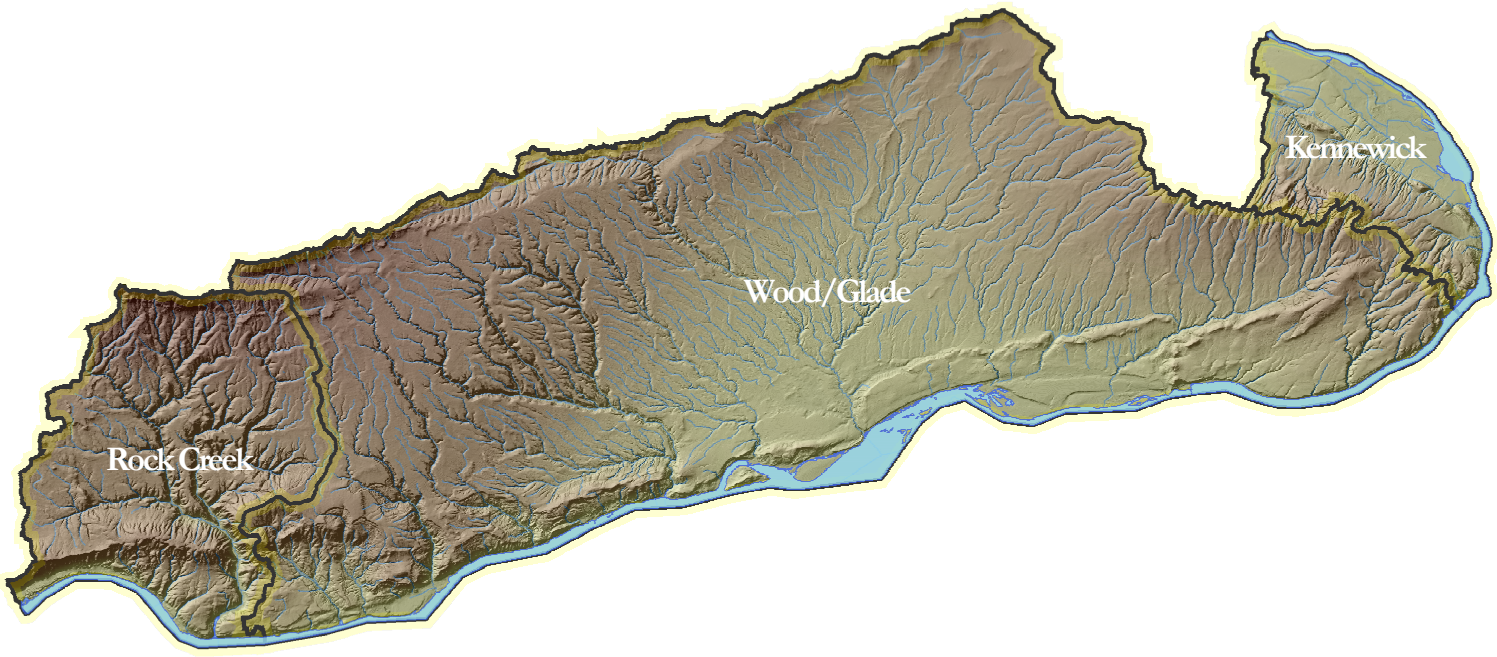
January 2008

WATERSHED MANAGEMENT PLAN

Rock-Glade Watershed (WRIA 31)

Prepared by WRIA 31 Planning Unit



Project Funded through Ecology Watershed Planning Grant Number G0200109

Prepared with the assistance of Aspect Consulting LLC
and Watershed Professionals Network

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Acronym List

°C	Degrees Celsius
°F	Degrees Farenheit
7-DADMax	Seven-day average of daily maximum water temperature
ACQ	Annual consumptive quantity
AKART	All known, available, and reasonable methods of prevention, control, and treatment
ASR	Aquifer storage and recovery
BFHD	Benton-Franklin Health District
BLM	United States Bureau of Land Management
BMID	Badger Mountain Irrigation District
BMP	Best management practice
BPA	Bonneville Power Administration
cfs	Cubic feet per second
CKCD	Central Klickitat Conservation District
CID	Columbia Irrigation District
CRB	Columbia River basalt group
CRP	Conservation reserve program
CSP	Conservation security program
CSRIA	Columbia-Snake River Irrigators Association
DDE	1,1'-(dichloroethenylidene)bis(4-chlorobenzene)
DNR	Washington State Department of Natural Resources
DPS	Distinct population segment
DOH	Washington State Department of Health
Ecology	Washington State Department of Ecology
EIS	Environmental impact statement
EKCD	Eastern Klickitat Conservation District
EPA	United States Environmental Protection Agency
EQIP	Environmental quality incentive program
ESHB	Engrossed Substitute House Bill
ESSHB	Engrossed Second Substitute House Bill
ESU	Evolutionarily significant unit
FCID	Franklin County Irrigation District #1
FCCD	Franklin County Conservation District
GIS	Geographic information system

GLO	General Land Office
gpd	Gallons per day
gpm	Gallons per minute
HAA	Haloacetic acids
HSG	Hydrologic soil group
IAC	Interagency Committee for Outdoor Recreation
ICG	Tri-Cities Urban Irrigation Regional Coordination Group
ISAB	Independent Scientific Advisory Board
kcfs	Thousand cubic feet per second
LLC	Limited liability company
KCEH	Klickitat County Environmental Health Department
KID	Kennewick Irrigation District
Max	Maximum
mg/L	Milligrams of solute per liter of solution
MGD	Million gallons per day
MIF	Minimum instream flow
Min	Minimum
MOA	Memorandum of agreement
MOU	Memorandum of understanding
NEPA	National environmental policy act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resource Conservation District
NPCC	Northwest Power and Conservation Council
NWPPC	Northwest Power Planning Council
O&M	Operation and maintenance
PAC	WRIA 31 Water Resource Planning and Advisory Committee
PCB	Polychlorinated biphenyl
PDO	Pacific decadal oscillation
pH	Negative logarithm of hydrogen ion concentration (measure of acidity/ alkalinity)
PUD	Public utility district
PWS	Public water system
QA/QC	Quality assurance/quality control
QAPP	Quality assurance project plan
RCW	Revised code of Washington
RWFCP	Regional water forecast and conservation plan

SEPA	State environmental policy act
SNOTEL	Snowpack telemetry
TDG	Total dissolved gas
TFW	Timber, Fish and Wildlife
THM	Trihalomethanes
TMDL	Total maximum daily load
UGA	Urban growth area
USBR	United Stated Bureau of Reclamation
USDA	United States Department of Agriculture
USFWS	United State Fish and Wildlife Service
USGS	United States Geological Survey
VRA	Voluntary regional agreement
WAC	Washington administrative code
WDFW	Washington Department of Fish and Wildlife
WPN	Watershed Professionals Network
WRIA	Water resource inventory area
WRTS	Water rights tracking system
WSDOT	Washington State Department of Transportation
WSU	Washington State University
WWTP	Wastewater treatment plant

Acknowledgements

The WRIA 31 watershed management plan represents the culmination of a four-year planning effort completed by representatives of a diverse group of water resource interests within the watershed. Special acknowledgement to the members of the WRIA 31 Planning Unit who volunteered considerable time and provided commitment and leadership to the watershed planning process:

- Adam Fyall (representing Benton County)
- Bruce Beauchene (representing City of Kennewick)
- Curt Dreyer (representing Klickitat County)
- Greg Schuler (representing State Agencies)
- Scott Andrews (representing Andrews Farms)
- Jim Beeks (representing Klickitat County Land and Natural Resource Advisory Committee)
- Dick Beightol (representing Klickitat County Water Conservancy Board)
- Harold Heacock (representing Business//Industry)
- Matt Henry (representing Solid Waste Management Industry)
- Roscoe Imrie (representing Hunting/Fishing)
- Steve Matsen (representing Eastern Klickitat Conservation District)
- Nicole Berg and her alternate Mark Nielson (representing Benton Conservation District)
- Dean Miller (representing Rock Creek Watershed Management Council)
- Stan Schweissing (representing Environmental)
- Cory Wilson (representing Citizens at Large)
- Russ Rasmussen and his alternate Bud Mercer (representing Irrigated Farming)
- David Whitmore (representing Recreation)
- Graig Schuster (representing Livestock Growers)
-

Thanks also to Mercer Canyons for providing a conference room for the Planning Unit meetings.

1 Introduction and Planning Framework

Washington State depends on reliable supplies of clean water to support growing communities, fish and other aquatic species, recreation, industry, agriculture, and other beneficial uses. Within any watershed there are a variety of competing demands (both instream and out-of-stream) for the available water resource. The watershed planning process in Washington State provides a mechanism for informed decision making regarding management of the state's limited water resources.

This document is the watershed management plan for Water Resources Inventory Area (WRIA) 31, the Rock-Glade Watershed established in chapter 173-500 WAC, which includes portions of Benton, Klickitat, and Yakima Counties in south-central Washington State. WRIA 31 extends from Kennewick on the east to approximately the John Day Dam on the west, and is bounded by the crest of the Horse Heaven Hills on the north and the Washington/Oregon border at the midpoint of the Columbia River on the south. The majority of the watershed receives little precipitation and has limited if any natural water storage as snowpack.

More so than most watersheds in the state, out-of-stream water uses in WRIA 31 are dependant on the Columbia River as its primary water supply. How the implementation of the Columbia River Basin Water Supply Act (chapter 90.90 Revised Code of Washington [RCW]), recently enacted by the Washington legislature occurs, is therefore of critical importance to WRIA 31. Management of the Columbia River is an important element within this WRIA 31 watershed management plan.

This Watershed Plan is the culmination of four years of collaborative work by the WRIA 31 Planning Unit, representing the watershed's stakeholders. An overriding reason for developing the watershed plan is to ensure that future management of the watershed's water resources is guided to the greatest extent possible by the watershed's citizens and governments closest to them. Development of this watershed management plan was funded under Grant number G0200109 obtained by the WRIA 31 Planning Unit from the Washington State Department of Ecology (Ecology) under the Watershed Planning Act (chapter 90.82 RCW).

This chapter provides a brief summary of watershed planning efforts for WRIA 31. The subsequent chapters of this watershed management plan are as follows:

- Chapter 2 - Watershed Existing Conditions
- Chapter 3 - WRIA-Wide Issues and Recommended Actions
- Chapter 4 - Rock Creek Area Issues and Recommended Actions
- Chapter 5 - Wood-Glade Area Issues and Recommended Actions
- Chapter 6 - Kennewick Area Issues and Recommended Actions

- Chapter 7 - Recap of Recommended Actions
- Chapter 8 - Implementation of watershed management plan
- Chapter 9 - References

For each issue identified in Chapters 3, 4, 5, and 6, the following information is provided:

- Statement of the issue;
- Assignment of a relative priority for that issue. Note that the priority listed for each issue is considered to be relative to all issues identified in the WRIA 31 watershed management plan (all chapters);
- Overview of pertinent background information framing the issue; and
- Identification of one or more actions recommended to be taken to address the issue.

1.1 WRIA 31 Planning Process and History

1.1.1 Legal Framework for State Watershed Planning

Chapter 90.82 RCW, the Watershed Planning Act, provides the framework under which government organizations and local citizens representing a range of water resource interests work collaboratively to manage water resources on the watershed scale.

The purpose of chapter 90.82 RCW is to develop a more thorough and cooperative method for determining what the current water resource situation is in each water resource inventory area (WRIA) of the state and to provide local citizens with the maximum possible input concerning their goals and objectives for water resource management and development (RCW 90.82.005).

The Legislature determined 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 stake in the availability and long-term management of the resources. The development of such plans also 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 (RCW 90.82.010).

The state watershed planning process is divided into four phases:

- Phase 1 – Organization of the Planning Effort
- Phase 2 – Preparation of Technical Assessments
- Phase 3 – Preparation and Approval of the watershed management plan
- Phase 4 – Implementation of the watershed management plan

The completed Phase 1 and Phase 2 efforts for WRIA 31 are described below.

1.1.2 Phase 1 Planning Organization

Initiating Governments and Intergovernmental Agreement

Pursuant to RCW 90.82.060(2), Klickitat County, Benton County, Yakima County, and the City of Kennewick concurred with initiating watershed planning in WRIA 31, and designated Klickitat County to be the Lead Agency. Klickitat County notified the Washington State Department of Ecology (Ecology) and applied for and received a grant to organize the planning effort. While supportive of watershed planning in WRIA 31, Yakima County chose not to actively participate in the process. There is tribal trust land but no reservation lands within the management area. Consequently, in accordance with RCW 90.82.060(4), no tribe participates as an initiating government.

The final Intergovernmental Agreement for WRIA 31 watershed planning was signed in May 2003 by the participating initiating governments, i.e., Klickitat County, Benton County, and the City of Kennewick. The Intergovernmental Agreement identified that watershed planning be conducted in accordance with the process and rules provided in an Operating Procedures Manual for WRIA 31, which was developed in accordance with RCW 90.82.060 and is an attachment to the Intergovernmental Agreement.

Mission for WRIA 31 Watershed Planning

In the Operating Procedures Manual, the Initiating Governments charged the Planning Unit with the mission of developing a plan for the management of water resources in WRIA 31. The participating Initiating Governments imparted to the Planning Unit the following goals for the watershed planning effort:

- Produce a water resource management plan that documents the means to restore and/or maintain water resources of sufficient quantity and quality to support community (geographically dispersed rural communities, as well as urban communities) and economic growth; and
- Produce a water resource management plan that documents the means to restore and/or maintain habitat and water resources of sufficient quantity and quality to support healthy plant, fish and wildlife, and human populations; and
- Accomplish the above in a balanced, credible manner that respects and accommodates the customs and cultures, aspirations, and rights of the people in the management area.

Planning Unit's Vision for WRIA 31 Watershed Planning

Our ongoing water resource planning respects the customs and cultures in the Rock-Glade Watershed. Implementation of this plan will provide dependable and high quality water supplies for our communities, economies, and natural environment.

Our sustainable approach to water resource management meets the needs of the present generation without compromising the needs of future generations. It results in stable communities where diverse cultures and economies thrive, while allowing us to preserve and enhance the natural environment that makes this place special and a recreational attraction to residents and visitors alike.

Water Quantity, Water Quality, and Habitat Planning Elements

The Watershed Planning Act (chapter 90.82 RCW) contains one required planning element - water quantity - and three optional plan elements - habitat, water quality and instream flows. Which of the optional elements, if any, are included in the scope of work for the planning effort is determined by the Initiating Governments for each WRIA.

In accordance with the Intergovernmental Agreement, watershed planning in WRIA 31 includes:

- The water quantity component under RCW 90.82.070;
- The water quality component under RCW 90.82.090; and
- The habitat component under RCW 90.82.100.

The instream flow component (RCW 90.82.080 and 085) is not in the scope of work for watershed planning in WRIA 31 unless that provision is modified by a majority vote of the Initiating Governments. Note that the instream flow component of the statute is a process for advancing recommendations for instream flow rules, which are analogous to water rights. A watershed plan must address instream flow needs of fish under the water quantity component of planning, regardless of whether the instream flow component (RCW 90.82.080 and 085) is included in the scope of planning.

Planning Unit Composition

Under the Watershed Planning Act, planning units assess water resources and recommend adaptive management strategies for water resources and habitat in the management area that is subject to the watershed plan. Under RCW 90.82.060(6), the participating WRIA 31 Initiating Governments determined the composition of the WRIA 31 Planning Unit through the Intergovernmental Agreement. The Planning Unit is composed of people representing a wide range of water resource interests in WRIA 31. Any change in the composition of the interests to be represented by the Planning Unit requires the approval of the Initiating Governments. The composition of the planning unit would be revised to include Yakima County government in the event that the County elects to become an active participant in the process.

The following water resources interests were identified and invited to participate in the WRIA 31 watershed planning process:

- Klickitat County (Initiating Government and Lead Agency)
- Benton County (Initiating Government)
- City of Kennewick (Initiating Government)
- Port of Kennewick
- Benton County Water Conservancy Board
- Klickitat County Water Conservancy Board
- Washington State Department of Ecology

- Confederated Tribes and Bands of the Yakama Nation
- Central Klickitat County Conservation District
- Eastern Klickitat County Conservation District
- Benton Conservation District
- Confederated Tribes of the Umatilla Reservation
- Health Districts
- USDA/Natural Resource Conservation Service
- Kennewick Irrigation District
- Columbia Irrigation District
- Klickitat County Public Utility District (PUD) No. 1
- Benton Rural Electric Association
- Recreation Representative
- Fishing/Hunting Representative
- Rock Creek Watershed Management Council
- Dryland Farming Representative
- Business/Industry Representative
- Solid Waste Management Industry Representative
- Irrigated Farming Representative
- Klickitat County Land and Natural Resource Advisory Committee
- Livestock Growers Representative
- Andrews Farms
- Timber Representative
- Education Representative
- Environmental Representative
- Citizen-At-Large
- Plymouth Water District

1.1.3 Phase 2 Technical Assessment

The second phase of the watershed planning process is technical assessment, which evaluates the status of water resources and aquatic habitat in the WRIA and provides the

technical basis for preparation of a watershed management plan in Phase 3. The WRIA 31 Planning Unit, through an open solicitation procurement process, selected Aspect Consulting LLC to provide technical support for the watershed assessment and plan development process. Aspect Consulting's team included subconsultant Watershed Professionals Network (WPN) for fisheries and aquatic habitat expertise. Aspect Consulting provides technical support services under a contract with Klickitat County, the Lead Agency for WRIA 31. The Aspect Consulting/WPN team assisted the WRIA 31 Planning Unit in preparing this watershed management plan.

The components of the technical assessment phase for WRIA 31 are outlined below. The assessment documents referenced below provide considerably greater technical detail.

Level 1 Assessment

An assessment of water resources and aquatic habitat based, primarily, on existing data and reports was the first step in the assessment phase. In general terms, this assessment is intended to determine what is known regarding water and habitat in the watershed, determine what is not known about those resources, and thereby identify data gaps and make recommendations for supplemental data collection and/or analyses as needed to fill those data gaps prior to development of the watershed plan in Phase 3. Because there is a four-year statutory time limit between receipt of the Phase 2 grant funding and when a proposed watershed management plan must be approved by the Planning Unit, any supplemental assessment needs to be focused on short-term studies critical for prioritization of issues and decision making in the watershed plan development.

Prior to starting the Level 1 Assessment, a written request for information to support the watershed assessment (Aspect Consulting 2004) was submitted to all members of the Planning Unit and other potentially interested parties, including the Yakama Nation, Washington Department of Fish and Wildlife (WDFW), and Washington Department of Health (DOH). The request was 3 pages in length, identifying specific types of information sought.

The Level 1 Assessment (Aspect Consulting and WPN 2004) summarizes available existing information regarding WRIA 31 water quantity, water quality, and aquatic habitat. In the Level 1 Assessment, WRIA 31 was divided into four hydrologic subbasins, which are, from west to east:

- Rock Creek subbasin;
- Wood-Alder Creeks subbasin;
- Glade-Fourmile Creeks subbasin; and
- Kennewick subbasin.

Chapter 2 of this plan summarizes the physical characteristics of the watershed, using information obtained from the Level 1 Assessment and the supplemental water storage and water quality assessments that are described below.

Supplemental Water Storage Assessments

The Planning Unit applied for and received a grant from Ecology (grant number G0500011) to conduct preliminary assessments of water storage opportunities within WRIA 31. The larger component of the storage assessments pertained to aquifer storage and recovery (ASR) in the Kennewick subbasin. ASR represents a water supply alternative that could make maximum use of the City of Kennewick's existing production capacity in the off-peak season, thus limiting or delaying the need to construct additional costly surface water treatment capacity to meet peak summer demand. The ASR program would shift some of Kennewick's Columbia River diversion from the low-flow summer months to the high-flow winter/spring months, thus making available additional water in the river during the critical-flow summer months. The ASR assessment included a hydrogeologic conceptual model, environmental assessment, and a project monitoring plan which is a preliminary plan for ASR pilot testing. The assessment addressed all requirements for each element of an ASR project as outlined in the ASR regulation (chapter 173-157 WAC). A target area for ASR was identified based on where the City projects need for future peaking source capacity to meet continued growth, proximity to existing water system infrastructure, and hydrogeologic conditions (e.g. distance from geologic structures forming aquifer boundaries). The Kennewick ASR assessment findings are presented in Aspect Consulting (2005d).

The smaller component of the supplemental storage project was evaluating water storage concepts in the Glade-Fourmile subbasin – the agricultural center of the WRIA in which irrigation represents the greatest water use in the entire WRIA. Based on existing information, ASR appears to be feasible from a hydrogeologic perspective, but the economic feasibility of applying ASR several miles inland from the Columbia River (source of surplus water to store) was uncertain. For the study, planning-level cost estimates were prepared by Anderson-Perry Inc. for a moderate sized storage project. In addition, general concepts for regional-scale water storage (using canal networks) were outlined. The Glade-Fourmile subbasin storage assessment findings are presented in Aspect Consulting (2005c). A follow-on assessment was subsequently conducted to evaluate potential cost savings for developing water storage in the subbasin by retrofitting existing Columbia River pump station and conveyance systems, used for seasonal agricultural irrigation, to allow their use to pump water for storage during the non-irrigation season. The technical evaluation of winterizing the existing systems, and associated planning-level costs was completed by SCM Consultants. The findings from this follow-on assessment are presented in Aspect Consulting (2006).

Supplemental Water Quality Assessments

The Planning Unit also applied for and received a grant from Ecology (grant number G0400370) to conduct a pair of water quality assessments, including collection of new field data, within WRIA 31.

A water quality assessment was completed to evaluate existing Rock Creek water temperature data relative to state water quality standards in effect at the time, and document historical changes to the creek channel and surrounding vegetation that can offer insight into potential causes of the elevated water temperatures (Aspect Consulting 2005b). The study also included analysis of nitrate and fecal coliform in creek water to evaluate whether livestock grazing in the subbasin is adversely impacting water quality.

Finally, a database was developed for use by the Eastern Klickitat Conservation District in management, evaluation, and reporting of water quality data for Rock Creek.

In addition, a water quality assessment was completed to evaluate current nitrate concentrations in Glade-Fourmile subbasin groundwater and surface water, and thereby evaluate whether changes to irrigation practices are resulting in measurable water quality improvement (reduced nitrate concentrations). The assessment included sampling locations that were sampled in the mid-1990s to evaluate concentration trends over the past decade, sampling additional groundwater and surface water locations to expand the geographic area of data coverage relative to previous studies, and supplementing those field data with public water system data from Department of Health (Aspect Consulting 2005c).

1.1.4 Phase 3 watershed management plan

In Phase 3 the Planning Unit determines how best to manage the water resources and aquatic habitat resources of the WRIA. In this case, the Planning Unit collectively identified priority issues regarding water quantity, water quality, and aquatic habitat. The Planning Unit also identified objectives associated with each issue, and developed recommended actions to meet those objectives, using the process outlined below.

Process for Plan Development

An important part of identifying key issues and associated strategies as part of the WRIA 31 watershed plan development was holding a series of six public workshops within the watershed to inform and solicit input from the local communities within each of three defined planning areas in WRIA 31. The planning areas correspond to the hydrologic subbasins defined in Phase 2, except that the Wood-Alder and Glade-Fourmile subbasins were combined into a single Wood-Glade planning area for the purposes of the public workshops. The defined planning areas are:

- The Rock Creek area on the west;
- The broad central Wood-Glade area; and
- The Kennewick area on the east.

The public workshops were held between November 2005 and June 2006, in three locations across the watershed:

- Bickelton Grange Hall representing the Rock Creek planning area;
- Roosevelt Elementary School representing the Wood-Glade planning area; and
- Kennewick Main Library representing the Kennewick planning area.

The workshops were advertised using a combination of direct mailings and newspaper notices. Two workshops were held at each location.

The first round of workshops provided an introduction to the WRIA 31 watershed planning process and an overview of the technical assessment findings, and then identified, discussed, and assigned relative priorities to a range of water resource and aquatic habitat issues for the respective planning area and those applicable to the wider

watershed ("WRIA-wide"). Preliminary strategies to address the identified issues were also discussed.

The second round of workshops incorporated information obtained in the first round of workshops to refine the definition of issues and their relative priorities and the associated action(s) recommended to address each issue. The issues and recommended actions identified during the six public workshops form the basis of this watershed management plan, which is the culmination of Phase 3.

Scope and Limitations of Watershed Management Plan

This watershed management plan is based on the best information available at the time of its preparation, and is consistent with the Initiating Governments' stated goals for watershed planning and the requirements of chapter 90.82 RCW. In accordance with the Intergovernmental Agreement, this plan addresses water quantity, water quality, and aquatic habitat.

The intent of this plan is to recommend actions to be implemented that are as specific as possible at this time. In general terms, such actions could include studies or monitoring to reduce data gaps; working with government agencies and/or other entities to develop or revise policies, regulations, locally managed plans, and/or voluntary regional agreements; planning and constructing water storage and other water supply projects; conducting improvements to water quality and aquatic habitat; conducting public education regarding WRIA 31 issues; and pursuing funding for implementing the recommended actions.

In accordance with RCW 90.82.120, there are limitations on what a watershed management plan can do. A watershed plan developed and approved under chapter 90.82 RCW can not contain provisions that:

- Conflict with existing state statutes, federal laws, or tribal treaty rights;
- Impair, diminish, modify in any manner any existing water right;
- Modify or require the modification of any waste discharge permit issued under chapter 90.48 RCW;
- Modify or require the modification of activities or actions taken or intended to be taken under a habitat restoration work schedule developed under the Salmon Recovery Planning Act (Chapter 246, Laws of 1998);
- Modify or require the modification of activities or actions taken to protect or enhance fish habitat if the activities or actions are: (i) Part of an approved habitat conservation plan and an incidental take permit, an incidental take statement, a management or recovery plan, or other cooperative or conservation agreement entered into with a federal or state fish and wildlife protection agency under its statutory authority for fish and wildlife protection that addresses the affected habitat; or (ii) part of a water quality program adopted by an irrigation district under chapter 87.03 RCW or a board of joint control under chapter 87.80 RCW. This prohibition on modifying or requiring modification of such activities or actions applies as long as the activities or actions continue to be taken in accordance with the plan, agreement, permit, or statement;

- Create any obligations or restrictions on forest practices additional to or inconsistent with the Forest Practices Act (chapter 76.09 RCW) and its implementing rules; or
- Change existing local ordinances or existing state rules or permits; however, a watershed plan may contain recommendations for changing such ordinances, rules, or permits.

Obligations under the Plan

A watershed management plan can not create any obligation for an entity without that entity's knowledge and consent. The Watershed Planning Act (RCW 90.82.130[3]) states that:

> "The planning unit shall not add an element to its watershed plan that creates an obligation unless each of the governments to be obligated has at least one representative on the planning unit and the respective members appointed to represent those governments agree to adding the element that creates the obligation. A member's agreeing to add an element shall be evidenced by a recorded vote of all members of the planning unit in which the members record support for adding the element."

The WRIA 31 Operating Procedures Manual adds further specifics:

> "To constitute an "obligation" on any government under RCW 90.82, the element of the watershed plan containing the obligation shall be clearly identified as an obligation and the government(s) that it obligates shall be identified. The watershed plan shall have a chapter, section, or appendix listing any and all obligations contained in the watershed plan. No watershed plan element shall be interpreted as creating an obligation unless the obligation is identified and listed as prescribed in this paragraph. The watershed plan shall contain this paragraph or comparable statement that informs the reader regarding the identification of obligations."

Additional discussion of obligations is provided in Section 8.7 of this Plan.

SEPA

Adoption of a watershed plan under chapter 90.82 RCW is a non-project action subject to environmental review under the State Environmental Policy Act (SEPA). Ecology prepared a statewide non-project Environmental Impact Statement (EIS) for watershed planning under chapter 90.82 RCW (Ecology 2003), which can be adopted by a SEPA lead agency to meet part or all of its responsibility for environmental review of watershed plan adoption. Subsequent project-specific SEPA review may be required for implementation of specific actions recommended in the watershed plan.

The SEPA lead agency will determine whether to adopt all or part of the statewide Watershed Planning EIS for determining SEPA compliance for this WRIA 31 watershed plan. Specifically, the SEPA lead agency will determine which of the recommended actions (projects) in the watershed plan fall within alternatives defined in the state-wide Watershed Planning EIS. Recommended actions in the WRIA 31 watershed management plan that are consistent with alternatives in the state-wide Watershed Planning EIS do not

require supplemental information for SEPA compliance, nor do they require enumeration of alternatives and potential impacts in the standard SEPA format.

Plan Approval and Modification Process

Under the Watershed Planning Act, the Planning Unit prepares and approves a draft watershed management plan that must be submitted to the counties in the management area for final approval. According to the WRIA 31 Operating Procedures Manual, the method by which the Planning Unit approves its proposed watershed management plan under RCW 90.82.130(1)(a) shall be by consensus of the members of the Planning Unit appointed to represent units of government and a majority vote of non-governmental members. For purposes of plan approval, consensus of the members appointed to represent units of government is achieved if three-quarters or more of the members appointed to represent units of government vote that they agree or have no objection to approving the plan.

Following Planning Unit approval of the proposed plan, or approved components of the plan, the legislative authorities of all counties (i.e., Benton, Klickitat, and Yakima counties) with territory within the management area that have not "opted out" of planning as provided in RCW 90.82.130(2)(a) must provide public notice of and conduct at least one public hearing on the watershed plan prior to convening a joint session to consider the proposal. The joint session may either approve the plan by majority vote of the members of each county's legislative authority, or return the plan to the Planning Unit with recommendations for changes. However, only the Planning Unit can make such changes. If the plan is returned to the Planning Unit, it can revise the plan and submit it again to the counties for approval using the same process. If that is done and the joint legislative session again declines to approve it, the watershed planning process terminates.

Once a watershed management plan is approved by the counties, Ecology may develop and adopt modifications to the plan or obligations imposed by the plan only through a negotiated form of rule making that uses the same processes used in developing and approving the plan (RCW 90.82.130[5]). In other words, it would involve approval of the modification by the Planning Unit and then the counties following a public hearing. Further clarification of the plan amendment process is provided in Chapter 8 "Implementation of WRIA 31 Management Plan."

1.1.5 Phase 4 Implementation

Implementation of the approved watershed management plan is the important final phase (Phase 4) of the watershed planning process. A detailed implementation plan provides the framework for how to implement the recommended actions of the watershed management plan. The detailed implementation plan must be submitted to Ecology within one year of accepting funding for Phase 4 and is a condition of receiving grants for the second and all subsequent years of the Phase 4 grant. The process for approving and amending the detailed implementation plan is prescribed in Chapter 8 "Implementation of WRIA 31 Watershed Management Plan."

According to RCW 90.82.043, the detailed implementation plan (at a minimum for the water quantity component of the plan) must cover the following elements:

- Strategies to provide for sufficient water for production agriculture; commercial, industrial, and residential uses; and instream flows;
- Timelines to achieve these strategies;
- Interim milestones to measure progress;
- Coordination and oversight responsibilities;
- Needed interlocal agreements and administrative approvals; and
- Specific funding mechanisms.

In developing the detailed implementation plan, the Planning Unit must consult with other entities and identify and seek to eliminate any activities or policies that are duplicative or inconsistent.

1.2 Public Outreach

The Watershed Planning Act emphasizes involvement of a watershed's citizens and natural resource stakeholders in the watershed planning process. The WRIA 31 watershed planning process is an open public process which has included the following opportunities for public involvement:

- All Planning Unit meetings are open to the public. Comments and ideas are welcome from those that are not members of the Planning Unit. A public comment period is provided at each Planning Unit meeting; written comments are likewise welcome. In addition, minutes from the meetings are maintained and are available to the public upon request.
- Following completion of the watershed assessment, a presentation of the assessment findings and the overall watershed planning process was made at the annual meeting of the Eastern Klickitat Conservation District (EKCD) in February 2005. The outline priorities and strategies, as well as draft chapters for the watershed plan were presented at the EKCD annual meeting in February 2007. The EKCD annual meeting draws primarily agricultural and ranching interests within the watershed.
- Six public workshops were held within the watershed to inform and solicit input from the local communities, as described in Section 1.1.4.
- After Planning Unit approval of the watershed management plan, Klickitat County and Benton County will provide public notice of and conduct a public hearing on the Plan.

2 Watershed Existing Conditions

WRIA 31, the Rock-Glade Watershed, encompasses portions of Benton, Klickitat, and Yakima counties in south-central Washington. As described in Section 1.1.3, a watershed assessment was conducted that provides the technical basis for preparation of this watershed management plan. The watershed assessment prepared in November 2004 was intended to compile and assimilate available information and describe what is known and unknown (data gaps) regarding water and instream habitat resources in the watershed. Supplemental water storage and water quality studies were implemented to help address data gaps identified in the watershed assessment. Together, the watershed assessment and supplemental studies detail the current understanding of existing conditions in WRIA 31.

A brief summary of the watershed existing conditions is provided below. The reader is referred to the assessment reports for additional technical details.

2.1 Geography and Planning Area Delineation

WRIA 31 covers approximately 1,594 square miles (1,020,230 acres) located in south-central Washington. The WRIA includes portions of Benton, Klickitat, and Yakima Counties, and extends from Kennewick on the east to approximately the John Day Dam on the west, and is bounded by the crest of the Horse Heaven Hills on the north and the Washington/Oregon border on the south. Approximately 50 percent of the watershed occurs within Benton County, 44 percent within Klickitat County, and 6 percent within Yakima County. From west to east, major drainages in WRIA 31 include Rock, Wood Gulch, Pine, Alder, Dead Canyon, and Glade Creeks, and Fourmile and Switzler Canyons (Figure 2-1).

Based on topography and other considerations, WRIA 31 was divided into four hydrologic subbasins for the purposes of the watershed assessment. Those subbasins are, from west to east, Rock Creek, Wood/Alder Creeks, Glade/Fourmile Creeks, and Kennewick. The two central subbasins, Wood/Alder Creeks and Glade/Fourmile Creeks, were then combined into one planning area termed the Wood/Glade planning area for the purposes of the watershed management plan. The planning areas and subbasins are equivalent for Rock Creek and Kennewick. The Rock Creek, Wood/Glade, and Kennewick planning areas are shown on Figure 2-1. The boundary between the Wood/Alder and Glade/Fourmile subbasins is the boundary between the Middle Lake Umatilla (Dead Canyon) drainage and Glade Creek drainage. The Columbia River, which runs east-west for length of the WRIA, was not treated as a separate subbasin for assessment or planning purposes. It was addressed both on WRIA-wide and planning area basis.

2.2 Geology and Soils

The WRIA 31 region is underlain by bedrock of the Columbia River Basalt Group (CRB) and interbedded terrestrial sediments deposited during time periods between the

individual lava flows. The CRB underlies all of WRIA 31 and is the watershed's principal source for groundwater. The CRB includes (from oldest to youngest) the Grande Ronde Basalt, Wanapum Basalt, and Saddle Mountains Basalt. Much of the eastern portion of WRIA 31 is covered with thin (generally less than 50 feet thick) deposits of Quaternary loess, alluvium, and flood deposits of sands, gravels, and silts. This material is commonly referred to as "overburden" covering the CRB.

The major geologic structures (folds and faults) defined within WRIA 31 include the Horse Heaven Hills anticline and Columbia Hills anticline systems, which form topographically-prominent ridges along the north and south boundaries, respectively, of the WRIA. A series of smaller similarly east-west trending folds and faults occur within these two dominant anticline systems. Superimposed upon these major east-west structures are a series of north-northeast trending shear faults and folds. The largest of these structures is the Central Syncline which cuts across the Glade Creek drainage basin.

The hydrologic characteristics of soils present within a watershed are important in assessing the potential for infiltration and runoff within the WRIA. The U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) categorizes soils into four Hydrologic Soil Groups (HSGs) based on infiltration and drainage properties.

The majority of WRIA 31, where soil data are currently available, is dominated by soils of Group B which are characterized as having moderate infiltration rates and are moderately well- to well-drained. The Kennewick and much of Wood/Glade planning areas are dominated by Group B soils. The Kennewick planning area is covered by a significant area (12 percent) of Group A (soils with high infiltration rates) and a small area (4 percent) of Group C (slow infiltration). The Wood/Glade has limited occurrence of Group A soils and increasing occurrence of Group C soils as you move west toward Alder Creek and Wood Gulch. Rock Creek has the highest proportion of Group D (very slow infiltration, high runoff) soils (36 percent) with the remainder mostly being Group B and C soils (57 percent combined).

Based on this soil group distribution, generally, infiltration rates should be lower in the western half of the WRIA (Rock and the western portion of the Wood/Glade planning areas) and somewhat higher throughout the eastern half of the WRIA, with areas of more variable infiltration rate along the Columbia River. In regions of most rapid infiltration, there is greater potential for groundwater recharge. In regions with slower infiltration rates, a greater proportion of precipitation would be expected to runoff to surface water.

2.3 Climate

The climate of WRIA 31 is influenced by marine air masses traveling eastward over the Cascades and along the Columbia River, as well as by continental air masses typically traveling southward from Canada. Precipitation is unevenly distributed across the WRIA, with forced uplift of marine air creating more precipitation in the higher elevations of the western portion of WRIA 31 (Rock Creek planning area). Precipitation decreases from west to east across the WRIA. Specifically, mean annual precipitation ranges from around 24 inches along the northwestern corner of the Rock Creek planning area to less than 8 inches near Kennewick on the east end of the WRIA. The majority of precipitation occurs between October and April, with some precipitation occurring as snow,

particularly at higher elevations in the Simcoe Mountains (northwest corner of the watershed)

As with precipitation, temperature varies across WRIA 31 with higher daily minimum and maximum temperatures in the lower elevation eastern portion of the WRIA and lower temperatures in the more mountainous northwest portion of the WRIA.

Average minimum daily temperatures are typically at or below freezing for December through February, and longer in the mountainous areas. The average maximum daily temperature is above freezing during all months at all stations in the WRIA.

Anticipated effects of progressive climate warming on WRIA 31 water resources include reduced snowpack and earlier melt of snow in the higher elevation headwaters of Rock Creek and in other snowpack-containing tributaries of the Columbia River upstream of WRIA 31. The conversion from snow to rain results in earlier and greater magnitude winter/spring runoff (streamflow) and reduced streamflow quantities through the summer and fall. Higher temperatures increase annual evapotranspiration which further contributes to lower summer/fall streamflows. The available information indicates that WRIA 31 streams have been intermittent, lacking late-season flow, throughout recorded history. Therefore, the greatest effects from climate change are likely to be on Rock Creek and on the Columbia River, with higher peak flows in winter/spring with earlier onset of dry conditions. The Columbia River is an intensively controlled hydrologic system that can mitigate expected changes to some degree.

2.4 Land Use, Population, and Economy

Land cover within WRIA 31 includes limited forestland, abundant shrubland, grassland, and cultivated land, and urban cover limited to the Kennewick area.

Land cover in the Rock Creek planning area is predominantly shrubland, with a substantial proportion of privately owned forestland in the basin's upper reaches. The Wood/Glade planning area is the predominant agricultural area of WRIA 31 with nearly half of the land in cultivation; shrubland and grassland comprise the rest of the Wood/Glade planning area. Urban development covers almost 20% of the Kennewick planning area, with shrubland and agricultural land comprising most of the rest.

As of the year 2000 census, the total population of WRIA 31 was approximately 67,600 persons, with approximately 97% (65,300) of those residing within the Kennewick planning area. Approximately 3% and less than 0.1% of the WRIA 31 population reside within the Wood/Glade and Rock Creek planning areas, respectively.

Agriculture, both dryland and irrigated, is the predominant economy within WRIA 31. Ranching is significant in the western part of the watershed (e.g., Rock Creek planning area). The only significant commercial/industrial economy in the watershed occurs within the Kennewick planning area. However, food processing (e.g., wineries, produce processing plants) are found in the Wood/Glade planning area and an aluminum plant/industrial area is located along the mainstem Columbia River in the southwest corner of the Rock Creek planning area.

2.5 Surface Water Resources

Very limited streamflow data are available for WRIA 31, except for the Columbia River. Aside from the Columbia River flow measurement systems at John Day and McNary dams, only two flow gauges in WRIA 31 (near mouths of Rock and Alder Creeks) have continuous flow data, and the data are limited to the 1960s. This gauging period occurred within a cool/wet climatic cycle (Pacific Decadal Oscillation [PDO]). Therefore, average streamflow conditions calculated from these data may overestimate long-term average conditions spanning both wet/cool and warm/dry PDO cycles.

The available streamflow data indicate that all WRIA 31 streams, aside from the Columbia River, are intermittent (lacking dry season flow) except in localized spring-fed reaches. Information from 1860s General Land Office (GLO) cadastral surveys provides insight on historical streamflows based on limited recorded observations. The survey identifies no significant flows and several areas of intermittent flows in Rock Creek which has the highest precipitation and streamflows of any stream in the WRIA. This historical information, coupled with observed intermittent conditions based on the United States Geologic Survey (USGS) stream gauging data in the 1960's occurring under minimal water use, suggests that intermittent streamflows in Rock Creek is representative of natural condition. If Rock Creek is naturally intermittent, as the weight of evidence suggests, then it is probable that streams in lower-precipitation areas to the east of it are also naturally intermittent except in localized spring-fed reaches (e.g., at the mouth of Alder Creek). Under current conditions, irrigation return flows supply dry season flows in some streams (e.g., Glade Creek).

2.5.1 Columbia River

The Columbia River is the largest source of water supply for WRIA 31, and is of critical importance for the existing economy and population and to support future growth within the watershed. Benton and Klickitat Counties' Shoreline Master Plans provide respective jurisdiction over shorelines of the Columbia River.

John Day Dam is located at river mile 216, just downstream of WRIA 31's western boundary. McNary Dam is located at river mile 292, near Plymouth (Glade/Fourmile subbasin) and immediately downstream of the confluences of the Yakima and Snake Rivers with the Columbia.

Because of federal flow regulation at the Columbia River dams, peak streamflow is typically delayed until the summer (June) and minimum flows occur in early autumn (September-October). Based on statistical evaluation of mean daily discharge values calculated from 34 years of data (water years 1969-2003) at both McNary and John Day Dams, flows during average years (50 percent exceedance) ranged from a low of about 110 thousand cubic feet per second (kcfs) in September-October to highs of about 300 kcfs in early June. The average-year flows met minimum average weekly instream flows (WAC 173-563-040[3]) for all time periods at both dams. During low flow years (90 percent exceedance), flows ranged from a low of about 80 kcfs in September-October to a high of about 160 kcfs in early June. During these dry years, minimum average weekly instream flow requirements were typically met during the period of September through mid-April, and were typically not met during the period of mid-April through August at both dams. In short, the mainstem Columbia River minimum instream flow targets are

met at both dams during statistically average water years, but not during the late season during statistically drier water years.

2.5.2 Uncertainty in Mainstem Flow-Survival Relationship

There is considerable controversy regarding the relationship between mainstem Columbia River flows and salmonid survival in the river. A policy for augmenting flows in the mainstem Columbia River is based on the hypothesis that a relationship exists between mainstem flow volumes and fish survival. The hypothesis is that lower flows equate to extended travel times which increase fish mortality as a result of increased exposure to predators and disease and delayed entry into saltwater. The hypothesis is based largely on 7-year study of smolt survival from the Snake River to John Day dam, in which two very low flow years resulted in low smolt survival (Sims and Ossiander 1981). On the basis of the flow-survival hypothesis, National Marine Fisheries Service (NMFS; now NOAA Fisheries) in 1995 and 2000 prepared Biological Opinions setting minimum flow targets for mainstem flows that greatly exceed the state's minimum instream flows for the mainstem promulgated in chapter 173-563 WAC.

Dr. Anderson of the University of Washington's School of Aquatic and Fishery Sciences has published a white paper (Anderson 2002) that fundamentally disagrees with the existence of a flow-survival relationship, and questions the original Sims and Ossiander (1981) study on which the hypothesis is largely based. He presents the results of newer research indicating that a flow-survival relationship does not exist, and concludes:

> "The evidence is now overwhelming to reject the hypothesis and the contention that flow augmentation and water withdrawals in the mainstem of the river system have any impact on salmon. However, over this same period the fish and water managers have increased the flow augmentation and implemented stringent regulations stopping water withdrawals. Furthermore, as the research has serially addressed and rejected the hypothesis on which the water policy was based the managers have reformulated the hypothesis into more nebulous forms."

In addition, the Independent Scientific Advisory Board (ISAB) for the Northwest Power Planning Council (NWPPC) updated its review of the flow augmentation policy in 2003, with emphasis on the Lower Snake River (ISAB 2003). In the updated review, they responded to questions posed by the NWPPC and the Columbia River Inter-Tribal Fish Commission. Based on their review, the ISAB came to a conclusion similar to that of Anderson (2002), stating:

> "A different perspective emerged from this latest review. We realize that the prevailing rationale for flow augmentation is inadequate. It is neither complete nor comprehensive. There is room for alternative explanations of available data that have both scientific justification and practical value for managing the hydrosystem for multiple uses including salmon recovery. The prevailing flow-augmentation paradigm, which asserts that in-river smolt survival will be proportionally enhanced by the amount of added water, is no longer supportable. It does not agree with the information now available."

In addition, more recent research from NOAA Fisheries scientists points increasingly toward the ocean – not the freshwater environment - as an important determinant in the survival and return of salmon to the Columbia and Snake Rivers. For example, Scheuerell and Williams (2005), in describing their findings, concluded:

> "This suggests that management policies directed at conserving this threatened stock of salmon need to explicitly address the important role of the ocean in driving future salmon survival."

As stated above, the Columbia River is the most important water resource in WRIA 31. It is the Planning Unit's position that the state's current management of the mainstem Columbia River is constrained by a federal flow augmentation policy that is not supported by the best available science. This issue and a recommended action to address it are included in Section 3.1.1 of this plan.

2.6 Groundwater Resources

The major aquifer systems in WRIA 31 are those of the Columbia River Basalt system, which includes from shallowest to deepest (geologically youngest to oldest) the Saddle Mountains, Wanapum, and Grande Ronde Basalts. Unconsolidated overburden (often referred to as alluvium) forms a relatively thin mantle over the basalts in much of the watershed. In addition, gravel deposits along the Columbia River are also used as a groundwater source for water supplies. Groundwater in these gravels is in close hydraulic connection with surface water of the Columbia River. The Saddle Mountains Basalt and Wanapum Basalts, and in certain locations the Columbia River gravels, are the primary groundwater sources for larger irrigation withdrawals in WRIA 31. The shallow Alluvial Aquifer supplies domestic uses, while the deeper Grande Ronde is largely unexplored in WRIA 31. For WRIA 31 as a whole, Columbia River surface water is a larger supply source than all groundwater sources combined.

Based on regional modeling published in 1990 by the USGS, current groundwater recharge across WRIA 31 as a whole is roughly double that under assumed predevelopment conditions (prior to significant human land use modification or development). The recharge increase is a result of return flows from irrigation water supplied from the Columbia River. Consequently, the recharge increase occurs primarily in the main areas of irrigated agriculture – the Wood/Glade and Kennewick planning areas.

The abundant presence of springs (groundwater discharge) documents hydraulic continuity between shallow groundwater and streams in WRIA 31 – particularly in the Rock and Alder Creeks. However, the quantity of spring discharge is generally insufficient to maintain streamflow throughout a stream during the dry season, with the exception of the mouth of Alder Creek. Hydraulic continuity between the basalt aquifers and the Columbia River is inferred based on regional groundwater flow directions, and evidence that the Columbia River reach between McNary and John Day dams is typically gaining more flow than surface water discharges are able to provide.

Long-term water level monitoring completed by Ecology and others document substantial water level declines in the Wanapum Basalt Aquifer in areas of intensive irrigation

(Wood/Glade planning area). In these same areas however, water levels in the overlying Saddle Mountains Basalt Aquifer have risen as a result of irrigation return flows.

2.7 Water Rights and Water Use

An estimated total annual volume of approximately 806,000 acre-feet/year is appropriated through water right permits and certificates in WRIA 31. The 1.27 million acre-feet/year McNary Dam hydroelectric water right is excluded from this total since it is largely non-consumptive. The unpermitted portion of the 1.3 million acre-foot/year John Day/McNary Pools reserve was also excluded from this total because that portion of reserve/appropriation that has not yet been issued in the form of water right permits and is not being diverted. Columbia River diversions and groundwater withdrawals comprise 84 and 16 percent, respectively, of the 806,000 acre-feet/year total annual appropriation. The overwhelming majority (89 percent) of this appropriated water is for irrigation use. Likewise, 85 percent of the new water rights applied for in the WRIA are for irrigation use (approximately 610 cfs instantaneous rights). The vast majority of appropriated water is within the Wood/Glade and Kennewick planning areas (86 and 13 percent by volume, respectively).

Based on analysis in the Level 1 watershed assessment, the estimated total annual water use in WRIA 31 is approximately 640,000 acre-feet/year (approximately 79% of the total annual quantities stated on water right certificates and permits). Of this total, an estimated 71 percent is supplied from the Columbia River, 18 percent from the Yakima River via the Kennewick Irrigation District and Columbia Irrigation District diversions, and 11 percent from groundwater sources. The Kennewick and Columbia Irrigation Districts divert and convey Yakima River water for irrigation use in the Kennewick planning area. Irrigation represents 97 percent of all water use in WRIA 31, with residential and non-residential uses accounting for roughly 1 and 2 percent, respectively. Similar to the distribution of water rights, the majority of estimated water use is within the Wood/Glade and Kennewick planning areas (79 and 20 percent by volume, respectively).

The watershed assessment includes a water balance for each subbasin to help understand the physical availability of water on the subbasin scale. Although they are subbasin-scale approximations, an important finding from the water balance exercise was estimation of the current net groundwater recharge for each subbasin. A positive net recharge indicates greater recharge to the groundwater system than pumping withdrawal from it, and vice versa. Comparing pre-developed and current net recharge values can highlight general trends in sustainable use vs. overdraft of groundwater resources on the subbasin scale. The water balance net groundwater recharge findings are as follow:

- In the Rock Creek planning area, the current net groundwater recharge is essentially unchanged from the predeveloped condition, consistent with lack of significant groundwater use in the planning area.
- In the Wood/Glade planning area, the current net recharge has been reduced to approximately ¼ of the predeveloped condition in the Wood/Alder Creeks subbasin, consistent with moderate water level declines measured in some subbasin wells. In the Glade/Fourmile subbasin representing the eastern part of the planning area, current net recharge is approximately -23,000 acre-feet/year

(annual depletion) indicating groundwater use exceeding total recharge, consistent with very large measured water level declines in some subbasin wells.

- In the Kennewick planning area, current net recharge is more than 13 times greater than the predeveloped condition, as a result of irrigation return flows from the large volume of imported Yakima River water and relatively limited groundwater pumping.

2.8 Water Quality

Based on the available water quality data, the primary water quality concerns identified in the watershed assessment for WRIA 31 were:

- Water temperature in Rock Creek, which is on the state's list of impaired water bodies as Category 5 (requiring a Total Maximum Daily Load [TMDL], which is a water quality improvement plan);
- Nitrate in shallow groundwater of the Glade/Fourmile subbasin. This is potentially a public health concern for people obtaining their water supply from shallow domestic wells in this subbasin; and
- Water temperature in the Columbia River, which is on the state's list of impaired water bodies as Category 5 (a multi-state and federal agency effort to develop a temperature TMDL for the Columbia River has been underway for several years).

The WRIA 31 supplemental water quality project for Rock Creek (Aspect Consulting 2005b) evaluated existing Rock Creek water temperature data relative to state water quality standards, and analyzed historical aerial photos to document historical changes to the creek channel and surrounding vegetation. The study also included analysis of nitrate and fecal coliform in creek water to evaluate whether livestock grazing in the subbasin is adversely impacting water quality.

Note that the state's surface water quality standards were revised subsequent to completion of the watershed assessment. The designated use-based temperature standards applicable to various stream reaches in the Rock Creek basin are more stringent than they were when the assessment was completed.

The conclusions and recommendation from the Rock Creek water quality study are as follow:

- Fecal coliform concentrations in Rock Creek surface water meet state surface water quality standards.
- There is no surface water quality standard for nitrate, but nitrate concentrations in Rock Creek are below drinking water quality standards;
- Rock Creek water temperatures increase in the downstream direction, and typically exceed the then-current state water temperature standard in downstream monitoring stations throughout the summer months. The measured water

temperatures also exceed the new lower temperature standards for the defined stream reaches,

- The total areal extent of vegetation across the valley bottom has been increasing steadily since 1938. This change is attributed primarily to active suppression of fires over the past century. The study did not evaluate stream shade or potential changes to it over time.
- The creek channel in the lower reaches (from the top of the area inundated by the John Day Pool to the Bickleton Highway) of the Rock Creek is shallow, rocky, and highly dynamic, changing course regularly over the period of photographic record.
- The collective information evaluated in the study indicates that the high water temperatures in Rock Creek may represent the natural condition; therefore, the statewide default water temperature standard may not be applicable for Rock Creek.

The objective of the WRIA 31 supplemental water quality study for the Glade/Fourmile subbasin (Aspect Consulting 2005a) was to evaluate whether changes to irrigation practices have resulted in measurable water quality improvement (reduced nitrate concentrations) relative to the 1980s and 1990s. The conclusions and recommendation from the Glade-Fourmile subbasin water quality study are as follow:

- Groundwater nitrate concentrations above the 10 mg/L drinking water standard are limited to the shallow aquifer (Saddle Mountains Basalt). The deeper Wanapum Basalt Aquifer has considerably lower nitrate concentrations.
- Surface water nitrate concentrations in Glade Creek, and to a lesser extent Fourmile Canyon, are elevated. There is no surface water quality standard for nitrate.
- The elevated nitrate concentrations are limited to irrigated areas. Much lower concentrations occur in areas of dryland farming.
- Current nitrate concentrations in the Saddle Mountains Basalt Aquifer and Glade Creek surface water are generally similar or higher to those observed in 1995, but there are exceptions.

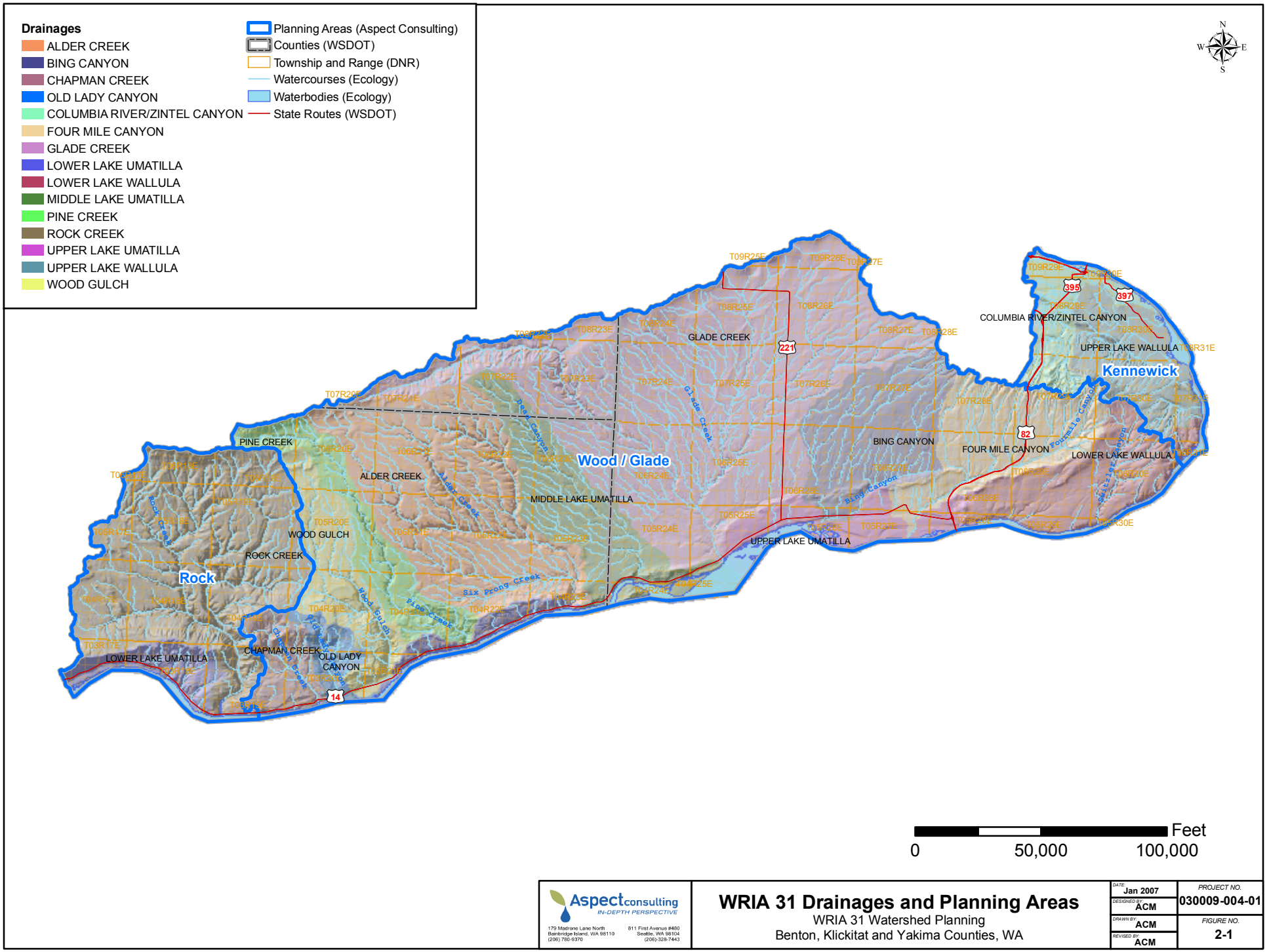
2.9 Aquatic Habitat

Instream habitat is of greatest interest in those WRIA 31 streams where anadromous salmonid distribution has been mapped by Washington Department of Fish and Wildlife, specifically Rock Creek (steelhead, chinook salmon), Chapman Creek (steelhead, chinook and coho salmon) and Wood Gulch (steelhead). The published data regarding current fish habitat conditions in those streams is limited. Washington Department of Fish and Wildlife maps also show steelhead, chinook, and coho salmon present in the Columbia River within WRIA 31.

In late June 2004, a reconnaissance survey was completed of portions of the WRIA 31 streams with emphasis on Rock Creek and Chapman Creek. This and other information

describing current physical characteristics (hydrology, channel substrate, riparian vegetation, etc.) together with the GLO cadastral surveys completed in 1867 and 1868 (reflecting average to wet annual conditions) provides a basis for assessing relative change from historical to present day conditions. For example, in terms of presence/absence of riparian vegetation in the Rock Creek subbasin, no differences were noted between today's conditions and the conditions of 1867 and 1868; however, differences in density or width of riparian stands could not be determined from the GLO notes. Rock Creek channel characteristics also appear to be similar to those noted in the 1860s survey (e.g., broad rocky reaches), with the exception that the lowermost reach (above the Columbia River backwater pool) may be somewhat wider today than historically.

Rock Creek is expected to have highest potential for instream habitat, although its intermittent hydrology may be a limiting factor for salmonid productivity. The road density in the Rock Creek subbasin is low relative to most basins in eastern Washington, and most of the roads are located on ridge tops or a considerable distance from the stream network. Given the low road density and their configuration in the Rock Creek subbasin, it is unlikely that roads have a significant effect on hydrology in this subbasin. However, in localized areas some roads may be affecting habitat through erosion of the road bed.



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WRIA 31 Drainages and Planning Areas

WRIA 31 Watershed Planning
Benton, Klickitat and Yakima Counties, WA

DATE: Jan 2007	PROJECT NO. 030009-004-01
DESIGNED BY: ACM	
DRAWN BY: ACM	FIGURE NO. 2-1
REVISED BY: ACM	

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3 WRIA-Wide Issues and Strategies

3.1 WRIA-Wide Water Quantity

3.1.1 Columbia River Water Supply

Issue: Water supply limitations pose a concern for the long-term sustainability of irrigated agriculture and constrain economic and population growth in the region.

- **a.** New water rights for mainstem Columbia River water have largely been unavailable, despite the John Day-McNary Pool reservations established in Chapter 173-531A WAC.
- **b.** Interruptible Columbia River water rights are not reliable for current water-dependent uses or supporting population and economic growth.
- **c.** There is a lack of specificity regarding the process for consultation with appropriate local, state, and federal agencies and tribes on applications for Columbia River water rights under chapters 173-531A and -563 WAC.
- **d.** There is considerable uncertainty regarding the relationship between Columbia River flows and salmonid survival, yet this issue largely drives the current policy on management of the river.

Objective: Ensure that adequate water supplies are available to meet current needs, provide for long-term sustainability of irrigated agriculture, and support economic and population growth within WRIA 31. Achieve this objective through active participation in the implementation of the Columbia River Basin Water Supply Act (Engrossed Second Substitute House Bill [ESSHB] 2860) and through Ecology's processing/granting new water right permits to exercise the John Day-McNary Pools reserves appropriated in chapter 173-531A WAC.

Priority[1]: High.

Background:

John Day-McNary Pools Reserve

In August 1978, promulgation of chapter 173-531 WAC established a reservation of 1.36 million acre-feet of water per year for future irrigation use on 340,000 acres, and a reservation of 26,000 acre-feet of water per year for future municipal use, from the John Day and McNary Pools of the Columbia River. The quantities reserved were based on future irrigation needs projected to exist by the year 2020. WAC 173-531-040 stated that "The reservation of water for irrigation purposes shall expire at such time as the entire reserved amount is developed under certificated water rights unless modified hereafter." That section also stated that "Waters represented by canceled or relinquished applications

[1] Note that priorities listed for each issue are relative to all issues presented in this watershed management plan.

and permits will still be considered reserved and may be subsequently filed on by interested appropriators." For the municipal reservation, WAC 173-531-050 stated: "The reservation shall expire when the entire reserved amount is developed under certificated water rights." A copy of chapter 173-531 WAC is included as an attachment in Ecology (1978).

Chapter 173-531 WAC was repealed and then replaced by chapter 173-531A WAC on June 24, 1980. WAC 173-531A reestablished the irrigation and municipal reservations, but the irrigation reserve was reduced to 1.32 million acre-feet/year of water for irrigation of 330,000 acres. Additionally, the provisions regarding expiration of the irrigation and municipal reservations when fully developed under certificated water rights were deleted. Chapter 173-531A WAC does not indicate any expiration of the reservations. Water represented by canceled or relinquished irrigation water right applications and permits shall still be considered reserved and may subsequently be filed on by interested appropriators.

There is no provision for the John Day-McNary Pools reservations to expire in the year 2020 in chapter 173-531A WAC (nor in its predecessor chapter 173-531 WAC). The year 2020 was used only as a timeframe for estimating future municipal demands in the Tri-Cities and future irrigation demand in the Horse Heaven Hills area so that corresponding quantities of water to meet those demands could be reserved.

As provided in RCW 90.03.345, irrigation and municipal reservations constitute appropriations within the meaning of the state water code, chapter 90.03 RCW. RCW 90.03.345 also provides that the priority date of an application for a water right permit from a reservation and the priority date of a water right permit issued under a reservation is the effective date of the reservation. For applications filed on or after June 24, 1980, for water from John Day-McNary Pools reservations and for water rights issued from the reservations on or after June 24, 1980, the priority date is the effective date of chapter 173-531A WAC.

Chapter 173-563 WAC "Instream Resources Protection Program for the Main Stem Columbia River In Washington State" was adopted on June 24, 1980, which was the same day the original John Day-McNary Pools reservations (chapter 173-531 WAC) were repealed and reestablished as the present irrigation and municipal reservations (chapter 173-531A WAC). Chapter 173-563 WAC establishes minimum instream flows for the mainstem Columbia River. The minimum instream flows are reservations of water and, in accordance with RCW 90.03.345, they are appropriations within the meaning of chapter 90.03 RCW for which the priority date is the effective date of chapter 153-563 WAC. In repealing chapter 173-531 WAC and replacing it with chapter 173-531A WAC on the same day that chapter 173-563 WAC became effective, the irrigation and municipal reservations were made subject to the mainstem Columbia River instream flows. Between 1980 and 1991, Ecology issued a number of water right permits that are subject to the mainstem Columbia River instream flows in chapter 173-563 WAC.

Ecology declared a moratorium on issuing any new water rights from the Columbia River in early 1992. That moratorium remained in effect until the 1997 Legislature passed ESHB 1110, which voided WAC 173-563-015 and, thereby, terminated the moratorium. Chapters WAC 173-531A and WAC 173-563 were amended in 1998 such that the instream flows and average weekly flows do not apply to any application for water from

the mainstem Columbia River on which a decision is made by Ecology on or after July 27, 1997 (the effective date of ESHB 1110). Any water right application considered for approval or denial after that date shall be evaluated for possible impacts on fish and existing water rights, and Ecology will consult with the appropriate state, local, and federal agencies and Indian tribes in making this evaluation. Any permit which is then approved for use of such waters will be, if deemed necessary, subject to instream protection or mitigation conditions determined on a case-by-case basis. However, water rights issued between June 24, 1980 and July 27, 1997 remain subject to the instream flows promulgated in chapter 173-563 WAC.

Columbia River Basin Water Supply Act

In 2006, the state legislature enacted the Columbia River Basin Water Supply Act, Engrossed Second Substitute House Bill 2860 (codified at chapter 90.90 RCW), which directs Ecology to "aggressively pursue the development of water supplies to benefit both instream and out-of-stream use." The legislation established a Columbia River Basin Water Supply Development Program and a Columbia River Basin Water Supply Development Account.

The legislation represents a new mandate for Ecology, which is early in the process of developing a program to implement the legislative directive. Storage and conservation of water are important tools for developing new water supplies under chapter 90.90 RCW.

WATER SUPPLY DEVELOPMENT ACCOUNT

The Columbia River Basin Water Supply Act created the Columbia River Basin Water Supply Development Account (the Account) in the state treasury. Expenditures from the Account may be used to develop new storage facilities, improve existing storage facilities, implement conservation projects, or other actions resulting in new water supplies within the Columbia River basin for both instream and out-of-stream uses. Two-thirds of the funds placed in the Account must be used to develop new water storage facilities; the remaining one-third must be used for other purposes listed in the statute. Except for the development of new storage facilities, RCW 90.90.010 prohibits use of the Account to fund water acquisition or transfers from one WRIA to another without specific legislative authority.

ALLOCATION AND DEVELOPMENT OF WATER SUPPLIES

Water supplies resulting from development of new storage facilities funded from the Account are to be allocated as follows:

- Two-thirds of the storage must be available for appropriation for out-of-stream uses; and
- One-third of the storage must be available to augment instream flows and will be managed by Ecology.

The two-thirds/one-third allocation of water resources between out-of-stream and instream uses does not apply to applications for changes or transfers of existing water rights in the Columbia River basin.

RCW 90.90.020(3) mandates that Ecology focus its efforts to develop water supplies for the Columbia River basin on the following needs:

1. Alternatives to groundwater for agricultural users in the Odessa subarea aquifer;
2. Sources of water supply for pending water right applications;
3. A new uninterruptible supply of water for holders of interruptible water rights on the Columbia mainstem (note that the Columbia River mainstem definition found at RCW 90.90.030(12)(a) may not be used for purposes of allocating water supplies pursuant to RCW 90.90.020);
4. New municipal, domestic, industrial, and irrigation water needs within the Columbia River basin.

EARLY ACTIONS

Ecology (2007) describes three early actions to make available new water supplies. One of the early actions – establishment of a new conveyance route to Potholes Reservoir may have little direct effect in making new water supplies available within WRIA 31.

The other two early actions, namely 1) additional drawdown of Lake Roosevelt proposed by the U.S. Bureau of Reclamation and 2) the Columbia-Snake River Irrigators Association (CSRIA) VRA, can help meet water supply needs in WRIA 31.

Diversion of a total of 132,500 acre-feet of storage from Lake Roosevelt during non-drought years is largely earmarked for irrigation supply in the Odessa subarea, additional municipal/industrial supply, and instream flow enhancement downstream of the Grand Coulee Dam. During drought years, Bureau of Reclamation proposes to divert an additional 50,000 acre-feet/year to provide 33,000 acre-feet of water for Columbia River mainstem interruptible water right holders and an additional 17,000 acre-feet/year for instream flow augmentation. This early action would potentially make available additional irrigation supply during drought conditions to address existing interruptible Columbia River irrigation rights in WRIA 31.

VOLUNTARY REGIONAL AGREEMENTS

RCW 90.90.030 authorizes Ecology to enter into Voluntary Regional Agreements (VRAs) as a mechanism to provide new water for out-of-stream use, to streamline the water right application process, and to protect instream flows. VRAs must ensure that, for water rights issued from the "Columbia River mainstem"[2], there is no negative impact on Columbia River mainstem instream flows in the months of July and August as a result of the new appropriations issued under the agreement. VRAs shall ensure that efforts are made to harmonize the VRA with watershed plans adopted under chapter 90.82 RCW that are applicable to the area covered by the VRA. A 60-day consultation with county legislative authorities and watershed planning groups with jurisdiction over the area

[2] RCW 90.90.030(12)(a) defines the "Columbia River mainstem" as "all water in the Columbia river within the ordinary high water mark of the main channel of the Columbia river between the border of the United States and Canada and the Bonneville dam, and all groundwater within one mile of the high water mark." That definition applies only to RCW 90.90.030 (voluntary regional agreements) and RCW 90.90.050 (Columbia River mainstem water resources information system) and may only be used for purposes of implementing these two sections of chapter 90.90 RCW.

where the water rights included in the agreement are located, as well as with WDFW, federal agencies, and affected tribal governments is required prior to execution of a VRA. The consultation satisfies all applicable consultation requirements under state law related to issuance of new water rights under RCW 90.90.030. The VRA section in the statute expires on June 30, 2012, but VRAs entered into by Ecology before that date can extend indefinitely.

The CSRIA VRA would make available new sources of water by implementing conservation measures (best management practices, BMPs) and other measures. The most recent version of the CSRIA VRA available at the time this watershed plan was developed was dated April 12, 2007, and had not been finalized The WRIA 31 Planning Unit[3] is very supportive of the CRISA VRA (April 12, 2007 version), as well as the preceding draft upon which the planning unit commented during the consultation process. The Planning Unit concurs with the BMPs proposed in the draft CSRIA VRA. Expeditious approval of the CSRIA VRA and issuing new water rights under it are in the public interest.

The WRIA 31 Planning Unit supports effective harmonization of VRAs with this watershed management plan and, towards that end, made recommendations pertaining to harmonization with the watershed plan during the consultation process for the CSRIA VRA. At the time this watershed plan was drafted, only one of the projects proposed for implementation under the CSRIA VRA was located partially within WRIA 31, the Kennewick Irrigation District's (KID's) proposed pump exchange. The WRIA 31 Planning Unit found that the KID's proposed pump exchange project is consistent with the WRIA 31 watershed management plan and is in the public interest (see Section 6.1.2).

The CSRIA VRA is unique in that the draft VRA was available at the time that ESSHB 2860 was enacted. Representatives from CSRIA had met with the WRIA 31 Planning Unit and communicated with watershed planning staff over a period of several years regarding the VRA prior to the enactment of ESSHB 2860. This enabled detailed consideration of the proposed BMPs and other aspects of the VRA by the Planning Unit. This also enabled a measure of harmonization of the CSRIA VRA with the watershed plan consistent with the intent of RCW 90.90.030(2)(c). If other VRAs are developed in the future that would be applicable within WRIA 31, the WRIA 31 Water Resource Planning and Advisory Committee (PAC), after adoption of this watershed plan, should be notified and engaged at the conceptual stage of the process to develop the VRA in order to ensure effective harmonization with the watershed plan.

WATER SUPPLY INVENTORY AND SUPPLY/DEMAND FORECAST

In response to RCW 90.90.040, Ecology produced the first Columbia River water supply inventory and long-term water supply and demand forecast (Golder Associates and Anchor Environmental 2006). According to statute, the water supply inventory/demand forecast must include a list of potential water supply and storage projects in the Columbia River basin, including estimates of cost per acre-foot, benefit to fish and other instream needs, benefit to out-of-stream needs, and environmental impacts. The water supply inventory is to be updated annually, and the supply/demand forecast every five years.

[3] Ecology is neutral regarding any VRA until it has final approval by the parties to the VRA.

RCW 90.90.040(1) provides that Ecology shall work with interested watershed planning groups and other interested parties to develop the water supply inventory/demand forecast. It is important for the WRIA 31 PAC to work with Ecology to develop and update the water supply inventory/demand forecast in order to promote consistency with the watershed plan.

Net water savings from water conservation projects must be placed in the state trust in proportion to the state funding provided to implement the project. Under RCW 90.42.040(1), trust water rights acquired in an area with an approved watershed plan developed under chapter 90.82 RCW shall be consistent with that plan if the plan calls for acquisition. Water rights acquired by the state trust in WRIA 31 as a result of state-funded conservation projects shall be consistent with this watershed management plan.

The 2006 water supply inventory/demand forecast identifies more than 5,000 potential agricultural conservation projects upstream of Bonneville Dam[4] with the potential to save almost one million acre-feet of water. The 2006 water supply inventory/demand forecast is based on the area above Bonneville Dam. At the time this watershed management plan was drafted, it was unclear what the demand forecast will be once the area of the Columbia River basin downstream of Bonneville Dam is considered. Additionally, the 2006 water supply inventory/demand forecast gives consideration to a one-mile "Management Zone". However, chapter 90.90 RCW does not establish a management zone or authorize the establishment of a management zone. According to water supply inventory/demand forecast's glossary "Management Zone" is defined as "The one-mile corridor on either side of the Columbia River mainstem as defined in ESSHB 2860." The only place that the "Columbia River mainstem" is defined and the only place where the phrase "one mile" appears in ESSHB 2860 is in section 4(12) (codified at RCW 90.90.030(12)) where it states: "The definitions in this subsection apply only to this section and section 6 of this act, and may only be used for purposes of implementing these sections." This limiting of the use of the Columbia River mainstem definition is reinforced in ESSHB 2860(6)(4) (codified at RCW 90.90.050(4)), which establishes the Columbia River mainstem water resources information system. The Planning Unit strongly believes that the Columbia River mainstem definition may not be used for purposes of developing the water supply inventory/demand forecast because it was developed pursuant to section 5 of ESSHB 2860 (codified at RCW 90.90.040), nor may the definition be used for purposes of implementing RCW 90.90.010 "Columbia river basin water supply development account – Use for storage facilities and access to water supplies – Evaluation – Public Comment – Use of water savings' or for purposes of implementing RCW 90.90.020 "Allocation and development of water supplies."

RCW 90.82.130(4) states:

> "After a plan is adopted in accordance with subsection (3) of this section, and if the department [Ecology] participated in the planning process, the plan shall be deemed to satisfy the watershed planning authority of the department with respect to the components under the provisions of RCW 90.82.070 through 90.82.100 for the watershed or watersheds involved in the plan. The department shall use the plan as the framework for making future water resource decisions for the planned

[4] RCW 90.90.040 did not restrict the scope of the inventory to areas above Bonneville Dam.

watershed or watersheds. Additionally, the department shall rely upon the plan as a primary consideration in determining the public interest related to such decisions."

This watershed management plan covers WRIA 31 as established in chapter 173-500 WAC. There is no management zone or other form of separate area established in chapter 173-500 WAC for the Columbia River or the one-mile area adjacent to the Columbia River. Under this watershed management plan, WRIA 31 is divided into three management areas for planning purposes and includes a WRIA-wide section for issues that are common across the three management areas. The Planning Unit does not recognize a one-mile or any other size management area/zone along the Columbia River. The WRIA 31 PAC will work with Ecology to resolve any current and potential future conflicts between watershed planning under chapter 90.82 RCW and implementation of the Columbia River basin water supply development program established under chapter 90.90 RCW.

The Planning Unit believes that the 2006 Water Supply/Demand Inventory and Forecast does not adequately recognize water demands throughout WRIA 31 – particularly water demands at distances greater than one mile from the mainstem which should benefit from the effort to develop water supplies under the Columbia River Basin Water Supply Act.

COLUMBIA RIVER MAINSTEM WATER RESOURCES INFORMATION SYSTEM

As provided in RCW 90.90.050(1): "In order to better understand current water use and instream flows in the Columbia River mainstem, the department of ecology shall establish and maintain a Columbia River mainstem water resources information system that provides the information necessary for effective mainstem water resource planning and management. For purposes of RCW 90.90.050, the definition of the Columbia River mainstem in RCW 90.90.030(12) applies and the definition is solely limited to the purpose of collecting data to meet the information requirements of RCW 90.90.050. As defined in RCW 90.90.030(12), the Columbia River mainstem "means all water in the Columbia River within the ordinary high water mark of the main channel of the Columbia River between the border of the United States and Canada and the Bonneville dam, and all ground water within one mile of the high water mark."

It is anticipated that the Columbia River Mainstem Water Resources Information System will make available important data and information of sufficient quality for the implementation of, and potentially future amendments to, this watershed management plan. The Implementing Governments (which include Ecology) will assist with development of elements of the information system relevant to WRIA 31 in order to maximize data quality and utility for purposes of watershed planning, including Phase 4 plan implementation.

PROGRAMMATIC EIS FOR IMPLEMENTATION OF COLUMBIA RIVER WATER MANAGEMENT PROGRAM

Ecology has prepared a programmatic (non-project) environmental impact statement (EIS) for implementation of a Columbia River Water Management Program (Ecology 2007). The programmatic EIS evaluates potential impacts associated with water conservation and storage, VRAs, and policy alternatives for implementing Ecology's Columbia River Water Management Program. The three early actions identified above are included in the EIS. Additional project-level environmental review under SEPA is

anticipated as the elements under Ecology's Columbia River Water Management Program are implemented.

One proposed project within WRIA 31, an aquifer storage and recovery (ASR) project for City of Kennewick, is discussed in the EIS as a prospective small water storage project eligible for funding consideration under the Columbia River Basin Water Supply Development Account.

Uncertainty in Relationship between Mainstem Flows and Salmonid Survival

As described in Section 2.5, there is considerable controversy regarding the hypothesis that a relationship exists between flows in the mainstem Columbia River and salmonid survival. Despite the uncertainty, federal management of the Columbia River hydropower system includes targeting mainstem minimum flows established in National Marine Fisheries Service Biological Opinions – flows that greatly exceed the State's minimum instream flows promulgated in chapter 173-563 WAC. The flow-survival hypothesis is largely based on research published in 1981. More recent research indicates that today's available science does not support the flow-survival hypothesis, as documented by Dr. Anderson of the University of Washington's School of Aquatic and Fishery Sciences (Anderson 2002) and the Independent Scientific Advisory Board for the Northwest Power Planning Council (ISAB 2003). There is also emerging research indicating that the ocean is at least as important a factor as the freshwater system in survival and thus return of adult salmon to the river (refer to Section 2.5 for additional detail on the research).

Management of Columbia River water resources is constrained by a flow augmentation policy which is not supported by the best available science.

At the time this watershed management plan was being developed, the State of Oregon was proposing a drawdown of the John Day Pool with the purpose of increasing streamflows for salmonids. The absence of science demonstrating any benefit from increasing streamflow aside, reducing the John Day minimum operating pool will have a significant impact on water supplies, aquatic habitat, recreation, transportation, power generation, and, possibly, water quality within the WRIA 31.

Recommended Actions[5]:

- Develop a process with Ecology for expediting the issuance of permits from the John Day-McNary Pools reservations to meet beneficial uses as specified under chapter 173-531A WAC. The process may include use of VRAs, rulemaking (if the need for rulemaking is determined by the PAC and approved as provided in Section 8.8 of this plan), MOU with Ecology, or other legal method.
- The PAC and Implementing Governments will pursue legislation to define the consultation process for processing water right applications that is consistent with the consultation process established for VRAs in RCW 90.90.030(4)(a). That is, establish a 60-day period for consultation with county legislative authorities, local watershed planning units, WDFW, affected tribal

[5] Numbering of recommended actions throughout this watershed management plan does not represent a relative prioritization of those recommended actions.

governments, and federal agencies, for applications that are not covered by an approved VRA or otherwise covered by statute.

- Support implementation of the VRAs that are consistent with this watershed management plan (e.g., CSRIA VRA). The WRIA 31 Lead Agency and or Implementing Governments should seek an agreement with Ecology regarding utilization of the WRIA 31 watershed planning process to support identification and prioritization of mitigation actions.
- Explore developing a VRA as a mechanism for expanding water supply availability within WRIA 31 (e.g. water storage; availability of conserved water).
- Pursue developing an intergovernmental agreement between the WRIA 31 Lead Agency or Implementing Governments with Ecology to ensure effective implementation of VRAs that would be applicable within the WRIA, and ensure harmonization of VRAs with the WRIA 31 watershed management plan as required under chapter 90.90 RCW. This may include defining a list of potential storage and conservation projects that make available new water supplies within WRIA 31. The WRIA 31 PAC will consult with Ecology regarding any proposed VRA that would be applicable within the WRIA.
- Pursue funding for water supply projects within WRIA 31. This can include larger projects like a Kennewick ASR pilot project and/or a regional water storage project in the Wood-Glade planning area (Section 3.1.2), and/or a source exchange project in which groundwater supply from pumping of deep wells is replaced by Columbia River supply (Section 5.1.1). It could equally include projects to meet smaller-scale water demands throughout the watershed, not limited by distance from the mainstem Columbia River.
- Develop a strategy in the context of the chapter 90.90 RCW to address existing interruptible Columbia River rights in WRIA 31 that are not included in the CSRIA VRA.
- The WRIA 31 Implementing Governments will provide information and help revise future Columbia River water supply inventories and long-term water supply and demand forecasts. This will include stronger recognition of smaller-scale water demands throughout the watershed, not limited by distance from the mainstem Columbia River. It is of importance to WRIA 31 that smaller-scale water supply projects, including those at distance away from the mainstem Columbia River, be recognized and planned for within implementation of the Columbia River Basin Water Supply Act. The PAC may seek funding for this participation.
- Pursue developing an intergovernmental agreement between the WRIA 31 Lead Agency and Ecology regarding implementation of the state trust water program within the WRIA. The intent is to ensure that, if state funding is used to acquire water rights, or parts of water rights, for placement in the state water trust program, such acquisitions are consistent with the watershed management plan and include early consultation with the Implementing Governments or PAC. It is also recommended that the PAC and Implementing Governments investigate

legislative actions that may be necessary to provide clarification about the timing and consultation criteria to ensure consistency with the approved watershed management plan.

- The WRIA 31 PAC will serve as an advisory body for implementing the Columbia River Basin Water Supply Development Program within WRIA 31.
- The WRIA 31 PAC will communicate with other planning units and local governments in the Columbia River basin in order to better develop a Columbia River basin-wide perspective of water resource issues and to identify opportunities for cooperative efforts. It is further recommended that the PAC be represented on relevant water resource policy advisory groups and forums on the state and federal level.
- Fill data gaps regarding factors that affect fish survival within the John Day and McNary Pools and assess fish and wildlife habitat in and adjacent to the Columbia River mainstem.

3.1.2 Limited Water Storage

Issue: There is little water storage capacity, outside of the John Day and McNary Pools, to help overcome the seasonal timing gap between water availability and water demand.

Priority: High.

Objective: Develop new water storage facilities off of the Columbia River mainstem to help meet future demand.

Background:

There is minimal existing water storage capacity in WRIA 31, outside of the John Day-McNary Pools. The City of Kennewick is the only entity in the WRIA actively using water storage of any appreciable quantity. The City currently has seven surface reservoirs and a clear well at the treatment plant with combined storage capacity of approximately 25 million gallons (77 acre-feet) for municipal use. The City's 2002 Water System Plan projects a storage deficit of approximately 6 million gallons (19 acre-feet) by the year 2021, and an additional storage deficit of roughly 20 million gallons (62 acre-feet) to serve full build out within the City's proposed 50-Year Growth Management Boundary.

The Columbia River is the only source of surplus water available for moderate- to large-scale storage within WRIA 31.

As described in Section 1.1.3, the Planning Unit has conducted preliminary assessments of water storage opportunities within WRIA 31 including aquifer storage and recovery (ASR) in the Kennewick subbasin, and water storage concepts in the Glade-Fourmile subbasin. In addition, Benton and Klickitat Counties have been evaluating options for development of the John Day/McNary pools reserves, including developing preliminary concepts for regional water conveyance and storage predominantly within the Wood-Glade planning area (Nakaty Enterprises 2006). These are described in the planning area-specific discussions that follow.

Recommended Actions:

The WRIA 31 PAC should coordinate identification and evaluation of storage needs and storage opportunities to best meet those needs throughout the watershed. The PAC or a sub-committee thereof would:

1. Work with the watershed's water resource interests to identify current and future water demands (both instream and out-of-stream) that could be met using seasonal storage and identify and assess the feasibility of prospective storage projects (local and/or regional) to meet those demands, as well as pursue funding for new storage.
2. Once a feasible project(s) is identified, identify prospective funding sources including but not limited to:
3. The Columbia River basin water supply development account;
4. Phase 4 watershed plan implementation funding;
5. Other state water storage grants (e.g., storage preconstruction grant);
6. If a storage project was proposed to replace an existing summer diversion, other grant sources might be available because of associated water quality and/or habitat improvements (e.g., Centennial Clean Water grants, Salmon Recovery Fund grants, etc.).
7. Contingent upon funding, proceed with design, construction, and testing of storage project(s).

Recommendations for potential application of water storage in each of the three planning areas are outlined below.

Rock Creek Area

As discussed in Chapter 4, no large demands for surface water are projected in the Rock Creek drainage or Goodnoe Hills areas of the Rock Creek Planning area. Therefore, at this time, new water storage to meet out-of-stream demand is not an expected need for this planning area in the foreseeable future. If that were to change, the storage options evaluated and potentially implemented in the Kennewick and Wood/Glade areas can likely be applied in the Rock Creek area.

Rock Creek provides spawning and rearing habitat for a steelhead population that is part of the Middle Columbia River steelhead Distinct Population Segment (DPS), which is listed as threatened under the federal ESA. The intermittent stream flows in Rock Creek are naturally occurring and limit the amount of fish habitat. Additionally, during the summertime many reaches of Rock Creek exceed water temperature standards, in large measure, due to low flows. Given its location east of the Cascade Range, low elevation, limited natural storage capacity and limited groundwater inputs, Rock Creek flows may be particularly vulnerable to year-to-year variability in precipitation as well as to predicted long-term global-scale warming trends. Water storage may be a viable option for augmenting streamflow in Rock Creek basin and mitigating climatic effects (refer to Section 4.1.1).

Wood/Glade Area

The Wood/Glade planning area encompasses the area of greatest current water demand in WRIA 31. It is also likely the area of greatest potential economic growth if new irrigation water supplies were available to the hundreds of thousands of irrigable acres in the area. Water storage is a potential option to make available new water supplies to grow the agricultural economy of this area.

Based on the findings of the Level 1 assessment, there were approximately 135,000 acres of irrigated farming and nearly 225,000 acres of dryland farming within the Wood/Glade planning area in 2001 (IRZ Consulting 2004). The dryland acreage represents a minimum additional irrigable land within the planning area. However, the planning area encompasses approximately 785,000 acres, and WSU (1970) estimated that the Horse Heaven Hills area contained more than 600,000 acres that could be used to grow irrigated crops.

The watershed assessment process included a preliminary assessment of water storage options to make available additional water for irrigation in the Wood/Glade area (Aspect Consulting 2005c). The assessment focused on estimating costs to pump and convey a small to moderate quantity of water (3,000 to 9,000 acre-feet/year) from the mainstem Columbia River inland to prospective storage reservoir locations 7 to 14 miles from the river, whether surface or subsurface.

The preliminary assessment concluded that a relatively small-scale storage project, at that distance from the river and assuming all new construction, would be economically infeasible for the agricultural industry without considerable public sector funding. However, winterizing existing river pump and conveyance systems to allow them to reliably pump water to storage during the winter could dramatically reduce the costs for potential storage projects (Aspect Consulting 2006).

The planning-level cost estimates showed an economy of scale (lower $ per acre-foot of water delivered) when increasing from a 3,000 to 9,000 acre-feet/year storage project. Therefore, it is appropriate and necessary to look at possible concepts for much larger, regional-scale storage projects that provide sufficient economy of scale to potentially be economically viable. Using existing pump/conveyance systems within the Wood/Glade area, retrofitted for winter operation, should also be considered as a means to reduce project cost.

A review of the John Day/McNary pools reservations and the development of preliminary concepts for irrigation water supply and storage on the regional scale within WRIA 31 was conducted pursuant to an intergovernmental agreement between Benton and Klickitat Counties (Nakaty 2004; Nakaty 2005; and Nakaty 2006). Historically, several assessments have been conducted to evaluate feasibility of irrigation development across the Horse Heaven Hills region, which includes the Wood/Glade and Kennewick planning areas of WRIA 31. Most notably, the Agricultural Research Center from Washington State University (WSU) was contracted by Horse Heaven Irrigation Inc. to complete a multidisciplinary assessment of irrigation development potential of the Horse Heaven Hills region (WSU 1970). In that study, the concept for delivering irrigation water was diversion from John Day and McNary Pools with conveyance through an extensive series of irrigation canals. The study outlined five different variations of diversion, canal, and dam systems, termed Concepts A through E. The various canal concepts all had specific

advantages and disadvantages, and all included dammed surface reservoirs for storage (typically within Glade Creek and Fourmile Canyon).

Recognizing the dramatic changes in irrigation engineering and economics since the 1970 study, Nakaty Enterprises formulated concepts for supplying irrigation water across the Horse Heaven Hills region. Irrigation water would be pumped from McNary Pool during the winter months into an extensive network of canals, similar to that proposed in the WSU (1970) report. The canal network itself provides the potential for very large storage volumes. A main canal running to the west near the 1000-foot elevation contour is initially considered. Smaller canals leading from the main canal would then serve individual irrigation operations. Water volumes via the canal system would be large, on the order of 1,000 to 1,300 cfs.

Further evaluation of the water storage options for the Wood/Glade planning area by the WRIA 31 PAC is a top priority for the early implementation of the WRIA 31 watershed management plan.

Kennewick Area

The City of Kennewick will continue to build surface reservoirs for municipal supply, as outlined in their Water System Plan. However, we recommend that the City also further evaluate the feasibility of storing water underground through ASR. ASR may provide a viable mechanism to store surplus Columbia River water during the off-peak (winter) season, and make that stored water available to meet the late-season peak demand. As such, ASR may help maximize use of the City's existing production and treatment capacity by using it more fully in the off-peak season, thus limiting or delaying the need to construct additional surface water treatment capacity which can be very costly in light of surface water treatment requirements. ASR would also diversify their sources of supply, thereby reducing vulnerability to water quality impact associated with the current reliance on the Columbia River system sources (refer to Section 6.1.3). ASR has already been identified as a water supply alternative of importance in the City's 2002 Water System Plan and in the Quad Cities' 2003 Regional Water Supply Feasibility Report (JUB Engineers 2003).

The City of Kennewick, with Planning Unit support, is seeking funding under the Columbia River water supply development account to implement a pilot ASR project as recommended in the Kennewick ASR feasibility study (Aspect Consulting 2005d).

That feasibility study identified a target area for ASR testing in the southwest part of the City's water service area. This general area was delineated based on a preference to locate prospective ASR well(s) within existing water system pressure zones where growing future demand is anticipated and generally near existing water supply infrastructure. Hydrogeologic conditions also factored into the target area identification. Within the target area, choice of an actual ASR location would depend on a number of factors including City ownership or access to property on which to site an ASR well, proximity to the City's current or planned water distribution infrastructure, as well as the presence of potential critical areas that could constrain locations of new wells and/or associated infrastructure.

An ASR pilot test would involve construction of one or more new ASR wells, plumbing the well(s) into the water distribution system, and testing the ASR system including water recharge, storage, and recovery as generally outlined in the preliminary pilot test plan that is part of the ASR feasibility study. The source water for an ASR pilot test would be the same as that planned for potential full-scale ASR operation: the water in the City distribution system closest to the ASR well.

At the time of preparation of this watershed plan, the City was participating in meetings with Ecology to discuss funding an ASR pilot study through the Columbia River water supply development account. The PAC recommends that Ecology fund the ASR pilot study so that the feasibility of storing and recovering Columbia River water from the basalt aquifer system can be assessed with confidence. The pilot study would provide an excellent demonstration project and has important implications for water storage throughout WRIA 31 and elsewhere in the Columbia River basin.

3.1.3 Preserve Water Rights in the Watershed

Issue: Relinquishment of existing water rights in the watershed may be occurring because water right holders are not adequately informed regarding relinquishment vs. options to preserve rights, and because mechanisms for efficient transfer of rights (e.g., local water market) are lacking. In addition, the state statutes' 5-year period for relinquishment does not accommodate changes in agricultural marketplaces and economics.

Priority: High.

Objective: Preserve existing water rights as an asset of the watershed.

Background:

Water rights are held by persons, corporate entities, or municipalities and have value to the water right owners. However, whether held by persons, corporate entities, or municipalities, water rights have value to community at large. Whenever water rights are relinquished or abandoned, it diminishes the availability of water supplies needed to support agriculture, energy production, and/or population and economy growth. Maintaining the inventory of existing water rights is in the public interest and is a high priority objective of the WRIA 31 watershed management plan.

In some cases there may be options to avoid abandonment or relinquishment of water rights. For example, water rights can be placed temporarily into the state trust water right program, or sold or leased. Additionally, State statute (RCW 90.14.140) defines certain conditions which provide "sufficient cause" under which existing water rights are not subject to relinquishment due to nonuse of all or a portion of the water by the owner of a water right for a period of five or more consecutive years. The list of sufficient causes for nonuse of water rights includes:

- drought, or other unavailability of water;
- military service – both active and nonvoluntary;
- federal or state agency leases of or options to purchase lands or water rights which precludes or reduces the use of the water right;

- federal laws imposing land or water use restrictions either directly or through voluntary enrollment (e.g., acreage limitation and production quotas such as crop reduction programs);
- weather conditions that result in a temporary reduction in water use;
- reduced irrigation due to participation in electricity buyback programs;
- water conservation measures implemented under the Yakima River basin water enhancement project;
- reliance on the transitory presence of return flow water in lieu of diversion or withdrawal for irrigation; or
- reduced use of irrigation water due to crop rotation, as long as the remaining portion of the water continues to be beneficially used.

In addition, there is no relinquishment of a water right if:

- claimed for power generation under chapter 90.16 RCW;
- used for standby or reserve water supply in time of drought or other low flow period;
- claimed for a determined future development;
- claimed for municipal water supply purposes under chapter 90.03 RCW;
- claimed under federal lands and thus not subject to appropriation by the state, in accordance with chapter 90.40 RCW;
- leased to another user and put to beneficial use in accordance with chapters 90.03 and 90.44 RCW;
- authorized for a purpose of use that is satisfied by the use of agricultural industrial process water under RCW 90.46.150; or
- such right is a trust water right under chapters 90.38 or 90.42 RCW.

Recommended Actions:

Public Education

The first recommended step is to increase public education regarding water rights. Many water right holders are not aware of the state water code's "use it or lose it" requirement and the fact that a water right only exists for the quantity of water actually put to beneficial use (apart from municipal inchoate [not yet perfected] rights). WRIA 31 water right holders need to be educated regarding the legal basics of state water rights to avoid inadvertent relinquishment of water rights within the watershed.

A recommended public education action is to prepare a flier explaining, in layman terms, water rights and their potential for relinquishment, and identifying local point of contacts for more information. The Klickitat County and Benton County Water Conservancy Boards have already taken some actions to educate the public regarding water rights, and could be appropriate points of contact. The water rights flier can be distributed as follows:

- Mail it to local residents and conservation districts;
- Post it on counties' web sites, have available for booths at fairs, etc.
- Hold periodic public education workshops on water rights within the watershed.

Establish Water Exchange and/or Facilitate a Water Market

A more involved recommendation is to establish a water market or "clearinghouse" that would provide a link and local point of contact for water right sellers/buyers or leasors/leasees, and municipal entities, to facilitate the transfer of, and prevent relinquishment of, existing water rights. The program would also provide information on the state's water trust program, which provides a mechanism to preserve rights ("relinquishment parking lot"). Close coordination of any water market system with Implementing Governments during watershed plan implementation will be required to ensure consistency with the watershed management plan. Specific action items include:

- Develop a framework for establishing a water exchange within WRIA 31, including use of the state water trust. A water management framework describing water banking/exchange options was recently completed for WRIA 30 (Aspect Consulting 2007). The framework was intended to serve as a scoping document to be further developed during the implementation phase of the WRIA 30 planning process. Although tailored toward implementation in WRIA 30, it can be adapted as starting point for WRIA 31.
- Develop procedural guidelines for transferring and leasing water rights so all parties understand the legal processes, administrative processes, and means for documenting beneficial use.
- Communicate/advertise the existence of the "marketplace" to interested parties within the watershed. This could include the same public education methods identified above for water right preservation.

Statutory Changes Needed to Accommodate Evolving Agricultural Markets/Practices

A key issue for irrigators in WRIA 31 is potential for water right relinquishment when adapting their crop types to changing agricultural market. One example of this is the current regional transition to crops for biofuels. As listed above, the water code includes an exemption to relinquishment associated with the reduced use of irrigation water resulting from crop rotation. The statute defines crop rotation as the "temporary change in the type of crops grown resulting from the exercise of generally recognized sound farming practices". The unused water resulting from crop rotation is protected from relinquishment if the remaining portion (i.e. for the new crop) of the water continues to beneficially used. This can pose a limitation for irrigation right holders since implementation of crop rotation may take longer than 5 years to complete, therefore making it difficult to satisfy the beneficial use requirement as defined under this exemption. Furthermore, the transition of crop types and acreages, and thus water demands, may not be precisely known when the transition begins. Moreover, many agribusiness firms in WRIA 31 make long-range decisions with 15 to 20 year planning horizons.

The PAC recommends communicating to the Governor and Legislature that it is in the public interest to maintain the existing inventory of water rights, because it is critical to the viability of the local community and regional economy.

The state water code needs to be amended to define changes in irrigation practices occurring over time periods longer than 5 years (at least 20 years) as sufficient cause for nonuse during that period (and preventing relinquishment if full use is achieved). One option might be a concept similar to the 'determined future development' exemption, i.e., the farmer would document a planned change in irrigation practices during which a water right may not be fully used for some period of transition, with a full use achieved by the end of the transition. Other options to address problems in the state water code will be more fully developed in the WRIA 31 Phase 4 detailed implementation plan.

3.1.4 Disincentives to Water Conservation

Issue: Disincentives to conserving irrigation water exist.

Priority: High.

Objective: Maximize water conservation by eliminating disincentives to conserving.

Background:

The Planning Unit recognizes that disincentives can exist to conserving water, particularly irrigation conservation. The disincentives include relinquishment of rights to the quantity of water made available through implementing conservation, and in some cases onerous conditions placed on recipients of conservation grants.

Water rights are subject to statutory relinquishment resulting from nonuse of all or a portion of the right for a period of five or more consecutive years, unless the cause of nonuse meets the definition of "sufficient cause" under RCW 90.14.140 and is exempt from relinquishment. At the present time, nonuse due to implementation of conservation measures does not qualify as "sufficient cause" under the water code and therefore poses a disincentive to conservation.

Conservation of water to make water available under a water right for irrigation of additional acres or for sale or lease is a strong incentive to conserve water. As provided in RCW 90.03.380(1): "A change in the place of use, point of diversion, and/or purpose of use of a water right to enable irrigation of additional acreage or the addition of new uses may be permitted if such change results in no increase in the annual consumptive quantity of water used under the water right. For purposes of this section, "annual consumptive quantity" means the estimated or actual annual amount of water diverted pursuant to the water right, reduced by the estimated annual amount of return flows, averaged over the two years of greatest use within the most recent five-year period of continuous beneficial use of the water right." Under RCW 90.90.010(4) net water savings achieved through measures funded by the Columbia River Basin Water Supply Development Account shall be placed in trust in proportion to the state funding provided to implement the project. The proposed CSRIA VRA provides for water right "recalibration" and provides that conserved water will be available to support issuance of new water rights under the VRA.

This watershed management plan recognizes that whenever a water right is recalibrated or annual consumptive quantity or net water savings is calculated, there are options available as to the methodology. Per current practices two recognized methodologies are Ecology's GUID 1210 and the method developed by the Benton County and Franklin County water conservancy boards (Benton County Water Conservancy Board Information Memorandum, December 10, 2004), for the purpose of processing changes/transfers of water rights within WRIA 31. Water right holders should have the option of utilizing either of these to methods, or other methods that are technically sound.

Recommended Actions:

1. The PAC should pursue legislation to effect changes in the water code that prevent relinquishment of rights to conserved irrigation water and provide flexibility in its future use (e.g. irrigation of expanded acreage). Removing the disincentives to water conservation from the state water code is a legislative action needed to implement the WRIA 31 watershed management plan and, as such, should be included in Ecology's annual report the appropriate standing legislative committees pursuant to RCW 90.82.043(5).

2. Propose and develop voluntary regional agreements as one option to make the quantity of conserved water available in the WRIA.

3. Identify conditions in conservation grants that may (unintentionally) create disincentives to implementing conservation or otherwise undermine this watershed management plan. Communicate this information with proposed solutions to responsible funding agencies.

4. Encourage conservation as a means to make water available for irrigation of additional acreage by the water right holder.

5. Where deemed appropriate by the Implementing Governments in consultation with the PAC, acquire water generated through conservation from willing water right holders, put it in the state trust program and make it available to meet out-of-stream and instream water uses in accordance with this watershed management plan. The PAC will serve in an advisory capacity for implementation of the state water trust program within the WRIA to ensure continuing conformance with the watershed management plan. In its advisory role, the PAC should propose and develop agreement(s) to ensure that trust water right programs further the purposes of this watershed management plan, not undermine it.

3.2 WRIA-Wide Water Quality

Issue: Water quality of the Columbia River is listed as impaired (state 303d list) and requires TMDLs. The effect of surface water quality discharging from WRIA 31 streams on Columbia River water quality warrants assessment.

Priority: Low.

Objective: Document the contribution of WRIA 31 streams to impaired water quality in the mainstem Columbia River.

Background:

Columbia River in WRIA 31 is on the state's list of impaired water bodies as Category 5 for water temperature. A multi-state and federal agency effort to develop a temperature TMDL for the Columbia River has been underway for several years.

All WRIA 31 streams, except the Columbia River, are intermittent and provide relatively small discharge volumes, even during spring runoff, relative to concurrent flows in the Columbia River mainstem. An estimate of the contribution of flows from WRIA 31 streams relative to Columbia River mainstem flows is provided below.

Flow Data for Columbia River in WRIA 31

Flow (discharge) data for the Columbia River in WRIA 31 are primarily collected by the U.S. Army Corps of Engineers who operate both McNary and John Day Dams. McNary Dam is located at river mile 292, near Plymouth (Wood/Glade planning area) and downstream of the confluences of the Yakima and Snake Rivers with the Columbia. John Day Dam is located at river mile 216, just downstream of WRIA 31's western boundary. Water that flows through the turbines in the dams and spills over the dams are reported in hourly and daily average discharge values. The period of record from McNary Dam is from January 1, 1964, to the present. The period of record from John Day Dam is from April 22, 1968, to the present.

In the WRIA 31 watershed assessment, mean daily discharge values were calculated from 34 years of data (water years 1969-2003) at both McNary and John Day Dams. Flows at McNary Dam are typically slightly less than at the downstream John Day Dam. This difference is attributed to inflow from tributaries and groundwater discharge to the river between the two dams including Rock, Alder, and Glade Creeks from WRIA 31 as well as the John Day and Umatilla Rivers and other tributaries from Oregon.

Streamflow in the John Day and Umatilla Rivers have been monitored by the USGS since the mid-1990s. Mean daily discharge values calculated from the period of record were used to assess the average flows the two rivers were contributing to the Columbia River. The sum of the mean daily discharge values were removed from the difference in flow between the two dams to calculate the mean daily change in flow between the two dams that would be attributable to the ungaged streams in both Washington and Oregon, including groundwater discharge to the River.

Based on this analysis, over the course of a year, the average increase in flow between McNary and John Day Dams is approximately 3,300 cubic feet per second (cfs). This flow volume is equal to approximately 1.9% of the annual average Columbia River flow at McNary Dam. In other words, tributaries from WRIA 31, Oregon, and direct discharge from groundwater contribute less than 2% of the Columbia River flow within WRIA 31.

Streamflow Estimates for WRIA 31 Tributary Streams

Limited discharge gauging data are available for WRIA 31 streams. The primary source of streamflow data for WRIA 31 streams is the USGS, who in the past maintained nine gauging stations in the WRIA. These stream gauging stations were located in the Rock Creek and Wood/Glade planning areas only; there have been no stream gauging stations established in the Kennewick planning area. Only three of the stations recorded continuous (daily) streamflow data and most of the stations operated for short periods of

time in the 1960s and 1970s. In addition, peak flow measurements have been collected at eight stations during that time period. Additional miscellaneous streamflow spot measurements are also available from the USGS (1964; 1989) and Ecology (Davis 1993; Garrigues 1996), and the Eastern Klickitat Conservation District (unpublished). The available flow data are summarized in the watershed assessment (Aspect Consulting and WPN 2004).

Only two of the daily gauges have records long enough to statistically analyze the flow records: Rock Creek near Roosevelt (Station 14036600) and Alder Creek at Alderdale (Station 14034350). These stations are located near the mouths of the respective creeks. Calculations of mean daily streamflow for Rock and Alder Creeks were conducted to estimate the average contributions of these two streams to flow in the Columbia River. Based on the available data, the mean daily flows for Rock and Alder Creeks during the period of record were 46 and 9 cfs, respectively. These values are also consistent with numerous spot flow measurements taken in both streams (presented in Aspect Consulting and WPN 2004).

Another large drainage in WRIA 31 is Glade Creek, where USGS peak flow gauges were maintained during the 1960s and 1970s, and a number of spot flow measurements have been made primarily since the early 1980s. The East Branch Glade Creek station was maintained for 16 years with no flow during eight of those years and only four years with significant peak flows (5 to 500 cfs). The spot flow data suggest that approximately 10 to 20 cfs are typical flows from Glade Creek. The higher flows (15-20 cfs) are irrigation return flows occurring during the fall.

The sum of these three primary WRIA 31 streams likely represents an annual average discharge of approximately 70 to 80 cfs into the Columbia River. Estimates for other small tributaries in WRIA 31 (e.g. Chapman Creek, Wood Gulch, Pine Creek, Dead Canyon, Bing Canyon, and Fourmile Canyon) are difficult, due to lack of available data. These streams are intermittent, such that during most of the year they would have no influence on the Columbia River. For example, in 1982, Pine Creek flows declined from 20-30 cfs in March to 1-2 cfs in May (see Table 3-4 in Aspect Consulting and WPN 2004). Based on the limited available data, we estimate these drainages together contribute on the order of 2 to 20 cfs on an annual basis.

Therefore, the best estimate for annual surface water contributions to the Columbia River from WRIA 31 tributaries is approximately 80 to 100 cfs, on an annual basis, or approximately 0.05% of the mean daily flow in the Columbia River.

State 303(d) List and TMDLs

Washington State is required under Section 303(d) of the federal Clean Water Act to periodically compile for the United States Environmental Protection Agency (EPA) a list of all surface waters in the state that are impaired by pollutants. Ecology prepares the list of impaired water bodies based on federal laws, state water quality standards, and the state's 303(d) policy. As a part of Ecology's Water Quality Assessment program all monitored water bodies are classified as Categories 1 through 5. Waters classified as Category 5 are placed on the 303(d) list and require the preparation of water quality improvement projects which can include definition of Total Maximum Daily Loads

(TMDLs). TMDLs identify the maximum amount of pollutant that can be released into a water body that will not impair the uses of the water.

Ecology's 2004 303(d) list includes portions of the Columbia River within WRIA 31 (with twelve 303[d] listings). The category 5 listings in the Columbia River are for the following parameters: Total PCBs and pesticides (4,4'-DDE and chlordane) in fish tissue; and water temperature. The Columbia River upstream of WRIA 31 (in WRIA 37) is also listed on the 303(d) list for the same parameters. Furthermore, two of the Columbia River's primary tributaries, the Snake River (WRIAs 33 and 35) and Yakima River (WRIAs 37 and 39), which discharge into the Columbia River near the upstream end of WRIA 31 are also on Ecology's 2004 303(d) list for the same parameters. This information, with the relative flow contributions described above, suggests that other sources have far greater effect on the water quality in the Columbia River in WRIA 31 than do the intermittent streams discharging to the Columbia within WRIA 31.

US EPA is working with the Ecology and other parties in the region to develop a temperature TMDL for the Columbia River. EPA's assessment for the Columbia River temperature TMDL development process indicates that only the Snake and Willamette rivers have sufficient volumes to affect mainstem Columbia River temperatures. Ecology should consult with the WRIA 31 PAC during the development of the temperature TMDL with respect to any water quality improvement actions and other aspects of the TMDL that may be applicable to activities in WRIA 31.

We are aware of no TMDL or water quality improvement activity regarding PCBs, 4,4-DDE, and/or chlordane in tissue of Columbia River fish. Ecology should consult with the WRIA 31 PAC during the development of a TMDL with respect to any aspects of the TMDL that may be applicable to activities in WRIA 31.

A TMDL is currently established for the reaches of the Columbia River in WRIA 31 for total dissolved gas (TDG). TDG is produced by water flowing over spillways on the dams. Ecology should consult with the WRIA 31 PAC regarding any change to the TDG standard or amendment to the TDG TMDL that would affect WRIA 31.

Rock Creek, in WRIA 31, is also listed on Ecology's 2004 list of impaired water bodies as category 5 for temperature. However, the listed stream segment is subject to the Forest and Fish Agreement, which is recognized as equivalent to an approved water quality improvement and protection plan. Additionally, it is unlikely that Rock Creek contributes significantly to water temperature in the Columbia River because of the very small flows in Rock Creek compared to those in the Columbia (discussed above), and the fact that the Columbia is listed as impaired for water temperature far upstream of WRIA 31 (to Lower Lake Roosevelt, WRIA 53).

Recommended Actions:

We conclude that the quality of water discharging from WRIA 31 streams has negligible effect on water quality in the Columbia River, and is not a factor in impaired water quality of the Columbia River mainstem. Nevertheless, the following actions are recommended:

- Ecology will coordinate with the WRIA 31 Initiating Governments regarding TMDL or other water quality-related activities on the mainstem Columbia River within WRIA 31.
- Develop a WRIA-wide water quality maintenance/improvement plan for tributary streams that are designated pursuant to the Federal ESA as critical habitat for the Middle Columbia River steelhead Distinct Population Segment. The plan would identify appropriate locally managed activities to be undertaken to ensure that water quality in the tributaries are maintained and, where practical, enhanced.

3.3 WRIA-Wide Aquatic Habitat

3.3.1 Limited Data Regarding Aquatic Habitat

Issue: Data regarding fish distribution and fish habitat are sparse throughout WRIA 31 (refer to Chapter 5 of Aspect Consulting and WPN 2004).

Priority: High.

Objective: Collect quality-assured data to fill data gaps regarding aquatic habitat throughout WRIA 31, so that appropriate actions to address factors affecting fish production can be developed.

Background:

Publicly available, quality-assured data to document aquatic habitat conditions throughout WRIA 31 are lacking. Additionally, there has been no assessment of the effects of land management on fisheries habitat in the WRIA. The Washington State Conservation Commission's Salmonid Habitat Limiting Factors report for WRIA 31 (Lautz 2000) provides some general descriptions of habitat conditions for some of the basins but provides little data and few citations to published information. This is largely due to the general lack of information regarding fish habitat in the area. The document draws largely on professional opinion of local biologists. These comments also extend to the Draft Klickitat Subbasin Summary (Berg et al. 2001), again due to the lack of available information.

Recommended Actions:

Due to the paucity of quality-assured fish habitat data for the WRIA, the approaches identified in this management plan to address fish habitat restoration and protection options rely extensively on data collection efforts to be conducted during implementation of the plan. Specific projects to be undertaken to address fish habitat issues will be identified based on the results of those studies completed using methods consistent with the adaptive management approach outlined in the Washington Comprehensive Monitoring Strategy for Watershed Health and Salmon Recovery (IAC 2002). The stated preference in this watershed management plan is to identify issues and develop approaches to resolve those issues based on quality assured data (see Section 8.5).

The preferred approach to addressing fish habitat issues is to identify characteristics of the habitat that are affecting fish production and then focus enhancement efforts first on those characteristics. For example, in Rock Creek, the habitat factors that are affecting

fish production are low summer flows and stream temperature. Other factors may be affecting fish production in the areas where suitable flow and stream temperature are present.

The approach used in this plan includes an identification of factors having substantial effects on fish production in areas where suitable flow and temperature are present and in areas where flow and temperature conditions can reasonably be attained through mitigation and restoration or enhancement. In these areas, approaches to addressing factors affecting fish production will be developed once the critical factors have been identified.

Collection of the information needed to assess current habitat conditions and limiting habitat characteristics, and thereby identify the projects that will provide the greatest benefit to fish, would preferably be completed early in the implementation phase.

Specific information regarding available information and recommended approaches are outlined for each of the three planning areas in the chapters that follow (Sections 4.3, 5.3, and 6.3 for Rock Creek, Wood-Glade, and Kennewick planning areas, respectively).

4 Rock Creek Area Issues and Recommended Actions

4.1 Rock Creek Area Water Quantity

4.1.1 Natural Streamflow Condition

Issue: Rock Creek's natural intermittent condition is a key factor influencing Rock Creek water temperature and aquatic habitat potential. Augmenting late-season flows in Rock Creek could provide water to help meet future instream or out-of-stream demands.

Priority: Low.

Objective: Evaluate options including storage to enhance Rock Creek streamflows to meet specific demands defined in the future.

Background:

The intermittent streamflows in Rock Creek currently support instream aquatic habitat, but limited if any out-of-stream uses other than livestock watering. Depending on future needs in the subbasin, enhancement of the natural streamflows could provide additional water to meet instream and/or out-of-stream demands.

Water could be made available for streamflow enhancement through water storage or pumping groundwater ("pump and dump"). Groundwater pump and dump could be conducted anywhere in the subbasin to add water to specific reaches at specific times. However, an analysis of hydraulic continuity between the aquifer pumped from and the stream reach would need to be conducted to ensure that the pumping would not intercept baseflow during that time. Storage of Columbia River water could benefit lower portions of the subbasin where conveyance from the Columbia might be conducted cost effectively. Higher in the subbasin, surplus water in Rock Creek or its tributaries could be diverted during the time of winter/spring peak runoff, stored, and subsequently released back to creek during the low-flow season. Possible options for such storage include an off-channel reservoir, in-channel dam located above the distribution of anadromous fish, or enhanced recharge (bank storage) of alluvium within the creek channel. Any of these options would require detailed assessment (technical, economic, environmental) based on meeting defined objectives.

Recommended Action:

As dictated by future demands in the subbasin, conduct a feasibility study of options to enhance streamflows in Rock Creek.

Because the natural streamflow condition is a key factor in elevated water temperature in Rock Creek, it is also addressed under Section 4.2.1 (Rock Creek water temperature), including installation of streamflow gages.

4.1.2 Groundwater Development Potential

Issue: There is limited understanding concerning the availability of additional water supply sources should water demand increase in the future. Specifically, there is little information regarding the groundwater development potential in this area.

This water resource issue pertains to the geographic area within Rock Creek drainage and Goodnoe Hills. For example, residential development may increase in the northwestern portion of the Rock Creek subbasin. This does not pertain to the Columbia River and that portion of the Rock Creek planning area adjacent to the Columbia River, including the far southwestern corner of the Rock Creek planning area where there is a diversion off the mainstem Columbia River for municipal uses.

Priority: Medium.

Objective: Develop baseline information to support developing additional groundwater supply sources if future water demand in the basin increases significantly.

Background:

There is limited information available about groundwater conditions in the Rock Creek drainage. The area is dominated by incised stream valleys and discontinuous aquifer systems created by the incised canyons. This dissection of the basalt can restrict lateral movement of groundwater, and thus limit the productivity of shallower aquifer systems above the bottoms of the canyons.

The Saddle Mountains Basalt is absent in all but the eastern margin of the Rock Creek drainage. The Wanapum Basalt is deeply eroded, occasionally exposing the deeper Grande Ronde Basalt in places along the lower reach of the Rock Creek valley and along the Columbia River Gorge. Although a majority of wells in the Rock Creek drainage are completed in the Wanapum Basalt, well yields are low. While the groundwater withdrawals in the Rock Creek drainage are currently for domestic and/or stock watering uses requiring only small yields, the aquifer dissection will limit yields from wells unless drilled far below the canyon bottoms where the aquifer can be more continuous and laterally extensive. There are domestic wells completed in the Grande Ronde Basalt near the Columbia River where the unit is exposed at or near the surface, but they too are low yielding domestic wells.

As described in the watershed assessment, the volume of groundwater withdrawal within the Rock Creek drainage is minor, and the limited available water level information indicates generally stable long-term water levels in the local aquifers.

To date, the lack of large water demands has limited the need to explore for larger-scale groundwater supplies within the Rock Creek drainage. At this time, there is no anticipated large increase in water demand for the Rock Creek drainage, but it is possible that such a demand could be created with future development or with a shift from dry-land to irrigated agriculture. Groundwater may represent a viable water supply source to meet possible larger future demands, particularly in the central and northern parts of the drainage where conveyance of Columbia River water may be impractical.

Recommended Actions:

A hydrogeologic evaluation is needed to explore deeper aquifer systems – below the depth of the canyon bottoms – to better understand whether groundwater quantity and quality is sufficient to meet potential large future demands in the Rock Creek planning area, should those demands materialize.

The first step in this action would be compiling and analyzing all the existing well logs and other information to develop a more detailed conceptual hydrogeologic model for the planning area than is currently available. This information should extend beyond the planning area boundaries since regional geologic structures, better documented in other areas, can be used to infer conditions within the planning area. For example, the City of Goldendale's Dingmon well, permitted as a 2005 emergency drought source, is located a couple miles west of the Rock Creek planning area boundary. It produces up to 450 gpm from the Wanapum Basalt at depths to approximately 400 feet; however, the presence of geologic structure between that well and the Rock Creek drainage may act as a hydraulic barrier and limit aquifer continuity to the east.

Using the updated hydrogeologic conceptual model, target depths for exploration of the Wanapum and/or Grande Ronde aquifer systems within the Rock Creek planning area can be developed to better determine productivity of the groundwater resource. The distribution and continuity of shallow water-bearing zones in the Wanapum will also be evaluated since they may provide a suitable water supply to domestic wells. This information can be focused on areas of anticipated growth (e.g. the northwestern corner of the subbasin). The hydrogeologic conceptual model would also consider hydraulic continuity between the aquifer units and adjacent surface waters.

A test/production well drilling program would then proceed. The well would necessarily be located in the area where water would be needed for a specific future demand. A site-specific drilling program would be developed based on location, expected drilling depth, and required yield. A temporary permit to drill and test a water supply well may need to be obtained from Ecology.

Water quality, in addition to yield, would be an important factor in the drilling program. Regionally, groundwater in the Wanapum Basalt is often of better quality (less mineralized) relative to that in the deeper Grande Ronde. The available water quality (esp. hardness and dissolved gasses) is an important consideration for the intended use of the water – potable, industrial (cooling or other), irrigation, etc. So, while moderate to high yields may be possible from the Grande Ronde, water quality may limit the range of uses for its groundwater. As an example, a relatively high yield aquifer (>1,000 gpm) was identified during exploration of the Grande Ronde by the City of Goldendale in the Simcoe Mountains north of town. However, water quality of this zone was very poor (total dissolved solids of approximately 1,300 mg/L), and not considered suitable for potable supply or many other uses without treatment or blending. There are a few deep irrigation supply wells located in the Swale Creek valley area, west of Rock Creek and south of the City of Goldendale, that tap both the Wanapum and Grande Ronde Basalt aquifers. Available information suggests that the water quality of the Grande Ronde Basalt in that area is acceptable for agricultural irrigation with moderate levels of total dissolved solids.

Because there currently is no significant new development nor large water demands in the Rock Creek drainage or Goodnoe Hills areas, this recommendation has a medium priority for WRIA 31 as a whole.

4.2 Rock Creek Area Water Quality

4.2.1 Elevated Water Temperature in Rock Creek

Issue: One segment of Rock Creek is listed on the State's 2004 303(d) list (Category 5) for impaired water quality, based on elevated water temperature in one headwater reach. Under a Category 5 listing, Rock Creek would require a Total Maximum Daily Load (TMDL) to address water temperature.

Monitoring results over the past decade indicate that stream temperatures in some reaches of Rock Creek exceed the numeric temperature criteria for Rock Creek's designated uses. Low summer flow and riparian shading likely have the largest effect on stream temperature; however, sediment inputs (natural and anthropogenic) might also affect temperature.

The weight of available evidence indicates that Rock Creek's intermittent streamflow is a natural, not man-made, condition (Aspect Consulting and WPN 2004; Aspect Consulting 2005b). Rock Creek's location, southern exposure, and broad, shallow, rocky channel in its lower reaches all may contribute to elevated water temperatures. This suggests that elevated water temperatures are a natural condition, not substantively influenced by human activity.

Priority: High.

Objective: Bring Rock Creek into compliance with state surface water standards for temperature. This could be achieved by collecting additional data and analysis that show the elevated temperatures are a result of natural conditions and human influence is increasing water temperature by no more than 0.3°C, or by developing and implementing a water quality improvement and protection plan (Category 4A or 4B) that over time results in compliance and recategorization as Category 1 (meets standards) or Category 2 (waters of concern).

Background:

Ecology's Water Quality Assessment Process

Every two years, Ecology performs a water quality assessment to characterize all waters of the state. Each waterbody segment is listed in one of 5 categories according to available water quality data:

1) Meets Tested Standards – available data show attainment of the water quality standard.
2) Waters of Concern – available data are not sufficient to show impairment but do raise a concern.
3) No Data.
4) Impaired but Does Not Require a TMDL (3 subcategories):

a. Has a TMDL – water is impaired by a pollutant and a TMDL has already been prepared.

b. Has a Pollution Control Project in place – water is impaired by a pollutant and another agency has prepared a plan that Ecology expects will improve water quality in a manner comparable to a TMDL and has active implementation ongoing.

c. Impaired by a Non-Pollutant – impaired by aquatic habitat degradation that is not the result of a pollutant (such as loss of spawning gravel or channel incision.

5) Impaired [the 303(d) list] - waters that do not meet an applicable water quality standard for one or more pollutants. A TMDL is required for each waterbody segment on the 303(d) list.

According to Ecology's Water Quality Program Policy 1-11, waters will not be placed on the 303(d) list when Ecology determines that the water temperature is due to natural conditions. As stated in Water Quality Program Policy 1-11: "The numeric criteria only apply at locations and times where the criteria can be achieved under natural conditions. At all other locations and times the estimated natural condition (commonly described as the system potential) would override the numeric criteria. …where the system does not have the potential to meet that goal, then we will not hold human sources accountable for what is a natural condition."

According to the state water quality standards, when the natural condition exceeds numeric temperature standards, a narrative criteria applies limiting human sources of warming to cumulatively increase the water temperature by no more than 0.3°C (0.54°F) (WAC 173-201A-200[1][c][i]).

The challenge lies in determining what portion of the temperature is the result of natural causes, and what portion arises from human activity. Such an analysis could require instream data collection, analysis of the location and extent of human activity, detailed review of historical conditions, and modeling.

After Ecology performs the state-wide water quality assessment, a 305(b) Report is prepared for waters in Categories 1 through 4 and a 303(d) list is prepared for waters in Category 5. The 303(d) list is sent to EPA for review and approval.

Ecology first performed a state-wide water quality assessment in 1996. At that time, data were submitted indicating temperature exceedances in Rock Creek. According to the 2002/2004 Ecology 303(d) report, 7-day means of daily maximums of 23.7°C were measured during 1990 and 1991 at a station in upper Rock Creek. As a result, a segment of Rock Creek located in Township 5N, Range 17E, Section 13 was identified for inclusion on the 303(d) list (listing ID # 7967).

In July 1996, Ecology and the Eastern Klickitat Conservation District (EKCD) signed a Memorandum of Agreement (MOA) regarding the delisting of Rock Creek from the 303(d) list. The MOA outlined the actions to be mutually undertaken by Ecology and the EKCD, including jointly filed annual progress reports. The MOA led to the exclusion of Rock Creek from the 1996 303(d) list.

In accordance with the MOA, monitoring sites were decided upon, equipment purchased, and EKCD began monitoring temperature, pH, dissolved oxygen, and nitrate (field test kit) in Rock Creek. EKCD continued the monitoring efforts and initiated the Rock Creek Coordinated Resource Management (CRM) group in 2001. These landowners were charged with the task of identifying and implementing Best Management Practices (BMPs) for grazing, forestry, and riparian management in Rock Creek. The Rock Creek CRM was established in response to Ecology/EKCD obligations 1 thru 3 on page 2 of the MOA, which dealt with identification of riparian zones needing revegetation, grazing and forestry management, and BMPs needed. Ecology/EKCD obligations 4 and 5 in the MOA (concerning monitoring) have been ongoing by EKCD since the inception of the MOA in 1996. A copy of the MOA is included as Appendix A to this plan.

Based on the summary of actions contained in this plan, historical documentation, records and actions, and ongoing implementation per the conditions of the 1996 MOA, EKCD believes that conditions 1 through 5 of the MOA have been fulfilled. This position is supported by the Planning Unit. However, it is now recognized that some of the reporting deliverables, an important part of the effort, documenting the implementation projects and the associated environmental benefits were not developed or submitted per the agreement. Actions and projects undertaken consistent with the MOA are discussed below.

The MOA expired in June 2001, but EKCD has continued to conduct temperature monitoring, riparian vegetation planting, providing landowners with assistance in developing and implementing best management practices (BMPs), and other actions agreed to in the MOA.

Although the MOA expired, EKCD has been involved with NRCS in several practices in the watershed. At least three landowners are cooperating in Environmental Quality Incentive Program (EQIP) contracts that involve off-site water troughs, spring enhancements, and riparian plantings with exclusion fencing. These practices are on seasonal streams that drain into Rock Creek. In addition to these, one landowner is cooperating in the NRCS' Conservation Security Program (CSP), in which he is rewarded for doing conservation practices, including fencing, wildlife habitat plantings, and participating in the Conservation Reserve Program (CRP). The landowner also has at least one Continuous CRP contract with exclusion fencing. At least two landowners have developed grazing management plans and nutrient management plans to help eliminate runoff into Rock Creek from livestock operations due to overgrazing and poor pasture management.

Within the process of WRIA watershed planning, the EKCD worked with the WRIA 31 Planning Unit to complete a variety of additional activities specific to Rock Creek including:

1. Compiled and evaluated available streamflow gauging data to document current understanding of streamflow hydrology.
2. Documented Rock Creek subbasin hydrogeologic conditions including locations of spring discharge (groundwater input).

3. Compiled and conducted preliminary evaluation of EKCD's water temperature and water quality data from 10 Rock Creek monitoring stations (1995-2003) relative to water quality standards.
4. Compiled appropriated water rights and estimated actual water use for the Rock Creek subbasin
5. Completed water balance for Rock Creek subbasin under assumed pre-development and current conditions.
6. Completed reconnaissance survey to document general conditions of portions of Rock Creek.
7. Completed assessment of General Land Office 1860s cadastral survey information as best available documentation of pre-development hydrologic and habitat conditions.
8. Developed a water quality database tool for EKCD to manage existing and future water temperature and other water data they collect for Rock Creek, and thus facilitate analysis of potential water temperature changes with time and reporting of the data to Ecology's EIM Database. This included training of EKCD staff in use of database tool, and the database remains in use.
9. Performed quality control on EKCD's existing Rock Creek water temperature data to eliminate errant data points.
10. Statistically evaluated EKCD's existing Rock Creek water temperature and air temperature data (1995-2004) to document current (baseline) water temperatures and evaluate relationship between air and water temperatures.
11. Analyzed aerial photographs available from NRCS Goldendale to assess historical changes in riparian vegetation. This information will be useful in evaluating potential for long-term success in implementing riparian plantings.
12. Collected water temperature, nitrate, and fecal coliform data for Rock Creek in Fall 2004 and Spring 2005 (see Section 4.2.2).
13. Prepared reports presenting the evaluation for Rock Creek water temperatures and other water quality data collected. The reports included conclusions regarding baseline water quality conditions and trends based on the existing data, comparison of historical changes to riparian vegetation extent based aerial photo analysis, as well as recommendations for future data management and evaluation and, if warranted, adjustment to the current water quality monitoring program.

In addition, the monitoring efforts of EKCD continue in Rock Creek, and, at the time of watershed plan preparation, EKCD is pursuing funding from Ecology for continued assessment, monitoring, and BMP implementation in Rock Creek and other streams in the WRIA.

In preparation of the 2002/2004 303(d) list, Ecology re-evaluated the status of Rock Creek and changed the status from Category 4B to Category 5. As stated in the

2002/2004 water quality assessment report, Ecology was "not able to confirm the results of implementation of items contained within the MOU. When further information becomes available, this listing will probably become a Category 1 or 2 based upon that data." The rationale for putting it back on the list was that the terms of the MOA were not fulfilled. The MOA obligation #6, regarding joint submittal of a yearly progress report by EKCD and Ecology, is the only obligation that was not adequately fulfilled. The Board of Supervisors for EKCD formally opposed the re-listing (EKCD 2006). One segment of Rock Creek is listed as impaired for water temperature only.

Current Water Quality Standards

In November 2006, the water quality standards for surface water (Chapter 173-201A WAC) were revised. The water quality standards' designate uses for all waters in Washington State are identified in Table 602 found in WAC 173-201A-602, or have their uses assigned in accordance with WAC 173-201A-600 and 260(3). Narrative and, in most cases, numerical standards apply to each water body according to its designated uses. Although a water body may have many different uses, it is the aquatic life uses that establish the temperature standard for a water body.

Most waters in WRIA 31 do not have a designated use specified in WAC 173-201A-602 Table 602 and thus are to be regulated for salmonid spawning, rearing, and migration in accordance with WAC 173-201A-600 and 260(3). The following water bodies within the Rock Creek drainage have uses designated in Table 602:

- All waters above the junction of Rock Creek and Quartz Creek and all waters above the junction of Squaw Creek have been designated as core summer salmonid habitat.
- All waters above the junction of Squaw Creek and an unnamed tributary in Section 33 T5N R19E: core summer salmonid habitat.

In the November 2006 revision of the surface water quality standards, Ecology designated portions of Rock Creek, Luna Gulch, Squaw Creek, and Quartz Creek as waters requiring supplemental protection for salmonid spawning and incubation. This designation imposes a more stringent water temperature criterion during the salmonid spawning and incubation season (February 15 through June 1).

The applicable temperature standards for each designated use are shown in Table 4-1. The water quality standards apply to the 7-day average of daily maximum temperatures, termed the 7-DADMax. The 7-DADMax for any individual day is calculated by averaging that day's daily maximum temperature with the daily maximum temperatures of the three days prior and the three days after that date.

Table 4-1. Temperature Standards Applicable to Waters in Rock Creek Planning Area

Use Designation	Temperature Standard (7DADMax)
Salmon and Trout Spawning (Feb 15-June 1)	13°C (55.8 °F)
Core Summer Salmonid Habitat	16°C (60.8 °F)
Spawning, Rearing and Migration	17.5 °C (63.5 °F)

Previous Studies and Monitoring Results

In 1995-1996, Ecology in cooperation with EKCD conducted an evaluation of high water temperature, including the influence of riparian canopy cover, in Rock Creek (Ehinger 1996). The study concluded that the high water temperatures in upper Rock Creek "may be natural for a small creek in a hot, sunny summer climate". It was inferred that the lack of riparian shading and rocky substrate were contributing factors to the observed water temperatures in the lower stream reaches; however, the study did not attempt to resolve whether these conditions were natural or the result of land use changes. Ehinger (1996) points out that it would be difficult to quantitatively estimate what portion of the observed high water temperature is natural versus due to man-made causes.

Based on the stream habitat survey, Ecology concluded that most of Rock Creek showed little impact from current forestry or agricultural practices, but evidence of past grazing practices and episodic flood events were apparent in the lower reaches. Six of the ten stations monitored in the study had riparian canopy (vegetative) cover more than ten percent below state target goals for eastern Washington Class A streams.

The outcome of the Ecology water quality study was a set of management recommendations to reduce water temperatures and thus improve instream habitat. The MOA was subsequently established between Ecology and EKCD outlining measures to be conducted and reporting requirements. In accordance with the MOA, riparian vegetation was planted along portions of the Rock Creek drainage (adjacent to Spring Creek), and EKCD has been monitoring water temperatures annually.

EKCD has monitored water temperature at 13 stations in the Rock Creek drainage for variable lengths of time from 1995 to present. The monitoring was primarily conducted in spring, summer, and early fall seasons. The ten years of data collected by EKCD were evaluated in Aspect Consulting (2005b).

ECKD's water temperature data indicate that, in general, water temperatures in the Rock Creek drainage increase downstream, with the coolest waters being found in the forested headwaters. However, at all monitoring sites, the 7DADMax exceeded 63.5 °F on multiple occasions during the summer and fall. The typical pattern for water temperature in the entire watershed is that daily maximum temperatures rise above the 7-DADMax of 63.5 °F usually sometime in May and do not cool down below that temperature until the end of September. The stations that consistently record the highest summer stream

temperatures are on the lower reach of Rock Creek and on Squaw Creek. The largest increase in temperature appears to occur between stations located on Rock Creek at the Bickleton Highway bridge and immediately downstream of the confluence with Squaw Creek (Aspect Consulting 2005b).

Aspect Consulting (2005b) also examined historical aerial photographs to look for changes in the extent of vegetation within the Rock Creek valley bottom over time. The study evaluated total vegetative acreage in the valley bottom irrespective of location relative to the stream; it was not a study of stream shade. The study reviewed four sets of aerial photos from 1938 to 2002 and concluded that total vegetative cover increased in each period. Additionally, the rate of increase gradually accelerated over the period of record. Fire suppression was identified as a potential cause for the increase in vegetation in the watershed. Localized losses in vegetation were attributed to floods (particularly in 1964) and wild fires.

The study also examined channel migration in the lower reach of Rock Creek over the same 1938 to 2002 period. This lower portion has a shallow, rocky channel, braided in segments, with little to no riparian cover. The channel is fairly dynamic, having changed courses multiple times over the time period examined. The coarse bedload observed throughout the lower reaches is testament to the erosive forces occurring during spring runoff in Rock Creek. The photo record documents that vegetation growth patterns in this reach change with the channel migration. Riparian vegetation becomes established along the channel, but when the channel migrates to another location that vegetation can die on the old channel alignment, thwarting efforts to establish mature riparian areas to shade the stream in this reach.

Hydrologic Condition

The low flows in Rock Creek are the primary reason it has elevated water temperatures throughout the dry season. The available information outlined below indicates that the intermittent condition of Rock Creek observed today is the natural hydrologic condition (Aspect Consulting and WPN 2004; Aspect Consulting 2005b).

While there are numerous springs mapped in the Rock Creek subbasin, the collective groundwater discharges provide insufficient baseflow to sustain flows throughout the drainage during the dry season. The only information quantifying surface water discharge from Rock Creek is from a former USGS stream gauge located near the confluence with the Columbia River, which was operated for six years during the 1960s. The gauging data document dry conditions throughout the dry season at that time when water use in the subbasin, like today, was minimal.

In short, the Rock Creek drainage is sparsely populated with minimal water use, and geologic conditions limit the quantities of groundwater discharge to support summer instream flows. This natural lack of late-season baseflow, in conjunction with the braided and highly dynamic stream channel and limited riparian vegetation in the lower reaches, combine to create a situation in which the water that is present is subject to abundant solar heating, and thus elevated water temperatures, throughout the summer. We are aware of no data indicating that the current intermittent condition is a result of human activities.

Recommended Actions:

Given the limited extent of human activity in the subbasin, as well as the historical evidence regarding increasing vegetative cover, it is likely that elevated temperatures in Rock Creek are largely the result of natural conditions as documented in Aspect Consulting (2005b).

According to Ecology Water Quality Policy 1-11, "Waters showing apparent exceedances of criteria due to documented natural background conditions, and with no significant human contribution will not be listed in Category 5." It is the opinion of the Planning Unit that Ecology did not give adequate consideration of natural water temperatures in the listing of Rock Creek as Category 5. Based on conversations with Ecology staff, as well as published Ecology guidance, in order to change the listing status from Category 5 to Category 1 analyses must be conducted to demonstrate with sufficient certainty that the cumulative temperature increase resulting from human activity is less than 0.3 °C (0.54 °F). Such an analysis would typically involve considerable data collection and modeling.

However, since temperatures are above the default numerical criteria, the same water quality standard applies regardless of whatever temperature represents the natural condition. That standard is that cumulative temperature increase above the numerical criteria resulting from human activity must be less than 0.3 °C (0.54 °F).

Thus, the Planning Unit recommends that a locally-managed pollution control plan (water quality improvement/protection plan) be developed to evaluate the cause of elevated temperature (i.e. effect of natural conditions versus human activity), and to continue implementing BMPs to ensure that human effects on temperature are within acceptable levels under the state water quality regulation. Once developed, and with continued, documented implementation, this water quality improvement/protection plan could be used to re-categorize Rock Creek from Category 5 (the 303[d] list) to Category 4b (impaired, but addressed through pollution control project).

The water quality improvement and protection plan may include many of the management practices already being implemented in the basin and those indicated in the 1996 MOA, such as:

- Monitor stream flow and temperature at locations best positioned to determining the effects of land use on water quality, and delineate between existing and natural conditions;
- Continue or implement programs such as cost-sharing for landowner vegetation efforts, no-till seeding, protection or enhancement of riparian areas that assist landowners in implementing BMPs which enhance canopy cover and encourage channel stabilization;
- Prioritize riparian planting to target areas that can be successfully vegetated, recognizing natural channel migration etc., and that have been impacted by land use practices such as livestock grazing;
- Advise and assist landowners in the upper watershed with BMPs to ensure road stability and protect against impacts from vegetation control activities; and

- Look for opportunities to implement BMPs for grazing and forestry practices that enhance riparian areas, stabilize soils, improve water quality and capability of soils to retain water. This could include construction of off-channel livestock watering locations and other livestock management actions, as discussed in Section 4.3.
- Develop and implement practical options to increase instream flows in Rock Creek, as discussed in Section 4.1.1.
- Regularly report on completion of activities required by the water quality improvement and protection plan, and progress toward stated objectives of the plan.

It is recommended that such efforts currently underway continue until the water quality improvement and protection plan is formalized.

It is also recommended that the Forests and Fish Report (USFWS et al 1999), which was prepared for the Forest Practices Board and the state's Salmon Recovery Office, and the attendant Forest Practices Rules, serve as the water quality improvement and protection plan for the forested headwaters of the Rock Creek drainage that are subject to the Forest Practices Rules. RCW 90.82.120(2) requires that the watershed plan take into account Forest Practices Rules and shall not create obligations or restrictions in addition to or inconsistent with those rules.

Design of a water quality improvement and protection plan should be coordinated with aquatic habitat enhancement actions under this watershed plan (Section 4.3). For example, if steelhead rearing locations are identified, enhancement of riparian vegetation in those specific locations would prove more cost-effective than un-targeted efforts.

Recognizing that Rock Creek contains the best aquatic habitat in WRIA 31, we also recommend that reaches of Rock Creek be considered for habitat enhancement projects that include riparian plantings to increase shade, recruitment of large woody debris, and shaded pool formation. The purpose of enhancement plantings would not be to reduce impacts from human activity, but rather to improve fish habitat beyond natural conditions. The middle reach of Rock Creek (between the Bickleton Highway bridge and the confluence with Squaw Creek) should be considered for shade enhancement projects, if practical and cost-effective, because monitoring indicated a significant temperature increase in that reach.

An additional recommendation is installation of permanent streamflow gauging stations at or near locations where water temperatures have been measured since 1996. The stations would provide automated continuous readings, with the type of instrumentation to be determined based on character of the stream reach to be monitored. Having reliable measured data to document streamflow hydrology within the Rock Creek basin would assist with: (1) Educated understanding of the causes of elevated water temperatures in the Rock Creek drainage; and (2) Determining appropriate areas of the basin for enhancement of salmonid habitat (e.g., focus enhancement of late-season rearing habitat to areas with late-season flow).

At the time of watershed plan preparation, three permanent, continuous-reading streamflow gauges are being planned for installation in Rock Creek. Ecology is installing one gauge just upstream from the Columbia River backwater pool – at or near the former USGS streamflow gauge that operated in the 1960s and near where EKCD sited its temperature monitoring station RC-10. In addition, the Planning Unit is pursuing funding to install two gauges in Rock Creek. Locations being considered include Rock Creek immediately downstream of the confluence with Squaw Creek (near EKCD temperature station RC-8) and at the Bickleton Highway crossing (near EKCD temperature station EKCD RC-6). Precise locations for the gauges will be determined based on channel conditions etc. as determined during a siting reconnaissance. It is recommended that EKCD and Ecology cooperatively develop an agreement and pursue funding to ensure long-term operation and maintenance of the stream gauges in Rock Creek.

4.2.2 Water Quality Monitoring

Issue: Nitrate and fecal coliform levels in the Rock Creek drainage meet water quality standards based on information collected in 2004 and 2005 (Aspect Consulting 2005b). However, there is no on-going program in Rock Creek drainage to monitor for potential future changes in these parameters and others parameters (e.g. turbidity, pH, and dissolved oxygen) pertinent to watershed health.

Priority: Low. (Addressing water temperature is the priority.)

Objective: Document long-term water quality conditions, apart from temperature, that could be attributable to land use in the watershed.

Background:

Nitrate and fecal coliforms are naturally occurring constituents usually present in surface waters. Increasing levels of nitrate would be evidence of higher nutrient loadings usually resulting from fertilizer use or animal grazing. Fecal coliforms can come from wildlife in the watershed, such as deer, but at higher concentrations are usually indicators of contamination typically associated with agriculture or livestock grazing.

As discussed in Section 4.2.1, Washington State's water quality standards for surface water are based on designated uses for each water body, whether or not the use actually occurs. The recreational uses of a waterbody establish the fecal coliform standard. There are three categories of recreational use: 1) extraordinary primary contact recreation, 2) primary contact recreation, and 3) secondary contact recreation. All of the waters in WRIA 31 are designated for primary contact recreation.

The fecal coliform standard for primary contact recreation is that levels not exceed a "geometric mean value of 100 colonies/100 mL, with not more than 10 percent of samples (or any single sample when less than ten sample points exist) exceeding 200 colonies/100 mL." (WAC 173-201A-200[1][g] Table 200). Geometric mean is a statistical average of a sample data set.

There is no nitrate standard for surface water; however, the drinking water standard for nitrate is 10 mg/L. Exceedance of this level in surface waters, while not a violation of state standards unless the stream is a human drinking water source, is an indicator of high nutrient concentrations that might be associated with changes in land use.

Water samples were collected at 11 sites in the Rock Creek drainage for analysis of nitrate and coliform bacteria by Aspect Consulting and EKCD as a component of the 2004/2005 water quality study (Aspect Consulting 2005b). The study concluded that:

- Nitrate concentrations were less than 0.6 mg/L, far below the 10 mg/L drinking water standard.
- Detected fecal coliform levels were below the state standard of 100 colonies/100mL.

The highest concentration of fecal coliform detected during the fall 2004 sampling of Rock Creek was 80 colonies/100 mL at a location immediately downstream of the Rock Creek-Squaw Creek confluence. Cattle feces were noted near this sampling location at the time of the fall sampling. During the spring 2005 event, the highest value detected was 30 colonies/100 mL at the sampling location near the mouth. Recent cattle activity was observed upstream of this location during this sampling event. These observations support the usefulness of fecal coliform monitoring as a potential indicator of the impacts of livestock grazing on water quality.

The data from the 2004/2005 study indicate that nitrate and fecal coliform concentrations in surface waters in the Rock Creek drainage meet state standards. However, there is currently limited routine monitoring for water quality parameters other than temperature. EKCD currently monitors water temperature at four stations in the Rock Creek drainage using instream temperature loggers. They also monitor pH and nitrate monthly using hand-held colorimetric field kits. The nitrate field kit has a detection limit of approximately 0.4 mg/L, which is above most of the nitrate levels measured in Rock Creek (0.01 to 0.5 mg/L). Consequently, nitrates could rise before current monitoring efforts would detect the increase.

Recommended Actions:

The 2004/2005 water quality study concluded that current levels of livestock grazing are not creating nutrient or bacterial levels in Rock Creek above state standards. Continued monitoring of these parameters can be used to track changes in water quality associated with future land use practices in the subbasin. In addition, monitoring data could be used to evaluate the effectiveness of BMPs intended to minimize grazing impacts to the creek.

We recommend adding periodic laboratory analyses for fecal coliform to EKCD's Rock Creek monitoring program to monitor for trends. As a starting point, water samples for fecal coliform analysis could be collected twice annually (e.g. low flow and high flow conditions) to compare with the results of the 2004/2005 study. The 2004/2005 data indicate generally higher sample concentrations of coliform in lower flow conditions than in higher flow conditions. If an additional round of samples in both flow conditions confirms this seasonal pattern, a single annual sampling during lower-flow conditions could be conducted subsequently to track trends over time. If coliform levels or other routinely measured water quality parameters (e.g., pH) show significant changes over time, nitrate could be added to the monitoring program.

If the Planning Unit desires to submit data to Ecology's water quality assessment program to categorize fecal coliform levels for Rock Creek (e.g., Category 1 = meets standards), more intensive sampling in one season would be required because the state

water quality standard is based on statistical averaging of the data. WAC 173-201A-200(b)(i) states that the statistical averaging of fecal coliform data should be done by season and include five or more data collection events within each season (preferably not exceeding 30 days in length).

4.3 Rock Creek Area Aquatic Habitat

4.3.1 Salmonid Distribution and Use

Issue: Rock Creek is considered to have the greatest fish production potential of any WRIA 31 stream aside from the Columbia River. However, salmonid distribution and habitat use in the Rock Creek subbasin is uncertain, thus areas of concern for aquatic habitat (low flows, water temperature, passage barriers, etc.) are uncertain.

Priority: High.

Objective: Determine the distribution and survival of salmonids in the watershed.

Background:

Three species of anadromous salmonids, fall chinook (*Onchorynchus tschawytscha*), coho *(Onchorynchus kisutch)*, and summer steelhead (*Onchorynchus mykiss*), are found in Rock Creek. Summer steelhead has been identified as indigenous to the subbasin. The summer steelhead population in Rock Creek is sustained through natural reproduction. There are no fish production hatcheries facilities currently located in the subbasin. The remaining anadromous use is believed to be a result of straying of other mid-Columbia stocks, or is incidental use associated with upriver migration of adults or downriver migration of juveniles (Berg et al. 2001).

The stock of summer steelhead present in WRIA 31 is considered part of the Middle Columbia Distinct Population Segment (DPS), which has been listed as "threatened" under the Endangered Species Act (Federal Register Vol. 71, No. 3, 834-862). The National Marine Fisheries Service's Interior Columbia Technical Review Team (ICTRT) designated Rock Creek as an unaffiliated, independent population of Mid-Columbia steelhead because the stream is geographically well separated from all other populations (62 kilometers from nearest spawning area outside of the basin) and has sufficient habitat (gauged by professional judgment) to support an independent population. A recovery plan for the Mid-Columbia steelhead DPS was being developed by National Marine Fisheries Service at the time this watershed plan was being developed.

Distribution and Abundance

Summer steelhead have been documented up to a point roughly ¼ mile above the confluence with Quartz Creek (BLM 1985; BLM 1986). Additional utilization may occur above this point. Steelhead have also been found in lower Quartz Creek (BLM 1985; BLM 1986) and are reportedly found in Squaw Creek up to the confluence with Harrison Creek.

No estimates of abundance and productivity are available for Rock Creek steelhead. Surveys conducted by Yakama Nation Fisheries in lower Rock Creek in 2002, 2003 and 2004 found as many as 35 to 45 steelhead redds per mile in the lower five miles, and

redds distributed in other areas of the watershed (NPCC 2004). These surveys, however, appear to have been intermittent and not conducted across all potential habitats, but reports on the survey, methods used and survey dates/locations are not published. No surveys of rearing fish have been conducted. Due to warm summer water temperatures and low summer flows, survival of juveniles may be low. Surveys of juveniles should include estimates of population size in early and late summer and trapping of out-migrating fish during summer to determine survival rates and the proportion of young that move into the Columbia River to rear. The WRIA 31 Planning Unit is interested in working with WDFW to collect data and determine the abundance and distribution of steelhead in the drainage.

Life History

Adults enter the Columbia River from May to November and hold in the Columbia River until fall and winter rains increase stream flows, enabling them to enter subbasin streams. The adults hold in Rock Creek and its tributaries until they spawn in February through April (Berg et al. 2001). Little watershed-specific information is available on juvenile life histories. Life stage timing can be inferred from those of nearby stocks. Fry are believed to emerge from April through mid-June, and will rear for up to two years (Berg et al. 2001). Smoltification and out-migration occur in April and May, peaking in early May.

In general, spawning may occur in any accessible area where suitable flow and substrate material are found. Rearing may be similarly widespread during portions of the year, but is largely restricted to pools fed by springs or groundwater upwelling areas in the mainstem and to the limited number of tributaries with flowing water during the summer and early fall. Known utilization includes the lower and middle portions of Rock Creek, lower Quartz Creek and Squaw Creek (Berg et al. 2001). Most Middle Columbia River steelhead spend two years in freshwater before migrating to the ocean (National Marine Fisheries Service 2003).

Recommended Actions:

Spawning Habitat

Document and monitor the distribution and abundance of spawning salmonids in Rock Creek and its tributaries. During spawning season, systematic redd surveys should be conducted throughout the basin using methods developed in consultation with the Washington Department of Fish and Wildlife and consistent with the Washington State Comprehensive Monitoring Strategy for Watershed Health and Salmon Recovery (IAC 2002). Data addressing the quality of habitat will be collected simultaneously (see Section 4.3.2). The extent of spawning habitat and the locations of identified redds will be recorded and mapped. The information will be published in a report following an approved QAPP developed for implementation of this management plan and in conformance with the “Quality Assurance Monitoring Plan for Status and Trends Monitoring for Watershed Health and Salmon Recovery” (Ecology publication No. 06-03-203; Ecology 2006e). At the time of watershed plan preparation, the Planning Unit is pursuing funding for a quantitative instream habitat assessment for Rock Creek that addresses this recommended action.

Rearing Habitat

The distribution and abundance of juveniles rearing in the subbasin should be evaluated. Snorkeling methods are recommended. Protocols should be consistent with the Washington State Comprehensive Monitoring Strategy for Watershed Health and Salmon Recovery (IAC 2002) and must follow an approved Quality Assurance Project Plan (QAPP) developed for the WRIA which is consistent with Ecology's quality assurance monitoring plan (Ecology 2006e). The evaluation should include surveys conducted in early and late summer to determine the change in distribution and abundance over the summer. The quantity and locations of occupied habitat will be documented and mapped. Temperature will be recorded at all survey sites to contribute to the evaluation of temperature tolerances of the local population (see Section 4.2.1). At the time of watershed plan preparation, the Planning Unit is pursuing funding for a quantitative instream habitat assessment for Rock Creek that addresses this recommended action.

Migration

Migration of juveniles out of the basin and enumeration of total juvenile production can be accomplished through the installation and year round operation of a screw trap. This will require the cooperation of Washington Department of Fish and Wildlife (WDFW). Monitoring of migration should be consistent with the Washington State Comprehensive Monitoring Strategy for Watershed Health and Salmon Recovery (IAC 2002) and must follow an approved QAPP.

As standard procedure, the efficiency of the trap will be determined by marking a sample of fish intercepted in the net and releasing them upstream of the net. The proportion of the marked fish subsequently intercepted will be used to estimate the total population passing each day. Methods will follow the mark-recapture method described by Seber (1985).

A subset of all intercepted fish will be weighed and measured. The age distribution of fish passing the trap will be determined using methods developed in consultation with WDFW.

All data will be reported following the Quality Assurance Guidelines developed for implementation of this Management Plan.

4.3.2 Habitat Quality and Potential Land Use Effects

Issue: Information available regarding Rock Creek instream habitat conditions and upslope watershed processes is insufficient to support quantitative evaluation of the land use effects on aquatic habitat or to support the identification of priority actions necessary to improve aquatic habitat.

Priority: High.

Objective: Evaluate the quality of habitat in the Rock Creek subbasin and the effects of land use on that habitat.

Background:

Portions of the Rock Creek subbasin are designated as critical habitat under the ESA (Federal Register Vol. 70, No. 170, pgs 52808 – 52832). The ESA defines critical habitat under section 3(5)(A) as follows:

i. The specific areas within the geographical area occupied by the species, at the time it is listed . . ., on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and

ii. Specific areas outside the geographical area occupied by the species at the time it is listed . . . upon a determination by the Secretary that such areas are essential for the conservation of the species.

The areas designated as critical habitat include the mainstem of Rock Creek from the mouth to the confluence with Quartz Creek and Squaw Creek from its confluence with Rock Creek, upstream to its confluence with Harrison Creek.

There is little published information regarding habitat conditions in Rock Creek. The Draft Rock Creek Subbasin Summary (Berg et al. 2001) and the Limiting Factors Analysis (Lautz 2000) are based largely on the personal observations of local area biologists. Additional information regarding habitat characteristics were developed during a reconnaissance survey of the area and a review of the Government Land Office (GLO) survey notes from the late 1800s. A brief summary of habitat conditions is provided below.

Seasonally low to non-existent stream flows are likely a primary factor limiting steelhead production in the Rock Creek watershed. Notes taken by the GLO in the 1800s indicate that the stream was historically intermittent. The lower Rock Creek was largely dry with a few pools. Hence, the current flow situation is likely natural, with the exception of the lower most reach which is inundated by the John Day/McNary Pool. The effects of anthropogenic changes in the watershed on stream flow have not been quantified, although such effects, if any, are likely small (See Section 4.2.1) and localized. Low to non-existent flows in all streams in the Rock Creek subbasin during late summer, fall and early winter limit juvenile mobility and can cause mortality due to stranding.

Late summer water temperatures in the lower Rock Creek subbasin regularly exceed 63.5°F (17.5^{o}C), the applicable water temperature standard for the basin (Figure 4-1). The state temperature standards indicate that "Moderately acclimated (16-20°C, or 60.8-68°F) adult and juvenile salmonids will generally be protected from acute lethality by discrete human actions maintaining the 7-DADMax temperature at or below 22°C (71.6°F) and the 1-day maximum (1-DMax) temperature at or below 23°C (73.4°F)." In much of the subbasin, water temperatures also exceed 23°C (73.4°F) and may be lethal to some or all of the salmonid population occupying those waters (Figure 4-1; Sullivan and Martin 2000). Water temperature is addressed in Section 4.2.1. Springs flowing into pools may provide cool water refugia for steelhead in some areas.

Riparian vegetation affects stream temperature by shading the stream and affects channel characteristics by providing stream bank stability and through the introduction and effect

of large woody debris. Recent historic changes in vegetated area within the Rock Creek valley have been evaluated but no assessment of stream shade has been completed. Large woody debris abundance in the Subbasin has not been assessed.

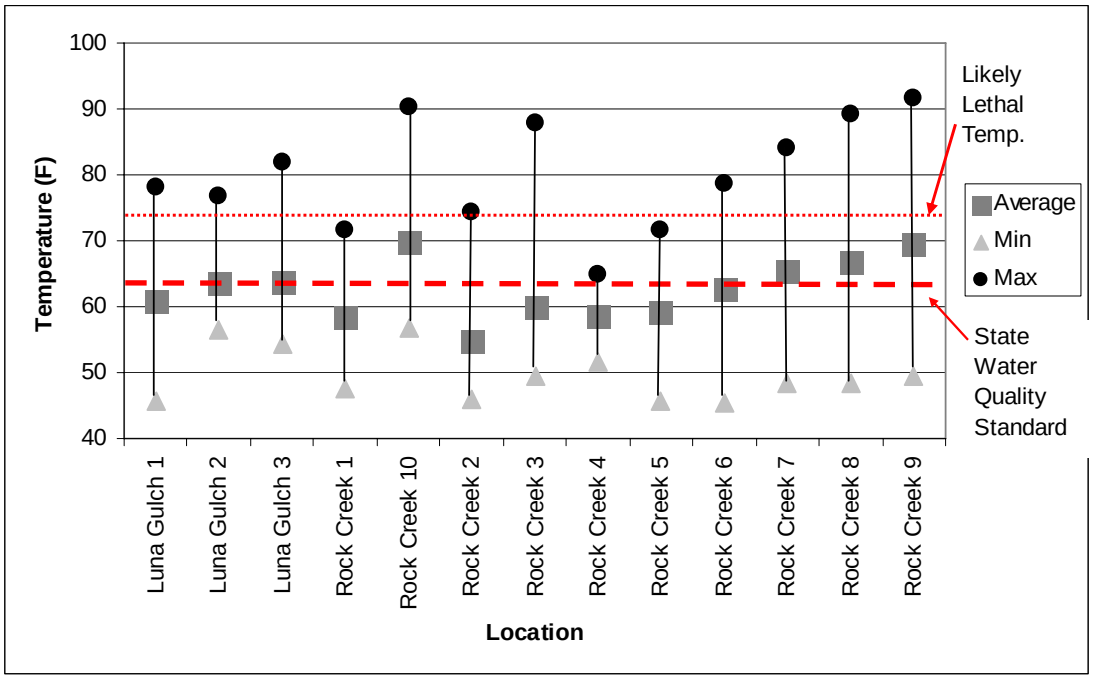

Figure 4-1. Maximum, average, and minimum late summer (July through September) stream temperatures (^{o}F) at 10 monitoring stations in Rock Creek. (Data collected by EKCD; see Aspect Consulting 2005b). The approximate lethal temperature for salmonids is depicted by the dotted red line and the state water quality standard is depicted by the red dashed line.

No published data are available regarding instream sediment loads. Given the low density grazing, low density housing, and low road density, the anthropogenic effects on sediment loads is likely low (Aspect Consulting and WPN 2004).

There are several places in the subbasin where the stream has avulsed. In these areas, the abundance of gravel, cobble, and boulders is unusually high. The GLO notes of the late 1800s indicate that the current situation was present prior to development in the basin (Aspect Consulting and WPN 2004); hence this is likely a natural condition.

Recommended Actions:

Approaches described in Section 4.2.1 to address Rock Creek water quality and water quantity also serve to restore and protect fish habitat. Those strategies address the two habitat factors that likely have the greatest effect on fish productivity in the Rock Creek subbasin. This section focuses on habitat conditions not previously addressed.

The stated preference in this watershed management plan is to identify issues and develop approaches to resolve those issues based on quality assured data (refer to Section 8.6 Quality Assurance). Due to the paucity of quality assured fish habitat data for the WRIA, the approach identified to address fish habitat restoration and protection options

relies extensively on data collection efforts to be conducted during implementation of the plan. Specific projects to be undertaken to address fish habitat issues will be identified based on the results of those studies completed using methods consistent with the adaptive management approach outlined in the Washington Comprehensive Monitoring Strategy for Watershed Health and Salmon Recovery (IAC 2002).

The preferred approach to addressing fish habitat issues is to identify characteristics of the habitat that are limiting fish production and then focus restoration efforts first on those characteristics. In Rock Creek, the habitat factors that are limiting fish production are low summer flows and stream temperature. Other factors may be affecting fish production in the areas where suitable flow and stream temperature are present.

The approach used in this plan includes identification of factors having substantial effects on fish production in areas where suitable flow and temperature are present and in areas where flow and temperature conditions can reasonably be attained through restoration or enhancement (see Section 4.2.1 for discussion of stream flow and temperature). In these areas, approaches to addressing factors affecting fish production will be developed once the critical factors have been identified.

Collection of the information needed to assess current habitat conditions and limiting habitat characteristics and to identify the projects that will provide the greatest benefit to fish would preferably be completed early in the implementation phase.

Spawning Habitat

Steelhead spawn in late winter and spring when flows are higher and stream temperatures are cool. Hence, spawning habitat in WRIA 31 may be in greater abundance than rearing habitat. The quantity of spawning habitat may become important if it is found that juvenile steelhead in the WRIA move either upstream or downstream into suitable habitat before flows decline in summer. Therefore, quantification of spawning habitat is recommended, but efforts should be minimized until the life history of the local stock is better understood. Substrate size and embeddedness should be documented following the methods described by Moberg (2006) in a subsample of spawning areas to determine the fine sediment loads in spawning gravels. Details of the methodology, including sampling design, will be developed during implementation and should be consistent with the Washington Comprehensive Monitoring Strategy for Watershed Health and Salmon Recovery (IAC 2002).

Passage Barriers

Additional information on passage barriers that will help to refine estimates of habitat available for anadromous fish will be collected. Any culverts that have not been assessed need to be evaluated to determine if they are passage barriers. Some of the culverts that have been previously assessed may need to be revisited if there are questions regarding earlier conclusions. Assessments will be compatible with the WDFW Fish Passage and Surface Water Diversion Screening Assessment and Prioritization Manual (WDFW 2000). These methods are also consistent with the Washington Comprehensive Monitoring Strategy for Watershed Health and Salmon Recovery (IAC 2002).

Rearing Habitat

Inventories of current habitat within the management area should be developed. These inventories should include identification of areas with year-round flow and suitable stream temperatures and identification of areas where these flow and temperature conditions may be reasonably attained. These areas represent the current and potential viable habitat.

In some instances, steelhead have been known to become adapted to higher temperatures than are normally endured, particularly in areas where food is in high abundance. For the purposes of determining the extent of viable and near viable habitat, the temperature tolerances of the local steelhead population will need to be evaluated. This can be completed during snorkel surveys of fish populations. Stream temperature should be recorded in all sites that are surveyed. The presence or absence of steelhead at various temperatures can then be used to estimate tolerable temperatures. The details of the study design will be developed during implementation prior to initiating any studies.

Within the viable or near-viable range of habitat, the volume of rearing habitat and factors affecting the quality of habitat will be assessed. Information collected during the inventories will include the depth and volume of pools, abundance of wood and boulders that influence the development of pools and capture and sorting of gravel and other sediments, channel morphology, and the amount of cover available. In addition, the review of the GLO notes, which was partially implemented during the watershed assessment, will be completed. This material will prove valuable in the assessment of channel conditions, particularly in areas that are currently unstable.

Data Collection Methods and Standards

Several manuals describing methods for fish habitat surveys have been developed by State agencies. The most commonly used of these methods include the following.

- WDFW's Stream Habitat Restoration Guidelines, Final Draft (Saldi-Caromile et al. 2004);
- WDFW's Integrated Streambank Protection Guidelines (Cramer et al. 2002);
- The Washington Comprehensive Monitoring Strategy for Watershed health and Salmon Recovery (IAC 2002) and the referenced methodologies listed in that document;
- Status and Trends Monitoring for Watershed Health and Salmon Recovery Quality Assurance Monitoring Plan (Ecology 2006e) and the referenced methodologies listed in that document;
- Timber, Fish and Wildlife (TFW) Monitoring Program method manuals for:
    - Habitat unit surveys (Pleus et al. 1999);
    - Large woody debris surveys (Schuett-Hames et al. 1999);
    - Salmonid spawning gravel composition surveys (Schuett-Hames et al. 2000c);
    - Salmonid spawning gravel scour surveys (Schuett-Hames et al. 2000b);

- Salmonid spawning habitat availability surveys (Schuett-Hames et al. 2000d);
- Stream segment identification (Pleus and Schuett-Hames 2000);
- Stream temperature surveys (Schuett-Hames et al. 2000a); and
- Riparian stand surveys (Smith 1998).

Protocols developed to address information needs will strive to be consistent with one or more of these state protocols; however, modifications of protocols may be required to ensure that the information needed is obtained during the assessments.

Data collection efforts must be developed using statistically robust methods and must include a quality assurance process. Data collected must be publicly available to ensure that the information can be used to identify projects, to facilitate monitoring of success against the goals of this action item, and to reduce redundancy of efforts, as well as to provide opportunity for critical review and validation. All data, with sample sites, methods, quality assurance data, data analyses, and discussion and conclusions must be provided in a publicly available format.

If sufficient funding is not available to address all habitats in the WRIA, rearing habitats will be given priority.

Public Education

Public education and communication is critical to the success of this program. Landowners must be informed regarding the intent of projects. Basic understandings regarding the influence of land use on the quality of fish habitat will be fostered through education programs. Participation in volunteer efforts will be encouraged. Details of the public education program will be developed during the plan implementation.

4.3.3 Monitoring

Monitoring of Rock Creek basin water quantity and water quality previously addressed in Section 4.2.1 is also applicable to this situation. Additional monitoring relative to the restoration and protection of fish habitat should include documentation on long-term trends in fish population levels and habitat quality. Additionally, the effectiveness of individual projects needs to be monitored to ensure that the projects result in the intended benefit. A Monitoring Plan will be developed during plan implementation. The Monitoring Plan will strive to be consistent with the statewide monitoring program, but may need to be modified to address individual situations.

Additional discussion of project management and potential funding is provided in Chapter 8, Implementation.

5 Wood-Glade Area Issues and Recommended Actions

5.1 Wood-Glade Area Water Quantity

5.1.1 Groundwater Level Declines in Basalt Aquifer

Issue: Groundwater levels in the Wanapum Basalt aquifer continue to decline locally, forcing well deepening and increased pumping costs, and raising uncertainty for the sustainability of irrigated agriculture in areas at distance from the Columbia River that are currently reliant on groundwater supply.

Priority: High.

Objective: For affected areas, develop alternative water supply sources to reduce (net) withdrawal from the Wanapum Aquifer and thereby maintain a sustainable groundwater supply.

Background:

Ecology Central Regional Office's groundwater level monitoring program provides a 30-plus year record of groundwater level changes in the basalt aquifers across WRIA 31. The long-term monitoring indicates up to hundreds feet of water level decline in the Wanapum Basalt aquifer since the late 1970s within intensively irrigated areas of the Wood-Glade planning area (summarized in Aspect Consulting and WPN 2004).

In the watershed assessment, the current net groundwater recharge was estimated for each of WRIA 31's four hydrologic subbasins. The net recharge equals recharge (from natural plus return flow sources) minus groundwater pumping. It therefore represents a groundwater balance for the collective aquifer systems (not aquifer specific). A positive net recharge indicates greater recharge to the groundwater system than pumping withdrawal from it, and vice versa. Comparing predevelopment and current net recharge estimates can highlight general trends in sustainable use vs. overdraft of groundwater resources on the subbasin scale. The net groundwater recharge estimates for the two hydrologic subbasins within the Wood-Glade planning area are as follows:

- In the Wood/Alder Creeks subbasin, current net recharge has been reduced to approximately ¼ of the predeveloped condition, consistent with moderate water level declines measured in some subbasin wells.
- In the Glade/Fourmile subbasin, current net recharge is approximately -23,000 acre-feet/year (annual depletion) indicating groundwater use exceeding total recharge, consistent with very large measured water level declines in some subbasin wells.

The current overdraft of the Wanapum aquifer is not sustainable, and threatens the viability of groundwater-supplied irrigated agriculture in the area. This situation is the

same as that occurring in the Odessa subarea of the Columbia basin project, where the state and federal governments have undertaken significant efforts to stabilize declining groundwater levels in the basalt aquifer system.

Recommended Actions:

It is recommended that water supply alternatives to groundwater pumping be initiated, particularly for areas away from the mainstem Columbia River. Specific recommendations include:

- As recommended in Section 3.1.2, develop conceptual design of a regional water storage and supply system utilizing surface canals and reservoirs, including integration of wind power (combined water/power utility). Exchanging large-scale groundwater withdrawals with Columbia River water from the John Day-McNary irrigation reservation is the most viable way to limit further overdraft of the groundwater resource while maintaining and growing the planning area's population and economy.

- Evaluate a voluntary source exchange (replacement) program in which groundwater rights in the Wood/Glade planning area are replaced by new surface water rights permitted from the John Day-McNary reserve (chapter 173-531A WAC). Though generally deemed to be in hydraulic connection, groundwater in deep basalt aquifers across much of the planning area represents a different source of water from the Columbia River. Most groundwater rights could not be transferred to Columbia River diversions under the state water code. Instead, a superseding water right permit or certificate would be issued designating that portion of the groundwater right replaced by water from the John Day-McNary reserve as a standby or reserve right that may be used when water delivered from the reserve is curtailed or otherwise not available. This is identical to the water right solution applied for groundwater rights in the Odessa subarea where source replacement using the Columbia River water is being planned for (RCW 90.44.510). Further discussion with Ecology is required regarding applying this solution to declining aquifer levels in the Wood/Glade planning area of WRIA 31. In addition to the water rights considerations, the area where the major aquifer declines are occurring would require a pressurized delivery system, either enlarging existing conveyance systems or constructing new ones dedicated for this purpose. The preliminary water storage assessment conducted for the Wood/Glade planning area documents a high cost to deliver Columbia River water miles inland from the river, for small to moderate water quantities (Aspect Consulting 2005c; see Section 1.1.3). Therefore, evaluation of project cost and funding possibilities would be required early in the process.

- Scope and conduct a drilling program to explore development potential of the Grande Ronde Basalt aquifer in this area and assess the hydraulic effect on the Wanapum Basalt aquifer caused by pumping the Grande Ronde. Distributing the groundwater withdrawal between the two aquifer systems should create a more sustainable pumping situation in the area and reduce some of the pumping pressure on the Wanapum Basalt aquifer. The Wanapum and Grande Ronde Basalt Aquifers are considered separate sources of water with respect to water

rights, so changing an existing withdrawal from one aquifer to the other would require a new water right. The Vantage interbed is a regionally extensive, low-permeability aquitard unit providing hydraulic separation of the Wanapum and Grande Ronde aquifer systems; however, the presence and character of the interbed is poorly documented in this planning area. Regionally, the Grande Ronde often has a mineralized water quality that requires treatment for potable use, but the water quality may not pose a constraint for irrigation supplies. This recommended action could involve deepening existing wells but more likely would involve drilling new test/production wells.

- Complete detailed water storage feasibility studies as warranted to address water needs not met through one of the recommended actions outlined above. Water storage can include both ASR for smaller quantities and a more regional system of surface storage (e.g., canals and/or dams) for larger quantities. Retrofitting existing river diversion/conveyance systems for winter operation has been identified as a cost-saving measure in conceptual terms, but evaluating actual systems and their owners' interest in operating them during the winter to fill reservoirs has not been completed. In addition to conveyance cost, the need for water treatment of source water for ASR systems is a disadvantage over surface water storage options.

- Continue Ecology's program of monitoring water levels in WRIA 31 wells, and ideally expand it to include additional wells in the multiple aquifer units as allowed by land owners. This action – including field measurements and management of the long-term data – could continue to be done by Ecology or could be transitioned to a member of the Implementing Governments in Phase 4 implementation; if the latter, the data should be shared with Ecology for input to their database. Water level trends combined with information on annual pumpage is important to assessing the future sustainability and potential overdraft of the groundwater resource.

- The PAC will give consideration to establishing all or a portion of the Wood/Glade Area as a groundwater management area under RCW 90.44.400. A local government can develop and implement a groundwater management program.

5.1.2 Higher-Value Crops Could Allow for Water Supply Investment

Issue: Maintaining a viable agricultural economy will likely require a continued shift toward higher value crops (e.g. from dry land to irrigated farming), to overcome increasing cost of energy and water supply to remain competitive. Availability of existing water rights and adequate water supply is limited in areas historically reliant on dry land farming practices and areas amenable to high value crops (e.g. wine grape production) that were not cultivated in the past. The place of use in existing water rights poses a constraint to shifting irrigation to production of high value crops. Ecology uses its annual consumptive quantity (ACQ) policy (Ecology Policy POL-1210), and the water conservancy boards with jurisdiction in WRIA 31 use either GUID 1210 or a methodology developed by the Benton County and Franklin County water conservancy

boards to evaluate water right changes which include adding acreage to the place of use of an existing water right.

Priority: High.

Objective: Achieve policy/regulatory changes that allow for maximum flexibility to change existing water rights in ways that support growth in the agricultural economy.

Background:

Investment in developing new water supplies will require an appropriate return on that investment. Historically, dry-land farming in the Horse Heaven Hills area has been economically viable, such that investment in new water supplies for irrigation has not been worthwhile for many farmers. With market and climate changes, dry-land farming may no longer be as viable as it once was. Therefore, to sustain and grow the agricultural economy of this area, a change to higher value crops is required. However, the change from dry-land farming to higher value crops will require that irrigation water be available. This can involve developing new irrigation supplies from the Columbia River (WRIA-Wide Water Quantity Issue 1) and/or maximizing use and flexibility of existing water rights.

Recommended Actions:

In addition to strategies presented in WRIA-Wide Water Quantity Issues 1 and 2 (Sections 3.1.1 and 3.1.2), work with Ecology to further evaluate and consider developing policies, including further review of the Department's ACQ policy, that facilitate, not restrict, shifting existing water rights to new areas that would support production of high value crops. Such changes would not increase annual consumptive use under the existing rights. Communications with legislators by the Implementing Governments and/or PAC may also be an option.

5.1.3 Expansion of Small Public Water Systems

Issue: In some areas of the watershed, there has been considerable difficulty in permitting expansion of small public water systems to meet demand.

Priority: Medium.

Objective: Eliminate artificial (administrative) constraints that prevent public water systems from meeting growing demand.

Background:

Given the rural nature of this planning area, creation or expansion of small public water systems can be desirable, particularly in situations where shallow single-family wells are impacted by nitrate. In such a case, conversion to a deep well supply serving multiple residential units can provide for a more reliable and safer source of potable water (see Section 5.2.1).

The number of connections in a public water system can be increased only if the water system has adequate water rights and source capacity to accommodate the increased demand. Reliably estimating water demand can be complicated, involving climate,

socioeconomic factors, distribution system condition (leakage rates, corrosion problems, etc.), conservation practices, etc.

Department of Health's (DOH) water system design manual (DOH 2001) states that the preferred criteria for estimating water demand are (in order of preference per WAC 246-290-221):

1. Reliable metered water use records;
2. Metered water use data from analogous water systems; and
3. Criteria and calculations as presented in the DOH design manual.

All public water systems are required to have totalizing water meters on their sources, per WAC 246-290-130(4)(g).

Historically, a typical DOH design criterion has been 800 gallons per day (gpd) per connection (residential unit) to meet assumed maximum daily demand. However, there is general recognition that current domestic household use, when measured, is typically less than 800 gpd unless there is significant landscape irrigation occurring. The public water systems addressed in this planning area issue are primarily serving agricultural worker communities, where landscape irrigation is typically negligible.

The current difficulties in permitting expansion of public water systems in the area largely stem from not having reliable information on actual water use, and thus falling back on an overstated 800 gpd/unit use assumption for system sizing. Limiting expansion of public water systems based on overestimates of demand (e.g., 800 gpd/unit) can result in a proliferation of single-family exempt wells, which are often shallow and vulnerable to water quality impact.

Recommended Actions:

The Planning Unit supports expansion of public water systems with safe sources of supply, rather than clusters of exempt wells in close proximity to one another. It is recommended that DOH work with local public water systems during the approval process for water system plans to allow service to the maximum number of persons/units possible within the systems' available water rights and source capacity. Actual water use based on system metering records should be the basis for determining whether a public water system has adequate water rights and source capacity to expand its number of connections.

The Planning Unit recommends that financial assistance be provided, through grants or loans, as needed to allow all public water systems in the planning area to purchase and install totalizing flow meters for sources and services. In the interim, until reliable metering data are available, water use information should be derived from a comparable water system(s) in the area when evaluating the potential for system expansion.

The Planning Unit strongly believes that new water right permits should be issued to public water systems where there is available supply and no impairment exists. Pursue legislative action to amend the state water code to provide for expedited processing of water right permits to small public water systems, and provide the state resources to implement it.

5.2 Wood-Glade Area Water Quality

5.2.1 Nitrate in Shallow Groundwater and Surface Water

Issue: Across a large area of the Wood-Glade area, elevated nitrate levels exist in shallow groundwater that serves as a domestic drinking water source.

Priority: High.

Objective: Ensure that all area residents have a safe source of potable water.

Background:

Water quality studies over the past two decades document elevated concentrations of nitrate in surface water and shallow groundwater of the Wood-Glade planning area. The 2005 WRIA 31 study of nitrate in groundwater and surface water for the area, which incorporated all available data, generated the following conclusions (Aspect Consulting 2005a):

- Groundwater nitrate concentrations above the 10 mg/L drinking water standard are limited to the shallow aquifer (Saddle Mountains Basalt). The deeper Wanapum Basalt aquifer has considerably lower nitrate concentrations;
- Surface water nitrate concentrations in Glade Creek, and to a lesser extent Fourmile Canyon, are elevated. There is no surface water quality standard for nitrate, but the concentrations in Glade Creek are above the drinking water standard;
- The elevated nitrate concentrations appear to be limited to irrigated areas. Much lower concentrations occur in areas of dryland farming; and
- The current nitrate concentrations are generally at or above those detected ten years previously, but there are exceptions.

Groundwater Quality Monitoring

Many residents in the planning area are served by one of the many public water systems in the area. These systems are required by the Washington State DOH to test for nitrate regularly, with the frequency depending on type of water system (Group A or Group B) and whether DOH is aware of nitrate as a potential health concern in the area. A public water system is any system providing water for human consumption through pipes or other constructed conveyances, excluding a system serving only one single-family residence and a system with four or fewer connections all of which serve residences on the same farm. A Group A system serves 15 or more connections, or 25 or more people for 60 or more days per year. A Group B system is any public water system that does not meet the definition of a Group A system.

Group A systems are required to test for nitrates annually, whereas Group B systems are required to test every three years. If nitrate is detected in a public water system source at a concentration greater 5 mg/L, the sampling frequency is increased to quarterly for both systems. Although public water systems typically treat their water prior to distribution, this is often limited to chlorine disinfection without targeting nitrate reduction. Due to

cost, water treatment is typically not considered a viable long-term solution to reduce elevated nitrate levels.

While nitrate concentrations in public water systems are monitored frequently and regulated accordingly, no such monitoring is required by the state for existing wells serving a single family (exempt wells). Klickitat County Environmental Health Department (KCEH) currently regulates new exempt wells by requiring testing for nitrate prior to approval of a new building permit. The nitrate results are currently organized in paper files; however, there is an ongoing effort to integrate water quality data into the county's GIS that is currently under development. There is no follow-up monitoring required after the initial building permit is issued, therefore exempt wells that meet county requirements during permitting could see future nitrate increases without detection. Furthermore, exempt wells installed prior to county testing requirements have likely not been monitored for nitrates.

The Benton-Franklin Health District (BFHD) currently has no nitrate testing requirement as a condition of new building permits in Benton County. The BFHD completed a rural water quality project in 1993 that sampled 150 primarily exempt wells in Benton and Franklin Counties (Benton-Franklin Health District 1993). The results of the study indicated that 21% of the wells sampled had nitrate concentrations above 10 mg/L, and another 21% of the wells sampled had nitrate concentrations between 5 and 10 mg/L. The recommendations based on the study were to repeat sampling in two to three years to identify trends in nitrate concentrations and "trouble" areas should be monitored on a regular basis. However, the BFHD does not currently have the resources to implement such a monitoring program to document concentrations or monitor long term trends.

Of note, the Franklin County Conservation District (FCCD) is currently implementing a nitrate sampling program in Franklin County (outside WRIA 31) with nearly 300 wells sampled every 2 years.

Public Education

Information is available on nitrates in groundwater within the planning area through the KCEH, BFHD, and DOH websites. KCEH sends information on nitrates to new well owners with concentrations above 10 mg/L, and by request. BFHD offers free educational programs on groundwater and groundwater contamination to local elementary schools and educational pamphlets are available in both English and Spanish. They also periodically offer free nitrate testing for local well owners, although participation has reportedly been fairly low.

Recommended Actions:

Although nitrates in public water system wells and new single family wells in Klickitat County are tested for nitrate, current nitrate concentrations in potentially a large number of single family wells in the Wood-Glade planning area are unknown. Nitrate levels in all wells that serve as a potable water supply should be measured to ensure that all area residents have a safe source of drinking water.

It is therefore recommended that the following actions be coordinated with the local health departments (KCEH, BFHD) to ensure safe drinking water for all area residents.

The local health districts will keep the state DOH informed as appropriate. The specific implementation strategy should be refined cooperatively with the local health departments, and potentially the local conservation districts, as part of the detailed implementation plan (see Chapter 8). It is anticipated that the local health departments, in cooperation with the local conservation districts, would implement the actions.

Inventory nitrate concentrations in all drinking water sources within the planning area

This recommendation is particularly important for unregulated single family (exempt) wells. The inventory can be organized in a similar manner to studies by the BFHD (1993) and the current inventory being implemented in Franklin County by the FCCD. To encourage participation, testing of the single family wells should be voluntary, confidential, and at no cost to the well owner. It is recommended that new single family wells in Benton County be tested for nitrate upon completion, as is currently done in Klickitat County. It is recommended that single family wells be tested once every three years if the nitrate concentration is below 5 mg/L, otherwise they should be tested annually.

These recommendations are specific to the Wood-Glade planning area, where elevated nitrate is known to exist in shallow groundwater. Application of the recommendations to broader areas of the counties would be decided by the county health departments.

Develop an integrated GIS/database to manage the available groundwater quality data

All water supply wells should be input into a Geographic Information System (GIS) linked to a database of well information and water quality data. This includes information collected in previous groundwater quality studies (described in Aspect Consulting 2005) and the results of the nitrate inventory described above. Each well location should have standard attributes including spatial coordinates (e.g., Washington state plane), addresses, owner names, Township-Range-Section and Quarter-Quarter section designations. Additional information such as water levels, water quality data, and well construction information (e.g., depth, casings and open intervals, presence/absence of seals) should also be included. A scanned version of the driller's well log could also be included in the system.

Identify if alternative drinking water sources are available to those with unsafe drinking water

Once the nitrate inventory is complete, all wells with nitrate concentrations above the 10 mg/L drinking water standard should be identified and alternative drinking water sources evaluated. Possible options for safe drinking water include bottled water, deepening wells to tap a water source with lower nitrate concentrations (e.g., Wanapum aquifer), and connecting to a nearby public water system with a safe source.

Continue to educate the public on proper wellhead protection, groundwater quality testing, and the risks associated with drinking water with elevated nitrates

Infants are the primary group at risk from elevated nitrates in drinking water. Nitrates can reduce the ability of red blood cells to carry oxygen which may lead to a fatal blood disorder in infants often referred to as "blue-baby syndrome".

Other than the information offered on the local and state health departments' web sites, "high-risk" areas can be identified based on the inventory and monitoring information described above and then targeted for additional education. Informational pamphlets, in both English and Spanish, can be mailed to residents in "high-risk" areas. Other options are to hold public meetings and publish articles in local newspapers which can be coordinated with the effort to solicit volunteers for the nitrate inventory. Information should also be made available at local hospitals and in child birth preparation classes to inform new mothers about the risks of making infant formula with water with elevated nitrates.

The existing nitrate education efforts by the local health departments are considered sufficient when persons consuming nitrate-impacted water are identified. However, identification of those persons can be improved by implementing the formalized inventory described above.

The state well construction regulations, chapter 173-160 WAC, include well siting and construction standards to limit the chance for contamination of the well from surface contamination sources. All water supply wells constructed in the WRIA are likely constructed by a licensed well driller in accordance with the state regulations, and there is not a reason to change the existing regulations. The need for well testing is described above.

5.3 Wood-Glade Area Aquatic Habitat

5.3.1 Critical Habitat Designations

Issue: In August 2005, NOAA Fisheries designated portions of Chapman Creek, Wood Gulch, Alder Creek, and Glade Creek as critical habitat.

a. Critical habitat designations are not supported with published data regarding current and historical habitat condition and/or salmonid use.

14. Data to support documentation of the quality and extent of habitat in these streams is not available..

Priority: Medium.

Objective: Document the quality and extent of fish habitat in reaches identified as critical habitat. Based on the results of data collection efforts, identify projects to restore and protect critical fish habitat.

Background: Steelhead have been mapped in the lower reach (approximately 0.3 miles) of Chapman Creek (http://www.streamnet.org) and Wood Gulch Creek (http://www.streamnet.org; Carl Dugger, personal communication, July 2004). Carl Dugger (WDFW) reported seeing juvenile of steelhead or rainbow trout in the lower portion of Chapman Creek (Lautz 2000). Resident rainbow trout are mapped in Glade Creek, but not steelhead (http://www.streamnet.org). Dead Canyon was surveyed for fish and no salmonids were found (Paul Hoffarth, personal communication, July 20, 2004). Juvenile steelhead were reportedly found in lower Alder Creek (NOAA Fisheries 2005a), but documentation of this sighting is not available. Any steelhead in Chapman Creek, Wood Gulch Creek, and/or other streams in the planning area are likely strays from other

populations or fish making temporary use of the lower reaches during upstream migration (Berg et al. 2001).

Habitat in Chapman Creek, Wood Gulch, Alder Creek, Pine Creek, and Glade Creek has been identified by NOAA Fisheries as critical habitat for the recovery of Mid-Columbia Steelhead (Table 5-1). The source of the information used to base the designations is unknown.

Table 5-1. Designated Steelhead Critical Habitat in the Wood-Glade Planning Area (NOAA Fisheries 2005a)

Creek	Miles of Critical Habitat	Upstream Extent (Approx)
Glade Creek	1	Lower 1 miles of creek
Wood Gulch Creek	11.3	Mainstem from mouth to roughly 3.5 miles upstream of confluence with Big Horn canyon and lower 1 miles of Big Horn Canyon
Pine Creek	4.5	Mouth to roughly the confluence with Juniper Canyon
Chapman Creek	0.3	Lower 0.3 miles
Alder Creek	3	Mouth to roughly Alderdale
Columbia River		Entire length along WRIA

Wood Gulch Creek largely goes dry in summer. There may be areas where isolated pools and short segments of stream flow are present, but these areas are likely very warm in summer. Hence, currently Wood Gulch Creek likely provides little to no rearing habitat. Any steelhead in Wood Gulch Creek are likely strays from other populations or fish making temporary use of the lower reaches during upstream migration (Berg et al. 2001).

Pine Creek has a fish barrier near the mouth of the creek where Highway 14 crosses (see Section 5.3.2). No fish have ascended into Pine Creek since the Highway was built.

Chapman Creek may have a velocity barrier to upstream passage at about river mile 0.3. Stream flow is very low in summer.

Alder Creek commonly reaches lethal temperatures (above 73°F) in most summers, including in the perennial spring-fed reach near the mouth (EKCD data presented in Table 4-7 of Aspect Consulting and WPN [2004]).

Habitat in Glade Creek is marginal and likely very warm in the summer, although this has not been well documented. Summer flow in Glade Creek is entirely irrigation return flow (Garrigues 1996; Aspect Consulting 2005a).

Published data regarding current habitat conditions in all of these creeks is virtually non-existent. The EKCD has collected periodic temperature measurements in the creeks since 1995, as summarized in the Level 1 watershed assessment (Aspect Consulting and WPN 2004). We are not aware of other published or otherwise publicly available data.

Recommended Actions:

Approaches described in Sections 3.1 and 3.2 to address water quality and water quantity also serve to restore and protect fish habitat. Those strategies address the two habitat factors that likely have a large effect on fish productivity in at least portions of the Wood-Glade planning area. This section focuses on habitat conditions not previously addressed.

Fish Distribution

Surveys of redds in streams can be difficult in drainages where stream flow is high. This is particularly true of steelhead populations which spawn during high flows. However, streamflow in each of the drainages within this subbasin are low enough to allow efficient and accurate estimates of spawning escapement during high flow periods. Redd surveys following methods described by Schuett-Hames and Pleus (2000d) or other standard methods supported by WDFW should be conducted to determine usage of the drainages as spawning habitat. The survey area should include all reaches downstream of passage barriers. Surveys must be repeated throughout the spawning period. Locations of redds should be mapped. This effort will establish whether the drainages are used for spawning.

Juveniles may or may not rear in the drainages where they hatch and resident salmonids may be present that were not detected during spawning surveys. Therefore, summer snorkel surveys are recommended to determine the presence or absence of fish in summer. Snorkel surveys should be conducted in early summer to determine the distribution of fish in the subbasin. The surveys should be repeated in late summer in reaches where fish were present early in the season to determine locations that provide season long rearing habitat. Methods for completion of the presence/absence surveys should follow the methods of Thorow et al (2004) or similar accepted protocols. Details of the methodology, including sampling design, will be developed during implementation and should be consistent with the Washington Comprehensive Monitoring Strategy for Watershed Health and Salmon Recovery (IAC 2002).

Spawning Habitat

Steelhead spawn in late winter and spring when flows are higher and stream temperatures are cool. Hence, spawning habitat in WRIA 31 is in greater abundance than rearing habitat. The quantity of spawning habitat may become important if it is found that juvenile steelhead in the WRIA move either upstream or downstream into suitable habitat before flows are reduced in summer. Therefore, quantification of spawning habitat is recommended, but efforts should be minimized until the distribution and life history of the local stock is better understood. We recommend that spawning habitat be mapped and quantified while redd surveys are conducted. Mapping efforts should be limited to stream reaches where redds are found. Substrate size and embeddedness should be documented following the methods described by Moberg (2006) in a subsample of spawning areas to determine the fine sediment loads in spawning gravels. Details of the methodology, including sampling design, will be developed during implementation and should be consistent with the Washington Comprehensive Monitoring Strategy for Watershed Health and Salmon Recovery (IAC 2002).

Passage Barriers

Additional information on passage barriers that will help to refine estimates of habitat available for anadromous fish should be collected. Any culverts that have not been

assessed need to be evaluated to determine if they are passage barriers. Some of the culverts that have been previously assessed may need to be revisited if there are questions regarding earlier conclusions. Assessments will be compatible with the WDFW Fish Passage and Surface Water Diversion Screening Assessment and Prioritization Manual (WDFW 2000). These methods are also consistent with the Washington Comprehensive Monitoring Strategy for Watershed Health and Salmon Recovery (IAC 2002).

Rearing Habitat

Inventories of current rearing habitat within the management area should be developed. These inventories should include identification of areas with year-round flow and suitable stream temperatures and identification of areas where these flow and temperature conditions may be reasonably attained if actions were taken. These areas represent the current and potential viable habitat. Due to the expected low fish population size within the Wood-Glade area, tolerable temperatures cannot be reliably developed within the area. Therefore, it is recommended that the temperatures apparently tolerated by Rock Creek steelhead be adopted as a guideline for determining the extent of viable habitat within the Wood-Glade area drainages.

Within the viable or near-viable range of habitat, the volume of rearing habitat and factors affecting the quality of habitat will be assessed. Information collected during the inventories include the depth and volume of pools, abundance of wood and boulders that influence the development of pools and capture and sorting of gravel and other sediments, channel morphology, and the amount of vegetative cover available. In addition, the review of the GLO cadastral survey notes, which was partially implemented during the watershed assessment, will be completed in detail. This material will prove valuable in the assessment of channel conditions, particularly in areas that are currently unstable.

Data Collection Methods and Standards

Several manuals describing methods for fish habitat surveys have been developed by state agencies. The most commonly used of these methods include the following:

- WDFW's Stream Habitat Restoration Guidelines, Final Draft. (Saldi-Caromile et al. 2004);
- WDFW's Integrated Streambank Protection Guidelines (Cramer et al. 2002);
- The Washington Comprehensive Monitoring Strategy for Watershed health and Salmon Recovery (IAC 2002) and the referenced methodologies listed in that document;
- Status and Trends Monitoring for Watershed Health and Salmon Recovery Quality Assurance Monitoring Plan (Ecology 2006) and the referenced methodologies listed in that document;
- Timber, Fish and Wildlife (TFW) Monitoring Program method manuals for:
- Habitat unit surveys (Pleus et al. 1999);
- Large woody debris surveys (Schuett-Hames et al. 1999);
- Salmonid spawning gravel composition surveys (Schuett-Hames et al. 2000c);

- Salmonid spawning gravel scour surveys (Schuett-Hames et al. 2000b);
- Salmonid spawning habitat availability surveys (Schuett-Hames et al. 2000d);
- Stream segment identification (Pleus and Schuett-Hames 2000);
- Stream temperature surveys (Schuett-Hames et al. 2000a); and
- Riparian stand surveys (Smith 1998).

Protocols developed to address information needs will strive to be consistent with one or more of these state protocols; however, modifications of protocols may be required to ensure that the information needed is obtained during the assessments.

Data collection efforts must be developed using statistically robust methods and must include a quality assurance process. Data collected must be publicly available to ensure that the information can be used to identify projects, to facilitate monitoring of success against the goals of the action item, and to reduce redundancy of efforts, as well as to provide opportunity for critical review and validation. All data, with sample sites, methods, quality assurance data, data analyses, and discussion and conclusions must be provided in a publicly available format.

If sufficient funding is not available to address all habitats in the Wood-Glade planning area, rearing habitats will be given priority.

Implementation of Habitat Protection and Restoration Projects

Drawing upon the information regarding habitat that is gained through filling data gaps, opportunities to improve habitat will be identified. Additional evaluations may be necessary to identify the most cost-effective approaches to addressing factors affecting habitat. For instance, if sediment is found to be affecting fish production, additional assessment of sediment sources may be required.

Protection of existing habitat will be addressed through regulatory and voluntary efforts. Several voluntary programs are available that encourage the development of riparian reserves. The following list of programs can be applied to provide habitat protection:

- The Conservation Reserve Enhancement Program (NRCS and Conservation Districts);
- The Conservation Reserve Program (NRCS);
- The Grassland Reserve Program (NRCS and the Farm Service Agency);
- The Wildlife Habitat Incentive Program (NRCS);
- The Healthy Forest Reserve (U.S. Department of Agriculture and Conservation Districts);
- The Wetlands Reserve Program (NRCS); and
- The Forestry Riparian Easement Program (DNR).

Participation in these programs is encouraged. Public education efforts will focus on providing landowners with information regarding these programs. The education outreach will focus on landowners with critical riparian habitats on their properties.

Public Education

Public education and communication is critical to the success of this program. Landowners must be informed regarding the intent of projects. Basic understandings regarding the influence of land use on the quality of fish habitat will be fostered through education programs. Participation in volunteer efforts will be encouraged. Details of the public education program will be developed during the plan implementation.

5.3.2 Fish Passage Barrier at Mouth of Pine Creek

Issue: The culvert at the mouth of Pine Creek (under Highway 14) is above stream level and thus a barrier to upstream passage of fish. There is a natural waterfall on Pine Creek, roughly 6 miles upstream of the mouth, which may block upstream passage of fish.

Priority: Medium.

Objective: Restore fish passage at the culvert.

Background: The lower 4.5 miles of Pine Creek have been listed as critical habitat. Access to the creek has been prohibited by the culvert since the construction of Highway 14. The quality of habitat upstream of the culvert is unknown.

Recommended Actions:

Habitat surveys discussed under Section 5.3.1 will provide information regarding the quality of habitat upstream of the Pine Creek culvert under Highway 14. This information can be provided to the Washington State Department of Transportation (WSDOT). The information will assist the assessment of the expected benefits of improving passage under the highway.

If viable habitat exists upstream of the highway, we recommend supporting efforts by the WSDOT to obtain funding for their replacement of the culvert.

6 Kennewick Area Issues and Recommended Actions

6.1 Kennewick Area Water Quantity

6.1.1 Mitigation for Quad Cities Water Right

Issue: The source and availability of mitigation water to allow Kennewick to exercise its share of the Quad Cities water is uncertain.

Priority: High.

Objective: Identify sources of mitigation water to allow for Kennewick's future exercise of the Quad Cities water right without interruption.

Background:

In September 2003, the Quad Cities, namely Kennewick within WRIA 31, and Richland, West Richland, and Pasco outside WRIA 31, jointly received a water right permit (S4-30976, the "Quad Cities water right") for diversion of Columbia River water to meet projected municipal, industrial, and commercial demands within the collective urban growth area (UGA) over the next 50 years (178 cfs; 96,619 acre-feet/year). Exercise of the Quad Cities water right permit is conditioned based on the August 2003 settlement agreement between the Quad Cities, Ecology, and the Center for Environmental Law and Policy. The permit also requires that the four cities work together to identify regional water supplies and follow coordinated conservation efforts.

The Quad Cities water right is an interruptible water right. Water may be appropriated under the permit only when Columbia River minimum instream flow (MIF) requirements specified in Condition E of the permit are met, or the consumptive use associated with the appropriation is fully mitigated. The MIF requirements specified in the permit are the flow targets from NMFS' 2000 Biological Opinion, which are more stringent (higher flows) than the Columbia River MIFs promulgated by the state in chapter 173-563 WAC.

Ecology has committed to making available trust water rights to mitigate for the first 10 cfs (7,227 acre-feet/year) of the Quad Cities' water right appropriation, assuming a consumptive use of 80%[6]. The first 10 cfs of the right are allocated from the John Day/McNary Pools reservation for municipal water use under chapter 173-531A WAC.

When the Quad Cities water right was prepared, Ecology intended to make available the required mitigation water using a combination of six trust water rights ("Buckley Trust water rights") and placing into trust three additional water rights (Grandview Farm water rights, or the "Simplot water"). Ecology is committed to acquiring 10 cfs of mitigation

[6] According to the Report of Examination for the Quad Cities water right, the 80% consumptive criterion was based on the Cities of Pasco and West Richland's consumptive use for the month of August only.

water, 20% (2 cfs) of which is assumed to be return flow thus providing an assumed net 80% (8 cfs) consumptive use. To make them eligible as mitigation under the Quad Cities right, the rights were to be changed to specify that the purpose of use includes "mitigation for municipal use" and the place of use includes "the McNary Pool of the Columbia River". Ecology is committed to providing the mitigation water in perpetuity.

For appropriation beyond the first 10 cfs increment, at least 50% of the consumptive use must be mitigated with 1:1 flow replacement using water upstream of McNary Dam. Aquatic habitat improvements that benefit Columbia River system fish can provide mitigation for up to 50% of the consumptive water use.

To access water beyond the first 10 cfs, the Quad Cities jointly need to submit an updated Regional Water Forecast and Conservation Plan (RWFCP) to Ecology and DOH at least every six years. The RWFCP will include water demand projections for the next 6-year period, needed source capacity and water rights to meet demands, estimated return flows, and a conservation program demonstrating how the best available and reasonable conservation technology will be implemented in the next 6-year period. The conservation program will document conservation achieved in the previous 6-year period, and water projected to be conserved in the next 6 years. Required elements of the conservation program include:

- Leak detection program;
- Large meter testing program;
- Residential meter repair/replacement program;
- Residential retrofit program;
- Source metering replacement and improvement;
- Water audit program for large water users;
- Joint plan with irrigation districts to address urban irrigation needs;
- Integrated water shortage and drought plan;
- School education program; and
- General public education program.

The RWFCP will estimate consumptive use for the previous 6-year period using best available information, reevaluating the current 80% assumption applied for the first 10 cfs increment.

The RWFCP will also include a mitigation plan for Ecology approval, if a non-interruptible appropriation is sought for the subsequent 6-year period. The mitigation plan must demonstrate, based on best available science, that the proposed mitigation will benefit Columbia River system fish at least to the same extent as would replacement water. Ecology will consult with and give a high degree of deference to WDFW and the tribes in determining whether the Quad Cities' proposed mitigation is acceptable. Any time Ecology approves mitigation to offset diversion increments after the first 10 cfs,

Ecology will issue an order that is subject to appeal to the Pollution Control Hearings Board. The next RWFCP is to be submitted to Ecology and DOH by 2008.

Following Ecology's investigation of water use for the previous 6-year period, Ecology will issue a certificate for the quantity of water put to beneficial use during that period.

The Quad Cities have signed a Memorandum of Agreement for their management of the Quad Cities water right and related programs.

Recommended Actions:

Reassess Annual Consumptive Use

The first recommended action is to reassess the assumption that 80% of water use is consumptive, in accordance with the Quad Cities water right. As stated above, the 80% value was based on information from August only, and is not at all representative of an annualized value. A more accurate estimate of annual consumptive use will reduce the quantity of mitigation water required to allow Kennewick to exercise its share of the right.

Kennewick, in cooperation with the other Quad Cities, has the necessary metering systems in place to prepare reliable estimates of its consumptive water use. Kennewick accurately meters its water production and wastewater treatment plant discharge to the Columbia River, and has educated estimates of system losses equating to return flows as a result of its water system planning and maintenance efforts. The Planning Unit foresees no additional activities needed for this recommendation beyond those Kennewick is implementing.

Identify Additional Water for Mitigation (Flow Replacement)

The Quad Cities are responsible to make available all additional water required to mitigate for the remaining 168 cfs of diversion under the Quad Cities water right. At least 50% of the mitigation quantity for each 6-year cycle must be achieved with 1:1 flow replacement. Options to obtain water for flow replacement could include but not be limited to the following:

ACQUIRING VALID WATER RIGHTS FOR TRANSFER INTO THE STATE'S WATER TRUST

The Quad Cities can acquire water rights upstream of McNary Dam and transfer them to the state water trust program for the purposes of instream flow, with the transferred quantity serving as mitigation. Because the consumptive use being mitigated under the permit will continue in perpetuity, only a permanent transfer would be acceptable as mitigation; a temporary lease or donation would not be acceptable. To serve as acceptable mitigation, the transferred water rights would need to be changed to include 'mitigation for municipal use' as a purpose of use and 'McNary Pool' as a place of use. Trust water rights acquired in an area with an approved watershed plan developed under chapter 90.82 RCW must be consistent with that plan if the plan calls for such acquisition (RCW 90.42.040). This applies to WRIA 31.

The first step is identifying existing rights for acquisition and transfer into the water trust. The concept of a local water exchange, outlined in Section 3.1.3, would be a mechanism for potential water right sellers to make known their interest to sell and facilitate contact and discussion of a potential sale/transfer. Alternatively, local real estate brokers can be

engaged to identify possible water right sellers and initiate discussion regarding sale/transfer of rights. There are restrictions on the types of water rights that can be accepted into the trust water program, and thus serve as mitigation. Water rights that are not acceptable as mitigation include: groundwater rights tapping a groundwater source not in hydraulic continuity with stream reaches of interest (McNary Pool in this case); donations that do not benefit instream flows; family farm permits with some exceptions; and rights that did not exist on July 28, 1991. Likewise, interruptible rights and non-additive ("supplemental") rights would not represent adequate mitigation for obtaining a non-interruptible appropriation under the Quad Cities right.

USE ASR TO REPLACE DIVERSION FROM RIVER IN CRITICAL FLOW MONTHS

If ASR is determined to be a feasible water supply alternative for Kennewick (refer to Section 3.1.2), ASR could make available additional water in the river during July and August when the ASR wells are pumping in lieu of surface diversion to help meet peak summer demand. If source water from the Columbia River would be diverted under the Quad Cities permit for ASR storage, the diversion would need to occur during those periods when the permit MIF is being met. Pumping the ASR well for recovery of stored water replaces an equivalent volume of water pumped from the Columbia River during those critical flow months. The volume of recovered water represents 1:1 flow replacement using a seasonal water source not available without ASR.

BASEFLOW ENHANCEMENT BY WASTEWATER INFILTRATION

A portion of the wastewater from the City's wastewater treatment plant could be considered for infiltration at selected location(s) and time(s) of the year, with the intent that the infiltrated water would provide additional baseflow either to tributary drainages or the mainstem Columbia River during critical flow periods. The additional baseflow would constitute flow augmentation. The quantity, location, and timing of infiltration to optimize environmental benefit through enhanced baseflow would require assessment.

OTHER

Other sources of water suitable for flow replacement mitigation under the Quad Cities water right may become apparent with time through the cities' exercise of the permit or other watershed plan implementation activities. All potential sources of mitigation water should be explored. Note that the Quad Cities water right includes rigorous conservation requirements as permit conditions, including specific conservation goals and schedules; therefore, water made available through these conservation measures is not available for use as mitigation under the permit.

The other major mitigation opportunity provided for in the Quad Cities permit is aquatic habitat improvements that benefit Columbia River system fish. These mitigation opportunities are outlined in Section 6.3.1.

6.1.2 Water for Urban Irrigation

Issue: There are constraints on reliability of irrigation supplies for the Kennewick planning area, largely derived from the Yakima River.

Priority: Medium.

Objective: Improve reliability of irrigation supplies in Kennewick area.

Background:

The federal Bureau of Reclamation authorizes Kennewick Irrigation District (KID) to divert water from the Yakima River at Prosser Dam, from where it is conveyed 11 miles downstream, via the Chandler Canal, to the Chandler Power and Pumping Plant. At Chandler, approximately 56 percent of the total water diverted is used to hydraulically pump (by suction) the water for irrigation into KID's gravity-flow canal system starting at Chandler. However, this "power water" is returned to the Yakima River, never reaching WRIA 31. Under its contract with Bureau of Reclamation, KID is currently allowed approximately 96,000 acre-feet/year of irrigation water subject to maximum monthly allotments and rationing during drought years. KID estimates conveyance, seepage, and overspill losses from their mostly unlined canals totaling approximately 26 percent, thus delivering approximately 71,000 acre-feet/year of water to its customers for use on 20,200 irrigable acres.

Columbia Irrigation District (CID) diverts 60,385 acre-feet/year of water from the Yakima River near Horn Rapids (north of West Richland), from where it gravity flows in mostly unlined canals to irrigate roughly 10,000 acres within the Kennewick planning area. Conveyance losses from the CID canals are assumed to be comparable to those of the KID canals.

Accounting for the losses, the watershed assessment estimated KID and CID together provide almost 116,000 acre-feet/year of irrigation water, with the majority reaching the Kennewick planning area. The seepage losses represent additional groundwater recharge, which eventually discharges to the Columbia River system.

KID has applied for a new water right to divert 22,610 acre-feet/year of Columbia River water for irrigation of 4,637 acres. This water right has been tied up in legal action, but resolution is expected in the next year. CID's capacity is currently limited by its conveyance canal system and there are no plans to seek additional water rights. Of the major irrigation districts in the Yakima basin, CID is located farthest downstream on the Yakima River. During drought years, their supply can be limited by low flows available at their point of diversion.

KID Pump Exchange Proposal

Over the past several years, KID has been evaluating a Pump Exchange Project with Bureau of Reclamation, in which some or all of their Yakima River diversion quantity (gravity flow) would be replaced by pumped diversion from the Columbia River downstream of the Yakima River confluence. Most recently, KID has been evaluating alternatives for exercising its new Columbia River water right (82 cfs; 22,610 acre-feet/year) once it is permitted by Ecology (expected in 2007). Some of the proposed alternatives involve exchanging Columbia River water under the new right for some of their existing Yakima River diversion at Prosser.

KID's current proposal (Alternative 5) makes use of their to-be-permitted Columbia River water right to replace a portion of their current Yakima River diversion (Pacific Northwest Project and IRZ Consulting 2007). The proposal includes a two-phased development with 15-year construction schedule. Phase I would include supplying water

to irrigate up to 3,125 acres within the Red Mountain and West Richland area. This water would be supplied from a new Yakima River diversion (45 cfs) located at Kiona, roughly 15 miles downstream from Prosser. Phase II would involve diverting Columbia River water (approximately 195 cfs) at Edison Street in Kennewick to supply water to 11,662 acres in KID's existing service area plus 700 new acres in the South Ridge area of Kennewick outside their current service area.

The proposal would reduce the quantity of water diverted from the Yakima River, thereby increasing, relative to current conditions, Yakima River instream flows by approximately 400 cfs between Prosser and Chandler, approximately 180 cfs between Chandler and Kiona, and approximately 140 cfs below Kiona. There would be a net flow reduction of approximately 55 cfs within the McNary Pool (195 cfs diversion minus 140 cfs discharge increase from Yakima River).

Under the proposal, KID's new water right is subject to the Columbia-Snake River Irrigators Association (CSRIA) voluntary regional agreement (VRA). As such, KID would adopt CSRIA's irrigation best management practices (BMPs). KID would pay the $10 per acre-foot mitigation fee to make the water right non-interruptible when Columbia River instream flow minimums (chapter 173-563 WAC) are not met. KID would also submit their other water rights for recalibration to reflect beneficial use consistent with the BMPs, as specified in the CSRIA VRA.

Tri-Cities Urban Area Irrigation Plan

The Tri-Cities Urban Area Landscape Irrigation Plan (HDR 2006) is a cooperative effort of KID, CID, and city of Kennewick within WRIA 31, and, outside of the WRIA, the Badger Mountain Irrigation District, Franklin County Irrigation District #1, and the cities of Richland, West Richland, and Pasco. The plan identifies an Action Area equivalent to the combined UGA of the four participating cities. The plan includes the following elements:

- Landscape irrigation demand forecasts based on population projections, and analyses of water supply, for each city and its individual UGA;
- Identification of existing service providers and recommended providers for specific geographic areas within the four cities' collective UGA;
- Strategies to address water shortages, which are broadly defined as drought response, system capacity limitations, system failure, and water rights limitations;
- Water management tools for cooperation and coordination among the participating entities; and
- Description of baseline environmental conditions and potential benefits and concerns associated with identified strategies.

The plan concludes that the participating entities have adequate water rights to meet both municipal and landscape irrigation demands through the year 2050, assuming the water is managed on a regional scale. The plan assumes a landscape irrigation demand (water duty) of 3.5 acre-feet of water per acre; however, the plan calls for better estimates of

actual use by 2008. The cities' regional conservation program required under the Quad Cities water right permit will be applied to landscape irrigation.

With respect to environmental effects, the KID and CID diversions from the lower Yakima River reduce instream flows in the Yakima during landscape irrigation season. However, the diversions do little to degrade water quality since most of the degradation is a result of upstream processes on the Yakima (Ecology 2001). The cities' and BMID's diversions from the Columbia River create no measurable difference in Columbia River water quality. The four cities' environmental ordinances and policies will also apply to the four irrigation districts operations within the cities' UGAs.

As an outcome of the plan, the Tri-Cities Urban Irrigation Regional Coordination Group (ICG) will continue to meet at least semi-annually to continue cooperative coordination regarding improving efficiency and reliability of irrigation water delivery within the four cities' collective UGA. This includes development of a "Model Tri-Cities Landscape Irrigation Agreement" for the participating entities to use for future shared construction, operation, and maintenance activities. In addition, a GIS database has been developed to document designated service responsibilities and infrastructure. Finally, the entities will implement a regional education program to increase residential and business awareness of water efficiency practices in landscape irrigation. The plan includes an implementation program with schedule.

Recommended Actions:

The Planning Unit supports implementation of the Tri-Cities Urban Area Irrigation Plan by KID, CID, City of Kennewick, and the other participating entities outside WRIA 31. The coordinated actions specified in the locally developed plan provide the best means to reliably meet future irrigation needs while minimizing associated water quality impacts in the Kennewick area of WRIA 31.

The recommendations of this watershed management plan pertaining to urban irrigation within the Kennewick planning area are outlined below.

KID Proposal

The Planning Unit supports KID's current proposal to exercise a portion of its new Columbia River water right in exchange for a portion of its Yakima River diversion as being consistent with the intent of this watershed plan. The proposal would increase reliability of KID's irrigation supplies, a benefit to the Kennewick planning area. The proposal would also increase flows in the lower Yakima River, below the existing KID diversion, with resulting potential net positive effects on aquatic habitat area, flow velocity, and possibly reduced growth of some aquatic plants. A program that achieves these benefits in a major tributary to the Columbia River, immediately upstream of WRIA 31, benefits fish in the WRIA 31 portion of the Columbia River.

It is recommended that the Planning Unit write a letter stating its support for the proposed program to relevant agencies and stakeholders (Ecology, Bureau of Reclamation, WDFW, NOAA Fisheries, Tribes, etc.). It is further recommended that the Planning Unit thereafter provide assistance to KID as warranted to help secure funding for implementation of the program.

Pursue Funding for Urban Irrigation Conservation Projects

Implementation of this watershed plan should include providing assistance to the implementers of the Tri-Cities Urban Area Irrigation Plan to obtain funding for irrigation conservation projects including public education. As municipalities and irrigation districts, the irrigation plan implementers have access to various funding sources for conservation projects, which now can include the Columbia River water supply development account.

Voluntary Regional Agreement for Water Made Available by Irrigation Conservation

The Planning Unit recommends working with the irrigation plan implementers to ensure a voluntary regional agreement is in place that makes the water generated from conservation practices available for use. To the extent that the irrigation conservation measures are funded through the Columbia River water supply development account, the conservation's net water savings must be placed in the state water trust (for instream flow) in proportion to the state funding provided to implement the project.

The draft CSRIA VRA addresses use of the net water savings from conservation BMPs implemented by irrigators pumping from the mainstem Columbia River.

The applicability of the CSRIA VRA to conservation savings under Tri-Cities Urban Area Irrigation Plan should be determined during Phase 4 implementation of this watershed plan, after the final CSRIA VRA is adopted and implemented. A new VRA specific to urban irrigation conservation savings in the Kennewick planning area can be developed if necessary.

6.1.3 Use of Reclaimed Water

Issue: There are obstacles to use of reclaimed municipal water, including high cost relative to benefit (benefit mainly to 1/2 mile of Columbia River between source diversion and treated effluent discharge in Kennewick's case) and public stigma re: use of reclaimed water.

Priority: Low.

Objective: Identify opportunities for cost-effective use of reclaimed municipal water.

Background:

City of Kennewick is the only entity in WRIA 31 producing a substantial quantity of wastewater, therefore reclaiming the City's wastewater for other uses including instream flow is considered. It is important to note that reuse of wastewater associated with exercising the Quad Cities water right for source water will need to be accounted for in determining the consumptive use requiring mitigation. This however is not the case with water supply diversion under the City of Kennewick's existing (non-Quad Cities) water rights.

The City has evaluated use of reclaimed water from its municipal wastewater treatment plant (WWTP). The WWTP currently produces Class B treated water, for which acceptable uses include irrigation of non-food crops, irrigation of selected food crops, irrigation of restricted access areas, and dust control and dampening of soils for

compaction, among other uses. Use of Class B treated wastewater is only allowed for application on food crops that undergo physical or chemical processing sufficient to destroy all pathogenic agents, or on food crops where no reclaimed water contacts the edible portion of the crop (e.g. surface irrigation of orchards and vineyards). Use of Class B treated water is not allowed for irrigation in unrestricted residential settings (DOH and Ecology 1997).

Section 5.5 of the City's Sewer Comprehensive Plan (City of Kennewick 2006) discusses possible uses for reclaimed water. One possible use for the Class B water currently produced by City is dust control (dampening unpaved roads and other surfaces) and dampening of soil for compaction (at construction sites, landfills, etc.). This use would involve building a storage facility for the reclaimed water, and hauling the water where it is needed in the City. The capital costs of initiating this project could be relatively low (~$120,000) to build a storage reservoir; however, the environmental benefit of the project would also be relatively limited. The City's point of Columbia River diversion for water supply is approximately ½ mile upstream of where the WWTP's treated water is returned to the water – only a short reach where flow improvement could be realized.

Class A treated water is the highest quality treated wastewater classified by the state and has the most unrestricted potential use. Use of Class A treated water is allowed for irrigation of all food crops, irrigation of open access areas (parks, residential landscapes), and groundwater recharge. The City has evaluated the cost to construct a packaged membrane bioreactor for use in the WWTP, allowing generation of Class A treated wastewater, as outlined below (City of Kennewick 2006):

- The WWTP capacity is approximately 12 million gallons per day (MGD), and the current average daily return of the WWTP to the Columbia River is about 5.5 MGD; therefore, there is excess WWTP capacity available.
- A preliminary estimated capital cost to achieve Class A wastewater is approximately $5 million for every 1 million gallons. This equates to more than $27 million to treat current average daily WWTP discharge volumes, and $60 million to treat up to the maximum capacity of the WWTP.
- Capital costs to build a conveyance system for the treated water can be significant depending on many different factors. For example, separate distribution system is required for reclaimed water to avoid potential cross contamination with potable water system. Costs to build a new conveyance system would depend on capacity and distance from the WWTP.
- In addition to high capital costs, long-term operation and maintenance (O&M) costs for operation of a package membrane treatment system and pumps for conveyance are significant.

At this time, the best prospect for using Class A reclaimed water would be discharging WWTP effluent into KID or CID irrigation canals and using it as open access irrigation water. KID and CID both divert water from the Yakima River, so the potential benefit would be to reaches of the Yakima River downstream of their respective diversion points. Flow increases in the Yakima River have corresponding benefits to the Columbia River as well. Most of KID/CID irrigation water is applied for residential use, requiring

treatment to Class A standards and making this option economically impractical at this time. As stated above, CID holds water rights that are at or above its canals' conveyance capacity so is not actively seeking new sources of water. KID's current priority for achieving additional water supply is its application for a new Columbia River water right. Therefore, pursuing an (expensive) reclaimed water source of supply is not considered a cost-effective option for KID at this time. Using reclaimed water as an irrigation water source for either CID or KID would necessitate increasing rates for that water, which would likely meet with public resistance.

In short, the cost of using reclaimed water from the City's WWTP outweighs the potential benefits to the watershed at this time. Even if grant funding were available to offset a portion of the high capital costs for the City to produce Class A treated wastewater and distribution system, high long-term O&M costs of operating the enhanced treatment system represent the primary obstacle to future use of reclaimed water. Currently, the City feels pursuing other water management strategies (e.g., water storage) is a higher priority for meeting its long-term water demands.

In May 2007, legislation was passed (ESSHB 6117) with the stated intent of facilitating and reinvigorating use of reclaimed water as a matter of state water resource policy. The legislation expands financial support and incentives for capital investments in use of reclaimed water. Section 4 of the legislation was vetoed by the governor because it was felt it would change the standard for mitigation of water right impairment resulting from a water reuse project, which could have unintended consequences to existing water rights. In the veto language, the governor directed Ecology to work with the legislative leadership to address water right impairment from water reuse projects as well as reclaimed water planning (coordination with watershed planning and other land use decisions), and provide a report to the governor and appropriate legislative committees by December 31, 2007.

The legislation also amends the Watershed Planning Act (chapter 90.82 RCW) to require Ecology to report to the legislature the extent to which reclaimed water has been identified in watershed plans as potential strategies to meet future water needs, and identify provisions in any detailed implementation plan that addresses barriers to implementing water reuse elements of the watershed plan. The legislation also requires Department of Health to report to the legislature by January 1, 2008, on the general status of reclaimed water use including public education and a program to generate public support for its use.

Recommended Actions:

No immediate action is recommended with respect to reclaimed water. The City should continue to evaluate using reclaimed water as water treatment technologies improve, potentially allowing more cost effective production of Class A treated wastewater for beneficial reuse.

6.2 Kennewick Area Water Quality

6.2.1 Vulnerability of Single Supply Source

Issue: The City of Kennewick's reliance on the Columbia River system as its water supply source makes it vulnerable to water quality contamination.

Priority: High.

Objective: Diversify supply sources to reduce system vulnerability to water quality impact.

Background:

The City of Kennewick is highly dependant on the Columbia River system for its water supply. Kennewick's primary sources of water include a Columbia River diversion with water treatment system and a pair of Ranney collectors[7] that withdraw shallow groundwater from the Columbia River gravels along the river. The Ranney wellfield withdraws a combination of upgradient groundwater and surface water filtered through the river bed sediment. The City also operates three low capacity wells that provide intermittent supply to small isolated water systems.

The reliance on the Columbia River system sources makes Kennewick – the population center of WRIA 31 - vulnerable to water quality contamination, whether from unintentional or intentional impacts. Given the immense flows in the Columbia River, the chance of acutely contaminating the river source is small. Nevertheless, diversification of Kennewick's sources of supply helps protect against water quality impacts. It can also reduce operational pumping costs by placing water sources closer to areas of growing demand, which will likely continue to expand to ever greater distances from the river in the future.

Recommended Actions:

Evaluate Groundwater Sources of Supply

Alternatives to the Columbia River system that can be potential municipal water sources need to be evaluated. There are no surface waters other than the Columbia River that are viable sources for municipal (or any) supply in the Kennewick planning area. Therefore, alternative water sources for this planning area are limited to groundwater: ASR and/or conventional production wells.

Detailed evaluation of ASR feasibility through pilot testing is the primary water quantity recommendation for the Kennewick planning area in this watershed plan (Section 3.1.2). That recommendation applies to this issue as well. An additional benefit of an ASR pilot testing program would be more detailed assessment of local aquifer productivity and ambient groundwater quality. If ASR assessment and pilot testing indicates that the Wanapum Basalt aquifer is promising in terms of yield and water quality for municipal supply, Kennewick can consider development of conventional groundwater production wells as additional supply sources.

[7] A Ranney well is large-diameter vertical casing (well) from which lateral collector pipes extend horizontally, typically installed in unconsolidated river bed sediments.

If identified productive aquifer zones are demonstrated to be in hydraulic continuity with the Columbia River system, new production wells could be added as additional points of withdrawals on the City's existing water rights, limiting the need to seek new water rights for the near future.

6.2.2 State Antidegradation Policy Applied to ASR

Issue: The current application/interpretation of the state antidegradation policy to ASR (e.g. storage of water containing chlorination byproducts) could constrain Kennewick's use of ASR.

Priority: High.

Objective: Obtain from Ecology a written policy, specific to ASR, which allows for de minimus impact to the quality of the receiving body of groundwater, as long as beneficial use of the groundwater resource is not impaired and it is not detrimental to the public interest.

Background:

If City of Kennewick were to apply ASR, it would store the same treated water that is served to the City's customers. The water must be disinfected using chlorine and therefore contains trace concentrations of the byproducts of this disinfection process (e.g., trihalomethanes [THMs] and haloacetic acids [HAAs]). THMs can form from reaction of chlorine with naturally occurring organic matter in the water. EPA has established health-based drinking water standards for total THMs and total HAAs. The disinfection byproducts are not naturally occurring in groundwater, and were not detected in the one sample of groundwater analyzed from the prospective ASR target area during the Kennewick ASR feasibility study (Aspect Consulting 2005d). Concentrations of disinfection byproducts in the City's treated water supply are consistently below drinking water standards. The ASR literature indicates that THMs and HAAs degrade relatively quickly when source water containing them is stored in the subsurface, although it is a site-specific evaluation (see discussion in Aspect Consulting 2005d).

If the water to be stored during ASR has chemical constituents present at concentrations above that in the ambient groundwater in the storage aquifer, the storage could be interpreted to violate the antidegradation provision of the state's Ground Water Quality Standards. The state's groundwater antidegradation policy is stated as follows (WAC 173-200-030):

A. Existing and future beneficial uses shall be maintained and protected and degradation of groundwater quality that would interfere with or become injurious to beneficial uses shall not be allowed.

B. Degradation shall not be allowed of high quality groundwaters constituting an outstanding national or state resource, such as waters of national and state parks and wildlife refuges, and waters of exceptional recreational or ecological significance.

C. Whenever groundwaters are of a higher quality than the criteria assigned for said waters, the existing water quality shall be protected, and contaminants that will

reduce the existing quality thereof shall not be allowed to enter such waters, except in those instances where it can be demonstrated to the department's satisfaction that:

i. An overriding consideration of the public interest will be served; and

ii. All contaminants proposed for entry into said groundwaters shall be provided with all known, available, and reasonable methods of prevention, control, and treatment ("AKART") prior to entry.

The antidegradation policy speaks both of not interfering with existing and future beneficial uses of the groundwater resource (in bullet A), and not allowing a reduction the existing quality (in bullet C). In practice, bullet C has been interpreted to mean that a water containing a higher concentration of any constituent can not be permitted for entry into a groundwater with lower concentrations of that constituent, unless the public interest is served and AKART is applied. Whether or not that process would interfere with beneficial use of the groundwater resource (bullet A) is often not considered, in the experience of the Planning Unit.

It is the opinion of the Planning Unit, including City of Kennewick as a potential ASR implementer, that the water treatment currently conducted by City on the source water to be stored would represent AKART for the purposes of an ASR project. It would be unreasonable (disproportionately costly) to conduct additional treatment to dechlorinate water already in the distribution system, prior to its storage via an ASR well.

More importantly, Kennewick's water treatment achieves a water source for potential storage that is suitable for potable supply, meeting state and federal drinking water standards.

Since the water to be stored via potential ASR in Kennewick meets drinking water standards, beneficial use of the groundwater in a deep storage aquifer would not be degraded as a result of its storage, thus meeting the intent of the Ground Water Quality Standards (chapter 173-200 WAC). Furthermore, a Kennewick ASR program would be in the overriding public interest, providing greater flexibility and reliability for meeting peak municipal demand while benefiting Columbia River flows during critical flow months. The state ASR rule states "The department shall give strong consideration to the overriding public interest in its evaluation of compliance with groundwater quality protection standards." (WAC 173-157-200[2]).

This issue has state-wide implications for ASR, since ASR is likely a water management strategy best suited to the state's municipal purveyors that already have in place a high-capacity water treatment system (which necessarily includes chlorine disinfection).

Recommended Actions:

Meet with Ecology water resource and water quality staff to discuss Ecology drafting a water quality policy or pursuing a statutory exemption, specific to ASR, which allows for de minimus impact to the quality of the receiving body of groundwater, as long as beneficial use of the groundwater resource is not impaired and it is not detrimental to the public interest.

The policy should consider (1) the possibility for generating disinfection byproducts in the aquifer, due to residual chlorine reacting with natural organic matter, such that the

byproducts persist at concentrations above drinking water standards; and (2) the possibility of groundwater discharge to surface water as an additional beneficial use of groundwater, and the resulting possibility of impacts to aquatic resources if water containing elevated concentrations of residual chlorine and/or byproducts were to discharge to sensitive streams. The policy should outline monitoring requirements and a guideline for establishing water quality action limits for disinfection byproducts in the event that in-situ degradation of these constituents does not occur.

The Planning Unit believes that the provisions in chapter 173-200 WAC (Ground Water Quality Standards) and chapter 173-157 WAC (ASR rule) provide Ecology the needed flexibility to make this policy determination. However, a written policy from Ecology, clarifying the position specific to ASR state-wide, should facilitate application of ASR within WRIA 31, the larger Columbia Basin, and the state as a whole.

6.2.3 Water Quality Outside Kennewick Water Service Area

Issue: It is uncertain whether rural domestic wells –outside Kennewick water service area - have water quality issues. For example, currently there is no requirement that single-family domestic wells in the area test their well.

Priority: Low.

Objective: Ensure that the rural population, outside Kennewick's water service area, has a safe source of potable water.

Background:

As described in Section 5.2.1, the Benton-Franklin Health District (BFHD) sampled rural wells in Benton County, including those within the Kennewick planning area, in 1993; a high proportion of the wells sampled had nitrate concentrations above 5 mg/L with a less number above the 10 mg/L drinking water standard. The BFHD indicated that they do not currently have the resources to continue a well monitoring program, and there is no well testing requirement as a condition of new building permits in Benton County. Consequently, there is relatively limited information regarding the quality of groundwater supplying single family wells in rural parts of the planning area outside City of Kennewick's water service area.

Recommended Actions:

As described for the Wood-Glade planning area (Section 5.2.1), maintaining safe water quality in rural areas is a public health issue that falls within the jurisdiction of the local health department (BFHD). As outlined in Section 5.2.1, BFHD may consider the following general approaches to address rural water quality:

- Inventory nitrate concentrations in all drinking water sources within the planning area;
- Develop an integrated GIS/database to manage the available groundwater quality data;
- Identify if alternative drinking water sources are available to those with unsafe drinking water; and

- Continue to educate the public on proper wellhead protection, groundwater quality testing, and the risks associated with drinking water with elevated nitrates.

The specific approaches and implementation/funding strategy should be refined by the BFHD, and potentially the local conservation districts or other entities working cooperatively with the BFHD. The planning unit fully supports the BFHD and other entities in their efforts to address the situation including lending assistance to obtain funding. In addition, any water quality information collected for the WRIA 31 assessments is publicly available to the BFHD for their use.

6.3 Kennewick Area Aquatic Habitat

Issue: The Quad Cities water right allows for habitat improvements that benefit Columbia River system fish as mitigation for up to 50% of the future consumptive water use. Understanding the amount of habitat to be created or restored to offset water use impacts and identifying opportunities for improvement could therefore be useful to Kennewick in future exercise of the water right.

Priority: Medium.

Objective: Develop better understanding of opportunities to improve aquatic habitat which is beneficial to Columbia River salmon populations, thus assisting Kennewick in implementing its portion of the Quad Cities water right.

Background:

As was described in Section 6.1.1, the Quad Cities jointly received a water right permit (the "Quad Cities water right") for diversion of Columbia River water to meet projected municipal, industrial, and commercial demands within the collective UGA over the next 50 years. The permit specifies minimum instream flow requirements for the Columbia River. Diversion of water is not permitted any time that the flow objectives are not met unless the consumptive portion of the diverted water is mitigated through flow replacement or habitat enhancement. Avenues for providing replacement water were discussed in Section 6.1.1. The discussion here focuses on habitat improvements.

Habitat improvements used as mitigation must benefit Columbia River system fish at least to the same extent as would replacement water. Any habitat project mitigation proposal developed by the Quad Cities must include a demonstration based upon best available science and other applicable legal requirements that the proposed mitigation will meet that requirement. In order to determine whether any proposed habitat mitigation project is acceptable, Ecology will consult with and give a high degree of deference to the WDFW, the Confederated Tribes and bands of the Yakama Nation, the Nez Perce Tribe, the Confederated Tribes of the Umatilla Indian Reservation, and the Confederated Tribes of the Warm Springs Reservation of Oregon.

Numerous studies have been conducted to evaluate the effect of river flow on juvenile survival. The results of those studies have been highly variable and often contradictory. Therefore, the effect of a reduction in flow is difficult to quantify. The benefit of habitat improvements can be quantified by estimating the volume of rearing and spawning habitat before and after the improvement, and multiplying the net change in volume of habitat by expected fish density within that area. Habitat improvements may possibly

include the removal of a mortality agent, such as poorly designed intake screens, in which case the benefit to Columbia River system fish would be measured in terms of the reduced mortality.

Recommended Actions:

There is a broad range of habitat improvement projects that could be implemented to benefit Columbia River system fish. Clarification regarding the types of mitigation that would be found acceptable and the geographical range within which mitigation can be developed is needed. Projects that benefit Columbia River system fish may be located outside of WRIA 31.

Within WRIA 31, efforts previously described for the Rock Creek and Wood-Glade planning areas would provide information regarding possible mitigation projects. There are no known fish-bearing tributaries to the Columbia River within the Kennewick planning area. Within the Kennewick planning area, any existing information regarding baseline habitat conditions and discussions with WDFW Tri-Cities personnel regarding potential to improve habitat should be evaluated to determine the need for supplemental information and to evaluate the potential for habitat restoration. Supplemental information may include a quantitative assessment of existing instream habitat conditions in local streams/wasteways and backwater areas of the mainstem Columbia River. Surveys may be required to document the condition of current spawning and rearing habitat, identify potential land use effects on habitat, and identify opportunities to improve the existing habitat. An assessment of the contribution of agricultural return flows to flows in streams/wasteways throughout the year may also be valuable.

Based on the existing and any supplemental information, opportunities for habitat improvement should be identified. Opportunities may also be identified by Planning Units in other WRIAs, WDFW, or other resource agencies – particularly for areas outside of the Quad Cities and outside WRIA 31. For opportunities outside of the Quad Cities, Kennewick and the other Quad Cities could consider contributing funding for the habitat projects and taking a proportionate credit for the mitigation achieved. That would need to be negotiated with Ecology in advance, specific to the conditions of the Quad Cities permit. Funding support should be sought to implement any identified projects.

7 Summary of Recommended Actions

This chapter provides a compilation of the recommended actions for each of the three planning areas and for WRIA 31 as a whole (WRIA-wide). The recommended actions for each identified issue in the watershed management plan are summarized in table format. Table 7-1 summarizes the WRIA-wide recommended actions. Tables 7-2, 7-3, and 7-4 summarize recommended actions for the Rock Creek, Wood-Glade, and Kennewick planning areas, respectively.

Each table lists each issue specific to that planning area along with the section of the watershed management plan in which the issue is presented, the planning objective, the issue's priority relative to all issues in the WRIA 31 watershed management plan, and a summary of recommended actions for the issue.

If there are any discrepancies between information presented in these four tables versus that presented in the text from the respective watershed management plan chapter, the watershed management plan text governs.

Table 7-1. Summary of Recommended WRIA-Wide Actions

Section # in Plan	Issue	Objective	Priority	Recommended Actions
Water Quantity				
3.1.1	Columbia River Water Supply	Ensure that adequate water supplies are available to meet current needs, provide for long-term sustainability of irrigated agriculture, and support economic and population growth within WRIA 31. Achieve this objective through active participation in the implementation of the Columbia River Basin Water Supply Act (Engrossed Second Substitute House Bill [ESSHB] 2860) and through Ecology's processing/granting new water right permits to exercise the John Day-McNary Pools reserves appropriated in chapter 173-531A WAC.	High	1) Develop a process with Ecology for expediting the issuance of permits from the John Day-McNary Pools reservations to meet beneficial uses as specified under chapter 173-531A WAC. The process may include use of VRAs, rulemaking (if the need for rulemaking is determined by the PAC and approved as provided in Section 8.8 of this plan), MOU with Ecology, or other legal method.
				2) The PAC and Implementing Governments will pursue legislation to define the consultation process for processing water right applications that is consistent with the consultation process established for VRAs in RCW 90.90.030(4)(a). That is, establish a 60-day period for consultation with county legislative authorities, local watershed planning units, WDFW, affected tribal governments, and federal agencies, for applications that are not covered by an approved VRA or otherwise covered by statute.
				3) Support implementation of the VRAs that are consistent with this watershed management plan (e.g., CSRIA VRA). The WRIA 31 Lead Agency and or Implementing Governments should seek an agreement with Ecology regarding utilization of the WRIA 31 watershed planning process to support identification and prioritization of mitigation actions.
				4) Explore developing a VRA as a mechanism for expanding water supply availability within WRIA 31 (e.g. water storage; availability of conserved water).
				5) Pursue developing an intergovernmental agreement between the WRIA 31 Lead Agency or Implementing Governments with Ecology to ensure effective implementation of VRAs that would be applicable within the WRIA, and ensure harmonization of VRAs with the WRIA 31 watershed management plan as required under chapter 90.90 RCW. This may include defining a list of potential storage and conservation projects that make available new water supplies within WRIA 31. The PAC will consult with Ecology regarding any proposed VRA that would be applicable within the WRIA.
				6) Pursue funding for water supply projects within WRIA 31. This can include larger projects like a Kennewick ASR pilot project and/or a regional water storage project in the Wood-Glade planning area (Section 3.1.2), and/or a source exchange project in which groundwater supply from pumping of deep wells is replaced by Columbia River supply (Section 5.1.1). It could equally include projects to meet smaller-scale water demands throughout the watershed, not limited by distance from the mainstem Columbia River.

Note: If there is any discrepancy between information here and that in the Chapter 3 text, the language of the Chapter 3 text governs.

Table 7-1. Summary of Recommended WRIA-Wide Actions

Section # in Plan	Issue	Objective	Priority	Recommended Actions
Water Quantity (continued)				
3.1.1 (continued)	Columbia River Water Supply (continued)	Ensure that adequate water supplies are available to meet current needs, provide for long-term sustainability of irrigated agriculture, and support economic and population growth within WRIA 31. Achieve this objective through active participation in the implementation of the Columbia River Basin Water Supply Act (Engrossed Second Substitute House Bill [ESSHB] 2860) and through Ecology's processing/granting new water right permits to exercise the John Day-McNary Pools reserves appropriated in chapter 173-531A WAC. (continued)	High (continued)	7) Develop a strategy in the context of the chapter 90.90 RCW to address existing interruptible Columbia River rights in WRIA 31 that are not included in the CSRIA VRA.
				8) The WRIA 31 Implementing Governments will provide information and help revise future Columbia River water supply inventories and long-term water supply and demand forecasts. This will include stronger recognition of smaller-scale water demands throughout the watershed, not limited by distance from the mainstem Columbia River. It is of importance to WRIA 31 that smaller-scale water supply projects, including those at distance away from the mainstem Columbia River, be recognized and planned for within implementation of the Columbia River Basin Water Supply Act. The PAC may seek funding for this participation.
				9) Pursue developing an intergovernmental agreement between the WRIA 31 Lead Agency and Ecology regarding implementation of the state trust water program within the WRIA. The intent is to ensure that, if state funding is used to acquire water rights, or parts of water rights, for placement in the state water trust program, such acquisitions are consistent with the watershed management plan and include early consultation with the Implementing Governments or PAC. It is also recommended that the PAC and Implementing Governments investigate legislative actions that may be necessary to provide clarification about the timing and consultation criteria to ensure consistency with the approved watershed management plan.
				10) The PAC will serve as an advisory body for implementing the Columbia River Basin Water Supply Development Program within WRIA 31.
				11) The PAC will communicate with other planning units and local governments in the Columbia River basin in order to better develop a Columbia River basin-wide perspective of water resource issues and to identify opportunities for cooperative efforts. It is further recommended that the PAC be represented on relevant water resource policy advisory groups and forums on the state and federal level.
				12) Fill data gaps regarding factors that affect fish survival within the John Day and McNary Pools and assess fish and wildlife habitat in and adjacent to the Columbia River mainstem.

Table 7-1. Summary of Recommended WRIA-Wide Actions

Section # in Plan	Issue	Objective	Priority	Recommended Actions
Water Quantity (continued)				
3.1.2	Limited Water Storage	Develop new water storage facilities off of the Columbia River mainstem to help meet future demand.	High	The PAC or subcommittee should identify and evaluate storage needs and storage opportunities to best meet those needs throughout the watershed. Refer to Section 3.1.2 for planning area-specific recommendations.
3.1.3	Preserve Water Rights in the Watershed	Preserve existing water rights as an asset of the watershed.	High	Increase public education regarding water rights to avoid inadvertent relinquishment. This can include developing a flier that explains water rights and their potential for relinquishment in layman's terms, and distributing it widely throughout the watershed.
				Establish a water market or "clearinghouse" that would provide a link and local point of contact for water right sellers/buyers or leasors/leasees, and municipal entities, to facilitate the transfer of, and prevent relinquishment of, existing water rights.
				Pursue legislative changes to the state water code to define changes in irrigation practices occurring over time periods longer than 5 years as sufficient cause for nonuse during that period (and preventing relinquishment if full use is achieved during the period).
3.1.4	Disincentives to Water Conservation	Maximize water conservation by eliminating disincentives to conserving.	High	1) The PAC should pursue legislation to effect changes in the water code that prevent relinquishment of rights to conserved irrigation water and provide flexibility in its future use (e.g. irrigation of expanded acreage). Removing the disincentives to water conservation from the state water code is a legislative action needed to implement the WRIA 31 watershed management plan and, as such, should be included in Ecology's annual report the appropriate standing legislative committees pursuant to RCW 90.82.043(5).
				2) Propose and develop voluntary regional agreements as one option to make the quantity of conserved water available in the WRIA.
				3) Identify conditions in conservation grants that may (unintentionally) create disincentives to implementing conservation or otherwise undermine this watershed management plan. Communicate this information with proposed solutions to responsible funding agencies.
				4) Encourage conservation as a means to make water available for irrigation of additional acreage by the water right holder.

Table 7-1. Summary of Recommended WRIA-Wide Actions

Section # in Plan	Issue	Objective	Priority	Recommended Actions
3.1.4 (continued)	Disincentives to Water Conservation (continued)	Maximize water conservation by eliminating disincentives to conserving. (continued)	High (continued)	5) Where deemed appropriate by the Implementing Governments in consultation with the PAC, acquire water generated through conservation from willing water right holders, put it in the state trust program and make it available to meet out-of-stream and instream water uses in accordance with this watershed management plan. The PAC will serve in an advisory capacity for implementation of the state water trust program within the WRIA to ensure continuing conformance with the watershed management plan. In its advisory role, the PAC should propose and develop agreement(s) to ensure that trust water right programs further the purposes of this watershed management plan, not undermine it.
Water Quality				
3.2	Columbia River Water Quality	Document the contribution of WRIA 31 streams to impaired water quality in the mainstem Columbia River.	Low	Ecology will coordinate with the WRIA 31 initiating governments regarding TMDL or other water quality-related activities on the mainstem Columbia River within WRIA 31.
				Develop a WRIA-wide water quality maintenance/improvement plan for tributary streams that are designated pursuant to the ESA as critical habitat for Middle Columbia steelhead. The plan would identify appropriate locally managed activities to be undertaken to ensure that water quality in the tributaries are maintained and, where practical, enhanced.
Aquatic Habitat				
3.3.1	Limited Aquatic Habitat Data Available	Collect quality-assured data to fill data gaps regarding aquatic habitat throughout WRIA 31, so that appropriate actions to address factors affecting fish production can be developed.	High	Collect quality assured data to assess current habitat conditions and limiting habitat characteristics, in accordance with the IAC's Washington Comprehensive Monitoring Strategy for Watershed Health and Salmon Recovery and other established and accepted protocols. Identify specific projects to address fish habitat issues based on the results of those studies. Specific information regarding available information and recommended approaches are outlined in Sections 4.3, 5.3, and 6.3 for Rock Creek, Wood-Glade, and Kennewick planning areas, respectively.

Table 7-2. Summary of Recommended Actions for the Rock Creek Planning Area

Section # in Plan	Issue	Objective	Priority	Recommended Actions
Water Quantity				
4.1.1	Natural Streamflow Condition	Evaluate options including storage to enhance Rock Creek streamflows to meet specific demands defined in the future.	Low	As dictated by future demands in the subbasin, conduct a feasibility study of options to enhance streamflows in Rock Creek.
4.1.2	Groundwater Development Potential	Develop baseline information to support developing additional water supply sources if future demand in the basin increases significantly.	Medium	Conduct a hydrogeologic evaluation to explore aquifer systems and better understand whether groundwater quantity and quality is sufficient to meet potential larger future demands in the Rock Creek planning area.
Water Quality				
4.2.1	Elevated Water Temperature in Rock Creek	Bring Rock Creek into compliance with state surface water standards for temperature. This could be achieved by collecting additional data and analysis that show the elevated temperatures are a result of natural conditions and human influence is increasing water temperature by no more than 0.3°C, or by developing and implementing a water quality improvement and protection plan (Category 4A or 4B) that over time results in compliance and recategorization as Category 1 (meets standards) or Category 2 (waters of concern).	High	Develop a locally-managed water quality improvement plan to 1) evaluate the cause of elevated temperature (i.e. effect of natural conditions versus human activity) and 2) continue implementing BMPs to ensure that human effects on temperature are within acceptable levels. The Forests and Fish Report/Forest Practices Rules serve as a water quality improvement plan for forested headwaters in the subbasin. Continue implementation of the management practices identified in the 1996 MOA between Ecology and EKCD until a water quality improvement plan is Evaluate habitat enhancement projects that include riparian plantings to increase stream shade. Install additional permanent streamflow gauging stations at or near locations where water temperatures have been measured since 1996. Station locations will be determined once currently planned gauges are operating and data gaps, if any, are identified.
4.2.2	Water Quality Monitoring	Document long-term water quality conditions, apart from temperature, that could be attributable to land use in the watershed.	Low	Monitor for trends in fecal coliform levels in Rock Creek by adding periodic laboratory analyses to EKCD's monitoring program.

Note: If there is any discrepancy between information here and that in the Chapter 4 text, the language of the Chapter 4 text governs.

Table 7-2. Summary of Recommended Actions for the Rock Creek Planning Area

Section # in Plan	Issue	Objective	Priority	Recommended Actions
Aquatic Habitat				
4.3.1	Salmonid Distribution and Use	Determine the distribution and survival of salmonids in the watershed.	High	Document and monitor the distribution and abundance of spawning salmonids in Rock Creek and its tributaries.
				Evaluate the distribution and abundance of juveniles rearing in the subbasin.
				Measure migration of juveniles and total juvenile production through installation and year-round operation of a screw trap, in cooperation with WDFW
4.3.2	Habitat Quality and Potential Land Use Effects	Evaluate the quality of habitat in the Rock Creek subbasin and the effects of land use on that habitat.	High	Implement the actions described in Section 4.2.1 to restore and protect fish habitat.
				Quantify spawning habitat (e.g., document substrate size and embeddedness in potential spawning areas).
				Collect additional information on passage barriers to help refine estimates of available habitat for anadromous fish.
				Develop an inventory of current rearing habitat, identifying areas of year-round flow and suitable stream temperatures and areas where these conditions may be reasonably attained.
				Collect water temperature data when conducting snorkel surveys to support evaluation of the temperature tolerances of local steelhead population.
				Implement a public education and communication program to inform landowners regarding the intent of habitat protection and restoration projects, educate the public regarding the influence of land use on the quality of fish habitat, and encourage participation in volunteer efforts.
4.3.3	Monitoring	Monitor the effectiveness of aquatic habitat protection and restoration efforts.	High	Develop and implement an aquatic habitat monitoring plan consistent with state protocols that provides for documenting long-term trends in fish population levels and habitat quality and documents effectiveness of habitat-related projects. Data collection efforts must be developed using statistically robust methods and must include a quality assurance process, and all data collected must be made publicly available.
				Conduct public education/communication to inform landowners regarding the intent of habitat-related projects and to foster understanding regarding the influence of land use on the quality of fish habitat and encourage participation in volunteer efforts.

Note: If there is any discrepancy between information here and that in the Chapter 4 text, the language of the Chapter 4 text governs.

Table 7-3. Summary of Recommended Actions for the Wood/Glade Creek Planning Area

Section # in Plan	Issue	Objective	Priority	Recommended Actions
Water Quantity				
5.1.1	Groundwater Level Declines in Basalt Aquifer	For affected areas, develop alternative water supply sources to reduce (net) withdrawal from the Wanapum Aquifer and thereby maintain a sustainable groundwater supply.	High	Develop conceptual design of a regional water storage and supply system making use of the John Day-McNary reserve.
				Evaluate a voluntary source exchange program in which groundwater rights are replaced by surface water rights permitted from the John Day-McNary reserve.
				Scope and conduct a drilling program to explore development potential of the Grande Ronde Basalt aquifer in this area and assess the hydraulic effect on the Wanapum Basalt aquifer caused by pumping the Grande Ronde.
				Complete detailed water storage feasibility studies as warranted to address water needs not met through one of the recommended actions above.
				Continue Ecology's program of monitoring water levels in WRIA 31 wells, and ideally expand it to include additional wells in the multiple aquifer units as allowed by land owners.
				The PAC will consider establishing all or a portion of the Wood/Glade Area as a groundwater management area under RCW 90.44.400. A local government can develop and implement a groundwater management program.
5.1.2	Higher-Value Crops Could Allow for Water Supply Investment	Achieve policy/regulatory changes that allow for maximum flexibility to change existing water rights in ways that support growth in the agricultural economy.	High	Work with Ecology to further evaluate and consider developing policies/regulations, including further review of its ACQ policy, that facilitate, not restrict, shifting existing water rights to new areas that would support production of higher value crops. Communications with legislators by the Implementing Governments and/or PAC may also be an option.
5.1.3	Expansion of Small Public Water Systems	Eliminate artificial (administrative) constraints that prevent public water systems from meeting growing demand.	Medium	DOH should work with local public water systems during approval of water system plans to allow service to the maximum number of persons/units possible within the systems' available water rights and source capacity.
				Provide financial assistance, through grants or other means, to allow all public water systems in the planning area to purchase and install totalizing flow meters for sources and services.
				Pursue legislative action to amend the state water code to provide for expedited processing of water right permits to small public water systems, and provide the state resources to implement it.

Note: If there is any discrepancy between information here and that in the Chapter 5 text, the language of the Chapter 5 text governs.

Table 7-3. Summary of Recommended Actions for the Wood/Glade Creek Planning Area

Section # in Plan	Issue	Objective	Priority	Recommended Actions
Water Quality				
5.2.1	Nitrate in Shallow Groundwater and Surface Water	Ensure that all area residents have a safe source of potable water.	High	Local DOHs, in cooperation with conservation districts, should consider the following actions: ● Inventory nitrate concentrations in all drinking water sources within the planning area; ● Develop an integrated GIS/database to manage the available groundwater quality data; ● Identify if alternative drinking water sources are available to those with unsafe drinking water; ● Continue to educate the public on proper wellhead protection, groundwater quality testing, and the risks associated with drinking water with elevated nitrates.
Aquatic Habitat				
5.3.1	Critical Habitat Designations	Document the quality and extent of fish habitat in reaches identified as critical habitat. Based on the results of data collection efforts, identify projects to restore and protect critical fish habitat.	Medium	Survey distribution of fish and redds downstream of passage barriers, using established protocols supported by WDFW including summer snorkel surveys.
				Quantify spawning habitat after the distribution and life history of the local stock is better understood. Map spawning habitat while conducting redd surveys using established protocols.
				Collect additional information on passage barriers to help refine estimates of available habitat for anadromous fish.
				Inventory current rearing habitat, identifying areas of year-round flow and suitable stream temperatures and areas where these conditions may be reasonably attained if actions were taken
				Collect statistically robust, quality-assured habitat data consistent with established state protocols (see Section 5.3.1); however, modifications of protocols may be required to ensure that the information needed is obtained during the assessments. Data collected will be made publicly available.
				Identify opportunities for habitat protection and restoration projects based on data collected to fill data gaps.
				Encourage participation in existing voluntary programs that provide for habitat protection.
				Implement a public education program to inform landowners regarding the intent of habitat protection and restoration projects, educate the public regarding the influence of land use on the quality of fish habitat, and encourage participation in volunteer efforts.
5.3.2	Fish Passage Barrier at Mouth of Pine Creek	Restore fish passage at the culvert.	Medium	Provide to WSDOT information from habitat surveys recommended in Section 5.3.1 regarding quality of habitat upstream of the culvert. Support WSDOT efforts to obtain funding for their replacement of the culvert.

Note: If there is any discrepancy between information here and that in the Chapter 5 text, the language of the Chapter 5 text governs.

Table 7-4. Summary of Recommended Actions for the Kennewick Planning Area

Section # in Plan	Issue	Objective	Priority	Recommended Actions
Water Quantity				
6.1.1	Mitigation for Quad Cities Water Right	Identify sources of mitigation water to allow for Kennewick's future exercise of the Quad Cities water right without interruption.	High	Reassess the current assumption of 80% annual consumptive use for mitigation under the Quad Cities water right. A more accurate estimate of annual consumptive use will reduce the quantity of mitigation water required. Identify additional sources of water for mitigation of the remaining 168 cfs of diversion under the Quad Cities water right (see Section 6.1.1 for options).
6.1.2	Water for Urban Irrigation	Improve reliability of irrigation supplies in Kennewick area.	Medium	Support KID's proposed pump exchange program including the Planning Unit writing a letter of support to stakeholders, and then assist KID as warranted to secure funding for program implementation. Assist implementers of the Tri-Cities Urban Area Irrigation Plan to pursue funding for urban irrigation conservation projects, including public education. After adoption of the CSRIA VRA, determine applicability of the CSRIA VRA to conservation savings under Tri-Cities Urban Area Irrigation Plan. If necessary, work with implementers of the Tri-Cities Urban Area Irrigation Plan not covered under the CSRIA VRA to evaluate developing a separate VRA that makes the water generated from conservation practices available for other
6.1.3	Use of Reclaimed Water	Identify opportunities for cost-effective use of reclaimed municipal water.	Low	No immediate action is recommended with respect to reclaimed water. City of Kennewick should continue to evaluate use of reclaimed water as water treatment technologies improve, potentially allowing more cost-effective production of Class A treated wastewater.
Water Quality				
6.2.1	Vulnerability of Single Supply Source	Diversify the City of Kennewick's supply sources to reduce system vulnerability to water quality impact.	High	To evaluate groundwater sources of supply, conduct a detailed evaluation of ASR feasibility through pilot testing.
6.2.2	State Antidegradation Policy as Applied to ASR	Obtain from Ecology a written policy, specific to ASR, which allows for de minimus impact to the quality of the receiving body of groundwater, as long as beneficial use of the groundwater resource is not impaired and it is not detrimental to the public interest.	High	Meet with Ecology water resource and water quality staff to discuss Ecology drafting a water quality policy or pursuing a statutory exemption, specific to ASR, which allows for de minimus water quality impact to the receiving body of groundwater as long as beneficial use of the groundwater resource is not impaired and it is not detrimental to the public interest.

Note: If there is any discrepancy between information here and that in the Chapter 6 text, the language of the Chapter 6 text governs.

Table 7-4. Summary of Recommended Actions for the Kennewick Planning Area

Section # in Plan	Issue	Objective	Priority	Recommended Actions
Water Quality (continued)				
6.2.3	Water Quality Outside Kennewick Water Service Area	Ensure that the rural population, outside Kennewick's water service area, has a safe source of potable water.	Low	Local DOHs, in cooperation with conservation districts, should consider the following actions: ● Inventory nitrate concentrations in all drinking water sources within the planning area; ● Develop an integrated GIS/database to manage the available groundwater quality data; ● Identify if alternative drinking water sources are available to those with unsafe drinking water; ● Continue to educate the public on proper wellhead protection, groundwater quality testing, and the risks associated with drinking water with elevated nitrates.
Aquatic Habitat				
6.3	Kennewick Area Aquatic Habitat	Develop better understanding of opportunities to improve aquatic habitat which is beneficial to Columbia River salmon populations, thus assisting Kennewick in implementing its portion of the Quad Cities water right.	Medium	Seek clarification regarding the types of mitigation that would be found acceptable and the geographical range within which mitigation can be developed, under the Quad Cities water right.
				Evaluate the potential for habitat restoration and the need for supplemental information by examining existing information regarding baseline habitat conditions and talking with WDFW Tri-Cities personnel regarding potential to improve habitat.
				Identify, using existing and any supplemental information, opportunities for applicable habitat improvement in WRIA 31 and/or other WRIAs.
				Consider contributing funds to habitat projects outside of the Quad Cities in exchange for a proportionate credit for the mitigation achieve. This approach would need to be negotiated with Ecology in advance.

Note: If there is any discrepancy between information here and that in the Chapter 6 text, the language of the Chapter 6 text governs.

8 Implementation of WRIA 31 Watershed Management Plan

Phase 4 of the watershed planning process is implementation of the watershed management plan, which begins after the final watershed management plan is approved in a joint session of Benton, Klickitat, and Yakima counties' legislative authorities. Without effective implementation, the four years of work culminating in the watershed plan would be of limited practical value.

Implementation of the watershed management plan will consist of both independent and coordinated actions by various organizations. Implementation of the actions called for in the watershed management plan will be subject to budgetary and staffing constraints. The Planning Unit also recognizes that additional assessment and planning, policy-related work, legislation, authorizations, permitting, and SEPA and/or NEPA review may be necessary before implementation of some actions can occur. However, in approving the watershed management plan, the water resource interests in WRIA 31 agree to help seek and support funding to carry out the actions identified in the plan, focusing first on the priority issues and actions with the greatest expected benefit.

A wide range of interests worked cooperatively to create a vision for the future condition of water resources within WRIA 31, evaluate the current condition of water resources and fish habitat, and reach agreement, as embodied in this plan, on how to manage the water resources and habitat. The effort to produce the watershed management plan is but the beginning of the cooperative effort that will be required to achieve the envisioned state of water resources. The entities who accept responsibility for carrying out various actions set forth in the watershed management plan need to formally commit themselves through memoranda of agreement, resolutions, policy statements, or other such actions. As the plan is implemented and new information becomes available, all water resources interests need to remain committed to monitoring progress and steering the effort in response to the evolving situation.

This chapter provides a general overview and considerations for watershed plan implementation.

8.1 Coordination of Plan Implementation

The Initiating Governments that are actively participating in watershed planning for WRIA 31 will ensure that planning is representative of a broad range of water resources interests in WRIA 31 and provide general oversight of plan implementation, initiate planning activities, define the scope of watershed planning, including plan implementation, and address policy issues that arise during implementation. At the time this plan was drafted Benton County, Klickitat County, and the City of Kennewick were the Initiating Governments that were actively participating in the process, but Yakima County can become an active Initiating Government whenever its legislative authority so determines.

The "Implementing Governments" will be made up of the Initiating Governments that are actively participating in the planning process, state agencies (with Ecology representing the state agencies), the interested health districts within the management area, and the interested conservation districts within the management area. These are the primary agencies and local governments that have authority to implement various plan activities. The Initiating Governments may expand the Implementing Governments' membership to include other entities. The Implementing Governments will meet quarterly or as needed to provide oversight and coordination of watershed plan implementation. A memorandum of understanding amongst the Implementing Governments and/or between the Implementing Governments and the Initiating Governments may be required to facilitate plan implementation.

Subject to the Governor's consent, the Initiating Governments intend to have Ecology continue to serve as the state representative responsible for communication and coordination with other state agencies. In cooperation with the other Implementing Governments, Ecology can, among other things, provide guidance and advice regarding technical, administrative, and/or funding issues, attend meetings, review documents and proposals for funding, and facilitate interaction with other state agencies.

The Planning Unit will continue to operate. Upon approval of the watershed management plan, the Planning Unit will be renamed as the Water Resource Planning and Advisory Committee (PAC) to reflect the planning and advisory responsibility of the committee. The PAC will serve as a dedicated resource for providing input to Implementing Governments regarding water resource and habitat issues, but shall have no authority that is not specifically granted by the Initiating Governments. The PAC is an advisory body to the Initiating Governments and the Implementing Governments.

The PAC is tasked with developing the detailed implementation plan during the first year of Implementation. Upon approval of the detailed implementation plan, and at times the PAC is not engaged in specific projects (e.g., evaluating a water storage opportunity, developing a water quality improvement and protection plan), it is envisioned that quarterly or biannual meetings will be sufficient to address PAC responsibilities.

The following are the responsibilities of the PAC:

- Developing a detailed implementation plan;
- Clarifying the watershed management plan and detailed implementation plan as needed;
- Updating/amending the watershed management plan and/or detailed implementation plan if requested by the Initiating Governments (the Initiating Governments retain the authority to initiate planning, and define the scope and process associated with any plan amendments);
- Reviewing work that is accomplished and advising on upcoming plan implementation work;
- Assisting with prioritizing projects and developing a statement of agreed priority for the management area; and

- Assisting with assessment of and advisement on water resource and habitat management issues as requested by the Initiating Governments or Implementing Governments.

8.2 Phase 4 Funding

Currently under chapter 90.82 RCW, Phase 4 Implementation grants are available to support implementation of the watershed plan. The Phase 4 grant may be up to $100,000 for each of the first three years of implementation. At the end of the three-year period, a two-year extension may be available for up to $50,000 each year. The Watershed Management Act requires a 10% match from the recipient of state Phase 4 funding. The match may include financial contributions or in-kind goods and services directly related to plan implementation during Phase 4. The PAC and Implementing Governments should continue discussion with legislators to support future funding of implementation activities.

Funding sources other than that from the state Watershed Management Act will ultimately be needed to implement the recommended actions in the WRIA 31 watershed plan.

8.3 Detailed Implementation Plan

A detailed implementation plan (DIP) provides the framework for how to implement the recommended actions of the watershed plan. The DIP will further prioritize actions recommended in the watershed plan for future funding and implementation. Submittal. of a DIP to Ecology is a condition of receiving grants for the second and all subsequent years of the Phase 4.

Chapter 90.82 RCW does not specify a process for approving the DIP or amendments to the DIP. However, as an obligation under RCW 90.82.130(3), Ecology shall not accept a DIP for WRIA 31, or amendment thereof, until such plan or amendment has been approved by the PAC (formerly called Planning Unit) using the same procedures by which it approved the watershed management plan under RCW 90.82.130(1)(a), and the DIP or amendment thereof has been approved by the legislative authorities of Benton, Klickitat, and Yakima counties following a public hearing. However, the county legislative authorities may approve a DIP or DIP amendment by resolution as an option to joint session, if approved by all counties.

As per RCW 90.82.043, the DIP must include the following elements at a minimum:

- Strategies to provide for sufficient water for production agriculture; commercial, industrial, and residential uses; and instream flows;
- Timelines to achieve these strategies (subject to funding constraints);
- Interim milestones to measure progress;
- Coordination and oversight responsibilities;
- Needed interlocal agreements and administrative approvals; and
- Specific funding mechanisms.

Furthermore, the PAC must consult with other entities planning in the watershed and identify and seek to eliminate any activities or policies that are duplicate or inconsistent.

8.4 Watershed Plan Amendment

Amendment of an approved watershed management plan is addressed in RCW 90.82.130(5), which provides that Ecology may develop and adopt modifications to the watershed management plan or obligations imposed by the plan only through a form of negotiated rule making that uses the same processes that applied in the watershed for developing the plan. Per RCW 90.82.130(3), Ecology shall utilize a form of negotiated rule making that includes approval of the watershed plan or obligation modification by the Planning Unit using the same procedures by which it approved the watershed management plan under RCW 90.82.130(1)(a) and includes approval of the watershed plan or obligation modification by the legislative authorities of Benton, Klickitat, and Yakima counties following a public hearing.

The Initiating Governments can initiate the process to amend this watershed management plan at any time for any reason. For example, this watershed management plan was developed and approved with an understanding of chapter 90.82 RCW and the state statutes linked to chapter 90.82 RCW as they existed in November 2007. Amendments to chapter 90.82 RCW or other state statutes made after that date might result in this watershed management plan being referenced or implemented in a manner inconsistent with the intent of the Planning Unit and/or counties that approved the plan. In such an event, the Planning Unit expects that the Initiating Governments might determine that amendment of the watershed management plan is needed.

8.5 Monitoring and Adaptive Management

Adaptive management involves learning from the outcomes of actions taken so that management can be changed promptly and appropriately if warranted. Adaptive management is a vital part of implementing a watershed management plan. Monitoring is a key part of many of the recommended actions in this watershed plan. Studies and monitoring can determine whether assumptions used in formulating the plan recommendations are valid or need adjusting. Monitoring the results of actions taken determines the effectiveness of the action in achieving its objective.

This and other types of information obtained during implementation may indicate a need to modify a recommended action or other element of the watershed plan or the DIP. This requires regular review of implementation results by the Implementing Governments and PAC to determine if the watershed plan objectives are being met. During the course of regular reviews, the Implementing Governments or PAC can recommend that changes be made to either the watershed plan or the DIP. Such recommendations will be submitted to the Initiating Governments for consideration. Upon concurrence of the Initiating Governments, an amendment to a watershed plan can be made in accordance with the procedures described in Section 1.1.4.

8.6 Quality Assurance

The Planning Unit is committed to the application of quality assurance principles in the implementation of the WRIA 31 watershed management plan. The Planning Unit is also committed to ensuring that information developed during studies and monitoring programs is available for public use.

Much of the information and data relied upon in the WRIA 31 Level I technical assessment had little if any documentation regarding quality control (QC) for the data collected. This is likewise true for many of the data historically submitted to Ecology and used in their state Water Quality Assessment, including for definition of impaired waterbodies (303[d] list). Recently, Ecology has updated and implemented policies for accepting only credible data for the state Water Quality Assessment that have documentation of appropriate quality assurance/quality control (QA/QC) (Ecology 2006a and 2006b).

A consistent application of data QA/QC is needed for implementing this watershed plan's recommended actions and evaluating the outcome. Use of Quality Assurance Project Plans (QAPP) is a standard method for ensuring a generally consistent level of quality for environmental data collection. The DIP will provide additional detail regarding application of QAPPs in Phase 4 implementation work. The DIP will also provide provisions for coordinating with other planning efforts within WRIA 31, to ensure that appropriate data QA/QC protocols are used consistently in all related work within the watershed. Additionally, development and implementation of a quality management system to support implementation of the watershed management plan and actions implemented pursuant to the plan is strongly encouraged.

8.7 Obligations Under this Plan

Each chapter within this plan identifies key issues for each of the three sub-basins and area-wide issues. The Planning Unit had identified the level of priority, objective and one or more recommended strategies to achieve each objective. The recommended actions have been developed based on available technical information, assessment activities undertaken by the Planning Unit, and knowledge of historical and current rules, polices and programs that affect resource management in WRIA 31. The recommended strategies are potentially viable measures to achieve the identified objectives. The Planning Unit members firmly believe the recommended actions provide pathways to effective implementation of the watershed plan. While the recommended actions provide pathways to support effective implementation of the plan they do not create formal obligations within the meaning of RCW 90.82.130(3) for individuals, organizations, or local, state and federal agencies. *See "Obligations" defined in the paragraphs below.*

Nothing in this document shall be construed as an obligation under 90.82.130(3) RCW to any entity unless specifically identified as such in this section.

A watershed management plan can not create any obligation for an entity without that entity's knowledge and consent, as provided in RCW 90.82.130[3]), which states:

"The planning unit shall not add an element to its watershed plan that creates an obligation unless each of the governments to be obligated has at least one representative

on the planning unit and the respective members appointed to represent those governments agree to adding the element that creates the obligation. A member's agreeing to add an element shall be evidenced by a recorded vote of all members of the planning unit in which the members record support for adding the element."

The WRIA 31 Operating Procedures Manual adds further specifics:

"To constitute an "obligation" on any government under RCW 90.82, the element of the watershed plan containing the obligation shall be clearly identified as an obligation and the government(s) that it obligates shall be identified. The watershed plan shall have a chapter, section, or appendix listing any and all obligations contained in the watershed plan. No watershed plan element shall be interpreted as creating an obligation unless the obligation is identified and listed as prescribed in this paragraph. The watershed plan shall contain this paragraph or comparable statement that informs the reader regarding the identification of obligations."

8.7.1 Specific Obligations

Obligations under the WRIA 31 watershed management plan are as follows:

- As an obligation under RCW 90.82.130(3), Ecology shall contact the WRIA 31 Initiating Governments prior to initiating actions to establish or amend instream flows within WRIA 31, and negotiate with the Initiating Governments regarding appropriate roles for various parties in the instream flow setting process.
- As an obligation under RCW 90.82.130(3), Ecology shall contact the WRIA 31 Initiating Governments prior to taking actions to establish new TMDLs or update existing TMDLs affecting waterbodies in WRIA 31. To the extent enabled under RCW 90.82.030, water quality in the WRIA is within the scope of watershed planning. The Implementing Governments and PAC will therefore continue to address water quality issues through implementation of this watershed plan. As such, the Initiating Governments expect to have the opportunity to provide information to and work with Ecology on water quality issues including TMDLs.
- As an obligation under RCW 90.82.130(3), Ecology shall adhere to the approval processes prescribed in this plan for watershed management plan amendments and the approval and amendment processes for the detailed implementation plan. These processes are specified in Section 9.4.
- As an obligation under RCW 90.82.130(3) and pursuant to RCW 90.90.040(1), Ecology shall work with the PAC when developing or updating sections of the Columbia River Basin Water Supply and Long-Term Water Supply and Demand Forecast pertinent to WRIA 31. Ecology and PAC will develop a formal procedure document regarding the PAC's role in updating the Columbia River Basin Water Supply and Long-Term Water Supply and Demand Forecast will be developed during the implementation phase of watershed planning.
- As an obligation under RCW 90.82.130(3) and pursuant to RCW 90.90.030(1)(c), Ecology shall work with the Implementing Governments and

PAC to ensure harmonization of voluntary regional agreements with this watershed management plan.

- As an obligation under RCW 90.82.130(3), but subject to the availability of funding, Ecology commits to installing and maintaining a stream flow gauge on Rock Creek. Prior to removing the gauge, Ecology will consult with the PAC or Implementing Governments to determine if an extension of this commitment is needed.

The Planning Unit expects a written acknowledgement of obligations from Ecology regarding implementation of this plan.

8.8 Rulemaking and Interagency Agreements

As provided in RCW 90.82.130(3), the Planning Unit has given its consent to state agencies, county governments, and parties who voluntarily assume obligations or commitments for watershed management plan implementation to employ written agreement, policy adoption, or change in documented procedures as means of fulfilling the obligations and commitments related to provisions of the statute. The Planning Unit has determined that rule making is not required for any obligation associated with the watershed management plan.

Should the PAC come to determine that rule making is appropriate, such determination shall be made only through the same process as was used by the Planning Unit to approve the watershed management plan under RCW 90.82.130. This does not preclude state agencies, county governments, or other entities from pursuing rule making or promulgation of ordinances under its own authority. If any state agency, county government, or other entity pursues rule making or promulgation of ordinances under its own authority, this watershed management plan shall not be used as the basis to justify such actions without a determination by the PAC and Initiating Governments that development of rules or ordinances is appropriate.

Upon approval by the county legislative authorities, the watershed management plan will be recognized by Ecology and accepted through a memorandum of agreement or official written statement. The binding agreement or official statement will acknowledge that Ecology participated in the planning process and that the plan is deemed to satisfy the Ecology's watershed planning authority for WRIA 31 with respect to the components included under the provisions of RCW 90.82.070, .090, and .100.

8.9 Constraints and Considerations for Implementation

8.9.1 Project Cost Efficiency

The Planning Unit is committed to focusing efforts on actions that have the greatest cost efficiency possible. Adherence to a cost-efficient approach for addressing issues will assure that implementation funds are being spent to the greatest benefit of the local community and the environment.

8.9.2 Funding

The Planning Unit recognizes that implementation of the watershed plan will be dependent on responsible entities receiving suitable funding. Funding will be required to support coordination of activities as well as actual projects. Identifying the sources of project funding is a critical element of the detailed implementation plan.

8.9.3 Applicable Law

Nothing in the watershed plan supersedes any federal, state, or county law or regulation. All actions in this plan are subject to applicable law. This watershed management plan does not include any obligations or restrictions on forest practices that are additional to or inconsistent with the Forest Practices Act (Chapter 76.09 RCW) and its implementing rules.

If any provision of this plan or any provision of any document incorporated by reference shall be held invalid, such invalidity shall not affect the other provisions of this plan which can be given effect without the invalid provision, and to this end the provisions of this plan are declared to be severable.

8.10 Related Planning Efforts

Under RCW 90.82.110, the Planning Unit must review "…planning, planning projects, and activities that have already been completed regarding natural resource management or enhancement in the management area and the products or status of those that have been initiated but not completed for such management and incorporate their products as appropriate to avoid duplication of work already performed or underway". Additionally, RCW 90.82.100 requires that where habitat restoration activities are being developed under chapter 246, Laws of 1998 (chapter 77.85 RCW as amended by ESHB 2496), such activities shall be relied upon as the primary non-regulatory habitat component for fish habitat.

The following subsections provide an overview of these actions and a review of the applicability of those actions to the implementation of the WRIA 31 watershed management plan. The reviews include an assessment of the various products in light of the quality assurance and reporting requirements adopted into this plan and the definitions of best available science provided in WAC 365-195-905.

8.10.1 State Salmon/Steelhead Recovery Planning Under Chapter 246, Laws of 1998

As of August 2007, no part of WRIA 31 is within the purview of a lead entity or regional salmon recovery organization established under chapter 246, Laws of 1998, (ESHB 2496) or under chapter 77.85 RCW as amended subsequent to 1998. Chapter 77.85 RCW provides for an organizational framework to guide and implement salmon recovery, including grant funding for salmonid habitat restoration and protection projects. This framework involves four main organizational structures enabled by the statutes:

- The Governor's Salmon Recovery Office;
- The Salmon Recovery Funding Board;

- Local Lead Entities; and
- Regional Recovery Organizations.

As of August 2007, no projects have been funded in WRIA 31through the grant program established under chapter 77.85 RCW. No lead entity adaptive management strategy or regional salmon recovery plan has been developed for WRIA 31 under chapter 246, Laws of 1998, or under chapter 77.85 RCW as amended subsequent to 1998. No part of WRIA 31 is addressed in the "2006 Statewide Strategy to Recover Salmon."

A limiting factors analysis (LFA) was completed for WRIA 31 in 2000, pursuant to Chapter 246, Laws of 1998 (Lautz 2000). Had a lead entity been established for WRIA 31, the LFA would have been part of the critical pathways methodology used to develop an adaptive management strategy, habitat work schedule, and habitat project lists pursuant to Chapter 246, Laws of 1998. As stated in the LFA: "The findings of this analysis are to be used by a locally based habitat project selection committee to prioritize appropriate projects for funding under the state salmon recovery program, as well as to assist project sponsors in identifying projects."

The LFA for WRIA 31 (Lautz 2000) provides overview information but does not provide sufficient information to quantitatively or accurately characterize habitat conditions. The document was affected by the paucity of data regarding fish and habitat conditions in the WRIA. Hence, the analysis was based primarily on professional opinion. Ecology has determined (Ecology 2004b) that, statewide, the LFAs that were produced pursuant to Chapter 246, Laws of 1998, do not conform with the data quality assurance requirements of Ecology's Water Quality Policy 1-11. When considering information in the LFA (Lautz 2000), care should be taken to ensure that the quality of the information provided in the LFA is appropriate for the intended purpose. Where quality assurance rules or policies are applicable, the LFA should be reviewed for conformance prior to use for specific projects or actions.

Where "best available science" criteria are applicable to the intended use, the LFA should be reviewed for conformance with guidelines regarding those criteria prior to use. In the case of Growth Management Act programs, the criteria for determining best available science are found in WAC 365-195-905. As a source of information, the LFA as a whole would be classified as a "synthesis" per WAC 365-195-905. As a synthesis, the LFA appears to lack the following characteristics required to be considered scientifically valid, as defined in the WAC.

- **Methods:** In most cases, methods used are not clearly stated.
- **Logical conclusions and reasonable inferences:** The sources of the information and/or the assumptions supporting the conclusions were rarely presented.
- **References:** References supporting the assumptions and conclusions were not provided for most of the information in the document.
- Additionally, the peer review criteria specified in WAC 365-195-905 may not have been met.

A comprehensive evaluation of the individual elements of the LFA for conformance with the criteria for determining best available science was not conducted as part of the watershed planning process. However, the user of information found in the LFA is cautioned to check the type of information being considered (e.g., opinion) for conformance with the appropriate required best available science characteristics (e.g., logical conclusions and reasonable inferences, content, and references).

The LFA for WRIA 31 (Lautz 2000) is cited in the fish habitat assessment portion of the WRIA 31 watershed assessments that provide the technical foundation for the fish habitat components of this watershed management plan. Deficiencies with the available data and information are identified in the watershed assessment. The reader is cautioned that, depending on the intended use, information and data cited from the LFA in the fish habitat section of the watershed assessment may or may not conform to the applicable quality assurance or best available science criteria.

In 1998, a Memorandum of Understanding for the Coordinated Implementation of the Watershed Management Act and Salmon Recovery Planning Act was prepared and agreed to by the following participating Washington State agencies:

- Department of Agriculture;
- Conservation Commission;
- Department of Community, Trade, and Economic Development;
- Department of Ecology;
- Department of Fish and Wildlife[8];
- Department of Health;
- Department of Natural Resources;
- Department of Transportation;
- Recreation and Conservation Office (formerly Interagency Committee for Outdoor Recreation);
- Puget Sound Water Quality Action Team;
- Salmon Recovery Office within the Governor's Office; and
- State Parks and Recreation Commission.

The agreement seeks to clarify roles and responsibilities of state agencies participating in watershed planning and salmon recovery, and foster cooperative working relationships and sharing of information among the participating state agencies, local governments, and tribal governments. Under this agreement, Ecology serves as the clearinghouse for watershed management planning requests to the Governor, as provided in the Watershed Management Act. Receipt of the request will trigger notification of all participating agencies through their designated leads. For salmon recovery planning, the Conservation Commission develops technical guidance for local lead entities to use as a guide in

[8] A letter of support for this watershed management plan from WDFW is included as Appendix B.

developing project lists. Ecology and the Conservation Commission are to coordinate to the maximum extent possible the local requests for technical assistance.

8.10.2 NPCC Subbasin Planning

The Northwest Power Act directs the Northwest Power and Conservation Council (NPCC) to develop a program to protect, mitigate, and enhance fish and wildlife of the Columbia River Basin. As part of this, the NPCC directed preparation of subbasin plans to assess existing conditions and define strategies that will guide the implementation of the NPCC's Fish and Wildlife Program at the subbasin level. The subbasin plans help prioritize the spending of Bonneville Power Administration (BPA) funds for projects that protect, mitigate, and enhance fish and wildlife that have been adversely impacted by the development and operation of the Columbia River hydropower system.

Draft Rock Creek Subbasin Summary

A Draft Rock Creek Subbasin Summary was generated in 2001 (Berg 2001). This document was developed as a precursor to the NPCC's subbasin planning process. The Draft Rock Creek Subbasin Summary provides information in the form of an overview of the subbasin's fish and wildlife and habitat, but does not provide specific information sufficient to quantitatively or accurately characterize fish habitat conditions. There is no indication that the Draft Rock Creek Subbasin Summary has been reviewed for conformance with Ecology's Water Quality Policy 1-11. However, NPCC officials have stated that the subbasin planning work products are not intended to be used for regulatory purposes (personal communications Tony Grover and Larry Cassidy). With respect to best available science criteria, the Draft Rock Creek Subbasin Summary does not appear to conform with the criteria specified in WAC 365-195-905 regarding documentation of methods and assumptions, logical conclusions and reasonable inferences, support with credible references, and, possibly, peer review.

The Draft Rock Creek Subbasin Summary (Berg 2001) is cited in the WRIA 31 watershed assessments that provide the technical foundation for the fish habitat components of this watershed management plan. As in the case of information and data from the WRIA 31 LFA, the reader is cautioned that information and information cited from the Subbasin Summary in the fish habitat chapter of the assessment may or may not conform to the applicable quality assurance or best available science criteria.

Lower Middle Mainstem Columbia River Subbasin Plan

NPCC's Lower Middle Mainstem Columbia River Subbasin Plan (Normandeau Associates 2004) focuses on Rock Creek in WRIA 31, but the plan also includes information on the mainstem Columbia River, as well as information on areas within the State of Oregon. It contains an assessment and inventory of fish and wildlife resources, as well as a management plan establishing fish and wildlife protection and restoration priorities. The Lower Mid-Columbia River Mainstem Subbasin Plan (the Subbasin Plan) was adopted by the NPCC into its Fish and Wildlife Program in 2005.

The Subbasin Plan was developed in a short time frame and with a minimal budget of less than $37,000 (Normandeau Associates 2004). The subbasin assessment is a cursory technical analysis to determine the biological potential of the subbasin and the opportunities for restoration. The inventory includes information on fish and wildlife

protection, and any restoration or artificial production activities within the subbasin. The management plan includes biological objectives and strategies for a 10-15 year planning horizon.

As stated in chapter 2.2 of the Subbasin Plan: "An important goal of the subbasin planning process continues to be to bring people together in a collaborative setting to improve communication, reduce conflicts, address problems and, wherever possible, reach consensus on biological objectives and strategies that will improve coordinated natural resource management on private and public lands" (Normandeau Associates 2004). However, the Planning Unit, affected local governments, and many local residents strongly believe that the planning process and the resulting Subbasin Plan fell far short of achieving this goal. Klickitat County rejected the Subbasin Plan (Klickitat County January 31, 2005 and February 9, 2005), as did the Central and Eastern Klickitat Conservation Districts (CKCD 2005; EKCD 2005), noting deficiencies in the planning process and work products.

Care should be taken when considering information in the Subbasin Plan to ensure that the quality of the information is appropriate for the intended purpose. Where quality assurance rules or policies (e.g., Ecology's Water Quality Policy 1-11) are applicable, the Subbasin Plan should be reviewed for conformance prior to use for the intended purpose.

Where "best available science" criteria are applicable to the intended use, the Subbasin Plan should be reviewed for conformance with guidelines regarding those criteria. In the case of Growth Management Act programs, the criteria for determining best available science are found in WAC 365-195-905. A comprehensive evaluation of the individual elements of the Subbasin Plan for conformance with the criteria for determining best available science was not conducted as part of the watershed planning process. However, the Subbasin Plan appears to lack the following characteristics outlined in WAC 365-195-905(5) as generally to be expected in a valid scientific process.

- **Peer Review:** The May 2004 draft Subbasin Plan was reviewed by an independent science review panel sponsored by NPCC and was subject to a public review process. However, the assessments, inventory, and management plan elements of the Subbasin Plan pertaining to the mainstem Columbia River were produced after the completion of the independent science and public review processes and, to the Planning Unit's knowledge, have not been peer reviewed to date. There is no documentation of the independent science review panel reviewing the final Subbasin Plan to determine if the deficiencies in the draft Subbasin Plan were adequately addressed. Klickitat County was under contract to NPCC to provide technical review, but the County's comments on the draft assessments, inventory and management plan were not addressed (Klickitat County January 31, 2005).
- **Methods:** Much of the subbasin assessment and management plan is based on opinion, especially those sections pertaining to Rock Creek and other streams in WRIA 31. Data were not available for quantitative assessments and the fish/fish habitat assessment and planning processes did not accommodate methods to reach agreement on assumptions. As noted in the Subbasin Plan: "QHA [Qualitative Habitat Assessment] was initiated for the Rock Creek watershed, but the quick execution of the subbasin planning process did not

afford development of a deliberate, open and cooperative process to discuss and come to consensus with the numerous assumptions necessary in providing rankings for the model" (Normandeau Associates 2004).

- **Logical conclusions and reasonable inferences:** As indicated above, numerous assumptions were made in the assessment and there was inadequate time for a deliberate, open and cooperative process necessary to reach agreement on those assumptions.
- **References**: References supporting the assumptions and conclusions were not provided for much of the information in the document pertaining to WRIA 31, but the LFA for WRIA 31 (Lautz 2000) is an often cited reference in the Rock Creek sections of the fish and fish habitat assessment.

As provided in RCW 90.82.043(4): "In developing the implementation plan, the planning unit must consult with other entities planning in the watershed management area and seek to eliminate any activities or policies that are duplicative or inconsistent." The Subbasin Plan and subbasin planning process should be addressed when developing the detailed implementation plan for WRIA 31. Encourage the NPCC to update the Subbasin Plan. The factors (e.g., inadequate funding, schedule, and stakeholder participation) that led to the problems with the current Subbasin Plan should be addressed. The PAC should participate in efforts to update the Subbasin Plan to address activities or policies that are duplicative of or inconsistent with the watershed management plan.

8.10.3 NMFS Salmon Recovery Plans

The Endangered Species Act (ESA) requires the National Oceanographic and Atmospheric Administration National Marine Fisheries Service (NMFS) to develop and implement recovery plans for conservation and survival of listed species. Recovery plans must describe specific management actions; establish objective measurable criteria for delisting; and estimate the time and cost to carry out measures needed to achieve recovery.

At the time this watershed management plan was being prepared, NMFS was in the process of preparing a steelhead recovery plan for Rock Creek and the rest of WRIA 31, but it was not available for review by the Planning Unit. Upon release of the draft steelhead recovery plan by NMFS, it is appropriate for the Planning Unit (or PAC) to submit comments during public review. Additionally, the steelhead recovery plan should be considered when developing the detailed implementation plan in accordance with in RCW 90.82.043(4).

8.10.4 Quad Cities Regional Water Supply Planning

The Quad Cities, namely Kennewick within WRIA 31, and Richland, West Richland, and Pasco outside WRIA 31, have cooperatively undertaken regional water supply planning. Regional planning efforts are documented in EES (2000), JUB Engineers (2003), the Tri-Cities Urban Landscape Irrigation Plan (refer to Section 1.3.6), and other documents.

In September 2003, the four municipalities jointly received the Quad Cities water right permit for diversion of Columbia River water to meet projected municipal, industrial, and commercial demands within the collective urban growth area over the next 50 years, as

described in Section 6.1.1. The Quad Cities jointly need to submit an updated Regional Water Forecast and Conservation Plan (RWFCP) to Ecology and DOH at least every six years to request appropriations under the permit. The RWFCP will include water demand projections for the next 6-year period, as well as needed source capacity and water rights to meet demands, and other elements.

The Quad Cities have signed a Memorandum of Agreement for their management of the Quad Cities water right and related programs.

8.10.5 Tri-Cities Urban Area Landscape Irrigation Planning

The Tri-Cities Urban Area Landscape Irrigation Plan (HDR 2006) is a cooperative effort of the cities of Kennewick, Richland, West Richland, and Pasco, and Kennewick Irrigation District (KID), Columbia Irrigation District (CID), Badger Mountain Irrigation District (BMID), and Franklin County Irrigation District #1 (FCID). The Plan addresses irrigation water delivery within the combined urban growth area of the four participating cities. The Plan establishes the Tri-Cities Urban Irrigation Regional Coordination Group (ICG) that coordinates the entities' efforts toward improving irrigation water delivery and establishes a public education program regarding water conservation. Additional detail regarding the Tri-Cities Urban Area Landscape Irrigation Plan is provided in Section 6.1.2.

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APPENDIX A

Memorandum of Agreement between Eastern Klickitat Conservation District and Ecology regarding Delisting of Rock Creek from 303(d) List

MEMORANDUM OF AGREEMENT BETWEEN THE
WASHINGTON STATE DEPARTMENT OF ECOLOGY
AND
EASTERN KLICKITAT CONSERVATION DISTRICT

REGARDING THE DELISTING OF ROCK CREEK FROM SECTION
303(D) LIST OF THE CLEAN WATER ACT

WHEREAS, Ecology has the lead responsibility for the designation of waters listed on 303(d) list of impaired water bodies;

WHEREAS, Eastern Klickitat Conservation District and the Department of Ecology desire to restore the quality of impaired waters to achieve water quality standards, in accordance with Section 303(d) of the Clean Water Act, thereby removing waters from the list of waters not meeting water quality standards.

WHEREAS, the Eastern Klickitat Conservation District and the Department of Ecology have prepared a project description for technical assistance to Eastern Klickitat Conservation District. The technical assistance will result in the delisting of Rock Creek (WA-31-2000) from the 303(d) list of impaired water bodies.

THEREFORE, the Department of Ecology and the Eastern Klickitat Conservation District agree upon the following:

The temperature data shows that maximum water temperature commonly exceeds the state water quality standard of 18.C for Class A streams throughout the basin. The stream habitat survey of stream substrate, riparian corridor, and canopy cover (and photographs of each site) indicate that most of Rock Creek shows little impact from current forestry or agricultural activities. Water temperature, especially in the lower part of the basin, is affected by the exposed rock substrate and natural lack of riparian cover. The temperatures observed in upper Rock Creek may be natural for a small creek in a hot, dry summer climate. A small stream, such as Rock Creek, situated on a south facing slope is especially sensitive to overheating. Based on the stream surveys, four of the ten monitoring sites meet or were within 10% of the target canopy coverage goals for eastern Washington Class A streams. Overall Rock Creek appears to be recovering.

It would be difficult and expensive to quantitatively estimate what portion of the observed high temperature is natural versus that due to anthropogenic influences. Current land management is probably adequate to protect this stream. However, there are several recommendations which would protect water quality, speed riparian recovery and perhaps prevent flood related damage in the future.

THEREFORE, the Department of Ecology and the Eastern Klickitat Conservation District shall work together to ensure that:

1. Identify riparian zones which can be successfully revegetated. Assist landowners to implement Best Managment Practices which would enhance canopy cover and encourage channel rehabilitation.

2. Grazing and Forestry practices will be monitored. Working closely with landowners, the focus will include; riparian area enhancement, soils stability, water quality and water retention capabilities.

3. Landowners in the upper watershed will be advised of Best Management Practices to ensure road stability and riparian corridor harvesting.

4. Continue water quality monitoring to obtain data for long range planning and for landowners participation with Best Management Practices.

5. Funds will be sought to assist with monitoring and rehabilitation efforts when needed.

6. Washington Department of Ecology and the Eastern Klickitat Conservation District will jointly submit a yearly progress report.

UPON reaching agreement between the Washington Department of Ecology and the Eastern Klickitat Conservation District that all of the above elements will be addressed the Department of Ecology has delisted Rock Creek from the 303(d) list of impaired water bodies of the State of Washington for temperature.

Legal Effect

This MOA creates no cause of action against Eastern Klickitat Conservation District or the state beyond those, if any, that may already exist under state or Federal law. In addition, the execution and implementation of this MOA does not constitute an explicit or implicit agreement by either Eastern Klickitat Conservation District or Ecology to subject itself to the jurisdiction of any federal or state court. Nor shall this MOA be construed as creating any right or benefit, substantive or procedural, enforceable at law or in equity, by any person or entity against Eastern Klickitat Conservation District or the Department of Ecology. This MOA shall not be construed to create any right or judicial review involving the compliance or noncompliance with this MOA.

Nothing in this MOA shall be construed to require actions by the Eastern Klickitat Conservation District of the Department of Ecology which are inconsistent with local, state or federal laws or regulations or any court order.

Termination

This MOA and all obligations arising thereunder, shall terminate on June 30, 2001. Eastern Klickitat Conservation District and the Department of Ecology intend, however, to continue to work cooperatively after this date and if necessary extend the MOA, to work toward the continued monitoring/data gathering to support/substantiate changes to the water quality standards relating to temperature for Rock Creek.

DATED this 9th day of July ,1996.

EASTERN KLICKITAT CONSERVATION DISTRICT

by Supervisors:

.....

Chair

.....

WASHINGTON STATE DEPT OF ECOLOGY
WATER QUALITY PROGRAM
SECTION MANAGER
ROBERT F. BARWIN

.....

APPENDIX B

Letter of Support for Watershed Plan from Washington Department of Fish and Wildlife (WDFW)

State of Washington
Department of Fish and Wildlife

1701 South 24th Avenue • Yakima, Washington 98902-5720 • (509) 575-2740 FAX (509) 575-2474

November 9, 2007

Department of Ecology
Greg Schuler
15 West Yakima Avenue Suite 200
Yakima, WA 98902

Subject: Watershed Planning WRIA 31 Comments

Dear Mr. Schuler:

Below please find comments concerning the WRIA 31 Watershed Plan and our participation in the planning process. In your role as the state caucus leader we would like to request that you please forward this letter to the WRIA 31 Planning Unit.

Due to resource constraints Washington Department of Fish and Wildlife was unable to fully engage with the WRIA 31 planning unit during the Assessment and Planning Phase pertaining to the watershed planning process for WRIA 31. WDFW has provided limited comments through the state caucus process on items concerning fish and wildlife habitat, instream flows (amount and timing), survey and assessment needs, and habitat enhancement (e.g. reconnect streams to their floodplains, meadow and wetland restoration, etc.). WDFW has not provided comments on Columbia River flow issues and needs concerning fish and wildlife habitat for this planning effort. WDFW respects the planning unit's right to state their opinion regarding Columbia River flow targets (BIOP Flows) and we agree that additional information could improve the understanding of the relationships between salmonid survival and instream flows in the Columbia River. WDFW is participating in the Columbia River Basin Water Management Program, which we hope will provide an effective means to evaluate and implement water management practices and instream flows solutions associated with the Columbia River and its tributaries. In addition, we hope this process will ultimately address the Planning Units concerns on this topic.

WDFW commends the planning unit for their effort and commitment to further characterize the tributaries within WRIA 31. Currently, some of the aquatic habitat in WRIA 31 is used by listed salmonids but our understanding of fish use

State of Washington
Department of Fish and Wildlife

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and habitat conditions are not complete. Additional fish surveys in this WRIA would be helpful in understanding current spatial and temporal distribution. Further instream flow assessments and habitat characterization would be helpful to refine limiting factors within the WRIA. Information from these efforts can be used to help develop the Detailed Implementation Plan and provide adaptive management support. Providing guidance for fish, wildlife, and habitat surveys and assessments and providing assistance in the development and implementation of projects that benefit fish are efforts that WDFW looks forward to participating in during the Implementation process. WDFW has both a technical assistance and permitting role that can support habitat protection and enhancement efforts in cooperation with the planning unit and its members.

WDFW hopes that the planning unit will continue to keep them informed and give as much notice as possible when WDFW participation is appropriate or required. Please contact the Richard Visser at 457-9308 for future assistance or seek coordination through the Department of Ecology via the state agency caucus.

Sincerely,

Richard Visser

Richard Visser
Watershed Steward Biologist

Cc: Dave McClure – Klickitat Co