Section 2
Regional Overview

2.1 Geography

The Walla Walla River Watershed occupies 1758 mi^2 (1,125,124 acres) in southeastern Washington and northeastern Oregon just east of where the Columbia River turns to form the Washington-Oregon border. The portion of the watershed located in Washington State, 1278 mi^2 (817,923 acres; 73%), is known as Watershed Resource Inventory Area 32 (WRIA 32). Although the Walla Walla River Watershed includes area in both Oregon and Washington, WRIA 32 includes only that portion of the watershed within Washington State. Approximately 75% of WRIA 32 is located within Walla Walla County, with the remainder located in Columbia County (see Exhibit 2-1). The Cities of Walla Walla, College Place, Dayton, Prescott, Touchet and Waitsburg are also located within the WRIA.

WRIA 32 is bounded by the Columbia River on the west, the Blue Mountains on the east, the state line on the south and the Snake River Basin to the north (see Exhibit 2-1). Lowland elevations range from 300 feet near the mouth of the Walla Walla to 2,500 feet at the base of the Blue Mountains while maximum elevations are found in the Blue Mountains at the far south-eastern portion of the WRIA, where elevations average approximately 5,000 feet (Saul, 2000).

2.2 Subbasin Delineation

For purposes of this assessment, WRIA 32 was divided into three subbasins, each based on prominent surface water features: Walla Walla River Subbasin, Touchet River Subbasin and Mill Creek Subbasin (see Exhibit 2-1). Each of these subbasins are described in more detail below. The subbasin delineations used for this assessment match those used by Kuttel et al. (2001) in the Walla Walla Watershed Limiting Factors Report published by the Washington State Conservation Commission. The intent of separating the watershed into subbasins is to define a basic scale for the collection of information that will allow for adequate resolution in the overall assessment effort. In this approach, comparisons can be made with regards to the adequacy of available data on a subbasin scale. The utility of this delineation is found in organizing the data with respect to specific hydrologic basins. These subbasins are defined by various locally prominent surface water elements. Although some information is not limited geographically by subbasin boundaries (e.g. selected groundwater data), assessment by subbasin offers a more refined scale for conducting the data collection and review, enabling greater detail information for use in the planning phase.

In addition, a portion of area within the WRIA 32 boundary was not included in this assessment (see Exhibit 2-1). While in the majority of WRIA 32 surface runoff drains into the Walla Walla River or one of its tributaries, in a small portion of area in the far western portion of the basin, runoff drains directly into the Columbia River. Because runoff from this area does not impact

water quantity, quality, or habitat issues in the Walla Walla River or its tributaries, this area was excluded from the Walla Walla River Watershed Assessment.

2.2.1 Walla Walla River Subbasin[1]

The Walla Walla River Subbasin includes the area that drains into the mainstem Walla Walla River north of the stateline, and all tributaries flowing into this portion of the river, with the exception of Mill Creek, separated into its own subbasin. The Walla Walla River Subbasin is home to the largest urban area in the WRIA, that of Walla Walla/College Place (population approx. 35,000), and the smaller population centers of Lowden (population approx. 50) and Dixie (population approx. 200). Similar to lower elevations of the Touchet River Subbasin, the Walla Walla River Subbasin is primarily comprised of a wide valley bottom and floodplain under intensive agricultural use. Land use ranges from highly urbanized in the Walla Walla/College Place vicinity to agriculture throughout the remainder of the subbasin. The Walla Walla River Subbasin is underlain by both the deep basalt aquifer that extends throughout the WRIA as well as the shallow gravel aquifer, centered around the City of Walla Walla and south that is of primary concern with respect to groundwater management.

Primary waterbodies in this subbasin include the Walla Walla River, Dry Creek, Mud Creek (Dry Creek tributary), Cottonwood Creek, Pine Creek, Cold Creek, Doan Creek, Garrison Creek, Stone Creek, Caldwell Creek, Reser Creek, Yellowhawk Creek and Russell Creek, several of which cross into or originate in Oregon. Yellowhawk and Garrison Creeks are controlled by U.S. Army Corps of Engineers headgates that convey water from Mill Creek to the Walla Walla River.

For the majority of the WRIA 32 assessment, Dry Creek was treated as a tributary within the Walla Walla Subbasin. However, due to its unique issues with respect to fish habitat, the Dry Creek drainage area is discussed separately in Section 8 of this assessment.

2.2.2 Touchet River Subbasin[1]

The Touchet River Subbasin encompasses the Touchet River headwaters originating high in the Blue Mountains (elevation 4,000-5,000 feet), the Touchet River, its tributaries and lands that drain to these waterbodies. The largest population center in the subbasin is the City of Dayton (population approx. 2,500). Other population centers in this subbasin include the cities of Waitsburg (population approx. 1,000), Prescott (population approx. 330), and Touchet (population approx. 410). Comprised of deep valleys cut through Columbia River Basalts, forestry is the dominant landuse in the upper elevations of the Touchet Subbasin, with some dryland farming on high plateaus and irrigated agriculture in the valley bottoms. The lower elevations of this subbasin contain a wide valley bottom and floodplain areas under intensive agricultural use.

[1] All information in this section was taken from Kuttel, 2001, unless otherwise noted.

In addition to the Touchet River mainstem, primary streams in the subbasin include the North and South Forks of the Touchet, Spangler Creek, Lewis Creek, Jim Creek, Wolf Fork, Robinson Fork, Coates Creek, Whitney Creek, the South Fork Touchet and its forks (Griffin, Burnt, and Green). As described in later sections of this document, significant water quantity, instream flow, water quality, and habitat issues are present in the Touchet River Subbasin, especially in lower reaches. Regarding water rights, the entire Touchet River has been closed to further consumptive appropriations of surface water from June 1st through October 1st through administrative rule (Chapter 173-532 WAC, Washington State, 1977).

2.2.3 Mill Creek Subbasin[2]

The Mill Creek Subbasin is the smallest of the three subbasins in the far southeastern portion of the WRIA. Mill Creek originates on U.S. Forest Service land high in the Blue Mountains of Washington, dips into Oregon for approximately 5 miles, and then returns to Washington at lower elevations. East of the City of Walla Walla, Mill Creek flows into the Bennington Lake Dam operated by the U.S. Army Corps of Engineers. The upper elevations of this watershed have been closed to public entry since 1954, except by special permit, as Mill Creek provides a significant municipal water supply for the City of Walla Walla and surrounding urban areas.

The lower portion of this subbasin contains plateaus where both dryland and irrigated agricultural are the dominant land uses. In addition to Mill Creek, primary streams in this subbasin include the North Fork of Mill Creek, Blue Creek, Deadman Creek, Burnt Fork, Green Fork and Bull Creek.

2.3 Climate and Precipitation

The climate of WRIA 32 is largely controlled by the Cascade Mountains to the west, the Pacific Ocean beyond the mountains, and the prevailing westerly winds. Air masses move from the Pacific Ocean over the Cascade Mountain range where they drop a majority of their moisture, leaving WRIA 32 region in an arid rain shadow. This rain shadow effect contributes to the arid steppe of the Columbia Basin that extends to the Blue Mountains. Elevation is an additional factor that significantly impacts climate in the Walla Walla basin, as local climate varies from warm and semiarid in the western lowlands to cool and relatively wet at higher elevations in the Blue Mountains.

Historic climatological data is available from the Western Regional Climate Center (WRCC) for 12 stations in WRIA 32, located either within the basin or close proximity. The WRCC database provides long term monthly averages for precipitation, minimum and maximum temperatures, snowfall, average snow depth, and elevation. Exhibit 2-2 shows the distribution of these stations, the time period for which each station collected data, and indicates whether the station was located within the WRIA 32 or outside its borders. Several sites also include snowpack data including the two Snotel Stations at Touchet and Spruce Springs.

[2] All information in this section was taken from Kuttel et al. (2001), unless otherwise noted.

INSERT EXHIBIT 2-1

The temperatures within WRIA 32 vary with yearly climatic cycles and location. Based on historical data, peak temperatures occur through July and start to decrease in late August. Furthermore, hotter temperatures are associated with the lower elevations while cooler temperatures are associated with the higher elevations within the WRIA. The average temperatures range from 20 - 25° F in the winter to 90 - 95° F in the summer. Exhibit 2-3 shows average maximum and minimum temperatures for three selected climate stations in the WRIA.

Precipitation patterns inversely reflect temperature gradients as precipitation rates increase progressively eastward and higher in elevation toward the Blue Mountains. Exhibit 2-4 shows average annual precipitation throughout the WRIA, while Exhibit 2-5 shows average precipitation for three specific stations. The lower west end of the basin averages less than 10 inches of precipitation per year while the higher east end of the basin averages 40-60 inches per year. For example, annual precipitation at Walla Walla, WA (elevation 632 feet) is approximately 13.5 inches, at Dayton, WA (elevation 1557 feet) approximately 17.5 inches, while average precipitation in the Blue Mountains (elevations exceeding 5000 feet) can reach 50 inches per year (CTUIR, 1999). This precipitation falls mainly in winter (October through March), with 70% occurring from October through March (Newcomb, 1965). In the lower parts of the basin, precipitation comes mainly as rain, while the uplands receive both rain and snow. Thunderstorms are rare throughout the basin, occurring on average only 11 days per year, mostly during the summer (CTUIR, 1999). Snow does not often accumulate to a depth of more than 1 foot on the lowlands, but it collects in depths of several feet in the Blue Mountains during an average winter (see Exhibit 2-6).

2.4 Geology and Hydrology

The WRIA contains two major physiographic provinces, the valley lowland and the Blue Mountains, both of which are part of the larger Columbia Plateau province (Kuttel et al., 2001; PGG, 1995). The earliest geologic strata in the province are sedimentary rocks which were later covered by several thousand feet of volcanic basalt forming the Columbia River Basalt Group. The basalt was then overlain by loess soils and, in some areas, large quantities of gravel and fine sediment (the Touchet Formation). Both of these layers were deposited during the various flood events that occurred around 16,000 years ago (Kuttel et al., 2001).

Primary surface water resources in WRIA 32 include the Walla Walla River, the Touchet River and Mill Creek. The Walla Walla River headwaters are high in the Blue Mountains at an elevation of approximately 6,250 feet in northeast Oregon. The Walla Walla River flows north from the Blue Mountains and enters Washington State just north of the community of Milton-Freewater, Oregon. Tributaries to the Walla Walla River in the include Birch, Cottonwood, Mud, Russell and Yellowhawk Creeks from the south and Dry Creek which drains a significant area in the center of the WRIA before entering the Walla Walla from the north. The Touchet River, the largest Walla Walla River tributary, is contained entirely within WRIA 32. It drains a majority of the northern portion of the WRIA before joining the Walla Walla River at Touchet, Washington. Mill Creek and its primary tributary, Blue Creek, drain a significant area in the southern and southeastern portions of the WRIA, also extending into Oregon. Mill Creek begins in the forested uplands, dips southward into Oregon, before returning to Washington where it

passes through the City of Walla Walla. Mill Creek enters the Walla Walla River approximately 6 miles below the City (Evans & Associates, 2001).

Groundwater in the basin is located in two primary aquifers: (1) the gravel aquifer, which consists of unconsolidated sediments lying above a clay unit in the central lowland part of the basin, and (2) the underlying basalt aquifer, which underlies the entire Walla Walla River Basin. The gravel aquifer, associated with the Touchet Formation, is smaller in extent (190 square miles), extending along the Walla Walla River from the City of Milton-Freewater to the town of Touchet. The average elevation of the gravel aquifer is 60 feet above the basalt aquifer, the two being separated by a clay layer (ACOE, 1997). Approximately 1/3 of the 3 million acre-feet of water stored in the gravel aquifer is available for use (Kuttel et al., 2001). This aquifer has significant hydraulic continuity with the Walla Walla River. By contrast, the deeper basalt aquifer is much larger in size and areal extent. Comprised of a series of interconnected lava flows, the basalt aquifer may range in thickness from several hundred to thousands of feet and cover as much as 2500 square miles extending across and beyond the boundaries of the basin. Of the 4 million acre-feet of water moving through this aquifer, approximately 2.6 million acre-feet are accessible for use (Kuttel et al., 2001).

2.5 Vegetation

Early visitors to the Basin encountered a landscape dominated by grasses and small shrubs. In 1805, Meriwether Lewis described the area near the mouth of the Walla Walla River as "covered with aromatic shrubs herbaceous plants and a short grass" (Thwaites, 1959). Other descriptions address the lack of timber, including that of James W. Nesmith, a member of the 1843 Whitman Party, who observed that "there are some spots of good soil immediately on the streams, but from Dr. Whitman's to the fort, a distance of twenty-four miles, there is no timber except a little cottonwood, or a species of Balm of Gilead, and at the fort there is not a tree in sight on either side of the Columbia River" (Evans, 1991). Another description of the landscape was given by Lyman (1918) for the area surrounding Mill Creek and the Walla Walla River as "covered with grass and spangled with flowers. Numerous clear cold streams, gushing in springs from the ground and overhung by birches and cottonwoods, with the wild roses drooping over them, made their gurgling way to a junction with the creek" (Lyman, 1918). The vegetation present on these landscapes was likely significantly affected by the well-documented use of fire as a management tool (CTUIR, 1999; Saul, 2000).

The majority of the WRIA 32 Basin is currently in agricultural production. Although highly altered by grazing, burning and agriculture, remnants of the grassland shrub-steppe vegetation remain. In most areas, however, the vegetation on the plateaus not under cultivation is dominated by cheatgrass (*Bromus tectorum*) but also velvet grass (*Holcus lanatus*), yellow starthistle (*Centaurea solstitialis*), barnyard grass (*Echinochloa crusgalli*), tansy (*Tanacetum vulgar*), and rattlegrass (*Bromus brizaeformis*). These species are not native to the Basin and often eliminate native vegetation (CTUIR, 1999).

Areas of low shrubs and grasses in the lowlands gradually give way to the open woodlands and upland coniferous forests of the Blue Mountains at higher elevations in the east (CTUIR, 1999). Historically, extensive riparian zones existed along streams in the WRIA (ACOE, 1997).

2.6 Fish, Wildlife, Aesthetic and Recreational Resources

A list of fish species present in WRIA 32 can be found in Table 2-1. Primary salmonid species in the Basin include chinook salmon (fall and spring; *Oncorhynchus tshawytscha*), summer steelhead/rainbow trout (*Oncorhynchus mykiss*), bull trout (*Salvelinus confluentus*), mountain whitefish (*Prosopium williamsoni*) and the non-native brown trout (*Salmo trutta*). Spring Chinook were historically present in the Touchet River and its four forks (Kuttel, 2001). Numbers diminished rapidly, although a few spring chinooks have been observed in the Walla Walla and Touchet Rivers recently (Kuttel, 2001).

Summer steelhead/rainbow trout were historically present in large numbers throughout the Basin. Steelhead remain largely distributed throughout the Basin, although their populations have declined resulting in their listing as threatened under the Endangered Species Act (ESA) in March, 1999 (Kuttel et al., 2001). The historical range of bull trout has been limited to the headwaters of the North and South Forks of the Walla Walla River, Mill Creek, the North Fork Touchet River, Wolf Fork, and South Fork Touchet River (Kuttel et al., 2001). Bull trout were listed as a threatened species under the ESA in June of 1998. Mountain whitefish also appear to be highly limited in both population and distribution. Brown trout have been observed in the mainstem Touchet River between Dayton and Waitsburg and in three of the four forks upstream of Dayton (Mendel et al., 1999).

Table 2-1
Fish Species Present in WRIA 32

Species	Origin[1]	Location[2]	Status[3]	Comments
Bull Trout (Salvelinus confluentus)	N	R, T	C	Headwater areas
Spring Chinook (*Oncorhynchus tshawytscha*)	H	R, T	R	Presumed hatchery strays
Fall Chinook (*Oncorhynchus tshawytscha*)	H	R, T	R	Presumed hatchery strays
Redband Trout/ Summer Steelhead (*Oncorhynchus mykiss*)	N	R, T	C/C	Dayton return range-184-1006; Walla return range – 279-815
Mountain Whitefish (*Prosopium williamsoni*)	N	R, T	R	
Brown Trout (*Salmo trutta*)	E	R, T	R	
Lamprey (Petromyzontidae)	N	R, T	U	brook, river
Longnose Dace (*Rhinichthys cataractae*)	N	R, T	R/I	
Speckled Dace (*Rhinichthys osculus*)	N	R, T	A	
Umatilla Dace (*Rhinichthys umatilla*)	N	R, T	I	
Leopard Dace (*Rhinichthys falcatus*)	N	R, T	I	
Chiselmouth (*Acrocheilus alutaceus*)	N	R, T	C	

Table 2-1 Fish Species Present in WRIA 32				
Species	**Origin[1]**	**Location[2]**	**Status[3]**	**Comments**
Peamouth (*Mylocheilus caurinus*)	N	R, T	I	
Redside shiner (*Richardsonius balteatus*)	N	R, T	C	
Northern pikeminnow (*Ptychocheilus oregonensis*)	N	R, T	C	
Sucker (Catostomidae)	N	R, T	C	Bridgelip, largescale
Carp (*Cyprinus carpio*)	E	R, T	R/I	Common in lower sections of the Walla Walla and Touchet
Bullhead catfish, brown (*Ameiurus nebulosus*)	E	R, T	R/I	Yellow, black
Tadpole madtom (*Notorus gyrinus*)	E	R, T	R/I	
Channel catfish (*Ictalurus natalis*)	E	R, T	C/I	(C) lower mainstem
Smallmouth bass (*Micropterus dolomieu*)	E	R, T	C/I	Common in lower sections of the Walla Walla and Touchet
Largemouth bass (*Micropterus salmoides*)	E	R, T	R/I	
Pumpkinseed (*Lepomis gibbosus*)	E	R, T	I	
Bluegill (*Lepomis macrochirus*)	E	R, T	R/I	
White crappie (*Pomoxis annularis*)	E	R, T	C/I	(C) lower mainstem
Black crappie (*Pomoxis nigromaculatus*)	E	R, T	C/I	(C) lower mainstem
Warmouth (*Lepomis gulosus*)	E	R, T	I	
Yellow Perch (*Perca flavescens*)	E	R, T	I	
Paiute sculpin (*Cottus beldingi*)	N	R, T	C	
Margin sculpin (*Cottus marginatus*)	N	R, T	C	
Torrent sculpin (*Cottus rhotheus*)	N	R, T	R	
3-spine stickleback (*Gasterosteus anculeatus*)	E	R, T	R/I	
Sandroller (*Percopsis transmontana*)	N	R, T	I	

[1]Origin: N=Native stock, E=exotic, H=Hatchery reintroduction
[2]Location: R=mainstem rivers and Mill Creek, T=tributaries, P=ponds
[3]Fish species abundance based on average number of fish per 100m^2: A=abundant, C=common R=rare, U=uncommon, and I=insufficient data

Other non-salmonid fish species of concern are also present in the WRIA. Margined sculpin (*Cottus marginatus*) is listed as a "sensitive" species by the State of Washington. Margined sculpin have been relatively common in the mainstem Touchet River near Waitsburg, in Coppei Creek, Wolf Creek, the North Fork of the Touchet and Robinson Fork (Mendel et al., 1999). Pacific Lamprey (Lampetra tridentate) are distributed throughout the Columbia River system, including relatively low numbers in WRIA 32 (Mendel et al., 1999). Additional native species in WRIA 32 include the specked dace (*Rhinichthys osculus*), chiselmouth (*Acrocheilus alutaceus*), redside shiner (*Richardsonius balteatus*), northern pikeminnow (*Ptychocheilus oregonensis*),

largescale sucker (*Catostomus macrocheilus*), and bridgelip sucker (*Catostomus columbianus*). In addition to brown trout, non-native species in the WRIA include the tadpole madtom (*Noturus gyrinus*), channel catfish (*Ictalurus punctatus*), yellow bullhead (*Ictalurus natalis*), smallmouth bass (*Micropterus dolomieui*) and bluegill (*Lepomis macrochirus*; Mendel et al., 1999).

Areas of healthy riparian vegetation in the lower elevations are of particular importance to wildlife, as these areas provide refuge and habitat. The majority of wildlife is found along the riparian, forested, and transitional steppe areas of the mountains and foothills where adequate food and habitat are available (CTUIR, 1999). Although limited in number, waterfowl present in the Basin either resident or during migrations include: ruffed grouse (*Bonasa umbellus*), bluegrouse (*Dendragapus obscurus*), Merriam's turkey (*Meleagris gallopavo*), mallard (*Anas platyrhynchos*), Canada goose (*Branta canadensis*), greenwinged teal (*Anas carolinensis*), cinnamon teal (*Anas cyanoptera*), wood duck (*Aix sponsa*), and the common merganser (*Mergus merganser*; CTUIR, 1999). Larger species such as elk and deer are also present in the Basin. Additional information regarding fish and wildlife species in the Basin and the habitat upon which they depend can be found in Section 8.

Many waterways of the WRIA are used for aesthetic and recreational purposes, a primary pursuit being sport fishing. A significant portion of recreational use is also focused upon Bennington Lake near the City of Walla Walla and in the upper elevations of the Blue Mountains.