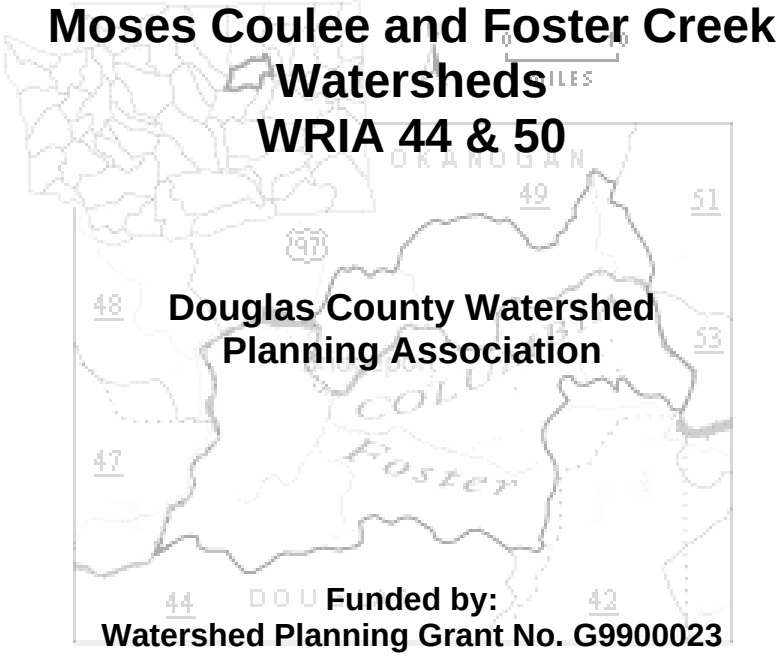
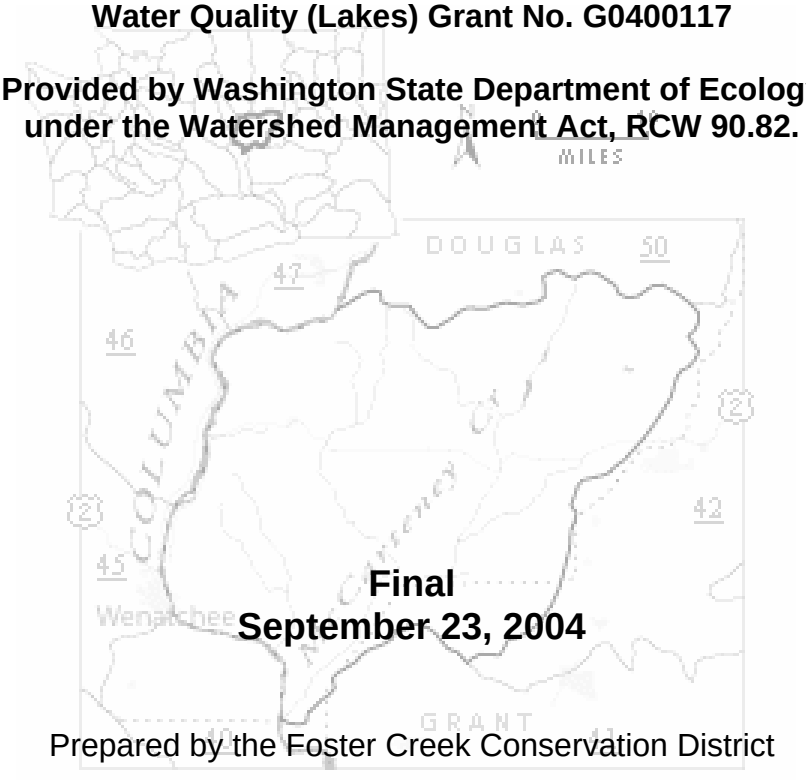
Watershed Management Plan
Moses Coulee and Foster Creek Watersheds
WRIA 44 & 50



Douglas County Watershed Planning Association

Funded by:
Watershed Planning Grant No. G9900023
In-Stream Flow Grant No. G0200263
Multi-purpose Water Storage Grant No. G0400115
Water Quality (Lakes) Grant No. G0400117

Provided by Washington State Department of Ecology under the Watershed Management Act, RCW 90.82.



Final
September 23, 2004

Prepared by the Foster Creek Conservation District

Basin Assessments conducted by Pacific Groundwater Group, R2 Resources and Montgomery Water Group, Inc.

WRIA 44/50 Watershed Management Plan

Approved by Planning Unit Members

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Douglas County Board of Commissioners

Steve Jenkins, City of Bridgeport

Greg Brizendine, East Wenatchee Water District

Mike McCourt- alt., East Wenatchee Water District

Ralph Socci, Bridgeport Irrigation District # 1

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Lee James Hanford, Bridgeport

Bill Stroud, East Wenatchee

Jack Linville, Palisades

Acknowledgements

Department of Ecology Lead, John Stormon

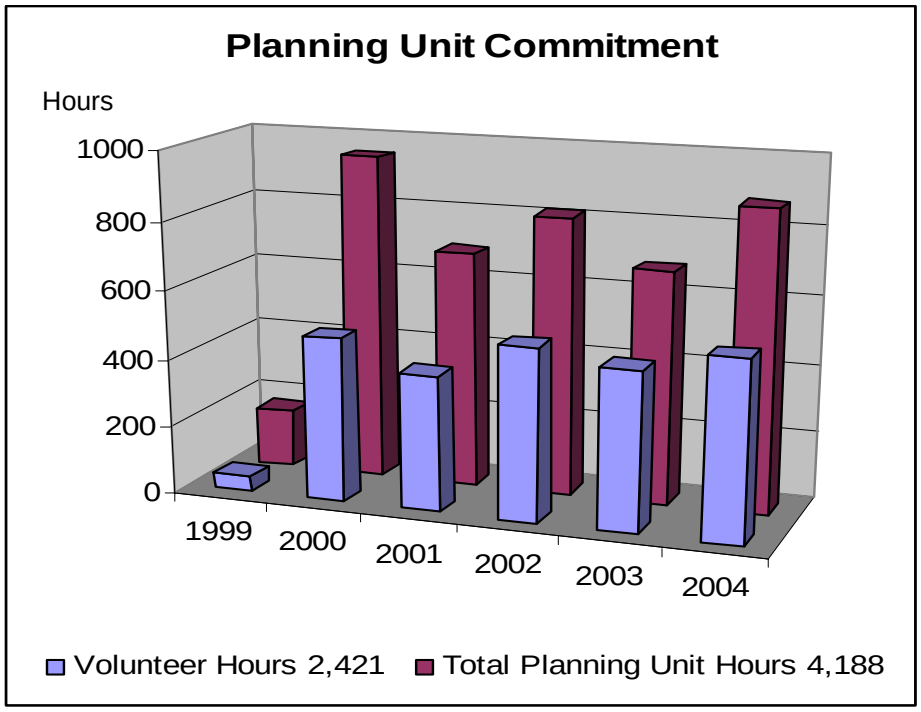
As Department of Ecology lead, John Stormon provided guidance and input while remaining open minded and supportive of our efforts to understand issues, make decisions by consensus, and recommend management strategies. His objectivity and determination to provide accurate information fostered our acceptance and belief that collaboration with the state was possible and that our planning efforts would be valued and utilized in future water resource management decisions.

Foster Creek Conservation District and Consultants

Whatever successes the Douglas County Watershed Planning Association has had are due in large part to the skills, devotion, and hard work of our Foster Creek Conservation District facilitator, Marilynn Lynn, and technical assistants, Tim Behne and Kathleen Bartu, and our consultants Steve Swope at Pacific Groundwater Group, R2 Resources, and Montgomery Water Group. We owe them all a great "thanks".

Douglas County Watershed Planning Unit

The development of the WRIA 44/50 Watershed Management Plan is a culmination of five years of commitment, monthly meetings, and over 4,000 hours devoted by planning unit members. **Volunteer members logged more than 58% of those hours.**



Douglas County Watershed Planning Association
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LOCAL GOVERNMENT:

Douglas County Board of Commissioners* – Mary Hunt
City of Bridgeport*– Steve Jenkins, Kris Hansen – alt.
East Wenatchee Water District* – Greg Brizendine, Mike McCourt – alt.
Bridgeport Irrigation District # 1* – Ralph Socci
Palisades Irrigation District – Steve King
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LOCAL COMMUNITIES:

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Foster Creek Conservation District** – Allen Miller
South Douglas Conservation District –Neil Irmer, Jim O'Brien – alt.
Palisades School District – Dave Billingsley
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Douglas County Wheat Growers – Joe Sprauer

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Otto W. Ross, Orondo
Sally Kane, Orondo
Jim Egbert, Mansfield
Lee James Hanford, Bridgeport
Bill Stroud, East Wenatchee
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* Initiating Governments for watershed planning in WRIAs 44 & 50
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Preface from the Douglas County Watershed Planning Unit

Initiated in 1999, the *Douglas County Watershed Planning Association (DCWPA)* was formed under the Watershed Management Act (ESHB 2514) to provide local citizens the maximum possible input in the management of water resources for the Foster and Moses Coulee Watersheds (WRIAs 44 & 50). As the thirty-one member stakeholder planning unit of the DCWPA, we are working together to plan for the future of the water resources that sustain our community, economy, and landscape. We include representatives from agriculture, horticulture, and economic development interest groups; federal, state, and local governments; and conservation or environmental groups. Additionally, there are six citizen @ large members representing the three Douglas County jurisdictions. Allen Miller, representing the Foster Creek Conservation District, explains, "*Those living on the land, residing in the local area, or managing agency resources and lands in this area know what is best for our watersheds. The watershed planning process is an unprecedented opportunity for local people to determine our own destiny*."

The development of this Watershed Management Plan is a culmination of five years of commitment, monthly meetings, and over 4,000 hours devoted by planning unit members. Volunteer members logged more than 58% of those hours. Through this process, we collectively defined our goals for water quantity, water quality, habitat, and instream flows. We identified issues and offered water resource solutions.

Each member of the planning unit was successful in working towards the collective well-being of the group while still representing their organizations. Each member offered a unique set of skills and knowledge base. Local landowners provided a history and familiarity to ensure an accurate representation of the watersheds. Other members offered organizational direction and technical expertise. New members were introduced as others needed to step down due to changing commitments. We continually sought broad-based involvement to insure that all interested parties were represented. All members contributed the vision for the future use of water resources in Douglas County.

The Foster Creek Conservation District served as the lead agency for watershed planning. The Conservation District was responsible for the administration and facilitation of the DCWPA and for creating an atmosphere of trust that allowed groups with varying interests to learn the other's point of view.

The WRIA 44/50 Watershed Management Plan represents a step towards a more cooperative results-focused way to manage our natural resources that incorporates local value and knowledge and in a way that sustains our local community, economy, and environment. The plan was approved by the planning unit September 23, 2004 and presented to the County Commissioners on September 30, 2004.

Table of Contents

Executive Summary

In 1998, the Legislature passed the Watershed Planning Act (Engrossed Substitute House Bill 2514) to provide a framework for local citizens, interest groups, and government organizations to collaboratively identify and address water-related issues in each of the 62 Water Resource Inventory Areas (WRIAs) of the state. In the fall of 1998, local and tribal governments convened to initiate watershed planning for water resources in the Moses Coulee and Foster Creek Water Resource Inventory Areas (WRIAs 44 & 50). Initiating governments included Douglas County, Grant County, Okanogan County, City of East Wenatchee, City of Bridgeport, Bridgeport Irrigation District #1, East Wenatchee Water District, and the Colville Confederated Tribes. A thirty-one member-planning unit met on a monthly basis from January 2000 to September 2004 to determine how best to manage the water resources.

The mission of the Douglas County Watershed Planning Association(DCWPA) is to create an on-going plan that provides local citizens with the maximum possible input concerning their goals and objectives for water resource management and development.

Although watershed planning is not state-mandated, if initiated, the scope of planning must include the water quantity component to "…address water quantity in the management area by undertaking an assessment of water supply and use in the management area and developing strategies for future use". In addition to the water quanity component, the DCWPA agreed to include all optional elements including water quality, habitat and instream flows and supplemental studies on lake water quality and water storage.

Technical Assessments

This WRIA 44/50 Watershed Management Plan is based on the science of the *WRIA 44/50 Final Phase 2 Basin Assessment*, along with additional assessments related to the water rights, water use, water recharge and discharge, hydrogeology, instream flows, water storage, and water quality. With exception of the *WRIA 44/50 Salmon and Steelhead Habitat Limiting Factors Report*, these assessments were completed during the 2514 watershed planning process.

- *WRIA 44/50 Salmon and Steelhead Habitat Limiting Factors Report*, March 2001
- *WRIA 44/50 Final Phase 2 Basin Assessment*, April 2003
- F*oster Creek and Lower Moses Coulee Level 2 Hydrogeologic Assessment*, November 2003
- *WRIA 44/50 Instream Flow Study (Step C – Draft Flow Recommendations)*, February 2004
- *Fish Snorkel Surveys of Priority Streams in WRIA 44 & 50 (Step B- Field Implementation)*, August 2004
- *WRIA 44/50 Water Storage Assessment and Feasibility Study*, August 2004

- *WRIA 44/50 Water Quality Assessment Jameson and Grimes Lake,* September 2004

The purpose of the *WRIA 44/50 Salmon and Steelhead Habitat Limiting Factors Report* was to assess the availability and condition of habitat adjacent to the Columbia River to sustain naturally producing salmonid populations. The report inventoried salmon distribution and productivity, stream channel and riparian conditions, and fish passage. This report provided a basis for further habitat assessment work under 2514 watershed planning.

The *WRIA 44/50 Final Phase 2 Basin Assessment* was both a comprehensive compilation and review of existing data and analysis of short-term field assessments in a two-year time frame. After review of number and types of water rights that exist in WRIAs 44 & 50, it was determined water rights along the Columbia River account for approximately 90 percent of the allocated water in WRIAs 44 & 50. There is a high demand for additional water rights from the Columbia River. Under ESHB 2514 watershed planning, the DCWPA did not have an opportunity to address Columbia River water resources. There is some demand for the allocation of additional water rights, likely to increase in the future, inside WRIAs 44 & 50. Total water use inside WRIAs 44 & 50 is approximately 6,995 af/yr, which is estimated at 3.0 percent of water discharging from the two WRIAs. Total water use inside WRIA 50 is approximately 237 af/yr. Total water use inside WRIA 44 is approximately 6,718 af/yr. Ninety percent of water use in inland WRIA 44 is used for irrigation in the Moses Coulee sub-basin. Most of the water is used during the irrigation season, from April to October, when only a portion of the annual water budget is available. There is a significant discrepancy between allocations on water applications, permits certificates, and claims and actual use. Based on review of domestic and public systems, private wells, and irrigation systems, actual water use may be less than figures listed above.

During the *WRIA 44/50 Final Phase 2 Basin Assessment* water quality samples were taken in Pine Canyon, Sand Canyon, Blue Grade Draw, Rock Island Creek, Foster Creek, Douglas Creek, Rattlesnake Springs, and McCartney Creek. All waters of WRIAs 44 & 50 are classified as Class A- Excellent, waters of the state (WAC 173-201a). None of the water bodies draining interior lands are currently listed as 303(d) impaired waters by the Washington State Department of Ecology. A screening level benthic macroinvertebrate sampling, indicator of overall stream health, suggested a wide range of water quality and instream habitat conditions exist in the streams. Based on this sampling, relatively good water quality and habitat conditions exist in perennial reaches of Douglas, Rock Island, and Pine Canyon Creeks. Pine Canyon and Rock Island Creeks support relatively good water quality conditions characteristic of spring-fed systems with cool water temperatures, low sediment levels, and stable flow regimes. Based on the benthic macroinvertebrate sampling, water quality and instream habitat conditions seem to be moderately impaired in Foster Creek and substantially impaired in Sand Canyon and Blue Grade Draw. Foster Creek has the highest macroinvertebrate density but lowest total taxa indicating stream disturbances, warm water temperatures, fine sediment accumulations, low stream flows, and water quality degradation. Data suggest routine,

chronic disturbances. Additionally, samples implied McCartney Creek sustained the highest diversity of macroinvertebrates.

Some findings from the water quality assessments are in need of additional exploration. At times, warm temperatures have been observed in Foster, McCartney, and Douglas Creeks. These temperatures are not necessarily detrimental to cold-water fish production. In Foster Creek, late summer plant growth and large fluctuations in dissolved oxygen concentrations were observed. In addition, during the late 1980s high levels of nutrients in shallow groundwater and in surface waters were measured in the Douglas Creek headwater region. In 1992, elevated levels of hexachlorobenzene (HCB) and dichlorodiphenyl dichloroethylene (p, p'DDE) were found in Douglas Creek. Some fecal coliform bacterial concentrations readings were high in Foster Creek during the months for July and August.

During the *WRIA 44/50 Final Phase 2 Basin Assessment,* habitat assessment included an identification of historic stream channel characteristics and riparian habitat. Riparian habitat assessment included a comparison between historic (1974) and the most current (1994) aerial photographs. Current baseline habitat data collection assessed anadromous fish access and the suitability of existing habitat. In general, the topography and landforms near streams as they enter the Columbia River limit the potential available fish habitat for spawning and rearing in the WRIA 44 & 50. The high plateau of the Columbia Basin breaks off sharply near the canyon walls of the Columbia River, creating: (1) very steep, cascading stream reaches through inter-gorge canyons, and (2) extensive alluvial floodplains at the mouths of these streams as the channel gradient flattens near the Columbia River. Most of the streams are seasonal flood channels; some have perennial or intermittent springs. Low summer stream flows often disappear below the surface of the alluvial fans (i.e., dry river bed conditions), restricting fish access and rearing capabilities. During the habitat assessment and subsequent surveys, juvenile Chinook salmon and steelhead trout were observed rearing in Foster Creek. Steelhead trout were also documented spawning in Foster Creek during the spring months. Foster Creek has year-round accessibility to RM 1.0. In Rock Island Creek, Chinook and coho salmon were observed rearing as well as resident trout. At the time of the survey, Rock Island Creek had year-round fish access ½ mile upstream.

The purpose of the *Foster Creek and Lower Moses Coulee Level 2 Hydrogeologic Assessment* and the *Water Storage Assessment and Feasibility Study* were to assess potential storage options including Aquifer Storage and Recharge (ASR) in the Lower Moses Coulee. The shallowest groundwater levels measured in Lower Moses Coulee were approximately 85 feet below ground surface. This finding indicates groundwater within the Moses Coulee is not in continuity with Douglas Creek, which is within ten feet of the ground surface. Hence, groundwater withdraws within the Moses Coulee are not likely to have an impact on surface waters.

The *WRIA 44/50 Instream Flow Study* was completed for Rock Island and Douglas Creeks in WRIA 44 and Foster Creek in WRIA 50. Rock Island and Foster Creeks were selected because of their connectivity to Columbia River and known salmonid use. Douglas Creek was selected based on a significant resident trout fishery.

The *WRIA 44/50 Water Quality Assessment of Jameson and Grimes Lake* included surface water sampling in both lakes and inflowing draws. Preliminary surveys indicated a high level of phoporous and concentrations of a toxic blue green algae, *Microcystis.sp*.

Issues and Proposed Actions

Based on planning guidelines, technical assessment findings, and public input, the DCWPA identified a set of primary issues and proposed actions. With the exception of instream flows, these action items are not specific obligations for agencies. More complete lists are included within each chapter of the Watershed Management Plan.

Water Quantity

The DCWPA identified two primary water quantity issues to provide 1.) a reliable water supply balanced among users including fish and wildlife, and 2.) future surface and groundwater availability. Key water quantity actions identified by the DCWPA include:

- Fill in data gaps on existing water rights, claims, and use in the Moses Coulee, Lower McCartney Creek, and Douglas Creek subbasins of WRIA 44.
- Promote a voluntary water rights relinquishment program to eliminate unused or duplicate rights and claims.
- Promote agricultural, municipal, domestic, and industrial water conservation.
- In areas that are experiencing growth in exempt well use, perform a localized water balance by determining the current water availability, current water use, and future water availability.
- Research positive incentives and land use policy to direct new development to areas with available water or connection to public water systems.
- Continue to assess feasibility of water storage in WRIAs 44 & 50.
- Develop an integrated county road maintenance plan to address erosion control and invasive and noxious weed management.

Water Quality

The primary water quality issue identified by the DCWPA was the need to protect ground and surface water quality. Primary actions to protect water quality are:

- Encourage upland and riparian area conservation practices.
- Provide technical assistance to install and maintain properly designed septic systems and identify and renovate failing systems.
- Develop a water quality education program that includes outreach to non-agriculture pesticide users.
- Assess roadways and stabilize areas where sediment could be transported offsite.
- Continue water quality monitoring in WRIAs 44 & 50. Priority water quality parameters for monitoring are fecal coliform, nutrients, stream temperatures, and dissolved oxygen.

Habitat

Primary habitat issues identified by the DCWPA are the need to: 1.) improve upland habitat to increase water-holding capacity to minimize peak and improve low flows, 2.) restore degraded riparian vegetation, and 3.) control invasive and noxious weeds. Primary actions to address these habitat issues include:

- Assist landowners to voluntarily maintain, restore, or create wetlands.
- Incorporate habitat protection and floodplain development controls into other comprehensive land use plans including the Growth Management Act, shoreline master programs, or critical areas ordinances.
- Assess the expansion of surface and stormwater management planning to developed areas county-wide.
- Implement in-channel projects that address geologic processes such as deep-seated slope failure, toe erosion, or landslides to prevent erosion and sedimentation.
- Research and propose recommendations to address erosion and sedimentation conditions in the Moses Coulee.
- Establish a county-wide voluntary weed management advisory committee.
- Design and implement a scope of work for continued monitoring of habitat conditions.

Instream Flow

The planning unit recommends setting a minimum instream flow for Foster Creek and Douglas Creek and desires to collaborate with the Department of Ecology in a development of a revised hydrograph for instream flow setting on Rock Island Creek. Ecology and the planning unit agree on flow numbers presented for Foster and Douglas Creeks. The planning unit recommends that if Ecology is required to set a minimum instream flow on Rock Island Creek, flows in a revised hydrograph will be reduced to account for the senior water right located at the developed spring (RM 0.55). The planning unit recommends Ecology begin rule-making by issuance of CR 101 within six months of the Douglas County's adoption of this Watershed Management Plan. The Department of Ecology can accept the obligation to set instream flows. Should it be determined that flows need to be set on any other streams or reaches in WRIAs 44 & 50 (in accordance with RCW 90.54.020(3)(a), Ecology and the planning unit agree to work together to determine those flows as provided for in RCW 90.82.130(5).

Implementation of Actions

The DCWPA was formed expressly for the purpose of developing the WRIA 44/50 Watershed Management Plan. The Planning Association itself has no authority in State law to carry out the plan provisions, but will rely on stakeholder organizations and others to implement the plan. The DCWPA has agreed to meet on a quarterly basis through the implementation phase to define coordination and oversight responsibilities and further develop the actions set forth in the WRIA 44/50 Watershed Management Plan.

Chapter 1. The Watershed Planning Act

The Watershed Planning Act

In order to move forward on increasingly critical water issues in the State of Washington, including diminishing water availability, water quality, and the loss of critical fish habitat, the 1998 Legislature passed the Watershed Planning Act (Engrossed Substitute House Bill 2514). The purpose of the Watershed Planning Act, codified in the Revised Code of Washington (RCW) 90.82, was to provide a framework for local citizens, interest groups, and government organizations to collaboratively identify and solve water-related issues in each of the 62 Water Resource Inventory Areas (WRIAs) of the state. The law uses Water Resource Inventory Areas (WRIA) as the organizing geographic unit defined by regulation, Ch. 173-500 Washington Administrative Code (WAC). The Watershed Planning Act enabled the state to offer grants up to $500,000 for planning in each WRIAs. RCW 90.82.010 states,

> "*The legislature finds that the local development of watershed plans for managing water resources and for protecting existing water rights is vital to both state and local interests. The local development of these plans serves vital local interests by placing it in the hands of people: Who have the greatest knowledge of both the resources and the aspirations of those who live and work in the watershed; and who have the greatest stake in the proper, long-term management of resources. The development of such plans serves the state's vital interests by ensuring that the state's water resources are used wisely, by protecting existing water rights, by protecting instream flows for fish and by providing for the economic well-being of the state's citizenry and communities. Therefore the legislature believes it necessary for units of local government throughout the state to engage in orderly development of these watershed plans."*

Process for Developing a Watershed Plan

The Watershed Management Act designates roles and responsibilities for various organizations and the public in the watershed planning process. These roles include "initiating governments" who serve as the organizing body, a "planning unit" that produces the watershed plan, and a "lead agency" that administers the grant funds. The watershed planning process can be categorized in four phases including organization of the planning unit, assessment of water resources, plan development, and plan implementation. The plan must be consistent with existing laws, treaties, water rights, habitat restoration programs, and other commitments; but may recommend changes in certain cases. No government, agency or organization is bound by the plan unless they voluntarily commit to plan provisions. Following approval by the planning unit, the Watershed Planning Act calls the county commissioners of all counties located in the WRIAs to consider the plan and hold a public hearing. Once approved by the planning unit and counties the plan can be implemented.

The watershed planning effort is a potentially powerful tool for informed local decision-making, breaking the water resources gridlock, and developing a comprehensive approach to managing water resources into the next century.

Scope of Watershed Planning

Although watershed planning is not state-mandated, if initiated, the scope of planning must include the water quantity component to "…address water quantity in the management area by undertaking an assessment of water supply and use in the management area and developing strategies for future use" (90.82.070 RCW). The scope of planning may also include an optional instream flow component (90.82.080 RCW), water quality component (90.82.090 RCW), and habitat component (90.82.100 RCW).

Plan Implementation

Passage of ESHB 1336, the Watershed Plan Implementation Bill, established a Phase 4 for watershed implementation and authorizes state funding to support plan implementation. An implementation plan is required in the first year of accepting implementation funds. The implementation plan will contain a timeline with strategies to provide sufficient water for multiple uses and instream flows. The implementation plan will also define coordination and oversight responsibilities. Funding assistance is available for up to $400,000 per WRIA for a five year period. A 10% local match is required. Implementation requires the Department of Ecology to use the plan as the "… framework for making future water resources decisions" and to "rely upon the plan as the primary consideration in determining the public interest…".

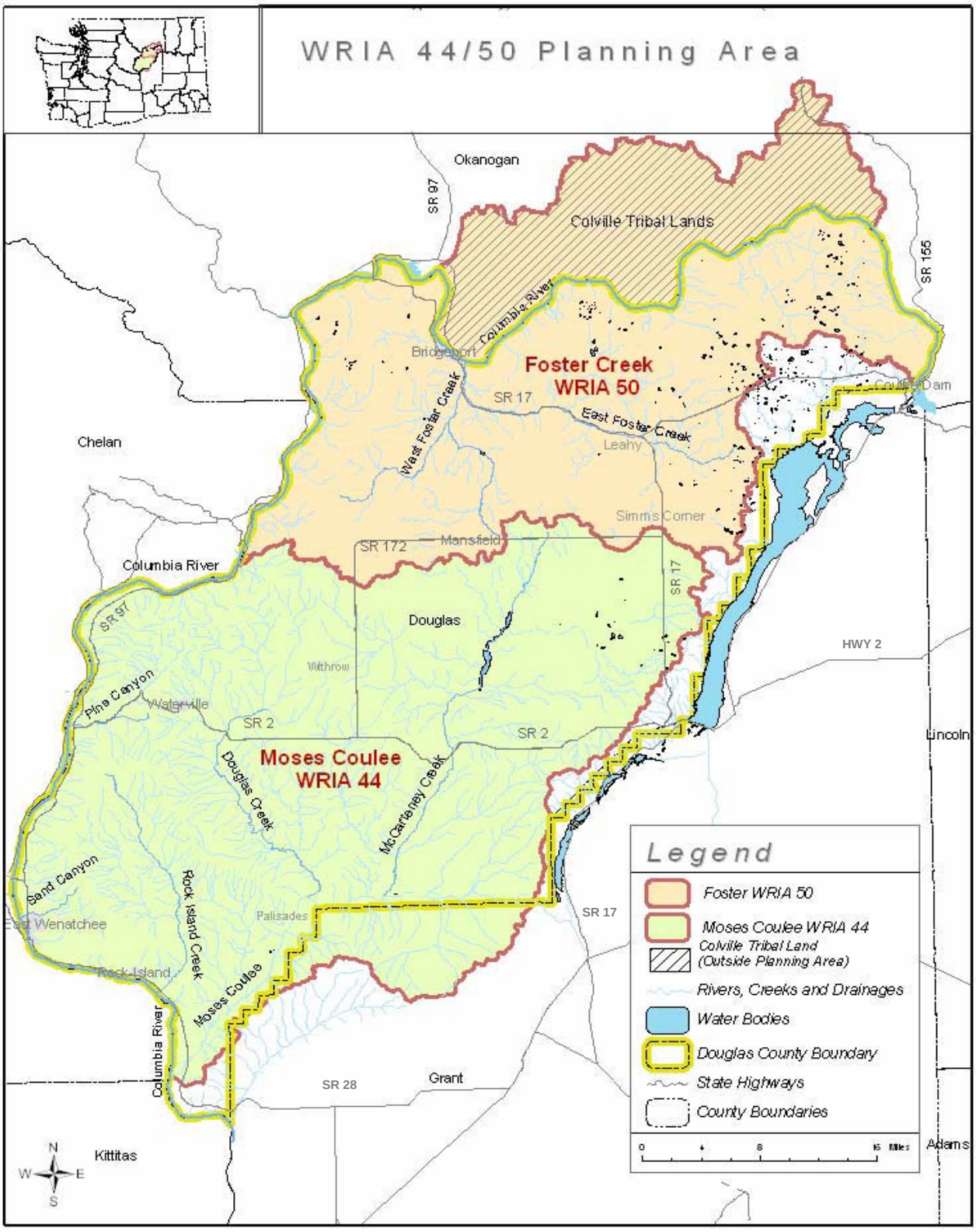
Chapter 2. Watershed Planning in WRIA 44/50

The following chapter explains how the *Douglas County Watershed Planning Association* (DCWPA) applied the Watershed Planning Act legislation to collaboratively identify and address water-related issues in the Moses Coulee and Foster Creek Water Resource Inventory Areas (WRIAs 44 & 50). Over five years of planning, the DCWPA determined the water resource concerns related to water quantity, instream flows, water quality, and habitat and prepared this action plan describing how to address these concerns.

Planning Area

The planning area addressed by the DCWPA includes the Moses Coulee Water Resource Inventory Area (WRIA 44) and the Foster Creek Water Resource Inventory Area (WRIA 50). The two watersheds are located in North Central Washington and include parts of Grant, Douglas, and Okanogan Counties as well as part of the Colville Confederated Tribes Reservation (See Figure 1.). WRIA 44 & 50 are part of a larger drainage, the Columbia River Basin. Under ESHB 2514 watershed planning, the DCWPA did not have an opportunity to address Columbia River water resources.

Figure 1. Planning Area



Participation

Initiation Governments and Lead Agency

In the fall of 1998, local and tribal governments convened to initiate watershed planning for water resources in the WRIAs 44 & 50. Under the Watershed Planning Act, planning may be initiated only with the concurrence of all counties within the WRIAs; the largest city or town within the WRIAs; and the water supply utility obtaining the largest quantity of water from the WRIAs (RCW 90.82.060). Initiating governments included Douglas County, Grant County, Okanogan County, City of East Wenatchee, City of Bridgeport, Bridgeport Irrigation District #1, East Wenatchee Water District, and the Colville Confederated Tribes. The initiating governments developed an Intergovernmental Agreement (Appendix A) for the purpose of administering the development of a local watershed plan. The initiating governments designated the Foster Creek Conservation District (FCCD) to serve as the lead agency for WRIAs 44 & 50 to administer grant funds and facilitate the planning unit.

Planning Unit

The Watershed Management Act identifies the "planning unit" as the group that develops and initially approves the watershed plan, or specific components of the plan. According to RCW 90.82.130, "Upon completing its proposed watershed plan, the planning unit may approve the proposal by consensus of all of the members of the planning unit or by consensus among the members of the planning unit appointed to represent units of government and a majority vote of the nongovernmental members of the planning unit." Ultimately, sixty-six groups and organizations were invited to become full voting members on the planning unit (Appendix B). Subsequently twenty-one of these organizations agreed to play an active role in the planning process. A planning unit was formed consisting of local interest groups, local government, conservation groups, federal and state agencies, and citizens at large. The thirty-one member planning unit met on a monthly basis from January 2000 to September 2004 to determine how best to manage the water resources.

Grant County, Okanogan County and Colville Confederated Tribes

The geographic area contained in the WRIA 44 & 50 does not correspond with political jurisdictions of county boundaries. According to RCW Chapter 90.82.130 (2) "(c) A county legislative authority may choose to opt out of watershed planning under this chapter and the public hearing processes under (a) and (b) of this subsection if the county's affected territory within a particular management area is: (i) Less than five percent of the total territory within the management area; …" Continuing, "A county choosing to opt out under the provisions of this section shall not be bound by obligations contained in the watershed plan adopted for that management area under this chapter. Even if a county chooses to opt out under the provisions of this section, the other counties within a management area may adopt a proposed watershed plan as provided in this chapter."

As initiating governments, Grant and Okanogan Counties approved of the administration and development of a local watershed plan for WRIAs 44 & 50. During the development of the Watershed Management Plan, Grant and Okanogan Counties selected to have Douglas County represent their interests on the planning unit. WRIA 44 encompasses approximately 729,934 acres. Approximately 681,973 acres are located in Douglas County and 47,961 acres are in Grant County. WRIA 50 covers approximately 577,882 acres. WRIA 50 is primarily located in Douglas County, but also includes part of the Colville Confederated Tribes Reservation and some private land ownership within the Reservation. Approximately 148,700 acres are located in the Colville Confederated Tribes Reservation. 51,121 acres are privately owned.

Upon advice of legal council, the Colville Confederated Tribe chose to remove themselves from participation in 2514 watershed planning in April 2003. The Colville Confederated Tribe served as an initiating government and was active in Phase 1 and 2 planning. RCW 90.82.060 (4) requires tribes to be invited to the planning process, but does not require participation. i.e., "If entities in subsection (2) or (3) of this section decide jointly and unanimously to proceed, they shall invite all tribes with reservation lands within the management area. (5) The entities in subsection (2) or (3) of this section, including the tribes if they affirmatively accept the invitation, constitute the initiating governments for the purposes of this section." Without the participation of the Colville Confederated Tribes in the planning process, the planning unit did not develop obligating actions for tribal lands.

Phases of Planning

The DCWPA began Phase 1 in January 2000. During Phase 1, the planning unit was formed, mission and goals established, and a scope of planning was defined. Each organization on the planning unit identified their interests in watershed planning and possible resources they could contribute to the planning process. In September 2000, the DCWPA initiated Phase 2 to assess the water resources of the WRIA 44 & 50. During this phase the planning unit worked closely with a consultant team led by the Pacific Groundwater Group (PGG), subcontracting with R2 Resource Consultants and Montgomery Water Group. A final draft Technical Basin Assessment for WRIA 44/50 was issued in April 2003. Based on findings in the Technical Basin Assessment, additional studies were initiated for water storage and water quality. The DCWPA initiated Phase 3 to develop a watershed management plan in January 2003. The plan was approved by the planning unit on September 23rd, 2004.

Scope of Planning

Upon recommendation of the planning unit and approval of the initiating governments, the DCWPA agreed to address all four elements of watershed planning including water quantity, water quality, habitat, and instream flows. Additionally, the planning unit conducted supplemental assessments on lake water quality and water storage.

Mission and Guiding Principles

With the exception of the scope of watershed planning and the final plan approval, the law did not prescribe specific decision-making protocols. The DCWPA agreed the planning unit would use a consensus decision-making process that is collaborative and all-inclusive. Based on the established DCWPA groundrules, consensus is defined as "a decision that allows every member to say I can live with the decision and accept it, even though it may or may not be exactly what I want". In March 2000, the planning unit consensually adopted the mission statement:

The mission of the Douglas County Watershed Planning Association is to create an on-going plan that provides local citizens with the maximum possible input concerning their goals and objects for water resource management and development.

The planning unit also adopted the following guiding principles:

- Watershed planning in WRIAs 44 & 50 must provide water resource user interests and directly involved interest groups at the local level with an opportunity to give input and direction to the process, in a fair and equitable manner. The plan should be comprehensive to include all people who are responsible for water management that integrates water quantity, water quality, and habitat.

- The watershed plan must fairly balance the water resource needs and provide a sustainable future for agriculture communities and wild lands for fish and wildlife. These needs include environmental, cultural, economic, and social health and stability.

- The watershed plan must recognize the contributions of farming and ranching to water resources, identify realistic improvements, and preserve agriculture in WRIAs 44 & 50.

- The watershed plan should provide a scientific basis to determine how new water uses are allocated for the greatest good.

- Local people have a sense of the history of the water resources and are stewards of the land and our way of life. The watershed plan must maintain local control, respect for private property rights, and minimum regulations to ensure people can live and prosper.

- The watershed plan should be based on scientific data and principles. Monitoring and assessment must be continued over the long-term to provide the basis for adapting management changes as needed and appropriate.

- The watershed plan must serve as an educational resource for those seeking to educate others as to the opportunities and constraints involved with water resources in the future.

- The watershed plan must be coordinated among entities and consistent with, and not duplicative of, ongoing efforts in each WRIA.

- Recommended actions in the watershed plan must be flexible and responsive to changes in market, technology, and environmental conditions.

- The watershed plan must be consistent with existing laws, treaties, water rights, habitat restoration programs, and other commitments; and may recommend changes in certain cases.

Public Review Process

As required by the watershed planning statute, the public were involved to ensure the plan reflects public attitudes and concerns. To meet this objective, all planning unit meetings were open to the public and included a time for public comment. Public meetings were held and flyers distributed to identify water resource issues and evaluate recommended actions. The public was notified of progress through Foster Creek Conservation District quarterly newsletters and press releases in local newspapers. The plan was approved by the planning unit on September 23rd, 2004. Following RCW 90.82.130 2(c), the County Commissioners shall provide public notice and conduct a public hearing on the proposed WRIA 44/50 Watershed Management Plan.

State Environmental Policy Act (SEPA) Threshold Determination

The Foster Creek Conservation District was designated as lead agency for the State Environmental Policy Act (SEPA) responsible for the environmental analysis and procedural steps. The Conservation District issued a threshold determination of nonsignificance (DNS). A DNS was issued at this time because actions in the plan are recommendations not obligations. Thus the plan serves as guidance, not a description of planned on-the-ground activities that could cause an adverse environmental impact. During the first year of implementation, the planning unit will develop an implementation plan to further characterize the actions identified in the watershed plan, define coordination and oversight responsibilities, set priorities, and develop a timeline and funding sources. In the future, any specific projects prioritized for actual implementation will be reviewed through the SEPA process to identify any potential environmental impacts associated with that specific project.

The Conservation District and Douglas County Watershed Planning Association (DCWPA) adopted the Final Environmental Impact Statement (EIS) for Watershed Planning under Chapter 90.82 RCW. Additonal actions not addressed in the Final EIS are included in the WRIA 44/50 SEPA Addendum.

Chapter 3. Goals, Issue and Actions

This chapter describes how the planning unit identified water resource goals, issues, and actions for water resources in WRIAs 44 & 50.

How the Planning Unit Identified Goals

The goals are the planning unit's vision for the future management of water quantity, water quality, and habitat. The planning unit identified goals across three broad categories, landscape, economy, and community, based on principles of sustainability. A sustainable society is one that is capable of meeting the needs of the present while leaving equal or better opportunities for the future. Sustainable management of the water resources on the landscape means protecting the quality of our environment including the water, air, and soil needed to support people and their economy as well as fish and wildlife. Sustainable management of the economy means developing management recommendations that are financially viable and not overly burdensome to future generations. Sustainable management of the community aspects of water resources includes maintaining and securing a quality of life for Douglas County citizens that reflects the values, ideas, beliefs, customs, and skills of the people developing the watershed plan.

The process began by having each member of the planning unit identify their individual goals. Like pieces of a puzzle, these individual goals were then combined into a collective statement of the total group, incorporating ideas and wording as much as possible. The collective goal statements were reviewed, adjusted, and agreed upon by the planning unit. Thus the collective goal statement became a consensus goal statement. The purpose of the consensus goals statement served to establish a foundation of trust and respect among the group members need to be able to work together in a consensual manner to identify issues and recommend actions.

How the Planning Unit Identified Issues and Actions

The planning unit identified watershed issues or concerns for water quantity, water quality, and habitat based on the watershed assessment findings and public forums held throughout the planning process. At the initiation of Phase 3, a total list of identified issues was compiled. Members reviewed the list of issues, added any final issues they felt were relevant, and selected those that applied to their defined goals.

The planning unit brainstormed potential actions that could be taken to address the issues of concern. Planning unit members reviewed actions and suggested additions and deletions. Members brought project proposals from their individual organizations to stimulate ideas for future water resource actions and projects. The WRIA 44/50 Watershed Management Plan is intended to provide a guideline and to set priorities to direct future water resource project development. With exception of instream flows, actions set forth in the plan are not intended to be obligations for any agency.

Each issue has a set of actions. An action may be repeated addressing several issues across water quantity, water quality, and habitat elements. In this case, only the action number is listed and the full text of the action is not repeated.

Chapter 4. Water Quantity

As mandated by the state legislature, watershed planning must include a water quanity component (90.82.070 RCW). Water quantity issues and actions are seen by the Douglas County Watershed Planning Association (DCWPA) as the having the highest priority among other optional components of water quality, habitat, and instream flows.

The overall **water quantity goals** for the DCWPA are based on a sustainable future for the landscape, the economy, and the communities of WRIAs 44 & 50. The water recommendations presented here provide a workable approach that minimizes regulatory impacts to the residents of the area.

4.1 Community

Goals

Our goals for the **community** are to manage water to promote social and economic well-being that improves or maintains our quality of life. In the future, water will be equitably distributed according to location and timing and there will be water available for growth. Water will be managed to provide for adequate drinking water, agriculture, fish, wildlife, stock watering, recreational opportunities, and tourism. There will be an increase in outreach to improve the community's understanding of water resources and the wise use of that water.

Issues and Actions

Issue 1 Quantity. Protect existing surface and groundwater rights.

Action 1. Fill in data gaps on existing water rights, claims, and use in the Moses Coulee, Lower McCartney Creek, and Douglas Creek subbasins of WRIA 44.

Issue 2 Quantity. Provide future surface and groundwater availability.

Future water should be available for agriculture, municipal, domestic, and industrial uses.

Actions: 2 and 3.

Action 2. Support legislation to improve irrigation water management in Washington State.

Action 3. Increase connection of agriculture and rural concerns to land use planning at the local and state level.

Agricultural Use: 4, 5 and 6.

Action 4. Promote on-farm agriculture water conservation and irrigation efficiency efforts such as replacing open laterals and trenches with closed pipe systems; replacing non-pressurized irrigation systems with pressurized sprinkler systems or drip irrigation systems; using soil moisture sensors to prevent over-watering; and constructing on-farm ponds to capture and reuse tailwater.

Action 5. Develop and encourage implementation of agricultural water conservation and irrigation efficiency efforts through regional or irrigation district infrastructure improvements such as lining canals, replacing open canals and ditches with closed pipe systems, or installing pump-back stations to capture tail water for reuse.

Action 6. Promote a voluntary surface and ground water rights relinquishment program in WRIAs 44 & 50.

Municipal, Domestic and Industrial Use: 7

Action 7. Promote xeriscaping, low-water use landscaping. Assess feasibility to incorporate xeriscaping into Douglas County land use code as a landscaping standard.

Municipal Use: 8 and 9.

Action 8. Continue municipal conservation programs to: 1.) encourage the individual water consumer to conserve, and 2.) promote operational efficiency measures for public water systems that minimize losses of water during routine flushing of mains and conserve water by detecting and repairing leaks and testing and repairing meters.

Action 9. Ensure that the watershed plan is consistent with planned future use of existing water rights for municipal water supplies.

Domestic Use: 3, 10, 11,12, 13, 14 and 15.

Action 10. Educate domestic water users to conserve water.

Action 11. In areas that are experiencing growth in exempt well use, perform a localized water balance by determining the current water availability, current water use, and future water availability.

Action 12. In areas of moderate to high density rural development, determine as feasible if localized water level lowering in wells or springs is due to increased exempt well use or drought conditions.

Action 13. Research alternative ways to supply water. Assess feasibility to create new water systems or extend public water systems. Coordinate actions

with the Chelan-Douglas Health District and the Washington State Department of Health.

Action 14. Research positive incentives and revisions to land use policy development regulations to direct new residential and industrial development to areas were groundwater is available or areas connected to a public water system. Possible development regulations could include requiring minimum lot size in areas of exempt well use or clustered development.

Action 15. Promote greywater segregation. Wastewater segregation involves the in-house separation of domestic sewage stream into two fractions: toilet wastes and kitchen sink wastes, referred to as blackwater; and dishwater, clothes washer, and bath/shower wastes referred to as greywater. Treated greywater can be used for landscape irrigation and toilet flushing to conserve potable water supplies. Treatment of greywater is achieved through the installation and operation of specialized on-site sewage system. Provide information on system design to homebuilders, real estate companies, and homeowners.

Industrial Use: 16

Action 16. Encourage industrial conservation measures and modifications to the following types of practices as appropriate: heating and cooling, product washing and processing, cleaning and maintenance, wastewater disposal, and landscaping. Encourage industries to participate in conservation programs such as the Department of Ecology's Technical Resources for Engineering Efficiency (TREE) Program.

4.2 Economy

Goals

Our goals for the **economy** are based on improved water use efficiency and more reliable water availability from year to year. This will provide more water for irrigated acreage and livestock; fish in streams and wildlife habitat; and commercial, residential, industrial, and recreational development. Storing water can provide a sustainable uniform supply throughout the year and prevent flood damage. As appropriate, water storage can be used for power generation.

Issues and Actions

Issue 3 Quantity. Establish Reliable Water Supply. Retain water from high flow to low flow periods throughout the year and from year to year. Water should be distributed equitably based on location and timing.

Actions: 17, 18, 19 and 20.

Action 17. Encourage continuation and expansion of conservation practices for protecting and restoring riparian areas such as plantings to establish a mature riparian corridor where feasible, bank stabilization, animal management, fencing, or alternative water sources.

Action 18. Encourage continuation and expansion of conservation practices in uplands (rangelands/cultivated) such as prescribed grazing, noxious weed control, critical area plantings, filter strips, conservation crop rotation, field borders, grass waterways, sediment ponds, or residue management.

Action 19. Pursue potential water storage projects in WRIAs 44 &50 for in-channel and off-channel sediment and erosion control, aquifer storage, bank storage, groundwater recharge, flood control, and habitat restoration or enhancement. Potential recommendations have been identified by the Pacific Groundwater Group based upon the findings from the *WRIA44/50 Storage Assessment and Feasibility Study, August 2004*. These recommendations are in need of further analysis during the implementation phase. (Recommendation are listed in Appendix C).

Action 20. Consider impacts of global climate variability and change on water resources in WRIAs 44 & 50. Climate is a key driver in determining when, where, and how much water is available in Washington State. Small changes affecting the Pacific Northwest climate system can have significant impacts on regional water supplies, including those in the WRIAs 44 & 50 (Impacts of climate variability and change in the Pacific Northwest are defined in Appendix F).

Issue 4 Quantity. Influence water-permitting process for the Columbia River. Ninety percent of water use in WRIA 44/50 is from the Columbia River.

Action 21. Develop and assess recommendations for water use proposals on the Columbia River such as the Columbia River Initiative (CRI).

4.3 Landscape

Goals

Our goals for the **landscape** are balanced between different water uses and include enough water to sustain a healthy community including enough water for fish and wildlife, historic livestock use, and irrigated agriculture. In the future there will be flexibility in the way water is distributed for livestock and wildlife use on rangelands. In the future noxious weeds will be controlled, soil erosion reduced, and surface runoff will be managed as appropriate to maximize groundwater recharge and water storage. Grasses, plants, and shrubs will be restored to disturbed areas where they were historically present.

Issues and Actions

Issue 5 Quantity. Achieve a balanced allocation of water. Supply communities with adequate domestic water and adequate irrigation water for sustainable agriculture. Protect fish and wildlife habitat. Provide water for future residential development, industry, and recreation.

Actions: 22 and 23.

Action 22. Set instream flows. Refer to Section 5.3 Instream Flow Recommendations.

Action 23. Encourage use of a Trust Water Rights Program to preserve water rights that are temporarily not being used. Inside WRIAs 44 & 50, surface water is used for irrigation in the Moses Coulee and for livestock watering throughout the watersheds.

Issue 6 Quantity. Control soil erosion and flooding. Lack of upland and riparian vegetation in some areas has reduced the water holding capacity and normal hydrologic functioning of streams.

Actions: 17, 18, 24 and 25.

Action 24. Provide education on value of local government critical area designations. Critical areas are wetlands, areas with a critical recharging effect on aquifers used for potable water, frequently flooded areas, geologically hazardous area, or fish and wildlife habitat conservation areas. It is the goal of Douglas County to protect these areas and policies are set to minimize impacts (Comprehensive Plan Chapter 10).

Action 25. Develop an integrated county road maintenance plan that addresses erosion and sedimentation, weed management, and positions the county for diverse funding sources.

Issue 7 Quantity. Control invasive and noxious weeds. Invasive and noxious weeds are displacing native bunchgrasses and beneficial plant communities. The shallow root systems and sparse canopies associated with weeds allows for increased surface water run-off, soil erosion, and evaporation from exposed soil surfaces.

Actions: 26, 27, 28, 29, 30 and 31.

Action 26. Provide education on invasive and noxious weed management to private landowners.

Action 27. Support enforcement of invasive and noxious weed management on fields enrolled in the Conservation Reserve Program (CRP).

Action 28. Stress to public and private landowners the need to budget for invasive and noxious weed management. This includes promoting invasive weed control efforts along recreation trails.

Action 29. Continue and expand weed survey and mapping to accurately identify and delineate land with populations of invasive or noxious weeds. The survey would allow land managers to predict areas that are potentially subject to weed invasion; to understand the biology of the invasion process and determine means by which weeds spread; to develop, implement, and evaluate weed management plans; to assess the economic impact of weed invasions; and to increase public awareness, education, and weed management efforts.

Action 30. Establish county-wide weed management committee to provide advice to landowners.

Action 31. For development activities that clear vegetation, encourage the adoption of performance standards to control erosion and sedimentation and prevent the establishment of weeds.

Chapter 5. Water Quality, Habitat and Instream Flows

5.1 Water Quality

The **overall water quality goals** for the Douglas County Watershed Planning Association are based on a sustainable future for the landscape, the economy and the communities of WRIAs 44 & 50. Water quality is essential to our economy so that present and future generations of people can thrive. Water quality is necessary to maintain the quality of life in our area that we enjoy now. Water quality is essential to our landscape so that the diversity of plants, animals, and natural communities that characterize this region and contribute to the quality of life that we all value can continue to thrive. Water quality is essential to our community so that we can pass on a full array of options to our children and other plant and wildlife species that depend upon a healthy environment. Good water quality is essential to people and the landscape in this region.

5.1.1 Community

Goals

Our water quality goals for the **community** are to maintain water quality to preserve drinking water supplies so that people have safe clean water for domestic consumption and food production. Drinking water requires minimal treatment to meet or exceed state public health standards for drinking water. Domestic wells provide clean water and aquifers are free of pesticides and herbicides. Communities are educated on water quality and the benefits of using hardy drought resistant plants for commercial and residential landscaping.

Issues and Actions

Issue 1 Quality. Potential for variable fecal coliform levels. Fecal coliform has been detected occasionally in some streams in the WRIAs. The presence of fecal coliform bacteria indicates that human waste from failing septic system and/or animal waste is entering the water.

Actions: 17, 32 and 33.

Action 32. Design and implement a scope of work for continued monitoring of water quality conditions to establish long-term data on ground and surface water quality for WRIAs 44 & 50.

Action 33. Work with health authorities to provide technical assistance to the public to install and maintain properly designed septic systems and other fluid disposal systems; identify and renovate failing septic systems; and to encourage testing and pumping of septic systems to prevent pollution. Educate recreational vehicle users and other members of the public about

the importance of dumping holding tanks at approved dumping stations. In areas that are unsuitable for on-site sewage systems and cannot connect to a central sewer system, promote safe alternative waste management designs such as composting or incinerating toilets.

Issue 2 Quality. Potential for high nutrient levels in surface waters. In excessive, these nutrients including nitrogen and phosphorus related compounds can stimulate abundant growth of aquatic plants.

Actions: 32, 33 and 34.

Action 34. Ensure nutrients are applied so no significant runoff or subsurface flow containing nutrients or other contaminants occur beyond field boundaries. Encourage agricultural soil and/ or plant tissue testing to determine agronomic need for nutrient addition.

Issue 3 Quality. **Potential organic compounds in Douglas Creek.** Trace amounts of hexachlorobenzene (HCB) and dichlorodiphenyl dichloroethylene (p, p'DDE) were found in sediment and organic tissue in 1992.

Action: 32.

5.1.2 Economy

Goals

Our water quality goals for the **economy** are focused on the availability and use of clean water to support domestic use, farming, livestock, wildlife habitat, and fishing and hunting. We want to assure an ample supply of suitable water for compatible industry, agriculture, fisheries, tourism, recreational uses, and other business interests. Strategies for securing good water quality should be economically feasible and contribute to the economic health of the region. There is no priority in order when listing fish, wildlife, and people.

Issues and Actions

Issue 4 Quality. Protect clean ground and surface water needed for domestic use, livestock, and habitat to support fish and wildlife.

Proposed Actions: 20, 35, 36, 37, 38, 39, 40, 41 and 42.

Action 35. Develop a water quality public education program intended to prevent or reduce nonpoint pollution. Educate non-agriculture pesticide users to apply pesticides following the label instructions and pertinent local, state, and federal regulations so groundwater and surface water standards are not violated. Pesticides are applied in appropriate forms and rates and during times so no significant

contamination occurs below the root zone or transport beyond the edge of the field. Pesticides are stored, handled, and disposed of to minimize risk of accidental spill or leakage.

Action 36. Develop a water quality assistance program intended to prevent or reduce nonpoint pollution.

Action 37. Encourage continuation and expansion of conservation practices on individual farms to reduce or prevent nonpoint pollution. On dry crop land, such practices may include contour buffer strips, cover crops, or nutrient management. On rangelands practices could include animal management, fencing or alternative watering facilities. In irrigated farmland, this may include practices such as filter strips, windbreak establishment, or nutrient management.

Action 38. In future water system upgrades, assess feasibility to construct and operate water reclamation and reuse facilities. (e.g., reclamation plants and use areas).

Action 39. Promote wellhead protection programs.

Action 40. Develop a monitoring program and water balance for the Jameson and Grimes Lake area that evaluates potential negative impacts to lake water quality and sets forth implementation measures. Monitoring protocols and potential projects based on monitoring results are listed in Appendix. D.

Action 41. Create county wide sampling plan for contamination including heavy metals, chloride, and fecal coliform bacteria. If high levels of coliform bacteria are found, identify coliform type to determine source.

Action 42. Assure that land use plans and development standards protect ground and surface water quality. Slated for revision in 2011, request earlier update of the Douglas County Shoreline Master Program to reduce the potential for no point pollution reaching the Columbia River. Incorporate all water resource concerns into the Critical Areas Ordinance update in 2005.

5.1.3 Landscape

Goals

Our water quality goals for the **landscape** are to assure sufficient water quality to provide an ample and reliable supply of high quality water needed to support the needs of fish, wildlife, and vegetation.

Healthy wetlands, upland vegetation, and riparian corridors are protected, restored, or enhanced to filter pollutants and minimize erosion and sedimentation. Riparian corridors provide habitat, contribute to groundwater recharge, and the health of aquatic stream systems. Erosion and sedimentation is managed to reduce the impact of peak to normal flood events. Water quality monitoring of pollutants and sediments is continued in the future so changes can be used to inform management strategies.

Issues and Actions

Issue 5 Quality. Tendency for warm summer stream temperatures.

The temperature of aquatic systems can limit or control the aquatic biota normally found in the system.

Actions: 4, 5, 17, 18, 24 and 32.

Issue 6 Quality. Potential for late summer dissolved oxygen deficits.

Action: 32.

Issue 7 Quality. Paved, gravel, and dirt roads have increased erosion and sediment delivery into streams.

Actions: 25, 43, 44 and 45.

Action 43. Encourage public and private landowners to assess roadways and stabilize areas where sediment could be transported offsite.

Action 44. Assess capacity to enhance riparian areas between water bodies and private, county, and state roadways.

Action 45. Work with private and public landowners to share cost, design, and implement projects that will protect or restore riparian vegetation, increase water quality, and enhance habitat.

5.2 Habitat

The **overall habitat goals** for the Douglas County Watershed Planning Association are based on a sustainable future for the landscape, the economy, and the communities of WRIAs 44 & 50. Our largely rural environment provides for opportunities to live, work, and recreate in a landscape where good stewardship supports habitat for native plant and animal species and a healthy economy and community. Actions are recommended to sustain or enhance the health and productivity of habitat for fish and wildlife and thereby to enhance and protect the quality of life for the local people. There is no priority in order when listing needs of fish, wildlife, and people.

5.2.1 Community

Goals

Our habitat goals for the **community** are to establish mixed land use capable of supporting multiple and diverse uses, including urban, rural, agricultural, and natural settings. Adequate water supply is maintained to allow for residential, commercial, recreational, and individual growth compatible with habitat protection needs.

Secure or enhance (through restoration and habitat design) diverse habitat types needed to support the full complement of plants and animals native to this region. Sound stewardship of these natural assets will also provide existing and future generations with more flexibility in shaping the future economy and community. Enough high quality habitat exists to support a diverse array of species in quantities to prevent new ESA listings. The economic and community rewards associated with good stewardship of listed and non-listed species habitat motivates landowners to manage for both profit and habitat.

Healthy relatively weed-free riparian areas are maintained as possible to provide resting and nesting cover for variety of species that enhance the quality of life by providing, for example, opportunities for education and passive recreation.

Our watersheds are a user-friendly place where we live, work, and recreate while still protecting wildlife and environment. We are known throughout the state and region for the diversity and health of the shrub-steppe wildlife that we collectively protect and manage while making a living from the land.

Issues and Actions

All habitat actions should be coordinated with local strategies such as the *Coordinated Upper Columbia Lead Entity Strategy 2004* and the *Douglas County Salmon Recovery Plan* (June 2005). Management strategies for projects in WRIAs 44 & 50 are include in Appendix E. Water Resource Projects Identified During Phase 3.

Issue 1 Habitat. Changed upland habitat. Conversion of native vegetation and wetlands to farmland and development has altered upland habitat changing the timing and

delivery of the water entering the WRIA 44 & 50 streams flowing ultimately to the Columbia River.

Proposed Actions: 18, 46 and 47.

Action 46. Assist landowners with voluntary maintenance, enhancement, restoration, or creation of wetlands.

Action 47. Support continued enrollment for Douglas County in the Conservation Reserve Program (CRP) and other Farm Bill Programs.

Issue 2 Habitat. Restore degraded riparian vegetation in feasible areas. Those areas resulting from human disturbance should be considered for restoration. An area that would not support a vegetated riparian area through natural disturbance, topography, or rocky conditions should not be planted, as success would be unlikely.

Proposed Actions 17, 45, 48 and 49.

Action 48. Support conservation easements and other land conservation practices in riparian areas for purposes of protecting habitat that allow compatible multiple use.

Action 49. Develop a county program to identify areas for off-site mitigation.

5.2.2 Economy

Goals

Our habitat goals for the **economy** are to utilize habitat improvements to relieve environmental pressures which impact agriculture, business, and the economy. Agriculture and habitat conservation are linked and help generate good incomes. Promote diverse agriculture, as viable alternatives arise, to support existing and future wildlife populations.

Continue to provide recreational opportunities for hunting and fishing, wildlife and bird watching, tourism, and recreational enjoyment and to enhance opportunities that will help the local economy. The health and beauty of our natural resources are maintained for future generations.

Issues and Actions

Issue 3 Habitat. Balanced needs of fish and people. Use a non-regulatory conservation benefit approach for the coexistence of habitat for upland and aquatic species and productive farming, grazing, and recreational hunting and fishing.

Proposed Actions: 50, 51, 52 and 53.

Action 50. Incorporate habitat protection and floodplain development controls into Growth Management Act comprehensive plans or other land use plans, shoreline master programs, and/or critical areas ordinances.

Action 51. Integrate habitat improvement planning into flood hazard management plans.

Action 52. Provide a stable base of funding for monitoring compliance and enforcement with the Shoreline Management Act and Critical Areas Code.

Action 53. Upgrade public bridges, culverts, roadways, and other infrastructure as necessary to eliminate or reduce their impacts, especially during flood events, upon people and fish.

5.2.3 Landscape

Goals

Our habitat goals are to sustain a healthy **landscape** that includes agriculture (dryland wheat farming, orchards, and livestock on rangelands), native non-invasive vegetation, and abundant wildlife biodiversity. Fish populations are self-sustaining with adequate cover to lower stream temperatures. Watersheds, including uplands, wetlands, riparian corridors, springs, and seeps are maintained and restored to provide a wealth of wildlife and native plant communities that represent the diversity of the region.

Habitat management supports restoring meadows where possible, establishing zones next to irrigated areas for game, increasing beneficial vegetation and decreasing noxious weeds, enhancing riparian systems and streams resiliency to intense floods, and increasing water storage for more uniform stream flows. Soil erosion control measures are encouraged

Beneficial vegetation well adapted to local climate and soil types requires minimal maintenance (trimming, watering, fertilizing, or treating for pests). Beneficial plants include native or indigenous species. Other varieties and imported plants are also deemed beneficial if they have few maintenance requirements and are not noxious weeds and not invasive.

There is a mixed use of open space including working landscapes, shrub-steppe wild lands, preservation of our forests, designated critical habitat areas, and protection of our natural resources for use by humans and wildlife. Protected habitats are balanced with recreational and agricultural uses. Raised awareness of dramatic changes over time to historic habitat and ecology.

Issues and Actions

Issue 4 Habitat. Peak flows. Although peak flows are a natural condition of the watersheds, human induced alterations can affect the water-holding capacity in the upland and riparian areas.

Proposed Actions: 17, 18 and 54.

Action 54. Balance water storage and channel flushing flows. Channel flushing flows are important to clear excess sediment from streams.

Issue 5 Habitat. Low flows. Although a natural condition, the frequency and duration of low flow conditions are an on-going concern for fish and people.

Proposed Actions: 4, 6, 17, 18, 45 and 55.

Action 55. Encourage installation of checkdams, compatible with habitat needs, to increase groundwater recharge and ultimately surface flow. Checkdams are small earthen or rock barriers placed across streams or that capture water as it flows downstream. The pressure created by the impounded water helps to improve infiltration and raise the local groundwater table.

Issue 6 Habitat. Decrease erosion and sedimentation. Land use practices including agriculture and development can cause decreased stability of substrate, banks, and channels; high levels of fine sediment; high likelihood of landslides; and increased turbidity in streams. In some streams, the sediment deposition is overwhelming the capacity of the stream to transport the fines downstream.

Proposed Actions: 17, 18, 24, 25, 56, 57, 58, 59, 60 and 61.

Action 56. Encourage implementation of the *Douglas County Surface and Stormwater Management Program* for the East Wenatchee Area.

Action 57. Assess the expansion of surface and stormwater management planning to developed areas countywide.

Action 58. Implement in-channel projects that address geologic processes such as deep-seated slope failure, toe erosion, or landslides. Includes continued work to minimize channel headcuts, stabilize banks, and vegetate gullies in the Foster Creek watershed.

Action 59. Assess and propose recommendations to address erosion and sedimentation conditions in the Moses Coulee.

Action 60. Encourage maintenance of drainage ditches, culverts, and other drainage structures to prevent clogging with debris and sediments.

Action 61. Encourage construction of retention and infiltration ponds that capture runoff from roads, development, farms, and irrigation return flows.

Issue 7 Habitat. Restore channel complexity in Foster Creek. A complex channel contains a mixture of habitat types that provide areas with different velocity and depths necessary for various salmon life stages. In contrast, a simple channel contains more uniform flow and few habitat types.

Action 62. In Foster Creek, implement habitat improvement projects to aid in restoration involving construction or placement of instream structures, such as cross vanes, weirs, large woody debris, or side channels. Use beavers as a restoration tool.

Issue 8 Habitat. Control invasive and noxious weeds. Invasive and noxious weeds are displacing native bunchgrasses and beneficial plant communities. The shallow root systems and sparse canopies of weeds allow for increased surface water run-off, soil erosion, and evaporation from exposed soil surfaces.

Actions: 26, 27, 28, 29, 30 and 31.

Issue 9 Habitat. Establish long-term data on habitat conditions. There is a need to collect and analyze change over time in riparian habitat, wetland habitat, floodplain function, sediment delivery and transport, temperature regimes, and groundwater/surface water interactions.

Action 63. Design and implement scope of work for continued monitoring of habitat conditions.

5.3 Instream Flow Recommendations

The planning unit recommends setting minimum instream flow at specific flow levels throughout the year for Foster Creek and Douglas Creek. On Foster Creek, the planning unit recommends the instream flow values be set at the Bridgeport irrigation diversion dam at RM 1.03. This would represent the minimum flow regime for surface water stream flows in the stream reach from the confluence with the Columbia River (RM 0.0) upstream to the dam (RM 1.03). The recommended flows are as follows (all flows in cfs):

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5.0	5.0	5.3	9.5	6.3	4.2	2.8	1.3	1.5	2.7	3.9	5.0

The planning unit recommends the instream flow values be set in Douglas Creek at RM 1.3 at USGS Gage station No. 4635. This would represent the minimum stream flow regime for the stream reach from the Palisades Irrigation Dam (RM 0.7), above the confluence of Douglas Creek with Moses Coulee, upstream to Pegg Canyon located at RM 1.8. These instream flow values will not apply to the Moses Coulee or alluvial fan of Douglas Creek. The following flow numbers (in cfs) are recommended for upper Douglas Creek:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
13.0	15.0	15.0	13.3	13.0	13.0	12.0	12.0	12.0	12.0	13.0	13.0

The flow recommendations are also highlighted in the following tables: Foster Creek (Table 5-1) and Douglas Creek (Table 5-2). The planning unit recommends Ecology begin rule making for Foster Creek and Douglas Creek by issuance of CR 101 within six months of County adoption of the WRIA 44/50 Watershed Management Plan.

The planning unit desires to collaborate with the Washington State Department of Ecology to set a minimum instream flow on Rock Island Creek. Because there is a discrepancy in the determination of whether the stream is intermittent or perennial, the planning unit initially did not recommend setting an instream flow for Rock Island Creek. The planning unit recommends that if Ecology is required to set a minimum instream flow on Rock Island Creek, instream flows in a revised hydrograph will be reduced to account for the senior water right located at the developed spring (RM 0.55). A minimum instream flow regime would be measured at the Chelan PUD pumphouse at RM 0.17. The planning unit recommends that if Ecology is required to set a minimum instream flow, Ecology begin rule-making by issuance of CR 101 within six months of the County adoption of the WRIA 44/50 Watershed Management Plan. The revised hydrograph would be developed with data that is collected during the rule-making period.

Should it be determined that flows need to be set on any other streams or reaches in WRIAs 44 or 50 in accordance with RCW 90.54.020(3)(a), Ecology and the planning unit agree to work together to determine those flows, as provided for in RCW 90.82.130(5). Instream flow recommendation is the only action in this Watershed Management Plan the Department of Ecology accepts as a specific obligation as defined in RCW 90.82.

Table 5-1. Review and recommendation of minimum instream flows for Foster Creek, WA.

Evaluation Parameter	Month JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Priority Species Life Stage:												
Primary	STH-wr	STH-wr	STH-wr	STH-s	STH-s	STH-s	STH-j	STH-j	STH-j	STH-j	STH-j	STH-j
Secondary	-	-	-	STH-i	STH-i	STH-i	STH-i	CH-r	CH-r	CH-r	CH-r	CH-r
<u>Hydrology Based</u>												
10% Exceedence	44.0	52.3	7.9	12.1	6.6	4.2	2.8	1.3	1.5	2.7	8.0	26.0
50% Exceedence	16.9	7.1	6.6	7.8	4.4	2.9	1.7	0.9	0.9	2.0	3.9	6.5
90% Exceedence	3.0	3.5	5.3	5.0	3.3	1.9	0.9	0.7	0.7	1.2	2.9	4.1
Tennant	1.3	1.3	1.3	2.6	2.6	2.6	2.6	2.6	2.6	1.3	1.3	1.3
Tessman	6.8	2.8	2.6	3.1	1.8	1.2	1.7	0.9	0.9	2.0	1.6	2.6
<u>Channel Based</u>												
Wetted Perimeter	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
<u>Habitat Based</u>												
Primary												
Max. Habitat	2.2	2.2	2.2	15.0	15.0	15.0	30.0	30.0	30.0	30.0	30.0	30.0
80% of Max.	-	-	-	7.5	7.5	7.5	13.5	13.5	13.5	13.5	13.5	13.5
50% of Max.	-	-	-	4.7	4.7	4.7	7.0	7.0	7.0	7.0	7.0	7.0
Secondary												
Max. Habitat	-	-	-	10.0a	10.0a	10.0a	10.0a	20.0	20.0	20.0	20.0	20.0
80% of Max.	-	-	-	5.0a	5.0a	5.0a	5.0a	6.5	6.5	6.5	6.5	6.5
50% of Max.	-	-	-	3.1a	3.1a	3.1a	3.1a	2.6	2.6	2.6	2.6	2.6
PU Recommended Minimum Flow	5.0	5.0	5.3	9.5#	6.3#	4.2	2.8	1.3	1.5	2.7	3.9	5.0

STH = steelhead trout, CH = Chinook salmon; s = spawning; r = rearing; wr = winter rearing; i = incubation

a – value represents 2/3 of primary species spawning flow for incubation

- Flow recommendation of 10% exceedence value reduced to account for available incubation habitat the subsequent month.

Table 5-2. Review and recommendation of minimum instream flows for Douglas Creek, WA.

Evaluation Parameter	Month											
	JAN	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Priority Species Life Stage:												
Primary	RBT-a	RBT-a	RBT-s	RBT-s	RBT-s	RBT-r	RBT-a	RBT-a	RBT-a	RBT-a	RBT-a	RBT-a
Secondary	RBT-j	RBT-j	RBT-i	RBT-i	RBT-i	RBT-i	RBT-j	RBT-j	RBT-j	RBT-j	RBT-j	RBT-j
<u>Hydrology Based</u>												
10% Exceedence	13.6	19.9	15.1	13.5	12.9	13.1	13.9	12.2	12.1	12.5	13.3	13.1
50% Exceedence	12.9	14.8	13.6	13.3	12.8	12.7	12.3	11.9	11.8	11.9	12.9	12.7
90% Exceedence	12.5	12.3	11.9	13.0	12.6	12.2	11.7	11.5	11.4	11.4	12.3	12.1
Tennant	2.6	2.6	2.6	5.1	5.1	5.1	5.1	5.1	5.1	2.6	2.6	2.6
Tessman	5.2	5.9	5.4	5.3	5.1	5.0	4.9	4.8	4.7	4.8	5.2	5.1
<u>Channel Based</u>												
Wetted Perimeter	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
<u>Habitat Based</u>												
Primary												
Max. Habitat	40.0	40.0	25.0	25.0	25.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
80% of Max.	24.0	24.0	16.5	16.5	16.5	24.0	24.0	24.0	24.0	24.0	24.0	24.0
50% of Max.	12.0	12.0	11.2	11.2	11.2	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Secondary												
Max. Habitat	14.0	14.0	16.7a	16.7a	16.7a	16.7a	14.0	14.0	14.0	14.0	14.0	14.0
80% of Max.	6.5	6.5	11.0a	11.0a	11.0a	11.0a	6.5	6.5	6.5	6.5	6.5	6.5
50% of Max.			7.5a	7.5a	7.5a	7.5a						
PU Recommended Minimum Flow	13.0	15.0	15.0	13.3	13.0	13.0	12.0	12.0	12.0	12.0	13.0	13.0

STH = steelhead trout, CH = Chinook salmon; s = spawning; r = rearing; wr = winter rearing; i = incubation
A – value represents 2/3 of primary species spawning flow for incubation

Appendices

WRIA 44/50
Watershed Management Plan

Douglas County Watershed
Planning Association

List of Appendices

Appendix A. Intergovernmental Agreement for Douglas County Watershed Planning and Designation of Lead Agency

Return Document to: Foster Creek Conservation District
P. O. Box 428, Waterville, WA 98858-0428
Document Title: Intergovernmental Agreement for Watershed Planning
Grantors: Foster Creek Conservation District, Douglas County, Grant County, Okanogan County, City of Bridgeport, City of East Wenatchee, Bridgeport Irrigation District #1, East Wenatchee Water District, and the Colville Confederated Tribes
Grantee: N/A
Legal Description: N/A
Parcel Number(s): N/A

INTERGOVERNMENTAL AGREEMENT FOR DOUGLAS COUNTY WATERSHED PLANNING AND DESIGNATION OF LEAD AGENCY

This INTERGOVERNMENTAL AGREEMENT ("Agreement") is entered into by and among the Initiating Governments of Douglas County, Grant County, Okanogan County, City of East Wenatchee, City of Bridgeport, Bridgeport Irrigation District #1, East Wenatchee Water District, Colville Confederated Tribes (collectively, the "Initiating Governments") and the Foster Creek Conservation District (known hereafter as the "Lead Agency") for the purposes of administrating the development of a local Watershed Plan under authority of ESHB 2514 (RCW 90.82) for the Foster Creek and Moses Coulee basins in Water Resource Inventory Areas (WRIA's) 44 and 50; defining the duties and responsibilities of the Initiating Governments and Lead Agency for the local watershed Planning Process; directing staff; contracting with consultants; and authorizing requests for grant funding.

RECITALS AND FINDINGS

WHEREAS, water resource planning has been and continues to be a responsibility of Washington State, counties, cities, water utilities, and tribes.
WHEREAS, the State of Washington has declared, and the Initiating Governments recognize, that proper utilization of the water resources of this State is necessary for the promotion of public health and economic well-being of the State and preservation of its natural resources and aesthetic values.
WHEREAS, the Initiating Governments recognize that it is in the best interests of the State and the Foster Creek and Moses Coulee basin that comprehensive watershed planning be given a high priority so that water resources and associated values can be utilized and enjoyed today and protected for tomorrow.

WHEREAS, the Douglas County Watershed Planning Association for WRIAs 44 and 50, was initiated pursuant to RCW 90.82.060 by the Initiating Governments in a grant application submitted by Foster Creek Conservation District and approved by the Washington State Department of Ecology for Phase One funding of watershed planning in Douglas County.

WHEREAS, comprehensive water resource planning must provide interested parties adequate opportunity to participate, and water resources issues are best addressed through cooperation and coordination among the State, Indian tribes, Local Governments, and all interested parties.

WHEREAS, utilization and management of the waters of this State are guided by certain general principles, including that uses of water for domestic, stock-watering, industrial, commercial, agricultural irrigation, hydroelectric power production, mining, fish and wildlife maintenance and enhancement, recreational, thermal power production, preservation of environmental and aesthetic values, and all other uses compatible with the enjoyment of the public waters of the State are beneficial.

WHEREAS, to develop a watershed Planning Process under ESHB 2514, the Initiating Governments shall work in cooperation with representatives of State and federal agencies, the Colville Confederated Tribes, Local Governments and representatives for agricultural, fisheries, recreational and environmental interests.

WHEREAS, the Initiating Governments must provide for the participation of a wide range of water resource interests in the composition of the Planning Unit for the Foster Creek and Moses Coulee basins, and it is critical to the success of the planning process that the Initiating Governments provide for broad public participation and education regarding the development and implementation of the local Watershed Plan.

WHEREAS, all Initiating Governments should be members of the Douglas County Watershed Planning Association and have designated the Foster Creek Conservation District as “Lead Agency” for the local watershed Planning Process.

NOW, THEREFORE, in consideration of the mutual agreements, covenants and promises contained herein, the Initiating Governments agree to the following terms:

1. DEFINITIONS

1.1. “Douglas County Watershed Planning Association” is the encompassing title of the entire ESHB 2514 watershed planning effort underway in Douglas County.

1.2. “Initiating Governments” means those local and tribal governments generally designated by RCW 90.82.060 for the purposes of initiating watershed planning, determining a Scope of Planning, and designating a Lead Agency for such planning. For the purposes of this Agreement, the Initiating Governments includes: Douglas County, Grant County,

Okanogan County, City of East Wenatchee, City of Bridgeport, Bridgeport Irrigation District #1, East Wenatchee Water District, and the Colville Confederated Tribes.

1.3. "Lead Agency" or "Agency" means the organization designated by the Initiating Governments pursuant to RCW 90.82.060 to serve as the lead agency for the Planning Process, including the receipt and administration of grant funds and providing staff support related to watershed planning. For the purposes of this Agreement the Lead Agency is the Foster Creek Conservation District.

1.4. "Local Governments" means cities, towns, irrigation districts and any other taxing authority.

1.5. "Organizing Board" means the organizing body of Initiating Governments for Douglas County Watershed Planning to provide ongoing coordination of Initiating Governments as needed during the watershed planning project.

1.6. "Planning Costs" means (1) the cost of preparing the studies and plans relating to the planning process; (2) the amounts paid to contractors for work performed under approved contracts; (3) the costs of legal, engineering, and other professional service relating to the watershed planning effort, the planning process and resolution of any disputes related thereto; and (4) other costs reasonably related to the planning process initiation, administration, auditing and general project management.

1.7. "Planning Process" means the Watershed Plan preparation under authority of RCW 90.82, the associated public involvement and education process, and activities provided for herein.

1.8. "Planning Unit" means the collective representatives of water resource interests who, as an autonomous body under authority of Chapter 90.82 RCW are tasked with the responsibility to prepare a detailed work plan and a Watershed Plan through the consensus process defined therein, and further outlined in Section 6 of this Agreement.

1.9. "Scope of Planning" means the determination made by the Initiating Governments as to which of the three (3) optional elements will be included in the Watershed Plan.

1.10. "State" means the State of Washington and any of its agencies.

1.11. "Watershed Plan" means the local watershed plan prepared by the Planning Unit under authority of ESHB 2514 (Chapter 247, Laws of 1998).

2. DUTIES OF THE FOSTER CREEK CONSERVATION DISTRICT AS LEAD AGENCY

2.1. Provide professional, technical, administrative and clerical support to the Initiating Governments and the Planning Unit. General support and assistance includes: arranging for meetings as well as preparation and

distribution of agendas and minutes of meetings; facilitate meetings of the Initiating Governments and the Planning Unit; preparation of draft documents and budgets for approval by the Initiating Governments.

2.2. Facilitate, coordinate, and/or contract for necessary research, data collection and analysis to support the planning process, as funding is available.

2.3. Develop and implement public education and information programs including periodic updates of the progress on watershed planning, using methods that facilitate early and continuous public involvement.

2.4. Integrate the planning process into and comply with State Environmental Policy Act requirements.

2.5. Receive and administer grants.

2.6. Assist the Initiating Governments in the development of a general Scope of Planning to be conducted.

2.7. Organize, upon request of the Planning Unit, public hearings and/or public meetings regarding the Watershed Plan.

2.8. Administer staff, and contracts with consultants and other professional services to facilitate the planning process and fund the activities of the Planning Unit.

2.9. Organize public hearings on the Watershed Plan prepared by the Planning Unit, and provide a report on the public hearings and its recommendation to the County legislative authorities for the approval process provided in RCW 90.82.130.

2.10. In the event that the Lead Agency desires to withdraw from the watershed Planning Process, written notice shall be provided to the Organizing Board sixty (60) days prior to withdrawal. The Lead Agency agrees to assist in the transition to a new Lead Agency.

3. SUPPORT AND FINANCING FOR THE PROJECT

3.1. When authorized by the Initiating Governments, the Lead Agency may apply for and accept grants in the name of the Douglas County Watershed Planning Association from federal, State, local and private sources. The Lead Agency may utilize existing grant funds and appropriations in the Lead Agency's ESHB 2514 watershed planning accounts for the purposes specified herein.

3.2. The Initiating Governments shall not be obligated to pay any debts of the Lead Agency or the Planning Unit. These costs shall be funded solely through grants and voluntary contributions.

3.3. The Lead Agency shall present to the Initiating Governments the annual budget for its operations under the Douglas County Watershed Planning project. The Agency's fiscal year shall be July 1 through June 30. The

budget for the Agency shall be approved prior to the acceptance of future funding.

3.4. The Lead Agency shall not acquire real property as part of the ESHB 2514 watershed Planning Process. Any personal property acquired for use by the Lead Agency shall be acquired in the name of the Watershed Planning Association. In the event the Lead Agency changes, all equipment and technical data shall be transferred to the new Lead Agency. At the termination of the watershed Planning Process, all such equipment and data shall be retained by the Lead Agency.

4. REPORTING REQUIREMENTS

An Agency representative shall report quarterly to each Initiating Government regarding its activities during the prior period. Reporting may be in writing, or by reporting to the Initiating Governments at a meeting held for that purpose or at a regularly scheduled meeting.

5. BOOKS, ACCOUNTS AND PERSONNEL POLICIES

5.1. The Agency shall be responsible for compliance with reporting requirements of the agencies or jurisdictions providing financial support to the watershed planning project.

5.2. The Agency shall keep full and complete books of accounts showing the Planning Costs incurred in connection with the planning process. The cost of keeping those books shall be considered to be a Planning Cost of the Agency. Audits of the books shall be performed every three (3) years, as required by State statute, by the Washington State Auditor. The cost of such audit shall be considered a Planning Cost. The results of annual, in-house audits by the Lead Agency shall be presented to the Initiating Governments. More frequent audits, if requested by any Initiating Government, shall be charged to the Initiating Government making the request.

6. INITIATING GOVERNMENTS

6.1. There is hereby established an Organizing Board (Board) as defined in section 1.5 of this Agreement. The Initiating Governments shall be represented by one (1) Commissioner from each County (Douglas County, Grant County, Okanogan County) and one (1) elected official from the City of East Wenatchee, City of Bridgeport, Bridgeport Irrigation District #1, East Wenatchee Water District, and the Colville Confederated Tribes. The governing body of each Initiating Government may appoint alternate representatives, who may or may not be elected officials. In the absence of the primary representative, said alternate will have the same responsibilities and authorities as the primary representative. Initiating Governments shall provide the Lead Agency with a letter designating the primary and alternate representatives.

6.2. Each Initiating Government shall have one vote on the Board.

6.3. A quorum of the Initiating Government Board shall be the majority of active members. "Active members" as defined herein shall be all members who have not formally withdrawn as provided for in section 6.4. The Board shall take action by a majority vote of those present at the meeting, except that proceeding to Phase II and Phase III of the planning process shall require unanimity in accordance with RCW 90.82.060(4).

6.4. Initiating Governments may withdraw from the Board by providing written notice to the Agency director or the Board Chairperson, or by announcing the withdrawal at a public meeting of the Board. This Agreement shall remain valid and in full force and effect and the Agency shall continue to serve as the Lead Agency for the watershed Planning Process despite any such withdrawal. The withdrawal of any Initiating Government from the Board shall not affect the Planning Unit's authority to prepare the Watershed Plan or the approval process set forth in RCW 90.82.

6.5. Roles and Responsibilities:

6.5.1. **Initiating Governments** are responsible for the organization of the Planning Unit and establishing the planning process. These duties include: determining the composition of and designating membership in the Planning Unit; determining the number of State agency representatives on the Planning Unit; developing a proposed Scope of Planning; and at the request of the Planning Unit, assist in resolving Planning Unit disputes regarding plan development.

6.5.2. **Initiating Governments** have provided a proposed scope of planning in Section 8 of this Agreement. The final determination of the scope of planning for the Watershed Planning process shall be approved by the Organizing Board.

6.5.3. **Initiating Governments** may seek additional funding to support watershed-planning efforts in Douglas County. The Initiating Governments shall not be obligated to pay any debts of the Lead Agency or the Planning Unit. All costs associated with the Douglas County Watershed Planning Association shall be funded solely through grants and voluntary contributions.

6.5.4. **Douglas County** is the regional government within Douglas County and has specific responsibilities under Chapter 90.82 RCW. These responsibilities include, but are not limited to, determining whether or not to be an Initiating Government for watershed planning projects conducted by agencies other than the Lead Agency designated by this Agreement; and adoption of any Watershed Plan that may result from a planning process. The process for plan review and adoption by Douglas County is classified as a legislative review pursuant to Chapter 14.10 of the Douglas County Code.

7. PLANNING UNIT RESPONSIBILITIES

If phase II planning is implemented, the Planning Unit shall have the following responsibilities:

7.1. Apply for state grants under the Watershed Planning Act (RCW 90.82).

7.2. Refine the work plan to develop a watershed management plan for the Douglas County Watershed Planning Association. Considerations shall be given to all existing plans and related planning activities.

7.3. Recommend to the Initiating Government Organizing Board additional members for appointment to the Planning Unit.

7.4. Hold meetings throughout the watersheds to insure a wide range of interests have the opportunity to participate in the planning process.

7.5. Review and recommend activities pertaining to staffing and funding of the Planning Unit.

7.6. Request the assistance of the Initiating Government Organizing Board in resolving disputes regarding interim decisions on plan development activities, if necessary.

If Phase III is implemented, the Planning Unit shall have the following responsibilities:

7.7. Develop and submit a Watershed Plan to the legislative authorities of the counties with territory within the management area (WRIA 44 and WRIA 50) for their review and adoption process. Prior to submittal to the county legislative authorities, said plan shall be approved by consensus of all of the members of the Planning Unit as provided for in RCW 90.82.130. (see note below)

7.8. The Watershed Plan shall be submitted to the Counties with territory within the management area within four (4) years of the request for Phase II funding (or as directed by the State Department of Ecology).

8. PROPOSED SCOPE OF PLANNING

For the purposes of organizing, the Initiating Governments will consider the following elements of watershed planning. The Initiating Governments will make the final determination on which optional elements will be addressed after analysis and discussion of potential impacts and implications.

A. Water Quantity: Assessing of water supply and use in the management area and developing strategies for future use. *(Mandatory)*

B. Instream Flow: The Planning Unit may request that Ecology either modify existing minimum instream flows, or adopt new minimum instream flows for streams that do not have them. *(Optional)*

C. Water Quality: The degree to which existing water quality standards are being met, the causes of water quality violations, consideration of Total Maximum Daily Loads (TMDL's) and recommendations for monitoring. *(Optional)*

D. Habitat: Coordination and development of the Watershed Plan to protect or enhance fish and wildlife habitat in the management area. *(Optional)*

9. AGENCY AND PUBLIC PARTICIPATION

The Agency shall work in cooperation with the Colville Confederated Tribes, other tribal governments, State and Federal agencies, and Local Governments. Public participation through public hearings and other methods shall be provided by the Agency as part of its management of the planning process. A framework plan for public participation shall be prepared by the Agency pursuant to section 2.3 for approval by the Planning Unit.

10. PROTECTION OF EXISTING RIGHTS

The Watershed Plan authorized by ESHB 2514 and this Agreement shall not contain any provisions that: (a) are in conflict with existing State statutes, federal laws, or tribal treaty rights, or other federally recognized tribal rights; (b) impair or diminish in any manner any existing water right evidenced by a claim filed in the water rights claim registry established under RCW 90.14 or a water right certificate or permit; or (c) violate any other provisions or limitations established in RCW 90.82.120.

11. REMEDIES/DISPUTE RESOLUTION

In the event of a dispute regarding rights and/or duties under this intergovernmental agreement, the Initiating Governments and Lead Agency agree to attempt resolution through mediation utilizing the services of a mediator agreed upon by all parties or as selected by the Executive Director of Washington Arbitration and Mediation Services, Inc. The cost of the mediation shall be born half by the parties requesting mediation and the other half to be paid by the other parties bound by this Agreement. The mediation will be held in Douglas County.

12. INTERGOVERNMENTAL AGREEMENT

This Agreement constitutes an exercise of the Initiating Governments' authority under RCW 39.34, the Interlocal Cooperation Act. The original of this Agreement shall be filed with the Douglas County Auditor. The recorded instrument shall be sent to the legislative authority of each Initiating Government and the Lead Agency. Copies of the Agreement shall be provided to the State Department of Community, Trade and Economic Development, and the Department of Ecology.

13. EFFECTIVE DATE/TERM OF AGREEMENT

13.1. This Agreement shall become effective upon its recording by the County Auditor of each County. The original Interlocal Agreement dated Spring 1999 shall be superseded by this Agreement, immediately upon its execution by each of the Initiating Governments identified in paragraph 1.2.

13.2. This Agreement automatically terminates effective at any time the Agency does not have sufficient funds necessary to meet current Planning Costs, unless the Initiating Governments each agree to contribute sufficient funding necessary to meet Planning Costs for the current fiscal year.

13.3. Unless earlier terminated under Section 12.2 or by written notice from each of the Initiating Governments, this Agreement shall terminate on or before December 31, 2002 if it is not extended by written agreement approved by each Initiating Government's legislative authority prior to such date.

14. ADOPTION/AMENDMENT

This Agreement may be amended at any regular or special meeting of the Initiating Government Organizing Board with the unanimous approval of the designated representatives of the Initiating Governments. All amendments shall be in writing, be numbered and attached to the Agreement and be distributed as set forth in Section 11.

PASSED BY THE BOARD OF COUNTY COMMISSIONERS FOR DOUGLAS COUNTY, WASHINGTON, this 10th day of January, ~~1999~~ 2000

BOARD OF COUNTY COMMISSIONERS
Douglas County, Washington

Chairman

Commissioner

Commissioner

ATTEST: Clerk of the Board

Approved as to form:
Steven M. Clem
Prosecuting Attorney

COMMISSIONERS COURT
SEAL
DOUGLAS COUNTY, WASHINGTON

PASSED BY THE BOARD OF COUNTY COMMISSIONERS FOR GRANT COUNTY, WASHINGTON, this _____ day of _____, 1999.

BOARD OF COUNTY COMMISSIONERS
Grant County, Washington

Chairman

Commissioner

Commissioner

ATTEST: Clerk of the Board

Approved as to form:
Prosecuting Attorney

PASSED BY THE BOARD OF COUNTY COMMISSIONERS FOR OKANOGAN COUNTY, WASHINGTON, this 25th day of January, ~~1999~~ 2000

BOARD OF COUNTY COMMISSIONERS
Okanogan County, Washington

ABSENT
Chairman

Commissioner

Commissioner

ATTEST: Clerk of the Board

Approved as to form:
Prosecuting Attorney

PASSED BY THE CITY COUNCIL OF THE CITY OF BRIDGEPORT, WASHINGTON, this 22 day of Nov, 1999.

CITY COUNCIL
City of Bridgeport, Washington

Mayor

ATTEST: City Clerk

Approved as to form:
Charles D. Zimmerman
City Attorney

PASSED BY THE CITY COUNCIL OF THE CITY OF EAST WENATCHEE, WASHINGTON, this 6th day of December, 1999.

CITY COUNCIL
City of East Wenatchee, Washington

Mayor

ATTEST: City Clerk

Approved as to form:
Charles D. Zimmerman
City Attorney

PASSED BY THE BOARD OF THE BRIDGEPORT IRRIGATION DISTRICT, DOUGLAS COUNTY, WASHINGTON, this 19th day of November, 1999.

BOARD
Bridgeport Irrigation District #1

President

ATTEST: District Secretary

Approved as to form:
Irrigation District Attorney

PASSED BY THE BOARD OF THE EAST WENATCHEE WATER DISTRICT, DOUGLAS COUNTY, WASHINGTON, this _____ day of _____, 1999.

BOARD
East Wenatchee Water District

President

ATTEST: District Secretary

Approved as to form:
Water District Attorney

Appendix B. Initial Invitees to WRIA 44/50 Planning

LOCAL GOVERNMENT:

Douglas County Board of Commissioners*
WSU Cooperative Extension
East Wenatchee Water District*
Douglas County Sewer District
Greater Wenatchee Irrigation District
Bridgeport Irrigation District*
Palisades Irrigation District
City of Wenatchee Municipal Water Supply
Wenatchee Reclamation District
Port of Douglas County
Chelan/Douglas Health District
Douglas County Public Utility District
Chelan County Public Utility District

LOCAL COMMUNITIES:

Mayors of their designees for the cities of Mansfield, Waterville, Bridgeport*, Rock Island, Coulee Dam, East Wenatchee* and for the communities of Orondo and Palisades.
Douglas County Regional Planning Commission
Foster Creek Conservation District
South Douglas Conservation District
School Districts

FEDERAL GOVERNMENT:

Bureau of Land Management
Natural Resources Conservation Service
Army Corps of Engineers
U.S. Fish & Wildlife Service
Douglas County Farm Service Agency
Bureau of Reclamation
U.S. Geological Survey
U.S. Environmental Protection Agency

STATE GOVERNMENT:

Department of Natural Resources
Department of Ecology
Department of Fish & Wildlife
Department of Transportation
Department of Parks & Recreation
Community Trade and Economic Development
Governor's Salmon Recovery Office

PRIVATE CORPORATIONS & BUSINESSES:

Central Washington Grain Growers

WA Association of Realtors
Association of WA Business
Central WA Homebuilders

ENVIRONMENTAL & CONSERVATION GROUPS:

North Cascades Chapter Sierra Club
North Central Washington Audubon
Ducks Unlimited
Trout Unlimited (Grand Coulee, Coulee City)
POWER
Washington Environmental Council
The Nature Conservancy of Washington

INDIAN TRIBES: Colville Tribe* and Yakama Tribe

AGRICULTURE, HORTICULTURE, & ECONOMIC DEVELOPMENT GROUPS:

Douglas County Cattlemen
Chelan/Douglas County Farm Bureau
Douglas County Wheatgrowers
Pomona Grange
WA Grower's Clearinghouse Association

OTHERS:

Interested Citizens: farmers, ranchers, orchardists, urban landowners, environmentalists, etc.

Other Groups: Bridgeport Bar residents, local commercial fish farmers, chambers of commerce's, sport fishers, Quest, local water users/irrigators, Complete the Loop Coalition

**** Initiating Governments***

Appendix C. Water Storage Recommendations

Based upon the findings from the WRIA44/50 Storage Assessment and Feasibility Study, August 2004, the Pacific Groundwater Group identified potential recommendations for the continuation of the Foster Creek and Douglas Creek basin storage projects. These recommendations are in need of further analysis during Phase 4 Implementation.

Foster Creek Recommendations

The storage assessment reviewed two potential storage sites in the Foster Creek basin located along the East Fork of Foster Creek. Both of those sites appear feasible from an engineering perspective and would provide benefits by reducing sediment loading to Foster Creek, improving riparian conditions and slightly increasing water storage. To continue planning and engineering for those sites we recommend the following steps:

1. Perform topographic survey of both sites (upper and lower) and prepare base maps. Consider using LIDAR to prepare aerial topographic map of sites. Base maps should contain property ownership information.
2. Perform geotechnical review, wetlands survey and permitting review of sites. The reviews are intended to provide information on existing conditions, determine the appropriate type of structures and determine the permitting requirements and potential mitigation needed for the projects.
3. Meet with U.S. Army Corps of Engineers to confirm permitting requirements and potential mitigation.
4. Prepare engineering designs of projects to select best stabilization technique (i.e. rock or gabion or other) and to complete construction plans. Also prepare environmental restoration designs to the extent required for permitting.

Douglas Creek Recommendations

The storage assessment reviewed three potential storage sites in the Douglas Creek basin. The first storage site reviewed was a surface water reservoir located along Douglas Creek upstream of Moses Coulee, a surface water diversion from Douglas Creek and infiltration into the alluvial fan at the outlet of Douglas Creek into Moses Coulee and a surface water diversion from McCartney Creek with infiltration into Moses Coulee. The first site does not appear to be viable from a cost and permitting perspective. The two infiltration sites are less expensive and likely easier to permit and therefore more feasible. They can provide benefits in terms of increased water supply through ASR and potentially reduce flooding in Moses Coulee. To continue planning and engineering for those sites we recommend the following steps:

1. Perform topographic survey of McCartney Creek Infiltration Facility and Douglas Creek Infiltration facility sites and prepare base maps for each. Consider using LIDAR to prepare aerial topographic map of sites. Consider extending LIDAR survey down Moses Coulee to pickup topographic information in flood problem

areas. That topography can be used to prepare a hydraulic model of Douglas Creek in Moses Coulee. Base maps should contain property ownership information.

2. Perform geotechnical review, wetlands survey and permitting reviews of sites. The reviews are intended to provide information on existing conditions, determine the potential size or extent of the projects and the type of structures and determine the permitting requirements and potential mitigation needed for the projects.
3. Perform additional hydrogeological studies of the sites including in-situ permeability tests to better characterize the location of the best areas for infiltration and the expected infiltration rate during the projects operation.
4. Perform additional hydrologic and hydraulic studies of the projects to estimate the effect of the projects on peak flows in Douglas Creek and the potential for reducing flooding in areas downstream. Prepare hydraulic model of Douglas Creek to determine its capacity and flows that create flooding conditions. Route flood flows through infiltration projects to determine the reduction in flood flow and the reduction in flood levels in Moses Coulee. Optimize storage and infiltration capacity of projects to maximize flood control benefits.
5. Meet with U.S. Army Corps of Engineers, Washington Department of Ecology and other agencies to confirm permitting requirements (wetlands, water rights) and determine the potential mitigation required to obtain permits.
6. Prepare engineering designs of projects to select the best methods of diverting, storing and infiltrating streamflow. Also prepare environmental restoration designs to the extent required for permitting.

Appendix D. Jameson and Grimes Lake Water Quality Recommendations

Based on the WRIA 44/50 Water Quality Assessment of Jameson and Grimes Lakes, September 2004, the planning unit is considering the following recommendations. These recommendations are in need of further analysis during Phase 4 Implementation.

1.) Formation of a monitoring program for long-term lake sampling.
Staff should be trained to collect water quality data for the lakes, creeks, and wells. A recommended sampling protocol is to:

- One sample from the surface of each of the lakes should be collected in June, July, August and September. Samples should be analyzed for pH, temperature, dissolved oxygen, secchi depth, conductivity, total phosphorus, and algae for identification.
- One sample from Stations 2 and 3 should be collected in March, April, May, and June. Samples should be analyzed for pH, temperature, conductivity, turbidity, and total phosphorus.
- Flows should be measured at Stations 2 and 3 whenever samples are collected.
- Flows at station 6, Jameson Lake outlet, should be monitored throughout the year.
- If a stormwater/ snow melt events occurs efforts should be made to quantify duration of event. Samples should be collected at regular interval during the event and analyzed for turbidity, total phosphorus, total nitrogen, pH, and conductivity.
- Include monitoring for toxic blue green algae.
- Forward results to local and state health departments as responsible parties for notification to public.

2.) Program coordination with Washington State Fish and Wildlife and Department of Ecology. Discussion should be initiated with state agencies to help coordinate the sampling program and assist in funding costs incurred with water sample analysis.

3.) Reducing potential impact of human and animal waste to the lakes. Planning unit should consider options for reducing the transport of human and animal waste into Jameson Lake. Options for consideration and further development are:

- Limit livestock access to riparian areas and lakeshores to reduce waste transport into lakes. Evaluate alternative livestock watering facilities.
- Improve capacity of natural wetlands and ponds to reduce pollutant transport in area between Bennett (Wittig) and Jameson Lakes.
- Lower level of Jameson Lake and construct wetlands and ponds to reduce pollutant transport.
- Seek sources of funding for planning, design, and construction.
- Encourage septic system owners to work with state and local health districts. Refer to plan action 32.
- Improve recreational use. Alleviate “open toilet” use at the south end of Jameson Lake by restrict access or providing sanitary facilities.

4.) Examine feasibility of adjusting water level of Jameson Lake. Need to have analysis of historic condition and rise and fall of the lake level. Lowering the water level will provide valuable protection against flooding. In addition to storage and protection against flooding the impact of agriculture and septic systems would be reduced. Funding should be found to pay for planning, permitting, design, and construction.

*5.) Develop water balance for Jameson Lake. Estimate groundwater inflow to Jameson Lake***.** Two possible approaches have been identified at this time. One is a Darcy's Law approach that would involve performing aquifer tests in existing wells in the Jameson Lake area and using driller's well logs to estimate aquifer thickness. Appropriate well constructions and access to existing wells in the area may limit this approach. A second possible approach may be a water balance to calculate groundwater flow to the lake by measuring surface inflows to Jameson Lake, precipitation, and estimating evaporation.

Appendix E. Water Resource Projects Identified During Phase 3

The planning unit generated a project proposal list from individual organizations to identify current projects and to stimulate ideas for future water resources projects. Ultimately, the WRIA 44/50 Watershed Management Plan is intended to provide a guideline and to set priorities to direct future water resource project development.

1.0 Water Quantity Projects

1.1 Palisades Irrigation District Efficiency Project

The Palisades Irrigation District (PID) consists of two diversions at the mouth of Douglas Creek where it enters the Moses Coulee. The PID serves up to twenty-five growers over 670 acres in the Palisades area. The present irrigation district consists of leaky old steel pipes subject to collapse. The project proposal includes several options for lower and upper line replacement. This upgrade would improve the reliability of the system and power efficiency, conserve water by reducing leaks and moderate user consumption, and leave more water in the stream during non-irrigation periods for resident trout.

1.2 Reclaimed Water Feasibility Assessment

The Douglas County Sewer District Treatment Plant discharges about 3 million gallons per day of treated wastewater. This water could potentially be used for landscape irrigation for parks, cemeteries, and golf courses. Currently, the City of East Wenatchee does not have the facilities to treat the wastewater to the tertiary level as required to protect public health and safety, and the tertiary treatment is cost prohibitive at this time compared to the benefits obtained. In the future, however, when the treatment plant is upgraded or a new plant is built reclaimed water may become feasible.

1.3 Industrial Fruit Packing Water Reclamation

In addition to wastewater treatment plants, other industries that use large volumes of water (i.e. fresh fruit packing facilities) may be able to reclaim some of their process water for reuse or other beneficial uses such as irrigation.

1.4 Hydrologic Restoration of the Cowboy Camp area of McCartney Creek

Proposal would restore (convert) Cowboy Camp area of McCartney Creek to a properly functioning multi-channel (or braided channel) stream system, supporting healthy riparian woody vegetation, native wet meadow grasses, and a healthy upland vegetation community. McCartney Creek has been put into a ditch running along the east side of what was once a riparian meadow, and dramatically altering this entire 35 to 40-acre area. A thumbnail calculation indicated that in its current condition, the meadow stores approximately 12 acre-feet of water. Properly restored, the same thumbnail calculation indicates it should be capable of holding closer to 600 acre-feet. The project

would increase water retention (storage), dampen both peak high and low flows through McCartney Creek, increase water quality through reduced water temperatures (shading), etc, and increase dissolved oxygen. Woody debris would improve fish habitat in general, and healthy riparian vegetation would also provide improved habitat for riparian dependent birds, and notably it would provide much needed sharp tailed grouse habitat.

2.0 Water Quality Projects

2.1 Wellhead Protection Projects

Douglas County, East Wenatchee Water District and the City of Wenatchee have a Wellhead Protection Program for the Regional Wells. The main goal of the program is to: "Maintain the long-term quality and quantity of groundwater resources in Douglas County by preventing contamination." There are twenty-three recommended activities from the program mostly related to educating the people who work or live in the critical areas around the wells. Similar wellhead protection projects could be done for any groundwater source in the WRIAs. A few examples are:

- Conduct a district wide-mailing to teach homeowners about the proper use of household and gardening chemicals and explain how improper use threatens groundwater.
- Develop a discreet, targeted public education for property owners within the wellhead protection boundaries.
- Develop a program to revise stormwater management regulations within the Final Wellhead Protection Boundaries.
- Work with Washington State Department of Transportation to develop management strategies for state transportation corridors through the designated recharge areas.

2.2 Monitoring at Dutch Henry Falls

Initiate a water quality assessment and monitoring program at the base of Dutch Henry Falls. Dutch Henry Draw drains a significant portion of the Waterville Plateau and terminates (except in very high water events) at the falls. Because it serves as a "collector", and doesn't suffer the dilution issues that Jameson Lake does, it appears to be a perfect candidate for study.
At minimum the falls would be monitored including the water quality parameters for phosphorus,soluble reactive phosphorus, nitrates, nitrites, total nitrogen, heavy metals, chlorides and fecal coliform bacteria.

3.0 Habitat

Habitat actions should be coordinated with the ***Upper Columbia Lead Entity Strategy 2004, Management Strategies for Projects in WRIA 44/50.*** The current strategy prioritizes projects that improve water quality and accessible habitat areas of creeks and streams with perennial flows entering into the Columbia River. The Upper Columbia Lead Entity Strategy:

1.1.1.1 *Foster Creek Management Strategy*

The Foster Creek drainage can be separated into two distinct sections based upon the types of projects indicated as most beneficial by our assessments. The reach from the confluence with the Columbia River to the abandoned irrigation dam at RM 1.03 prioritizes projects that improve channel sinuosity and reduce streambank erosion. The remainder of the main steam Foster Creek including the west, middle, and east forks of Foster Creek prioritize projects that reduce stream bank erosion as well as sedimentation from adjacent lands that drain into the creeks and reduce the impact of high-volume runoff events due to spring melt and storm events. Direct benefits to listed salmonids will occur from projects increasing the quality of water by reducing sediment loading, reducing temperature, and decreasing the likelihood of contaminants from nearby lands.

1.1.1.2 *Rock Island Creek Management Strategy*

Rock Island Creek provides habitat for listed salmonids as well as other anadromous and resident fish species below the developed spring at RM 0.52. Based upon our limiting factors analysis, projects addressing habitat/riparian protection and increases in spawning habitat will be given highest priority. Projects to reduce sedimentation are not indicated as high priority based on our observations however; other aspects of water quality such as temperature and contamination are of high priority.

1.1.1.3 *Sand Canyon Creek Management Strategy*

Sand Canyon Creek provides habitat for listed salmonids as well as other anadromous and resident fish species below SR 28 (Sunset Highway) where there is currently an irrigation structure that is a blockage to fish passage. Spawning surveys have shown the potential for rearing habitat in this lower section. Projects that increase the quantity and quality of rearing habitat are given priority. Risks to the current riparian vegetation are present and projects that provide protection, restoration, and active management will be sought out."

Appendix F. Impacts of Climate Variability and Change in the Pacific Northwest

University of Washington
Joint Institute for the Study of the Atmosphere and Ocean
Center for Science in the Earth System
Climate Impacts Group

This information is provided by the University of Washington's Climate Impacts Group (CIG), an interdisciplinary research group conduction research on the impacts of climate variability and change in the Pacific Northwest.

1. Climate Impacts on Water Resources

Pacific Northwest climate is a key driver in determining when, where, and how much water is available in Washington State. Small changes affecting the Pacific Northwest climate system, therefore, can have significant impacts on regional water supplies, including those in the Moses Coulee and Foster Creek Watersheds (WRIA 44/50). Two key climate drivers to consider in watershed planning are natural climate variability and global climate change.

1.1 Natural Climate Variability

The El Niño/Southern Oscillation (ENSO) and the Pacific Decadal Oscillation (PDO) are important sources of natural climate variability affecting the Pacific Northwest. ENSO and PDO are natural cycles in Pacific Ocean sea surface temperatures and related ocean/atmosphere dynamics that influence climate globally. ENSO phases, also known as El Niño (the warm phase of ENSO) and La Niña (the cool phase of ENSO), are a major source of year-to-year climate variability, typically lasting 6 to 18 months and reaching peak intensity in December (Figure 1). The PDO, which is also categorized as warm phase or cool phase, is a major source of decadal-scale (approximately 10 to 30 years) climate variability (Figure 2).

Figure 1. Monthly average values for the Niño 3.4 ENSO index, January 1950-January 2004. Positive (orange) index values indicate an El Niño event. Negative (blue) values indicate a La Niña event. Anomalies are shown as deviations (in degrees Celsius) from mean sea surface temperatures (SST) in the Niño 3.4 region of the equatorial Pacific. Deviations less than 0.5° Celsius (0.9° Fahrenheit) from the mean are classified as ENSO-neutral. *(Figure source: NOAA National Climatic Data Center)*

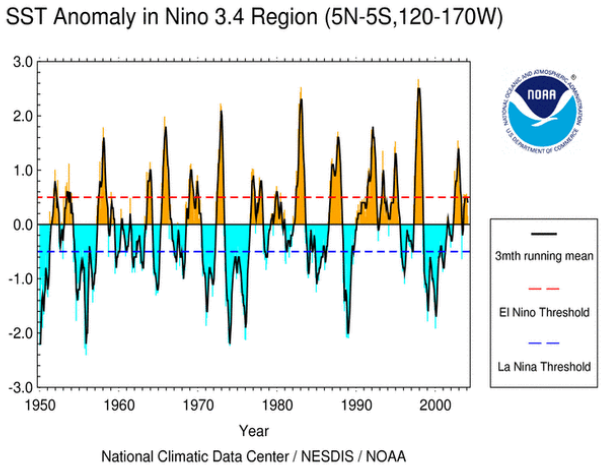
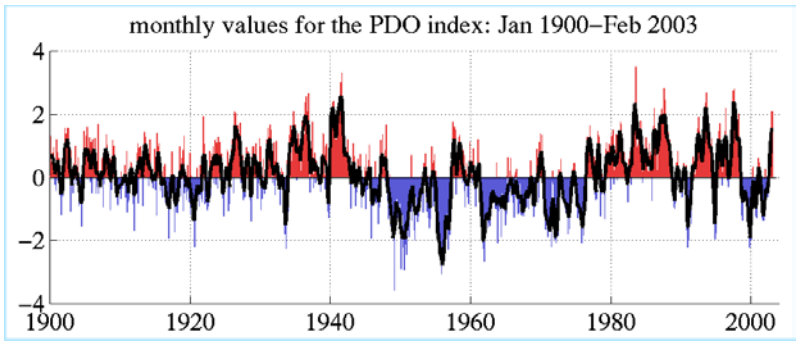


Figure 2. Monthly values for the PDO index, January 1900 to February 2003. Positive (red) index values indicate a warm phase PDO; negative (blue) index values indicate a cool phase PDO. While short-term flips in PDO phases do occur, PDO phases generally persist for 20-30 years, as indicated in this figure. *(Figure source: NOAA, Bering Climate)*



Analysis of 20th century ENSO and PDO events by the University of Washington's Climate Impacts Group (CIG) finds that:

- El Niño winters tend to be warmer and drier than average, while La Niña winters tend to be cooler and wetter than average.
- Warm phase PDO winters tend to be warmer and drier than average, while cool phase PDO winters tend to be cooler and wetter than average.
- When the two events are in-phase (an El Niño during a warm phase PDO or a La Niña in a cool phase PDO), the potential for temperature and precipitation extremes increases. (Figure 3).

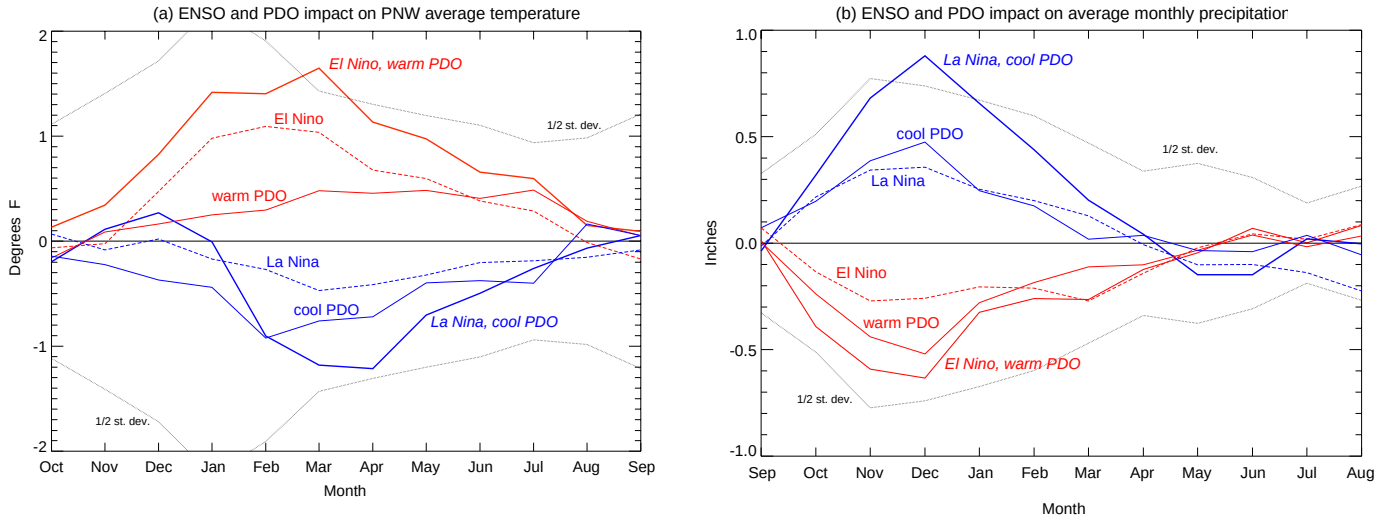


Figure 3: Impacts of ENSO and PDO on average Pacific Northwest (a) temperature and (b) precipitation(1900-1999). Figure 3 illustrates the additive effects of ENSO and PDO when in-phase (shown here as deviations from average), calculated using temperature and precipitation data for 1900-1999. Increases in average temperature and decreases in average precipitation are more significant when warm ENSO (El Niño) and PDO phases occur simultaneously than when either occurs alone. Conversely, decreases in average temperature and increases in average precipitation are more significant when cool ENSO (La Niña) and PDO phases occur simultaneously. Effects are most pronounced during October through March. The dotted line represents 1/2 standard deviation from the mean. *(Figure source: Climate Impacts Group, University of Washington*).

The changes in regional temperature and precipitation associated with warm and cool ENSO/PDO phases affect many aspects of the Pacific Northwest environment (Table 1). For example, the warmer and drier conditions that typically occur with warm phase ENSO and PDO increase the *potential* for reduced snowpack, lower streamflows, degraded coastal and near-shore ocean habitat quality, reduced salmon returns, drought, and forest fires. Cool phase ENSO and PDO conditions increase the potential for the opposite effects. Twentieth century ENSO/PDO phases are listed by year in Table 2.

El Niño and warm PDO conditions in the Pacific Northwest *increase* chances for:	
o Lower than average mountain snowpack o Lower than average streamflow o Fewer floods o Lower quality coastal and near-shore marine habitat o Drought o Conflict over water resources o Coastal erosion	o Lower than average salmon returns o Forest fires o Increased tree growth, seedling establishment, and forest productivity at higher elevations o Decreased tree growth, seedling establishment, and forest productivity at lower elevations

La Niña and cool PDO conditions in the Pacific Northwest *increase* chances for:	
o Higher than average mountain snowpack o Higher than average streamflow o Flooding o Higher quality coastal and near-shore marine habitat o Fewer droughts o Landslides o Coastal flooding	o Higher salmon returns o Fewer forest fires o Decreased tree growth, seedling establishment, and forest productivity at higher elevations o Increased tree growth, seedling establishment, and forest productivity at lower elevations

Table 1. Potential ENSO (left) and PDO (right) impacts on the PWN environment.

ENSO/PDO State	Cool phase PDO *1900-1924, 1947-1976, 1999-??***	Warm phase PDO *1925-1946, 1977-1998*
La Niña *(cool phase ENSO)*	1904, 1907, 1909, 1910, 1911, 1917, 1918, 1921, 1923, 1950, 1951, 1955, 1956, 1963, 1965, 1968, 1971, 1972, 1974, 1975, 1976, 1999, 2000, 2001	1925, 1932, 1934, 1938, 1939, 1943, 1944, 1945, 1984, 1985, 1986, 1989, 1996
ENSO Neutral	1901, 1902, 1908, 1913, 1916, 1922, 1947, 1948, 1949, 1953, 1954, 1957, 1960, 1961, 1962, 1967, 2002, 2004	1927, 1928, 1929, 1933, 1935, 1936, 1937, 1946, 1979, 1981, 1982, 1990, 1991, 1993, 1994, 1997
El Niño *(warm phase ENSO)*	1900, 1903, 1905, 1906, 1912, 1914, 1915, 1919, 1920, 1924, 1952, 1958, 1959, 1964, 1966, 1969, 1970, 1973	1926, 1930, 1931, 1940, 1941, 1942, 1977, 1978, 1980, 1983, 1987, 1988, 1992, 1995, 1998, 2003

Table 2: ENSO/PDO phases since 1900. Years are categorized as El Niño or La Niña when December-February temperatures in the Niño-3.4 region of the tropical Pacific are ½ standard deviation above (El Niño) or below (La Niña) mean temperature. Years that do not exceed the ½ standard deviation threshold are considered ENSO Neutral. The ENSO and PDO states assigned to any given year span the winter of the listed year and the fall prior (e.g., 2004 means (Oct-Dec) 2003 and winter (Jan-March) 2004 were, in this case, ENSO Neutral). The potential for precipitation and temperature extremes is higher when ENSO and PDO are in the same phase (shaded cells). *** It is believed that the PDO shifted to cool phase in mid-1998, but a recent shift back to warm phase PDO (in mid-2002) makes it difficult to determine at this time if the 1998 shift was a true phase shift*.

1.2 Climate Change

In addition to the interannual effects of natural climate variability, water resources in WRIA 44 and 50 will also be affected by global climate change. An evaluation of seven 21st century climate change scenarios for the Pacific Northwest shows that, in general, the region is expected to get warmer and wetter as a result of climate change. These climate change scenarios are based on assumptions about (1) future greenhouse gas and aerosol

emissions, and (2) modeled sensitivity to those changes. Both are imperfectly known but the scenarios produced provide valuable insights into likely future conditions.

Based on the evaluation of seven global warming scenarios, the CIG projects increases in average annual temperature on the order of 2.5°F by the 2020s and 3.8°F by the 2040s (Table 3). Pacific Northwest winters are also projected to get wetter on average (+8%), but the range of uncertainty in precipitation change is much larger than that associated with temperature change. Projected increases in summer precipitation are negligible given how little rain falls in the summer and may be lost if evapotranspiration rates increase. All of these changes are expected on top of the 1.5°F warming (average) already experienced throughout the region during the 20th century.

	Temperature change	**Precipitation change**	
Decades	*Avg. Annual (°F)*	*Oct-Mar*	*Apr-Sept.*
2020s			
Low	0.8 °F	+ 2%	- 4%
Average	*2.5 °F*	*+ 8%*	*+ 4%*
High	3.3 °F	+ 18%	+ 14%
2040s			
Low	2.7 °F	- 2%	- 7%
Average	*3.8 °F*	*+9 %*	*+ 2%*
High	4.9 °F	+ 22%	+ 9%

Table 3. Projected changes in average annual Pacific Northwest temperature and precipitation for the decades of the 2020s and 2040s. The projections are based on analysis of seven climate models driven by an increase in equivalent carbon dioxide of approximately 1% per year. Changes are benchmarked to the decade of the 1990s.

1.2.1 Hydrologic Impacts of Climate Change

Climate change projections for the Pacific Northwest have important implications for water supplies in snowmelt dominant basins such as WRIA 44 and 50. The Pacific Northwest winter "wet season" (October-March) typically brings ample snow to colder, higher elevation areas in snowmelt dominant basins. Patterns of seasonal streamflow are shaped by snowpack accumulation in winter and melting snow in the spring and summer; winter streamflow is typically low with peak runoff occurring in the late spring/early summer (May-June) as warming temperatures melt winter snowpack.

Snowmelt dominant basins are vulnerable to climate change because of the effects of increased winter temperature on snow accumulation and melt. Warmer winter temperatures result in more winter precipitation falling as rain rather than snow in a larger portion of the basin. This shift in precipitation type reduces the amount of water stored as snow in those portions of the basin located near the current mid-winter snowline (very cold high elevation areas might see an *increase* in snowpack accumulation if winter precipitation increases as projected). The shift in precipitation type also results in higher winter streamflow, a benefit for hydropower production facilities.

Climate change impacts on winter precipitation and snowpack accumulation have important carry-over effects on the volume and timing of spring and summer streamflow. Temperature-induced reductions in winter snowpack reduce the volume of spring and summer streamflow in snowmelt dominant basins. Warmer summer temperatures may also reduce late summer base flows if net evapotranspiration increases. Changes in cloud cover and wind (which are difficult to model reliably) can have significant mitigating effects on evapotranspiration losses, however. Decreased base flows in late summer and higher water temperatures may pose threats to cold water fish, including salmon. On the positive side, reduced spring streamflow decreases the risk of spring flooding.

Changes in the timing of spring streamflow are driven by the influence of warmer winter/spring temperatures on the timing of snow melt. Warmer temperatures earlier in the snowmelt season induce earlier snow melt, potentially shifting peak spring runoff earlier into the spring season by as much as four weeks by 2040. This shift in streamflow timing may affect a snowmelt dominant basin's ability to meet water demands during the driest time of the year by lengthening the time between peak spring runoff and the onset of fall rains.

On the demand side, warmer summer temperatures are projected to increase summer water demand. In a recent study of climate change impacts on the Bull Run watershed (Portland, Oregon)[1], CIG researchers found that while population growth has the largest impact on future water supply needs, the cumulative impact of climate change on water supply and customer demand by 2040 is considerable: climate change would require that the City of Portland develop additional water supply totaling 50% of what would be needed to meet population growth alone by 2040.

1.3 Climate Impacts on Water Quality

Changes in water quality can have a significant impact on the ability of water bodies to support aquatic life and to serve as a drinking water source for growing populations. While most water quality degradation is attributed to human influences, climate variability and change may exacerbate existing, or contribute to new, water quality problems within a watershed.

Climate variability and change may affect water quality in inland freshwater rivers and streams as a result of changes in ambient air temperature, precipitation, and seasonal streamflow patterns. Major water quality parameters of concern include instream flow volumes, water temperature, dissolved oxygen, pH, fecal coliform, total suspended solids and turbidity, and concentrations of nutrients, toxic substances, and heavy metals.

[1] Palmer, R.N., and M. A. Hahn. 2002. The Impacts of Climate Change on Portland's Water Supply: An Investigation of Potential Hydrologic and Management Impacts on the Bull Run System. Report prepared for the Portland Water Bureau, University of Washington, Seattle. 139 pp.

It is important to note that changes in water quality will vary across and within streams in a watershed. Therefore, while water quality may be degraded in one part of the watershed (or, for example, within the lower reach of a stream), the same degradation may not be found elsewhere in the watershed (or stream). Consistent baseline monitoring for trends in flow, temperature, and water chemistry is key to determining climate influences on water quality[2].

1.4 Planning for Climate Variability and Change

The watershed planning unit recognizes that natural climate variability and global climate change may affect water resources and water resource management activities within WRIA 44 & 50. The planning unit also recognizes that decisions made today can shape future vulnerability to a variety of water resource stresses, including climate variability and change.

Given the potential for climate variability and change to affect a variety of watershed planning goals and objectives, the watershed planning unit recommends considering climate impacts when possible during implementation of the watershed plan. Factoring existing information about climate impacts into implementation of the watershed plan can help buffer management and infrastructure choices made during the watershed planning process against what is known (and not known) about Pacific Northwest climate variability and change. Further analysis of climate impacts (e.g. detailed planning studies), monitoring, and outreach to watershed residents and resource managers are also valuable steps that the watershed planning unit can take.

The ultimate objective of planning for climate variability and change is building the capacity required to efficiently manage climate impacts before and as they occur. This may entail modifying existing policies, practices, and procedures to provide the flexibility necessary to adjust to short-term and long-term changes in climate. In some cases, new policies may need to be developed. Building adaptive capacity may also involve modifying or constructing infrastructure designed to mitigate impacts. Specific examples of adaptive strategies that may be addressed through watershed planning include, but are not limited to, the following:

- Expanded use of climate information (e.g. seasonal forecasts) in water resources management,
- Diversifying sources of water supply,
- Increasing usable storage (including surface water and aquifer storage and recovery),
- Connecting regional water systems,
- Conservation and demand management,
- Installing high efficiency delivery systems for irrigated agriculture,

[2] Murdoch, P.S., J.S. Baron, and T.L. Miller (2000). Potential effects of climate change on surface-water quality in North America. *Journal of the American Water Resources Association* Vol.36, No.2, pp.347-366.

- Advanced wastewater treatment ("gray water"), and
- Water banking and water markets (through state or other programs).

In all cases, building adaptive capacity to climate variability and change is expected to evolve over time. Resource managers within WRIA 44 and 50 should be open to regular

Appendix G. WRIA 44/50 Characteristics

1.1 Geography

The majority of WRIAs 44 and 50 consists of broad rolling plateau, underlain by basalt and interspersed by intermittent drainages. The Columbia River cuts a deep gorge westward through WRIA 50 and then curves southward marking the western boundary of WRIAs 44 and 50. In most places along the Columbia River there are a series of nearly level to gently sloping terraces. Long, steep slopes lead from these terraces to the upland plateau. Elevations range from approximately 800 feet at the Columbia River to 4,100 feet at Badger Mountain. The average elevation ranges between 2,000 and 3,000 feet mean sea level (Johnson 1974). There are five incorporated communities in WRIAs 44 and 50 located on the plateau or along the banks of the Columbia River.

In WRIA 44, periodic immense floods from the glacial Lake Missoula formed the dominating scablands and loess islands. A dominating geologic structure, the Moses Coulee in WRIA 44 is a deep, wide flat-bottomed valley between Badger Mountain and Beezley Hills. The Coulee gradually descends as it extends southwesterly through WRIA 44 to its end on the bank of the Columbia River. Steep side slopes rise about 600 feet from the valley floor before leveling off in the upper plateau. The valley bottom is a nearly level floodplain ranging from one-half to three-fourths of a mile wide (KCM 1995; Beieler 1981). In WRIA 44, there are three incorporated communities, East Wenatchee and Rock Island positioned along the Columbia River and Waterville situated on the plateau. In addition to these incorporated cities and towns, there are concentrations of population in historical settlement areas. These settlement areas in WRIA 44 include the communities of Withrow and Douglas located on the plateau, Orondo situated on the Columbia River and the Palisades settlement area located approximately 10 miles up the Moses Coulee from Highway 28 (DCTLS 1995). The total population in WRIA 44 is approximately 23,879 people.

In WRIA 50, the dominating blanket of glacial till was deposited by the melting retreat of the Okanogan lobe of the Wisconsin Glacier. WRIA 50 includes the incorporated communities of Bridgeport and Mansfield as well as a portion of the Town of Coulee Dam (DCTLS 1995). The total population in WRIA 50 is approximately 7,703 people.

1.2 Land Use

The history of the WRIAs 44 and 50 has been intricately tied to a diverse range of agricultural activities. The plateau areas were the first to be settled in the late 1800's, with dryland grain crops and livestock grazing. After the development of the irrigation systems along the Columbia River in the early decades of the 1900's, particularly in the Wenatchee Valley, irrigated orchard agriculture was an added incentive to bring people into the area (DCTLS 1995). Today the principal economic activity and predominant land use remain in agricultural production including dryland grain crops, rangeland livestock grazing, and irrigated orchard farming. In WRIA 44, 88% of the land base is in private ownership. In WRIA 50, 70% of the land base is in private ownership.

Approximately 45% of the land within the WRIAs is used for dryland non-irrigated crop. Because of soil types and climate the dominant dryland crop is winter wheat, which is grown in a fallow rotation. Every other year a particular piece of ground

sits idle in order to increase the moisture and mineral content of the soil (DCTLS 1995). Thirty-three percent of total cropland acres have been taken out of production and enrolled into the Federal Conservation Reserve Program (CRP). In 2003, a total of 186,145 acres have been enrolled in the program (FSA, pers. comm., 2003).

Approximately 49% of the land within the WRIAs is rangelands used primarily for beef cattle production. Because of soil types and climate, a portion of the land on the plateau is not suitable for dry land crop production, but it does provide area for rangeland grazing. The largest concentrations of these areas are typically located at the fringes of the plateau, immediately adjacent to the basalt breaks and in the northeast portion of the County (DCTLS 1995).

Less than 5% percent of the cropland in the WRIAs is irrigated agriculture, and is primarily used for the production of hard and soft fruit and forage crops. The irrigated agriculture lands are located along the Columbia River corridor, adjacent upland areas, and in the Palisades area of the Moses Coulee. Most of the remaining land area is characterized by shrub steppe and forest vegetation that provides diverse wildlife habitat

1.3 Climate

The climate of WRIA 50 and WRIA 44 is influenced by elevation, topography, distance and direction from the ocean, prevailing westerly winds and the position and intensity of the high and low pressure centers in the western Pacific Ocean. The Cascade Mountains partly shield the area from strong Arctic winds resulting in cold but not severe winters. In summer, Pacific Ocean winds are partly blocked; days are hot, but nights are fairly cool. Temperature ranges can vary noticeably between the lowland river corridor areas and the plateau, but they generally average between 25 degrees in January and 85 degrees and more in the summer months. Average annual precipitation ranges from 8 to 12 inches, 9 inches in Wenatchee and 11 inches in Waterville. The heaviest precipitation occurs during the winter months as snowfall. Snowfall averages range from 20 to 35 inches in the lower elevations and 40 to 80 inches in the plateau areas. Of the total, an annual precipitation of approximately 16% or 1.81 inches is received during the summer months of June, July and August. If streams do not have a groundwater source, this low summer precipitation often causes flow to ceases altogether. Prevailing wind direction and speed varies according to topographic situation and season. High winds occur with greater frequency on exposed ridges and the upland surface of the watershed than on the floodplains (Beieler 1981;Thompson and Ressler 1988; Douglas County 1995; Johnson 1974).

1.4 Hydrology

Streams in WRIAs 44 and 50 consist of intermittent flows with perennial reaches sustained by a groundwater. High flows occur during the spring, where flows during the rest of the year can cease altogether. The two major drainage basins that handle the surface water runoff are the Moses Coulee and Foster Creek, both of which deposit directly into the Columbia River.

Precipitation occurring within the WRIAs 44 and 50 may run off directly to a stream, percolate to groundwater, or return to the atmosphere through evaporation or evapotranspiration (PGG 2003). Groundwater and surface water move from topographically high margins of the plateau toward major surface drainages. There may be transfers of water between groundwater and streams as water moves towards the

Columbia River. Many of the streams become groundwater as they enter the Columbia River basin because the alluvium becomes coarser (more permeable), thicker, and is more easily recharged by surface water. In general, there is hydraulic connection between the Columbia River and the surrounding alluvium. Therefore, groundwater pumped from the alluvial aquifer within a short distance of the Columbia likely originates from the Columbia River. Groundwater pumped within a short distance of the Columbia likely captures water from the Columbia by inducing infiltration or intercepts ground water flowing toward the Columbia, depending on the physical setting (PGG 2000). In some cases, withdrawals near the Columbia River are through deep solid rock and are not derived from the Columbia River (personal communication, Otto W. Ross). Much of the water use in the WRIAs, whether for irrigation or domestic use, occurs along the banks of the Columbia River. Therefore, much of the water used within the WRIAs likely comes from outside of the WRIAs and not from precipitation falling within the WRIAs (PGG 2000).

Storms of extreme intensity and short duration occur in the watersheds causing high flood events. Flood events are causes by two distinct climatological patterns including summer thunderstorms or a warm rain-on-snow storm event. Thunderstorms occur primarily during the summer months and normally have high rainfall intensities over relatively small areas (KCM 1995; Johnson 1974). Major thunderstorms typically have peak rainfall intensities as high as 0.5 inches in 15 minutes, 1.25 inches in 1 hour, and 2.0 inches in 90 minutes (KCM 1995). Rain-on-snow events occur in the late winter or early spring, usually with smaller amounts of precipitation. Early snowfall will insulate the ground and reduce the depth of freezing to only a few inches, whereas lack of early snow can result in freezing depths approaching 30 inches. With the ground frozen and infiltration prevented, the melting snow combined with rainfall can create a large runoff event. Flooding problems are not widespread, but are occasionally severe on alluvial fans and localized flood plains, which are subject to flash floods (KCM 1995; Johnson 1974). Major floods have occurred about every 10 years, although smaller storms causing localized damage are more frequent. Water moves fast and transports sediment. The existing stream corridors have been shaped and continue to be reshaped by high flood events. Most of the sediment moves on to the Columbia River, but a few intermittent streams pass through small ponds and reservoirs where the flow slows and the soil grains settle, thereby depositing much of the sediment load (Munson 1989).

Major natural lakes in WRIAs 44 and 50 include Jameson (332 surface area in acres) and Grimes (124 surface area in acres). Several smaller lakes (less than 100 acres) and seasonal “potholes” are scattered throughout the area. Atkins Lake, once covering 149 surface acres, is now dry during the summer months. As the lakes are sustained by groundwater they can be indirectly related to water quantity in the streams (KCM 1995; Johnson 1974). A number of lakes and seasonal potholes in Eastern Washington are saline. Salinity is caused when lakes have no outlets except evaporation, particularly in areas with high evaporation rate and where runoff waters into such lakes pick up and carry various mineral solids into the lakes. Over long periods of time these lake accumulate varying amounts of such solids, which change the chemistry of the waters (DOE 1973).

An understanding of geologic characteristics is necessary to understand the factors influencing surface and groundwater movement and quality. Geological formations

control groundwater yield and the depths at which the water can be obtained (Johnson 1974).

Interflow zones within the basalt bedrock and course grain glacio-fluvial deposits throughout WRIAs 44 and 50 constitute important sources of groundwater. The subbasins in WRIAs 44 and 50 may or may not correlate with groundwater basins. WRIAs 44 and 50 are predominantly underlain by the Miocene basaltic rocks of the Columbia River Basalt Group. The basalt sequence is generally 2,000 to 3,000 feet thick and has been divided, from oldest to youngest, into two main units: the Grande Ronde Basalt and the Wanapum Basalt. The Grande Ronde Basalt, which is the thickest, contains as many as 131 flows; the Wanapum Basalt, as many as 33 flows. Interbed deposits, often consisting of mud stones, siltstone, and sandstone, separate the two basalt formations.

Individual basalt flows in the Columbia River Basalt Group range from a few tens of feet to about 300 feet in thickness; the average thickness is about 100 feet. Some thick flows that are exposed in canyons and road cuts display extensive fracture patterns due to differential rates of cooling. The tops and the bottoms of flows are typically permeable because of rubble zones, vesicles, and fractures. These zones form the principal aquifers within the basalt. However, some of these open spaces are filled with clay minerals that decrease permeability. The central parts of most flows are dense and are less permeable. Openings caused by minor vertical cooling fractures provide some limited permeability in the central part of the flows.

The Ellensburg formation and other unconsolidated deposits overlie the basalts in many areas. These deposits are generally less than 50 feet thick on the plateau but may be as much as 200 feet thick on the banks of the Columbia and in Moses Coulee. The bedrock that underlies the Columbia River Basalt Group consists of pre-Miocene igneous, metamorphic, and consolidated sedimentary rocks (PGG 2003).

1.5 Geology

The geology of WRIA 44 and WRIA 50 can best be described by a sequence of extruding lava and glaciations followed by extreme flooding. WRIAs 44 and 50 are part of the extensive Columbia River Plateau, which was formed by the extrusion of basalt. Columbia River basalt flows cover 36% of the Washington State. They consist of four basic basalt formations starting with the Imnaha Basalt at 17.5 million years ago, followed by the Grande Ronde Basalts 16.5 to 15.6 million years ago, the Wanapum Basalts 15.6 to 14.5 million year ago and the Saddle Mountains Basalts 14.5 to 6.0 million years ago. These four groups are composed of 311 individual flows containing a total of over 41,000 cubic miles (Charles Mason, 2003). Eruptions were not from a single vent but from very long cracks or fissures extending miles in length. An individual eruption was probably fed by many fissures erupting simultaneously. The thick lava sequence consisted of an undetermined number of flows, which in places, are separated by sedimentary interbeds. Varying thickness of sediments overlie the basalt in nearly all locations, with basalt generally more deeply buried beneath the coulees than beneath the uplands (KCM 1995).

After basalt was extruded, the region was warped into broad basins in which several sub-basins were formed by locally intense folding by faulting. In these sub-basins, deposits of clay, silt, sand and gravel accumulated during the Pleistocene or Glacial Epoch approximately 10,000 to 1.6 million years ago (KCM 1995).

Lava flows were generally restricted to areas south of the present location of the

Columbia River; however, thinner layers of basalt extend north of the Columbia River. North of the river, the basalt becomes progressively thinner to where granite rock outcrops at the land surface. In the northern part of WRIA 50 faulting and folding has shaped mountainous terrain into what is known as the Okanogan Highlands physiographic province (Johnson 1974).

Between about 10,000 and 1.6 million years ago, during the Pleistocene Epoch (or Ice Age), the Earth's climate underwent periods of alternate cooling and warming. During the periods of cooling, vast continental ice sheets grew in size and extended far beyond the polar regions. In addition, alpine glaciers developed locally in the higher mountains. In southern Canada, the ice sheets periodically thickened and advanced southward, some reaching the northern parts of the United States before retreating and melting back to the north as the climate again became warmer (Charles Mason, 2003). Glaciers began to move southward down the major river valleys of the Okanogan, San Poil, Columbia, Colville, Pend Oreille, and Priest River Valleys and the Purcell Trench. Glaciers moving south down the valleys of Okanogan and Columbia Rivers encountered the high basaltic rim of the plateau along the east-west segment of the Columbia River-Spokane axis. This rim was a partial barrier to the ice, but glaciers proceeded to enter from the northwestern side of Douglas County. There the Okanogan Lobe spread almost 30 miles south across the Waterville Plateau. Okanogan Lobe fanned out from the plateau rim near Bridgeport and flowed southeast toward Coulee City, south toward Mansfield, and southwest toward the foot of the Cascades at Chelan.

The surface of the Waterville Plateau preserves many classic glacial features. The veneer of glacial deposits is generally thin, and the basalt bedrock is exposed in many places. Glacial grooves and striations are evident on some rock surfaces. The glacier carried granite derived sediment from Okanogan Valley, and basalt peeled from the north rim of the plateau as it was overrun by the ice where deposited. Light colored glacial erratics from the Okanogan scattered on the plateau surface as well as great blocks of basaltic bedrock peeled from the plateau rim. Some of these blocks are as big as a house. The Okanogan Lobe of ice left a large deposit of glacial till called the "Withrow moraine" to mark its southern margin. This broad ridge several miles wide and full of irregular hills and depressions extends from Chelan southeast to the area just north of Coulee City.

Erosion and formation of Moses Coulee and other river meltwater channels in the region (including the Grand Coulee) was augmented by enormous floods from Lake Missoula, a glacially dammed mountain lake east of Spokane that was alternately blocked and opened by glacial fluctuations. The Spokane Floods, as they are commonly termed, created the coulee, pothole, basin and butte topography known as the "Channeled Scablands". The floods left giant current ripples and giant gravel bars in a great sweeping switchback on the west side of the Moses Coulee. The floodwaters ripped off the cover of loess along the main channels and cut into the basalt bedrock. The Spokane Floods were responsible for many of the present-day landscape formations in the Columbia River basin. The flat bottomed coulees are now filled with several hundred feet of glacial and river deposits (KCM 1995).

Moses Coulee came into existence, hundreds of years before nature even contemplated the formation of the Grand Coulee, although Grand Coulee was formed in a similar manner. The portion of the flood waters out of Glacial Lake Missoula, which followed the route of the Spokane and Columbia Rivers, actually a fraction of the total

flow, ran into the flank of the Okanogan Lobe of the Continental Ice Sheet. This Okanogan Lobe, which had migrated down from British Columbia, had blocked the Columbia River channel, near what is Bridgeport today, forcing the flood to find a new route to the sea. A precursor of Moses Coulee already existed in the form of drainages of several stream channels, off the plateau. These had combined into a decent size canyon, emptying into the Columbia, at the present egress of Moses Coulee. These ancient drainages are in clear evidence today along the palisades of the coulee, in the form of truncated streambeds, interspaced with faceted spurs (Charles Mason, 2003).

The continued onslaught of the Okanogan Lobe eventually blocked the overflow route into Moses Coulee and a new route had to be established for the repeated floods out of Glacial Lake Missoula. Thus, the formation of Grand Coulee was initiated. Moses Coulee never again experienced any of the later Glacial Lake Missoula floods, as its upper or North end vanished beneath hundreds of feet of ice, of the Okanogan Lobe. When the ice finally gave up its fight against the sun and retreated back into Canada, it left behind a vast moraine, made up of drumlins of glacial till and massive erratics, forming the blockage for a lake, we know today as Jameson (Charles Mason, 2003). Therefore, the Columbia Plateau glaciation includes not only the effects produced directly by the passage of ice over the ground but also all the modification brought by glacial meltwater and glacially diverted rivers far beyond the terminus of the ice (KCM 1995; McKee 1972; USGS 1974).

1.6 Soils

In WRIA 44, the scablands and loess islands were formed as immense floods periodically broke through the ice dams blocking glacial Lake Missoula. In result, the soils are typically deep loess and silts with generally poor drainage characteristics (Beieler 1981; Johnson 1974). On the basalt upland plateau of WRIA 50 and part of WRIA 44, the siltloam soil was deposited by the recession of the Okanogan lobe of the Wisconsin Glacier. As the glacier melted, it retreated up the valley leaving behind a blanket of glacial till and extremely fine wind-blown soils. Up to 50 feet thick, the till is composed of clay, silt, sand, gravel, cobbles, and boulders. This soil type is a sand-loam and deeper silt-loam soil that is deep and well drained (Beieler 1981). The shorelines of the Columbia River are dominated by well-drained sands and gravels (KCM 1995).

1.7 Vegetation

The natural vegetation of WRIA 44 and 50 varies in response to temperature, moisture availability, and soil characteristics. Native shurb-steppe vegetation in open range areas is typical of semi-arid climate regions of the Columbia Basin including bunchgrass, sagebrush, and widely scattered bitterbrush (KCM 1995). Close to the ground, biological or “cryptobiotic” soil crust are fragile microfloral communities composed of bluegreen algae, bacteria, fungi, mosses, and lichens that stabilize the soil from wind and water erosion (Paige and Ritter 1999).

Forest, consisting of scattered stands of Douglas-fir and ponderosa pine, is limited by the arid climate to about 8,000 acres on Badger Mountain (Beieler 1981). These species are widely scattered in eastern Washington at areas of elevation receiving sufficient rainfall (Knutson and Neaf 1997).

Most natural drainage corridors, such as East Foster, currently consist of small copses and short galleries of riparian vegetation along both perennial and intermittent

streams. Typical species are waterbirch, aspen, hawthorn, willows, and wild roses (Thomson and Ressler 1998). Non-native species such as reed canary grass, Russian olive and black locust can be found in these habitats. Small, intermittent streams and draws may naturally have little or no characteristic riparian vegetation. Instead, they consist of largely upland plant species, including big sagebrush, bitterbrush, rabbitbrush, and spiny hopsage (Knutson and Neaf.1997). Along the Columbia River, high river water levels, groundwater, and irrigation overflow provide moisture levels sufficient to foster a dense, lush shrub-grass understory and stands of cottonwoods (KCM 1995).

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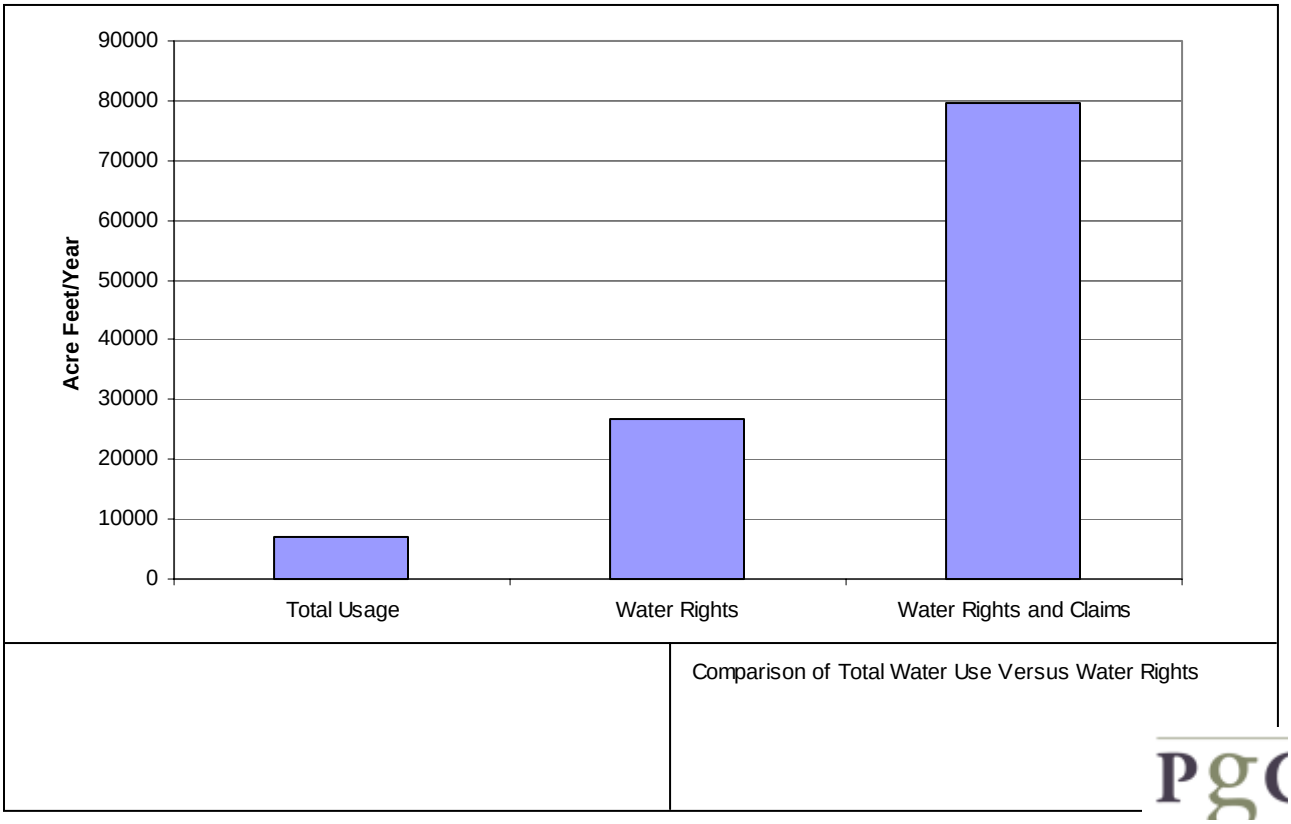
MINORITY REPORT
FOR THE DCWPA MANAGEMENT PLAN

Subject: Adjudication of Water Rights and Claims

In the Basin Assessment report prepared by the Pacific Groundwater Group (PGG), the principal contractor to the Watershed Planning Association (WPA), much attention is given to Water Rights and Claims. (cf Tables 5-1 and 5-2 with Figures 5-1 and 5-2 and Tables 8-1, 8-2, and 8-3 with Figures 8-1, 8-2 and 8-3).

The Douglas County-wide distributions of water use, water rights, and water rights and claims are summarized in the following bar graph prepared by PGG. What is striking about these data is that water tied up in rights and claims is more than seven times the amount of water usage.



Is there water tied up in claims that could be applied to beneficial uses?

The WPA has been aware of this situation since almost the beginning of the studies but has declined to discuss actions that would produce studies of the question and possibly lead to adjudication of water rights and claims. I personally conducted an independent

and limited study of the adjudication issue, particularly the decades-long Yakima Basin surface water adjudication and can understand the DCWPA's reluctance to undertake actions that could lead to adjudication.

But, I think the question raised is a legitimate one, especially in light of our water storage study which suggests that by investing millions of dollars we can augment annual flows by a negligible amount.

I recommend that we conduct a survey of water rights and claims that will give us insight into the potential for freeing up water for beneficial uses.

And that we properly evaluate the modifications of the adjudication law, including the establishment of a “water court” that would expeditiously resolve the issues.

Currently, the only means we have to apply unused water to new, beneficial uses is by transfer, a process in which the Water Conservancy Board plays a role.

Submitted by: William G. “Bill” Stroud, Citizen at Large.

Appendix I. Record of Deleted Issues and Actions

The following issues and actions were brought forward, discussed, and considered by the planning unit. For various reasons, the planning unit selected not to include these issues and actions in the final WRIA 44/50 Watershed Management Plan.

Issues

- An adequate and reliable supply of affordable potable water is not available for every family within the designated Urban Growth Areas.
- Examine potential water quality impacts of wastewater treatment biosolids application on agricultural land. (This issue is included with traditional fertilized application under Action 33.)

Actions

- Perform adjudication of water rights in the Foster Creek and/or Moses Coulee Watersheds.
- Request a "reservation" of groundwater rights in areas of WRIA 44/50 with anticipated future water demand and available groundwater for specific beneficial use including agricultural, residential, or industrial development.
- Develop local enforcement to identify and eliminate illegal uses of water.
- Evaluate some set or subset of existing water rights within a basin or subbasin to identify those that are subject to relinquishment.
- Develop framework for the DCWPA to review and process water rights, applications and claims.
- Review and modify pesticide use in the upland areas focusing on potential for water quality impacts.
- Examine impediments to access to municipal water supply.
- Construct and operate water reclamation and reuse facilities (e.g., reclamation plants and use areas).
- Assist the Boulder Park Soil Improvement Project to increase the rigor of the sampling program to enhance the monitoring already underway.
- Move river dikes back from existing stream channels to allow for floodplain restoration and channel maintenance.
- Change or transfer existing water rights for out-of-stream beneficial uses acquired through purchase, lease, or voluntary methods, to other out-of-stream beneficial uses in the Palisades Irrigation District.

Appendix J. WRIA 44/50 Technical Assessments

The following technical assessments were completed under the 2514 watershed planning process. For information on how to receive an electronic or hard copy of the following assessments and data results contact the Foster Creek Conservation District, 103 North Baker Street, P.O. Box 428, Waterville, WA 98858, (509)745-8362 ext. 3.

- *WRIA 44/50 Final Phase 2 Basin Assessment*, April 2003
- *Foster Creek and Lower Moses Coulee Level 2 Hydrogeologic Assessment*, November 2003
- *WRIA 44/50 Instream Flow Study (Step C – Draft Flow Recommendations*), February 2004
- *Fish Snorkel Surveys of Priority Streams in WRIA 44 & 50 (Step B- Field Implementation)*, August 2004
- *WRIA 44/50 Water Storage Assessment and Feasibility Study*, August 2004
- *WRIA 44/50 Water Quality Assessment Jameson and Grimes Lakes*, September 2004

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