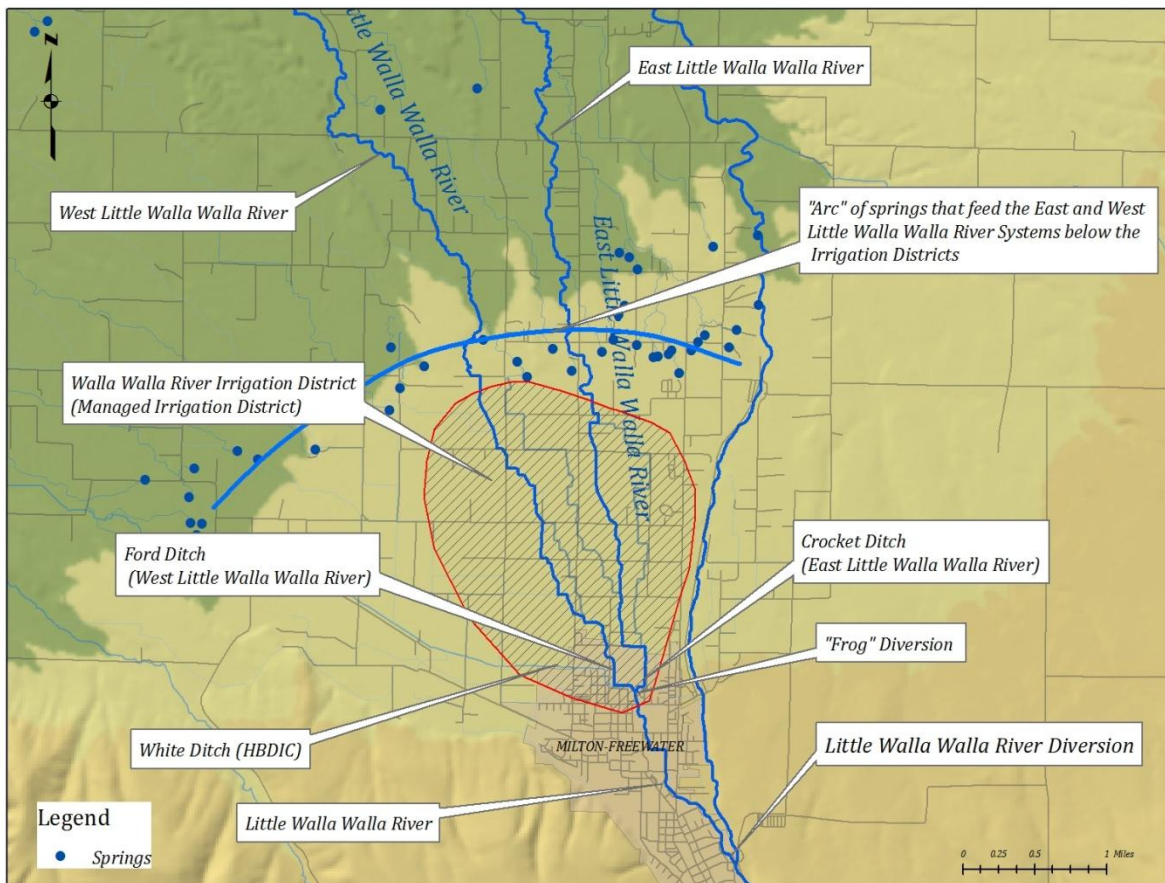


Figure LWW- 1: East and West Little Walla Walla River Systems

The seepage assessments on the East and West Little Walla Walla Rivers were conducted in the spring of 2009 and the late summer of 2009. The WWBWC followed the same procedures discussed in the methodology section. In March of 2009 the WWBWC, agency partners, and volunteers conducted seepage assessments below the “Arc of springs” below the Walla Walla River Irrigation District on both the East and the West Little Walla Walla Rivers and the assessments continued downstream to the Walla Walla River.

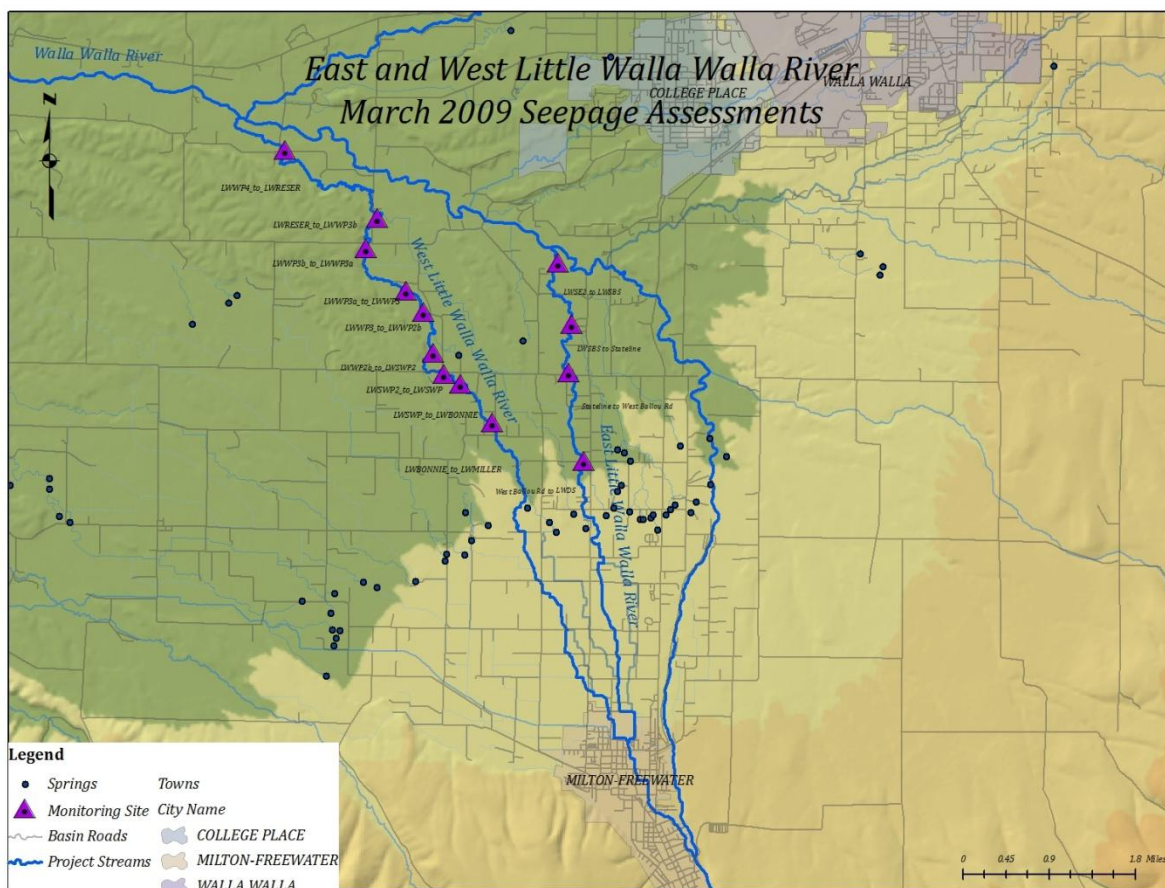
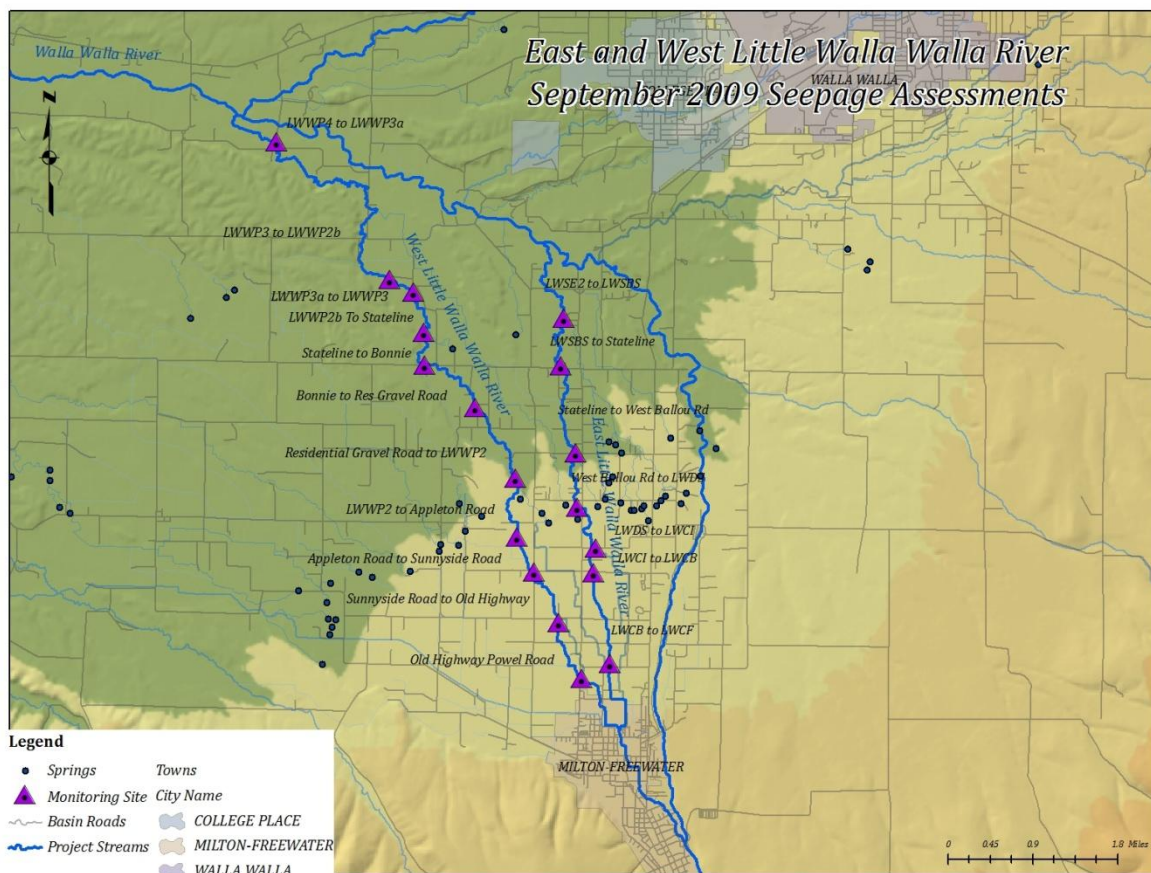
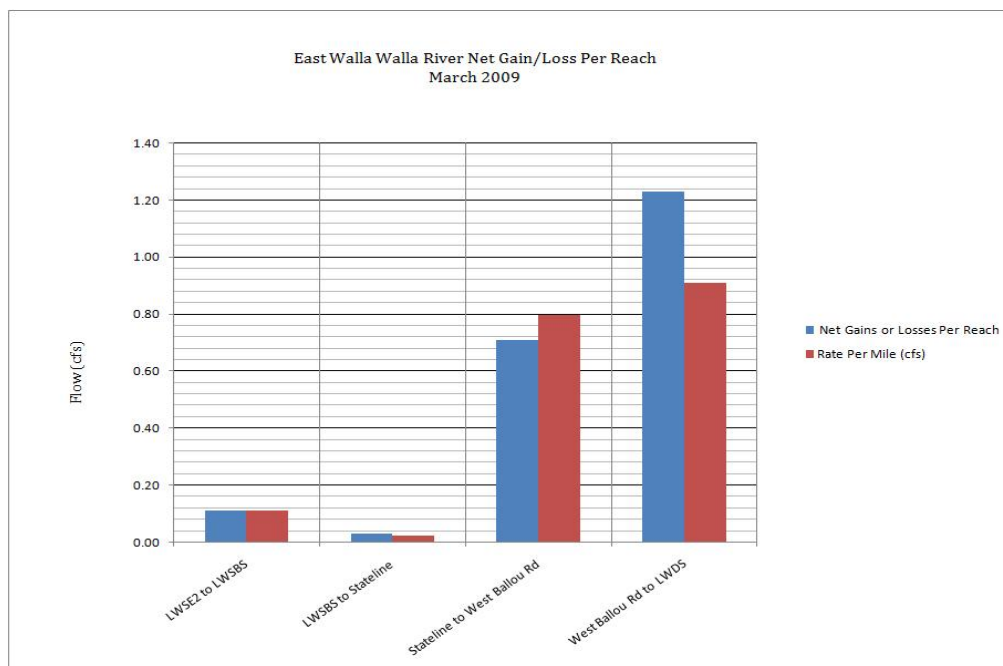


Figure LWW- 2: March 2009 Seepage Assessment Monitoring Locations (Attachment C-1 Sampling location index)

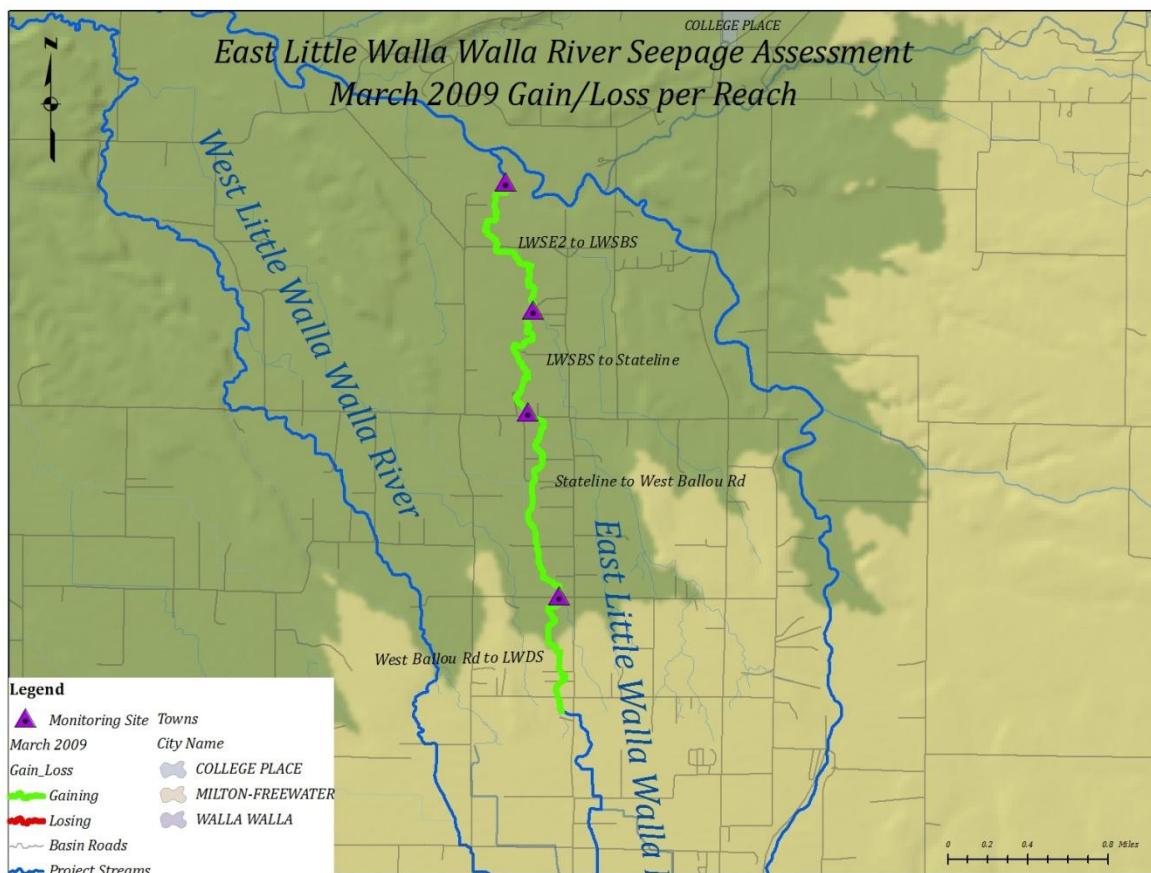
The late summer assessments covered the same reaches as the spring assessments but also included the reaches inside the irrigation district. The thalweg of both systems were digitized using ArcView 9.2 then the digitized layers were transformed into linear routes to allow for the ability to break the features into uniform segments.



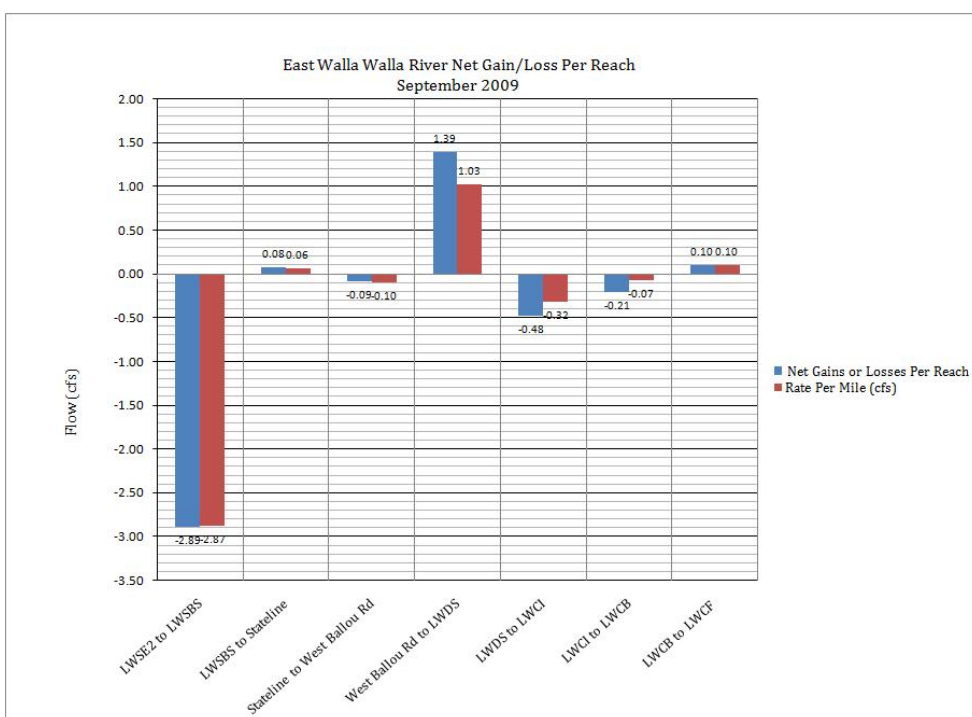
LWW- 3: September 2009 Seepage Assessment Monitoring Locations



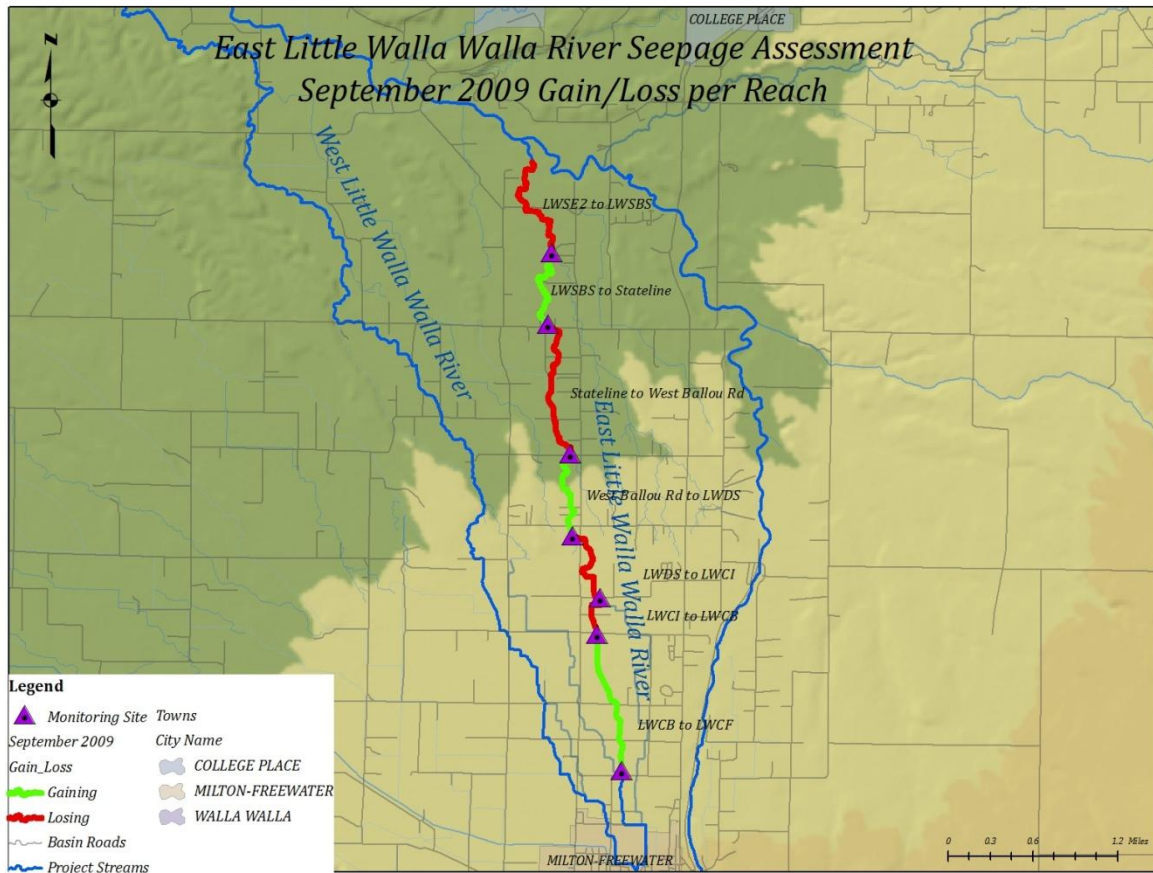
LWW-4: March 2009 East Little Walla Walla River Gains and Losses per Reach and Rate of Gain and Loss per Mile



LWW- 5: East Little Walla Walla River Seepage Assessment March 2009 Gains and Losses per Reach

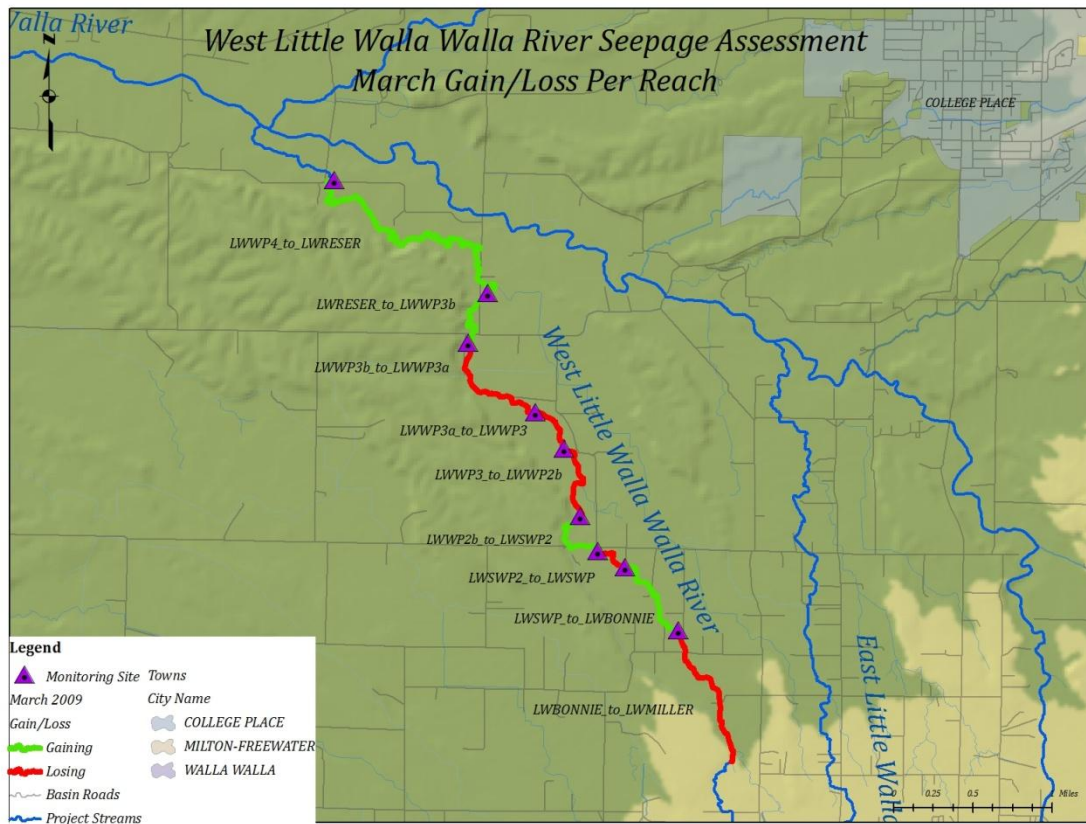


LWW- 6: September 2009 East Little Walla Walla River Gains and Losses per Reach and Rate of Gain and Loss per Mile

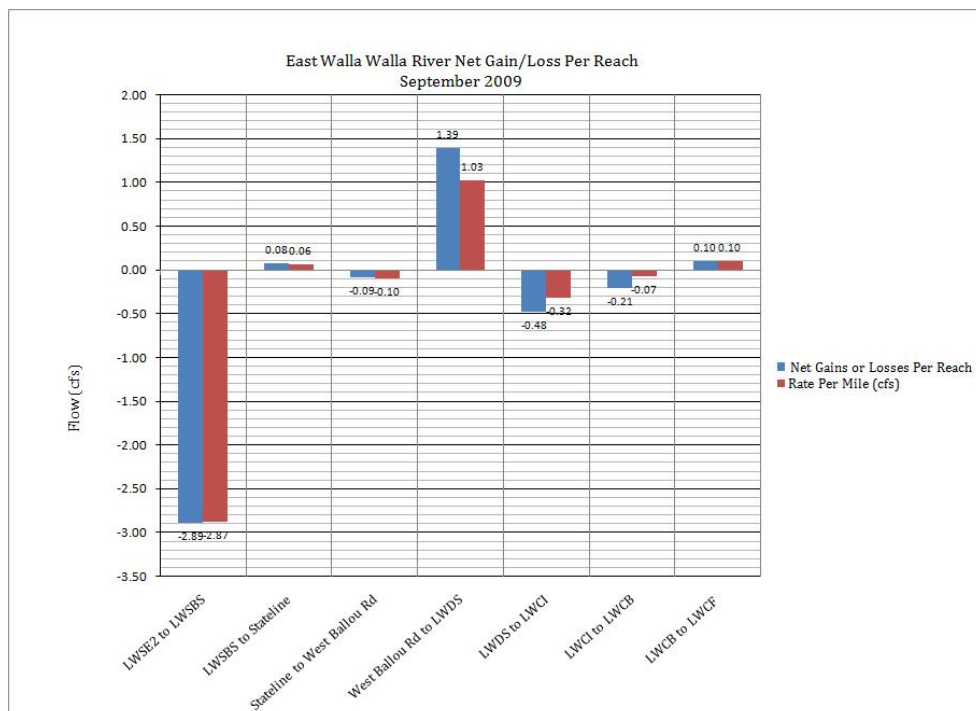


LWW- 7: East Little Walla Walla River Seepage Assessment March 2009 Gains and Losses per Reach

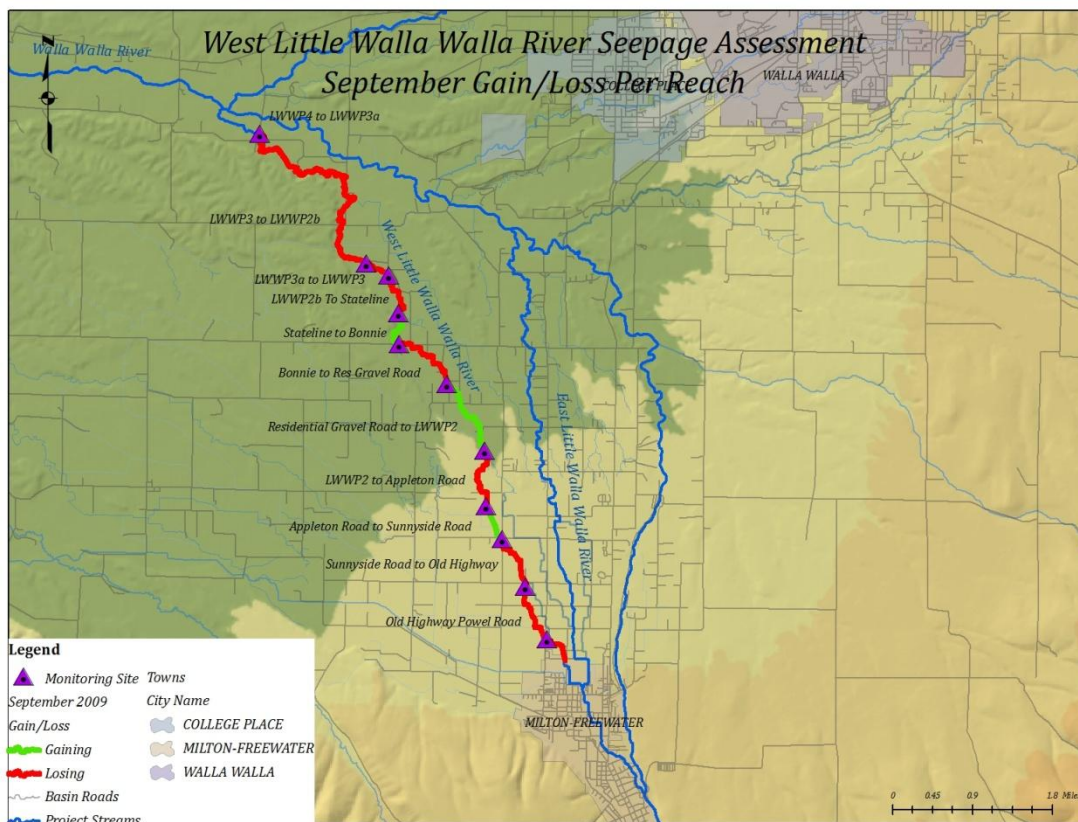
The datasheets for the two East and West Little Walla Walla River seepage assessments can be found in Attachments B-8 and 9



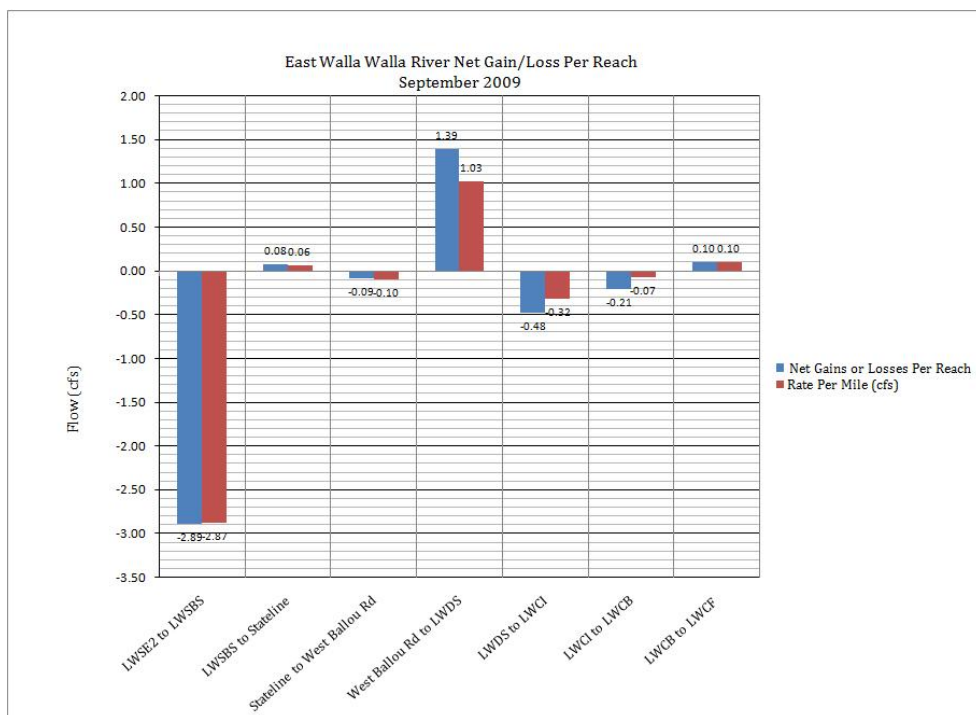
LWW- 8: West Little Walla Walla River Seepage Assessment March 2009 Gains and Losses per Reach



LWW- 9: March 2009 West Little Walla Walla River Gains and Losses per Reach and Rate of Gain and Loss per Mile



LWW- 10: West Little Walla Walla River Seepage Assessment September 2009 Gains and Losses per Reach



LWW- 11: September 2009 West Little Walla Walla River Gains and Losses per Reach and Rate of Gain and Loss per Mile

## Summary:

The water budget analysis and data sets discussed in this report provide water managers and researchers in the Walla Walla basin a more refined tool by which to look at seasonal and spatial flow distribution in the Walla Walla River, Touchet River, Mill Creek, and the East and West Little Walla Walla River systems. While these values represent 'snap shots' in time, the information can be coupled with the numerous continuous gauges sites to help piece together the transient nature of each of the flow systems. Rates of net gains and losses provide an estimate of the magnitude of channel bed flux relative to three important irrigation related seasons in the Walla Walla basin.

The analysis tends to support the current theories about where each system shows groundwater gains and losses with several exceptions. Areas such as the Walla Walla River in Oregon at the levee segment that have been shown through other studies to be areas of high loss are confirmed using this data collection and analysis approach. With additional basin wide efficiency projects being proposed the data sets collected for the assessed systems will help provide information on how each system may be affected. Further seepage assessments should be conducted to confirm these results with particular focus being spent on areas where analysis was either inconclusive or contradictory to commonly-held theories about each of the assessed systems.

## **Collaborators:**

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# Attachment A

## Attachment A-1

### June 2002 Seepage Data Set

| Flow Measurement Location                             | Actual River Mile | Rate Per Mile | Net Gain/Loss | Gross Gain/Loss Change (Instream) | Net Diversion Total | Net Trib Total | Flow (cfs) |
|-------------------------------------------------------|-------------------|---------------|---------------|-----------------------------------|---------------------|----------------|------------|
| Peppers Bridge Location (WDFW/WDOE Gauge station)     | 41.07             | 15.85         | 19.50         | 19.50                             | 0.00                | 0.00           | 118.00     |
| Walla Walla River WWBWC # M-10 (MNWW40.8)             | 42.30             | 9.20          | 6.90          | 6.90                              | 0.00                | 0.00           | 98.50      |
| Walla Walla River WWBWC # M-9a (Mauer Lane)           | 43.05             | -1.69         | -1.00         | -1.00                             | 0.00                | 0.00           | 91.60      |
| Tumalum Road Bridge (M-8) (MNWW42.3)                  | 43.64             | 0.35          | 0.20          | 0.20                              | 0.00                | 0.00           | 92.60      |
| Walla Walla River (M-7) (MNWW42.9)                    | 44.21             | -31.52        | -35.30        | -35.30                            | 0.00                | 0.00           | 92.40      |
| Walla Walla River M-5b (MNWW44)                       | 45.33             | 14.83         | 8.60          | 15.60                             | 0.00                | 7.00           | 127.70     |
| Walla Walla River Nursery Bridge (M-4) (MNWW44.5)     | 45.91             | -23.29        | -18.40        | -18.40                            | 0.00                | 0.00           | 112.10     |
| Levy, 0.5 mile us of Nursery Bridge (M-3)             | 46.70             | -25.52        | -29.60        | -147.20                           | -117.60             | 0.00           | 130.50     |
| Grove School Bridge (M-1a) (MNWW46.1)                 | 47.86             | 18.26         | 37.80         | 32.20                             | -5.60               | 0.00           | 277.70     |
| Day Road                                              | 49.93             | -33.93        | -30.20        | -30.20                            | 0.00                | 0.00           | 245.50     |
| Joe West Bridge (MNWW49.1)                            | 50.82             | 19.82         | 32.50         | 72.20                             | -2.10               | 41.80          | 275.70     |
| South Fork Bridge                                     | 52.46             | 0.21          | 1.10          | -2.90                             | -4.00               | 0.00           | 203.50     |
| SF Walla Walla River at CTUIR Fish Hatchery (SFWW7.0) | 57.63             | -12.47        | -20.20        | -20.20                            | 0.00                | 0.00           | 206.40     |
| SF Walla Walla River (SFWW9.0)                        | 59.25             | -5.13         | -9.40         | -9.40                             | 0.00                | 0.00           | 226.60     |
| OWRD Gauge Station, SF Walla Walla River              | 61.08             |               |               |                                   |                     |                | 236.00     |

#### Flow data applies to River flow at Location ID

Rate/Net gain-loss/Gross/Net Div and Trib data applies from Location ID to next UPSTREAM site.

| <b>Attachment A-2</b>                                 |                          | <b>August 2002 Seepage Data Set</b> |                      |                                          |                            |                       |                   |
|-------------------------------------------------------|--------------------------|-------------------------------------|----------------------|------------------------------------------|----------------------------|-----------------------|-------------------|
| <b>Flow Measurement Location</b>                      | <b>Actual River Mile</b> | <b>Rate Per Mile</b>                | <b>Net Gain/Loss</b> | <b>Gross Gain/Loss Change (Instream)</b> | <b>Net Diversion Total</b> | <b>Net Trib Total</b> | <b>Flow (cfs)</b> |
| Peppers Bridge Location (WDFW/WDOE Gauge station)     | 41.07                    | -0.82                               | -0.40                | -0.10                                    | 0.00                       | 0.30                  | 12.40             |
| Oregon/WA stateline (WDFW Gauge station 2001-2)       | 41.56                    | 1.49                                | 1.10                 | 1.10                                     | 0.00                       | 0.00                  | 12.50             |
| Walla Walla River WWBWC # M-10 (MNWW40.8)             | 42.30                    | 4.53                                | 3.40                 | 3.40                                     | 0.00                       | 0.00                  | 11.40             |
| Walla Walla River WWBWC # M-9a (Mauer Lane)           | 43.05                    | -7.46                               | -4.40                | -4.40                                    | 0.00                       | 0.00                  | 8.00              |
| Tumalum Road Bridge (M-8) (MNWW42.3)                  | 43.64                    | -1.23                               | -0.70                | -0.70                                    | 0.00                       | 0.00                  | 12.40             |
| Walla Walla River (M-7) (MNWW42.9)                    | 44.21                    | -13.85                              | -5.40                | -5.40                                    | 0.00                       | 0.00                  | 13.10             |
| Walla Walla River (M-6) Gravel Pit (MNWW43.6)         | 44.60                    | -21.10                              | -15.40               | -15.40                                   | 0.00                       | 0.00                  | 18.50             |
| Walla Walla River M-5b (MNWW44)                       | 45.33                    | 0.00                                | 0.00                 | 7.40                                     | 0.00                       | 7.40                  | 33.90             |
| Levy, Willow Lane (M-5a)                              | 45.38                    | -9.81                               | -5.20                | -5.20                                    | 0.00                       | 0.00                  | 26.50             |
| Walla Walla River Nursery Bridge (M-4) (MNWW44.5)     | 45.91                    | -10.51                              | -8.30                | -12.90                                   | -4.60                      | 0.00                  | 31.70             |
| Levy, 0.5 mile us of Nursery Bridge (M-3)             | 46.70                    | -3.88                               | -4.50                | -54.30                                   | -49.80                     | 0.00                  | 44.60             |
| Grove School Bridge (M-1a) (MNWW46.1)                 | 47.86                    | 6.51                                | 7.10                 | 2.90                                     | -4.20                      | 0.00                  | 98.90             |
| Couse Creek Road Bridge (MNWW47)                      | 48.95                    | -3.47                               | -3.40                | -6.80                                    | -3.40                      | 0.00                  | 96.00             |
| Day Road                                              | 49.93                    | 2.02                                | 1.80                 | 1.80                                     | 0.00                       | 0.00                  | 102.80            |
| Joe West Bridge (MNWW49.1)                            | 50.82                    | 3.96                                | 6.50                 | 4.20                                     | -7.80                      | 5.50                  | 101.00            |
| South Fork Bridge                                     | 52.46                    | 1.31                                | 1.80                 | -3.20                                    | -5.00                      | 0.00                  | 96.80             |
| SF Walla Walla River (SFWW1.7)                        | 53.83                    | 1.74                                | 6.60                 | -0.90                                    | -7.50                      | 0.00                  | 100.00            |
| SF Walla Walla River at CTUIR Fish Hatchery (SFWW7.0) | 57.63                    | 5.37                                | 8.70                 | 8.70                                     | 0.00                       | 0.00                  | 100.90            |
| SF Walla Walla River (SFWW9.0)                        | 59.25                    | -4.21                               | -7.70                | -7.80                                    | -0.10                      | 0.00                  | 92.20             |
| OWRD Gauge Station, SF Walla Walla River              | 61.08                    | x                                   | x                    | x                                        | x                          | x                     | 100.00            |

**Flow data applies to River flow at Location ID**

Rate/Net gain-loss/Gross/Net Div and Trib data applies from Location ID to next UPSTREAM site.

### Attachment A-3

#### June 2003 Seepage Data Set

| Flow Measurement Location                             | Actual River Mile | Rate Per Mile | Net Gain/Loss | Gross Gain/Loss Change (Instream) | Net Diversion Total | Net Trib Total | Flow (cfs) |
|-------------------------------------------------------|-------------------|---------------|---------------|-----------------------------------|---------------------|----------------|------------|
| Oregon/WA stateline (WDFW Gauge station 2001-2)       | 41.56             | 7.16          | 5.30          | 4.90                              | -0.40               | 0.00           | 11.90      |
| Walla Walla River WWBWC # M-10 (MNWW40.8)             | 42.30             | 2.13          | 1.60          | 1.60                              | 0.00                | 0.00           | 7.00       |
| Walla Walla River WWBWC # M-9a (Mauer Lane)           | 43.05             | -11.02        | -6.50         | -6.50                             | 0.00                | 0.00           | 5.40       |
| Tumalum Road Bridge (M-8) (MNWW42.3)                  | 43.64             | 3.16          | 1.80          | 1.80                              | 0.00                | 0.00           | 11.90      |
| Walla Walla River (M-7) (MNWW42.9)                    | 44.21             | -17.95        | -7.00         | -7.00                             | 0.00                | 0.00           | 10.10      |
| Walla Walla River (M-6) Gravel Pit (MNWW43.6)         | 44.60             | -11.51        | -8.40         | -8.40                             | 0.00                | 0.00           | 17.10      |
| Walla Walla River M-5b (MNWW44)                       | 45.33             | -14.72        | -8.54         | -7.90                             | 0.00                | 0.64           | 25.50      |
| Walla Walla River Nursery Bridge (M-4) (MNWW44.5)     | 45.91             | 2.28          | 1.80          | -3.40                             | -5.20               | 0.00           | 33.40      |
| Levy, 0.5 mile us of Nursery Bridge (M-3)             | 46.70             | -2.84         | -3.30         | -80.80                            | -77.50              | 0.00           | 36.80      |
| Grove School Bridge (M-1a) (MNWW46.1)                 | 47.86             | 8.81          | 9.60          | 5.60                              | -4.00               | 0.00           | 117.60     |
| Couse Creek Road Bridge (MNWW47)                      | 48.95             | 0.20          | 0.20          | -3.10                             | -3.30               | 0.00           | 112.00     |
| Day Road                                              | 49.93             | 3.48          | 3.10          | 3.00                              | -0.10               | 0.00           | 115.10     |
| Joe West Bridge (MNWW49.1)                            | 50.82             | -8.09         | -13.26        | -7.00                             | -4.60               | 10.86          | 112.10     |
| South Fork Bridge                                     | 52.46             | 2.96          | 15.30         | 6.80                              | -8.50               | 0.00           | 119.10     |
| SF Walla Walla River at CTUIR Fish Hatchery (SFWW7.0) | 57.63             | -5.00         | -8.10         | -8.10                             | 0.00                | 0.00           | 112.30     |
| SF Walla Walla River (SFWW9.0)                        | 59.25             | 5.96          | 10.90         | 10.70                             | -0.20               | 0.00           | 120.40     |
| OWRD Gauge Station, SF Walla Walla River              | 61.08             |               |               |                                   |                     |                | 109.70     |

#### Flow data applies to River flow at Location ID

Rate/Net gain-loss/Gross/Net Div and Trib data applies from Location ID to next UPSTREAM site.

# Attachment A-4

August 2003 Data Set

| Flow Measurement Location                                         | Actual River Mile | Rate Per Mile | Net Gain/Loss | Gross Gain/Loss Change (Instream) | Net Diversion Total | Net Trib Total | Flow (cfs) |
|-------------------------------------------------------------------|-------------------|---------------|---------------|-----------------------------------|---------------------|----------------|------------|
| Highway 12 Bridge (Mouth of Walla Walla River)                    | 0.00              |               |               |                                   |                     |                |            |
| Nine Mile Bridge                                                  | 8.54              | -1.81         | -13.32        | -13.32                            | 0.00                | 0.00           | 3.64       |
| USGS Touchet Gage                                                 | 15.91             | -2.04         | -23.97        | -21.24                            | 0.00                | 2.73           | 16.96      |
| Lowden Rd Bridge                                                  | 27.64             | 13.10         | 26.59         | 23.80                             | -2.79               | 0.00           | 38.20      |
| MacDonald Rd Bridge                                               | 29.67             | -1.71         | -6.20         | -28.00                            | -21.80              | 0.00           | 14.40      |
| Detour Road                                                       | 33.29             | 2.97          | 3.24          | 2.24                              | -1.20               | 0.20           | 42.40      |
| Swegle Road Bridge                                                | 34.38             | -0.46         | -0.67         | -0.67                             | 0.00                | 0.00           | 40.16      |
| Last Chance Road Bridge                                           | 35.84             | -3.26         | -5.47         | -7.67                             | -2.40               | 0.20           | 40.83      |
| Beet Road Bridge                                                  | 37.52             | -9.49         | -5.60         | -5.60                             | 0.00                | 0.00           | 42.90      |
| Walla Walla River (WDFW #5 Site)                                  | 38.11             | 0.89          | 1.20          | 25.70                             | -0.80               | 25.30          | 48.50      |
| Old Milton HWY Bridge                                             | 39.46             | 2.42          | 3.90          | 3.90                              | 0.00                | 0.00           | 22.80      |
| Peppers Bridge Location (WDFW/WDOE Gauge station)                 | 41.07             | 6.37          | 3.12          | 3.20                              | -0.22               | 0.30           | 18.90      |
| Oregon/WA stateline (WDFW Gauge station 2001-2)                   | 41.56             | 0.95          | 0.70          | 0.70                              | 0.00                | 0.00           | 15.70      |
| Walla Walla River WWBWC # M-10 (MNWW40.8)                         | 42.30             | -1.07         | -0.80         | -0.90                             | -0.10               | 0.00           | 15.00      |
| Walla Walla River WWBWC # M-9a (Mauer Lane)                       | 43.05             | -1.69         | -1.00         | -1.00                             | 0.00                | 0.00           | 15.90      |
| Tumalum Road Bridge (M-8) (MNWW42.3)                              | 43.64             | -4.56         | -2.60         | -2.60                             | 0.00                | 0.00           | 16.90      |
| Walla Walla River (M-7) (MNWW42.9)                                | 44.21             | -12.82        | -5.00         | -5.00                             | 0.00                | 0.00           | 19.50      |
| Walla Walla River (M-6) Gravel Pit (MNWW43.6)                     | 44.60             | -21.54        | -16.80        | -14.20                            | 0.00                | 2.60           | 24.50      |
| Levy, Willow Lane (M-5a)                                          | 45.38             | 0.94          | 0.50          | 0.50                              | 0.00                | 0.00           | 38.70      |
| Walla Walla River Nursery Bridge (M-4) (MNWW44.5)                 | 45.91             | -7.09         | -5.60         | -10.60                            | -5.00               | 0.00           | 38.20      |
| Levy, 0.5 mile us of Nursery Bridge (M-3)                         | 46.70             | -3.71         | -4.30         | -47.80                            | -43.50              | 0.00           | 48.80      |
| Grove School Bridge (M-1a) (MNWW46.1)                             | 47.86             | 4.22          | 4.60          | -0.70                             | -5.30               | 0.00           | 96.60      |
| Couse Creek Road Bridge (MNWW47)                                  | 48.95             | 6.24          | 6.12          | 3.10                              | -3.02               | 0.00           | 97.30      |
| Day Road                                                          | 49.93             | 0.56          | 0.50          | 0.40                              | -0.10               | 0.00           | 94.20      |
| Joe West Bridge (MNWW49.1)                                        | 50.82             | 3.84          | 6.30          | 2.80                              | -5.40               | 1.90           | 93.80      |
| South Fork Bridge                                                 | 52.46             | 2.10          | 2.88          | -5.40                             | -8.28               | 0.00           | 91.00      |
| SF Walla Walla River (SFWW1.7)                                    | 53.83             | 2.78          | 10.56         | 6.90                              | -3.66               | 0.00           | 103.30     |
| SF Walla Walla River at CTUIR Fish Hatchery (SFWW7.0)             | 57.63             | 2.10          | 3.40          | 3.40                              | 0.00                | 0.00           | 96.40      |
| SF Walla Walla River (SFWW9.0)                                    | 59.25             | -7.65         | -14.00        | -14.00                            | 0.00                | 0.00           | 93.00      |
| OWRD Gauge Station, SF Walla Walla River                          | 61.08             | -4.08         | -24.36        | 0.00                              | 0.00                | 24.36          | 107.00     |
| Walla Walla River 47 feet upstream of Burnt Cabin (Find location) | 67.05             | -1.55         | -1.70         | 1.80                              | 0.00                | 3.50           | 89.50      |
| Walla Walla River 71 feet us Table Creek                          | 68.15             | 8.37          | 16.23         | 27.70                             | 0.00                | 11.47          | 87.70      |
| SF Walla Walla River (upstream of Skiphorton)                     | 70.09             | 2.85          | 10.52         | 16.60                             | 0.00                | 6.08           | 60.00      |
| Upper South Fork Walla Walla River (Reser Creek)                  | 73.78             |               |               |                                   |                     |                | 43.40      |

**Flow data applies to River flow at Location ID**

Rate/Net gain/Loss/Gross/Net Div and Trib data applies from Location ID to next UPSTREAM site.

# Attachment A-5

June 2004 Data Set

| Flow Measurement Location                         | Actual River Mile (GIS) | Rate Per Mile | Net Gain/Loss | Gross Gain/Loss Change (Instream) | Net Diversion Total | Net Trib Total | Flow (cfs) |
|---------------------------------------------------|-------------------------|---------------|---------------|-----------------------------------|---------------------|----------------|------------|
| Highway 12 Bridge (Mouth of Walla Walla River)    | 0.00                    | x             | x             | x                                 | x                   | x              | x          |
| Nine Mile Bridge                                  | 8.54                    | -0.02         | -0.08         | -0.08                             | 0.00                | 0.00           | 184.54     |
| Cummings Bridge                                   | 12.71                   | -16.53        | -52.89        | -47.97                            | 0.00                | 4.92           | 184.62     |
| USGS Touchet Gage                                 | 15.91                   | 16.55         | 75.62         | 172.20                            | -3.86               | 100.44         | 232.59     |
| Lowden Rd Bridge                                  | 27.64                   | 2.33          | 4.73          | 1.94                              | -2.79               | 0.00           | 60.39      |
| MacDonald Rd Bridge                               | 29.67                   | -2.03         | -7.36         | -32.91                            | -25.55              | 0.00           | 58.45      |
| Detour Road                                       | 33.29                   | 2.25          | 2.45          | 35.26                             | 0.00                | 32.82          | 91.36      |
| Swegle Road Bridge                                | 34.38                   | 2.53          | 3.70          | 3.70                              | 0.00                | 0.00           | 56.09      |
| Last Chance Road Bridge                           | 35.84                   | -1.30         | -2.96         | -40.23                            | -40.94              | 3.67           | 52.39      |
| Walla Walla River (WDFW #5 Site)                  | 38.11                   | -9.82         | -13.26        | 49.37                             | 0.00                | 62.63          | 92.62      |
| Old Milton HWY Bridge                             | 39.46                   | 1.35          | 2.17          | 2.17                              | 0.00                | 0.00           | 43.24      |
| Peppers Bridge Location (WDFW/WDOE Gauge station) | 41.07                   | -7.91         | -9.73         | -7.57                             | 0.00                | 2.16           | 41.07      |
| Walla Walla River WWBWC # M-10 (MNWW40.8)         | 42.30                   | 11.96         | 16.02         | 16.02                             | 0.00                | 0.00           | 48.64      |
| Tumalum Road Bridge (M-8) (MNWW42.3)              | 43.64                   | 3.70          | 2.11          | 2.11                              | 0.00                | 0.00           | 32.62      |
| Walla Walla River (M-7) (MNWW42.9)                | 44.21                   | 0.18          | 0.07          | 0.07                              | 0.00                | 0.00           | 30.51      |
| Walla Walla River (M-6) Gravel Pit (MNWW43.6)     | 44.60                   | -19.15        | -25.09        | -23.09                            | 0.00                | 2.00           | 30.44      |
| Walla Walla River Nursery Bridge (M-4) (MNWW44.5) | 45.91                   | 0.45          | 0.88          | -158.54                           | -159.42             | 0.00           | 53.53      |
| Grove School Bridge (M-1a) (MNWW46.1)             | 47.86                   | 35.06         | 30.15         | 31.84                             | -1.87               | 3.56           | 212.07     |
| Mainstem u/s Couse Creek                          | 48.72                   | 42.62         | 8.95          | 8.95                              | 0.00                | 0.00           | 180.23     |
| Couse Creek Road Bridge (MNWW47)                  | 48.95                   | -17.76        | -17.41        | -19.64                            | -2.23               | 0.00           | 171.28     |
| Day Road                                          | 49.93                   | 27.21         | 24.22         | 24.17                             | -0.05               | 0.00           | 190.92     |
| Joe West Bridge (MNWW49.1)                        | 50.82                   | -10.90        | -17.90        | 4.00                              | -5.40               | 27.30          | 166.75     |
| South Fork Bridge                                 | 52.46                   | -1.70         | -8.90         | -12.90                            | -4.00               | 0.00           | 162.80     |
| SF Walla Walla River (SFWW9.0)                    | 59.25                   | 8.60          | 29.70         | 24.30                             | -5.50               | 0.00           | 175.70     |
| OWRD Gauge Station, SF Walla Walla River          | 61.08                   | x             | x             | x                                 | x                   | x              | 151.40     |

Flow data applies to River flow at Location ID

Rate/Net gain-loss/Gross/Net Div and Trib data applies from Location ID to next UPSTREAM site.

# Attachment A-6

August 2004 Data Set

| Flow Measurement Location (Reach Locations)           | Actual River<br>Mile<br>(GIS) | Rate Per Mile<br>(cfs) | Net Gain/Loss<br>(cfs) | Gross Instream<br>Gain/Loss Change<br>(cfs) | Net Diversion<br>Total (cfs) | Net Tributary<br>Inputs Total<br>(cfs) | Measured<br>Instream Flow<br>(cfs) |
|-------------------------------------------------------|-------------------------------|------------------------|------------------------|---------------------------------------------|------------------------------|----------------------------------------|------------------------------------|
| Highway 12 Bridge (Mouth of Walla Walla River)        | 0.00                          | x                      | x                      | x                                           | x                            | x                                      | x                                  |
| Cummings Bridge                                       | 12.71                         | -1.48                  | -4.74                  | -6.30                                       | -1.56                        | 0.00                                   | 16.70                              |
| USGS Touchet Gage                                     | 15.91                         | 0.57                   | 2.60                   | 2.52                                        | -1.54                        | 1.46                                   | 23.00                              |
| Touchet-Gardena Road Bridge                           | 20.48                         | 1.70                   | 12.14                  | 9.01                                        | -3.59                        | 0.46                                   | 20.48                              |
| Lowden Rd Bridge                                      | 27.64                         | -0.02                  | -0.05                  | -8.19                                       | -8.14                        | 0.00                                   | 11.47                              |
| MacDonald Rd Bridge                                   | 29.67                         | 0.96                   | 4.51                   | -11.08                                      | -17.71                       | 2.12                                   | 19.66                              |
| Sweeple Road Bridge                                   | 34.38                         | -3.71                  | -5.42                  | -5.42                                       | 0.00                         | 0.00                                   | 30.74                              |
| Last Chance Road Bridge                               | 35.84                         | 1.39                   | 2.34                   | 0.79                                        | -2.00                        | 0.45                                   | 36.16                              |
| Beet Road Bridge                                      | 37.52                         | -2.63                  | -1.55                  | -1.55                                       | 0.00                         | 0.00                                   | 35.37                              |
| Walla Walla River (WDFW #5 Site)                      | 38.11                         | -2.12                  | -2.86                  | 23.44                                       | -0.29                        | 26.59                                  | 36.92                              |
| Old Milton HWY Bridge                                 | 39.46                         | 1.83                   | 2.96                   | 2.96                                        | 0.00                         | 0.00                                   | 13.48                              |
| Peppers Bridge Location (WDFW/WDOE Gauge station)     | 41.07                         | 1.14                   | 1.40                   | 1.50                                        | -0.28                        | 0.38                                   | 10.52                              |
| Walla Walla River WWBWC # M-10 (MNWW40.8) (Beaver)    | 42.30                         | 1.92                   | 1.44                   | 1.44                                        | 0.00                         | 0.00                                   | 9.02                               |
| Walla Walla River WWBWC # M-9a (Mauer Lane)           | 43.05                         | 0.41                   | 0.24                   | 0.24                                        | 0.00                         | 0.00                                   | 7.58                               |
| Tumalum Road Bridge (M-8) (MNWW42.3)                  | 43.64                         | 2.00                   | 1.14                   | 1.14                                        | 0.00                         | 0.00                                   | 7.34                               |
| Walla Walla River (M-7) (MNWW42.9)                    | 44.21                         | -9.97                  | -3.89                  | -3.89                                       | 0.00                         | 0.00                                   | 6.20                               |
| Walla Walla River (M-6) Gravel Pit (MNWW43.6)         | 44.60                         | -15.79                 | -12.32                 | -10.32                                      | 0.00                         | 2.00                                   | 10.09                              |
| Levy, Willow Lane (M-5a)                              | 45.38                         | -1.75                  | -0.93                  | -0.93                                       | 0.00                         | 0.00                                   | 20.41                              |
| Walla Walla River Nursery Bridge (M-4) (MNWW44.5)     | 45.91                         | -3.61                  | -7.07                  | -77.44                                      | -70.37                       | 0.00                                   | 21.34                              |
| Grove School Bridge (M-1a) (MNWW46.1)                 | 47.86                         | 8.09                   | 8.82                   | 8.82                                        | 0.00                         | 0.00                                   | 98.78                              |
| Couse Creek Road Bridge (MNWW47)                      | 48.95                         | -3.29                  | -3.22                  | -3.22                                       | 0.00                         | 0.00                                   | 89.96                              |
| Day Road                                              | 49.93                         | -12.24                 | -10.89                 | -10.95                                      | -0.06                        | 0.00                                   | 93.18                              |
| Joe West Bridge (MNWW49.1)                            | 50.82                         | 11.11                  | 18.33                  | 11.57                                       | -6.76                        | 0.00                                   | 104.13                             |
| South Fork Bridge                                     | 52.46                         | 0.49                   | 2.51                   | -3.90                                       | -6.41                        | 0.00                                   | 92.56                              |
| SF Walla Walla River at CTUIR Fish Hatchery (SFWW7.0) | 57.63                         | 4.09                   | 6.63                   | 6.63                                        | 0.00                         | 0.00                                   | 96.46                              |
| SF Walla Walla River (SFWW9.0)                        | 59.25                         | -7.65                  | -14.00                 | -14.17                                      | -0.17                        | 0.00                                   | 89.83                              |
| OWRD Gauge Station, SF Walla Walla River              | 61.08                         | x                      | x                      | x                                           | x                            | x                                      | 104.00                             |

## Flow data applies to River flow at Location ID

Rate/Net gain-loss/Gross/Net Div and Trib data applies from Location ID to next UPSTREAM site.

# Attachment A-7

## 2007 August Data Set

| Flow Measurement Location (Reach Locations)           | Actual River Mile (GIS) | Rate Per Mile (cfs) | Net Gain/Loss (cfs) | Gross Instream Gain/Loss Change | 2007 Net Diversion Total (cfs) | 2004 Net Tributary Inputs Total (cfs) | 2004 Flow (cfs) |
|-------------------------------------------------------|-------------------------|---------------------|---------------------|---------------------------------|--------------------------------|---------------------------------------|-----------------|
| Nine Mile Bridge                                      | 8.50                    | -0.57               | -2.40               | -5.58                           | -3.18                          | 0.00                                  | 5.70            |
| Cummings Bridge                                       | 12.71                   | 0.32                | 1.02                | -0.70                           | -1.72                          | 0.00                                  | 11.30           |
| USGS Touchet Gage                                     | 15.91                   | 0.86                | 3.94                | -0.20                           | -6.96                          | 2.82                                  | 12.00           |
| Lowden Rd Bridge                                      | 27.64                   | 1.10                | 2.24                | -6.20                           | -8.44                          | 0.00                                  | 12.20           |
| MacDonald Rd Bridge                                   | 29.67                   | 0.70                | 2.53                | -12.20                          | -14.73                         | 0.00                                  | 18.40           |
| Detour Road                                           | 33.29                   | -1.91               | -2.08               | 1.10                            | 0.00                           | 3.18                                  | 30.60           |
| Swegle Road Bridge                                    | 34.38                   | 0.12                | 0.18                | 0.09                            | -0.09                          | 0.00                                  | 29.50           |
| Last Chance Road Bridge                               | 35.84                   | 0.37                | 0.62                | -1.38                           | -2.00                          | 0.00                                  | 29.41           |
| Beet Road Bridge                                      | 37.52                   | 3.22                | 1.90                | 1.90                            | 0.00                           | 0.00                                  | 30.79           |
| Walla Walla River (WDFW #5 Site)                      | 38.11                   | -2.26               | -3.06               | 14.73                           | 0.00                           | 17.79                                 | 28.89           |
| Old Milton HWY Bridge                                 | 39.46                   | 0.60                | 0.97                | 0.97                            | 0.00                           | 0.00                                  | 14.16           |
| Peppers Bridge Location (WDFW/WDOE Gauge station)     | 41.07                   | 2.88                | 3.54                | 3.54                            | 0.00                           | 0.00                                  | 13.19           |
| Walla Walla River WWBWC # M-10 (MNWW40.8) (Beaver)    | 42.30                   | 1.23                | 0.92                | 0.92                            | 0.00                           | 0.00                                  | 9.65            |
| Walla Walla River WWBWC # M-9a (Mauer Lane)           | 43.05                   | -2.90               | -1.71               | -2.00                           | -0.29                          | 0.00                                  | 8.73            |
| Tumalum Road Bridge (M-8) (MNWW42.3)                  | 43.64                   | -1.67               | -0.96               | -0.96                           | 0.00                           | 0.00                                  | 10.73           |
| Walla Walla River (M-7) (MNWW42.9)                    | 44.21                   | -18.44              | -7.16               | -7.16                           | 0.00                           | 0.00                                  | 11.69           |
| Walla Walla River (M-6) Gravel Pit (MNWW43.6)         | 44.60                   | -1.26               | -0.92               | -0.92                           | 0.00                           | 0.00                                  | 18.85           |
| Walla Walla River M-5b (MNWW44)                       | 45.33                   | -1.63               | -0.94               | -0.94                           | 0.00                           | 0.00                                  | 19.77           |
| Levy, Willow Lane (M-5a)                              | 45.38                   |                     |                     |                                 |                                |                                       |                 |
| Walla Walla River Nursery Bridge (M-4) (MNWW44.5)     | 45.91                   | -1.56               | -1.69               | -4.79                           | -3.10                          | 0.00                                  | 20.71           |
| Walla Walla River M-2 (MNWW45.6)                      | 46.99                   | -4.56               | -4.00               | -73.00                          | -69.00                         | 0.00                                  | 25.50           |
| Grove School Bridge (M-1a) (MNWW46.1)                 | 47.86                   | 10.41               | 11.32               | 11.32                           | 0.00                           | 0.00                                  | 98.50           |
| Couse Creek Road Bridge (MNWW47)                      | 48.95                   | -2.84               | -2.78               | -5.52                           | -2.74                          | 0.00                                  | 87.18           |
| Day Road                                              | 49.93                   | 0.43                | 0.38                | 0.34                            | -0.04                          | 0.00                                  | 92.7            |
| Joe West Bridge (MNWW49.1)                            | 50.82                   | -0.89               | -1.46               | -3.26                           | -6.00                          | 4.20                                  | 92.36           |
| South Fork Bridge                                     | 52.46                   | 0.38                | 1.95                | -4.78                           | -6.73                          | 0.00                                  | 95.62           |
| SF Walla Walla River at CTUIR Fish Hatchery (SFWW7.0) | 57.63                   | 4.59                | 7.41                | 7.30                            | -0.11                          | 0.00                                  | 100.4           |
| SF Walla Walla River (SFWW9.0)                        | 59.25                   | -7.03               | -12.89              | -12.89                          | 0.00                           | 0.00                                  | 93.1            |
| OWRD Gauge Station, SF Walla Walla River              | 61.08                   | x                   | x                   | x                               | x                              | x                                     | 105.99          |

### Flow data applies to River flow at Location ID

Rate/Net gain-loss/Gross/Net Div and Trib data applies from Location ID to next UPSTREAM site.

| <b>Attachment A-8</b>                                                                          |                                | <b>2007 October Data Set</b> |                            |                                        |                                       |                                              |                        |
|------------------------------------------------------------------------------------------------|--------------------------------|------------------------------|----------------------------|----------------------------------------|---------------------------------------|----------------------------------------------|------------------------|
| <b>Flow Measurement Location (Reach Locations)</b>                                             | <b>Actual River Mile (GIS)</b> | <b>Rate Per Mile (cfs)</b>   | <b>Net Gain/Loss (cfs)</b> | <b>Gross Instream Gain/Loss Change</b> | <b>2007 Net Diversion Total (cfs)</b> | <b>2007 Net Tributary Inputs Total (cfs)</b> | <b>2007 Flow (cfs)</b> |
| Nine Mile Bridge                                                                               | 8.50                           | -3.04                        | -12.80                     | -16.60                                 | -3.80                                 | 0.00                                         | 54.34                  |
| Cummings Bridge                                                                                | 12.71                          | -2.77                        | 35.14                      | 36.24                                  | -57.40                                | 58.50                                        | 70.94                  |
| Detour Road                                                                                    | 33.29                          | 4.31                         | 4.69                       | 14.09                                  | 0.00                                  | 9.40                                         | 34.70                  |
| Swegle Road Bridge                                                                             | 34.38                          | -0.84                        | -1.22                      | -1.31                                  | -0.09                                 | 0.00                                         | 20.61                  |
| Last Chance Road Bridge                                                                        | 35.84                          | 0.80                         | 1.34                       | 0.53                                   | -2.00                                 | 1.19                                         | 21.92                  |
| Beet Road Bridge                                                                               | 37.52                          | 3.35                         | 1.98                       | -15.31                                 | -17.29                                | 0.00                                         | 21.39                  |
| Walla Walla River (WDFW #5 Site)                                                               | 38.11                          | -1.49                        | -2.01                      | 20.29                                  | 0.00                                  | 22.30                                        | 36.70                  |
| Old Milton HWY Bridge                                                                          | 39.46                          | -0.64                        | -1.04                      | -1.04                                  | 0.00                                  | 0.00                                         | 16.41                  |
| Peppers Bridge Location (WDFW/WDOE Gauge station)                                              | 41.07                          | 3.22                         | 3.95                       | 3.95                                   | 0.00                                  | 0.00                                         | 17.45                  |
| Walla Walla River WWBWC # M-10 (MNWW40.8) (Beaver)                                             | 42.30                          | -1.52                        | -2.03                      | -2.03                                  | 0.00                                  | 0.00                                         | 13.50                  |
| Tumalum Road Bridge (M-8) (MNWW42.3)                                                           | 43.64                          | 1.57                         | 0.90                       | 0.90                                   | 0.00                                  | 0.00                                         | 15.53                  |
| Walla Walla River (M-7) (MNWW42.9)                                                             | 44.21                          | -11.23                       | -4.36                      | -4.36                                  | 0.00                                  | 0.00                                         | 14.63                  |
| Walla Walla River (M-6) Gravel Pit (MNWW43.6)                                                  | 44.60                          | -1.80                        | -1.40                      | -1.40                                  | 0.00                                  | 0.00                                         | 18.99                  |
| Levy, Willow Lane (M-5a)                                                                       | 45.38                          | -11.25                       | -5.94                      | -5.94                                  | 0.00                                  | 0.00                                         | 20.39                  |
| Walla Walla River Nursery Bridge (M-4) (MNWW44.5)                                              | 45.91                          | 0.70                         | 0.76                       | 0.76                                   | 0.00                                  | 0.00                                         | 26.33                  |
| Walla Walla River M-2 (MNWW45.6)                                                               | 46.99                          | -0.91                        | -0.80                      | -87.50                                 | -86.70                                | 0.00                                         | 25.57                  |
| Grove School Bridge (M-1a) (MNWW46.1)                                                          | 47.86                          | 13.31                        | 14.47                      | 14.47                                  | 0.00                                  | 0.00                                         | 113.07                 |
| Couse Creek Road Bridge (MNWW47)                                                               | 48.95                          | -1.80                        | -1.76                      | -4.50                                  | -2.74                                 | 0.00                                         | 98.60                  |
| Day Road                                                                                       | 49.93                          | 6.15                         | 5.44                       | 5.40                                   | -0.05                                 | 0.00                                         | 103.10                 |
| Joe West Bridge (MNWW49.1)                                                                     | 50.82                          | 0.70                         | 1.15                       | 1.15                                   | 0.00                                  | 0.00                                         | 97.70                  |
| South Fork Bridge                                                                              | 52.46                          | 2.28                         | 11.77                      | 9.17                                   | -2.60                                 | 0.00                                         | 96.55                  |
| SF Walla Walla River at CTUIR Fish Hatchery (SFWW7.0)                                          | 57.63                          | -3.76                        | -6.08                      | -6.08                                  | 0.00                                  | 0.00                                         | 87.38                  |
| SF Walla Walla River (SFWW9.0)                                                                 | 59.25                          | -7.93                        | -14.54                     | -14.54                                 | 0.00                                  | 0.00                                         | 93.46                  |
| OWRD Gauge Station, SF Walla Walla River                                                       | 61.08                          | x                            | x                          | x                                      | x                                     | x                                            | 108.00                 |
| <b>Flow data applies to River flow at Location ID</b>                                          |                                |                              |                            |                                        |                                       |                                              |                        |
| Rate/Net gain-loss/Gross/Net Div and Trib data applies from Location ID to next UPSTREAM site. |                                |                              |                            |                                        |                                       |                                              |                        |

| Attachment A-9                                                                                 |                         | 2008 July Data Set  |                     |                                 |                                |                                       |                 |
|------------------------------------------------------------------------------------------------|-------------------------|---------------------|---------------------|---------------------------------|--------------------------------|---------------------------------------|-----------------|
| Flow Measurement Location (Reach Locations)                                                    | Actual River Mile (GIS) | Rate Per Mile (cfs) | Net Gain/Loss (cfs) | Gross Instream Gain/Loss Change | 2007 Net Diversion Total (cfs) | 2007 Net Tributary Inputs Total (cfs) | 2007 Flow (cfs) |
| Nine Mile Bridge                                                                               | 8.5                     | -0.2                | -0.7                | -0.7                            | 0.0                            | 0.0                                   | 58.3            |
| Cummings Bridge                                                                                | 12.7                    | 0.7                 | 2.4                 | 4.0                             | 1.7                            | 0.0                                   | 59.0            |
| USGS Touchet Gage                                                                              | 15.9                    | -2.5                | -11.3               | 38.3                            | -1.1                           | 50.7                                  | 55.0            |
| Touchet-Gardena Road Bridge                                                                    | 20.5                    | 0.8                 | 6.0                 | 4.3                             | -3.3                           | 1.6                                   | 16.7            |
| Lowden Rd Bridge                                                                               | 27.6                    | 6.7                 | 13.5                | -4.5                            | -18.1                          | 0.0                                   | 12.4            |
| MacDonald Rd Bridge                                                                            | 29.7                    | -7.2                | -26.0               | -37.4                           | -11.3                          | 0.0                                   | 16.9            |
| Detour Road                                                                                    | 33.3                    | 14.2                | 15.4                | 21.4                            | -0.2                           | 6.2                                   | 54.3            |
| Swegle Road Bridge                                                                             | 34.4                    | -1.2                | -1.8                | -1.8                            | 0.0                            | 0.0                                   | 32.9            |
| Last Chance Road Bridge                                                                        | 35.8                    | -7.4                | -12.5               | -14.2                           | -1.8                           | 0.0                                   | 34.7            |
| Beet Road Bridge                                                                               | 37.5                    | 25.2                | 14.9                | 14.9                            | 0.0                            | 0.0                                   | 48.9            |
| Walla Walla River (WDFW #5 Site)                                                               | 38.1                    | -1.0                | -1.3                | 15.4                            | -1.0                           | 17.6                                  | 34.0            |
| Old Milton HWY Bridge                                                                          | 39.5                    | -3.1                | -5.0                | -5.0                            | 0.0                            | 0.0                                   | 18.7            |
| Peppers Bridge Location (WDFW/WDOE Gauge station)                                              | 41.1                    | -0.1                | 5.9                 | 5.5                             | -0.4                           | 0.0                                   | 23.6            |
| Walla Walla River WWBWC # M-10 (MNWW40.8) (Beaver)                                             | 42.3                    | 3.0                 | 2.2                 | 2.2                             | 0.0                            | 0.0                                   | 18.1            |
| Walla Walla River WWBWC # M-9a (Mauer Lane)                                                    | 43.0                    | -7.4                | -4.4                | -4.4                            | 0.0                            | 0.0                                   | 15.9            |
| Tumalum Road Bridge (M-8) (MNWW42.3)                                                           | 43.6                    | -0.8                | -0.5                | -0.5                            | 0.0                            | 0.0                                   | 20.3            |
| Walla Walla River (M-7) (MNWW42.9)                                                             | 44.2                    | -5.6                | -2.2                | -2.2                            | 0.0                            | 0.0                                   | 20.8            |
| Walla Walla River (M-6) Gravel Pit (MNWW43.6)                                                  | 44.6                    | -8.2                | -6.0                | -6.0                            | 0.0                            | 0.0                                   | 22.9            |
| Walla Walla River M-5b (MNWW44)                                                                | 45.3                    | -184.9              | -8.7                | -8.7                            | 0.0                            | 0.0                                   | 28.9            |
| Levy, Willow Lane (M-5a)                                                                       | 45.4                    | 1.9                 | 1.0                 | 1.0                             | 0.0                            | 0.0                                   | 37.6            |
| Walla Walla River Nursery Bridge (M-4) (MNWW44.5)                                              | 45.9                    | -10.5               | -11.4               | -11.4                           | 0.0                            | 0.0                                   | 36.6            |
| Walla Walla River M-2 (MNWW45.6)                                                               | 47.0                    | 9.1                 | 8.0                 | -78.7                           | -86.7                          | 0.0                                   | 47.9            |
| Grove School Bridge (M-1a) (MNWW46.1)                                                          | 47.9                    | -0.2                | 10.0                | 10.0                            | 0.0                            | 0.0                                   | 126.6           |
| Couse Creek Road Bridge (MNWW47)                                                               | 49.0                    | -0.5                | -0.5                | -3.3                            | -2.7                           | 0.0                                   | 116.6           |
| Day Road                                                                                       | 49.9                    | -5.9                | -5.2                | -5.3                            | -0.1                           | 0.0                                   | 119.9           |
| Joe West Bridge (MNWW49.1)                                                                     | 50.8                    | 17.9                | 29.5                | 35.5                            | -4.7                           | 10.8                                  | 125.1           |
| South Fork Bridge                                                                              | 52.5                    | 0.4                 | -21.7               | -24.3                           | -2.6                           | 0.0                                   | 89.6            |
| SF Walla Walla River at CTUIR Fish Hatchery (SFWW7.0)                                          | 57.6                    | -2.6                | -4.2                | -4.2                            | 0.0                            | 0.0                                   | 113.8           |
| SF Walla Walla River (SFWW9.0)                                                                 | 59.3                    | 5.5                 | 10.0                | 10.0                            | 0.0                            | 0.0                                   | 118.0           |
| OWRD Gauge Station, SF Walla Walla River                                                       | 61.1                    | x                   | x                   | x                               | x                              | x                                     | 108.0           |
| <b>Flow data applies to River flow at Location ID</b>                                          |                         |                     |                     |                                 |                                |                                       |                 |
| Rate/Net gain-loss/Gross/Net Div and Trib data applies from Location ID to next UPSTREAM site. |                         |                     |                     |                                 |                                |                                       |                 |

| Attachment A-10                                                                                |                         |                     |                     | 2008 November Data Set                |                                |                                       |                 |
|------------------------------------------------------------------------------------------------|-------------------------|---------------------|---------------------|---------------------------------------|--------------------------------|---------------------------------------|-----------------|
| Flow Measurement Location (Reach Locations)                                                    | Actual River Mile (GIS) | Rate Per Mile (cfs) | Net Gain/Loss (cfs) | Gross Instream Gain/Loss Change (cfs) | 2008 Net Diversion Total (cfs) | 2008 Net Tributary Inputs Total (cfs) | 2008 Flow (cfs) |
| Nine Mile Bridge                                                                               | 8.5                     | 0.4                 | 11.7                | 8.2                                   | -3.6                           | 0.0                                   | 52.0            |
| Cummings Bridge                                                                                | 12.7                    | 0.9                 | 3.5                 | -3.6                                  | -7.1                           | 0.0                                   | 67.3            |
| USGS Touchet Gauge                                                                             | 15.9                    | -0.1                | -42.9               | -23.6                                 | -8.9                           | 28.2                                  | 78.0            |
| Touchet-Gardena Bdg                                                                            | 20.5                    | -3.3                | -2.1                | 0.7                                   | -0.9                           | 3.7                                   | 15.8            |
| Lowden Rd Bdg                                                                                  | 27.6                    | 0.7                 | 3.1                 | -5.3                                  | -8.4                           | 0.0                                   | 10.9            |
| MacDonald Rd Bridge                                                                            | 29.7                    | 2.1                 | 2.2                 | -4.3                                  | -18.5                          | 20.5                                  | 22.3            |
| Swegle Rd Bdg                                                                                  | 34.4                    | -0.4                | -3.6                | -3.6                                  | 0.0                            | 0.0                                   | 22.5            |
| Last Chance Rd Bdg                                                                             | 35.8                    | 2.9                 | 0.6                 | 0.6                                   | 0.0                            | 0.0                                   | 18.9            |
| Beet Rd Bdg                                                                                    | 37.5                    | 0.2                 | 3.0                 | -30.6                                 | -33.6                          | 0.0                                   | 19.5            |
| WWR WDFW #5 Site                                                                               | 38.1                    | -1.1                | -1.3                | 25.5                                  | 0.0                            | 26.7                                  | 56.1            |
| Old Milton Hwy Bdg                                                                             | 39.5                    | -0.2                | -3.5                | -3.5                                  | 0.0                            | 0.0                                   | 28.2            |
| Hwy 125 Bdg                                                                                    | 40.1                    | 1.2                 | 0.8                 | 0.8                                   | 0.0                            | 0.0                                   | 24.7            |
| Pepper Bridge                                                                                  | 41.1                    | -0.9                | -1.3                | -1.1                                  | 0.0                            | 0.2                                   | 25.5            |
| M-10                                                                                           | 42.3                    | -0.2                | -3.6                | -3.6                                  | 0.0                            | 0.0                                   | 24.0            |
| M9a (Mauer Lane)                                                                               | 43.0                    | 1.3                 | 0.5                 | 0.5                                   | 0.0                            | 0.0                                   | 20.4            |
| Turn-A-Lum Bdg                                                                                 | 43.6                    | 0.2                 | 9.4                 | 9.4                                   | 0.0                            | 0.0                                   | 20.9            |
| M-5                                                                                            | 45.4                    | -0.9                | -0.6                | -0.6                                  | 0.0                            | 0.0                                   | 30.3            |
| Nursery Bdg M-4                                                                                | 45.9                    | -0.3                | -7.5                | -96.8                                 | -89.3                          | 0.0                                   | 29.7            |
| M1a Grove School Bdg                                                                           | 47.9                    | -0.1                | -14.7               | -14.7                                 | 0.0                            | 0.0                                   | 111.5           |
| Couse Creek Rd Bdg                                                                             | 49.0                    | 0.2                 | 5.3                 | 2.1                                   | -3.2                           | 0.0                                   | 96.7            |
| Day Road                                                                                       | 49.9                    | -0.2                | -4.9                | -7.1                                  | -2.2                           | 0.0                                   | 105.3           |
| Joe West Bdg                                                                                   | 50.8                    | -5.7                | -0.3                | 0.3                                   | -0.3                           | 0.8                                   | 102.6           |
| South Fork Bdg                                                                                 | 52.5                    | -0.6                | -8.7                | -13.0                                 | -4.3                           | 0.0                                   | 101.8           |
| CTUIR Hatchery                                                                                 | 57.6                    | 0.3                 | 5.3                 | 5.3                                   | 0.0                            | 0.0                                   | 97.3            |
| Keating                                                                                        | 59.3                    | -0.8                | -2.0                | -2.0                                  | 0.0                            | 0.0                                   | 102.6           |
| SF Walla Walla BLM Trailhead Bdg                                                               | 60.9                    | x                   | x                   | x                                     | x                              | x                                     | 100.6           |
|                                                                                                |                         |                     |                     |                                       |                                |                                       |                 |
|                                                                                                |                         |                     |                     |                                       |                                |                                       |                 |
|                                                                                                |                         |                     |                     |                                       |                                |                                       |                 |
|                                                                                                |                         |                     |                     |                                       |                                |                                       |                 |
| Flow data applies to River flow at Location ID                                                 |                         |                     |                     |                                       |                                |                                       |                 |
| Rate/Net gain-loss/Gross/Net Div and Trib data applies from Location ID to next UPSTREAM site. |                         |                     |                     |                                       |                                |                                       |                 |

# Attachment B

## Attachment B-1

| 2002 Composite Seepage Data Set                |                   |                            |                      | 2002 June Data Set |               |                                   |                          |                 | 2002 August Data Set |               |                                   |                          |                 |
|------------------------------------------------|-------------------|----------------------------|----------------------|--------------------|---------------|-----------------------------------|--------------------------|-----------------|----------------------|---------------|-----------------------------------|--------------------------|-----------------|
| Flow Measurement Location                      | Actual River Mile | Walla Walla River Reach ID | Defined Reach Dist * | Rate Per Mile      | Net Gain/Loss | Gross Gain/Loss Change (Increase) | 2002 Net Diversion Total | 2002 Flow (cfs) | Rate Per Mile        | Net Gain/Loss | Gross Gain/Loss Change (Increase) | 2002 Net Diversion Total | 2002 Flow (cfs) |
| Highway 12 Bridge (Mouth of Walla Walla River) | 0.0               | 1                          | 1-2                  |                    |               |                                   |                          |                 |                      |               |                                   |                          |                 |
| Nine Mile Bridge                               | 8.5               | 2                          | 2-3                  |                    |               |                                   |                          |                 |                      |               |                                   |                          |                 |
| Cunningham Bridge                              | 12.7              | 3                          | 3-4                  |                    |               |                                   |                          |                 |                      |               |                                   |                          |                 |
| USGS Touchet Gage                              | 15.9              | 4                          | 4-5                  |                    |               |                                   |                          |                 |                      |               |                                   |                          |                 |
| Touchet-Gardena Road Bridge                    | 20.5              | 5                          | 5-6                  |                    |               |                                   |                          |                 |                      |               |                                   |                          |                 |
| Lowden Rd Bridge                               | 27.6              | 6                          | 6-7                  |                    |               |                                   |                          |                 |                      |               |                                   |                          |                 |
| McDonald Rd Bridge                             | 29.7              | 7                          | 7-8                  |                    |               |                                   |                          |                 |                      |               |                                   |                          |                 |
| Detour Road                                    | 33.3              | 8                          | 8-9                  |                    |               |                                   |                          |                 |                      |               |                                   |                          |                 |
| Swegle Road Bridge                             | 34.4              | 9                          | 9-10                 |                    |               |                                   |                          |                 |                      |               |                                   |                          |                 |
| Last Chance Road Bridge                        | 35.8              | 10                         | 10-11                |                    |               |                                   |                          |                 |                      |               |                                   |                          |                 |
| Beet Road Bridge                               | 37.5              | 11                         | 11-12                |                    |               |                                   |                          |                 |                      |               |                                   |                          |                 |
| Walla Walla River (MDFW #5 Site)               | 38.1              | 12                         | 12-13                |                    |               |                                   |                          |                 |                      |               |                                   |                          |                 |
| Old Milton HWY Bridge                          | 39.5              | 13                         | 13-14                |                    |               |                                   |                          |                 |                      |               |                                   |                          |                 |
| Peppers Bridge Location                        | 41.1              | 14                         | 14-15                | 15.9               | 19.5          | 19.5                              | 0.0                      | 118.0           | -0.8                 | -0.4          | -0.1                              | 0.0                      | 0.3             |
| Oregon/WA state line                           | 41.6              | 15                         | 15-16                |                    |               |                                   |                          |                 | 1.5                  | 1.1           | 1.1                               | 0.0                      | 0.0             |
| WVBYWC # M-10                                  | 42.3              | 16                         | 16-17                | 9.2                | 6.9           | 6.9                               | 0.0                      | 98.5            | 4.5                  | 3.4           | 3.4                               | 0.0                      | 0.0             |
| WVBYWC # M-9a                                  | 43.0              | 17                         | 17-18                | -1.7               | -1.0          | -1.0                              | 0.0                      | 91.6            | -7.5                 | -4.4          | -4.4                              | 0.0                      | 0.0             |
| Tunalum Road Bridge (M-9)                      | 43.6              | 18                         | 18-19                | 0.4                | 0.2           | 0.2                               | 0.0                      | 92.6            | -1.2                 | -0.7          | -0.7                              | 0.0                      | 0.0             |
| Walla Walla River (M-7)                        | 44.2              | 19                         | 19-20                | -31.5              | -35.3         | -35.3                             | 0.0                      | 92.4            | -13.8                | -5.4          | -5.4                              | 0.0                      | 0.0             |
| Walla Walla River (M-6) Gravel Pit             | 44.6              | 20                         | 20-21                |                    |               |                                   |                          |                 | -21.1                | -15.4         | -15.4                             | 0.0                      | 0.0             |
| Walla Walla River M-5b                         | 45.3              | 21                         | 21-22                | 14.8               | 8.6           | 15.6                              | 0.0                      | 127.7           | 0.0                  | 0.0           | 7.4                               | 0.0                      | 7.4             |
| Levy, Willow Lane (M-3a)                       | 45.4              | 22                         | 22-23                |                    |               |                                   |                          |                 | -9.8                 | -5.2          | -5.2                              | 0.0                      | 0.0             |
| Walla Walla River Nursery Bridge (M-4)         | 45.9              | 23                         | 23-24                | -23.3              | -18.4         | -18.4                             | 0.0                      | 112.1           | -10.5                | -8.3          | -12.9                             | -4.6                     | 0.0             |
| Levy, 0.5 mile us of Nursery Bridge (M-3)      | 46.7              | 24                         | 24-25                | -25.5              | -29.6         | -147.2                            | -117.6                   | 130.5           | -3.9                 | -4.5          | -54.3                             | -49.8                    | 0.0             |
| Grow School Bridge (M-1a)                      | 47.9              | 25                         | 25-26                | 18.3               | 37.8          | 32.2                              | -5.6                     | 277.7           | 6.5                  | 7.1           | 2.9                               | -4.2                     | 0.0             |
| Mansum u/s Couze Creek                         | 48.7              | 26                         | 26-27                |                    |               |                                   |                          |                 |                      |               |                                   |                          |                 |
| Couze Creek Road Bridge                        | 49.0              | 27                         | 27-28                |                    |               |                                   |                          |                 | -3.5                 | -3.4          | -6.8                              | -3.4                     | 0.0             |
| Day Road                                       | 49.9              | 28                         | 28-29                | -33.9              | -30.2         | -30.2                             | 0.0                      | 245.5           | 2.0                  | 1.8           | 1.8                               | 0.0                      | 0.0             |
| Joe West Bridge                                | 50.8              | 29                         | 29-30                | 19.8               | 32.5          | 72.2                              | -2.1                     | 275.7           | 4.0                  | 6.5           | 4.2                               | -7.8                     | 5.5             |
| South Fork Bridge                              | 52.5              | 30                         | 30-31                | 0.2                | 1.1           | -2.9                              | -4.0                     | 203.5           | 1.3                  | 1.8           | -3.2                              | -5.0                     | 0.0             |
| Private Property (SFVWV 7)                     | 53.8              | 31                         | 31-32                |                    |               |                                   |                          |                 | 1.7                  | 6.6           | -0.9                              | -7.5                     | 0.0             |
| CTUR Fish Hatchery                             | 57.6              | 32                         | 32-33                | -12.5              | -20.2         | -20.2                             | 0.0                      | 206.4           | 5.4                  | 8.7           | 8.7                               | 0.0                      | 0.0             |
| Private Property (SFVWV 0)                     | 59.3              | 33                         | 33-34                | -5.1               | -9.4          | -9.4                              | 0.0                      | 226.6           | -4.2                 | -7.7          | -7.8                              | -0.1                     | 0.0             |
| OVERD Gauge Station                            | 61.1              | 34                         | 34-35                |                    |               |                                   |                          | 236.0           |                      |               |                                   |                          | 100.0           |
| US Burnt Cabin                                 | 67.0              | 35                         | 35-36                |                    |               |                                   |                          |                 |                      |               |                                   |                          |                 |
| Walla Walla River 71 feet us Table Creek       | 68.2              | 36                         | 36-37                |                    |               |                                   |                          |                 |                      |               |                                   |                          |                 |
| US Shipholton Creek                            | 70.1              | 37                         | 37-38                |                    |               |                                   |                          |                 |                      |               |                                   |                          |                 |
| DS Reser Creek                                 | 73.8              | 38                         | 38-39                |                    |               |                                   |                          |                 |                      |               |                                   |                          |                 |

\* All data on corresponding line referred analysis from that Walla Walla River site to next UPRIVER site. Exception: Flow data applies to site only.

# Attachment B-2

| 2003 Composite Seepage Data Set                |                   |                            |                      | 2003 June Data Set |               |                                     |                          |                     | 2003 August Data Set |               |               |                                     |                          |                     |                 |
|------------------------------------------------|-------------------|----------------------------|----------------------|--------------------|---------------|-------------------------------------|--------------------------|---------------------|----------------------|---------------|---------------|-------------------------------------|--------------------------|---------------------|-----------------|
| Flow Measurement Location                      | Actual River Mile | Walla Walla River Reach ID | Defined Reach Data * | Rate Per Mile      | Net Gain/Loss | Gross Gain/Loss Change (downstream) | 2003 Net Diversion Total | 2003 Net Trib Total | 2003 Flow (cfs)      | Rate Per Mile | Net Gain/Loss | Gross Gain/Loss Change (downstream) | 2003 Net Diversion Total | 2003 Net Trib Total | 2003 Flow (cfs) |
| Highway 12 Bridge (Mouth of Walla Walla River) | 0.0               | 1                          | 1-2                  |                    |               |                                     |                          |                     |                      |               |               |                                     |                          |                     |                 |
| Nine Mile Bridge                               | 8.5               | 2                          | 2-3                  |                    |               |                                     |                          |                     |                      | -1.8          | -13.3         | -13.3                               | 0.0                      | 0.0                 | 3.6             |
| Cummings Bridge                                | 12.7              | 3                          | 3-4                  |                    |               |                                     |                          |                     |                      |               |               |                                     |                          |                     |                 |
| USGS Touchet Gage                              | 15.9              | 4                          | 4-5                  |                    |               |                                     |                          |                     |                      | -2.0          | -24.0         | -21.2                               | 0.0                      | 2.7                 | 17.0            |
| Touchet-Gardena Road Bridge                    | 20.5              | 5                          | 5-6                  |                    |               |                                     |                          |                     |                      |               |               |                                     |                          |                     |                 |
| Lowden Rd Bridge                               | 27.6              | 6                          | 6-7                  |                    |               |                                     |                          |                     |                      |               |               |                                     |                          |                     |                 |
| MacDonald Rd Bridge                            | 29.7              | 7                          | 7-8                  |                    |               |                                     |                          |                     |                      | 13.1          | 26.6          | 23.8                                | -2.8                     | 0.0                 | 38.2            |
| Detour Road                                    | 33.3              | 8                          | 8-9                  |                    |               |                                     |                          |                     |                      | -1.7          | -6.2          | -28.0                               | -21.8                    | 0.0                 | 14.4            |
| Swegle Road Bridge                             | 34.4              | 9                          | 9-10                 |                    |               |                                     |                          |                     |                      | 3.0           | 3.2           | 2.2                                 | -1.2                     | 0.2                 | 42.4            |
| Lart Chance Road Bridge                        | 35.8              | 10                         | 10-11                |                    |               |                                     |                          |                     |                      | -0.5          | -0.7          | -0.7                                | 0.0                      | 0.0                 | 40.2            |
| Beet Road Bridge                               | 37.5              | 11                         | 11-12                |                    |               |                                     |                          |                     |                      | -3.3          | -5.5          | -7.7                                | -2.4                     | 0.2                 | 40.8            |
| Walla Walla River (WDFW #5 Site)               | 38.1              | 12                         | 12-13                |                    |               |                                     |                          |                     |                      | -9.5          | -5.6          | -5.6                                | 0.0                      | 0.0                 | 42.9            |
| Old Milton HWY Bridge                          | 39.5              | 13                         | 13-14                |                    |               |                                     |                          |                     |                      | 0.9           | 1.2           | 25.7                                | -0.8                     | 25.3                | 48.5            |
| Peppers Bridge Location                        | 41.1              | 14                         | 14-15                |                    |               |                                     |                          |                     |                      | 2.4           | 3.9           | 3.9                                 | 0.0                      | 0.0                 | 22.8            |
| Oregon/WA state line                           | 41.6              | 15                         | 15-16                | 7.2                | 5.3           | 4.9                                 | -0.4                     | 0.0                 | 11.9                 | 0.9           | 0.7           | 0.7                                 | 0.0                      | 0.3                 | 18.9            |
| WVWBC # M-10                                   | 42.3              | 16                         | 16-17                | 2.1                | 1.6           | 1.6                                 | 0.0                      | 0.0                 | 7.0                  | -1.1          | -0.8          | -0.9                                | -0.1                     | 0.0                 | 15.0            |
| WVWBC # M-9a                                   | 43.0              | 17                         | 17-18                | -11.0              | -6.5          | -6.5                                | 0.0                      | 0.0                 | 5.4                  | -1.7          | -1.0          | -1.0                                | 0.0                      | 0.0                 | 15.9            |
| Tunahum Road Bridge (M-9)                      | 43.6              | 18                         | 18-19                | 3.2                | 1.8           | 1.8                                 | 0.0                      | 0.0                 | 11.9                 | -4.6          | -2.6          | -2.6                                | 0.0                      | 0.0                 | 16.9            |
| Walla Walla River (M-7)                        | 44.2              | 19                         | 19-20                | -17.9              | -7.0          | -7.0                                | 0.0                      | 0.0                 | 10.1                 | -12.8         | -5.0          | -5.0                                | 0.0                      | 0.0                 | 19.5            |
| Walla Walla River (M-6) Gravel Pit             | 44.6              | 20                         | 20-21                | -11.5              | -8.4          | -8.4                                | 0.0                      | 0.0                 | 17.1                 | -21.5         | -16.8         | -14.2                               | 0.0                      | 2.6                 | 24.5            |
| Walla Walla River M-5b                         | 45.3              | 21                         | 21-22                | -14.7              | -8.5          | -7.9                                | 0.0                      | 0.6                 | 25.5                 |               |               |                                     |                          |                     |                 |
| Levy, Willow Lane (M-5a)                       | 45.4              | 22                         | 22-23                |                    |               |                                     |                          |                     |                      | 0.9           | 0.5           | 0.5                                 | 0.0                      | 0.0                 | 38.7            |
| Walla Walla River Nursery Bridge (M-4)         | 45.9              | 23                         | 23-24                | 2.3                | 1.8           | -3.4                                | -5.2                     | 0.0                 | 33.4                 | -7.1          | -5.6          | -10.6                               | -5.0                     | 0.0                 | 38.2            |
| Levy, 0.5 mile us of Nursery Bridge (M-3)      | 46.7              | 24                         | 24-25                | -2.8               | -3.3          | -80.8                               | -77.5                    | 0.0                 | 36.8                 | -3.7          | -4.3          | -47.8                               | -43.5                    | 0.0                 | 48.8            |
| Grove School Bridge (M-1a)                     | 47.9              | 25                         | 25-26                | 8.8                | 9.6           | 5.6                                 | -4.0                     | 0.0                 | 117.6                | 4.2           | 4.6           | -0.7                                | -5.3                     | 0.0                 | 96.6            |
| Mauistem u/s Couee Creek                       | 48.7              | 26                         | 26-27                |                    |               |                                     |                          |                     |                      |               |               |                                     |                          |                     |                 |
| Couee Creek Road Bridge                        | 49.0              | 27                         | 27-28                | 0.2                | 0.2           | -3.1                                | -3.3                     | 0.0                 | 112.0                | 6.2           | 6.1           | 3.1                                 | -3.0                     | 0.0                 | 97.3            |
| Day Road                                       | 49.9              | 28                         | 28-29                | 3.5                | 3.1           | 3.0                                 | -0.1                     | 0.0                 | 115.1                | 0.6           | 0.5           | 0.4                                 | -0.1                     | 0.0                 | 94.2            |
| Joe West Bridge                                | 50.8              | 29                         | 29-30                | -8.1               | -13.3         | -7.0                                | -4.6                     | 10.9                | 112.1                | 3.8           | 6.3           | 2.8                                 | -5.4                     | 1.9                 | 93.8            |
| South Fork Bridge                              | 52.5              | 30                         | 30-31                | 3.0                | 15.3          | 6.8                                 | -8.5                     | 0.0                 | 119.1                | 2.1           | 2.9           | -5.4                                | -8.3                     | 0.0                 | 91.0            |
| Private Property (FWWRI 7)                     | 53.8              | 31                         | 31-32                |                    |               |                                     |                          |                     |                      | 2.8           | 10.6          | 6.9                                 | -3.7                     | 0.0                 | 103.3           |
| CTUR Fish Hatchery                             | 57.6              | 32                         | 32-33                | -5.0               | -8.1          | -8.1                                | 0.0                      | 0.0                 | 112.3                | 2.1           | 3.4           | 3.4                                 | 0.0                      | 0.0                 | 96.4            |
| Private Property (FWWRI 0)                     | 59.3              | 33                         | 33-34                |                    |               |                                     |                          |                     |                      | -7.6          | -14.0         | -14.0                               | 0.0                      | 0.0                 | 93.0            |
| OWRD Gauge Station                             | 61.1              | 34                         | 34-35                |                    |               |                                     |                          |                     | 109.7                | -4.1          | -24.4         | 0.0                                 | 0.0                      | 24.4                | 107.0           |
| US Burnt Cabin                                 | 67.0              | 35                         | 35-36                |                    |               |                                     |                          |                     |                      | -1.5          | -1.7          | 1.8                                 | 0.0                      | 3.5                 | 89.5            |
| Walla Walla River 71 feet us Table Creek       | 68.2              | 36                         | 36-37                |                    |               |                                     |                          |                     |                      | 8.4           | 16.2          | 27.7                                | 0.0                      | 11.5                | 87.7            |
| US Shipshorton Creek                           | 70.1              | 37                         | 37-38                |                    |               |                                     |                          |                     |                      | 2.9           | 10.5          | 16.6                                | 0.0                      | 6.1                 | 60.0            |
| DS Reser Creek                                 | 73.8              | 38                         | 38-39                |                    |               |                                     |                          |                     |                      |               |               |                                     |                          |                     | 43.4            |

\* All data on corresponding line referred analysis from that Walla Walla River site to next UPPIVER site. Exception: Flow data applies to site only.

# Attachment B-3

| 2004 Composite Seepage Data Set                |                   |                            |                      | 2004 June Data Set |               |                                  |                          |                     |                 | 2004 August Data Set |                     |                                       |                                |                                       |                 |
|------------------------------------------------|-------------------|----------------------------|----------------------|--------------------|---------------|----------------------------------|--------------------------|---------------------|-----------------|----------------------|---------------------|---------------------------------------|--------------------------------|---------------------------------------|-----------------|
| Flow Measurement Location                      | Actual River Mile | Walla Walla River Reach ID | Defined Reach Data # | Rate Per Mile      | Net Gain/Loss | Gross Gain/Loss Change (net/ann) | 2004 Net Diversion Total | 2004 Net Trib Total | 2004 Flow (cfs) | Rate Per Mile (cfs)  | Net Gain/Loss (cfs) | Gross Interann Gain/Loss Change (cfs) | 2004 Net Diversion Total (cfs) | 2004 Net Tributary Inputs Total (cfs) | 2004 Flow (cfs) |
|                                                |                   |                            |                      |                    |               |                                  |                          |                     |                 |                      |                     |                                       |                                |                                       |                 |
| Highway 12 Bridge (Mouth of Walla Walla River) | 0.0               | 1                          | 1-2                  |                    |               |                                  |                          |                     |                 |                      |                     |                                       |                                |                                       |                 |
| Nine Mile Bridge                               | 8.5               | 2                          | 2-3                  | 0.0                | -0.1          | -0.1                             | 0.0                      | 0.0                 | 184.5           |                      |                     |                                       |                                |                                       |                 |
| Cummings Bridge                                | 12.7              | 3                          | 3-4                  | -16.5              | -52.9         | -48.0                            | 0.0                      | 4.9                 | 184.6           | -1.5                 | -4.7                | -6.3                                  | -1.6                           | 0.0                                   | 16.7            |
| USGS Touchet Gage                              | 15.9              | 4                          | 4-5                  | 16.5               | 75.6          | 172.2                            | -3.9                     | 100.4               | 232.6           | 0.6                  | 2.6                 | 2.5                                   | -1.5                           | 1.5                                   | 23.0            |
| Touchet-Gardena Road Bridge                    | 20.5              | 5                          | 5-6                  |                    |               |                                  |                          |                     |                 | 1.7                  | 12.1                | 9.0                                   | -3.6                           | 0.5                                   | 20.5            |
| Louderan Rd Bridge                             | 27.6              | 6                          | 6-7                  | 2.3                | 4.7           | 1.9                              | -2.8                     | 0.0                 | 60.4            | 0.0                  | 0.0                 | -8.2                                  | -8.1                           | 0.0                                   | 11.5            |
| Macdonald Rd Bridge                            | 29.7              | 7                          | 7-8                  | -2.0               | -7.4          | -32.9                            | -25.6                    | 0.0                 | 58.5            | 1.0                  | 4.5                 | -11.1                                 | -17.7                          | 2.1                                   | 19.7            |
| Detour Road                                    | 33.3              | 8                          | 8-9                  | 2.2                | 2.4           | 35.3                             | 0.0                      | 32.8                | 91.4            |                      |                     |                                       |                                |                                       |                 |
| Suegla Road Bridge                             | 34.4              | 9                          | 9-10                 | 2.5                | 3.7           | 3.7                              | 0.0                      | 0.0                 | 56.1            | -3.7                 | -5.4                | -5.4                                  | 0.0                            | 0.0                                   | 30.7            |
| Last Chance Road Bridge                        | 35.8              | 10                         | 10-11                | -1.3               | -3.0          | -40.2                            | -40.9                    | 3.7                 | 52.4            | 1.4                  | 2.3                 | 0.8                                   | -2.0                           | 0.5                                   | 36.2            |
| Beer Road Bridge                               | 37.5              | 11                         | 11-12                |                    |               |                                  |                          |                     |                 | -2.6                 | -1.6                | -1.6                                  | 0.0                            | 0.0                                   | 35.4            |
| Walla Walla River (WD/FW #3 Site)              | 38.1              | 12                         | 12-13                | -9.8               | -13.3         | 49.4                             | 0.0                      | 62.6                | 92.6            | -2.1                 | -2.9                | 23.4                                  | -0.3                           | 26.6                                  | 36.9            |
| Old Milton HWY Bridge                          | 39.5              | 13                         | 13-14                | 1.3                | 2.2           | 2.2                              | 0.0                      | 0.0                 | 43.2            | 1.8                  | 3.0                 | 3.0                                   | 0.0                            | 0.0                                   | 13.5            |
| Peppers Bridge Location                        | 41.1              | 14                         | 14-15                | -7.9               | -9.7          | -7.6                             | 0.0                      | 2.2                 | 41.1            | 1.1                  | 1.4                 | 1.5                                   | -0.3                           | 0.4                                   | 10.5            |
| Oregon/WA state line                           | 41.6              | 15                         | 15-16                |                    |               |                                  |                          |                     |                 |                      |                     |                                       |                                |                                       |                 |
| WYBENC # M-10                                  | 42.3              | 16                         | 16-17                | 12.0               | 16.0          | 16.0                             | 0.0                      | 0.0                 | 48.6            | 1.9                  | 1.4                 | 1.4                                   | 0.0                            | 0.0                                   | 9.0             |
| WYBENC # M-9a                                  | 43.0              | 17                         | 17-18                |                    |               |                                  |                          |                     |                 | 0.4                  | 0.2                 | 0.2                                   | 0.0                            | 0.0                                   | 7.6             |
| Tumatum Road Bridge (M-5)                      | 43.6              | 18                         | 18-19                | 3.7                | 2.1           | 2.1                              | 0.0                      | 0.0                 | 32.6            | 2.0                  | 1.1                 | 1.1                                   | 0.0                            | 0.0                                   | 7.3             |
| Walla Walla River (M-7)                        | 44.2              | 19                         | 19-20                | 0.2                | 0.1           | 0.1                              | 0.0                      | 0.0                 | 30.5            | -10.0                | -3.9                | -3.9                                  | 0.0                            | 0.0                                   | 6.2             |
| Walla Walla River (M-6) Gravel Pit             | 44.6              | 20                         | 20-21                | -19.2              | -25.1         | -23.1                            | 0.0                      | 2.0                 | 30.4            | -15.8                | -12.3               | -10.3                                 | 0.0                            | 2.0                                   | 10.1            |
| Walla Walla River M-5b                         | 45.3              | 21                         | 21-22                |                    |               |                                  |                          |                     |                 |                      |                     |                                       |                                |                                       |                 |
| Levy, Willow Lane (M-5a)                       | 45.4              | 22                         | 22-23                | 45.4               | 0.9           | -158.5                           | -159.4                   | 0.0                 | 53.5            | -3.6                 | -7.1                | -77.4                                 | -70.4                          | 0.0                                   | 21.3            |
| Walla Walla River Nursery Bridge (M-4)         | 45.9              | 23                         | 23-24                | 0.5                | 0.9           | -158.5                           | -159.4                   | 0.0                 | 53.5            | -3.6                 | -7.1                | -77.4                                 | -70.4                          | 0.0                                   | 21.3            |
| Levy, 0.5 mile us of Nursery Bridge (M-5)      | 46.7              | 24                         | 24-25                |                    |               |                                  |                          |                     |                 |                      |                     |                                       |                                |                                       |                 |
| Grove School Bridge (M-1a)                     | 47.9              | 25                         | 25-26                | 35.1               | 30.2          | 31.8                             | -1.9                     | 3.6                 | 212.1           | 8.1                  | 8.8                 | 8.8                                   | 0.0                            | 0.0                                   | 98.8            |
| Mauntem u/s Couze Creek                        | 48.7              | 26                         | 26-27                | 42.6               | 8.9           | 8.9                              | 0.0                      | 0.0                 | 180.2           |                      |                     |                                       |                                |                                       |                 |
| Couze Creek Road Bridge                        | 49.0              | 27                         | 27-28                | -17.8              | -17.4         | -19.6                            | -2.2                     | 0.0                 | 171.3           | -3.3                 | -3.2                | -3.2                                  | 0.0                            | 0.0                                   | 90.0            |
| Day Road                                       | 49.9              | 28                         | 28-29                | 27.2               | 24.2          | 24.2                             | 0.0                      | 0.0                 | 190.9           | -12.2                | -10.9               | -11.0                                 | -0.1                           | 0.0                                   | 93.2            |
| Joe West Bridge                                | 50.8              | 29                         | 29-30                | -10.9              | -17.9         | 4.0                              | -5.4                     | 27.3                | 166.8           | 11.1                 | 18.3                | 11.6                                  | -6.8                           | 0.0                                   | 104.1           |
| South Fork Bridge                              | 52.5              | 30                         | 30-31                | -1.7               | -8.9          | -12.9                            | -4.0                     | 0.0                 | 162.8           | 0.5                  | 2.5                 | -3.9                                  | -6.4                           | 0.0                                   | 92.6            |
| Private Property (STWV17)                      | 53.8              | 31                         | 31-32                |                    |               |                                  |                          |                     |                 |                      |                     |                                       |                                |                                       |                 |
| CTUR Fish Hatchery                             | 57.6              | 32                         | 32-33                | 8.6                | 29.7          | 24.3                             | -5.5                     | 0.0                 | 175.7           | 4.1                  | 6.6                 | 6.6                                   | 0.0                            | 0.0                                   | 96.5            |
| Private Property (STWV20)                      | 59.3              | 33                         | 33-34                |                    |               |                                  |                          |                     |                 | -7.6                 | -14.0               | -14.2                                 | -0.2                           | 0.0                                   | 89.8            |
| OWERD Gauge Station,                           | 61.1              | 34                         | 34-35                | x                  | x             | x                                | x                        | x                   | 151.4           | x                    | x                   | x                                     | x                              | x                                     | 104.0           |
| US Burnt Cabin                                 | 67.0              | 35                         | 35-36                |                    |               |                                  |                          |                     |                 |                      |                     |                                       |                                |                                       |                 |
| Walla Walla River 71 feet w Table Creek        | 68.2              | 36                         | 36-37                |                    |               |                                  |                          |                     |                 |                      |                     |                                       |                                |                                       |                 |
| US Shiphorton Creek                            | 70.1              | 37                         | 37-38                |                    |               |                                  |                          |                     |                 |                      |                     |                                       |                                |                                       |                 |
| DS Reser Creek                                 | 73.8              | 38                         | 38-39                |                    |               |                                  |                          |                     |                 |                      |                     |                                       |                                |                                       |                 |

\* All data on corresponding line referred analysis from that Walla Walla River site to next UPRIVER site. Exception: Flow data applies to site only.

# Attachment B-4

| 2007 Composite Seepage Data Set                |                   |                            | 2007 August Data Set |               |               |                                   |                          |                            |                     | 2007 October Data Set |                                       |                                |                                       |                 |
|------------------------------------------------|-------------------|----------------------------|----------------------|---------------|---------------|-----------------------------------|--------------------------|----------------------------|---------------------|-----------------------|---------------------------------------|--------------------------------|---------------------------------------|-----------------|
| Flow Measurement Location                      | Actual River Mile | Walla Walla River Reach ID | Defined Reach Data # | Rate Per Mile | Net Gain/Loss | Gross Gain/Loss Change (Instream) | 2004 Net Diversion Total | 2004 Flow Trib Total (cfs) | Rate Per Mile (cfs) | Net Gain/Loss (cfs)   | Gross Instream Gain/Loss Change (cfs) | 2004 Net Diversion Total (cfs) | 2004 Net Tributary Inputs Total (cfs) | 2004 Flow (cfs) |
| Highway 12 Bridge (Month of Walla Walla River) | 0.0               | 1                          | 1-2                  |               |               |                                   |                          |                            |                     |                       |                                       |                                |                                       |                 |
| Nine Mile Bridge                               | 8.5               | 2                          | 2-3                  | -0.6          | -2.4          | -5.6                              | -3.2                     | 0.0                        | 5.7                 | -3.0                  | -16.6                                 | -3.8                           | 0.0                                   | 54.3            |
| Cummings Bridge                                | 12.7              | 3                          | 3-4                  | 0.3           | 1.0           | -0.7                              | -1.7                     | 0.0                        | 11.3                | -2.8                  | 36.2                                  | -57.4                          | 58.5                                  | 70.9            |
| USGS Touchet Gage                              | 15.9              | 4                          | 4-5                  | 0.9           | 3.9           | -0.2                              | -7.0                     | 2.8                        | 12.0                |                       |                                       |                                |                                       |                 |
| Touchet-Gardena Road Bridge                    | 20.5              | 5                          | 5-6                  |               |               |                                   |                          |                            |                     |                       |                                       |                                |                                       |                 |
| Lowden Rd Bridge                               | 27.6              | 6                          | 6-7                  | 1.1           | 2.2           | -6.2                              | -8.4                     | 0.0                        | 12.2                |                       |                                       |                                |                                       |                 |
| MacDonald Rd Bridge                            | 29.7              | 7                          | 7-8                  | 0.7           | 2.5           | -12.2                             | -14.7                    | 0.0                        | 18.4                |                       |                                       |                                |                                       |                 |
| Devour Road                                    | 33.3              | 8                          | 8-9                  | -1.9          | -2.1          | 1.1                               | 0.0                      | 3.2                        | 30.6                | 4.3                   | 14.1                                  | 0.0                            | 9.4                                   | 34.7            |
| Swigle Road Bridge                             | 34.4              | 9                          | 9-10                 | 0.1           | 0.2           | 0.1                               | -0.1                     | 0.0                        | 29.5                | -0.8                  | -1.3                                  | -0.1                           | 0.0                                   | 20.6            |
| Last Chance Road Bridge                        | 35.8              | 10                         | 10-11                | 0.4           | 0.6           | -1.4                              | -2.0                     | 0.0                        | 29.4                | 0.8                   | 0.5                                   | -2.0                           | 1.2                                   | 21.9            |
| Beet Road Bridge                               | 37.5              | 11                         | 11-12                | 3.2           | 1.9           | 1.9                               | 0.0                      | 0.0                        | 30.8                | 3.4                   | 2.0                                   | -15.3                          | 0.0                                   | 21.4            |
| Walla Walla River (WDFW #3 Site)               | 38.1              | 12                         | 12-13                | -2.3          | -3.1          | 14.7                              | 0.0                      | 17.8                       | 28.9                | -1.5                  | 20.3                                  | 0.0                            | 22.3                                  | 36.7            |
| Old Milton HWY Bridge                          | 39.5              | 13                         | 13-14                | 0.6           | 1.0           | 1.0                               | 0.0                      | 0.0                        | 14.2                | -0.6                  | -1.0                                  | 0.0                            | 0.0                                   | 16.4            |
| Peppers Bridge Location                        | 41.1              | 14                         | 14-15                | 2.9           | 3.5           | 3.5                               | 0.0                      | 0.0                        | 13.2                | 3.2                   | 4.0                                   | 0.0                            | 0.0                                   | 17.5            |
| Oregon/WA state line                           | 41.6              | 15                         | 15-16                |               |               |                                   |                          |                            |                     |                       |                                       |                                |                                       |                 |
| WVWVC # M-10                                   | 42.3              | 16                         | 16-17                | 1.2           | 0.9           | 0.9                               | 0.0                      | 0.0                        | 9.7                 | -1.5                  | -2.0                                  | 0.0                            | 0.0                                   | 13.5            |
| WVWVC # M-9a                                   | 43.0              | 17                         | 17-18                | -2.9          | -1.7          | -2.0                              | -0.3                     | 0.0                        | 8.7                 |                       |                                       |                                |                                       |                 |
| Tumham Road Bridge (M-8)                       | 43.6              | 18                         | 18-19                | -1.7          | -1.0          | -1.0                              | 0.0                      | 0.0                        | 10.7                | 1.6                   | 0.9                                   | 0.0                            | 0.0                                   | 15.5            |
| Walla Walla River (M-7)                        | 44.2              | 19                         | 19-20                | -18.4         | -7.2          | -7.2                              | 0.0                      | 0.0                        | 11.7                | -11.2                 | -4.4                                  | 0.0                            | 0.0                                   | 14.6            |
| Walla Walla River (M-6) Gravel Pit             | 44.6              | 20                         | 20-21                | -1.3          | -0.9          | -0.9                              | 0.0                      | 0.0                        | 18.9                | -1.8                  | -1.4                                  | 0.0                            | 0.0                                   | 19.0            |
| Walla Walla River M-5b                         | 45.3              | 21                         | 21-22                | -1.6          | -0.9          | -0.9                              | 0.0                      | 0.0                        | 19.8                |                       |                                       |                                |                                       |                 |
| Lery, Willow Lane (M-5a)                       | 45.4              | 22                         | 22-23                |               |               |                                   |                          |                            |                     | -11.2                 | -5.9                                  | 0.0                            | 0.0                                   | 20.4            |
| Walla Walla River Nursery Bridge (M-4)         | 45.9              | 23                         | 23-24                | -1.6          | -1.7          | -4.8                              | -3.1                     | 0.0                        | 20.7                | 0.7                   | 0.8                                   | 0.0                            | 0.0                                   | 26.3            |
| Lery, 0.5 mile up of Nursery Bridge (M-3)      | 46.7              | 24                         | 24-25                | -4.6          | -4.0          | -73.0                             | -69.0                    | 0.0                        | 25.5                | -0.9                  | -87.5                                 | -86.7                          | 0.0                                   | 25.6            |
| Grove School Bridge (M-1a)                     | 47.9              | 25                         | 25-26                | 10.4          | 11.3          | 11.3                              | 0.0                      | 0.0                        | 98.5                | 13.3                  | 14.5                                  | 0.0                            | 0.0                                   | 113.1           |
| Maintain w/a Coues Creek                       | 48.7              | 26                         | 26-27                |               |               |                                   |                          |                            |                     |                       |                                       |                                |                                       |                 |
| Coues Creek Road Bridge                        | 49.0              | 27                         | 27-28                | -2.8          | -2.8          | -5.5                              | -2.7                     | 0.0                        | 87.2                | -1.8                  | -4.5                                  | -2.7                           | 0.0                                   | 98.6            |
| Day Road                                       | 49.9              | 28                         | 28-29                | 0.4           | 0.4           | 0.3                               | 0.0                      | 0.0                        | 92.7                | 6.1                   | 5.4                                   | 0.0                            | 0.0                                   | 103.1           |
| Joe West Bridge                                | 50.8              | 29                         | 29-30                | -0.9          | -1.5          | -3.3                              | -6.0                     | 4.2                        | 92.4                | 0.7                   | 1.2                                   | 0.0                            | 0.0                                   | 97.7            |
| South Fork Bridge                              | 52.5              | 30                         | 30-31                | 0.4           | 2.0           | -4.8                              | -6.7                     | 0.0                        | 95.6                | 2.3                   | 11.8                                  | 9.2                            | 0.0                                   | 96.6            |
| Private Property (SFVW17)                      | 53.8              | 31                         | 31-32                |               |               |                                   |                          |                            |                     |                       |                                       |                                |                                       |                 |
| CTUR Fish Hatchery                             | 57.6              | 32                         | 32-33                | 4.6           | 7.4           | 7.3                               | -0.1                     | 0.0                        | 100.4               | -3.8                  | -6.1                                  | 0.0                            | 0.0                                   | 87.4            |
| Private Property (SFVW09.0)                    | 59.3              | 33                         | 33-34                | -7.0          | -12.9         | -12.9                             | 0.0                      | 0.0                        | 93.1                | -7.9                  | -14.5                                 | 0.0                            | 0.0                                   | 93.5            |
| OWRD Gauge Station                             | 61.1              | 34                         | 34-35                | x             | x             | x                                 | x                        | x                          | 106.0               | x                     | x                                     | x                              | x                                     | 108.0           |
| US Burnt Cabin                                 | 67.0              | 35                         | 35-36                |               |               |                                   |                          |                            |                     |                       |                                       |                                |                                       |                 |
| Walla Walla River 71 feet w/ Table Creek       | 68.2              | 36                         | 36-37                |               |               |                                   |                          |                            |                     |                       |                                       |                                |                                       |                 |
| US Siphon Creek                                | 70.1              | 37                         | 37-38                |               |               |                                   |                          |                            |                     |                       |                                       |                                |                                       |                 |
| DS Reser Creek                                 | 73.8              | 38                         | 38-39                |               |               |                                   |                          |                            |                     |                       |                                       |                                |                                       |                 |

All data on corresponding line referred analysis from that Walla Walla River site to next UPRIVER site. Exception: Flow data applies to site only.

\* All data on corresponding line referred analysis from that Walla Walla River site to next UPRIVER site. Exception: Flow data applies to site only.

Attachment B-5

| Composite Seepage Data Set 2008             |                         |                     |                     | 2008 July Data Set                    |                                |                                       |                 |                                                   |                         | 2008 November Data Set |                     |                                       |                                |                                       |                 |
|---------------------------------------------|-------------------------|---------------------|---------------------|---------------------------------------|--------------------------------|---------------------------------------|-----------------|---------------------------------------------------|-------------------------|------------------------|---------------------|---------------------------------------|--------------------------------|---------------------------------------|-----------------|
| Flow Measurement Location (Reach Locations) | Actual River Mile (GIS) | Rate Per Mile (cfs) | Net Gain/Loss (cfs) | Gross Instream Gain/Loss Change (cfs) | 2008 Net Diversion Total (cfs) | 2008 Net Tributary Inputs Total (cfs) | 2008 Flow (cfs) | Flow Measurement Location (Reach Locations)       | Actual River Mile (GIS) | Rate Per Mile (cfs)    | Net Gain/Loss (cfs) | Gross Instream Gain/Loss Change (cfs) | 2008 Net Diversion Total (cfs) | 2008 Net Tributary Inputs Total (cfs) | 2008 Flow (cfs) |
|                                             |                         |                     |                     |                                       |                                |                                       |                 |                                                   |                         |                        |                     |                                       |                                |                                       |                 |
| Nine Mile Bridge                            | 8.5                     | -0.2                | -0.7                | -0.7                                  | 0.0                            | 0.0                                   | 58.3            | Nine Mile Bridge                                  | 8.5                     | 0.4                    | 11.7                | 8.2                                   | -3.6                           | 0.0                                   | 52.0            |
| Cummings Bridge                             | 12.7                    | 0.7                 | 2.4                 | 4.0                                   | 1.7                            | 0.0                                   | 59.0            | Cummings Bridge                                   | 12.7                    | 0.9                    | 3.5                 | -3.6                                  | -7.1                           | 0.0                                   | 67.3            |
| USGS Touchet Gage                           | 15.9                    | -2.5                | -11.3               | 38.3                                  | -1.1                           | 50.7                                  | 55.0            | USGS Touchet Gage                                 | 15.9                    | -0.1                   | -42.9               | -23.6                                 | -8.9                           | 28.2                                  | 78.0            |
| Touchet-Gardena                             | 20.5                    | 0.8                 | 6.0                 | 4.3                                   | -3.3                           | 1.6                                   | 16.7            | Touchet-Gardena Road Bridge                       | 20.5                    | -3.3                   | -2.1                | 0.7                                   | -0.9                           | 3.7                                   | 15.8            |
| Lowden Rd Bridge                            | 27.6                    | 6.7                 | 13.5                | -4.5                                  | -18.1                          | 0.0                                   | 12.4            | Lowden Rd Bridge                                  | 27.6                    | 0.7                    | 3.1                 | -5.3                                  | -8.4                           | 0.0                                   | 10.9            |
| MacDonald Rd                                | 29.7                    | -7.2                | -26.0               | -37.4                                 | -11.3                          | 0.0                                   | 16.9            | MacDonald Rd Bridge                               | 29.7                    | 2.1                    | 2.2                 | 4.3                                   | -18.5                          | 20.5                                  | 22.3            |
| Detour Road                                 | 33.3                    | 14.2                | 15.4                | 21.4                                  | -0.2                           | 6.2                                   | 54.3            | Detour Road                                       |                         |                        |                     |                                       |                                |                                       |                 |
| Swegle Road Bridge                          | 34.4                    | -1.2                | -1.8                | -1.8                                  | 0.0                            | 0.0                                   | 32.9            | Swegle Road Bridge                                | 34.4                    | -0.4                   | -3.6                | -3.6                                  | 0.0                            | 0.0                                   | 22.5            |
| Last Chance Road                            | 35.8                    | -7.4                | -12.5               | -14.2                                 | -1.8                           | 0.0                                   | 34.7            | Last Chance Road Bridge                           | 35.8                    | 2.9                    | 0.6                 | 0.6                                   | 0.0                            | 0.0                                   | 18.9            |
| Beet Road Bridge                            | 37.5                    | 25.2                | 14.9                | 14.9                                  | 0.0                            | 0.0                                   | 48.9            | Beet Road Bridge                                  | 37.5                    | 0.2                    | 3.0                 | -30.6                                 | -33.6                          | 0.0                                   | 19.5            |
| Walla Walla River                           | 38.1                    | -1.0                | -1.3                | 15.4                                  | -1.0                           | 17.6                                  | 34.0            | Walla Walla River (WDFW #5 Site)                  | 38.1                    | -1.1                   | -1.3                | 25.5                                  | 0.0                            | 26.7                                  | 56.1            |
| Old Milton HWY                              | 39.5                    | -3.1                | -5.0                | -5.0                                  | 0.0                            | 0.0                                   | 18.7            | Old Milton HWY Bridge                             | 39.5                    | -0.2                   | -3.5                | -3.5                                  | 0.0                            | 0.0                                   | 28.2            |
| Peppers Bridge                              | 41.1                    | -0.1                | 5.9                 | 5.5                                   | -0.4                           | 0.0                                   | 23.6            | Hwy 125 Bdg                                       | 40.1                    | 1.2                    | 0.8                 | 0.8                                   | 0.0                            | 0.0                                   | 24.7            |
|                                             |                         | 0.0                 | 0.0                 |                                       |                                |                                       |                 | Peppers Bridge Location (WDFW/WDOE Gauge station) | 41.1                    | -0.9                   | -1.3                | -1.1                                  | 0.0                            | 0.2                                   | 25.5            |
| Walla Walla River                           | 42.3                    | 3.0                 | 2.2                 | 2.2                                   | 0.0                            | 0.0                                   | 18.1            | Walla Walla River WWBWC # M-10                    | 42.3                    | -0.2                   | -3.6                | -3.6                                  | 0.0                            | 0.0                                   | 24.0            |
| Walla Walla River                           | 43.0                    | -7.4                | -4.4                | -4.4                                  | 0.0                            | 0.0                                   | 15.9            | Walla Walla River WWBWC # M-9a                    | 43.0                    | 1.3                    | 0.5                 | 0.5                                   | 0.0                            | 0.0                                   | 20.4            |
| Tumalum Road                                | 43.6                    | -0.8                | -0.5                | -0.5                                  | 0.0                            | 0.0                                   | 20.3            | Tumalum Road Bridge (M-8)                         | 43.6                    | 0.2                    | 9.4                 | 9.4                                   | 0.0                            | 0.0                                   | 20.9            |
| Walla Walla River (M)                       | 44.2                    | -5.6                | -2.2                | -2.2                                  | 0.0                            | 0.0                                   | 20.8            | Walla Walla River (M-7) (MNWW42.9)                |                         |                        |                     |                                       |                                |                                       |                 |
| Walla Walla River (M)                       | 44.6                    | -8.2                | -6.0                | -6.0                                  | 0.0                            | 0.0                                   | 22.9            | Walla Walla River (M-6) Gravel Pit                |                         |                        |                     |                                       |                                |                                       |                 |
| Walla Walla River M-                        | 45.3                    | -184.9              | -8.7                | -8.7                                  | 0.0                            | 0.0                                   | 28.9            | Walla Walla River M-5b (MNWW44)                   |                         |                        |                     |                                       |                                |                                       |                 |
| Lewy, Willow Lane                           | 45.4                    | 1.9                 | 1.0                 | 1.0                                   | 0.0                            | 0.0                                   | 37.6            | Lewy, Willow Lane (M-5a)                          | 45.4                    | -0.9                   | -0.6                | -0.6                                  | 0.0                            | 0.0                                   | 30.3            |
| Walla Walla River                           | 45.9                    | -10.5               | -11.4               | -11.4                                 | 0.0                            | 0.0                                   | 36.6            | Walla Walla River Nursery Bridge (M-4)            | 45.9                    | -0.3                   | -7.5                | -96.8                                 | -89.3                          | 0.0                                   | 29.7            |
| Walla Walla River M-                        | 47.0                    | 9.1                 | 8.0                 | -78.7                                 | -86.7                          | 0.0                                   | 47.9            | Walla Walla River M-2 (MNWW45.6)                  |                         |                        |                     |                                       |                                |                                       |                 |
| Grove School Bridge                         | 47.9                    | -0.2                | 10.0                | 10.0                                  | 0.0                            | 0.0                                   | 126.6           | Grove School Bridge (M-1a)                        | 47.9                    | -0.1                   | -14.7               | -14.7                                 | 0.0                            | 0.0                                   | 111.5           |
|                                             |                         | 0.0                 | 0.0                 |                                       |                                |                                       |                 |                                                   |                         |                        |                     |                                       |                                |                                       |                 |
| Couse Creek Road                            | 49.0                    | -0.5                | -0.5                | -3.3                                  | -2.7                           | 0.0                                   | 116.6           | Couse Creek Road Bridge (MNWW47)                  | 49.0                    | 0.2                    | 5.3                 | 2.1                                   | -3.2                           | 0.0                                   | 96.7            |
| Day Road                                    | 49.9                    | -5.9                | -5.2                | -5.3                                  | -0.1                           | 0.0                                   | 119.9           | Day Road                                          | 49.9                    | -0.2                   | -4.9                | -7.1                                  | -2.2                           | 0.0                                   | 105.3           |
| Joe West Bridge                             | 50.8                    | 17.9                | 29.5                | 35.5                                  | -4.7                           | 10.8                                  | 125.1           | Joe West Bridge (MNWW49.1)                        | 50.8                    | -5.7                   | -0.3                | 0.3                                   | -0.3                           | 0.8                                   | 102.6           |
| South Fork Bridge                           | 52.5                    | 0.4                 | -21.7               | -24.3                                 | -2.6                           | 0.0                                   | 89.6            | South Fork Bridge                                 | 52.5                    | -0.6                   | -8.7                | -13.0                                 | -4.3                           | 0.0                                   | 101.8           |
|                                             |                         | 0.0                 | 0.0                 |                                       |                                |                                       |                 |                                                   |                         |                        |                     |                                       |                                |                                       |                 |
| SF Walla Walla                              | 57.6                    | -2.6                | -4.2                | -4.2                                  | 0.0                            | 0.0                                   | 113.8           | SF Walla Walla River at CTUIR Fish                | 57.6                    | 0.3                    | 5.3                 | 5.3                                   | 0.0                            | 0.0                                   | 97.3            |
| SF Walla Walla                              | 59.3                    | -1.6                | -3.0                | -3.0                                  | 0.0                            | 0.0                                   | 118.0           | SF Walla Walla River (SFWW9.0)                    | 59.3                    | -0.8                   | -2.0                | -2.0                                  | 0.0                            | 0.0                                   | 102.6           |
| OWRD Gauge                                  | 61.1                    |                     |                     |                                       |                                |                                       | 121.0           | OWRD Gauge Station, SF Walla Walla                | 60.9                    | x                      | x                   | x                                     | x                              | x                                     | 100.6           |
|                                             |                         |                     |                     |                                       |                                |                                       |                 |                                                   |                         |                        |                     |                                       |                                |                                       |                 |
|                                             |                         |                     |                     |                                       |                                |                                       |                 |                                                   |                         |                        |                     |                                       |                                |                                       |                 |
|                                             |                         |                     |                     |                                       |                                |                                       |                 |                                                   |                         |                        |                     |                                       |                                |                                       |                 |
|                                             |                         |                     |                     |                                       |                                |                                       |                 |                                                   |                         |                        |                     |                                       |                                |                                       |                 |

Attachment B-6 Mill Creek Seepage Assessment.

Attachment B-6

| Composite Seepage Data Set 2008-09          |                         |                     | 2008 October Data Set |                                       |                                |                                       | 2009 June Data Set |                                             |                         |                     |                     |                                       |                                |                                       |                 |
|---------------------------------------------|-------------------------|---------------------|-----------------------|---------------------------------------|--------------------------------|---------------------------------------|--------------------|---------------------------------------------|-------------------------|---------------------|---------------------|---------------------------------------|--------------------------------|---------------------------------------|-----------------|
| Flow Measurement Location (Reach Locations) | Actual River Mile (GIS) | Rate Per Mile (cfs) | Net Gain/Loss (cfs)   | Gross Instream Gain/Loss Change (cfs) | 2008 Net Diversion Total (cfs) | 2008 Net Tributary Inputs Total (cfs) | 2008 Flow (cfs)    | Flow Measurement Location (Reach Locations) | Actual River Mile (GIS) | Rate Per Mile (cfs) | Net Gain/Loss (cfs) | Gross Instream Gain/Loss Change (cfs) | 2009 Net Diversion Total (cfs) | 2009 Net Tributary Inputs Total (cfs) | 2009 Flow (cfs) |
| Swegle Road Bridge                          | 0.5                     | -1.7                | -2.4                  | -2.4                                  | 0.0                            | 1.2                                   | 10.5               | Swegle Road Bridge                          | 0.5                     | -1.7                | -2.4                | -2.4                                  | 0.0                            | 1.8                                   | 16.1            |
| Last Chance Road Bridge                     | 1.9                     | -0.4                | -0.4                  | -0.4                                  | 0.0                            | 0.0                                   | 8.2                | Last Chance Road Bridge                     | 1.9                     | -0.2                | -0.2                | -0.2                                  | 0.0                            | 0.0                                   | 14.0            |
| Wallula Rd Bridge                           | 2.9                     | 4.7                 | 8.2                   | 7.5                                   | -0.8                           | 0.0                                   | 8.6                | Wallula Rd Bridge                           | 2.9                     | 1.8                 | 3.2                 | 2.1                                   | -1.1                           | 0.0                                   | 14.2            |
| Goes Bridge                                 | 4.7                     | 0.2                 | 1.4                   | -1.2                                  | -2.6                           | 0.0                                   | 1.1                | Goes Bridge                                 | 4.7                     | 0.1                 | 0.7                 | -1.4                                  | -2.1                           | 0.0                                   | 12.1            |
| Tausick Rd Bridge                           | 10.6                    | -5.4                | -3.0                  | -1.5                                  | 0.0                            | 1.5                                   | 2.3                | Tausick Rd Bridge                           | 10.6                    | -6.8                | -3.8                | -1.7                                  | 0.0                            | 2.1                                   | 13.5            |
| Below Yellowhawk Diversion                  | 11.1                    | 0.1                 | 0.2                   | -23.3                                 | -23.4                          | 0.0                                   | 3.8                | Below Yellowhawk Diversion                  | 11.1                    | -0.6                | -1.5                | -33.0                                 | -31.5                          | 0.0                                   | 15.2            |
| 5 Mile Rd Bridge                            | 13.5                    | 1.4                 | 3.0                   | -1.4                                  | -4.3                           | 0.0                                   | 27.1               | 5 Mile Rd Bridge                            | 13.5                    | 2.0                 | 4.2                 | -0.9                                  | -5.1                           | 0.0                                   | 48.2            |
| 7 Mile Rd Bridge                            | 15.6                    | -2.8                | -12.6                 | -11.7                                 | 0.0                            | 0.8                                   | 28.5               | 7 Mile Rd Bridge                            | 15.6                    | -1.7                | -7.6                | -6.1                                  | 0.0                            | 1.5                                   | 49.1            |
| 20 Mile Bridge                              | 20.2                    | 7.8                 | 8.2                   | 8.2                                   | 0.0                            | 0.0                                   | 40.2               | 20 Mile Bridge                              | 20.2                    | 4.6                 | 4.8                 | 4.8                                   | 0.0                            | 0.0                                   | 55.2            |
| USGS Gauge                                  | 21.2                    | -1.7                | -2.4                  | -2.4                                  | 0.0                            | 0.0                                   | 32.0               | USGS Gauge                                  | 21.2                    | -1.5                | -2.1                | -2.1                                  | 0.0                            | 0.0                                   | 50.4            |
| Mill Creek At Stateline                     | 22.6                    |                     |                       |                                       |                                |                                       | 34.4               | Mill Creek At Stateline                     | 22.6                    |                     |                     |                                       |                                |                                       | 52.5            |

Attachment B-7

Composite Seepage Data Set 2009

June 2009 Data Set

| Flow Measurement Location<br>(Reach Locations) | Actual<br>River Mile<br>(GIS) | Rate Per Mile<br>(cfs) | Net Gain/Loss<br>(cfs) | Gross<br>Instream<br>Gain/Loss<br>Change (cfs) | Net<br>Diversion<br>Total (cfs) | Net<br>Tributary<br>Inputs Total<br>(cfs) | Measured<br>Instream Flow<br>(cfs) |
|------------------------------------------------|-------------------------------|------------------------|------------------------|------------------------------------------------|---------------------------------|-------------------------------------------|------------------------------------|
| <i>Cummings</i>                                | 0.86                          | 0.14                   | 1.79                   | -16.21                                         | -18.00                          | 0.00                                      | 106.95                             |
| <i>Johnson Bridge</i>                          | 8.80                          | 0.42                   | 10.55                  | 10.55                                          | 0.00                            | 0.00                                      | 123.16                             |
| <i>I W Sims Rd Bdg</i>                         | 13.18                         | -0.31                  | -12.85                 | -12.85                                         | 0.00                            | 0.00                                      | 112.61                             |
| <i>Site #4</i>                                 | 17.18                         | 1.38                   | 3.49                   | 1.26                                           | -2.23                           | 0.00                                      | 125.46                             |
| <i>Luckenbill Rd Bdg</i>                       | 21.99                         | 0.49                   | 6.35                   | 6.35                                           | 0.00                            | 0.00                                      | 124.20                             |
| <i>Hoffman Rd</i>                              | 25.09                         | -0.60                  | -11.97                 | -11.97                                         | 0.00                            | 0.00                                      | 117.85                             |
| <i>Harvey Shaw Rd</i>                          | 32.23                         | 1.06                   | 4.69                   | 4.69                                           | 0.00                            | 0.00                                      | 129.82                             |
| <i>Petty John</i>                              | 37.20                         | -4.28                  | -1.01                  | -1.01                                          | 0.00                            | 0.00                                      | 125.13                             |
| <i>Hwy 125 Bdg</i>                             | 41.53                         | -0.48                  | -5.56                  | -5.69                                          | -0.13                           | 0.00                                      | 126.14                             |
| <i>Hart Road #5</i>                            | 44.19                         | -0.62                  | -7.39                  | -7.14                                          | -0.91                           | 1.16                                      | 131.83                             |
| <i>Hwy 124 Bdg</i>                             | 48.79                         | 0.21                   | 19.38                  | 23.08                                          | 0.00                            | 3.70                                      | 138.97                             |
| <i>Waitsburg</i>                               | 52.92                         | -1.17                  | -10.27                 | -8.77                                          | -8.93                           | 10.43                                     | 115.89                             |
| <i>Dayton Levee</i>                            | 64.97                         | x                      | x                      | x                                              | x                               | x                                         | 124.66                             |

Composite Seepage Data Set 2009

September 2009 Data Set

| Flow Measurement Location<br>(Reach Locations) | Actual<br>River Mile<br>(GIS) | Rate Per Mile<br>(cfs) | Net Gain/Loss<br>(cfs) | Gross<br>Instream<br>Gain/Loss<br>Change (cfs) | Net<br>Diversion<br>Total (cfs) | Net<br>Tributary<br>Inputs Total<br>(cfs) | Measured<br>Instream Flow<br>(cfs) |
|------------------------------------------------|-------------------------------|------------------------|------------------------|------------------------------------------------|---------------------------------|-------------------------------------------|------------------------------------|
| <i>Cummings</i>                                | 0.86                          | -4.41                  | -1.80                  | -21.86                                         | -20.06                          | 0.00                                      | 11.88                              |
| <i>Johnson Bridge</i>                          | 8.80                          | -14.13                 | -0.31                  | -0.31                                          | 0.00                            | 0.00                                      | 33.74                              |
| <i>I W Sims Rd Bdg</i>                         | 13.18                         | -0.74                  | -5.43                  | -5.43                                          | 0.00                            | 0.00                                      | 34.05                              |
| <i>Site # 4</i>                                | 17.18                         | 1.03                   | 4.67                   | 4.67                                           | 0.00                            | 0.00                                      | 39.48                              |
| <i>Luckenbill Rd Bdg</i>                       | 21.99                         | -8.19                  | -1.25                  | -1.25                                          | 0.00                            | 0.00                                      | 34.81                              |
| <i>Harvey Shaw Rd</i>                          | 32.23                         | 2.45                   | 2.03                   | 2.03                                           | 0.00                            | 0.00                                      | 36.06                              |
| <i>Petty John</i>                              | 37.20                         | -1.65                  | -2.62                  | -2.62                                          | 0.00                            | 0.00                                      | 34.03                              |
| <i>Hwy 125 Bdg</i>                             | 41.53                         | -2.56                  | -2.84                  | -2.45                                          | 0.00                            | 0.39                                      | 36.65                              |
| <i>Hwy 124 Bdg</i>                             | 48.79                         | -0.39                  | -10.70                 | -10.50                                         | 0.00                            | 0.20                                      | 39.10                              |
| <i>Waitsburg</i>                               | 52.92                         | 3.51                   | 3.43                   | 0.06                                           | -8.00                           | 4.63                                      | 49.60                              |
| <i>Dayton Levee</i>                            | 64.97                         | x                      | x                      | x                                              | x                               | x                                         | 49.54                              |

Touchet Seepage Assessment.

| Attachment B-8                              |                         |                     |                     |                                       |                                |                                       |                 |
|---------------------------------------------|-------------------------|---------------------|---------------------|---------------------------------------|--------------------------------|---------------------------------------|-----------------|
|                                             |                         |                     |                     |                                       |                                |                                       |                 |
| Composite Seepage Data Set 2009             |                         |                     |                     | March 2009 Data Set                   |                                |                                       |                 |
| Flow Measurement Location (Reach Locations) | Actual River Mile (GIS) | Rate Per Mile (cfs) | Net Gain/Loss (cfs) | Gross Instream Gain/Loss Change (cfs) | 2009 Net Diversion Total (cfs) | 2009 Net Tributary Inputs Total (cfs) | 2009 Flow (cfs) |
| LWWP4                                       | 0.8                     | 0.83                | 2.16                | 1.92                                  | -0.24                          | 0                                     | 2.77            |
| LWRESER                                     | 2.96                    | 0.18                | 0.08                | 0.58                                  | 0                              | 0                                     | 1.43            |
| LWWP3b                                      | 3.41                    | -0.95               | -0.78               | -0.78                                 | 0                              | 0                                     | 0.85            |
| LWWP3a                                      | 4.23                    | -1.85               | -0.63               | -0.63                                 | 0                              | 0                                     | 1.63            |
| LWWP3                                       | 4.57                    | -0.73               | -0.43               | 0.38                                  | 0                              | 0.81                                  | 2.26            |
| LWWP2b                                      | 5.16                    | 3.2                 | 1.6                 | 1.6                                   | 0                              | 0                                     | 1.88            |
| LWSWP2                                      | 5.66                    | -2.12               | -0.53               | -0.53                                 | 0                              | 0                                     | 0.28            |
| LWSWP                                       | 5.91                    | 0.22                | 0.14                | 0.14                                  | 0                              | 0                                     | 0.81            |
| LWBONNIE                                    | 6.56                    | -0.02               | -0.02               | -0.67                                 | -1.247                         | 0.6                                   | 0.67            |
| LWMILLER                                    | 7.57                    | x                   | x                   | x                                     | x                              | x                                     | 1.34            |
|                                             |                         |                     |                     |                                       |                                |                                       |                 |
| Seepage Data Set 2009                       |                         |                     |                     | September 2009 Data Set               |                                |                                       |                 |
| Flow Measurement Location (Reach Locations) | Actual River Mile (GIS) | Rate Per Mile (cfs) | Net Gain/Loss (cfs) | Gross Instream Gain/Loss Change (cfs) | 2009 Net Diversion Total (cfs) | 2009 Net Tributary Inputs Total (cfs) | 2009 Flow (cfs) |
| LWWP4                                       | 0.68                    | 0.0                 | 0.0                 | 0.0                                   | 0.00                           | 0.00                                  | 0.00            |
| LWWP3a                                      | 4.1                     | -0.6                | -0.2                | -0.2                                  | 0.0                            | 0.0                                   | 0.01            |
| LWWP3                                       | 4.4                     | -0.2                | -0.1                | -0.1                                  | 0.0                            | 0.0                                   | 0.20            |
| LWWP2b                                      | 5.0                     | 0.2                 | 0.1                 | 0.1                                   | 0.0                            | 0.0                                   | 0.30            |
| Stateline                                   | 5.5                     | -1.0                | -0.9                | -1.1                                  | -0.2                           | 0.0                                   | 0.18            |
| Bonnie                                      | 6.4                     | 3.0                 | 3.0                 | 0.7                                   | -3.0                           | 0.8                                   | 1.28            |
| Residential Gravel Road                     | 7.4                     | -0.9                | -0.7                | -0.2                                  | 0.0                            | 0.5                                   | 0.57            |
| LWWP2                                       | 8.2                     | 0.3                 | 0.2                 | -0.9                                  | -1.1                           | 0.0                                   | 0.80            |
| Appleton Road                               | 8.7                     | -2.9                | -2.1                | -0.8                                  | -0.3                           | 1.6                                   | 1.74            |
| Sunnyside Road                              | 9.4                     | -0.5                | -0.4                | -5.0                                  | -4.7                           | 0.0                                   | 2.53            |
| Old Highway                                 | 10.1                    | -2.1                | -0.8                | -3.8                                  | -3.8                           | 0.9                                   | 7.54            |
| Powell Road                                 | 10.5                    |                     |                     |                                       |                                |                                       | 11.30           |

West Little Walla Walla Seepage Assessment.

Attachment B-9

Composite Seepage Data Set

March 2009 Data Set

| Flow Measurement Location (Reach Locations) | Actual River Mile (GIS) | Rate Per Mile (cfs) | Net Gain/Loss (cfs) | Gross Instream Gain/Loss Change (cfs) | Net Diversion Total (cfs) | Net Tributary Inputs Total (cfs) | Measured Instream Flow (cfs) |
|---------------------------------------------|-------------------------|---------------------|---------------------|---------------------------------------|---------------------------|----------------------------------|------------------------------|
| LWSE2                                       | 0.20                    | 0.11                | 0.11                | 0.11                                  | 0.00                      | 0.00                             | 11.98                        |
| LWSBS                                       | 1.19                    | 0.02                | 0.03                | 11.13                                 | 0.00                      | 11.10                            | 11.87                        |
| Stateline and McDaniels Rd                  | 1.90                    | 0.80                | 0.71                | -0.74                                 | -1.45                     | 0.00                             | 0.74                         |
| West Ballou Rd.                             | 3.03                    | 0.91                | 1.23                | 1.48                                  | 0.00                      | 0.25                             | 1.48                         |
| LWDS                                        | 3.77                    | x                   | x                   | x                                     | x                         | x                                | 0                            |

Composite Seepage Data Set

September Data Set

| Flow Measurement Location (Reach Locations) | Actual River Mile (GIS) | Rate Per Mile (cfs) | Net Gain/Loss (cfs) | Gross Instream Gain/Loss Change (cfs) | Net Diversion Total (cfs) | Net Tributary Inputs Total (cfs) | Measured Instream Flow (cfs) |
|---------------------------------------------|-------------------------|---------------------|---------------------|---------------------------------------|---------------------------|----------------------------------|------------------------------|
| LWSE2                                       | 0.20                    | -2.87               | -2.89               | -2.89                                 | 0.00                      | 0.00                             | 9.2                          |
| LWSBS                                       | 1.19                    | 0.06                | 0.08                | 11.28                                 | 0.00                      | 11.20                            | 12.09                        |
| Stateline and McDaniels Rd                  | 1.90                    | -0.10               | -0.09               | -1.04                                 | -0.95                     | 0.00                             | 0.81                         |
| West Ballou Rd.                             | 3.03                    | 1.03                | 1.39                | 1.83                                  | 0.00                      | 0.44                             | 1.85                         |
| LWDS                                        | 3.77                    | -0.32               | -0.48               | -0.48                                 | 0.00                      | 0.00                             | 0.02                         |
| LWCI                                        | 4.44                    | -0.07               | -0.21               | -0.41                                 | -0.20                     | 0.00                             | 0.5                          |
| LWCB                                        | 4.77                    | 0.10                | 0.10                | -2.98                                 | -3.08                     | 0.00                             | 0.91                         |
| LWCF                                        | 5.80                    | x                   | x                   | x                                     | x                         | x                                | 3.89                         |

East Little Walla Walla Seepage Assessment

# Attachment C

## Attachment C-1

### WWBWC Rivers, Springs/Creeks, and Ditch Gauge Locations INDEX 2010

D = Download  
F = Flow  
T = Temperature  
C = Conductivity  
S = Staff Gauge Reading

| Site ID                        | System<br>Stream/Spring Name    | Site Location                                                         | Tasks         |
|--------------------------------|---------------------------------|-----------------------------------------------------------------------|---------------|
| <u>West Little WW System</u>   |                                 |                                                                       |               |
| LWWP                           | West Branch West Little WW      | East of Winsap Rd.                                                    | D, F, C, T, S |
| LWLW                           | West Little WW                  | North/Northwest of Appleton Rd. - Winsap Rd. intersection             | D, F, C, T, S |
| LWWP2                          | West Little WW                  | West of Winsap Rd.                                                    | D, F, C, T, S |
| LWSWP                          | West Little WW                  | S of Stateline Rd, near Valley Chapel Rd intersection                 | D, F, C, T, S |
| LWWP3                          | West Little WW                  | Off of Valley Chapel Rd.                                              | D, F, C, T, S |
| LWWP4                          | West Little WW                  | East side of Swegle Rd.                                               | D, F, C, T, S |
| <u>East Little WW System</u>   |                                 |                                                                       |               |
| LWSE                           | Spring Branch to East Little WW | Ferndale Rd.                                                          | D, F, C, T, S |
| LWSE2                          | East Little WW                  | Off of Beet Rd.                                                       | D, F, C, T, S |
| LWWBS                          | Spring to Big Spring Branch     | North side of Ballou Rd.                                              | D, F, C, T, S |
| LWSBS                          | Big Spring Branch               | Off of Old Milton HWY                                                 | D, F, C, T, S |
| LWBSM1                         | Big Spring Branch               | Yates Lane (Private) off of Old Milton HWY                            | D, F, C, T, S |
| LWDS                           | Downing Spring                  | Robin Lane (Private) off of Old Milton HWY                            | D, F, C, T, S |
| <u>Lewis Prong/Walsh Creek</u> |                                 |                                                                       |               |
| LWSLP                          | Walsh Creek (Lewis Prong in OR) | Stateline Rd. and Trolley Lane                                        | D, F, C, T, S |
| <u>Crockett System</u>         |                                 |                                                                       |               |
| LWCKK                          | West Branch West Crockett       | North side of Appleton Rd. on east side of west bulge, Davis Orchards | D, F, C, T, S |
| LWCA                           | West Crockett                   | North side of Cobb Rd.                                                | D, F, C, T, S |
| LWCF                           | West Branch West Crockett       | North side of Cobb Rd.                                                | D, F, C, T, S |
| LWCB                           | East Branch Crockett            | Appleton Rd. and Weis Rd., on south side of Appleton Rd.              | D, F, C, T, S |
| LWCI                           | Crockett Branch                 | Crockett Rd. and Old Milton HWY, on south side of Crockett Rd.        | D, F, C, T, S |
| <u>Ford Branch System</u>      |                                 |                                                                       |               |
| LWFC                           | West Ford Branch                | On east side of Old Milton HWY, south of Cobb Rd.                     | D, F, C, T, S |
| LWFD                           | Ford Branch                     | West side of Winsap Rd., at junction of Winsap Rd. and Appleton Rd.   | D, F, C, T, S |
| LWFH                           | East Ford Branch                | Off of Umapine HWY, next to West Little WW River sign                 | D, F, C, T, S |
| LWFMM                          | West Ford Branch                | Off of Umapine HWY, next to West Little WW River sign                 | D, F, C, T, S |