Middle Snake River Watershed
Level 1 Assessment
Executive Summary

The purpose of watershed planning under the State of Washington Watershed Management Act (WMA) is to provide a framework for local citizens, interest groups, and government organizations to collaborate in meeting this challenge such that management of water resources enhances the economic health, environmental health, and quality of life in the region through identification and resolution of water resource issues.

Watershed Planning Process

Voluntary watershed planning under the WMA occurs in three primary phases:

- Phase I: Organization
- Phase II: Conducting Watershed Assessments
  - Level 1: Summarize Existing Data and Identify Data Gaps
  - Level 2: Gather Additional Information to Fill Data Gaps
  - Level 3: Long-term Monitoring
- Phase III: Developing a Watershed Plan

The initiating governments began organizing the planning effort (Phase I) in 2003 by identifying Asotin County PUD as the lead agency for watershed planning in WRIA 35. Asotin County PUD and the initiating governments then developed the WRIA 35 Planning Unit. The WRIA 35 Planning Unit is responsible for guiding the overall development of the watershed plan for the Walla Walla Basin that will address the following water resource issues: water quantity, instream flows, water quality, and habitat.

Watershed Assessment

This assessment documents the information gathered from existing resources under the Phase II, Level 1 Watershed Technical Assessment. To satisfy the goals and objectives of the WRIA 35 Planning Unit, the following issues were reviewed and are addressed within this technical assessment:

- Section 1 – Introduction and Purpose
- Section 2 – Watershed Characteristics
- Section 3 – Asotin Creek Implementation Area
- Section 4 – Middle Snake River Implementation Area
- Section 5 – Pataha Creek Implementation Area
- Section 6 – Tucannon River Implementation Area
- Section 7 – Ground Water Resources
- Section 8 –Water Balance

- Section 9 – Instream Flow
- Section 10 – Recommendations

In addition, this assessment identifies those areas where data is lacking (data gaps) that will need to be addressed during the Level 2 assessment to facilitate development of the watershed plan during Phase III. Level 2 assessment activities are starting in January 2005.

Physiographic Setting

The Middle Snake River Watershed (WRIA 35) occupies 2,250 mi^2 in southeastern Washington along the Idaho border to the east and Oregon border to the south, and the Palouse Watershed (WRIA 34) to the north, and the Walla Walla (WRIA 32) and Lower Snake (WRIA 33) to the west. Exhibit 2-1 shows the regional location of the WRIA 35. The Middle Snake Watershed encompasses portions of Asotin, Whitman, Garfield, and Columbia Counties within Washington. It should be noted that approximately 340 square miles of the lower Grande Ronde Watershed is located within WRIA 35 boundaries but is not part of the planning effort. Diamond Peak, located in the headwaters of the Tucannon River, is the highest point in the basin with an elevation of 6,380 feet, while the confluence of the Snake and Tucannon Rivers is the lowest point at approximately 540 feet. The City of Clarkston and towns of Starbuck, Pomeroy, and Asotin are also located within the WRIA.

For purposes of this assessment, WRIA 35 was divided into four subbasins (termed “Implemenatation Areas”), each based on prominent surface water features: Asotin Creek, Middle Snake River, Pataha Creek, and Tucannon River (see Exhibit 2-2). These four implementation areas were also defined in this manner because they are generally consistent with the subbasins delineated under the limiting factors analysis conducted by the Washington Conservation Commission, subbasin plans prepared under the Bonneville Power Association/Northwest Power Planning Council and the Salmon Recovery Programs. It should be noted that the Planning Unit decided not to include the Grande Ronde subbasin in this assessment.

Climate

The Middle Snake Watershed is semi-arid and is largely influenced by the Cascade Mountains to the west, the Pacific Ocean, and the prevailing westerly winds. Regional climate depends greatly on elevation and varies from warm and semiarid in the northern lowlands to cool and relatively wet at higher elevations in the Blue Mountains. This increased elevation causes mean annual precipitation rates to exceed 40 inches per year in some areas while elevations may be as low as 500 feet to the north and receive 10-15 inches per year. Much of the precipitation occurs from November to January and at higher elevation falls as snow that persists as snow pack until March or April. Snowfall at lower elevations (below 1500 feet) seldom remains more than a few weeks. In addition, the annual spring snowmelt may provide substantial stream flow for a limited period. Air temperatures vary distinctly from cooler mean temperatures at higher elevations in the Blue Mountains to much warmer mean temperatures at lower elevations in the Palouse.

Geology

The Blue Mountains in southeast Washington were formed approximately 110 million years ago when volcanic islands and the sea floor from the Pacific Ocean rode up onto the western edge of the North American continent. The ancient fractured and folded lava flows comprise the basaltic rocks that make up the geology of the basin. The basalt flows that covered the region, which are thousands of feet thick, diverted the Columbia River northward and westward to its present location and are largely responsible for the topography of the Columbia Basin. Each basalt formation accumulated from individual flows ranging in thickness from 10-300 feet. The current topography of the region results from a combination of erosion and underlying structural deformation of the basalt. Within the last 35 to 40 million years, dry climate and outwash from receding ice glaciers created vast quantities of fine-grained sediments deposited throughout the region. This sediment was carried by wind and deposited throughout the basin. The mountain and plateau soils are dominated by these wind-blown silt (loess) deposits.

Vegetation

Historically, the Middle Snake River watershed was covered by prairie and canyon grasslands and shrub steppe vegetation. This was predominantly in the lower to middle elevations. Forests dominated in the higher elevations near and within the Blue Mountains. Presently, much of the grasslands and prairies have been converted to crop and livestock production. Non-irrigated row crops, primarily wheat, cover approximately 37 percent of the vegetative cover land, while grass-forb plant covers over 30 percent of the vegetative cover. Coniferous forest covers about 20 percent, while shrub lands cover 7 percent of the vegetative cover. The remaining vegetation is a mix of various vegetation classes.

Population, Land Use, and Land Ownership

The total population of Asotin County in 2000 was 20,551. Of this total 19,256 lived in the cities of Asotin or Clarkston and surrounding areas. No major population centers are present in the Whitman County portion of the WRIA. The city of Pomeroy was the most populated area in Garfield County with 1,517 residents. The largest town in the Columbia County portion of the WRIA was Starbuck with a population of 130 in year 2000. Private land comprises 1,711 square miles (76%) of the WRIA, while the federal government manages 436 square miles (19%), and the state of Washington manages 103 square miles (~5%). Population projections conducted in this Level 1 assessment, estimate population to be ~33,400 in WRIA 32.

Based on the 1992 land cover data, the predominant land covers within WRIA 35 are agriculture land cover totaling more than 475,000 acres (33 percent) of the watershed; pasture and grassland that covers almost 300,000 acres (21 percent); and scrubland which covers slightly more than 400,000 acres (28 percent) of the watershed. The majority of forestland is in the Umatilla National Forest and is managed by the USFS for multiple uses including timber management, livestock grazing, outdoor recreation, mining, and water management. The state of Washington and non-industrial private forestland owners manage the remaining forestland. The amount of developed land within WRIA 35 is minimal with less than 10,000 acres (1 percent) of the watershed.

Agriculture in the basin and surrounding region is dominated by non-irrigated farming in the uplands, irrigated farming in the lower valleys, and cattle ranching. The primary agricultural activities in WRIA 35 include wheat and barley and small grains/alfalfa with summer fallow every two to three years.

Surface Water Resources

Gauged Stream Flow

Historical gauged stream flow data exists throughout the WRIA. However, few of these stations are still in use, and some of the locations may not be appropriate for the emerging management priorities of the basin. The two factors determining the usefulness of stream flow data include its location and its period of record. From information collected under the Level 1 Assessment, priority streams have been identified for streamflow management and potentially setting instream flow levels (see Exhibit ES-2). Several new gauges have recently been installed by Ecology and Washington State University, but the periods of record are short. The mainstems generally have adequate data for estimating stream flows, but many of the tributaries either have no gauges or new gauges have a very short period of record.

There is a need to further examine the stream flow data in assessing the baseflow component from ground water returns, as well as to potentially identify gaining and losing reaches within the major basins in the WRIA. Further resolution of the ground and surface water interaction will greatly enhance the knowledge base surrounding the overall water balance in each implementation area.

Instream Flow Studies

No formal minimum instream flows have been set in WRIA 35 by State rule. However, surface water source limitations (SWSL) closing or defining low flow limits have been established in several streams. Instream flow studies have been conducted for Tucannon River and Asotin Creek. The out-of-stream and instream demands, instream flow studies, SWSLs and gauging information described above provide a starting point for *identifying* priority areas for establishing minimum instream flows in the Basin.

Out-of-Stream Water Uses

Agricultural (irrigation) use is the most prominent in the basin[1] but there is no readily available metered data for this type of use. Most of the agricultural use is derived from surface water sources. The largest single use is associated with irrigation and industrial/municipal use by areas served by the Asotin County Public Utility District, which utilizes ground water sources to meet these demands. Based on the water projection estimates through the planning period (2025), total demand in the basin is expected to be ~18,300 acre-feet per year, which includes both surface and ground water use. This is based on limited population growth and the assumption that irrigation use will not change significantly from current usage.

[1] There are also large commercial/industrial and municipal uses in the Clarkston area based on water rights.

Ground Water Resources

The principal hydrogeologic units are part of the Columbia River Basalt Group (CRBG), which underlie the entire area. Overlying these basalt units are diverse unconsolidated sediments. The most common is wind-deposited loess. Most of these sediments are present throughout the watershed in limited thickness and do not provide significant water-bearing or producing capacities. The most recent conceptualization as described in Whiteman et al. (1994) define the hydrologic framework as shown in Table 7-1, wherein the major basalt and sediment stratigraphy groups correspond with the hydrologic units: the Saddle Mountains Unit, Wanapum Unit, and Grande Ronde Unit, Saddle Mountains-Wanapum interbed, and Wanapam-Grande Ronde interbed.

Ground water in the basalt aquifers generally flows from the higher elevation recharge areas in the Blue Mountains toward the main surface water bodies, discharging toward the Snake River and Grande Ronde River. The primary tributaries such as the Tucannon River and Asotin Creek do not appear to control the regional flow patterns in the basalt aquifers, but baseflows (ground water discharge) to these tributaries are a significant portion of the total stream flows, which indicate that shallow ground water is affected by the smaller tributaries on a local level. Baseflow is shown to be a significant portion of the total stream flow year-round due to the hydrology and hydrogeology in WRIA 35. Ground water discharge to streams is significant in the basin, ranging from approximately 30 percent in the winter months to over 90 percent of stream flow in the summer.

Water Rights

In the WRIA 35 basin there are a total of 182 surface water right permits and certificates. Of these, 173 are primary water rights. The total annual and instantaneous quantities associated with primary surface water rights for WRIA 35 are 10,371.8 afy and 203.37 cfs, respectively. The majority of surface water rights in the basin have, by far, been appropriated for irrigation purposes. In total, irrigation surface water rights account for 9,605 afy of the total annual quantity and 81.09 cfs of the total instantaneous quantity. There is one water right shown for municipal supply for 6.24 cfs with no annual quantity shown, which was issued to Washington Water Power Company for municipal supply for the City of Clarkston.

There are a total of 225 ground water right permits and certificates. Of these, 205 are primary water rights. The total annual and instantaneous quantities associated with primary ground water rights for WRIA 35 are 28,290 afy and 43,836 gpm, respectively. The majority of ground water rights in the basin have, by far, been appropriated for irrigation purposes. In total, irrigation ground water rights account for 15,423 afy of the total annual quantity and 24,402 gpm of the total instantaneous quantity. Other categories of use representing sizeable appropriations of instantaneous quantity include commercial, municipal, and domestic uses.

Water Balance

The water balance represents an accounting of the quantity of water that is available annually, the sources of that water, and how it is distributed as surface versus ground water. Only a crude estimate of the water balance within the WRIA could be generated primarily because of the limited information on evapotranspiration and the ground water system, especially as it relates to hydraulic continuity (transfer of water between the surface and groundwater systems). These two components among all others are the dominant source of error in the present water balance estimate.

Based on the watershed-wide water balance, the net demands is less than 1 percent of the net precipitation in the basin. Whatever errors and uncertainty are associated with the estimates in the basin-wide water balance, it is of interest to note that the demands are small with respect to the overall volume of water(s) within the WRIA. Notwithstanding, the availability of that water cannot be determined until specific numbers are established for in-stream flow needs.

Water Quality

Based on the available surface water quality data, temperature and sediment are the primary issues affecting habitat, while fecal coliform issues have been identified as issues for drinking water use. Specifically, elevated temperatures and sediment loadings in Pataha, Tucannon, and the Snake River have been identified. Water quality deficiencies in the watershed also affect drinking water supplies. Fecal coliform has been identified as a concern in Asotin and Pataha Creeks, requiring TMDLs and clean-up plans. Data on temperature is available from various gauging stations throughout the WRIA, while data on other surface water quality parameters such as chemical pollution, sediment, dissolved oxygen levels, etc. is primarily available from Ecology monitoring stations and consequently is very limited in scope. Specifically, the availability of toxics monitoring is most limited in the basin.

With the exception of monitoring data from city production wells, most of the ground water quality data is regional in nature. Information reviewed in this Level 1 Assessment is based on knowledge of ground water quality of the Columbia River Basalt aquifers. Consequently, plans should be put into place to seek additional data sources and identify critical points of interest where actual field sampling efforts may be needed.

the connection between land use and water quality needs to be clarified for planning purposes. To determine effective strategies for water quality enhancement, watershed plan elements will focus on limiting water quality impacts from various types of land use.

Habitat

Habitat conditions were not reviewed as part of this Level 1 Assessment document. The Planning Unit is relying on the subbasin planning efforts for the Lower Snake River, Tucannon River, and Asotin Creek subbasins for the habitat assessment, along with the State Salmon Recovery Planning currently underway. Generally, subbasin planning has identified flow conditions in some streams as a limiting factor for fish habitat. Temperature has also been identified in many parts of the basin as a limiting factor. Since temperature is strongly related to the amount of flow in the streams, this is an indication that limited flows occur in these areas as well. However, flow has not been identified as a priority limiting factor. Additional assessment needs to occur to determine the priority instream flow needs and conflicts in the basin.

Recommendations

The assessment includes a discussion of the adequacy of the different types of technical data compiled and reviewed as part of the Level 1 Assessment in terms of completing the Watershed Plan. Those data needs that are being at least partially addressed under the Level 2 assessment scope of work are listed below. Recommendations for the remaining additional work are summarized in Table 10-1.

- Quantify the impacts from changing timber and agricultural practices, as well as growth (or decline) of municipal and industrial activity. The focus of this work would be to examine historical changes in land use and link those potentially to changes in water quantity or quality. Conduct a detailed land use review along priority streams based on instream flow, habitat, and water quality concerns.

- More specific and detailed analysis of usage and practices may be needed to develop management strategies appropriate for local areas along or adjacent to priority streams; improved understanding of existing surface water diversions and ground water withdrawals

- Further examine stream flow data in assessing the baseflow component from ground water returns, as well as identify gaining and losing reaches within the major basins in the WRIA.

- Conduct additional instream flow studies on priority reaches that currently do not have results. Instream flow studies may involve IFIM method or other methods approved by Ecology. Costs will depend on the type of method used and the number of locations

- Initial investigation should be conducted to identify potential long-term water supply options, including off-stream storage, shallow aquifer storage and recovery (treated), conservation, and reuse (treated). This work should identify possible strategies and locations for implementation as well as anticipated planning level costs estimates that may be required for program development or capital improvements.

- Also, as part of the Level 2 storage assessment, the ability to manipulate recharge and discharge in the basalt aquifer should be considered. Well logs from the Ecology have been downloaded, but only a cursory review has been conducted under this Level 1 Assessment. As part of the Level 2 assessments for storage and/or instream flow, these well logs can be further evaluated as part of this effort.

Addressing many of these data gaps will involve long-term data collection and analysis efforts, beyond the four-year schedule for completing the watershed plan. Hence, the watershed management plan will need to include an adaptive management framework for incorporating new information into watershed management strategies as it becomes available.