FINAL

WENATCHEE WATERSHED MANAGEMENT PLAN

Developed by:
The WRIA 45 Planning Unit

April 26, 2006 043-1284.203
Final

ACKNOWLEDGEMENTS

Initiating Governments

In 1998 the Washington Legislature passed House Bill 2514 that defined the conditions and funding for watershed planning across the State. After a series of meetings in 1998 and 1999, the local community in the Wenatchee watershed showed interest in participating in the watershed planning process. Under the law (RCW 90.82), the "initiating governments" must mutually decide to proceed with watershed planning. After a series of meetings in 1998 and 1999, **Chelan County, the City of Wenatchee, and the Wenatchee Reclamation District** elected to proceed with developing a watershed plan. They designated Chelan County as the Lead Agency for the effort and invited Colville Confederated Tribes and Yakama Nation to participate. Chelan County, as Lead Agency, secured the initial grant funding for the process and worked to establish the multi-stakeholder "Planning Unit" (WWPU) that would act as the overall decision-making body for the effort. Chelan County attended to the many needs of the effort and ensured consistent and diverse participation on the Planning Unit in addition to administering grant funds and contracts and providing staff to facilitate and coordinate the process, including an extensive public outreach effort.

Planning Unit

The Wenatchee Watershed Plan was developed through the participation and input of numerous stakeholders from the Wenatchee Watershed over the past eight years; many of whom spent countless hours providing information, reviewing and formulating plan actions, and attending meetings to represent their constituencies. These individuals are listed below:

Audubon Washington
Naki Stevens
Barn Beach Reserve
Jeff Parsons
Blue Star Growers
Bob Gix
Cascade Orchard Irrigation Company
Cot Rice
Center for Environmental Law and Policy
Karen Allston
Barry Goldstein
Chelan County Commissioners
Jim Lynch
Esther Stefaniw
John Hunter
Keith Goehner (current)
Ron Walter (current)
Buell Hawkins (current)
Chelan County Conservation District
Peggy Entzel
Mike Rickel
Chelan County Natural Resource Department
Lisa DeVera
Mike Kaputa
MaryJo Sanborn
Lee Duncan
Dana Bates
Matt Collins
Chelan County Planning Department
Larry Angell
Chelan County Port District
Dayle Rushing
Chelan County Public Utility District
Steve Hays
Dick Nason
Jeff Osborne
Keith Truscott
Chuck Peven
Waikele Hampton
David Johnson
Shaun Seaman
Julie Pyper

Chelan-Douglas Health District
Leslie Turner
Marc Marquis
Chelan-Douglas Land Trust
Gordon Congdon
Citizens
Dave Klinger
Lisi Ott
Lyle Hoeffner
Fred Smith
Edgar Meyer
City of Cashmere
Michelle Taylor
Charlie Cruickshank
Tom Hastings
City of Leavenworth
Mike Deason
Scott Hugill
Connie Krueger
City of Wenatchee
Dan Curry
Jessica Shaw
Governor's Salmon Recovery Office
Bob Bugert
Icicle Creek Watershed Council
Buford Howell
Dick Rieman
Icicle Irrigation District
Mel Weythman
Joel Teeley
Jones-Shotwell Ditch
Mel Weythman
KOHO Radio
Chris Rader
Lake Wenatchee State Park
Rick Halstead
Leavenworth Adopt-A-Forest
Pat Rasmussen
Longview Fibre
Steve Tift
North Central Homebuilders Association
Jim Blair
David Winters
North Central Washington Association of Realtors
John Wilson
North Central Washington Audubon Society
Jon Soest
Mark Oswood
Rachael Scown
National Oceanic & Atmospheric Administration – Fisheries
Dale Bambrick
Osprey Rafting Company
Gary Planagan
Peshastin Hi-Up
Jon Tall
Kameron Miller
Peshastin Irrigation District
Jim Robertson
Joel Teeley
Jim Koempel
Trout Unlimited
Ron and Jan Carpenter
Tom Kahler
Tumwater Drilling
Steve Ballew
US Bureau of Reclamation
Steve Kolk
US Forest Service
Glenn Hoffman
Ken MacDonald
Vaughn Marable
Cameron Thomas
Matt Karrer
Heather Murphy
Cindy Raekes
Sonny O'Neal
US Fish & Wildlife Service
Jim Craig
Kate Terrell
Judy DeLaVergne
Karl Halupka
Washington Department of Fish & Wildlife
Carmen Andonaegui
Mark Cookson
Chris Parsons
Dennis Beich

Bob Vadas
Hal Beecher
Washington Growers Clearinghouse Association
Kirk Mayer
Washington Rivers Conservancy
Lisa Pelly
Washington State Department of Ecology
John Monahan
David Holland
Bob Barwin
Jim Carroll
Derek Sandison
David Schneider
Jim Pacheco
Washington State Senate
Senator Linda Parlette
Wenatchee Reclamation District
Rick Smith
Wenatchee-Chiwawa Irrigation District
Dennis Pobst
Washington State University-Extension
Tim Smith
Kevin Powers (4H Forestry Education)
Yakama Nation
Tom Ring
Bob Rose
Lee Carlson

Appreciation and acknowledgement extends to all others that we have inadvertently excluded, and all the citizens who attended various public meetings and tours over the years to contribute their local knowledge to the development of the plan……Thank you.

Technical and Plan Development Support

The Wenatchee Watershed Plan could not have been developed without significant contributions from various professionals, contractors, experts and agencies who provided key technical, policy, facilitation and coordination support over the years. The result of these contributions is a technically sound and exceptional watershed plan that is accessible by the community and likely to be readily implemented.

Golder Associates
Lisa Dally Wilson and Alyssa Neir of Golder Associates were instrumental in organizing and writing the watershed plan. Golder provided key facilitation and technical expertise (including water use estimates) for the instream flow and water resource management strategy portions of the plan. Their hard work and commitment to this Planning Unit are greatly appreciated.

EES Consulting
Pete Rittmueller of EES Consulting performed key PHABSIM studies in the watershed and provided important technical advice on the instream flow and water resource management portions of the plan.

Montgomery Water Group
Bob Montgomery of the Montgomery Water Group (MWG) completed the initial Watershed Assessment which represented one of the first work products of the Planning Unit and the basis for future water resource decisions of the Planning Unit. MWG was a key contributor to the Lake Wenatchee Water Storage Feasibility Study and is currently completing the water storage component of the watershed plan.

Jones & Stokes
Mark Matthies and John Soden of Jones & Stokes completed the lower Wenatchee channel migration zone study, which provided the Planning Unit with its first habitat assessment and project development information. Jones & Stokes contributed particularly to the efforts of the habitat subcommittee and a series of watershed tours held in 2004.

Other Consultants

The following other consultants contributed in some way to the development of this plan: Dan McDonald with Montgomery Watson HARZA for his work on the Lake Wenatchee Water Storage Feasibility Study; Lisa Parks, Chuck Jones, and Kris Hansen of Alliance Consulting have helped to represent the City of Cashmere in the planning process; Carolyn Pearson with ECO-AIM for technical and biological assistance on various habitat projects; Peter Burgoon with Water Quality Engineering for his work on various water quality projects; Mike Ward with Terraqua for his work with the Regional Technical Team; Susan Gulick with Sound Resolutions for her work on facilitating the initial watershed planning meetings; and Steve Swope with Pacific Groundwater Group for his contributions to the water storage study.

Washington State Department of Ecology (Ecology)

Various staff members with Ecology provided PHABSIM study information for Chiwawa River and Nason Creek as well as technical reports for the various parameters in the water quality component of the plan.

United States Bureau of Reclamation (USBOR)

The USBOR provided key funding and technical expertise to the Planning Unit in order to complete the lower Wenatchee River, Peshastin Creek and Icicle Creek PHABSIM studies, without which many of the plan components could not have been completed.

Other Related Planning Efforts

Several other planning efforts overlapped with Wenatchee watershed planning and provided essential technical information and recommended actions that have been incorporated into this watershed plan. Numerous agency and consultant scientists and staff participated in these efforts, and while they may not have directly participated in this process, their work has been a significant contribution to this effort. These efforts include the Upper Columbia Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Plan, the Wenatchee Subbasin Plan, the Wenatchee River Watershed Action Plan and the Wenatchee River TMDL Process.

FUNDING SOURCES

Preparation of this Watershed Plan and associated technical work that was used as a basis for plan development was funded under the following grants:

Watershed Planning Phases I through III

Phases I through III Wenatchee Watershed Planning, including plan development was funded under Grant No. G0000075, provided by the Washington State Department of Ecology under the Watershed Management Act, RCW 90.82.

Instream Flow

Supplemental funding for instream flow analysis and negotiation was provided under:

- Grant No. G0400335, provided by the Washington State Department of Ecology
- IAC Grant No. 04-1700, provided by the Salmon Recovery Funding Board of the Interagency Committee for Outdoor Recreation (IAC)
- Additional financial assistance by the US Bureau of Reclamation

Storage Assessment

Supplemental funding for a multi-purpose storage assessment was provided under:
Grant No. G0500130, provided by the Washington State Department of Ecology

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

List of Acronyms and Abbreviations

ac-ft	acre-feet
ADD	Average Daily Demand
AF	acre-feet
BACI	Before-After-Control-Impact
BMP	Best Management Practice
BOD	Biochemical Oxygen Demand
BPA	Bonneville Power Administration
CCCD	Chelan County Conservation District
CCD	Census County Division
CCNRD	Chelan County Natural Resource Department
CD	Compact Disc
CDHD	Chelan-Douglas Health District
CELP	Center for Environmental Law and Policy
cfs	cubic feet per second
ChiwaukumH	Chiwaukum Creek Sub-watershed Habitat Actions
ChiwawaH	Chiwawa River Sub-watershed Habitat Actions
ChumH	Chumstick Creek Sub-watershed Habitat Actions
ChumQUAL	Chumstick Creek Sub-watershed Water Quality Actions
ChumQUANT	Chumstick Creek Sub-watershed Water Quantity Actions
CIR	Crop Irrigation Requirement
CMZ	channel migration zone
DDT	Dichlorodiphenyltrichloroethane
DIP	Detailed Implementation Strategy
DNR	Washington State Department of Natural Resources
DO	Dissolved Oxygen
DOH	Washington State Department of Health
DNS	Determination of Non-Significance
DS	Determination of Significance
Ecology	Washington State Department of Ecology
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ERU	Equivalent Residential User or Unit
ESA	Endangered Species Act
ESHB	Engrossed Substitute House Bill
ESU	Evolutionarily Significant Unit
EWWD	East Wenatchee Water District
FC	Fecal Coliform
FLIR	Forward-Looking Infrared Radar
GIS	Geographic Information Systems
GLU	Growth and Land Use Actions
GMA	Growth Management Act
gpd	gallons per day
gpd/hh	gallons per day per household
gpm	gallons per minute
H	Habitat Actions
IcicleH	Icicle Creek Sub-watershed Habitat Actions
IcicleQUAL	Icicle Creek Sub-watershed Water Quality Actions
IMP	Implementation Actions

ISEMP	Integrated Status and Monitoring Program
ISF	instream flow
IRPP	Instream Resources Protection Program (current 1983 instream flow rule)
LiDAR	Light Detection and Ranging
LitWenH	Little Wenatchee River Sub-watershed Habitat Actions
LkWenH	Lake Wenatchee Sub-watershed Habitat Actions
LowWenH	Lower Wenatchee River Sub-watershed Habitat Actions
LowWenQUAL	Lower Wenatchee River Sub-watershed Water Quality Actions
LWD	large woody debris
MDD	Maximum Day Demand
MDNS	Mitigated Determination of Non-Significance
MGD	million gallons per day
MissionH	Mission Creek Sub-watershed Habitat Actions
MissionQUAL	Mission Creek Sub-watershed Water Quality Actions
MissionQUANT	Mission Creek Sub-watershed Water Quantity Actions
MWG	Montgomery Water Group
NasonH	Nason Creek Sub-watershed Habitat Actions
NEPA	National Environmental Policy Act
NOAA	National Oceanic & Atmospheric Administration
NPCC	Northwest Power and Conservation Council
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NSTQUANT	Northside Tributaries Water Quantity Actions
OCPI	Overriding Consideration of the Public Interest
OFM	Washington State Office of Financial Management
PeshastinH	Peshastin Creek Sub-watershed Habitat Actions
PeshastinQUANT	Peshastin Creek Sub-watershed Water Quantity Actions
PHABSIM	Physical Habitat Simulation
PO	Public Outreach Actions
PUD	Chelan County Public Utility District
Q	stream discharge, flow (usually measured in cfs)
Q_i	Instantaneous flow
QUAL	Water Quality Actions
QUANT	Water Quantity Actions
RCW	Revised Code of Washington
RM	River Mile
RTT	Regional Technical Team
SEPA	State Environmental Policy Act
SIS	Summary Implementation Strategy
SSHIAP	Salmon and Steelhead Habitat Inventory and Assessment Project
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
U and A	Usual and accustomed (hunting and fishing areas)
UCRTT	Upper Columbia Regional Technical Team
UCSRB	Upper Columbia Salmon Recovery Board
UGA	Urban Growth Area
UpWenH	Upper Wenatchee River Sub-watershed Habitat Actions
UpWenQUAL	Upper Wenatchee River Sub-watershed Water Quality Actions
US	United States
USBOR	U.S. Bureau of Reclamation

USFS	United States Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
VSP	viable salmonid population
WAC	Washington Administrative Code
WCC	Washington Conservation Commission
WDFW	Washington Department of Fish and Wildlife
WhiteH	White River Sub-watershed Habitat Actions
WQTS	Water Quality Technical Subcommittee
WRIA	Water Resource Inventory Area
WRMS	Water Resource Management Strategy
WUA	weighted usable area
WWPU	Wenatchee Watershed Planning Unit
WWTP	Wastewater treatment plant

Standard Water Unit Conversions

1 cfs = 448.8 gpm
1 cfs = 646,272 gpd
1 cfs = 1.98 ac-ft per day
1 cfs = 0.6463 mgd
1 cubic foot = 7.48 gallons
1 gpm = 1,440 gallons per 24 hour day
1 gpm = 1.61 ac-ft per year
1 ac-ft = 1 foot of water on 1 acre
1 ac-ft = 325,851 gallons

GLOSSARY

1983 Instream Flow Rule: All consumptive water rights appropriated after adoption of the 1983 Instream Flow Rule for the diversion of surface water from the main stem of the Wenatchee River and perennial tributaries are subject to the 1983 instream flow requirements which can be found in Chapter 173-545 WAC. All water rights junior to the instream flow rule are subject to interruption when regulatory flows are not achieved. The instream flow rule does not affect water rights that were in existence prior to 1983. (Montgomery Water Group (MWG), 2003:7-1).

90.22 RCW: The Minimum Water Flows and Levels Act of 1967 set forth a process for protecting instream flows through adoption of rules.

90.54 RCW: The Water Resources Act of 1971, particularly section 20, includes language that states base flows are to be retained in streams except where there are "overriding considerations of the public interest". Further, waters of the state are to be protected and utilized for the greatest benefit to the people and that allocation of water will be generally based on the securing of "maximum net benefits" to the people of the state. This Act also authorizes Ecology to reserve waters for future beneficial uses.

90.82 RCW: This established the framework and funding for watershed planning in Washington State. The Watershed Planning Act of 1998 also gives local watershed planning groups the authority to recommend minimum instream flows to Ecology for rule-making. See Watershed Management Act on p. xvii.

Adaptive Management: "Continual improvement of management programs, based on information collection and application of various actions over time." Adaptive management involves management that monitors the results of policies and/or management actions, and integrates this new learning, adapting policy and management actions as necessary.

Adjudication: "The process where all those claiming the right to use water from a water source are joined in a single legal action to determine the rights and priorities for the use of the water" (Clifford, et al., 2004:149).

Appropriation: "The establishment of a water right by diversion, due diligence and beneficial use. Must be adjudicated to establish seniority of right" (Clifford, et al., 2004:149).

Average Day Demand (ADD): The total amount of water delivered to the system in a year divided by the number of days in the year, or the average total amount of water used each day during a one-year period. The ADD is determined from the historical water use patterns of the system and can be used to project future demand within the system.

Beneficial use: Beneficial use shall include, but not be limited to, use for domestic water, irrigation, fish, shellfish, game and other aquatic life, municipal, recreation, industrial water, generation of electric power, and navigation (RCW 90.14.031(2)).

Bioaccumulation: A general term for the accumulation of substances, such as pesticides (DDT is an example), methylmercury, or other organic chemicals in an organism or part of an organism. The accumulation process involves the biological sequestering of substances that enter the organism through respiration, food intake, epidermal (skin) contact with the substance, and/or other means. The sequestering results in the organism having a higher concentration of the substance than the

concentration in the organism's surrounding environment. (http://toxics.usgs.gov/definitions/bioaccumulation.html).

Char: Bull trout and Dolly Varden (WAC 173-201A-200(1)(a)(i)).

Class A: Waters that typically exhibit extraordinary water quality that markedly and uniformly exceeds the requirements for all or substantially all uses (Cristea and Pelletier, 2005).

Class AA: Waters that typically exhibit excellent water quality that meets or exceeds the requirements for all or substantially all uses (Cristea and Pelletier, 2005).

Conservation: The management of resources so as to minimize waste and maximize efficiency of use.

Consumptive Use: "The amount of water consumed during use that does not return to a water system" (Clifford, et al., 2004:150).

Control point: A stream gage that is used to measure the discharge of the stream to ensure that the instream flow requirements are met.

Core population: A group of one or more local populations that exist within core habitat (UCSRB, 2005).

Crop Irrigation Requirement (CIR): Water supplied by irrigation to satisfy evapotranspiration that is not provided by water stored in the soil and precipitation. Where additional quantities of water are required for leaching, frost-protection, cooling and other miscellaneous crop requirements, these quantities are added to the CIR.

Domestic Water Use: For purposes of this plan, domestic water use is defined as water to satisfy human domestic needs of a household or business, including water used for drinking, bathing, sanitary purposes, cooking, laundering, irrigation of not over one-half acre of associated lawn or garden per dwelling, care of household pets, and other incidental household uses. For permit-exempt domestic water use of groundwater sources, total outdoor watering for multiple residences shall be consistent with the groundwater permit exemption provisions in RCW 90.44.050.

East Bank Aquifer Regional Water Supply (Regional Water Supply): The East Bank Aquifer Regional Water Supply is jointly owned and operated by the City of Wenatchee, East Wenatchee Water District (EWWD) and the Chelan County PUD. The water supply serves the greater Wenatchee area.

Efficiency: Increasing the output with the same amount of input. For example, increasing irrigation efficiency would mean that there is a greater crop production from the same amount of water use.

Enhancement: Actions that move toward creating the specific functional condition of restoration, without necessarily achieving all criteria necessary for restoration, or the complete creation of that condition.

Equivalent Residential User or Unit (ERU): A measure of water demand in terms of an equivalent number of single family dwellings.

Exceedance Hydrograph: A hydrograph showing the probability that a certain discharge will be exceeded in any given year. For example, the 10% exceedance hydrograph indicates that the flows of record exceeded the hydrograph flows 10% of the time. A 10% exceedance hydrograph is indicative of higher flows while a 90% exceedance hydrograph represents lower flows.

Exempt Wells: Wells that do not require a permit from the Department of Ecology and are generally used for domestic purposes, including stock water and small-scale irrigation.

Fire Suppression: The act of fighting an actual fire.

Group A Systems: Those water systems that regularly serve either 15 or more service connections or 25 or more people per day for 60 or more days per year.

Group B Systems: Those water systems that serve fewer than 15 service connections and fewer than 25 people per day, or 25 or more people per day for fewer than 60 days per year.

Group Domestic Systems: A water system that services 2-14 connections for domestic purposes including associated irrigation of lawn and garden.

Group Domestic Use: Water from a system that services 2-14 connections for domestic purposes. The water can also be used to water an associated lawn and garden.

Growth Management Act: The Act (Chapter 36.70A RCW) was adopted by the Legislature in 1990. The GMA requires state and local governments to manage Washington's growth by identifying and protecting critical areas and natural resource lands, designating urban growth areas, preparing comprehensive plans and implementing them through capital investments and development regulations. (from http://www.gmhb.wa.gov/gma/)

High Flow: The 10 percent exceedance probability which is the flow rate that is exceeded ten percent of the time.

Hydraulic continuity: The degree to which groundwater is connected to a nearby surface water body, such as a river or lake (also called groundwater surface water interaction) (Golder Technical Memo Jan 6, 2005)

Hydrograph: A graph of water discharge over time.

Hyporheic Zone: A zone of saturated sediments lying below the streambed and extending laterally beneath the stream bank (Boulton, 2000).

Impairment: Harmful effects to existing water rights. (http://www.ecy.wa.gov/pubs/961804swr.pdf)

Instream Flow: Used to identify a specific stream flow (typically measured in cubic feet per second, or cfs) at a specific location for a defined time, and typically following seasonal variations. Instream flows are usually defined as the streamflows needed to protect and preserve instream resources and values, such as fish, wildlife and recreation. (http://www.ecy.wa.gov/programs/wr/instream-flows/isfhm.html)

Instream Use: "A type of end application of water use that does not require withdrawal from the source. Examples of instream uses are recreational, navigational, and ecosystem preservation" (Clifford, et al., 2004:150).

Irrigation Efficiencies Program: Helps private landowners partner with local conservation districts to save water and aid in salmon recovery by implementing best management practices to increase the efficiency of on-farm water application and conveyance systems. (http://www.scc.wa.gov/programs/irrigation/)

Junior water right: "Water rights that were established more recently than senior rights. The more recent a date on a water right, the more "junior" it is relative to water rights with older issuance dates. All water rights are defined in relation to other rights, and a water right holder only acquires the right to use a specific quantity of water under specified conditions. Therefore, when limited water is available, junior rights cannot be exercised until all senior rights have been satisfied" (Clifford, et al., 2004:152).

Lease: A lease of a water right is a temporary acquisition of all or part of the right.

Limiting Factor: Conditions that limit the ability of habitat to fully sustain populations of anadromous and resident fish and other aquatic life.

Low flow: The 90 percent exceedance probability which is the flow rate that is exceeded ninety percent of the time.

Maximum allocation: The maximum flow that could be allocated from the watershed or sub-watershed, subject to instream flow requirements, for storage, seasonal allocation to new uses through water rights, and the reservation.

Maximum Day Demand (MDD): The average amount of water delivered to the system on the year's maximum water use day. This number is typically calculated using a peaking factor in conjunction with the ADD. According to DOH guidelines, water system facilities must be designed to convey maximum daily demands.

Median Flow: The 50 percent exceedance probability. It equals the flow rate that occurred five years out of ten (MWG, 2003:4-5).

Municipal Use: There are three situations where water is considered to be for municipal use. The first is when water is used for residential purposes by fifteen or more residential service connections or for a nonresidential population that is, on average, at least 25 people for at least 60 days a year. The second is when water is used for governmental or governmental proprietary purposes by a city, town, public utility district, county, sewer district, or water district. The third includes indirect uses of water for residential, governmental or governmental proprietary purposes through the delivery of treated or raw water to a public water system for such use (RCW 90.03.015).

National Environmental Policy Act (NEPA): A 1969 federal Act that requires federal agencies to integrate environmental values into their decision making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions. (http://www.epa.gov/compliance/nepa/)

Non-Consumptive use: Water use is non-consumptive when its use does not result in long-term diversion from the water source or diminishment of the source. Additionally, when water is diverted and returned to the source at the point of diversion following its use in the same quantity as diverted and meets water quality standards for the source, the water use is classified as non-consumptive.

Non-point source: Pollution that does not come from one particular source.

Nonuse: Water that has not been put to beneficial use.

Out-of-stream water use: A use that requires water to be taken out of the stream.

Overriding Consideration of the Public Interest (OCPI): An executive decision exercised by the Director of the Department of Ecology (Director) when implementation of a water resource management program, taken as a whole, is deemed to be in the interest of the public, but absent such a finding the program would be contrary to Washington State water law.

Periphyton: A complex matrix of algae and heterotrophic microbes attached to submerged substrata in almost all aquatic ecosystems. It serves as an important food source for invertebrates and some fish, and it can absorb contaminants. Periphyton is also an important indicator of water quality; responses of this community to pollutants can be measured at a variety of times scales representing physiological to community-level changes. (http://www.esd.ornl.gov/BMAP/comm_per.htm)

Physical Habitat Simulation (PHABSIM): Physical Habitat Simulation is a collection of computer programs that can be used to represent habitat suitability for specific fish species and life stages according to characteristics of micro-habitat (depth, velocity, and substrate). PHABSIM results in Weighted Usable Area (WUA) Curves, which represent habitat availability at different discharges. The results show the habitat loss associated with a change in stream discharge.

Planning Horizon: The time period that is considered in the planning process. For purposes of the Wenatchee Watershed Plan, the planning horizon is 20 years starting in 2005 and ending in 2025.

Planning Unit: "A group that represents a wide range of water resource interests, tasked with conducting a watershed assessment and completing a watershed plan for one (or more) WRIAs. The initiating governments are responsible for development of an inclusive Planning Unit for the WRIA (RCW 90.82)" (Association of Cities, 1999:viii).

Point source: Pollution that comes from one source (i.e., a discharge pipe).

Potable water: Water that is suitable for drinking.

Protection: Prevention of future more active or invasive land use activities than the current land use.

Restoration: Creating a specific functional condition that has the desired effect on a given species.

Return Flows: Water that flows back to a surface or groundwater source after it has been diverted or pumped.

Senior water right: Water rights that are older (more senior) than those of junior rights. All water rights are defined in relation to other rights, and a water right holder only acquires the right to use a specific quantity of water under specified conditions. Thus, when limited water is available, senior rights are satisfied first in the order of their Priority Date" (Clifford, et al., 2004:154).

Single domestic use: Water that is used in one residence or business for domestic purposes. The water can also be used to water an associated lawn and garden.

Stock water use: Water use for stock that is consistent with Chelan County Code, Section 11.88.030 or any subsequent amendments. It does not include feed lots and dairies, or other activities which are not related to normal grazing land uses.

Streamflow: The volume of water flowing in a stream channel.

Sub-watershed or Sub-basin: A geographic portion of a management area, defined by the planning unit, on the basis of hydrologic or hydrogeologic characteristics" (Association of Cities, 1999:viii).

Toe-width Methodology: A quick habitat assessment tool used primarily for small streams. The measurement from the toe of one stream bank to the toe of the other is put into an equation and an estimation of flows needed for salmon and steelhead spawning and rearing is derived. (http://www.ecy.wa.gov/programs/wr/instream-flows/isfsci.html)

Total Maximum Daily Load (TMDL): A "…calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources" (US EPA website, http://www.epa.gov/owow/tmdl/intro.html)

Total Maximum Daily Load process: A process to identify sources of pollution in waters, determine how much of each kind of pollution the waters can receive without violating water quality standards, and set allowable pollution limits for various sources. Federal law requires states to undertake a TMDL process" (Association of Cities, 1999:ix).

Tributary: A stream that contributes water to a larger stream.

Trust water: Water rights that have been donated, leased, or permanently sold and result in a trust water right for a specified beneficial purpose, including instream flows. A trust water right for instream flow is exercised when it is in the river. A water right exercised through the trust program for the beneficial use of instream flows is not relinquished for non-use while it is in the program.

Urban Growth Areas (UGA): Areas designated by a county, with input from towns and cities, where growth and higher densities are expected and supported by urban services.

Water Bank: An institutional mechanism that facilitates the legal transfer and market exchange of surface water, groundwater, or water storage. This mechanism may be administered by any type of entity, such as private, public, or non-profit.

Water Held in Trust: Per the Washington State trust water legislation (RCWs 90.38 and 90.42.040) *water can be held in trust by the State* to be put to instream uses and to protect it from relinquishment. Water cannot be held in trust by any entity except the State of Washington, but *water held in trust* can be a component of, and be managed by any Water Bank (even one that is not administered by the State). The term *water trust* defines an entity that operates only to manage *water held in trust*. (A *water bank* may choose to operate a *water trust* as a subset of the larger bank.)

Water Market: The term *water market* has been used interchangeably with the term *water bank* in discussions in WRIA 45. For purposes of consistency, the term *water bank* will be used from this point forward.

Water reservation: Water that is reserved for future out-of-stream use and exempt from instream flow requirements. Out-of-stream uses include domestic, municipal, and stock water uses, fire suppression, and fire emergency (with the exception of feedlots).

Water Resource Inventory Areas (WRIA): "One of 62 geographic areas comprising the State of Washington, defined on the basis of surface water resources and codified in Washington Administrative Code 173-500-040" (Association of Cities, 1999:ix).

Water Resource Management Flow (WRM): Also known as "Minimum Instream Flow." These flows are set in rule by the state to manage future water allocation. Ecology will use these flows to help guide future water resource decisions and to protect existing water rights. Minimum instream flows are not flows that *need* to be left in the river.

Water right certificate: The legal record of a water right issued by Ecology once the department confirms that all the conditions of the permit have been met. It is recorded at a county auditor's office. Once Ecology issues a certificate, the water right is considered appurtenant (attached) to the land on which the water is used. (http://www.ecy.wa.gov/pubs/961804swr.pdf)

Water right claim: A claim to a water right, for a water use that predates the state's water permitting system (for surface water, 1917/1932, for ground water, 1945). The validity of a claim can only be confirmed through judicial processes. (http://www.ecy.wa.gov/pubs/961804swr.pdf)

Water right permit: Permission by the state to develop a water right; it is not a final water right. A permit allows you to proceed with construction of the water system and start putting the water to beneficial use, in accordance with the terms of your permit. (http://www.ecy.wa.gov/pubs/961804swr.pdf)

Watershed: "The land area that drains into the defined waterbody" (Clifford, et al., 2004:156).

Watershed Management Act: The 1998 law (90.82 RCW) that sets a framework for developing local solutions to watershed issues on a watershed basis. The intent of this legislation is to have local stakeholders address issues in their own watersheds via a "Planning Unit" [See also 90.82 RCW above].

Watershed Management Plan: A document presenting the findings and recommendations of the planning unit for a Watershed Management Program in the management area" (Association of Cities, 1999:ix).

Wetland filtration strips: Areas of wetlands that capture runoff and through natural processes filter the water that infiltrates to the groundwater.

Xeriscaping: Low water use landscaping (Chelan County PUD).

1.0 WATERSHED PLANNING IN WRIA 45

1.1 Introduction

In 1998 the Washington State Legislature passed the Watershed Management Act (formed under ESHB 2514; Chapter RCW 90.82), which provided for locally-based watershed planning in each of the 62 Water Resource Inventory Areas (WRIAs) in the State. The intent of this legislation is to have local stakeholders address issues in their own watersheds via a "Planning Unit". The Planning Unit is comprised of those entities most familiar with instream and out-of-stream demands on the water resource: local citizens, businesses, public agencies, and Tribes. Many of those involved have worked on water-related issues in the community prior to "Watershed Planning" through development of the 1998 Watershed Action Plan and other programs. The Planning Unit for the Wenatchee Watershed (Water Resource Inventory Area 45; WRIA 45) has developed this Watershed Plan to help manage this water resource for the benefit of future generations, while meeting both the environmental and economic goals of the community.

The citizens of the Wenatchee community appreciate the need to protect the water resource into the future and to manage it in a sustainable way. Water management strategies have been developed based on best available science and local community input. The plan addresses a 20-year planning horizon (through 2025) and incorporates an adaptive management focus to allow flexibility and integration of new information into the Plan's current recommendations and actions. It is also important to note that this plan has been prepared as part of Phase III of the Watershed Planning process. Phase III integrates stakeholder issues and recommendations for the watershed and is a product of community and government participation in WRIA 45. Therefore, this plan builds upon earlier technical assessment phases of Watershed Planning, and integrates previous and concurrent studies that address water quantity, instream flow, habitat, growth and land use, and water quality in the Wenatchee Watershed.

1.2 Watershed Characterization

Figure 1-1 shows the Wenatchee Watershed (WRIA 45) and its component sub-watersheds. The Wenatchee Watershed (WRIA 45) is approximately 1,370 square miles, including some areas that drain directly into the Columbia River. This plan focuses on the areas that drain directly into the Wenatchee River: the 12 sub-watersheds shown in Figure 1-1. This area consists of approximately 1,330 square miles and includes 230 miles of major streams and rivers and associated aquatic habitat. The headwaters of WRIA 45 originate in the Cascade Mountain range as the Little Wenatchee and White Rivers. These rivers flow into Lake Wenatchee, the source of the Wenatchee River. Various tributaries to the Wenatchee River add significant volume to the river. The Chiwawa River, White River, Little Wenatchee River, Nason and Icicle Creeks are the source of over 90% of the surface water within the watershed (Wenatchee River Watershed Action Plan Addendum, 1996). Primary tributaries include: Nason Creek (River Mile [RM] 53.6), Chiwawa River (RM 48.6), Chiwaukum (RM 35.6), Icicle (RM 25.6), Chumstick (RM 23.5), Peshastin (RM 17.9), and Mission (RM 10.4) Creeks. The Wenatchee River discharges into the Columbia River in the City of Wenatchee.

Groundwater resources in WRIA 45 are located primarily in bedrock and sediment overlying bedrock. The productive aquifers are located in the alluvial and glaciofluvial outwash sediments (Wenatchee River Watershed Action Plan, 1998). There is no continuous, regional aquifer that characterizes the entire watershed due to the diverse geology and geography of the region. In addition, there have been no comprehensive estimates or calculations that indicate the amount of groundwater available in the watershed or sub-watersheds (Golder, 2005a).

The broad range of activities, natural resources, and economic opportunities in the Wenatchee Watershed can be attributed to the highly variable landscape over which the Wenatchee River and its headwaters flow. The WRIA extends from the snowfields, glaciers and steep, forested Cascade Mountains in the northwest, through orchards in the Wenatchee River Valley, to the shrub-steppe of the eastern watershed at the confluence of the Wenatchee and Columbia Rivers. Average annual precipitation over this drainage area varies from over 150 inches at the Cascade Crest to 8 inches in Wenatchee. The climate in the watershed is hot and dry in the summer, especially in the lower elevations. The higher elevations receive, on average, between 10 and 20 feet of snow in the winter (Wenatchee River Watershed Action Plan, 1998). Snowmelt is a primary source of late summer and fall streamflow. Variability in winter precipitation results in highly variable streamflow, especially in the more arid lower watershed. The different climatic zones within the watershed are important because the largest irrigation and domestic water demands occur in the drier, lower valley near Wenatchee where streamflow can be limited some years. Due to its diversity, the watershed has been divided into tributary areas, or sub-watersheds, to enable application of water management strategies that are appropriate on a local scale.

The Wenatchee River and its tributaries boast some of the healthiest anadromous fish runs in the Columbia River drainage and contain salmonid habitat that is important to the entire Columbia River region. However, spring Chinook in the Wenatchee Watershed have been federally listed as endangered and bull trout and steelhead have been listed as threatened under the Endangered Species Act (ESA) (listings occurred in 1998, 1999, and 2006 respectively). There are core populations of sockeye salmon, steelhead, bull trout, and both spring and Summer Chinook salmon in the upper Wenatchee that are relatively strong when compared to other populations in the Columbia Sub-basin. Anadromous salmonid populations in the Wenatchee are influenced by activities that occur both within and outside of the watershed as they must negotiate a 468-mile journey from the mouth of the Wenatchee River to the Pacific Ocean, once as smolts and again as adults. Within the watershed, human alterations are reducing habitat quality and quantity (Andonaegui, 2001).

In the Treaty of 1855, the Yakama Nation ceded a portion of its land to the United States and reserved a portion for the Yakama Reservation. The entire Wenatchee Watershed is contained within the ceded area. While ceding title to the land, the Yakama Nation reserved certain rights on the ceded lands including the right to hunt and fish at usual and accustomed places (U and A's) and on open and unclaimed lands. The right to fish carries with it a right to have water in the streams to ensure that fish survive their life histories. Therefore, the Yakama Nation's treaty fishing rights include the right to have water in the streams of WRIA 45 to ensure that fish survive their life histories. In the Yakima River adjudication, that right has been assigned a priority date of Time Immemorial, so it is the senior water right in the basin. The same applies to the Wenatchee, although the Wenatchee basin has not been adjudicated. In the Yakima basin, the court also made it clear that the right to fish at usual and accustomed places entails a right to water for fish in those stream reaches that are upstream of the U and A's where the fish harvested at the U and A's spawn and rear. In endorsing this watershed plan, the Yakama Nation does not give up any of its Treaty or Sovereign rights.

According to 2005 County Assessor parcel data, approximately 23,850 people reside within the watershed on a full- or part-time basis; approximately 18,500 residents were reported in the 2000 US Census. The majority of the population resides in the cities of Cashmere and Leavenworth, the communities of Monitor, Peshastin, Dryden and Plain, and in the rural areas along the mainstem Wenatchee River from Leavenworth to Wenatchee. The City of Wenatchee is not addressed by this management plan, as most of the land area within the city limits drains directly to the Columbia River. There is also a growing part-time population in the upper watershed associated with vacation homes. The population in the WRIA is projected to increase at an average rate of approximately 2.4% per year between 2000 and 2025 (Chelan County, 2000; Chelan County Planning, personal

communication, 2005). Much of that growth is intended to occur within Urban Growth Areas (UGAs) and on other privately owned land in the low-lying valley bottoms along the Wenatchee River and its major tributaries.

The land uses in the rural areas of the watershed are primarily forest management and production, orchard production, scattered residences, lodging facilities, agricultural support facilities, and small home-based industries. Highways, railroads and roads also comprise a significant portion of the land area in WRIA 45. Over eighty percent of the area encompassed by WRIA 45 is in public ownership; the majority of which is under federal land management. A significant portion of the forest in the upper watershed is congressionally designated wilderness area. Issues addressed by this plan that require action on federal land or by federal agencies will require National Environmental Policy Act (NEPA) compliance.

Less than twenty percent of the watershed is currently in private ownership. It is anticipated that most future development in the watershed will occur on these lands. Currently orchards comprise one of the largest private land uses (by acreage) in the WRIA. Recreation and tourism are also providing increasing economic opportunities in the region. People travel from across the region to enjoy river rafting, kayaking, climbing, hiking, fishing, and backpacking opportunities.

1.3 Agriculture in the Watershed

The largest industry in the Wenatchee Valley is agriculture, predominantly tree fruit. The watershed supports many family-owned orchards, some established well over one hundred years ago. This valley is internationally recognized for the tree fruit grown here, and has gained a reputation as one of the best production areas for winter pears in the United States. Tree fruit sales bring significant revenues to the watershed (approximately $100 million gross, annually) much of which supports the local economy. Various professionals in the area estimate that an acre of pears provides approximately $10,000 to $12,000 to the local economy (Smith, personal communication, 2005). Of the approximately 9,000 acres of tree fruit in production in the Wenatchee Watershed, the majority of the acreage is in pears, and a much smaller percentage is in cherries and apples (Gix, personal communication, 2006). Although the tree fruit industry and associated irrigation systems are common throughout central Washington, the operation of this industry in the Wenatchee Watershed is unique and has resulted in a successful economy for several generations and should be understood in the context of this plan.

Given the limited rainfall in the Wenatchee Valley, agriculture is only possible by providing a reliable source of water to orchards throughout the growing season (April – October) via irrigation systems. Although a few growers have individual water rights from a well or nearby creek or river that serves their orchard, the majority of orchards in the Wenatchee Valley are served by an elaborate system of effective irrigation canals. Some of these irrigation canal systems were constructed over 100 years ago and most operate on a gravity flow system, meaning water is diverted from an upstream location and is delivered to downstream users via an irrigation ditch. A certain amount of water in the canal is necessary to move water through the entire system and thus service the users at the end of the line. Those who use water from an irrigation canal do not hold their own water right, but instead hold shares of one larger right associated with the entire canal.

It's important to note that fruit trees need water throughout the growing season. The amount of water needed varies constantly depending on the weather and the stage of fruit development. In growing high quality tree fruit, the greatest water demand for the trees occurs as fruit growth peaks during July and August. Unlike other crops where water conservation can be accomplished by skipping a cutting or allowing the crop to die early, limiting water to fruit trees will negatively affect the one harvest of

the season and may permanently affect the tree which takes years to establish itself as a productive fruit producer. Therefore, the opportunities for decreasing direct on-farm water use in an orchard are somewhat limited.

Significant improvements in both on-farm and off-farm water use efficiency have occurred over the last century through the improvement of irrigation systems and conveyance infrastructure. In the 1930s, rill irrigation (filling trenches with water) was common. In the 1940s and 1950s many growers transitioned to hand lines and overhead sprinklers and permanent cover crops (which helped minimize erosion). Now, permanent, under tree, irrigation systems are widespread.

Delivery system improvements have also occurred in the valley over the years. Many canal systems have been lined and are well maintained, although there is still opportunity to line some earthen canals in the WRIA. It is in the best interest of the agricultural community that canal systems continue to be well maintained, as they are relied upon by so many. An example of efforts being made in the WRIA includes the Peshastin Irrigation District's conversion of the Tandy Ditch from an open canal to a pipe. This conversion resulted in a 3.5 cfs savings that was conserved for instream use over the bypass reach. (Note that lining or piping canal water will benefit the reach between the diversion and the point at which non-consumptive return flows occur; this section of stream is often called a "bypass" reach).

This watershed plan encourages further evaluation of water use and consideration of improvements where possible. However, it is recognized that many efficiency improvements have been made by the agricultural community over the years and "smart" water use is implicit in orchard operations (too much water too early hurts tree fruit).

External economic and political factors impact the agricultural community in WRIA 45. These include decreased access to foreign markets, increased foreign access to the US market; increased costs associated with ensuring local pests are not introduced into foreign & domestic markets, increased transportation costs, state regulatory costs and seasonal labor shortages due in part to immigration and guest worker program policy. Growers continue to seek and adopt new technologies and innovative practices to address those challenges. However, due to the above issues and urban encroachment some orchard land in WRIA 45 has recently been sold for development purposes. Pressure to sell agricultural land for non-agricultural uses is expected to continue (Mayer, personal communication, 2006).

The WRIA 45 community values agricultural land uses in the watershed and encourages opportunities for agriculture to be sustainable. These opportunities may include the support of agricultural tourism and the ability to change the type of crop produced to respond to changing economic conditions.

1.4 WRIA 45 Participation

The Wenatchee Watershed Plan is the collaborative product of numerous stakeholders in the watershed. Many have spent countless hours providing information, developing plan issues and actions, and attending meetings to represent their constituencies. Many local citizens attended public meetings, workshops, and tours over the years and greatly contributed their local knowledge to the development of the plan.

Active entities represented on the Planning Unit are listed below. Governmental members are those members of the Planning Unit who have the ability, through their jurisdiction, responsibility, or authority, to implement specific elements of a watershed plan. Non-governmental members are those members of the Planning Unit who have an interest in the development of a watershed plan but do not

have the ability to implement specific and tangible elements of a watershed plan. A full list of individuals who have participated in this process is presented in the acknowledgements section of this plan.

Governmental Members

*Chelan County** **Initiating Governments*
*Wenatchee Reclamation District**
*City of Wenatchee**
Chelan County Public Utility District
City of Cashmere
City of Leavenworth
Chelan County Conservation District
Chelan-Douglas Health District
Washington State Agency Caucus
- *Washington State Department of Ecology (caucus lead)*
- *Washington State Department of Fish & Wildlife*
- *Washington State Department of Health*

Yakama Nation
US Forest Service
US Fish and Wildlife Service
US Bureau of Reclamation
Cascade Orchards Irrigation Company
Jones-Shotwell Ditch
Icicle Irrigation District
Peshastin Irrigation District
Wenatchee-Chiwawa Irrigation District

Non-Governmental Members

Blue Star Growers
Washington Growers Clearinghouse Association
Longview Fibre Company
North Central Washington Audubon Society
Citizens/Landowners
North Central Washington Association of Realtors
North Central Home Builders Association
Center for Environmental Law and Policy (CELP)

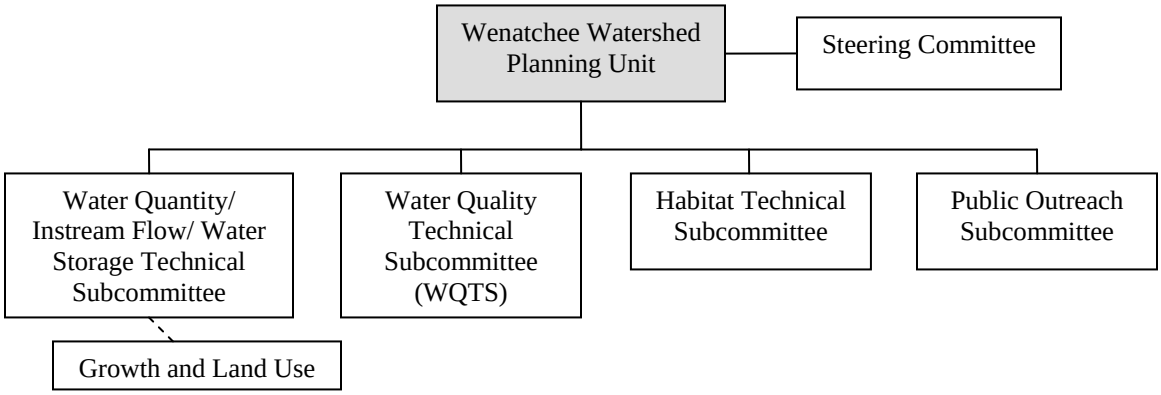
1.5 Planning Unit History and Operating Procedures

The three initiating governments, Chelan County (Lead Agency), the Wenatchee Reclamation District and the City of Wenatchee, assembled late in 1998 and determined they would pursue watershed planning under RCW 90.82. The Wenatchee Watershed Planning Unit (WWPU) formed in 1999; Chelan County was designated Lead Agency for grant management purposes and to provide administrative, facilitation and technical support to the process. Participation on the WWPU has always been open to include "anyone who has an interest in the Wenatchee River Watershed" (WWPU, 2003). Active Planning Unit members are grouped as governmental or non-governmental based on their ability to implement specific and tangible elements of the plan.

Much of the watershed planning work in WRIA 45 has been (and continues to be) performed by several key technical subcommittees under the direction of the Planning Unit. These committees address technical and policy issues associated with each of the technical elements and develop

alternative approaches for the Planning Unit's consideration. The Water Quantity/Instream Flow/Water Storage, Water Quality, and Habitat Technical Subcommittees include a broad range of representation from those with special technical expertise or an interest in the subject area. The flow chart below illustrates the structure of the Planning Unit, its steering committee and its subcommittees.

Planning Unit Structure



Decisions throughout this collaborative planning process have been made by consensus as defined by the WWPU to mean that the decision "allows every participating member to say, 'I can live with the decision and accept it, even though it may not be exactly what I want'" (WWPU, 2003). Each subcommittee has operated under consensus as well, developing more specific procedures as needed. Subcommittees make recommendations to the Planning Unit for consideration. For decisions that are substantive and binding, and for final plan approval, the Planning Unit will use the formal decision making process, as described in RCW 90.82. This formal process encourages consensus as described above where each entity will have one vote. However, if consensus cannot be achieved, then approval requires consensus of governmental entities and a majority vote among non-governmental entities.

1.6 Mission, Goal and Objectives

The intent of the Watershed Management Act is to "meet the needs of a growing population and a healthy economy statewide; meet the needs of fish and healthy watersheds statewide, and advancing these two principles, in increments over time." The Watershed Management Act goes on to state that, "enhancing the flexibility of our water management system to meet both environmental and economic goals are important steps to providing a better future for our State" (RCW 90.82 notes 2001 c 237).

Consistent with the intent of the Watershed Planning Act, the Wenatchee Watershed Planning Unit has defined its mission:

> "*to collaboratively develop a management plan for sustaining and improving watershed and community health.*"

In implementing this management plan, the Planning Unit's goal is to:

> *"protect water resources, habitat and water use in a way that balances the educational, economic and recreational values associated with a healthy community."*

The Planning Unit is working to achieve this goal by meeting the following objectives:

1. Assess water supply and use, and develop strategies for meeting current and future needs for both in-stream and out-of-stream use (Water Quantity and Instream Flow Subcommittee).
2. Protect and enhance habitat of threatened and endangered and culturally important species throughout the Wenatchee Watershed, improving overall habitat function and connectivity (Habitat Subcommittee).
3. Address polluted water bodies that do not meet state and federal water quality standards [Water Quality Technical Subcommittee (WQTS)].

1.7 Relationship to Other Planning Processes in WRIA 45

Planning for salmon recovery and Total Maximum Daily Load (TMDL) development are occurring in parallel to watershed planning in WRIA 45. Both of these plans will be integrated into the Wenatchee Watershed Plan as aquatic habitat and water quality elements, respectively. The salmon recovery and TMDL planning processes provide an opportunity to discuss sub-watershed scale issues in depth.

Ongoing processes related to Watershed Planning in WRIA 45 include:

- Upper Columbia Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Planning
- Wenatchee Subbasin Planning
- WRIA 45 Total Maximum Daily Load (TMDLs) (Temperature, Fecal Coliform, DDT, and pH and Dissolved Oxygen (DO))
- Instream Flow Assessment/Negotiations
- Multi-purpose Water Storage Assessment
- Lower Wenatchee Channel Migration Zone Study
- Northwest Forest Planning Process for the Wenatchee and Okanogan National Forests
- Local Governments Growth Management Act (GMA) Critical Area updates

1.8 Plan Components and Supporting Technical Documents

This plan includes the mandatory water quantity component, as well as the optional water quality, instream flow, and habitat components of a watershed management plan. A list of primary technical assessment documents that have been completed and used in support of this watershed plan is provided below. Many can be found on the Chelan County Natural Resource Department (CCNRD) Website (http://www.co.chelan.wa.us) using the "Natural Resource Program" link under "Departments". The water quantity and instream flow components are addressed in a WRIA 45 Water Resource Management Strategy detailed in Sections 3.0 through 5.0, related growth and land use issues (Section 6.0), and a storage study that is ongoing, concurrent to Plan development. The water quality component includes issues and strategies identified by the Total Maximum Daily Load (TMDL) study (Section 7.0). The habitat component was written concurrently with the Draft Upper Columbia Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Plan. The habitat component and the Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Plan are separate documents, but their goals and objectives are consistent. The habitat component, presented in Section 8.0 is

broader in scope than the Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Plan, and considers the needs of the terrestrial portion of the watershed system.

Habitat

- *Final Draft Habitat Component (Golder, 2005c)
- Draft Upper Columbia Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Plan (UCSRB, 2005)
- Upper Columbia Biological Strategy (UCRTT, 2002)
- Wenatchee Limiting Factors Assessment (WCC, 2001; Andonaegui, 2001)
- Wenatchee Subbasin Plan (prepared by Chelan County and Yakama Nation) (NPCC, 2004)

Instream Flow

- *Summary of Instream Flow Assessment Work (provided by CCNRD, 2005)
- *Final Technical Report Lower Wenatchee River PHABSIM Studies (includes Peshastin) (EES Consulting, Inc and Thomas R. Payne and Associates, August, 2005b)
- Instream Flow Study of Icicle Creek (US Bureau of Reclamation (USBOR), 2005)
- Toe-Width summary (provided by Washington State Department of Ecology (Ecology))
- Nason and Chiwawa WUA curves (provided by Ecology)
- Bull Trout Habitat Suitability Report (EES Consulting, Inc. 2005a)

Water Quantity

- *2003 Wenatchee Watershed Assessment (MWG, 2003)
- *WRIA 45 Groundwater Technical Memo (Golder, 2005a)

Water Quality

- 1998 Wenatchee River Watershed Action Plan (Wenatchee River Watershed Action Plan, 1998)
- *Supplemental Water Quality Assessment
    - Pesticide Use and Toxicity Assay in Mission, Brender and Yaksum Creeks (Burgoon and Rickel, 2003b)
    - Assessment of Sources of Fecal Coliform in Mission and Brender Creeks (Burgoon and Rickel, 2003a)
- Wenatchee TMDL
    - DDT in Lower Mission Creek (Serdar and Era-Miller, 2004)
    - Temperature Assessment (Cristea and Pelletier, 2005)
    - Forest Service Temperature Assessment (Wiley and Cleland, 2003)
    - Wenatchee pH, DO Assessment (Carroll and O'Neal, 2005b)
    - Wenatchee Fecal Coliform Assessment (Carroll and O'Neal, 2005a)

*reports completed with state Watershed Planning funds

1.9 Organization of the Wenatchee Watershed Plan

The Wenatchee Watershed Plan is the product of seven years of collaboration, during which the Planning Unit has developed management strategies and actions beneficial to the resources of the entire watershed. Habitat, water quality, water quantity and instream flow, and growth and land use

subcommittees have worked to develop these components to be consistent with other ongoing processes in the region.

This plan is intended for both the general public and for participants in the watershed planning process, as well as for the entities that will be implementing the prescribed actions. The Planning Unit's intent is to keep the plan concise and to provide a clear Executive Summary, allowing for easier presentation and review during the public review process. The body of this plan includes a summary of management recommendations developed by the WRIA 45 Planning Unit as a part of the planning process. The issues and corresponding actions are presented by plan component and sub-watershed and are identified by the following acronyms.

WRMS	Water Resource Management Strategy Issues and Recommended Actions
QUANT	Water Quantity Issues and Recommended Actions
GLU	Growth and Land Use Issues and Recommended Actions
QUAL	Water Quality Issues and Recommended Actions
H	Habitat Issues and Recommended Actions
IMP	Implementation Issues and Recommended Actions
PO	Public Outreach Issues and Recommended Actions

ChiwaukumH	Chiwaukum Creek Sub-watershed Habitat Recommended Actions
ChiwawaH	Chiwawa River Sub-watershed Habitat Recommended Actions
ChumQUANT	Chumstick Creek Sub-watershed Water Quantity Recommended Actions
ChumQUAL	Chumstick Creek Sub-watershed Water Quality Recommended Actions
ChumH	Chumstick Creek Sub-watershed Habitat Recommended Actions
IcicleQUAL	Icicle Creek Sub-watershed Water Quality Recommended Actions
IcicleH	Icicle Creek Sub-watershed Habitat Recommended Actions
LitWenH	Little Wenatchee River Sub-watershed Habitat Recommended Actions
LkWenH	Lake Wenatchee Sub-watershed Habitat Recommended Actions
LowWenQUAL	Lower Wenatchee River Sub-watershed Water Quality Recommended Actions
LowWenH	Lower Wenatchee River Sub-watershed Habitat Recommended Actions
MissionQUANT	Mission Creek Sub-watershed Water Quantity Recommended Actions
MissionQUAL	Mission Creek Sub-watershed Water Quality Recommended Actions
MissionH	Mission Creek Sub-watershed Habitat Recommended Actions
NasonH	Nason Creek Sub-watershed Habitat Recommended Actions
NSTQUANT	Northside Tributaries Water Quantity Recommended Actions
PeshastinQUANT	Peshastin Creek Sub-watershed Water Quantity Recommended Actions
PeshastinH	Peshastin Creek Sub-watershed Habitat Recommended Actions
UpWenQUAL	Upper Wenatchee River Sub-watershed Water Quality Recommended Actions
UpWenH	Upper Wenatchee River Sub-watershed Habitat Recommended Actions
WhiteH	White River Sub-watershed Habitat Recommended Actions

In addition, the Plan contains a summary of the recommendations organized by sub-watershed that enables local stakeholders to clearly identify the areas where they can take action. Supporting information can be found in the appendices and in Phase II Technical Assessment reports. It is important to note that the majority of the technical information has not been repeated in this report unless it was necessary to understand the basis for the recommendation. This plan contains the following sections:

Section 1	Watershed Planning in WRIA 45
Section 2	Summary of Issues in WRIA 45 and Recommended Actions
Section 3	Estimates of Current and Future Water Use
Section 4	A Water Resource Management Strategy for WRIA 45
Section 5	Water Quantity Recommended Actions that Support the Water Resource Management Strategy
Section 6	Growth and Land Use Issues and Recommended Actions
Section 7	Water Quality Issues and Recommended Actions
Section 8	Habitat Issues and Recommended Actions
Section 9	Summary of Plan Recommendations by Sub-watershed
Section 10	Plan Implementation
Section 11	Public Outreach
Section 12	State Environmental Policy Act (SEPA) Gap Analysis
Section 13	References

1.10 Plan Availability

Copies of this plan, including the Appendices, are available for review at the following locations:

- Wenatchee Public Library, 310 Douglas St., Wenatchee 662-5021
- Cashmere Public Library, 101 Woodring, Cashmere 782-3314
- Leavenworth Public Library, 700 Hwy 2, Leavenworth 548-7923
- Chelan County Natural Resource Department, 316 Washington Street, Wenatchee 667-6533

A copy of the plan is available online on the Chelan County Natural Resource Department Website (http://www.co.chelan.wa.us) using the "Natural Resource" link under "Departments" and on Compact Disc (CD) that can be obtained by calling the Chelan County Natural Resource Department office in Wenatchee, WA at (509) 667-6533.

2.0 SUMMARY OF ISSUES AND RECOMMENDED ACTIONS IN WRIA 45

The Wenatchee Watershed Planning Unit has identified a number of key water related issues and potential management strategies and actions to address those issues through a series of scoping workshops and subsequent discussion. This section presents a summary of those actions as recommended in this plan. Implementation of the recommended actions is subject to securing the necessary funding, resources, and legislative authorizations (where required). In addition, implementation will be subject to applicable regulations including SEPA and NEPA requirements.

Water in the Wenatchee Watershed supports agriculture, businesses, communities, cities (Cashmere, Leavenworth, part of Wenatchee), outdoor recreation, anadromous and resident fish and other aquatic life, other wildlife, and substantial public lands, predominantly National Forest lands. The aim of the Wenatchee Watershed Plan is to protect and enhance instream flows and associated habitat, while also providing adequate water for communities, citizens, businesses and agriculture into the future. The character of the watershed-wide issues has shaped this unique and complex plan. Many actions demonstrate the linkages that exist between water quantity, instream flow, growth and land use, water quality, and habitat in the watershed.

The characteristics of WRIA 45 vary widely in terms of population, development, future growth, economy, existing and future water use, water availability, habitat status and needs, streamflow, and water quality. Therefore, some actions are relevant for the entire WRIA while others are only applicable to specific sub-watersheds. In order to facilitate the implementation of the plan on a more local level, actions that are specific to an individual sub-watershed are identified and discussed in Section 9.0.

Tables 2-1 through 2-16 present a summary of the recommended actions in the plan and the agency(s) or entity(s) responsible for the implementation of each of the proposed actions. Tables 2-1 through 2-7 summarize watershed-wide actions pertaining to instream flow, quantity, growth and land use, quality, habitat, implementation, and outreach, respectively. Tables 2-8 through 2-16 summarize sub-watershed specific actions.

Further discussion of each issue, the recommended actions, and planned implementation of those actions can be found in the following sections:

Section 4: Water Resource Management Strategy (WRMS)

Section 5: Water Quantity Actions Supporting WRMS

Section 6: Growth & Land Use

Section 7: Water Quality

Section 8: Habitat

Section 9: Sub-watershed Summaries

Section 10: Implementation

Section 11: Public Outreach

3.0 CURRENT AND FUTURE WATER USE IN WRIA 45

This section presents a summary of surface and groundwater use estimates developed subsequent to the Phase II Technical Assessment to support planning goals in WRIA 45. The water quantity component of watershed planning under Chapter 90.82 RCW requires, among other things, estimates of current and future surface water and groundwater use in the watershed. Information summarized in this section includes estimates of current water use (2002), forecasts of future water use over the planning horizon (2025), and an annual water budget. Forecasted water use is used to help determine the quantity and geographic distribution of a water reservation for domestic, municipal and stock water use in WRIA 45. A discussion of the water reservation is included as part of an instream flow rule described further in Section 4.0.

A more detailed description of the methods and sources of data used to develop estimates of current and future water use and the water budget summarized in this section can be found in Appendix A.

3.1 Estimates of Current and Future Water Use

The general approach used to develop current water use estimates and water use projections through 2025 included the following steps.

1. Estimate the current number of households that are serviced by Group A (15 or greater connections) and Group B (less than 15 connections) water systems, and those serviced by a permit-exempt well.
2. Convert estimates of current population to estimates of current water use using water use factors for full and part-time use.
3. Clarify Chelan County's estimates of population growth rate between 2000 and 2025 for UGA and non-UGA areas of the Cashmere and Leavenworth-Lake Wenatchee Census County Divisions (CCDs).
4. Apply the growth rates (defined in Step 3) to current estimates of water use (defined in Step 2), on a sub-watershed scale, to estimate future municipal and domestic water use in 2025 by sub-watershed.
5. Where larger municipalities were able to provide direct projections of 2025 water use in their water system plans, those data were used directly, in place of step 4.

Each of these steps is described briefly below with the results of the analysis. A more detailed description of the methods and sources of data used to develop estimates of current and future water use and the water budget summarized in this section can be found in Appendix A.

3.1.1 Estimates of Current Population in WRIA 45

County Assessor parcel data, U.S. Census data, and Washington State Department of Health (DOH) water system data were used to gain an understanding of the distribution of people by types of water use (part-time or full-time) and by types of water service (Group A, Group B, or exempt well).

The distribution of current population by sub-watershed and by water use type and water service types is presented in Figure 3-1.

Groups that are shown include:

- **Full-time water users:** include any people which indicated WRIA 45 as their place of residence in the 2000 Census by the U.S. Census Bureau. The largest full-time population is estimated to be in the Lower Wenatchee Sub-watershed (7,886 people) and the smallest full-time population in the Little Wenatchee Sub-watershed (3 people).

- **Part-time water users:** include any people which may live in the WRIA but do not consider it their primary residence. This was calculated as the difference between the population estimated based the number of residential parcels in each sub-watershed and the population estimated from Census data. In general, sub-watersheds in the Leavenworth-Lake Wenatchee CCD are more likely to have large part-time populations. The Lake Wenatchee, Upper Wenatchee, Nason, and Chiwawa Sub-watersheds are all estimated to have part-time populations double that of full-time populations.

- **Population served by Group A and B water systems** was estimated using an internal DOH database (Nicodemus, 2005) which records the number of connections served by such systems. Certain water purveyors provided individual data that were used in place of DOH data, these details are presented in Appendix A. The population presented in Figure 3-1 includes only residential connections (not businesses or other non-residential users). The Chumstick Sub-watershed has the largest population serviced by Group A and B systems (3,351 people), due primarily to the City of Leavenworth Group A Water System.

- **Population served by exempt wells** was estimated as the difference between total population (full- and part-time water users), and Group A and B populations. Population served by exempt wells is of interest because this water use is not recorded under individual water rights and it is often difficult to estimate the total number of exempt wells in an area, as they are not tracked. In addition, exempt well use is dispersed which makes it difficult to estimate its cumulative effect on the WRIA water balance. The Lower Wenatchee Sub-watershed has the largest population served by exempt wells in the WRIA (4,910 people).

3.1.2 Population and Water Use Growth Rates

Two sources of data were used to provide an estimate of how water use will grow between 2002 and 2025:

- Water use projections from individual water purveyors. The Cities of Leavenworth and Cashmere (Urban Growth Areas) have water system plans for their service areas that included estimates of total future water use (including residential, commercial, industrial, etc.).

- Projected percent increases in population from Chelan County's use of the Office of Financial Management (OFM) "high" Total Resident Population projection for each of two Census County Divisions (CCDs), the Lake Wenatchee-Leavenworth CCD and the Cashmere CCD (MWG, 2003). Population projections provide an estimate of how water use will grow in the absence of large changes in water use (such as a large new industrial user or conservation).

The County's allocation of population to the urban and rural areas within each CCD is based on Urban Growth Area (UGA) allocations by Chelan County to the Cities of Cashmere and Leavenworth

and a third, future UGA[1] to be located in the Peshastin-Dryden area (Chelan County, 2002). The County has also made revisions to the total rural population in the Lake Wenatchee-Leavenworth CCD which is reflected in this analysis and discussed further in Appendix A. These urban-rural allocations were used to apply the percent increase in population at the sub-watershed level.

The resulting projected percent increases in water use are: [2]

- Leavenworth-Lake Wenatchee CCD
  - Non-UGA– 1.18%, based on County projections
  - Leavenworth UGA – 3.4%, growth rate (compounded) based on City of Leavenworth water system plan data (2002)
- Cashmere CCD
  - Non-UGA – 1.16%, based on County projections
  - Cashmere UGA – 1.0%, based on City of Cashmere water system plan data (2004)
  - Future UGA (Peshastin) – 6.09%, based on County projections

3.1.3 Estimates of Current and Future Domestic and Municipal Water Use

Municipal and domestic water use were estimated for the year 2002 and projected to 2025. The results, grouped by sub-watershed and use type, are presented in Table 3-1.

Water use is presented in terms of Average Day Demand (ADD), which represents the average daily use in a year, and Maximum Day Demand (MDD), which represents the maximum daily demand in a year. ADD was calculated by multiplying the number of full-time connections by a rate of 380 gallons per day (gpd), and each part-time connection by a use rate of 95 gpd (consistent with assumptions in the Phase II Technical Assessment; MWG, 2003). Households serviced by exempt wells were assumed to use a full-time rate of 380 gallons per day (gpd) (MWG, 2003). MDD was calculated by multiplying ADD by a peaking factor of 2.5 (MWG, 2003).

Future (2025) water use in rural areas was calculated by applying the rural population growth rate for that Census County Division to existing water use and assuming that the percentage of full-and part-time water use for Group A and B systems will remain constant. All new exempt wells were assumed to be full time use. Future (2025) water use in Leavenworth and Cashmere was based on projected use as reported in their water system plans. In the Peshastin-Dryden area, where a future UGA is expected, future water use is based on County Planning population allocations.

These estimates of future domestic and municipal water use have been used to help establish the quantities of water in a water reservation for each sub-watershed in the WRIA (see Section 4, Management Strategy).

---

[1] The County anticipates development of a third UGA within the planning horizon of this watershed plan. For purposes of estimating future water use, the third UGA is assumed to be established in the Peshastin-Dryden area and growth calculations in the UGA are based on County allocations.

[2] It should be noted that population projections were not developed as part of this analysis, rather existing population projections were summarized and clarified through discussions with individual entities such as Chelan County and the cities within WRIA 45.

3.2 Water Budget

The intent of the water budget is to present the scale of major human water uses as compared to streamflow in each sub-watershed of WRIA 45, and for the WRIA overall, for periods of limited water availability (September). Water budgets, presented in Figure 3-2, compare water use (both groundwater and surface water) and surface water flows directly. Any delays of impacts to streamflow from demands met by groundwater are not directly represented by these data; groundwater storage has not been assessed to this extent. This snapshot is not a water balance that compares the timing and quantity of hydrologic inputs and outputs for each sub-watershed.

Municipal and domestic water use is presented as Maximum Day Demands (MDD) and Average Day Demands (ADD). MDD represents the peak daily demand in a year and ADD represents average daily demand in a year. For further discussion on MDD and ADD, see Section 3.1 and Appendix A. Additional water use demands (commercial/industrial, irrigation, and fish propagation) are presented as their instantaneous water rights reported in the Wenatchee River Basin Watershed Assessment (MWG, 2003). Using water right data as representative of certain uses is conservative because it assumes that the full extent of the water right is exercised and that water right claims are not duplicative.

In addition to water use, the table and figure include low flow (90% exceedance flow for September); average flow (50% exceedance flow for September), and high flow (10% exceedance flow for September) estimates. An exceedance flow represents the flow that has a given percent chance of being equaled or exceeded in any one year. This represents the range of flows that have historically occurred in September. September is a consistently low flow month throughout the period of record. Therefore, this budget provides a snapshot of the potential range of summer flow conditions combined with estimates of the maximum and average water use.

4.0 A WATER RESOURCE MANAGEMENT STRATEGY FOR WRIA 45

The Wenatchee Watershed Planning Unit (WWPU) recommends establishing a new water resource management strategy (WRMS) for the watershed that strikes a balance between protecting and enhancing flows for fish and providing adequate future water for communities, citizens, businesses and agriculture.

This section provides an overview of the proposed water resource management strategy and recommendations. Background information is provided for context, followed by issue statements and recommended actions. Actions include proposed new management flows at each control point[3], a water reservation to provide a year-round supply for specified uses, and a seasonal supply of water (maximum allocation) for seasonal use and storage. This section also includes specific strategies and actions to be implemented in each sub-watershed, as necessary. Watershed-wide measures to enhance this water resource management strategy and help mitigate potential impacts of use of the reservation are presented in Section 5.0; Watershed-wide Water Quantity Recommendations.

This water resource management strategy is intended to apply to water supply originating in WRIA 45 and does not currently include water sources outside the Wenatchee Watershed. The Wenatchee Watershed Planning Unit recognizes that there are ongoing discussions concerning the capacity and longevity of the East Bank Aquifer Regional Water Supply (Regional Water Supply) that serves the greater Wenatchee area (the East Bank Aquifer supply is located outside of WRIA 45). The Regional Water Supply is jointly owned and operated by the City of Wenatchee, East Wenatchee Water District (EWWD) and the Chelan County Public Utility District (PUD). At this time the Wenatchee Watershed Plan does not include recommendations that consider the Regional Water Supply as a source of water for the Lower Wenatchee River and its tributaries. The Regional Water Supply will only be considered a water source for the Lower Wenatchee River and its tributaries if the owners of the Regional Water Supply choose to provide water to these areas. Future coordination between the Wenatchee Watershed Planning Unit and owners of the Regional Water Supply should be encouraged. However, one of the owners, the EWWD, is not currently a member of the Wenatchee Watershed Planning Unit and therefore cannot be obligated to provide water to the Lower Wenatchee River and its tributaries as part of this watershed plan.

4.1 Background

1983 Rule – Wenatchee River Basin Instream Resources Protection Program

Water resources of the Wenatchee River Watershed (WRIA 45) are currently managed according to an administrative law (rule) established in 1983. This existing management program includes instream flows at specified control points and provision for year-round water for future use by single domestic uses, and for seasonal water uses subject to flow. This 1983 rule was established to assist with water allocation decisions and to protect senior water rights. There are currently five instream flow control points in the Wenatchee Basin, established by Chapter 173-545 WAC (See Figure 4-1). These points are, in order from upstream to downstream: (1) Wenatchee River at Plain, (2) Icicle Creek near Leavenworth, (3) Wenatchee River at Peshastin, (4) Mission Creek near Cashmere, and (5) Wenatchee River at Monitor. In addition, Peshastin Creek was closed to further appropriation between June 15 and October 15. Actual streamflow in the Wenatchee River at Monitor and Plain, and on Mission Creek are less than instream flows established by rule approximately half the time during low-flow months. When flows are not met, junior water rights (those water rights issued after 1983) are required to discontinue use until flows in the stream are higher than flows in the rule. Since

[3] A stream gage that is used to measure the discharge of the stream to ensure that the instream flow requirements are met.

1983, the Washington State Department of Ecology (Ecology) has regulated junior water right holders nine times. Water rights that were issued prior to the 1983 rule are not affected by the rule and are not subject to interruption due to low flows.

Why Revise the Existing "Water Resource Management Program" in the Wenatchee?
Water resource management programs are revised when new information is available or when it is necessary to address instream and/or out-of-stream water needs that were not addressed in the past. Since 1983, when the rule was established, a number of changes and issues have arisen related to aquatic resources protection (e.g. endangered species listings) and out-of-stream water use (e.g. municipal water legislation). The 1983 instream flows were not adequately based on the biological needs of fish, and may therefore provide inadequate protection. New information is now available that better identifies the biological requirements of threatened and endangered species. Although single domestic use is not limited, new supplies for group domestic and municipal uses are subject to flows under the 1983 rule. Group domestic and municipal systems are required to demonstrate that an Overriding Consideration of the Public Interest (OCPI) would be served before being authorized by Ecology to develop a new year-round supply. This situation makes it difficult for municipalities to provide water for growth, especially in designated urban growth areas (UGAs) as specified under the Growth Management Act (GMA). Lastly, the 1983 rule fails to address seasonal uses (e.g. irrigation) or storage of water to meet future seasonal or year-round water use needs.

A New Water Resource Management Strategy (WRMS) for the Wenatchee
The Planning Unit has clearly identified issues associated with the current program (1983 rule) and developed recommended actions to address these issues as part of a proposed new water resource management strategy. The issues and actions are outlined below.

4.2 Water Resource Management Strategy (WRMS) Issues

The following general issue statements were developed during the WWPU scoping process, and are included here as the overarching issues addressed by the overall water resource management strategy.

- There is a need to assess current management flows (1983 Flow Rule) and determine whether changes should be made to better meet the needs of aquatic species and humans in WRIA 45 through the year 2025.

- There is concern in the Wenatchee Watershed that instream flow regulations or closures may result in the inability to obtain water for new domestic use in areas serviced by exempt wells, group domestic and municipal water systems. Particular areas of concern include the Chumstick Creek, Chiwawa River, Mission Creek, and Peshastin Creek Sub-watersheds; the Monitor area, Northside tributaries, and other areas.

- There is a need to develop an adaptive management process for this Water Resource Management Strategy (WRMS) to address and integrate new data as they become available.

4.3 Water Resource Management Strategy (WRMS) Recommended Actions

The proposed water resource management strategy for WRIA 45 includes a reserve of water from which new domestic, municipal, and stock water (except feedlots) uses will be allocated. The reserve is not subject to instream flow. In addition to specified uses that require a water right permit, future domestic water uses that rely upon permit-exempt wells are also authorized under the reserve. Administration of the reserve and associated actions are addressed in Section 5.2.

Note that instream flow regulations and closures apply only to new uses. There is no loss of existing rights or diminishment of existing uses that result from a new water resource management strategy.

The following recommended actions were developed by the WWPU to address the issues identified above. Although listed as independent actions, they are recommended for implementation as a package. The Wenatchee Watershed Planning Unit (WWPU):

WRMS-1: Recommends that the State Department of Ecology adopt, in rule, the new water resource management strategy for WRIA 45, including the management flows (revised instream flows) at specified control points, the water reserve, and maximum allocations. The management flows, water reserve and maximum allocation are outlined in more detail in Sections 4.4 through 4.6.

WRMS-2: Recommends that the Planning Unit or future implementing body in WRIA 45 be involved with Ecology, in any scoping, study planning, study implementation, alternatives analysis, negotiations or rule development if Ecology undertakes instream flow or related water management studies or rulemaking in the watershed.

WRMS-3: The WWPU with Chelan County taking the lead role will participate in the development and implementation of an adaptive management process to support this water resource management strategy. The process should address flexibility in the distribution of the reserve across the WRIA. The details of the adaptive management process will be determined as part of Phase IV Implementation.

WRMS-4: Implementation of a new or existing instream flow rule in the Wenatchee Watershed will require that flow monitoring continues at all existing and proposed control points on the Wenatchee River and its tributaries. Figure 4-1 shows the locations of all control points and active stream gages in the watershed. The following actions address these requirements. The WWPU:

> **WRMS-4a**: Recommends that Ecology continue to support monitoring at all existing stream gages in the Wenatchee Watershed. Ecology and partners must ensure that the gages and streamflow data are well maintained. Updated data should be made available on the Ecology website in a timely manner for all gages managed by Ecology.
>
> **WRMS-4b**: Encourages the USGS to continue to maintain USGS gages in the watershed to support implementation of this water resource management strategy.
>
> **WRMS-4c**: Recommends a new stream gage be established at the existing control point on the Icicle Creek. Details will be determined during Phase IV, Implementation.
>
> **WRMS-4d**: Review the gage location on the Chiwawa River as related to the impacts on flows from withdrawals.

These actions, taken together, form a water resource management strategy for the Wenatchee River Watershed (WRIA 45), intended to manage water through the year 2025. The strategy is proposed to ensure that aquatic resources are protected while the water in the watershed is being put to maximum beneficial use. The strategy includes new and revised instream flows at specified control points; and associated conditions such as year-round reserve water for future domestic, municipal and stock water uses, and maximum allocations for storage and other seasonal uses that are subject to flow.

This strategy can be enhanced through development and implementation of additional tools and actions, including the establishment of a WRIA 45 water bank, storage, conservation, water right

transfers, use of a trust water program, and updates to subdivision and land use management requirements. These additional measures (tools) are discussed in Section 5.0.

It is important to note that this proposed water resource management strategy will not affect existing water rights; it applies only to new water rights for new uses to be established in the future. Although the instream flows proposed as part of this strategy will not put water into streams, they will protect aquatic resources from degradation, and existing senior water rights from impairment. However, additional measures discussed in Section 5.0 (e.g. storage, conservation, trust water program) can be used to return water to streams.

4.4 Instream Flow Recommendations

This portion of the strategy recommends that the existing Instream Resources Protection Program for the Wenatchee River Watershed (Chapter 173-545 WAC) be revised to reflect more current knowledge of the instream flow needs of aquatic species. The WWPU recommends revising existing instream flows and establishing new instream flows at new control points as described below.

4.4.1 Control Points in the Wenatchee River Watershed

Figure 4-1 shows the locations of existing and proposed future instream flow control points in WRIA 45. The following existing and new control points are recommended for use in managing instream flows under a revised water resource management program for the Wenatchee River Watershed:

1. Wenatchee River at Monitor (existing control point and gage)
2. Wenatchee River at Peshastin (existing control point and gage)
3. Wenatchee River at Plain (existing control point and gage)
4. Mission Creek Near Cashmere (existing control point and gage)
5. Peshastin Creek at Green Bridge (new control point at gage)
6. Icicle Creek near Leavenworth (existing control point, new gage needed)
7. Nason Creek (new control point at gage)
8. Chiwawa River (new control point at gage)

This strategy does not recommend eliminating any of the existing control points. Rather, the WWPU recommends establishing new control points for Peshastin Creek, Nason Creek, and the Chiwawa River to augment the program to monitor and manage water resources of the Wenatchee River Watershed. It will be necessary to secure additional funds to establish and maintain a streamflow gage for the Icicle River near Leavenworth. While this is an existing control point as a matter of administration, there has not been a streamflow gage at this control point for many years.

4.4.2 Management Flows (revised Instream Flows)

Figures 4-2 through 4-9 and Tables 4-1 through 4-8 show management flows (instream flows) proposed for this water resource management strategy for each control point. The tables also present the fish species and life stage that served as rationale for flow setting.

The WWPU recommends that existing instream flows for the Wenatchee River at Plain remain unchanged. However, the Planning Unit recommends that existing instream flows for the Wenatchee River at Monitor, Wenatchee River at Peshastin, Mission Creek near Cashmere, and Icicle Creek near Leavenworth be revised, as illustrated in Figures 4-2, 4-3, 4-5, and 4-7, respectively. The Planning Unit also recommends that Ecology adopt rules establishing instream flows for Peshastin Creek, Nason Creek, and the Chiwawa River as illustrated in Figures 4-6, 4-8 and 4-9 respectively. Instream

flow studies (EES, 2005b; USBOR, 2005) including modeling of flow needs for fish are used to support the new recommended flows. Appendix B presents additional information about the development of these management flow recommendations.

It is also important to note that establishment of proposed management flows in rule will not:

- affect existing water rights; it applies only to new rights established after the instream flow have been established in rule.
- put water in streams; instead it will protect flows from degradation, and existing senior water rights from impairment

Establishment of instream flows will address only one of several issues identified by the WWPU. A program addressing out-of stream water use is provided below to address concerns regarding future water use needs in the Wenatchee River Watershed.

4.5 Out-of-Stream Recommendations

The WWPU proposes two tools to manage new out-of-stream uses as part of this strategy. It is understood that the instream flow recommendations (Section 4.4) are not stand-alone recommendations. Instead, they are part of a package that also includes:

a. a water reservation
b. a maximum water allocation

A water reservation would provide water for future year-round use and a maximum allocation would provide water for seasonal use and storage. A revised water resource management program would not change access to existing water rights.

4.5.1 Water Reservation

This portion of the strategy proposes to establish a reserve of four (4) cubic feet per second (cfs) for the entire WRIA. The reserve is allocated by sub-watershed and was estimated to provide a year-round reliable supply of water for specific future uses in WRIA 45 through 2025 in a manner that would not impair aquatic resources. The reserve can include use of groundwater or surface water sources depending on site-specific conditions. The reservation is split among sub-watersheds and between the upper and lower watershed to ensure that sufficient water is available to service growth based on water use forecasts and GMA population allocations.

Reserved Uses

The following water uses qualify for the reserve and would not be subject to interruption when management flows (revised instream flows) are not met[4]:

- Domestic use: Water to satisfy the human domestic needs of a household or business, including water used for drinking, bathing, sanitary purposes, cooking, laundering, care of household pets, and outdoor irrigation of up to one-half acre of associated lawn or garden per dwelling[5,6], and other incidental uses. For permit-exempt domestic water use of ground water

[4] Fire suppression is not part of the reservation as it is not subject to a water right permit. It is assumed that water for fire suppression is not subject to instream flow and therefore, available year-round without interruption.

[5] ½ acre of associated lawn and garden refers to the amount of the lot that is irrigated, and is not prescribing lot sizes.

sources, total outdoor watering for multiple residences shall be consistent with the groundwater permit exemption provisions in RCW 90.44.050.,

- Municipal (including residential, commercial and industrial uses that are provided by a municipal water system within its water service area), and
- Stock water use (except feedlots), must be consistent with the Chelan County Code, Section 11.88.030 or any subsequent amendments.

Water uses that are not provided for by the reservation include:

- New commercial or industrial uses that require water right permits and are located outside of a municipal purveyor's water service area (acquire water rights through change applications of already appropriated water, a water bank, or a new water right that is subject to new instream flows).
- New agricultural uses (acquire water through change applications of already appropriated water, a water bank, or a new water right that is subject to new instream flows).
- Any uses not specified under Reserved Uses

Uses that are not eligible for water from the reserve will need to obtain water by acquiring valid water rights, new water rights that are subject to management flows, and/or water rights through a water bank.

Basis for 4 cfs Reservation

The quantity of the water reserve has been determined based on both the protection of instream uses and the projected out-of-stream needs in the watershed. The four cfs reservation in the Wenatchee as estimated based on acceptable habitat loss at the Monitor control point (downstream-most control point) should provide water for anticipated growth through 2025.

It is anticipated that 4 cfs, or 2.58 million gallons per day (MGD), would be sufficient to meet the projected demands for domestic, municipal, and stock water needs of the entire watershed through 2025 (Currently domestic and municipal use in the Wenatchee Watershed is approximately 7.5 cfs). Table 4-9 indicates the number of new residential and municipal connections anticipated in WRIA 45 through 2025 and the estimated water use associated with those connections by sub-watershed. Average daily demand (ADD) forecasts assume household use of 380 gpd.

The habitat loss associated with the use of a reservation in the mainstem Wenatchee River, Peshastin Creek, Icicle Creek, Nason Creek and the Chiwawa River has been assessed using PHABSIM. This assessment conservatively assumes that all reservation use (water from both groundwater and surface water sources) will directly impact surface water flows at the time of use. The resource agencies' goal is to limit reservation related habitat loss to less than 1% and to allow a 1% to 2% loss under some conditions (Ecology, 2004). This proposed water management strategy results in less than 1% habitat loss for most sub-watersheds. Average habitat loss is between 1% and 2% in the Lower Wenatchee River. The habitat impact of full reserve use at each location was reviewed with representatives of state resource agencies and other Planning Unit members to gain consensus that aquatic resources would be minimally impaired.

[6] This acreage limitation does not apply where separate irrigation water is used for outdoor watering.

Reservation by Sub-watershed

The 4 cfs reservation in the mainstem Wenatchee River applies to the entire watershed. The reserve is further allocated between the upper and lower portions of the WRIA, and among sub-watersheds to ensure that the water available for servicing growth is distributed equitably and based on projected growth and future water needs. Additional limitations and sub-watershed allocations are based on local aquatic habitat needs. Sub-watershed limitations and associated strategies are presented in Section 4.6. Table 4-10 presents the anticipated reserve by sub-watershed (column one) and the habitat loss that results from the use of reserve water in that sub-watershed (column two). Table 4-10 (column three) also indicates the maximum amount of water that can be debited to the reserve in a specific sub-watershed such that the resulting habitat loss for that tributary does not exceed one percent.

Flexibility has been built into the distribution of the reserve over the watershed. General rules that apply to the distribution of the reserve over the watershed, and to the approved use of reserve water are as follows:

Rule I: Watershed-wide reservation cannot exceed 4 cfs in total

Rule II:
1. Lower WRIA Reserve cannot exceed 3.5 cfs
2. Upper WRIA Reserve cannot exceed 1.0 cfs

Rule III: General Rule for Individual Sub-watershed Reservations:

Limited to the greater of:

a. Amount projected to meet 2025 water use needs
b. Amount that does not exceed 1% habitat loss

With the following exceptions:

Mission Creek: 0.03 cfs with conditions for 2 years after rule adoption (see Section 4.6.4)

Chumstick Ck: 0.043 cfs with conditions for 3 years after rule adoption (Section 4.6.6)

Icicle Creek: 0.1 cfs (In the near term, City of Leavenworth debits the Lower Wenatchee Reserve. An additional 0.4 cfs may be allocated after flow restoration efforts targeting habitat between the upstream diversions (hatchery, City of Leavenworth and Icicle Irrigation District) and hatchery return are addressed (Section 4.6.7).

Accounting of the reservation by Chelan County Natural Resource Department (CCNRD) is addressed in Section 5.2.

4.5.2 Maximum Water Allocation (Cap)

To best accommodate water storage opportunities, this portion of the strategy recommends the establishment of a maximum water allocation or “cap” of total water available for storage or other seasonal uses. The maximum allocation represents the maximum flow that could be allocated from the watershed or sub-watershed, subject to instream flow requirements, for storage and seasonal allocation to new uses through water rights. Table 4-11 presents the maximum allocation by sub-watershed, subject to management flows. The maximum allocation specified for a control point is the maximum flow that can be diverted above that control point, by the sum of new water uses. The

cumulative maximum allocation in the Wenatchee Watershed at any time cannot exceed the limits set at the Monitor gage. Although individual sub-watershed maximum allocations may sum to an amount greater than the specified maximum allocation at Monitor, they cannot all be put to use at the same time across the watershed. During months when no allocation is allowed at Monitor, there can be no allocation further upstream in the watershed.

The rationale in setting maximum allocations revolved around the following principles:

- Instream flows must first be met;
- Maximum allocation from each sub-watershed will be limited to 1/10th of the 50% exceedance flow for each month. This will result in a higher maximum allocation during spring runoff and a lower allocation for fall and winter months; and
- In each sub-watershed, there are 1- 2 months (Late summer to early fall) over which no maximum allocation for future diversion is likely, including storage. On the rare occasions when higher flows occur during months with no maximum allocation, these flows are of benefit to both spawning and rearing fish.
- Further analysis and discussion may need to take place regarding maximum allocation limits in specific sub-watersheds and the mainstem Wenatchee and the relationship between the allocations, and habitat and channel-forming processes.

The combination of new management flows and a maximum allocation serve to protect stream channel maintenance processes and outmigration of fish species in all sub-watersheds, while enabling the opportunity for diversion or storage. In most sub-watersheds the opportunity for diversion or storage will occur 10 months of the year. This wide time frame will allow for maximum flexibility in future water use projects.

4.5.3 Exemptions

No future water allocated in WRIA 45 will be exempt from management flows (eg., a new instream flow rule) other than that water allocated from the reservation. If established, this revised strategy would allow all new domestic, municipal, and stock water uses (including permit-exempt wells) projected to occur through 2025 to be allocated in an equitable manner through the reservation. Fire suppression and fire emergency use of water are also not subject to management flows.

4.6 Water Resource Management Strategy by Control Point

Development of instream flow and future water resource management recommendations in WRIA 45 is based on flows necessary to protect aquatic resources, water available for out-of-stream use or storage, and the need to provide a year-round (uninterruptible) reliable supply of water for future uses. This strategy recommends management flows, a maximum allocation and a reservation, where available, for each priority sub-watershed in the WRIA with an associated stream gage monitoring (control) point. Supporting aquatic resources data and analysis are included as instream flow (ISF) Appendix B.

The following information is provided for each control point proposed in this WRIA 45 Water Resource Management Program:

- A figure showing proposed (new or revised) management flows, exceedance hydrographs and, where appropriate, the 1983 management flows for comparison.

- A table presenting management flows and maximum allocation by month

The actual water reserved by sub-watershed is presented in Table 4-10.

4.6.1 Wenatchee River at Monitor: Watershed-Wide Control Point

These instream flow conditions reflect all in-stream and out-of-stream activities within the WRIA as the Monitor gage is the lowest most control point in WRIA 45.

Flow – Figure 4-2 and Table 4-1 show proposed management flows at the Monitor gage. These flow conditions reflect all in-stream and out-of-stream activities within the WRIA as the Monitor gage is the lowest most control point in WRIA 45.

Maximum Allocation (Cap) – Table 4-1 shows the maximum allocation associated with the Monitor gage, subject to management flow requirements. This is the total amount of water available for storage and appropriation of seasonal water rights for other uses, by month for the entire watershed.

Strategy for Future Use:

- **Reservation:** A cumulative reservation of 4 cfs sufficient to meet growth in WRIA 45 through 2025. Applies to domestic use and associated lawn and garden irrigation, municipal and stock water uses. The 4 cfs reserve is based on flows measured at the Monitor gage.

4.6.2 Wenatchee River at Peshastin

Flow: Figure 4-3 and Table 4-2 show proposed management flows at the Peshastin gage on the Wenatchee River

Maximum Allocation (Cap): Table 4-2 shows the maximum allocation associated with the Wenatchee River at Peshastin gage, subject to management flow requirements.

Strategy for Future Use:

- **Reservation:** The Monitor and Peshastin gages on the Wenatchee River are viewed as one unit for reservation accounting purposes.

4.6.3 Wenatchee River at Plain

The management flows at the Plain gage have not been revised for this management program. The flows continue to be set at the levels specified in the 1983 flow rule.

Flow: Figure 4-4 and Table 4-3 show 1983 management flows at the Plain gage on the Wenatchee River.

Maximum Allocation (Cap): Table 4-3 shows the maximum allocation associated with the Plain gage, subject to management flow requirements. This maximum allocation includes all water allocated above Plain gage.

Strategy for Future Use:

- **Reservation:** A reservation of 0.5 cfs to 1.0 cfs is available for the entire upper watershed, above Leavenworth. This reservation provides water for projected growth in the Upper

Wenatchee, Chiwaukum, Nason, Little Wenatchee, White, Chiwawa and Lake Wenatchee Sub-watersheds.

4.6.4 Mission Creek Near Cashmere

Flow: Figure 4-5 and Table 4-4 show proposed management flows at the Mission Creek gage on the Wenatchee River.

Maximum Allocation (Cap): Table 4-4 shows the maximum allocation associated with the Mission Creek gage, subject to flows. In the case of the Mission Creek Sub-watershed, the maximum allocation includes seasonal water for storage and other uses subject to instream flow. No water is available under this cap during the months of July, August, or September.

Strategy for Future Water Use:

Chelan County as lead (with support from Ecology), will convene a Mission Creek Forum to assess options to provide water for future growth (to provide an uninterruptible supply of water for domestic, municipal and stock water uses) through the purchase, lease, or transfer of existing, valid, water rights or from storage (storage oppoortunties within Mission Sub-watershed or through the Peshastin and/or Icicle Irrigation Districts). All new permit exempt wells in the Mission Sub-watershed will be debited to a Mission Creek reservation, once created through water right lease or purchase. A total of 0.12 cfs is necessary to provide water for growth to the Mission Creek Sub-watershed through 2025 (assuming the City of Cashmere obtains any new water from the mainstem Wenatchee and new Cashmere water is debited to the Lower Wenatchee Sub-watershed). In the interim, a 0.03 cfs reserve for Mission Creek is available for use for two years following initial rule adoption, given the following conditions:

- Allocate Cashmere water from Lower Wenatchee reservation.
- Metering of all new uses under the interim reserve.
- Recognizing that 0.12 cfs is needed, 0.03 cfs from the watershed-wide reserve can be allocated in the Mission Sub-watershed to accommodate current growth until water can be acquired through other alternatives as identified by the Mission Creek Forum. 0.03 cfs will be available for two years after rule adoption. Conservation can stretch this time period.
- As water rights are purchased or transferred for use in the Mission reserve to meet a “no net impact” standard, the first purchase(s) will credit the 0.03 cfs interim reserve, then the additional 0.09 cfs will be available for forecasted growth as it is purchased.
- If water rights are not purchased or leased to cover the interim reserve of 0.03 cfs within two years of rule adoption or if conservation measures that provide additional water are not implemented, Ecology would close the Mission Sub-watershed to further appropriation on a seasonal basis and existing outdoor water use could be curtailed when flows are not met.

Mission Issue Statement

The Mission Creek Sub-watershed is, at times, dry. Water is not left in the stream to appropriate for new users. Therefore, surface water and groundwater are not available for further appropriation to provide an uninterruptible supply for domestic, municipal and stock water uses during low flow periods. Different water management alternatives need to be evaluated to determine the most effective solutions to fulfill both instream and out-of-stream needs and mitigate impacts of withdrawals on habitat, streamflow, and groundwater levels in the Mission Creek Sub-watershed.

Mission Recommended Actions

MissionQUANT-1: Chelan County as lead (with support from Ecology), will convene a Mission Creek Forum to assess options to provide water for future growth through the purchase, lease or transfer of existing, valid water rights or from storage (storage opportunities within Mission Sub-watershed or through the Peshastin and/or Icicle Irrigation districts). This will be conducted for the purpose of providing an uninterruptible supply for domestic, municipal and stock water uses. During Phase IV, Implementation, the Mission Creek Forum will determine whether the strategies for Mission are relevant to Brender Creek, and consider assembling separate strategies to address local instream flow concerns and conditions for Brender Creek, if appropriate.

Within two years of rule adoption, the Forum will have developed opportunities and researched funding opportunities for these alternatives.

MissionQUANT-2: As part of Phase IV, Implementation, evaluate alternatives that could increase available water for instream and out-of-stream uses. Clearly address specific water needs in the Mission Creek and evaluate water conservation, storage, purchase, lease and transfer of water rights, water from other sub-watersheds, and other alternatives as appropriate.

MissionQUANT-3: One quarter (0.03 cfs) of the 0.12 cfs projected 2025 water needs is available for growth for two years after rule adoption. If, after two years, water rights are not purchased or leased to cover the interim reserve of 0.03 cfs or conservation measures that provide additional water are not implemented, Ecology would close the Mission Sub-watershed to further appropriation on a seasonal basis, and existing outdoor water use established subsequent to the adoption of WAC 173-545 could be curtailed when flows are not met. All water allocated to the City of Cashmere will be debited to the Lower Wenatchee Reserve and not to the Mission Reserve.

MissionQUANT-4: Consider storing water in Icicle/Peshastin and use that water to augment flows and provide mitigation water in Mission Creek.

MissionQUANT-5: Consider storage opportunities within Mission Sub-watershed (See Section 5.5).

MissionQUANT-6: Metering of all new uses covered under the Mission reserve (includes all new domestic uses).

MissionQUANT-7: Evaluate out-of-kind mitigation and enhancement projects over time, if appropriate. Identify habitat and water quality improvements to mitigate additional reserve water.

MissionQUANT-8: Chelan County or other entity with agency funding assistance will investigate water rights for purchase or lease as part of the mitigation and enhancement strategy for Mission Sub-watershed. The County will seek funding from BPA, Ecology, Washington Rivers Conservancy, Washington Water Trust, and others. As water rights are purchased or transferred for use in the Mission reserve to meet a "no net impact" standard, the first purchase(s) will credit the 0.03 cfs interim reserve, then the additional 0.09 cfs will be available for forecasted growth as it is purchased.

4.6.5 Peshastin Creek at Green Bridge

Flow: Figure 4-6 and Table 4-5 show proposed management flows at the Green Bridge gage on Peshastin Creek.

Maximum Allocation (Cap): Table 4-5 shows the maximum allocation associated with the gage on Peshastin Creek at Green Bridge, subject to management flow requirements. The maximum

allocation would require lifting the current closure for the months of June through July, but would be subject to new flows during those months.

Strategy for Future Water Use:
Replace existing seasonal closure in June and July with new management flows. There is currently a seasonal closure (June 15 – Oct 15) to any future surface or groundwater allocation in the Peshastin Sub-watershed. This program recommends a **revised rule that would change the current closure to August 1 – October 15** (allowing allocation of water during spring runoff periods), the establishment of new flows and a maximum allocation for storage and seasonal use, subject to flows and the new closure. New domestic uses will be serviced through the reservation. Lifting the closure between June 15 and July 31 will provide storage opportunities that would not otherwise be possible and provide incentive for mitigation.

- **Reservation**: A reservation of 0.1 cfs would be made available for use in the Peshastin Sub-watershed. This reservation would consider reach specific issues, such as dewatered reaches in the lower Peshastin Creek.

Peshastin Issue Statement

Water is limited. Therefore, different water management alternatives need to be evaluated to determine the most effective solutions to fulfilling the instream and out-of-stream needs and mitigating the impacts to habitat, streamflow, and groundwater levels in the Peshastin Creek Sub-watershed.

Peshastin Recommended Actions

PeshastinQUANT-1: Evaluate passage requirements for fish immediately below the Peshastin Irrigation District diversion (addressing bypass reach/piping).

PeshastinQUANT-2: Consider other instream projects that improve habitat.

PeshastinQUANT-3: As part of Phase IV, Implementation, evaluate alternatives that could increase available water for instream and out-of-stream uses. Clearly address specific water needs in the Peshastin and evaluate water conservation, storage, purchase, lease and transfer of water rights, and other alternatives.

PeshastinQUANT-4: Evaluate and institute programs to increase instream flows through water acquisitions, leases, and transfers.

4.6.6 Chumstick Creek (Interim closure with exceptions and data collection plan)

Preliminary hydrology and toe width data are available for the Chumstick and were analyzed; however, the synthesized hydrology data were not adequate to assess water availability on the Chumstick and the reach from which toe-width data were collected may not adequately represent the Creek. Therefore, instream (management) flows have not been developed for the Chumstick Sub-watershed.

Strategy for Future Water Use:
An interim closure for the Chumstick Sub-watershed is recommended for three years while data are collected and alternatives are assessed. Uses that are not subject to the closure (and can continue throughout the three year interim closure) include: fire suppression, domestic use from wells, stock water uses, and seasonal storage, pending evaluation by the Chumstick Water Forum and Ecology.

These exempt uses would be limited to a total of 0.043 cfs while studies are being performed to determine future water availability in the Chumstick. Seasonal storage opportunities and other alternatives in Chumstick will be evaluated by Ecology and the Chumstick Water Forum through the water right application process on a case-by-case basis during the three year interim period. Storage opportunities in Chumstick will be addressed as part of the Chumstick strategy after conclusion of the Forum's three year process and coordinated with the WRIA 45 Multi-Purpose Storage Assessment. This interim closure will be re-evaluated at the end of the three year period by the Chumstick Forum and Ecology.

Chelan County as lead (with support from Ecology), will convene a Chumstick Creek Forum to assess options to provide water for future growth (to provide uninterruptible supply for domestic, municipal and stock water uses) through the purchase, lease or transfer of existing, valid water rights or from storage. A cumulative impact analysis of permit exempt use and uses associated with permits and claims approved since 1983 will be conducted by Ecology as authorized under the 1983 flow rule (Ecology, 1983). Chelan County will partner with Ecology in this study. The cumulative impacts assessment will help to determine whether Ecology will curtail outdoor domestic water use of wells installed after 1983, and whether Ecology will close the Chumstick Sub-watershed to outdoor water use in the future. A total of 0.13 cfs is necessary to provide water for growth to the Chumstick Creek Sub-watershed through 2025 (assuming the City of Leavenworth obtains any new water from the mainstem Wenatchee or Icicle). In the interim, a 0.043 cfs reserve for Chumstick Creek is available for use for three years following initial rule adoption, given the following conditions:

- Metering of all new uses under the interim reserve.
- City of Leavenworth obtains any new water from the lower Wenatchee reserve.
- Recognizing that 0.13 cfs is needed, 0.043 cfs from the watershed-wide reserve can be allocated in the Chumstick Sub-watershed to accommodate current growth until water can be acquired through other alternatives as identified by the Chumstick Creek Forum. 0.043 cfs will be available for three years after rule adoption. Conservation can stretch this time period.
- As water rights are purchased or transferred for use in the Chumstick reserve to meet a "no net impact" standard, the first purchase(s) will credit the 0.043 cfs interim reserve, then the additional 0.09 cfs will be available for forecasted growth as it is purchased.
- If water rights are not purchased or leased to cover the interim reserve of 0.043 cfs within three years of rule adoption, or if conservation measures that provide additional water are not implemented, Ecology would close the Chumstick Sub-watershed to all further appropriation on a seasonal basis and existing outdoor water use could be curtailed when flows are not met.

Chumstick Issue Statement

The Chumstick Sub-watershed lacks the data to evaluate available water and recommended allocation strategies. Hydrogeology is complex and not well understood. There is a need to develop detailed water resource management strategies based on additional data indicating groundwater availability.

Alternatives for future water in the Chumstick are limited. Therefore, different water management alternatives need to be evaluated to determine the most effective solutions to fulfilling the instream and out-of-stream needs and mitigating the impacts to habitat, streamflow, and groundwater levels in the Chumstick Creek Sub-watershed.

Chumstick Recommended Actions

ChumQUANT-1: Chelan County as lead (with support from Ecology), will convene a Chumstick Water Forum to guide data collection, oversee the proposed water management strategy, and help develop mitigation measures.

ChumQUANT-2: Chumstick Water Forum to assist in developing a data collection plan to monitor surface water flows (specify location) and develop management flows.

ChumQUANT-3: Chumstick Water Forum, with assistance from Chelan County and Ecology, to conduct groundwater monitoring to understand hydraulic continuity and overall impact of exempt wells on groundwater levels and streamflows.

ChumQUANT-4: Recommend that Ecology close the Chumstick Sub-watershed for an interim period of three years while data are collected and alternatives are assessed. Uses that are not subject to the closure (and can continue throughout the three year interim closure) include: fire suppression, domestic use from wells, stock water uses, and seasonal storage, pending evaluation by the Chumstick Water Forum and Ecology. These exempt uses would be limited to a total of 0.043 cfs while studies are being performed to determine future water availability in the Chumstick and a future strategy is assessed. Seasonal storage opportunities and other alternatives in Chumstick will be evaluated by Ecology and the Chumstick Water Forum through the water right application process on a case-by-case basis during the three year interim period. Storage opportunities in Chumstick will be addressed as part of the Chumstick strategy after conclusion of the Forum's three year process and coordinated with the WRIA 45 Multi-Purpose Storage Assessment. This interim closure will be re-evaluated at the end of the three year period by the Chumstick Forum and Ecology. Note that water storage tanks as included in the Chumstick Community Wildfire Protection Program are exempt from this closure.

ChumQUANT-5: Ecology and Chelan County to implement reservation conditions as follows: One third (0.043 cfs) of the 0.13 cfs projected 2025 water needs is available for growth for three years after rule adoption. Allocation of the remainder of the reserve would be considered only after completion of additional instream flow assessments (ChumQUANT-2) and a cumulative impacts study (ChumQUANT-3, 6) and would be subject to appropriate conditions and limitations based on the result of those assessments (ChumQUANT-7). If, after completion of the cumulative impact study, Ecology determines that the cumulative effects of domestic water uses negatively affect water available for instream flows, Ecology will consider allowing only in-house water use from the reservation. If after 3 years, water rights are not purchased or leased to cover the interim reserve of 0.043 cfs or conservation measures that provide additional water are not implemented, Ecology would close the Chumstick Sub-watershed to further appropriation on a seasonal basis, and existing outdoor water use established subsequent to the adoption of WAC 173-545 could be curtailed when flows are not met. Note that the City of Leavenworth will debit any new water from the Lower Wenatchee Reserve and not the Chumstick Reserve.

ChumQUANT-6: A cumulative impact analysis of permit exempt use and uses associated with permits and claims approved since 1983 will be initiated by Ecology as authorized under the 1983 flow rule. Chelan County will partner with Ecology in this study. The cumulative impacts assessment will help to determine whether Ecology will curtail outdoor domestic water use of wells installed after 1983, and whether Ecology will close the Chumstick Sub-watershed to outdoor water use in the future.

ChumQUANT-7: Chumstick Forum, Chelan County and Ecology to re-evaluate a proposed strategy for the Chumstick in three years after rule adoption, when new monitoring data have been collected

and assessed and cumulative impact analysis is complete. Consider allowing group domestic groundwater use of deeper aquifer only as part of the Chumstick strategy addressed by the Forum.

ChumQUANT-8: Chelan County will evaluate alternatives to improve fish passage at the North Road culvert, and further pursue replacement of culverts upstream of North Road on Chumstick Creek.

ChumQUANT-9: Metering of all new uses covered under the Chumstick reserve (includes all new domestic uses).

ChumQUANT-10: As part of Phase IV, Implementation, the Planning Unit and the Chumstick Forum (with Chelan County as lead) will evaluate alternatives that could increase available water for instream and out-of-stream uses. Clearly address specific water needs in the Chumstick and evaluate water conservation, storage opportunities, purchase, lease and transfer of water rights, water transfer from other sub-watersheds, and other alternatives. Consider conjunctive use and evaluate pumping from the deep aquifer to augment flows in the Chumstick. Investigate storage options where stored water could be used to augment flows and provide mitigation water.

ChumQUANT-11: Encourage conservation and outreach.

ChumQUANT-12: Chelan County or other entity with agency funding assistance will investigate water rights for purchase or lease as part of the mitigation and enhancement strategy for Chumstick Sub-watershed. The County will seek funding from BPA, Ecology, Washington Rivers Conservancy, Washington Water Trust, and others. As water rights are purchased or transferred for use in the Chumstick reserve to meet a "no net impact" standard, the first purchase(s) will credit the 0.043 cfs interim reserve, then the additional 0.09 cfs will be available for forecasted growth as it is purchased.

Consider information from adjudication records (1982-1984) when investigating water rights for purchase or lease.

4.6.7 Icicle Creek

Flow: Figure 4-7 and Table 4-6 show proposed management flows at the Icicle Creek control point at the East Leavenworth Road bridge. The gage, "Icicle Creek above Snow Creek near Leavenworth" is located upstream of the control point.

Maximum Allocation (Cap): Table 4-6 shows the maximum allocation associated with the Icicle gage, subject to management flow requirements.

Strategy for Future Use:

- Reservation: A reservation of 0.1 cfs would be made available for use in the Icicle Sub-watershed. An additional 0.4 cfs may be allocated after flow restoration efforts targeting habitat between the upstream diversions (hatchery, City of Leavenworth and Icicle Irrigation District) and hatchery return are addressed.

4.6.8 Nason Creek

Flow – Figure 4-8 and Table 4-7 show proposed management flows at the gage on Nason Creek near mouth.

Maximum Allocation (Cap): Table 4-7 shows the maximum allocation associated with the Nason Creek gage, subject to management flow requirements.

Strategy for Future Water Use:

- **Reservation**: A reservation of 0.5 to 1.0 cfs would be made available for the entire upper watershed, above Leavenworth. This includes 0.1 to 0.16 cfs in the Nason Sub-watershed.

4.6.9 Chiwawa River

Flow – Figure 4-9 and Table 4-8 show proposed management flows at the gage at Chiwawa River near Plain.

Maximum Allocation of new water: Table 4-8 shows the maximum allocation associated with the Chiwawa gage, subject to management flow requirements.

Strategy for Future Water Use:

- **Reservation**: A reservation of 0.5 to 1.0 cfs would be available for the entire upper watershed, above Leavenworth. This would include 0.1 to 0.5 cfs in the Chiwawa Sub-watershed.

4.6.10 Northside Tributaries

Issue Statement

There are limited flow and groundwater data for the Northside Tributaries that indicate whether there is a water availability problem or a pending future water availability problem. There is general concern about water availability in the canyons. However, it is difficult to characterize groundwater availability with this system. Canyon Public Meetings were held to gain input from property owners in developing long-term strategies for water supply. Future water management alternatives need to be evaluated to determine the most effective solutions to fulfilling water needs in the canyons.

The recommendations below envision water supplied from within WRIA 45 and not water supplied from the East Bank Aquifer Regional Water Supply system unless the owners of the Regional Water Supply choose to supply water to these areas.

Recommended Actions

NSTQUANT-1: Future water supply availability should be discussed with Chelan County Public Utility District (PUD) to determine whether they have the capacity and infrastructure to provide backup supply. The East Bank Aquifer Regional Water Supply will only be considered as a source of water for this area if approved by the owners of the Regional Water Supply.

NSTQUANT-2: PUD and Chelan County to consider pumping from Wenatchee Valley and a potential PUD hookup in Nahahum.

NSTQUANT-3: Chelan County and Ecology to provide public information regarding water limitations in Northside Tributaries (Fact Sheets).

NSTQUANT-4: Chelan County and Ecology to work with local community to design and implement a groundwater monitoring program in existing wells to determine trends in groundwater levels.

NSTQUANT-5: Alternatives Analysis for Northside Tributaries to include options such as use of out-of-basin water, pumping from lower Wenatchee reserve, PUD hookup, deep groundwater, storage, and water right purchase.

4.7 What happens after 2025 or when the reserve has been depleted?

There are a number of water management options available to extend the life of the reservation after the 4 cfs reserve has been allotted. Additional water management tools that could potentially extend the life of the reservation are discussed in Section 5.0. Furthermore, the reservation is subject to the adaptive management intent of the plan. This allows the per-household debit to the reservation be subject to review based on new data or information.

5.0 WATERSHED-WIDE WATER QUANTITY ACTIONS (THAT SUPPORT THE WATER RESOURCE MANAGEMENT STRATEGY)

This section presents recommended water quantity-related management actions that are tools to support the water resource management strategy (WRMS) presented in Section 4.0. Many of the actions provided in this section will provide additional water for both instream and out-of-stream purposes, will help meet future water needs, and will extend the life of the water reservation for WRIA 45. Issues and associated actions presented in this Section were initially identified by Planning Unit members during a series of workshops intended to focus this watershed management plan. Since that time, the issues and actions have been further refined.

5.1 Water Rights, Trusts and Banks

5.1.1 Water Rights - Background

Water Rights in Washington State

Surface and groundwater claims and permits and certificates in the State of Washington are based on different sets of laws; however, all require the demonstration of beneficial use. Water right claims are water rights established *before* the State Codes were adopted; water right permits and certificates are water rights established *after* the State Codes were adopted.

The State water codes for surface water were adopted in 1917 and for groundwater in 1945. In 1967, the Water Rights Claims Registration Act was passed to create a record of the water uses claimed to be rights established prior to adoption of the water code. The registry was initially open from July 1, 1969 through June 30, 1974 (Smith, 1998). Since then, the Water Rights Claims Registry has been opened three times. Therefore, claims for water use may have been registered multiple times resulting in duplicate, triplicate, or possibly quadruplicate records of what should be a single use.

All certificates and permits granted after the adoption of the State Water Codes are based on the prior appropriation doctrine (Smith, 1998). Each water right has an associated priority date (when the water was first put to beneficial use for claims or the date of the permit or certificate) that is used to determine seniority amongst water right holders. Senior water right holders have an earlier priority date than those water right holders that are junior to them (referred to as “first in time, first in right”). The existing 1983 Instream Resources Protection Program (IRPP) for the Wenatchee Watershed establishes instream flows and rules that are, in effect, water rights for the Wenatchee River, Mission Creek, Peshastin Creek and Icicle Creek with and priority date of 1983. Any water right granted subsequent to the 1983 rule is junior to the instream flow and subject to interruption during years where the management flows are not achieved. Those people who hold water rights established prior to the rule are senior to the instream flows, and are not affected by the rule.

Not all groundwater uses require a permit or certificate. “Exempt wells” are exempt from the water right permit application process (Chapter 90.44.050). Permit-exempt withdrawals are those uses that withdraw up to 5,000 gallons/day for single or group domestic purposes, industrial purposes, or watering a lawn or non-commercial garden of ½ acre or less, or watering stock (Smith, 1998).

Instream flows as recommended by the Planning Unit (WWPU), to be set for rivers or creeks that do not have existing minimum instream flow levels set by rule shall have a priority date of two years after funding was first received from Ecology under RCW 90.82.040, unless otherwise determined by a unanimous vote of the members of the WWPU but in no instance may it be later than the effective date of the rule adopting such flow (Chapter 90.82.080(2)(a) RCW). This would pertain to recommendations made for Peshastin Creek, Nason Creek, and the Chiwawa River.

Any increase to existing instream flows, as recommended by the WWPU, would have a priority date that is two years after funding was first received for planning in WRIA 45. This would pertain to recommendations made for the Wenatchee River at Monitor, the Wenatchee River at Peshastin, Mission Creek near Cashmere, and Icicle Creek near Leavenworth (Chapter 90.82.080 (2)(b) RCW).

It is possible to lose a water right or a portion of a water right through relinquishment or abandonment. A water right is relinquished if all or part of the water right is not used for a period of five or more consecutive years (RCW 90.14.160), unless sufficient cause is shown. There are specific circumstances (RCW 90.14.140(1)) and uses (RCW 90.14.140(2)) that do not result in a relinquishment or loss of the water right.

Tribal Water Rights

In the Treaty of 1855, the Yakama Nation ceded a portion of its land to the United States and reserved a portion for the Yakama Reservation. The entire Wenatchee Watershed is contained within the ceded area. While ceding title to the land, the Yakama Nation reserved certain rights on the ceded lands including the right to hunt and fish at usual and accustomed places (U and A's) and on open and unclaimed lands. The right to fish carries with it a right to have water in the streams to ensure that fish survive their life histories. Therefore, the Yakama Nation's treaty fishing rights include the right to have water in the streams of WRIA 45 to ensure that fish survive their life histories. In the Yakima River adjudication, that right has been assigned a priority date of Time Immemorial, so it is the senior water right in the basin. The same applies to the Wenatchee, although the Wenatchee basin has not been adjudicated. In the Yakima basin, the court also made it clear that the right to fish at usual and accustomed places entails a right to water for fish in those stream reaches that are upstream of the U and A's where the fish harvested at the U and A's spawn and rear.

In endorsing this Watershed Plan, the Yakama Nation does not relinquish any of its Treaty or Sovereign rights.

5.1.2 Trust Water - Background

One of the uses described in RCW 90.14.140(2)(h) is a trust water program. An example of a trust program is the Ecology Trust Water Program that allows water right holders to donate, lease, or permanently sell their water right to the program for whatever beneficial use they designate. This program can safeguard all or part of a water right for a specified length of time. This program allows right holders flexibility in the amount of water they use and protects the right from the risk of relinquishment or loss of the priority date. For example, if a water right is placed in the Trust program for five years then the water right can be exercised as an instream flow right (or any other beneficial use) and those five years are not considered a period of nonuse. Therefore relinquishment would not have occurred.

Five years in trust, if not designated for another use, would mean the right would be exercised for the five years as an instream flow water right. RCW 90.42 provides water users with legal processes whereby water rights can be donated, leased, or permanently sold and result in a trust water right for instream purposes. Procedures are somewhat different for donation, lease, and purchase of water rights, however, in each case, the water right when accepted into trust (in the case of donations and leases) or when created as a permanent trust water right, is an instream flow water right if that's what the donor, lessor, seller and state request. Unlike rights for irrigation, domestic, municipal, or industrial purposes, a trust water right for instream flow is exercised when it is in the river. A water right that is exercised for a beneficial use is therefore not relinquished for non-use.

Other important attributes of the Trust Water Program:

- A trust water right retains the same priority date as the originating water right. However, where a trust water right derives from a portion of another right, as between a trust water right and the original right, the trust right retains the same priority date but is junior to the original right.

- Generally, a water user may only change the portion of a water right that has been put to beneficial use. Additionally, the quantity of water transferred to trust is limited to the "extent to which the water right was exercised" during the five years prior to the transfer. RCW 90.42.080(4)(8).

- The change, as requested, may not impair any existing rights. Ecology considers multiple factors when making a decision on a transfer to trust including the following: (1) whether the right is valid; (2) whether the water right has been abandoned or relinquished for nonuse; (3) whether the change will increase the instantaneous or annual quantity of the water used; (4) whether the change will increase the consumptive use of the water; (5) whether the change will otherwise enlarge the water right; and (6) whether the change is contrary to the public interest.

- Any water right conveyed to trust as a gift for the purposes of instream flow is deductible as a gift for federal income tax purposes by the person conveying the water right. RCW 90.42.080(7).

- A water right may be donated or leased for transfer to trust on a temporary basis. In such situations, "the full quantity of water diverted or withdrawn to exercise the right before the donation or acquisition shall be placed in the trust water rights program and shall revert to the donor or person from whom it was acquired when the trust period ends."

- Water can be transferred to the Trust Water Program through a purchase, lease, donation, split-season lease, or dry year lease. Split-season and dry year leases are not practical alternatives for perennial crops like orchards.

    - Purchase – A purchase of a water right is a permanent acquisition of that right for change to an instream flow use.

    - Lease – A lease of a water right is a temporary acquisition of all or part of the right. For shorter-term leases (less than 5 years), Ecology uses an expedited administrative change process.

    - Donation – A water right owner may donate their water to trust on a temporary or permanent basis. A permanent donation may constitute a charitable contribution for the donor and therefore be tax deductible.

Potential partners in Trust Water programs and funding include Washington Water Trust, Washington Rivers Conservancy, BPA, USBOR, NPCC, Ecology and others.

5.1.3 Water Banks - Background

This proposed program recommends developing a water bank for the entire watershed. Water banking can be defined as "an institutional mechanism that facilitates the legal transfer and market

exchange of various surface, groundwater, and storage elements" (Clifford, et. al., 2004). The purposes of a water bank can be to: create a more reliable source of water, ensure future water, promote conservation, act as a market mechanism, and/or resolve issues of inequity.

Details regarding the bank would be developed during the implementation phase (Phase IV) of watershed planning. A water bank can be used to provide water for future domestic and municipal use or otherwise to service growth where no water is currently available. Water banks are recommended for development in the Mission and Chumstick Sub-watersheds, and may also be developed for the Northside Tributaries. Water banks can also help support mitigation requirements for reservations that will require that water be put back into streams. The bank could also serve as a central clearing house for water right purchase and transfers to support other uses such as agricultural, commercial and industrial uses that are not eligible for the reservation.

Water Bank Considerations in WRIA 45

Considerations for banks developed for Mission Creek, Chumstick Creek and the Northside Tributaries are listed below.

- The geographic extent of the bank for transfers of water rights and/or assignment of mitigation credits is the topographic boundary of the respective watershed, from its headwaters downstream to its confluence with the Wenatchee River, including groundwater in hydraulic continuity. For the Northside Tributaries, this would be defined as the topographic boundary for each of the Olalla, Nahahum, Hay, Williams and Derby watersheds, from their headwaters downstream to their confluence with the Wenatchee River, including groundwater in hydraulic continuity.

- The bank must maintain a consumptive use neutrality or surplus between the existing uses and water rights acquired and the prospective uses and transfer or change of water rights or mitigation credits granted. The consumptive use calculations should be conducted in a manner consistent with recognized methods. One example is Ecology's draft guidance document (Ecology and WDFW, 2003) which uses the Washington State Irrigation Guide (NRCS, 2005).

- The bank may grant mitigation credit for certain out-of-kind aquatic resource habitat improvements, provided that the bank shall maintain net habitat improvement over the baseline established in the Wenatchee Watershed Plan for the Mission Creek, Chumstick Creek or Olalla, Nahahum, Hay, Williams and Derby Watersheds. Out-of-kind mitigation banking will be considered in Phase IV, Implementation. The habitat estimates shall be conducted in a manner consistent with recognized methods. One example is Ecology's wetlands mitigation criteria.

- To protect the adopted instream flow, the transfer of water rights and/or assignment of mitigation credit must be conducted to maintain flow neutrality along Mission Creek.

- The purpose of a water bank for Mission, Chumstick, and/or Olalla, Nahahum, Hay, Williams and Derby is to ensure the availability of safe and reliable domestic water supplies, consistent with the Wenatchee Watershed Plan.

- The administrative manager of the bank will be a market maker. In that capacity, the administrative manager may acquire water rights and dedicate them to the bank, or create new water supplies through construction or purchase of storage facilities, or acquire

water rights and import water from outside the Mission, Chumstick or Olalla, Nahahum, Hay, and Derby Watersheds.

- The operation of new storage facilities and any new appropriations associated with importing water must be consistent with the appropriation limits and minimum flows contained in the Wenatchee Watershed Plan.

- The bank will ensure that water transfers and/or assignment of mitigation credit are consistent with RCW 90.03.380, RCW 90.44.100, and will not result in impairment to any existing water rights.

5.1.4 Water Rights, Trusts and Bank - Issues

The WRIA 45 Planning Unit encourages Ecology to process water right transfers and new water right applications, and to develop strategies that allow local flexibility in water right permitting and transfers.

The WRIA 45 Planning Unit would like to further explore options for temporary lease, transfer and purchase of water rights, including options to protect water from relinquishment and to accommodate change in the type of crop grown or conversion from agricultural to residential land use.

There is a need to develop an administrative structure for a water bank for WRIA 45.

5.1.5 Water Rights, Trusts and Bank - Recommended Actions

QUANT-1: Develop recommendations for Ecology regarding the processing of new water right applications and applications for water right changes and transfers in WRIA 45. Create the recommendations through a collaborative approach between the Planning Unit and the Chelan County Water Conservancy Board, and base them on knowledge of water availability, allocation and flows; consistent with the proposed instream flow rule and resulting reservation and maximum allocation requirements for sub-watersheds. Recommendations may include data requirements necessary to evaluate the impacts of an application on surface and groundwater, areas of concern, policy regarding changes and transfers (may link to land use conversions or incentives for agricultural preservation). Recommendations should also consider facilitation of water right transfers or changes that will result in new water for a reservation in flow impaired sub-watersheds such as Mission and Chumstick Creeks.

QUANT-2: Request additional Ecology staff time from the legislature to process WRIA 45 water rights. (Focus may be transfers or new applications).

QUANT-3: Ecology should enforce existing regulations and policies concerning water rights and use.

QUANT-4: Provide incentives for conserving water rather than using it to avoid losing it. Encourage efficiencies through current water law using tools such as water trusts and/or other innovative techniques. Consider the Irrigation Efficiencies Program, and other incentives programs offered by the state and other entities. Criteria for participation include a demonstration of financial need and environmental benefit, a minimum 10 year lease of the conserved water to the Trust Water Program, and the public investment in the project not exceeding 85% of the total cost. In general, the state offers financial programs and incentives to conserve when there is a public benefit. In

many cases, dedication of the conserved water to instream flows has been the legislature's preferred means of securing the public benefit.

QUANT-5: Consider Ecology's Trust Water Program as an option to temporarily safeguard water rights during times of non-use or reduced use while satisfying the needs of beneficial uses in the watershed. Develop strategies for using trust water to safeguard water that may be used in the future to support a more water-intensive crop type or conversion from agriculture to residential. Use of this program is consistent with the proposed water resource management strategy as described in Section 4.0.

QUANT-6: Develop an administrative structure for a water bank for WRIA 45. Section 5.1.3 introduces water banks; however, the details of the administration of a water bank in WRIA 45 will be determined in Phase IV, Implementation.

QUANT-7: Chelan County or other entity with agency funding assistance will investigate water rights for purchase or lease in WRIA 45. The County will seek funding from Washington Water Trust, Washington Rivers Conservancy, BPA, USBOR, NPCC, Ecology and others. Water rights that are purchased or leased can be used to extend the water reservation while adhering to a "no net impacts" standard.

5.2 Tracking Water Availability and Use

As part of the Water Resource Management Strategy for WRIA 45, Chelan County Natural Resource Department is responsible for administration of the water reserve, and will provide the accounting for the water reservation by sub-watershed. Domestic water use will be deducted from the reservation at a rate of 380 gallons per day/household (gpd/hh) (indoor and outdoor) for full time use. This is the average daily water use factor per residential connection, based upon usage and connection data from larger Group A systems in WRIA 45 (MWG, 2003). This applies to all future domestic and municipal water use connections that are not classified as part time by Group A and B water systems. This average daily use factor of 380 gpd/hh will initially be used for the purpose of reservation accounting. Assessments of actual domestic water use will be conducted to verify the 380 gpd assumption WRIA-wide and to adjust the amount of water remaining in the reservation at five year intervals as specified below. Domestic use of part time water connections (as classified by the DOH for Group A and B systems) is 95 gpd/hh.

The Planning Unit has discussed metering options and determined that metering all new uses eligible under the reserve, combined with a monitoring program that assesses a statistically significant sample of water use types in WRIA 45 can be used to estimate the average per household water use in the WRIA, and track the status of the reserve over time. The assessments would occur at five year intervals, or more frequently if the number of wells drilled or building permits indicates growth greater than the projection is occurring within any of the sub-watersheds. This program to assess average per household water use over time is detailed in QUANT-8. Chelan County will be tracking new domestic and municipal use as part of their administration of the water reservation as described in QUANT-9, and a strategy for measuring future use to assess the status of the reservation over time is discussed in QUANT-10 below.

The following actions will be required as part of reservation management.

5.2.1 Tracking Water Availability and Use - Issues

There is a need to track water use for both administration of the reservation and to better understand water availability for future use in WRIA 45.

5.2.2 Tracking Water Availability and Use - Recommended Actions

QUANT-8: Chelan County Natural Resource Department will develop and administer a monitoring program to assess actual domestic water use to verify the 380 gpd per household assumption used to debit the reservation and to adjust the amount of water remaining in the reservation at five year intervals, or more frequently if the number of wells drilled or building permits granted indicate that growth is occurring more rapidly than projected in any sub-watershed. These assessments will be conducted based on a statistical sample of new domestic water users (single domestic, group domestic and municipal water use and associated lawn and garden irrigation (some with separate irrigation, some without), some with stock, etc.). Metering data will be incorporated into the water use audit and the accounting system.

This monitoring program will be included as part of the adaptive management element to the water resource management strategy discussed in Section 4.0. If necessary, the per household water use factor used to debit the reservation will be adjusted based on statistical sampling and metering in the WRIA (380 gpd/hh is a guide, an accounting tool).

This water use audit will be further developed during Phase IV, Implementation. As part of this audit, the consumptive portion of the daily household water use factor will be assessed, and may be used to debit the reservation. This will be considered during the first year of implementation.

QUANT-9: Reservation accounting will include the tracking of new exempt wells by Chelan County through the building permit process, septic approval through the Chelan-Douglas Health District (CDHD), tracking new domestic and municipal water rights granted by Ecology and tracking well drilling permits as issued by Ecology. The mechanism for tracking the permitted uses will be determined as part of Phase IV, Implementation. Chelan County is currently developing a method for tracking new permit-exempt wells in WRIA 46. This should also be considered for WRIA 45.

> **QUANT-9a**: Chelan County Natural Resource Department will track new exempt wells through the building permit process and will coordinate with the CDHD. A joint city/county process will need to be implemented to assist the county in tracking any building permits requiring exempt wells that are issued by other cities (if applicable) within the watershed.
>
> **QUANT-9b**: New rights that are granted by Ecology for domestic water uses will be tracked by CCNRD. The mechanism for tracking the new permitted uses that will debit the reserve will be determined as part of Phase IV, Implementation.
>
> **QUANT-9c**: Long-term funding for tracking is required.

QUANT-10: The Planning Unit recommends metering be required for all new uses eligible under the reserve. The Planning Unit will further define responsible entities, and staffing, budget and funding considerations of the metering program as part of Phase IV, Implementation. Chelan County, CDHD, Ecology, utilities, and others will work together to structure the program. The following should be addressed as part of phase IV:

- Identify responsible entities, and address staffing, cost and funding concerns

- Consider implementation by an existing utility with an existing metering program
- Consider having water users read their own meters
- Consider use of Ecology's water measuring system and database
- Consider metering options for existing water users and development of a voluntary program that uses existing metering programs' available meters.

5.3 Exempt Wells

5.3.1 Background

RCW 90.44.050 requires that before any water user may withdraw groundwater for a beneficial use after enactment of the groundwater code in 1945 he or she must first obtain a permit from the state's water resources agency. However, the legislature allowed 4 exemptions from the permit requirement. They are:

- Domestic and group domestic purposes up to 5000 gpd
- Irrigation of up to ½ acre of non-commercial lawn or garden
- Industrial purposes up to 5000 gpd
- Stock watering

In addition, the Wenatchee 1983 instream flow rule (WAC 173-545-070(3)) provides that any single domestic water use in WRIA 45 is not subject to the adopted minimum instream flows. This exception applies to both surface and groundwater. It provides:

> *WAC 173-545-070(3): Single domestic and stock watering use, except that related to feedlots, shall be exempt from the provisions established in this chapter. If the cumulative impacts of numerous single domestic diversions would significantly affect the quantity of water available for instream uses, then only single domestic in–house use shall be exempt if no alternative source is available.*

Under RCW 90.44.050, a domestic water use that does not exceed 5000 gpd or the irrigation of lawn or non-commercial garden of not more than ½ acre in area is exempt from permitting. Therefore, if the water source is a well, a water right permit is not required as long as the amounts of water used are within the exempted amounts. If the use is for more than one residence, a group domestic use, or the combined non-commercial irrigation is greater than ½ acre, then the use would be subject to the adopted minimum flows because WAC 173-545 does not exempt group domestic use from the minimum instream flows.

If the group domestic system operator sought a water right permit, it could be approved without minimum flow conditions pursuant to WAC 173-545-070(2) only if Ecology determined that OCPI was served and no alternative source of water is available. And, finally, WAC 173-545-070(3) provides that if cumulative impacts of numerous single domestic diversions would significantly affect the quantity of water available for instream uses, then only single domestic in-house use can be exempted from the adopted instream flows.

5.3.2 Exempt Wells - Issues

There is a need to track overall exempt well use and to enforce current exempt well use for irrigation and domestic outdoor purposes. Ecology is responsible for determining compliance with the exempt well statute. However their staffing levels have not historically allowed them to do so. Therefore, no

one entity is currently determining whether actual use is within the range that is allowed by the rule in WRIA 45. Furthermore, no agency/entity is currently tracking the number of exempt wells or overall water usage by exempt wells in the watershed.

5.3.3 Exempt Wells - Recommended Actions

QUANT-11: Undertake hydrogeologic studies to assess the influence of groundwater withdrawals on surface water. Identify funding for this study and responsible parties (WWPU to identify sub-areas for study, responsible entity as part of Phase IV, Implementation).

QUANT-12: Funding should be requested to survey (using GPS) private wells. The CDHD should investigate collaborating with Ecology to include these new data in the water well report log database. Recommend that the county, health district, and Ecology work together to identify, log and provide oversight of exempt wells. As part of this oversight responsibility, the CDHD should work with DOH to survey wells with greater than 3 connections. Chelan County has already conducted a GPS survey and evaluation of Group A systems (> than 14 connections).

QUANT-13: Provide public education as to the roles, responsibilities and regulations pertinent to exempt wells, and encourage the proper entities to enforce/implement (CDHD, DOH, Ecology, County).

QUANT-14: Credit a water service provider for abandoned and/or decommissioned exempt wells. This action will be further developed in Phase IV, Implementation. The well consolidation process is addressed in RCW 90.44.105. This statute presumes a credit of 800 gpd/well unless an alternative minimum is established by Ecology in consultation with DOH or there is credible evidence of non-use.

5.4 Water Use, Efficiency and Conservation (Strategies for Increasing Future Water Availability)

5.4.1 Conservation and Efficiency - Issues

Policies are needed to address changes in water needs and usage resulting from land use conversions from agricultural to residential and from lower density to higher density uses. These policies should include strategies for improved water use efficiency and conservation for residential, industrial and commercial (public water systems and exempt wells) and agricultural (irrigation districts and ditches) water uses. There is a need to investigate opportunities for increased efficiency in outdoor water use in the watershed. Lack of incentives possibly results in higher consumption. Water conservation incentives should be more equitable among purveyors.

5.4.2 Conservation and Efficiency - Recommended Actions

QUANT-15: As part of Phase IV, Implementation, Chelan County and cities should develop policies that can be used to ensure efficient use of water in the event of a land division or new development. These include:

> **QUANT-15a**: For land division applications that have shares in an irrigation district, develop policies requiring that the developer provide tie-ins to the irrigation box; ensure easements; deliver water to parcels, where practicable; and form a Homeowners Association for residential uses. Encourage Irrigation Districts to work with the county and cities to extend infrastructure and irrigation water service where practicable.

QUANT-15b: For land division applications on property with individual water rights, Chelan County should develop policies that encourage the developer to provide residential tie-ins to the water source for residential irrigation purposes.

QUANT-15c: Encourage cities and Chelan County to develop policies that encourage conservation measures for outdoor water use as a condition of subdivision approval (eg., drought tolerant landscaping, maximum lawn size, stormwater collection systems, residential irrigation system installation). Encourage use of small scale storage, rain barrels, for outdoor irrigation.

QUANT-15d: Encourage cities to develop policy statements that address transfer of water rights from private water right holders in the event of a land use conversion. For example, the City of Cashmere has policies in place that require water rights to be transferred to the City upon land division/service provision by the City's system. This policy helps preserve the City's ability to serve future users within the UGA with water.

QUANT-15e: Provide public information that encourages actions QUANT-15a through QUANT-15d, and explains the benefits (provide this information during subdivision application or preliminary plat comment period).

QUANT-15f: Encourage cluster development, and group domestic over single domestic systems to increase water use efficiency. Explore encouraging group domestic over single domestic use as part of the approval process for land division applications. Further develop this recommendation as part of Phase IV, Implementation.

QUANT-16: Research how different entities in the watershed are implementing conservation measures and acknowledge current efforts. [Note that Leavenworth is metering and employs a rate and fee structure that encourages conservation. Cashmere is currently working on revising their rate structure such that there will be more incentive for conservation.]

Encourage additional conservation measures where needed. Encourage incentive based solutions. These may include:

Residential, Industrial and Commercial (Public Water System and exempt wells)

QUANT-16a: Encourage cities and other water providers to implement a rate and fee structure that promotes conservation (similar to Leavenworth's current program and Cashmere's proposed program).

Irrigation (Districts and Canal Companies)

QUANT-16b: Encourage funding to line canals or implement other delivery system improvements, where appropriate.

QUANT-16c: Encourage the use of reclaimed water (tertiary treatment) for outdoor irrigation, industrial, and commercial use (see Ecology Watershed Guidance).

QUANT-16d: As part of Phase IV, Implementation, convene a forum to investigate conservation strategies and how they could be implemented by irrigation districts, ditches and other private companies. Involve utilities, cities, Chelan County and Ecology when appropriate. There is a need to work with members of irrigation districts, ditches and others to determine ways to save water and ensure that water rights are protected into the future.

Items of discussion could include alternative rate structures based on purpose of water use; partnerships with cities and utilities; utility coordination during development; tools to conserve water, improve instream flows and protect water rights at the same time; and distribution of public education materials.

QUANT-17: Encourage on-farm efficiencies and implementation of Best Management Practices (BMPs) to encourage water conservation.

QUANT-18: Encourage the County to provide information and education about water conservation options and fire planning; including: outdoor watering, timing, types of native vegetation that require low water use, lawn size, low flow fixtures, etc. to the new land user. The Municipal Water Law requires that water systems provide education and outreach regarding water conservation. However, water users that are using irrigation ditch water for outdoor use and/or exempt wells will not receive this information. Irrigation systems may also be able to provide materials in monthly billings. The details of this educational program will be determined during Phase IV, Implementation. Realtors should be encouraged to distribute public education materials describing water conservation and efficient water management techniques.

5.5 Storage Opportunities

Storage is another tool that can be used to maximize the beneficial use of water while minimizing instream impacts. Storage opportunities can also provide water for out-of-stream uses without debiting the reserve, thereby lengthening the life of the reserve.

5.5.1 Background

Step A Storage Assessment Results

The Multi-Purpose Water Storage Assessment for the Wenatchee Watershed (MWG, 2006) identified and reviewed a number of potential water storage strategies to improve streamflow and water supply conditions in WRIA 45. These opportunities are shown on Figure 5-1. The first stage of the storage assessment identified potential water storage strategies and opportunities such as new surface water reservoirs, optimizing or enlarging the capacity of existing reservoirs or lakes, tapping existing lakes, storm water storage and groundwater recharge. The assessment also evaluated small scale storage strategies such as repairing stream headcuts, enhancement of natural floodplain storage through channel migration zone and wetland protection projects, use of rain barrels at individual residences and providing small fire storage tanks. At the end of the first stage all of the opportunities were ranked according to the factors such as:

- The potential improvement in instream flow, water supply, water quality and habitat
- The opportunity's consistency with the Biological Strategy for the Wenatchee Watershed
- The opportunity or sub-watershed importance relative to other opportunities and sub-watersheds

It was determined that small scale opportunities such as enhancement of natural floodplain storage through channel migration zone and wetland protection projects would proceed through funding by other grants. There are a number of habitat related storage opportunities that can be pursued, many of which include activities that help channels access their floodplains. The Storage Assessment provided the following programmatic recommendations for small scale storage opportunities:

Stream Channel Restoration and Repair

This strategy entails actions that restore habitat and riparian conditions to streams. It includes headcut repairs, placement of wood and gravel in streams to improve habitat, construction of off-channel rearing areas, and planting to enhance riparian areas. A number of creeks were identified by the Water Quantity Subcommittee as needing headcut repairs. Those creeks include Peavine Canyon, Poison Canyon, Sand, Ruby, Lower Camas, Mill and Larsen Creeks. There are other creeks in the watershed that would likely benefit from this strategy. Channel migration zone projects that enhance off-channel or floodplain areas also fall under this strategy. Stream channel restoration actions have the ability to increase bank storage and off-channel storage along streams and rivers while improving habitat and riparian conditions.

Small Water Storage Tanks for Fire Protection

This strategy entails placing 10,000 gallon water tanks in areas that are not served by a water system with fireflow capability. The tanks could be filled from nearby streams or wells and left until needed. In discussions with Fire District 3 in the Leavenworth area, there were about 10 locations for water tanks identified that would greatly improve the Fire District's capability to fight fires. Fire District 6 would have a similar need. The need for additional water storage was identified in the Peshastin Creek Drainage Community Wildfire Protection Plan (CCCD, 2005b) and Leavenworth Area Community Wildfire Protection Plan (CCCD, 2005a).

Rainwater Capture

Rainwater capture is a strategy that can be used by residents to funnel snowmelt or rainfall off of the roof of their house and into a storage basin where it can be used for domestic or irrigation purposes. This strategy is becoming common in rural areas, especially where water supplies are limited. Although the volume of water that can be captured seems limited, a 1000 square foot roof on a house in an area that receives 24 inches of precipitation per year could capture over 10,000 gallons of water annually.

Step B Storage Assessment Results

The Water Quantity Subcommittee recommended analysis of specific, larger scale opportunities as part of the second stage (Step B) of the Multi-purpose Storage Assessment. Eighteen opportunities were selected for a more detailed analysis; located primarily in the Mission, Icicle, Peshastin, Lower Wenatchee and Chumstick Sub-watersheds. Those sub-watersheds experience the greatest water supply and instream flow issues. A potential opportunity in the Nason Sub-watershed has since been added to the list.

The results of the Step B Assessment include:

- Instream reservoirs would have the largest storage capacity and be the most cost-effective to construct (reservoirs analyzed cost approximately $4,900 to $8,000 per acre-foot of storage and supplemented flows by approximately 6-19 cfs for a month in late summer). Although the opportunities could greatly improve instream flow and water supply conditions in some basins, the permitting of these opportunities requires public participation and the process can be lengthy. Most opportunities are located on federal public land. Potential sites on federal public lands managed by the U.S. Forest Service (USFS) will require public analysis and disclosure before they may be approved as a storage project.

- Enlargement of existing reservoirs and lakes was also identified as a cost efficient storage alternative ($15,000 to $25,000 per acre-foot of storage and flow supplementation is less than 1 cfs for a month). These opportunities would also be subject to extensive environmental review.

- An opportunity to transfer 3 cfs from the Chiwawa Basin to Little Chumstick Creek was identified in the Assessment. A water storage reservoir was analyzed in conjunction with a pumping station. This alternative was estimated to cost $21,500 per acre foot of water stored. The ability to implement this project quickly may be more feasible as the footprint of the reservoir is on private land.

- The most costly opportunities reviewed in the Step B Assessment were off-channel reservoirs ($19,000 to $181,000 per acre-foot). Most of these opportunities would present fewer permitting issues as the sites for the reservoirs are located on private land and the footprint of the opportunity much smaller than other alternatives. However, the flow benefits of these opportunities are generally small. The exception in this category is the Campbell Creek Reservoir. The Campbell Creek Reservoir opportunity would provide a significant storage and flow benefit (500 acre-feet, 7 cfs for 30 days). As a portion of the potential reservoir would be placed on federal public lands managed by the U.S. Forest Service, it will require public analysis and disclosure before it may be approved as a storage project.

- Overall the most cost-effective opportunity may be the optimization of high alpine lakes operated by the Leavenworth National Fish Hatchery and the Icicle and Peshastin Irrigation Districts. It is thought the cost of such an opportunity will be much less than other water storage opportunities because the reservoirs already exist and the opportunity will change only the operation of the reservoirs to provide more water in late summer. No cost estimates were prepared for this opportunity as it was determined that additional analyses would be performed with the next stage of water storage grants, starting in spring 2006.

Next Steps: Alternatives/Needs Analysis

The water storage opportunities analyzed in the assessment will be further ranked by the Water Quantity Subcommittee and it is expected that a handful of opportunities will be selected for the next stage of study. An alternatives analysis will be completed for each sub-watershed in which an opportunity is being considered, prior to the initiation of the permitting phase by the USFS, to ensure the storage opportunities meet the required water needs and are the best alternative to meeting those needs. Different water management alternatives will be evaluated to determine the most effective solutions to fulfilling the instream and out-of-stream needs and mitigating the impacts to habitat, streamflow, and groundwater levels. Alternatives analyses are particularly important for the Chumstick and Mission Sub-watersheds where water is limited and an interim reserve is in place (See Section 4.6). Alternatives to be evaluated include, but are not limited to: water conservation, storage, purchase, lease and transfer of water rights, water transfer from other sub-watersheds, conjunctive use, and pumping from the deep aquifer to augment surface flows in the applicable sub-watersheds. Storage options should be evaluated to determine whether stored water could be used to augment flows and provide mitigation water.

The Alternatives/Needs Analysis would include:

- Clearly identify the instream and out-of-stream water needs
- Identify potential alternatives to meeting some or all of those needs
- Analyze the costs and benefits of the alternatives in terms of water supply and other criteria used in the Water Storage Assessment
- Perform an extensive public participation and public involvement program to determine public acceptability of the water storage opportunities and the alternative opportunities

- Compare the costs and benefits of alternatives to the water storage opportunities described in the Water Storage Assessment. The cost/benefit analysis of the alternatives should also consider permitting and implementation feasibility.

Final Steps: Technical Feasibility
Thusfar, the evaluation of water storage opportunities in the Wenatchee Watershed has been a reconnaissance-level or preliminary study. Much more detailed information is required to adequately assess the feasibility of any one of the opportunities. The final stage of study will fully consider factors that will affect the technical feasibility of the opportunities and ability to obtain permits. Information required to assess the technical feasibility of the potential opportunities include:

- Subsurface explorations to determine geotechnical engineering issues
- Additional streamflow measurements and gaging at the site of the reservoirs to determine the yield of the basins
- Topographic information to determine the size of the project facilities
- Environmental reviews to assess wetland, fisheries, wildlife and botanical impacts
- Hydrologic modeling of basins to determine the effect the reservoirs will have on streamflow, both when capturing flow during spring and when releasing during late summer
- Additional review of permitting requirements with USFS and other agencies
- Public participation and input into new water storage opportunities to determine public acceptability

The opportunities that will be studied in this phase will likely be wholly or partially sited on land managed by the USFS. For a project to take place, a proponent would submit a proposal to the USFS. The USFS will follow agency regulations, including use of the NEPA process to evaluate the opportunities and alternatives to the proposed action.

5.5.2 Storage- Recommended Actions

QUANT-19: Consider funding storage options from the Storage Assessment. See relevant sub-watershed sections (Section 9.0) for specific storage opportunities as listed in the WRIA 45 Storage Assessment Report.

5.6 Studies and Projects to Support the Water Resource Management Strategy

5.6.1 Projects and Studies - Issues

There is a need for additional studies to better understand the water resources, water use, and effectiveness of management strategies implemented in WRIA 45 and its sub-watersheds.

5.6.2 Projects and Studies - Recommended Actions

QUANT-20: CCNRD or other entities to administer studies on water resources throughout the watershed, especially in areas where inadequate data exist to make decisions regarding future water use (eg., Chumstick, Northside Tributaries).

> **QUANT-20a**: Water budgets have been prepared by sub-watershed. These budgets indicate total water use by use type (eg., residential, industrial, commercial, agricultural, fish

propagation), but do not provide estimates of consumptive use. A consumptive crop irrigation requirement is presented. Further this study by defining the consumptive portion of the water use in the water budgets. Incorporate water usage rates with varying efficiencies for each water use type. Use this information to develop appropriate and useful water use efficiency requirements on lands that have been converted from agricultural to residential.

QUANT-20b: Study groundwater in specific areas of the watershed (eg., Mission Creek, Lower Chumstick/Eagle Creek area, Monitor area). Finalize the areas for study as part of Phase IV, Implementation.

QUANT-20c: There is a need to better understand the groundwater – surface water interaction in the watershed. Formalize studies to address this issue.

QUANT-21: Evaluate the consumptive portion of reserved water uses and determine if recharge credit should be included in the accounting of the reservation.

QUANT-11: Undertake hydrogeologic studies to assess the influence of groundwater withdrawals on surface water. Identify funding for this study and responsible parties (WWPU to identify sub-areas for study, responsible entity as part of Phase IV, Implementation).

ChumQUANT-2: Chumstick Water Forum to assist in developing a data collection plan to monitor surface water flows (specify location) and develop management flows.

ChumQUANT-3: Chumstick Water Forum, with assistance from Chelan County and Ecology, to conduct groundwater monitoring to understand hydraulic continuity and overall impact of exempt wells on groundwater levels and streamflows.

ChumQUANT-6: A cumulative impact analysis of permit exempt use and uses associated with permits and claims approved since 1983 will be initiated by Ecology as authorized under the 1983 flow rule. Chelan County will partner with Ecology in this study. The cumulative impacts assessment will help to determine whether Ecology will curtail outdoor domestic water use of wells installed after 1983, and whether Ecology will close the Chumstick Sub-watershed to outdoor water use in the future.

ChumQUANT-7: Chumstick Forum, Chelan County and Ecology to re-evaluate a proposed strategy for the Chumstick in three years after rule adoption, when new monitoring data have been collected and assessed and cumulative impact analysis is complete. Consider allowing group domestic groundwater use of deeper aquifer only as part of the Chumstick strategy addressed by the Forum.

NSTQUANT-1: Future water supply availability should be discussed with Chelan County Public Utility District (PUD) to determine whether they have the capacity and infrastructure to provide backup supply. The East Bank Aquifer Regional Water Supply will only be considered as a source of water for this area if approved by the owners of the Regional Water Supply.

QUANT-8: Chelan County Natural Resource Department will develop and administer a monitoring program to assess actual domestic water use to verify the 380 gpd per household assumption used to debit the reservation and to adjust the amount of water remaining in the reservation at five year intervals, or more frequently if the number of wells drilled or building permits granted indicate that growth is occurring more rapidly than projected in any sub-watershed. These assessments will be conducted based on a statistical sample of new domestic water users (single domestic, group domestic and municipal water use and associated lawn and garden irrigation (some with separate irrigation,

some without), some with stock, etc.). Metering data will be incorporated into the water use audit and the accounting system.

This monitoring program will be included as part of the adaptive management element to the water resource management strategy discussed in Section 4.0. If necessary, the per household water use factor used to debit the reservation will be adjusted based on statistical sampling and metering in the WRIA (380 gpd/hh is a guide, an accounting tool).

This water use audit will be further developed during Phase IV, Implementation. As part of this audit, the consumptive portion of the daily household water use factor will be assessed, and may be used to debit the reservation. This will be considered during the first year of implementation.

6.0 GROWTH AND LAND USE ISSUES AND RECOMMENDATIONS

6.1 Introduction

The water resource management strategy of this plan needs to be integrated into land use planning processes and decisions undertaken by local governments to ensure that the reservation allocations and eligible uses are considered. The following actions address the integration of the proposed water resource management strategy with land use planning.

6.2 Integrating Water Availability in Land Management Decisions

GLU-1: As part of reservation accounting, establish a resource base for decision-makers to use to consider technical water resource information when making land use change decisions and when considering land use permit applications. This should include:

> **GLU-1a**: Chelan County Natural Resource Department (CCNRD) will provide technical input regarding the reservation and eligible uses into the decision making process for consideration by city and county land use decision makers.
>
> **GLU-1b**: Water resource and supply related data for the watershed will be maintained in a database by CCNRD (eg., a water supply dataset including water system boundaries, an exempt well tracking system, on-going tally of water rights and water use per water system, instream flow and groundwater level data, an assessment of whether current water rights can service full build-out based on current zoning, etc.). CCNRD would update this information as a larger population is served in the future and ensure the information is available in a format that is easily understood by the public.

6.3 Chelan County Land Use/Zone Change Applications

GLU-2: As part of Chelan County's zone change process, water supply and water resource information is available for use from CCNRD.

6.4 City UGA and Comprehensive Plan Amendments

GLU-3: As there is urban growth in the WRIA, ensure that water availability is considered in UGA boundary decisions for existing and new UGAs. For proposed Urban Growth Area boundary expansions that are outside the jurisdiction of an existing water service area, the proposal for expansion should include documentation of a water purveyor's intention to provide water, their ability to provide water, or the ability of the development to provide water if it is to be self-served.

6.5 Consistency between the Critical Area Ordinance and the Wenatchee Watershed Plan

There is a need for consistency between 2514 Watershed Planning and critical areas protections under GMA, and to integrate regulatory and non-regulatory programs to achieve the goals of both Watershed Planning and critical areas protection under GMA. The following actions address this need for consistency.

GLU-4: The Wenatchee Watershed Planning Unit is supportive of the goals and intent of the GMA to provide critical area protections, as these are consistent with water quality, quantity and habitat goals of the Wenatchee Watershed Plan and the Watershed Planning Act. The Planning Unit further

supports the efforts of local jurisdictions to implement non-regulatory programs that protect critical areas and is interested in exploring potential partnerships in these efforts.

GLU-5: Data, protection measures and strategies relating to critical area protections should be documented as part of the watershed planning process. Encourage local jurisdictions to utilize the data, protection measures and strategies identified in the 2514 Wenatchee Watershed Plan in the development and update of critical area protections under GMA. Ensure that this information is readily available to local jurisdictions.

GLU-6: The protection measures and strategies identified in the 2514 Watershed Plan should be considered by local governments as non-regulatory mechanisms to protect critical areas watershed wide. These approaches include:

- Land protection measures such as easements, leases, purchases and other creative measures, such as transfer of development rights to protect remaining floodplain and riparian habitat
- Wetland restoration
- Fish passage improvements; removal of fish passage barriers
- Restore channel function
- Reconnect disconnected habitat areas
- Restore floodplain function
- Maintain forest roads
- Control and eradicate noxious weeds

7.0 WATER QUALITY ISSUES AND RECOMMENDATIONS

7.1 Introduction

The Water Quality Technical Subcommittee (WQTS) of the WRIA 45 Planning Unit is currently working with Ecology on the Total Maximum Daily Load (TMDL) study of temperature, fecal coliform bacteria, dichlorodiphenyltrichloroethane (DDT), dissolved oxygen (DO) and pH in the watershed. The Water Quality component of the Wenatchee Watershed Plan is the product of an effort to coordinate the ongoing programs within the watershed. In addition to recommendations in the TMDL Study, this plan integrates recommendations provided by the WQTS and considers the 1998 Watershed Action Plan's recommendations to improve water quality within the watershed. The 2004 303(d) listings are the most recent evaluation of the water quality in the Wenatchee Watershed.

Figure 7-1 displays the 2004 303(d) listings for impaired waters in WRIA 45. The TMDL listings are determined by sampling the water quality at points along the stream length. The points on the map do not represent the sampling points, but the center of the stream reach within the Township, Range, and Section in which the sampling point was located. The actual locations of sampling points in WRIA 45 are not currently available from Ecology.

7.1.1 Relevance of Water Quality Parameters

The role of each water quality parameter evaluated in the TMDL process in determining the overall health of the Wenatchee Watershed is discussed below. Temperature, DDT, and DO/pH may directly pose problems for characteristic uses in the Wenatchee Watershed while fecal coliform is considered an indicator of other specific water quality problems in the watershed.

Temperature

The State water quality standard for temperature targets temperature changes from human activities based on a stream's class designation and provides an exception for situations where the natural conditions violate the water quality standard. The maximum acceptable temperature is 16.0°C for Class AA streams, 18°C for Class A streams, or the temperature that can be characterized as the natural condition of the stream (Cristea and Pelletier, 2005). In cases where the standard is set by the natural conditions of the stream, "no temperature increases will be allowed which will raise the receiving water temperature by greater than 0.3°C" (Cristea and Pelletier, 2005, p. 25). The water quality standards protect the characteristic uses of a stream. The characteristic uses protected by the temperature standard in the Wenatchee Watershed "are salmonid and other fish migration, rearing, spawning, and harvesting" (Cristea and Pelletier, 2005, p. 25). The temperature considerations for aquatic life are detailed in WAC 173-201A-200(1)(c).

Fecal Coliform

The State water quality standards for fecal coliform protect the Wenatchee Watershed's characteristic uses from possible harmful, disease-causing pathogens (e.g., bacteria and viruses) associated with human and animal waste. The presence of fecal coliform is an indicator of the presence of waterborne diseases: dysentery, typhoid fever, viral and bacterial gastroenteritis, and hepatitis A (Carroll and O'Neal, 2005a). Characteristic uses include water supply; stock watering; salmonid and other fish migration, rearing, spawning, harvesting; wildlife habitat; and recreation (Carroll and O'Neal, 2005a).

DDT

The Mission Creek Sub-watershed is the area of concern for exceedances of the DDT standard in the Wenatchee Watershed. In the past, DDT was used in the area to control pests before it was banned by

the EPA in 1972. Due to its persistence, DDT takes decades to degrade, and still remains in the soil and waterbodies of some areas (Serdar and Era-Miller, 2004). The bioaccumulation of DDT in aquatic life can result in the concentration of DDT in fish tissue, for example, being greater than the DDT concentration in the surrounding environment. The characteristic uses protected by the water quality standard for DDT include aquatic habitat and human fish consumption (Serdar and Era-Miller, 2004).

DO/pH[7]

The standards for DO and pH protect fisheries (salmonids and other aquatic life and habitat) and wildlife, as well as public health and enjoyment in the Wenatchee Watershed. Phosphorus in the watershed affects DO levels and pH. Fish and other aquatic life are sensitive to DO and pH levels and can only survive within a specific range of these water quality characteristics.

7.1.2 Partnerships

To date the efforts of the WQTS and Ecology to produce these TMDLs or clean-up plans for DDT, fecal coliform bacteria and temperature have progressed under normal processes with predictable outcomes. However, the pH and DO parameters for the Wenatchee River pose some unique regulatory and wastewater infra-structure challenges. Additional collaborative partnerships to develop a strategy for pH and DO that meets the requirements of the TMDL and the needs of local communities and governments will be needed.

In an effort to address the pH and DO parameters, Chelan County, Chelan County PUD and the cities of Cashmere, Leavenworth and Wenatchee are entering into a partnership with funding assistance from Ecology, special legislative funding and their own funds to accomplish two primary tasks. The first task is to facilitate and develop a workable strategy that can be used and ultimately approved by the Environmental Protection Agency (EPA) in Ecology's TMDL submittal for DO and pH. The second task is to review and make suggestions for future improvements to Ecology's Technical Assessment, Summary Implementation Strategy (SIS), and adaptive management approaches to meet state water quality standards for these parameters. The goal is to develop a clean-up plan for these parameters that the local community and local governments can support and ultimately implement. As such, additional strategies to address point and non-point sources of phosphorus will be reported during the implementation phase of the Wenatchee Watershed planning effort.

7.2 TMDL Studies in WRIA 45

Water quality monitoring has indicated that there are locations in the Wenatchee River and its tributaries that exceed State and Federal water quality standards for temperature, fecal coliform, pH, dissolved oxygen, and DDT. A Total Maximum Daily Load (TMDL) study and implementation plan are being completed to comply with the federal mandate of the Clean Water Act, state laws to control point and non-point source pollution, and the 1997 Memorandum of Agreement between the EPA and Ecology.

[7] Phosphorus is typically the limiting nutrient in algal (periphyton) growth; therefore, when excessive amounts of phosphorus are introduced into a waterbody, it leads to algal blooms. Algal growth may cause elevated DO levels and pH during the day and low DO levels and pH at night. DO is produced in the photosynthesis process and consumed when periphyton and bacteria respire. The pH is affected by the level of dissolved inorganic carbon in the water. When the periphyton consume dissolved inorganic carbon during the photosynthesis process, the pH increases; respiration then increases the amount of dissolved organic carbon in the water so the pH decreases.

The goal of the TMDL is to ensure that an impaired water body attains water quality standards within a reasonable period of time. The TMDL identifies pollutant sources, actions to be implemented, and potential implementing entities to reduce pollutant inputs and achieve water quality standards. A phased monitoring approach is also developed to assess the effectiveness of actions and verify that water quality standards are met.

Ecology began working with the Wenatchee WQTS in 2001 to develop the TMDL. The committee is comprised of representatives from the EPA, Ecology, Chelan County, Chelan County PUD (PUD), Chelan-Douglas Health District (CDHD), the Chelan County Conservation District (CCCD), irrigation districts, city agencies, environmental groups and private citizens.

Several key milestones in the evolution of the TMDL implementation plan are worth noting. Field studies addressing the 303(d) listed parameters were developed and conducted by Ecology between 2002 and 2004, with assistance from the CCCD. Technical reports were completed between 2004 and 2006. Successive drafts of the technical reports were reviewed and commented upon by the WQTS and Planning Unit. Ecology responded to those comments and they were incorporated into the technical reports. Scientists conducting the work provided numerous presentations and engaged in discussions with the group.

Success of the TMDL is based upon the collective implementation of the many actions identified in the TMDL SIS documents for each parameter. The SIS documents are general clean-up plans describing implementation actions and potential implementing entities. A Detailed Implementation Plan (DIP) will be prepared within one year following approval of the TMDL Submittal by EPA. The DIP should describe the specific implementation activities that should be performed by all of the various stakeholders in order to achieve the TMDL targets. The plan should identify in more detail how, when, and where implementation and monitoring activities should be conducted. Ecology and other entities should provide technical assistance and seek additional funding for these activities and any new activities that may be identified as the body of data grows. Public input should be sought to help prepare the plan. Additionally, continued monitoring of implementation activities and water quality will assess the progress of the TMDL.

7.3 Adaptive Management of the TMDL Process

The data collection and literature review conducted for and presented in the TMDL technical reports for the Wenatchee River Watershed represent the current state of knowledge for temperature, fecal coliform, pH, dissolved oxygen, and DDT in the watershed. It is the understanding of the WQTS that additional studies will be performed to fill data gaps and address unanswered questions as determined by the WQTS.

Conclusions and recommendations currently presented in the TMDL may be revised based on new data as they become available. It is also the understanding of the WQTS that any new data gathered from further study can be incorporated in the TMDL process in the SIS reports or DIP wherein recommendations and management strategies may be refined. This adaptive management approach is acceptable to both Ecology staff and the WQTS. Ecology will partner with stakeholders in the watershed to conduct studies addressing information gaps (eg., monitoring).

Further monitoring for purposes of the TMDL assessment will be addressed in the TMDL SIS reports and DIP. Any new science available as a result of these studies will be integrated into the SIS reports and DIP as new conclusions and management recommendations. Management strategies addressing both point and non-point sources are subject to this adaptive management approach.

7.4 Watershed-Wide Recommended Actions

Some recommendations resulting from the TMDL study are included in this watershed plan. Ecology and the WQTS have developed a SIS for each parameter addressed in the TMDL process in WRIA 45. The issue statements and recommendations in this plan have been agreed upon by the WQTS as of the March 22, 2006 WQTS meeting. Further revisions to these recommendations should be considered during Phase IV, Implementation of this watershed plan. The actions presented below and in Section 9.0 are based on the following Draft SIS Reports: DO/pH SIS (WQTS, 2006a), DDT SIS (WQTS, 2006b), Fecal Coliform SIS (2006c), and the Temperature SIS (2006d). These reports are summarized below:

DO/pH SIS (WQTS, 2006a)

- The SIS is the implementation section of the TMDL submittal to EPA that describes actions to be taken to improve dissolved oxygen and pH levels and meet water quality standards. It was originally developed by David Schneider, Department of Ecology TMDL Lead, utilizing conclusions and recommendations of the Wenatchee River Basin Dissolved Oxygen, pH and Phosphorus TMDL technical study. It has been further refined with comments from the WQTS. This is the latest version with comments incorporated following roundtable discussion at the March 22, 2006 WQTS meeting.

DDT SIS (WQTS, 2006b)

- The SIS is the implementation section of the TMDL submittal to EPA that describes actions to be taken to reduce DDT inputs and meet water quality standards. It was originally developed by David Schneider, Department of Ecology TMDL Lead, utilizing conclusions and recommendations of the Mission Creek DDT TMDL technical study (Serdar and Era-Miller, 2004). It has been further refined with comments from the WQTS. This is the latest version with comments incorporated following roundtable discussion at the February 16, 2006 WQTS meeting.

Fecal Coliform SIS (WQTS, 2006c)

- The SIS is the implementation section of the TMDL submittal to EPA that describes actions to be taken to reduce fecal coliform inputs and meet water quality standards. It was originally developed by David Schneider, Department of Ecology TMDL Lead, utilizing conclusions and recommendations of the Wenatchee River Basin Fecal Coliform TMDL Study (Carroll and O'Neal, 2005a), Wenatchee River Watershed Action Plan (1998), Assessment of Fecal Coliform in Mission and Brender Creeks (Burgoon and Rickel, 2003a), and Recommendations-Actions from a Mission Creek Stream Walk conducted by David Schneider and Michael Rickel in 2004. It has been further refined with comments from the WQTS. This is the latest version with comments incorporated following roundtable discussion at the March 22, 2006 WQTS meeting.

Temperature SIS (WQTS, 2006d)

- The SIS is the implementation section of the TMDL submittal to EPA that describes actions to be taken to reduce temperature inputs and meet water quality standards. It was originally developed by David Schneider, Department of Ecology TMDL Lead, utilizing conclusions and recommendations of the Wenatchee River Temperature TMDL Study (Cristea and Pelletier, 2005). The Draft SIS has been further refined with comments from the WQTS. This is the latest version with comments incorporated following roundtable discussion at the February 16, 2006 WQTS meeting.

7.4.1 Watershed-wide Water Quality (QUAL) Issue

There is a need to address the exceedances of State and Federal water quality standards for temperature, fecal coliform, pH, dissolved oxygen, and DDT in the Wenatchee River and its tributaries.

7.4.2 Watershed-wide Water Quality (QUAL) Recommendations

Water quality actions that apply to the watershed as a whole (WRIA 45) or to multiple sub-watersheds are included in this section. Sub-watershed specific water quality actions can be found for the applicable sub-watershed in Section 9.0. Note: the actions to address temperature exceedances listed below apply to the Wenatchee River and most of its tributaries, with the exception of the White River.

QUAL-1: Chelan County Conservation District (CCCD) should continue to oversee and implement recommendations in the Watershed Action Plan, ensure other entities are also implementing voluntary actions in the Watershed Action Plan, and encourage continued funding of these efforts.

QUAL-2: Ecology should continue to work with the local watershed planning group through both implementation of the current TMDL, and on future TMDLs if further listings arise.

QUAL-3: Ecology should continue to work with the local watershed planning group for funding future projects.

QUAL-4: Encourage the Wenatchee Watershed Planning Unit and its other subcommittees (Water Quantity, Instream Flow, Habitat, and Growth and Land Use) to use the information in the TMDL Technical Reports and SISs along with their conclusions, recommendations, and actions for a more holistic approach to restoration, preservation, and enhancement of the watershed for all beneficial uses (WQTS, 2006a; WQTS, 2006b; WQTS, 2006c; WQTS, 2006d).

7.4.3 Multi-Sub-watershed Temperature Issue

There is a need to address the exceedances of State and Federal water quality standards for temperature in the Wenatchee River and most of its tributaries, with the exception of the White River, based on the 2004 303(d) list for impaired waters for temperature in Washington State. Loss of riparian habitat and low streamflow are two factors that may contribute to exceedances of State and Federal temperature water quality standards in these sub-watersheds. In some cases, the natural conditions in some portions of the watershed are likely to be warmer than 16/18 degrees Centigrade (numeric criteria for state standards during critical conditions). The recommended actions presented below have not been duplicated in each of the sub-watershed sections.

7.4.4 Multi-Sub-watershed Temperature Recommendations

QUAL-5: Appropriate actions to be used in the appropriate location should be determined to address temperature exceedances in Phase IV, Implementation for all of the temperature-related recommendations in the Plan.

QUAL-6: Actions to improve shade near surface waters should be implemented, where feasible. Shade management practices should involve the development of mature riparian vegetation. The WQTS should use the information provided in the temperature technical report and Planning Unit studies (FLIR, LIDAR, PHABSIM, etc.) to create a prioritized list of locations and plan for

establishing riparian vegetation. Associated monitoring should be planned and implemented over time, as full riparian vegetation requires many years to become established. The upper watershed should be addressed first as it has the most potential for shade improvements and water temperature reductions. An evaluation of the 303(d) listed waters in the upper watershed should be conducted to see if they should be dropped from the 303(d) list due to natural conditions (Chiwaukum Creek, Little Wenatchee River). The WQTS should coordinate with the Planning Unit's other subcommittee conclusions, recommendations, and actions to reduce water temperatures (WQTS, 2006d).

QUAL-7: For U.S Forest Service land, the riparian reserves prescriptions in the Northwest Forest Plan should be implemented for the establishment of mature riparian vegetation, where appropriate. The U.S. Forest Service should be the primary implementing agency. The WQTS and the Department of Ecology should coordinate with the U.S. Forest Service (WQTS, 2006d).

QUAL-8: For State and privately owned forest land, the riparian vegetation prescriptions in the Forests and Fish Report (Washington State Department of Natural Resources (DNR), 1999) should be implemented for all perennial streams. Load allocations are included in this TMDL for forest lands in accordance with the section of the Forests and Fish Report entitled "TMDLs produced prior to 2009 in mixed use watersheds." The WQTS and the Department of Ecology will coordinate with the Department of Natural Resources (WQTS, 2006d).

QUAL-9: For areas that are not managed in accordance with either the Forest Plan or the Forests and Fish Report, voluntary programs to increase and protect riparian vegetation should be developed, such as riparian buffers and conservation easements. The WQTS and the Department of Ecology should work with private forested landowners, agencies, and stakeholders to develop and monitor the projects (WQTS, 2006d).

QUAL-10: Stream temperature is related to the amount of instream flow, and increases in flow generally result in decreases in temperatures. The WQTS should work with the Planning Unit and watershed entities to encourage projects that have the potential to increase and protect surface and groundwater flows. Voluntary retirement, purchase, leasing of existing water rights, or other conservation methods to preserve and enhance instream flow should be encouraged. In addition, water storage opportunities that have the potential to increase instream flows during critical periods should be considered (WQTS, 2006d).

QUAL-11: Adaptive management activities to control potential channel widening processes should be encouraged. Reductions in channel width are expected as mature riparian vegetation is established. For example, activities that reduce sediment runoff to surface waters from upland and channel erosion can affect channel width and temperatures (WQTS, 2006d).

QUAL-12: Actions to improve hyporheic exchange flows and groundwater-surface water recharge should be identified and implemented to improve the current temperature regime and reduce maximum daily instream temperatures. Factors that influence hyporheic exchange flow include the vertical hydraulic gradient between surface and subsurface waters as well as the hydraulic conductivity of streambed sediments. Activities that reduce instream flows, hyporheic exchange and hydraulic conductivity of streambed sediments can increase stream temperatures, such as drilling of wells along streams and connected ground water reservoirs, and development in the flood plain. The WQTS should work with the Planning Unit and its subcommittees to identify and implement management activities designed to protect and enhance instream flow and subsurface water exchange with streams. Actions should be identified and implemented to reduce upland and channel erosion and avoid sedimentation of fine materials in the stream substrate (WQTS, 2006d).

QUAL-13: Ecology should continue existing temperature monitoring, and expand the current temperature monitoring program such that it is consistent with flow monitoring actions recommended in WRMS-4a and WRMS-4c.

QUAL-14: The WQTS should work with the Planning Unit in the development of proposed water storage, irrigation, habitat, and development projects to provide input regarding shade, riparian vegetation, and engineering to reduce water temperatures (WQTS, 2006d).

QUAL-15: To determine the effects of management strategies within the Wenatchee River Basin, regular monitoring is recommended. Continuously-recording water temperature monitors should be deployed from July through August to capture the critical conditions. The following locations should be targeted for a minimal sampling program: Wenatchee River near mouth, Icicle Creek near mouth, Nason Creek near mouth, Peshastin Creek near mouth, and Mission Creek near mouth. Monitoring will be conducted associated with BMPs to track progress toward shade and water quality targets. Water temperature monitoring should be conducted and coordinated with associated BMP projects over time (WQTS, 2006d).

QUAL-16: Funding assistance should be sought from Ecology through its grants and loans programs to implement actions and ongoing monitoring. Other funding sources should be identified and applications submitted to provide funding for ongoing activities. The WQTS will recommend qualified entities to conduct associated monitoring (WQTS, 2006d).

7.5 Specific Sub-watershed Recommended Actions

Issues and recommended actions specific to individual sub-watersheds can be found in Section 9.0. These include actions addressing DDT and fecal coliform in the Mission Creek Sub-watershed, fecal coliform in the Chumstick Sub-watershed, and DO/pH in the Lower Wenatchee, Icicle and Upper Wenatchee Sub-watersheds.

8.0 HABITAT ISSUES AND RECOMMENDATIONS

The Wenatchee Watershed contains salmonid habitat important to the entire Columbia River region. The Upper Columbia Biological Strategy (Biological Strategy) states that, "the Wenatchee River is unique among sub-basins in the Upper Columbia Region in that it supports the greatest diversity of populations and overall abundance of salmonids, yet is facing the greatest risk of habitat loss and degradation. There are core populations of sockeye salmon, steelhead, bull trout, and both Spring and Summer Chinook salmon in the upper Wenatchee [Watershed] that are relatively strong when compared to other populations in the Columbia sub-basin" (UCRTT, 2002). However, spring Chinook in the Wenatchee Watershed has been federally listed as endangered and bull trout and steelhead have been listed as threatened under the Endangered Species Act (ESA) (listings occurred in 1997, 1999, and 2006 respectively).

This habitat component of the Wenatchee Watershed Plan builds upon existing research, reports, and programs to initiate habitat improvement actions in WRIA 45. The Draft Upper Columbia Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Plan (UCSRB, 2005) is the most recent report that identifies issues and actions to address habitat needs for spring Chinook, steelhead, and bull trout in the Wenatchee River Watershed. The Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Plan, in conjunction with the Biological Strategy, is used to identify both restoration (UCSRB, 2005) and protection (UCRTT, 2002) actions in the watershed.

Actions are identified that will improve the function and connectivity of habitat throughout the watershed. As specified in the Watershed Planning Act (RCW 90.82.100), the Plan emphasizes salmonid and aquatic habitat. However, to benefit both aquatic and terrestrial species, upland habitat is considered as it relates to aquatic processes.

8.1 Goals and Intent

According to RCW 90.82.100, the 2514 habitat component of a watershed plan is designed to "protect or enhance fish habitat in the management area." This will be accomplished in WRIA 45 through existing laws and ordinances, and through coordination with ongoing activities in the watershed, such as Salmon Recovery planning. Beyond those requirements, the Planning Unit is taking a project-oriented, watershed-scale approach to habitat improvements based on Evolutionarily Significant Unit (ESU) priorities and will work to facilitate local involvement and public education within the watershed.

The Wenatchee Watershed Plan focuses on treating the source of habitat degradation, as opposed to treating only the effects. Treatments at the source are preferred over engineering solutions, which, rather than eliminate the problem, often move it further downstream. In recommending projects for habitat protection, enhancement, and restoration, the Planning Unit will consider the priorities of local residents within each sub-watershed, priorities of management agencies and the needs of the larger watershed-scale system.

8.2 Habitat Status and Information Sources

The Wenatchee Watershed provides habitat for a wide variety of terrestrial and aquatic species. Natural habitat characteristics vary throughout the watershed from the steep, forested mountains in the northwest to the shrub-steppe of the eastern watershed at the confluence of the Wenatchee and Columbia Rivers. Terrestrial species that inhabit the Wenatchee Watershed and receive special attention through a variety of planning and regulatory processes include the Peregrine falcon, Bald eagle, Northern Spotted owl, Marbled murrelet, lynx, Larch Mountain salamander, and other species

that are threatened or endangered, or otherwise closely monitored through federal and state programs. The Washington Department of Natural Resources (DNR) has completed a catalogued list of species and habitat types in the watershed recognized by its agency as priorities for management and preservation (WDFW, 2005).

The Wenatchee Watershed is home to a variety of aquatic species including the following salmonids: Spring and summer Chinook, sockeye, steelhead, westslope cutthroat, and migratory and resident bull trout. The documented, presumed, and potential distributions of anadromous salmonids in each of the sub-watersheds of the WRIA are illustrated in Figures 9-1 to 9-9 in this document as described by the Salmon and Steelhead Habitat Inventory and Assessment Project (SSHIAP) (WCC, 2001). The watershed is also home to other culturally important species such as lamprey and re-introduced coho. The potential distribution of these species is an important consideration in determining which habitat improvement activities to implement.

Much of the planning, protection, and restoration/enhancement work in the watershed has focused on the needs of salmonids because of the federal Endangered Species Act listings of Upper Columbia River (including the Wenatchee) spring Chinook as endangered and bull trout and steelhead as threatened in 1997, 1999, and 2006 respectively. All the fish stocks in the Wenatchee Watershed except summer Chinook and sockeye are classified as depressed in the Washington Department of Fish and Wildlife (WDFW) Salmonid Stock Inventory (SaSi) index. The watershed also supports resident westslope cutthroat trout. Coho salmon were extirpated from the region in the early 1900s; there are efforts underway by the Yakama Nation to reintroduce them. Additional information regarding the status of aquatic habitat can be reviewed in the Limiting Factors Analysis (Andonaegui, 2001), Draft Upper Columbia Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Plan (UCSRB, 2005), the Upper Columbia Biological Strategy (UCRTT, 2002), the Wenatchee Subbasin Plan (NPCC, 2004), Washington Conservation Commission fish distribution data (SSHIAP) (WCC, 2001), and an assortment of other reports as detailed in the Wenatchee Phase II Habitat Completion Memo (Golder, 2005b).

The WRIA 45 Limiting Factors Analysis described habitat conditions in relation to aquatic habitat needs in the Wenatchee Watershed as follows, “Anadromous salmonid populations in the Wenatchee [Watershed] are influenced by the following out-of-[watershed] impacts: degraded estuarine habitat, fish harvest, unfavorable ocean conditions, and the effects of seven Columbia River reservoirs and hydroelectric dams on smolt and adult migration. Spring and summer Chinook, sockeye salmon, and steelhead trout must negotiate a 468 mile journey from the mouth of the Wenatchee River to the Pacific Ocean, once as smolts and again as adults. Within the [watershed], human alterations to the environment are exacerbating naturally limiting conditions by reducing habitat quality and quantity, thereby reducing a species’ chances of successfully completing its life cycle. These alterations have primarily occurred in the lower gradient, lower reaches of sub-watersheds in the lower [part of WRIA 45] and include road building and placement, [railroads], conversion of riparian habitat to agriculture and residential development, water diversion, reduced large woody debris (LWD) recruitment, and flood control efforts that include LWD removal, berm construction, and stream channelization” (Andonaegui, 2001).

Much more has been researched and written about the salmonid and terrestrial habitat conditions in the Wenatchee Watershed, and many of those documents were used to provide background data for this Watershed Plan. Priorities for aquatic habitat projects in the Wenatchee Watershed Plan are based primarily on the biological needs identified in the Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Plan (UCSRB, 2005). These priorities were found to be consistent with the Wenatchee Subbasin Plan (NPPC, 2004) and the WRIA 45 Limiting Factors Analysis (Andonaegui, 2001).

Habitat improvement projects have been developed through a combination of input provided at public meetings held in various locations across the watershed in early 2005, noted project needs from various local agencies, and the needs established by the Habitat Subcommittee of the Wenatchee Watershed Planning Unit. In early 2005, the Planning Unit requested information on planned or needed habitat projects from many entities and agencies working in the watershed. These proposed projects were catalogued by sub-watershed and by status (complete, ongoing, proposed). The catalogued projects (as of June 2005) along with their location relative to fish distribution, land use, Northwest Forest Plan designation, and fish barriers can be found in Appendix C. Chelan County Natural Resource Department is currently maintaining this list of projects and continuing to track projects and funding opportunities. The Habitat Subcommittee with Chelan County as lead should coordinate with funding organizations, the Upper Columbia Salmon Recovery Implementation Team, and action agencies. The Habitat Subcommittee with Chelan County as lead intends to maintain a database of habitat projects for the Wenatchee Watershed.

8.3 Action Types: Protection and Restoration/Enhancement

The actions prescribed to address habitat issues fall into two categories: *Protection* and *Enhancement/Restoration*. Protection consists of actions to ensure that potential future activities or land uses will not interfere with habitat goals. Examples of this type of action are land acquisitions and conservation easements. Enhancement and restoration consist of actions to improve or restore habitat for a target species, such as the removal of fish passage barriers, restoration of channel function, or reconnection of disconnected habitat areas. These terms are defined by the Planning Unit as follows:

- Restoration – Creating a specific functional condition that has the desired effect on a given species.
- Enhancement Actions – Actions that move toward creating the specific functional condition of restoration, without necessarily achieving all criteria necessary for restoration, or the complete creation of that condition.
- Protection – Prevention of future more active or invasive land use activities than the current land use.

Protection is only applicable in areas that have retained healthy, functioning habitat in a relatively pristine condition. Protection is more cost and time-effective in the long term than restoration or enhancement actions because a larger, on-the-ground activity is not required to *create or restore* habitat. Where it is possible to protect functioning systems, protection is recommended over restoration/ enhancement actions. Actions to restore fish access to fully functioning protected areas are also a high priority. Throughout the watershed, there are areas where adequate stewardship is currently occurring. In these areas, continued maintenance is recommended before initiation of new protection or restoration/enhancement actions.

8.4 Public Outreach

In January 2005, nine workshops were held throughout the watershed to introduce residents to the various methods or "tools" that could be applied in their sub-watershed to help to protect or enhance habitat. The tools address instream, riparian, and upland areas, and include both policy and on-the-ground actions. However, certain tools are only applicable at specific locations. Members of the public were asked to voice preferences regarding habitat improvement in their areas. Workshops were held for the Chiwawa and Upper Wenatchee; Nason; Icicle; Chumstick; Peshastin; White, Little Wenatchee, and Lake Wenatchee; Mission, Brender, and Yaksum; Lower Wenatchee from

Leavenworth to Dryden; and Lower Wenatchee from Dryden to Mouth Sub-watersheds. Based on their familiarity with the area, residents identified locations in need of habitat improvement and proposed specific projects.

8.5 Evaluation Criteria for Habitat Projects

An internal, evolving list of proposed projects is currently being maintained by Chelan County Natural Resource Department. The list will be continually prioritized based on availability of funds, citizen interests, habitat needs, project feasibility, local and watershed-wide needs, and the foreseeable benefits of individual projects. The Habitat Subcommittee with Chelan County as lead will maintain a publicly accessible database of past and current habitat projects. The Planning Unit recognizes there is a need to take a watershed system approach to river health from upstream to downstream. This system approach will help us understand where to prioritize needs in the watershed. Key factors in prioritizing projects are as follows:

8.5.1 Biological Needs and Priorities

Prioritization of habitat projects should first consider the biological needs established for each sub-watershed in the Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Plan (UCSRB, 2005). The Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Plan considered sub-watershed habitat condition and relative location in the watershed to gauge effectiveness of habitat improvements in each sub-watershed and watershed-wide. This resulted in the assignment of a "sub-watershed biological priority category" ranging from 1 to 3 to each sub-watershed. This category describes the watershed-wide benefit resulting from implementation of habitat actions in that sub-watershed. Descriptions of the categories are as follows:

Category 1 – These areas represent systems that most closely resemble natural, fully functional aquatic ecosystems. They comprise large, connected blocks of high-quality habitat that support more than two listed species. Exotic species may be present but are not dominant in abundance. ***Protecting these areas is a priority, although restoration in some areas is also needed.***

Category 2 – These areas support important aquatic resources and are strongholds for one or more listed species. Compared to Category 1 areas, Category 2 areas have a higher level of fragmentation resulting from habitat disturbance or loss. These areas have a large number of sub-watersheds where native populations have been lost or are at risk for a variety of reasons. ***Restoring ecosystem function and connectivity within these areas are priorities.***

Category 3 – These areas may still contain sub-watersheds that support salmonids, but they have experienced substantial degradation and are strongly fragmented by habitat loss, especially through loss of connectivity with the mainstem corridor. ***The priority in these areas is to rectify the primary factors that cause habitat degradation.***

In general, watershed-scale prioritization of projects should be accomplished in the following way:

- **Category 1** sub-watersheds should receive priority allocation of financial and management resources.
- Subsequent allocation of resources should be given to **Categories 2** and **3**, in that order, once refuge habitats (**Category 1**) for the target species are protected and secured. This does not mean, however, that specific actions should not occur in **Category 2** and **3** sub-watersheds until all activities in **Category 1** sub-watersheds are completed. Any projects within those sub-watersheds that increase the range, life history diversity, or age cohorts

of one or more species would contribute to the overall strategy of making them more robust to disturbances outside and within the region.

Sub-watershed categories, and recommended actions for each sub-watershed as of the 2005 Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Plan and 2002 Biological Strategy, are illustrated in Figure 8-1.

8.5.2 Terrestrial Benefit

Terrestrial benefit(s) of projects will be factored into the initial biological prioritization (above). A project with anticipated terrestrial benefits should rank higher than other projects in the same aquatic biological benefit category (above) without terrestrial benefits. For example, if two projects are proposed that provide the same biological benefit to a Category 1 watershed, and one of those also provides critical habitat for avian species, it will rank higher than the other.

8.5.3 Community Awareness, Education and Acceptance

Community acceptance of proposed actions should be factored into the results from the prioritization above, resulting in a final list of prioritized projects. Community involvement in the habitat project planning process was initiated at the January 2005 public workshops. The public will continue to be engaged throughout the planning process.

8.5.4 Project Cost and Feasibility

Project cost and feasibility are also key factors to be considered in project prioritization.

8.5.5 Benefits to threatened, endangered, and/or other aquatic or culturally important species

Benefits to threatened, endangered, and/or other aquatic or culturally important species will be taken into consideration in project prioritization.

8.6 Watershed-Wide Habitat Actions

The WRIA 45 Planning Unit has identified actions for protection or restoration/enhancement of habitat over the entire watershed system. These actions address issues that affect the watershed as a whole. The following watershed scale-studies assessing terrestrial and aquatic habitat needs were used as resources in developing this action list:

- Chelan County Fish Barrier Inventory (Chelan County, 2001)
- Instream flow assessment (EES, 2005b) (Golder, 2003)
- Draft Wenatchee River Total Maximum Daily Load (TMDL) Study (Ecology, 2005)
- Channel Migration Zone (CMZ) Study (Jones and Stokes, 2004)

Watershed-wide actions identified by the Planning Unit are:

H-1: Implementation of watershed planning will be coordinated with the Salmon Recovery Implementation Schedule (the Implementation Plan Matrix is Appendix H in UCSRB (2005)) and the Upper Columbia Salmon Recovery Implementation Team. The Wenatchee Habitat Subcommittee will serve as the local coordinating body for implementation of salmon recovery habitat actions across the watershed. Chelan County Natural Resource Department is currently developing a habitat

project database that will be available to the subcommittee in the near future to list past projects, track current projects, and evaluate what future habitat actions should take place.

H-2: The WRIA 45 Planning Unit supports implementation of projects identified in the Wenatchee River and Nason Creek Channel Migration Zone Study (Jones and Stokes, 2004).

H-3: The WRIA 45 Planning Unit supports implementation of the actions in the Wenatchee Subbasin Plan (Subbasin Plan sections 7.4 to 7.8 (NPCC, 2004)), and supports the Subbasin Plan approach to evaluation and monitoring of terrestrial and aquatic ecosystems in the Wenatchee Watershed. Section 2.5.1 of the Wenatchee Subbasin Plan which lists key findings from the Terrestrial Assessment is reproduced in Appendix C. The Planning Unit asks the co-planners and co-managers to seek funding from Bonneville Power Administration (BPA) and other sources for implementation of these actions.

H-4: The Habitat Subcommittee with Chelan County as lead should coordinate with funding organizations and action agencies to maintain a publicly accessible database of past and current habitat projects for the Wenatchee Watershed.

H-5: The Planning Unit will provide opportunities for public comment on watershed scale studies and plans when, by a vote of the Planning Unit, they are determined to be a priority of the Planning Unit and important to aquatic health and habitat.

H-6: The mainstem Wenatchee River provides habitat *important to the entire watershed* for many life stages of spring and summer Chinook, steelhead, bull trout and other culturally important species, and needs to be protected, enhanced, and restored. All remaining intact areas on the mainstem should be maintained. Where possible, floodplain function should be restored, particularly from the Mission Creek confluence downstream to the Columbia River confluence.

H-7: All property owners and managers in the watershed are encouraged to continue to cooperate in maintaining forest roads. Opportunities for inter-agency or multiple owner cooperation in roads management should continue to be supported (Additional and background information on forest roads in presented in Appendix C).

H-8: Noxious weeds threaten aquatic and terrestrial ecosystems throughout the Wenatchee Watershed. The Planning Unit supports efforts toward noxious weed control and eradication.

H-9: Consider using the Icicle Fund "Natural Resource Profile" as a tool to identify terrestrial habitat opportunities (Pacific Biodiversity Institute, 2002).

H-10: A fish barrier inventory has been conducted in many areas of the watershed; however, key inventory data regarding each barrier is not always consistent (i.e. whether it is a partial or full barrier, etc.). A method for updating the inventory should be established and funded. The Chelan County fish barrier inventory should be integrated with fish barrier information collected by other land managers, such as the Forest Service. Look at SalmonScape as a starting point for integrating barrier information. The organization has been able to integrate barrier information from other land managers. In addition, the Habitat Subcommittee should try to address the need to include irrigation diversions, specifically pump diversions, in the Chelan County Fish barrier inventory using appropriate funding sources.

H-11: Efforts that are ongoing in the Wenatchee Watershed to improve or maintain habitat quality need to be encouraged and retained. Recognize and acknowledge achievements in the watershed that

have accomplished habitat improvement or protection. Develop a landowner or organization recognition program to recognize habitat improvement projects or achievements in the watershed.

H-12: Initiate public information efforts to discourage harassment of spawning salmonids (UCRTT, 2002).

H-13: Salmon habitat restoration and protection actions should be coordinated with the Wenatchee Habitat Subcommittee to ensure consistency with watershed-wide strategies as identified in the watershed plan and other plans. Additionally, all other actions related to salmon recovery, including hatchery, harvest and hydropower activities, should be coordinated with the Wenatchee Habitat Subcommittee. Hatchery, harvest and hydropower activities that have a negative or adverse affect on local habitat restoration or protection actions must be carefully considered in the context of the local habitat strategy.

Short-term

H-14: Address passage barriers (UCSRB, 2005).

H-15: Address diversion screens (UCSRB, 2005).

H-16: Reduce the abundance and distribution of brook trout through feasible means (e.g., increased harvest) (UCSRB, 2005).

H-17: Protect and maintain stream and riparian habitats within Category 1 assessment units (UCSRB, 2005).

H-18: Protect, maintain, or enhance beneficial stream and riparian habitat conditions established by implementing Short-term Actions within assessment units (UCSRB, 2005).

H-19: Where feasible and practical, maintain connectivity throughout the historical distribution of the species (UCSRB, 2005).

Administrative/Institutional

H-20: NOAA Fisheries, U.S. Fish and Wildlife Service (USFWS), the Army Corp of Engineers, and State agencies should improve the permitting process for projects specific to recovery actions by reducing the time, cost, and review process requirements. These entities should also implement programmatic consultations for actions related to the implementation of the Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Plan and improve their review of species recovery projects with the local governments (UCSRB, 2005).

Research and Monitoring

H-21: Wenatchee Habitat Subcommittee members can attend an annual Upper Columbia Monitoring Coordination Workshop for regular updates on all watershed-wide and other monitoring programs. In addition, the Subcommittee will be updated by the Regional Technical Team, as available, to ensure consistency across planning processes as well as to evaluate the effect of habitat improvement projects in the watershed.

Hatchery Related

H-22: The effects of hatchery practices in the Upper Columbia Basin on productivity are currently unknown. Research on reproductive success of hatchery produced fish that spawn in the wild is needed to assess effects on productivity (UCSRB, 2005).

H-23: Additionally, future hatchery facilities will support recovery goals, and minimize and mitigate any impacts (including goals within other hatchery, harvest and hydropower activities). This list should not be considered all inclusive and specific actions will be determined and negotiated by the responsible parties (UCSRB, 2005).

H-24: Determine whether supplementation programs in the Wenatchee Sub-basin affect the viable salmonid population (VSP) parameters of spring Chinook (UCSRB, 2005).

H-25: Develop, maintain, and provide a comprehensive inventory of habitat projects and their costs and benefits (effectiveness) to the public annually (UCSRB, 2005).

8.7 Sub-Watershed Scale Actions

For each sub-watershed within WRIA 45, a map has been created to illustrate documented, presumed, and potential salmonid species distribution (Figures 9-1 through 9-9). Salmonid distribution shown on these maps is as reported by SSHIAP (WCC, 2001). The Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Plan (UCSRB, 2005) and Biological Strategy (UCRTT, 2002) identified biological needs within each sub-watershed of WRIA 45. Figures 9-1 through 9-9 present the biological recommendations for Category 1, 2, and 3 sub-watersheds. See Chapter 9 for the specific actions for each sub-watershed. These actions are also listed in Tables 2-8 through 2-16. Further identification of potential projects in these sub-watersheds will be a critical step in implementation of the habitat component of the Plan. In addition, Appendix C provides a habitat overview and a detailed description of historic, ongoing, and proposed habitat projects and actions for each sub-watershed, current as of June 2005.

8.8 Effectiveness Evaluation and Adaptive Management

Evaluating and documenting the effectiveness of habitat protection and restoration/enhancement actions, and ongoing adaptation of those actions, is critical to the successful implementation of the habitat component of the Wenatchee Watershed Plan, as well as the Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Plan. The Draft Upper Columbia Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Plan (UCSRB, 2005) includes administrative reviews to assess whether the actions were carried out as planned and monitoring of the effectiveness of recovery actions using the Before-After-Control-Impact (BACI) design with stratified random sampling.

Another program to evaluate and document the effectiveness of habitat actions is the Wenatchee River Integrated Status and Effectiveness Monitoring Program (ISEMP). This program is funded through various federal, state, and local efforts and is a collaborative effort of many entities. It has two complementary components. The first consists of sub-basin-scale pilot status and trend monitoring efforts for anadromous salmonids and their habitat. The second consists of effectiveness monitoring for suites of habitat restoration projects in the Wenatchee Watershed. This work builds on current status and trend monitoring programs.

9.0 SUMMARY OF PLAN RECOMMENDATIONS BY SUB-WATERSHED

The broad range of activities, natural resources, and economic opportunities in the Wenatchee Watershed can be attributed to the highly variable landscape over which the Wenatchee River and its headwaters flow. The WRIA's diverse geography, climate, biology, human impacts, and human needs have been considered in the development of this plan. Due to its diversity, the watershed has been divided into tributary areas, or sub-watersheds, as shown on Figure 1-1, to enable application of water management strategies that are appropriate on a local scale. This section provides a summary of watershed actions that are relevant to each sub-watershed. Sub-watersheds are addressed from downstream to upstream in WRIA 45: Lower Wenatchee, Mission, Peshastin, Chumstick, Icicle, Upper Wenatchee, Chiwaukum, Chiwawa, Nason, Lake Wenatchee, White and Little Wenatchee Rivers. Figures 9-1 through 9-9 show each sub-watershed and corresponding land uses, surface waters, stream gage and control point locations, water quality listings, fish barriers, habitat recommendations, and fish presence.

This section is intended to serve as a convenient reference for those who wish to understand how the watershed plan applies to the sub-watershed in which they live. It is also intended to help facilitate the Plan's implementation on a sub-watershed level. It should be noted that, in addition to the recommended actions in these sub-watershed sections, there are also watershed-wide actions that apply to individual sub-watersheds. The watershed-wide actions are summarized in Tables 2-1 through 2-7, and further discussed in Sections 4 -8, 10, and 11 of this plan.

Tables 2-8 through 2-16 summarize the sub-watershed specific actions that are described in this section. Background information that provides context for sub-watershed issues and recommendations is provided in the following Sections:

Section 3: Estimates of Current and Future Water Use
Section 4: A Water Resource Management Strategy for WRIA 45 (including Instream Flows)
Section 5: Watershed-Wide Water Quantity Actions
Section 6: Watershed-Wide Growth and Land Use
Section 7: Watershed-Wide Water Quality
Section 8: Watershed-Wide Habitat

9.1 Lower Wenatchee Sub-watershed

Area Description

The 68,128-acre Lower Wenatchee Sub-watershed covers the area from below Tumwater Canyon downstream to the confluence with the Columbia River (RM 23.5 to RM 0). This drier portion of the WRIA receives 20 to 30 inches of precipitation per year. The Lower Wenatchee Sub-watershed is the most highly populated sub-watershed in the Wenatchee Basin, supports a significant portion of the agricultural economy in the WRIA, and includes the majority of the private land in the WRIA. The economy in this sub-watershed is strongly supported by agriculture (mainly apples, pears and cherries covering nine percent of the land area) and also includes services in Cashmere, Dryden and Peshastin. The City of Leavenworth, located just outside of the Lower Wenatchee Sub-watershed, also influences the economy, land and water use in the Lower Wenatchee. The total population (including 36% of the City of Cashmere's population) in the Lower Wenatchee was 7,886 people in 2000, approximately 42.6% of the population in the entire Wenatchee Watershed.

A significant portion of the irrigation water used in WRIA 45 is withdrawn from the Wenatchee River as it flows through the Lower Wenatchee Sub-watershed. The river channel has been constrained by

the major state highway corridor and railroad that run alongside the river. A large portion of riparian land is privately owned. The Lower Wenatchee River is a very popular whitewater rafting/kayaking destination. Rafting has become a significant industry in recent years, has increased the number of people on the river and has resulted in significant growth in local recreation and tourism.

Native salmonid species found in the Lower Wenatchee Sub-watershed are sockeye salmon, spring and summer Chinook, steelhead, rainbow, and migratory and resident bull trout. This sub-watershed provides spawning and rearing habitat for Summer Chinook and steelhead, and serves as an important passage corridor for anadromous species, and is therefore critical to the health of anadromous fish in the entire Wenatchee Watershed. Figure 9-1 provides an overview of the sub-watershed, its land uses, stream gage and control point locations, water quality issues, fish barriers, habitat recommendations, and fish presence.

The Northside Tributaries (Derby, Hay, Olalla, and Nahahum) are small, south-facing tributaries located on the north side of the Lower Wenatchee Sub-watershed. The tributaries face unique challenges with respect to water availability, as they are located at lower elevations, are naturally dry, do not drain a significant amount of land area and contribute very little runoff. The water in these creeks comes as spring runoff due to the melting snowpack and is used primarily for irrigation and stock watering (Ecology, 1983). Salmonids are present in Derby Canyon and are not known to be present in other Northside Tributaries. Specific recommendations for the Northside Tributaries are listed below.

Lower Wenatchee Issues

Seasonal low flows and diminished water quality are significant issues in the Lower Wenatchee Sub-watershed. Furthermore, low instream flows in the late summer months and changes in channel morphology disrupt the distribution and abundance of salmonid species (Peven, 2004). Roads and railroads have constrained river channel migration, cut off habitat, and decreased woody debris and gravel recruitment (Peven, 2004). The Lower Wenatchee River has exceeded State and federal water quality standards for pH, DO, temperature and other constituents (see Figure 9-1). DO and pH are related to phosphorus transport and loading in the sub-watershed. Increased flows may also help address temperature exceedances in the Lower Wenatchee River.

Similar to most sub-watersheds in the lower, more populated portion of the WRIA, water needs in the Lower Wenatchee include that for (1) current water right holders who may have difficulty obtaining water during low flow or dry conditions (this may currently be an issue in the Northside Tributaries); (2) future growth outside of municipal service areas; and (3) recreation.

Recommended Actions - Lower Wenatchee Sub-watershed

The following actions have been recommended to address water quantity, instream flows, water quality, and habitat issues as they relate specifically to the Lower Wenatchee Sub-watershed. The issues and recommended actions are also summarized in Table 2-8. These actions should be implemented along with the watershed-wide actions (Tables 2-1 through 2-7) as discussed in Sections 4 – 8, 10 and 11 in this Watershed Plan. Responsibility for implementing the actions in the Plan is subject to securing necessary funding.

9.1.1 Water Management Recommended Actions

There are two stream gages and control points located in the Lower Wenatchee Sub-watershed: 1) Wenatchee River at Monitor; and 2) Wenatchee River at Peshastin (see Figure 9-1). The stream gage at Monitor is used as an overall control point for WRIA 45. When minimum instream flows are not regularly met at the Monitor gage, Ecology notifies junior water right holders and requires them to

curtail water use. The Wenatchee River at Monitor and at Peshastin gages are two separate control points, however they are viewed as one unit for reservation accounting purposes.

New minimum instream flows (management flows), a water reservation for future year-round use, and a maximum allocation (that is subject to flows) for storage and other seasonal uses have been specified for each control point (Figures 4-2 and 4-3; Tables 4-1 and 4-2). The Monitor gage on the Wenatchee River is the downstream-most control point in the watershed and is used to manage flows in the watershed and as a measure of total reservation water use. The cumulative, WRIA-wide 4 cfs reservation is based on flows measured at the Monitor gage. The reserve available to the Lower Wenatchee Sub-watershed and tributaries to the Lower Wenatchee River is 3.0 – 3.5 cfs.

The Northside Tributaries are located within the Lower Wenatchee Sub-watershed. The strategy for future water use in the Northside Tributaries includes additional research to further understand the nature and extent of water shortages, and to identify subsequent actions that residents can implement to mitigate impacts of withdrawal and increase water availability in the area. These recommendations are listed below.

NSTQUANT-1: Future water supply availability should be discussed with Chelan County Public Utility District (PUD) to determine whether they have the capacity and infrastructure to provide backup supply. The East Bank Aquifer Regional Water Supply will only be considered as a source of water for this area if approved by the owners of the Regional Water Supply.

NSTQUANT-2: PUD and Chelan County to consider pumping from Wenatchee Valley and a potential PUD hookup in Nahahum.

NSTQUANT-3: Chelan County and Ecology to provide public information regarding water limitations in Northside Tributaries (Fact Sheets).

NSTQUANT-4: Chelan County and Ecology to work with local community to design and implement a groundwater monitoring program in existing wells to determine trends in groundwater levels.

NSTQUANT-5: Alternatives Analysis for Northside Tributaries to include options such as use of out-of-basin water, pumping from lower Wenatchee reserve, PUD hookup, deep groundwater, storage, and water right purchase.

Various water management alternatives need to be evaluated to determine the most effective methods to fulfill instream and out-of-stream needs and mitigate the impacts to habitat, streamflow, and groundwater levels in this sub-watershed. An alternatives analysis of water management options will be conducted as part of the implementation phase of watershed planning (Phase IV). The analysis will clearly address specific water needs in the Lower Wenatchee Sub-watershed and other areas as appropriate, and evaluate water conservation, storage opportunities, purchase, lease and transfer of water rights, inter-basin transfer of water and other alternatives to determine the appropriate combination of water management options that could be used to increase the water availability in the Lower Wenatchee Sub-watershed (including the Northside Tributaries). Alternatives for assessment are discussed further in Section 5 (watershed-wide water quantity recommendations). Sub-watershed specific storage opportunities included in the Multi-purpose Storage Assessment (MWG, 2006) for the Lower Wenatchee Sub-watershed are presented below.

- CMZ Project 6: Reconnect an oxbow/former channel using a bridge or large culverts which would increase the floodplain capacity.

- CMZ Project 9: Reconnect a cattail marsh located in a farmed area using an at-grade culvert through the railroad embankment to increase floodplain capacity.
- CMZ Project 10: Construct a surface connection to the river from the existing pond to increase floodplain capacity on a site that contains native riparian forest, an open-water wetland and several former back channels.
- CMZ Project 11: Create additional open water/backchannel habitat to increase the floodplain capacity of a floodplain hardwood forest between SR2 and the river which currently floods during 2 yr+ events.
- CMZ Project 15: Pull back or breach the levee to restore back-channel access on the site of a former floodplain that has an open water wetland. Plant riparian vegetation to maintain recreational river access.
- Cashmere Wastewater Lagoon (10 acre-feet): Replace the wastewater lagoon with a more compact wastewater treatment facility and use the lagoon as a stormwater holding pond, possibly using it to recharge groundwater.
- Derby Canyon Off-channel Reservoir (1-20 acre-feet): Construct small off-channel reservoirs on available private land to hold water diverted in the winter or spring months and release the water in the summer months.
- Williams Canyons Off-channel Reservoir (1-50 acre-feet): Construct small off-channel reservoirs on available private land or National Forest land to hold water diverted in the winter or spring months and release the water in the summer months.
- Olalla Canyon Off-channel Reservoir (1-20 acre-feet): Construct small off-channel reservoirs on available private land or National Forest land to hold water diverted in the winter or spring months and release the water in the summer months.
- Nahahum Canyon Off-channel Reservoir (1-20 acre-feet): Construct small off-channel reservoirs on available private land to hold water diverted in the winter or spring months and release the water in the summer months.
- Peshastin Recharge Basin: Divert water from the Wenatchee River to a recharge basin that would be constructed near the Wenatchee River to augment groundwater supplies.

9.1.2 Water Quality Recommended Actions

There is a need to address the exceedances of State and Federal water quality standards for pH and dissolved oxygen in the Lower Wenatchee River. Both point and non-point sources of phosphorus that affect the pH and DO levels in the Lower Wenatchee Sub-watershed should be addressed. The sub-watershed-specific water quality actions for temperature in the Lower Wenatchee Sub-watershed are listed in Section 7, Water Quality. See Table 2-4 for additional watershed-wide water quality actions.

DO/pH

LowWenQUAL-1: The partnership formed to secure funding for further study of DO and pH (Chelan County, Chelan County PUD and the cities of Cashmere, Leavenworth and Wenatchee) should continue to work together, with the WQTS to acquire funding assistance and work with the WQTS to:

- Facilitate and develop a workable strategy that can be used and ultimately approved by the EPA and in Ecology's TMDL submittal for DO and pH, and

- Review and make suggestions for future improvements to Ecology's technical assessment, summary implementation plan, and adaptive management approaches to meet state water quality standards for these parameters.

LowWenQUAL-2: Strategies to address point and non-point sources of phosphorus as part of the TMDL for DO and pH will be reported during the implementation phase of the Wenatchee Watershed planning effort.

LowWenQUAL-3: Large reductions of phosphorus inputs are needed from point sources in the Wenatchee River Watershed, especially waste water treatment plants (WWTPs). A regulatory strategy should be developed and implemented with WWTPs and Ecology to institute controls over time through National Pollutant Discharge Elimination System (NPDES) permits that will reduce phosphorous discharges to surface and groundwaters. WWTPs to be addressed include the Lake Wenatchee, Stevens Pass, Leavenworth, Peshastin, and Cashmere waste water treatment plants. Conduct associated monitoring and adaptive management (WQTS, 2006a).

LowWenQUAL-4: Controls should be developed and implemented through new and existing regulatory permits, if needed, to reduce phosphorous inputs to surface and groundwaters from other Wenatchee Watershed point sources. Conduct associated monitoring and adaptive management (WQTS, 2006a).

LowWenQUAL-5: Large reductions of phosphorus inputs are needed from nonpoint sources in the Wenatchee River Watershed. Mass-balance modeling showed that two reaches of the lower Wenatchee River exhibit higher diffuse phosphorous loading than other reaches. One reach brackets the community of Dryden and the other brackets the city of Cashmere. Studies should be done in these two reaches, focusing on groundwater-surface water interaction and land-uses that may be contributing phosphorus inputs to the river. Actions should be implemented based on the conclusions and recommendations of these studies to reduce inputs of phosphorous from these areas (WQTS, 2006a).

LowWenQUAL-6: Groundwater discharges to the Wenatchee River, Icicle Creek, and their tributaries affects dissolved oxygen levels and nutrient concentrations. Groundwater is discharged to the river or creeks in some reaches, and is recharged in other reaches. In the Wenatchee basin, groundwater flow and Biochemical Oxygen Demand (BOD)/nutrient concentrations may be elevated due to upland practices such as orchard irrigation and wastewater discharge to groundwater from lagoons and on-site septic systems. Assessments of groundwater contributions and sources of nutrients (phosphorous) should be conducted. Actions should be implemented based on the conclusions and recommendations of these studies to reduce inputs of phosphorous from these areas (WQTS, 2006a).

LowWenQUAL-7: Non-point sources along the length of the river may be contributing BOD and nutrients. Address failing septic systems through actions identified in the Wenatchee Watershed Fecal Coliform TMDL. Continue site specific inspections and enforcement of regulations that restrict placement of on-site septic drain fields from areas deemed to have unsuitable soils. A study should be conducted to assess soils and onsite septic systems. Estimates should be made of the maximum number and density of on-site drain fields that the upper basin can accommodate and still meet the water quality standards, as was done in the Lake Chelan study (Patmont et al., 1989). Conduct associated monitoring and adaptive management (WQTS, 2006a).

LowWenQUAL-8: Nutrients (phosphorous) can enter streams from storm water events. Work with Chelan County and municipalities to reduce storm water inputs, utilizing the Eastern Washington

Storm water Manual or equivalent. Encourage the appropriate entities to include language that addresses storm water in comprehensive plans and ordinances. Work with developers. (See LowWenQUAL-18). Conduct associated monitoring and adaptive management (WQTS, 2006a).

LowWenQUAL-9: Nutrients (phosphorous) can enter surface and ground water from residential yards and gardens, hobby farms, City and County Parks, business owned landscapes, etc. An education outreach plan should be developed and implemented to heighten awareness and reduce inputs from these sources. Policies and practices should be implemented in City and County Public Works departments. The County and cities should consider implementing a ban on the sale of high phosphate detergents, such as is being considered in Spokane. Conduct associated monitoring and adaptive management (WQTS, 2006a).

LowWenQUAL-10: Nutrients can enter streams from materials used to de-ice, clean, and maintain roads and parking lots. Animal waste from roads and parking lots can enter streams and increase nutrient loading. Work with the County, cities, businesses, and the WA State Department of Transportation to determine if road and parking lot maintenance practices may be contributing to nutrient loading and if necessary investigate ways to reduce nutrient inputs from these practices. Conduct associated monitoring and adaptive management (WQTS, 2006a).

LowWenQUAL-11: Nutrients (phosphorous) can be released to ground and surface waters from development practices, such as disruption of soils during conversions of orchard lands to housing. Actions should be conducted to prevent nutrients from entering ground and surface waters before, during and after construction. Work with developers to implement these actions. Encourage entities to include appropriate language in county and city comprehensive plans, growth management, and critical area ordinances. Conduct associated monitoring and adaptive management (WQTS, 2006a).

LowWenQUAL-12: The operation of Columbia River dams apparently backs up the Wenatchee River from its mouth approximately one mile. It has been hypothesized that this back-water may contribute to the exceedances of pH and dissolved oxygen levels in that reach. Work with the Chelan PUD to conduct an assessment of the possible back-water effect that may be created by operation of the Rock Island dam. Implement actions from the report's conclusions and recommendations to improve water quality (WQTS, 2006a).

LowWenQUAL-13: Consider implementing actions recommended in the Wenatchee River Basin Temperature and Fecal Coliform TMDLs if the actions address problems that have been identified in the Lower Wenatchee. Lowering temperatures and reducing nutrient inputs will improve pH and dissolved oxygen levels in the Wenatchee River Watershed (WQTS, 2006a).

LowWenQUAL-14: Reserve load capacities for Biochemical Oxygen Demand (BOD) and nutrients should be established for the Upper Wenatchee River and Icicle Creek. Reserve load capacities are needed because there is no additional assimilative capacity for dissolved oxygen in the upper watershed during critical conditions. A point source regulatory strategy and nonpoint source BMP strategy should be developed to protect the reserve capacities and maintain water quality standards (WQTS, 2006a).

LowWenQUAL-15: Encourage lining of earthen canals where appropriate. Work with irrigation districts to implement BMPs and adaptive management programs to minimize any nutrient loading that is not already being addressed (WQTS, 2006a).

LowWenQUAL-16: Agricultural practices can contribute nutrients to ground and surface waters through crop watering practices, application of fertilizers, and soil disturbance activities. Work with

the agricultural community to encourage practices that will reduce nutrient inputs to ground and surface waters while enhancing crop quality and yield. Examples include technical assistance through farm plans and Best Management Practices (BMPs). Conduct associated monitoring and adaptive management (WQTS, 2006a).

LowWenQUAL-17: Funding for these projects should be sought through Department of Ecology Centennial and 319 grants and loans. Identify and access other funding sources through the Planning Unit and other entities. Ongoing adaptive management should be utilized to provide the best use of funds and environmental benefits (WQTS, 2006a).

LowWenQUAL-18: Proper filtration of nutrients through land use practices can have a beneficial effect on nutrient reductions to ground and surface waters. Encourage implementation of wetlands, filter strips, riparian vegetation, bio-swales, drainage basins, pervious surfaces, etc. in residential, commercial, agricultural, industrial, development, and municipal practices. Conduct associated monitoring and adaptive management (WQTS, 2006a).

LowWenQUAL-19: Identify and investigate any non point sources in tributaries that may be contributing to nutrient loads (WQTS, 2006a).

9.1.3 Habitat Recommended Actions

The Lower Wenatchee Watershed has been assigned a Category 2 Habitat Priority. This implies that it is a sub-watershed that supports important aquatic resources and is a stronghold for one or more listed species. Compared to Category 1 areas, Category 2 areas are characterized by a higher level of fragmentation resulting from habitat disturbance or loss. In addition, native populations have been lost or are at risk because of limited habitat diversity and quantity, fragmentation of the sub-watershed due to habitat loss, and unstable channels. Restoring ecosystem function and connectivity within this area are priorities (UCSRB, 2005). Appendix C provides detail on habitat projects current as of June 2005. Habitat recommendations for the Lower Wenatchee as reported in the 2005 Draft Upper Columbia Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Plan (UCSRB, 2005) and Biological Strategy (UCRTT, 2002) include:

LowWenH-1: Use practical and feasible means to increase stream flows (within the natural hydrologic regime and existing water rights) in the Wenatchee River (UCSRB, 2005).

LowWenH-2: Reduce water temperatures by restoring riparian vegetation along the river (UCSRB, 2005).

LowWenH-3: Increase habitat diversity and quantity by restoring riparian habitat along the Wenatchee River, reconnecting side channels and the floodplain with the river, and increasing large woody debris in the side channels (UCSRB, 2005).

LowWenH-4: Protect existing riparian habitat and channel migration floodplain function (UCRTT, 2002).

9.2 Mission Sub-watershed

Area Description

Mission Creek drains a 59,794 acre area, joins the Wenatchee River at Wenatchee RM 10.4, and contributes 2% of the Wenatchee River's annual flow (Wenatchee River Watershed Action Plan Addendum, 1996). The sub-watershed receives an average of 19 inches of precipitation per year and

ranges in elevation between 795 to 6,800 feet. This highly variable topography has restricted settlement and agriculture (mainly pear and apple orchards) to the valley bottom in the lower elevations near the mouth of Mission Creek. Irrigation canals cross the area in the lower portion of the sub-watershed and service some orchards, but there are also a significant number of individual water right holders in the Mission Sub-watershed. The sources of water for the canals are the Icicle and Peshastin Sub-watersheds—not Mission Creek. Although agriculture comprises a small percent of the overall land area in the sub-watershed (3%), it is important to the local community, fruit packing industry, and economy.

A large portion of Mission Creek has been channelized to transport flood-flows due to major flood events in the 1940s and 1950s that damaged and jeopardized downstream development. Mission Creek has also been confined by development in its floodplain (Wenatchee River Watershed Action Plan Addendum, 1996). The upper portion of the sub-watershed is primarily forestland (77.4% of the sub-watershed) that is managed by the U.S. Forest Service (Wenatchee River Watershed Action Plan Addendum, 1996; MWG, 2003). The Mission Sub-watershed is home to 3,895 people (including 64% of the City of Cashmere's population), about 21.0% of the total population in the Wenatchee Watershed. A portion of the City of Cashmere is also located in the Mission Sub-watershed.

Native salmonid species in the Mission Creek Sub-watershed are juvenile spring Chinook and steelhead. At present, the Mission Sub-watershed is not considered to contribute significantly to salmonid population abundance; however, biologists consider Mission Creek to be important for preserving spatial and genetic diversity in the context of the entire species. Figure 9-2 provides an overview of the sub-watershed, its land uses, stream gage and control point locations, water quality issues, fish barriers, habitat recommendations, and fish presence.

Mission Issues

Limited water quantity, insufficient instream flow, and diminished quality are the leading issues in the Mission Creek Sub-watershed. The sub-watershed is fully appropriated during low flow periods (meaning that it is, at times, dry). Mission and Brender Creeks have exceeded State and federal water quality standards for DDT and fecal coliform; Yaksum Creek has exceeded State and federal water quality standards for DDT. There is a long history of water quality concerns and subsequent monitoring in the Mission Creek Sub-watershed (Wenatchee River Watershed Action Plan, 1998). Fecal coliform is a very difficult water quality parameter to address and is also a public health issue. Habitat is also a priority as efforts are being made to maintain the existing native salmonid diversity despite the small quantity of available quality habitat in the sub-watershed. Specific habitat concerns include the channelization of lower Mission, Brender and Yaksum Creeks; fish passage barriers (culverts); and low or non-existent flows with associated high instream temperatures in lower Mission Creek which disrupt the distribution and abundance of native species, particularly in summer.

Similar to most sub-watersheds in the lower, drier portions of the WRIA, water needs in the Mission Sub-watershed include that for (1) current water right holders who may have difficulty obtaining water during low flow or dry conditions; (2) future growth outside of the Cashmere municipal service areas; (3) improving water quality; and (4) providing instream flows to benefit fish and other aquatic resources.

Recommended Actions - Mission Sub-watershed

The following actions have been recommended to address water quantity, instream flows, water quality, and habitat issues as they relate specifically to the Mission Sub-watershed. The issues and recommended actions are also summarized in Table 2-9. These actions should be implemented along with the watershed-wide actions (Tables 2-1 through 2-7) as discussed in Sections 4 – 8, 10, and 11 in

this Watershed Plan. Responsibility for implementing the actions in the Plan is subject to securing necessary funding.

9.2.1 Water Management Recommended Actions

The Mission Creek Sub-watershed is, at times, dry. Water is not left in the stream to appropriate for new users. Therefore, surface water and groundwater are not available for further appropriation to provide an uninterruptible supply for domestic, municipal and stock water uses during low flow periods. The water resource management strategy is more complex for Mission; however, it still includes a control point, management flows, and a maximum allocation (Figure 4-5 and Table 4-4). The control point for the Mission Creek Sub-watershed is the Mission Creek at Cashmere stream gage. The maximum allocation, subject to flows, includes seasonal water for storage and other uses. The cap set by the maximum allocation means that there is no new water available for storage or seasonal uses in July, August or September.

A reservation needs to be created for the Mission Sub-watershed through the lease or purchase of water rights. However, this strategy for future use includes an interim, two-year reserve of 0.03 cfs that can be used while alternate water sources are identified to achieve the full 0.12 cfs that will be needed to sustain future growth until 2025. The availability of the interim reserve is conditioned on a number of requirements as outlined in Section 4.6.4. If the interim reserve is not supplemented by the purchase or transfer of existing water rights within two years of rule adoption, Ecology would close the Mission Sub-watershed to further appropriation, and existing outdoor water use could be curtailed when flows are not met. All water for the City of Cashmere is to be debited to the Lower Wenatchee reserve and not to the Mission Creek reserve.

The strategy for Mission is based on the need for water for future growth and for instream benefits in an over-appropriated basin. Some of the recommendations that have been identified to increase water availability are listed below.

MissionQUANT-1: Chelan County as lead (with support from Ecology), will convene a Mission Creek Forum to assess options to provide water for future growth through the purchase, lease or transfer of existing, valid water rights or from storage (storage opportunities within Mission Sub-watershed or through the Peshastin and/or Icicle Irrigation districts). This will be conducted for the purpose of providing an uninterruptible supply for domestic, municipal and stock water uses. During Phase IV, Implementation, the Mission Creek Forum will determine whether the strategies for Mission are relevant to Brender Creek, and consider assembling separate strategies to address local instream flow concerns and conditions for Brender Creek, if appropriate.

Within two years of rule adoption, the Forum will have developed opportunities and researched funding opportunities for these alternatives.

MissionQUANT-2: As part of Phase IV, Implementation, evaluate alternatives that could increase available water for instream and out-of-stream uses. Clearly address specific water needs in the Mission Creek and evaluate water conservation, storage, purchase, lease and transfer of water rights, water from other sub-watersheds, and other alternatives as appropriate.

MissionQUANT-3: One quarter (0.03 cfs) of the 0.12 cfs projected 2025 water needs is available for growth for two years after rule adoption. If, after two years, water rights are not purchased or leased to cover the interim reserve of 0.03 cfs or conservation measures that provide additional water are not implemented, Ecology would close the Mission Sub-watershed to further appropriation on a seasonal basis, and existing outdoor water use established subsequent to the adoption of WAC 173-545 could

be curtailed when flows are not met. All water allocated to the City of Cashmere will be debited to the Lower Wenatchee Reserve and not to the Mission Reserve.

MissionQUANT-4: Consider storing water in Icicle/Peshastin and use that water to augment flows and provide mitigation water in Mission Creek.

MissionQUANT-5: Consider storage opportunities within Mission Sub-watershed (See Section 5.5).

MissionQUANT-6: Metering of all new uses covered under the Mission reserve (includes all new domestic uses).

MissionQUANT-7: Evaluate out-of-kind mitigation and enhancement projects over time, if appropriate. Identify habitat and water quality improvements to mitigate additional reserve water.

MissionQUANT-8: Chelan County or other entity with agency funding assistance will investigate water rights for purchase or lease as part of the mitigation and enhancement strategy for Mission Sub-watershed. The County will seek funding from BPA, Ecology, Washington Rivers Conservancy, Washington Water Trust, and others. As water rights are purchased or transferred for use in the Mission reserve to meet a "no net impact" standard, the first purchase(s) will credit the 0.03 cfs interim reserve, then the additional 0.09 cfs will be available for forecasted growth as it is purchased.

Various water management alternatives need to be evaluated to determine the most effective methods to fulfill instream and out-of-stream needs and mitigate the impacts to habitat, streamflow, and groundwater levels in this sub-watershed. An alternatives analysis of water management options will be conducted as part of the implementation phase of watershed planning (Phase IV). The analysis will clearly address specific water needs in the Mission Sub-watershed, and evaluate water conservation, storage opportunities, purchase, lease and transfer of water rights, inter-basin transfer of water and other alternatives to determine the appropriate combination of water management options that could be used to increase the water availability in the Mission Sub-watershed. Water management alternatives for this assessment are discussed further in Section 5 (watershed-wide water quantity recommendations). Sub-watershed specific storage opportunities included in the Multi-purpose Storage Assessment (MWG, 2006) for the Mission Sub-watershed are presented below.

- East Fork Mission Creek Reservoir (10-50 acre-feet): Divert water to an existing depression on National Forest land.
- Upper Reach Mission Creek Lake (10-50 acre-feet): Divert water to an existing lake on National Forest land.
- Little Camas Creek Reservoir (50-100 acre-feet): Instream reservoir located on National Forest land.
- Headcut Repair on Peavine Canyon, Poison Canyon, Sand Creek: Install check structures in the creeks to increase the bed level, thereby increasing bank storage along the creek.
- Cashmere Recharge Basin: Divert water in the winter or spring when flow is sufficient to a recharge basin located on privately owned land in the Lower Mission Creek area to augment groundwater supplies.

9.2.2 Water Quality Recommended Actions

Mission, Brender, and Yaksum Creeks have exceeded State and federal water quality standards for DDT. Transport of DDT contaminated soil to these creeks may contribute to water quality problems in the Mission Sub-watershed. It is also possible that DDT is moving through the groundwater system and discharging into the three creeks; however, this DDT transport mechanism in the sub-watershed has not been fully characterized.

Mission and Brender Creeks have exceeded State and federal water quality standards for fecal coliform. Fecal coliform is a public health issue and a very difficult water quality parameter to address because it requires the loading and transport of fecal coliform from non-point sources to be characterized and reduced.

The sub-watershed-specific water quality actions for temperature in the Mission Sub-watershed are listed in Section 7, Water Quality. See Table 2-4 for additional watershed-wide water quality actions.

DDT

MissionQUAL-1: Significant reductions in DDT loads may be achieved by preventing bank erosion or by other means of limiting transport of upland soils to streams. BMPs such as riparian buffers and wetlands can also filter and uptake DDT from surface and groundwater. Many BMPs are currently being implemented in the watershed. BMPs should be continued, refined, expanded, and monitored to further reduce erosion, surface runoff, TSS in the water column, and groundwater transport of DDT. BMPs include farm practices, storm water runoff, riparian vegetation planting, orchard conversions, residential practices, riparian buffers, wetlands, etc. These and other appropriate BMP actions and locations should be identified and implemented in coordination with the Planning Unit and its committees (WQTS, 2006b).

MissionQUAL-2: A phased monitoring approach should be conducted to assess the effectiveness of BMPs and DDT-TSS (Total Suspended Solids) reduction efforts. This may take time to achieve and, as TSS loads are reduced and DDT levels are monitored, TSS targets may be adjusted to correspond to DDT targets (WQTS, 2006b).

MissionQUAL-3: Evaluation of soil transport to streams should be conducted during large rainfall events when visual observations can be made and/or sections of streams with high sediment runoff and TSS can be isolated. An assessment should be conducted to investigate if any other events contribute soil to streams such as spring thaw processes or irrigation practices (WQTS, 2006b).

MissionQUAL-4: More comprehensive groundwater monitoring should be conducted, including further assessment of the relationship between surface water, groundwater, and DDT fate and transport (WQTS, 2006b).

MissionQUAL-5: Assessments are recommended for all irrigation systems in the watershed to identify any mechanisms that may contribute to sediment transport which are not yet being addressed by BMPs. Actions should be identified and implemented to address the findings. Lining of earthen canals should be encouraged (WQTS, 2006b).

MissionQUAL-6: Activities should be identified and undertaken to provide ongoing outreach, education, and technical assistance to growers, streamside landowners, developers, stakeholders, and the general public (WQTS, 2006b).

MissionQUAL-7: Funding assistance should be sought from Ecology through its grants and loans programs to implement actions and ongoing monitoring. Other funding sources should be identified and applications submitted to provide funding for ongoing activities. The WQTS will recommend qualified entities to conduct associated monitoring (WQTS, 2006b).

MissionQUAL-8: Development over old orchards is a primary concern. Measures should be implemented to prevent DDT laden orchard soils disturbed during construction from being transmitted to streams and lakes in the watershed. Language requiring measures to prevent DDT laden soils from entering the waterways during and after construction should be developed by the WQTS and included in County and municipality development ordinances, growth management plans, and critical area ordinances. The Stormwater Management Manual for Eastern Washington or an equivalent document should be utilized in developing ordinances, and guiding municipal, private, and construction storm water practices (WQTS, 2006b).

MissionQUAL-9: Assessments are recommended for stormwater control systems in the watershed to identify any mechanisms that may contribute to sediment transport which are not yet being addressed by BMPs. Actions should be identified and implemented to address the findings through a list of prioritized projects (WQTS, 2006b).

Fecal Coliform

MissionQUAL-10: Identify sources of fecal coliform (FC) pollution to Mission Creek Sub-watershed, utilizing the FC technical study. Identify human and nonhuman sources and/or failing on-site septic systems. Plan and implement corrective actions. The Chelan-Douglas Health District (CDHD) should address failing septic systems. Other entities should address manageable sources of FC pollution as appropriate. Assessments should include the following areas:

a. Mission Creek between Binder Road (RM 1.2) and Creekside Place (RM 0.9).
b. Mission Creek above RM 5.1, RM 3.8, and RM 1.2.
c. A pipe discharge just below the Tripp Canyon road crossing of Mission Creek (RM 3.0)
d. Mission Creek culvert at Pioneer Street that discharges from the City of Cashmere stormwater drain system and apparently runs in the dry season due to nearby seepage infiltration (RM 0.7)
e. Mission Creek culvert at Pioneer Street that diverts irrigation management return flows from the Peshastin Irrigation Canal to Mission Creek (RM 0.7)
f. The Peshastin Irrigation Canal discharge to the stormwater collection system to confirm it is not a source to Mission Creek (RM 0.7)
g. The Peshastin Irrigation District drain that returns water to Brender Creek (RM 0.1)
h. Yaksum Creek (RM 0.3 and RM 2.5), and two culverts at the Pioneer Street bridge crossing (RM 0.1 and RM 0.6)
i. Brender Creek between river mile 1.2 (where Brender Creek first crosses Pioneer Road) and river mile 2.5. Investigate suspect domestic on-site septic systems in this reach (RM1.2 to RM 1.6) for proper functioning. A walking inspection of the creek should be conducted to look for illegal discharges.
j. No Name Creek from its source (RM 1.3), downstream to Mill Pond (RM 0.5), to the mouth (RM 0.1).
k. Sand Creek in the forested area of upper Mission Creek (Station 45SN00.1)
l. The ditch from the Icicle Creek Irrigation District irrigation management flow return (RM 0.1) (WQTS, 2006c).

MissionQUAL-11: Implement and monitor BMPs to meet the Fecal Coliform TMDL Technical Assessment target reductions (WQTS, 2006c).

MissionQUAL-12: Utilizing this report, City of Cashmere, and Ecology information, work with the city of Cashmere to identify sewer system root intrusion in areas near streams. Repair and upgrade sewer collection and delivery system (WQTS, 2006c).

MissionQUAL-13: The CDHD will continue to work with consenting homeowners to conduct monitoring of on-site wells in areas of fecal coliform exceedances to help identify the source/s. Utilize this assessment (July 2003) to help identify locations for testing (WQTS, 2006c).

MissionQUAL-14: CDHD will continue to implement onsite sewage disposal system technical assistance and education programs for homeowners and the industry (WQTS, 2006c).

MissionQUAL-15: The CDHD will continue to permit sewage systems per Washington Administrative Code (WAC), including analyzing soils and technologies suitable for individual sites; review/approve the proposed design, specifications, installation and if required, the ongoing maintenance in accordance with the WAC; provide public information under real estate disclosure laws; and review all land use proposals to ensure that the WAC is properly enforced prior to approval by the County (WQTS, 2006c).

MissionQUAL-16: A grant/loan funding program should be developed and implemented to replace or repair failing septic systems (WQTS, 2006c).

MissionQUAL-17: The CDHD should explore obtaining legal authority from Chelan County to operate a pumper notification program with area septage pumpers as part of its onsite septic system operation and maintenance program. The septage pumpers would work with the CDHD to appropriately identify and correct failing septic systems (WQTS, 2006c).

MissionQUAL-18: The CDHD and watershed would benefit from the funding, development and maintenance of a digital system for all onsite septic system permits issued in Chelan County, and a Geographic Information Systems (GIS) database of the onsite septic systems (WQTS, 2006c).

MissionQUAL-19: When the TMDL DIP is developed, the committee should utilize detailed recommendations from the Wenatchee River Watershed Action Plan (WQTS, 2006c).

MissionQUAL-20: Conduct stream walk cleanups along the stream (Fall, Spring, Summer) with area schools, homeowners, and other groups (WQTS, 2006c).

MissionQUAL-21: Conduct ongoing community fecal coliform education/awareness campaigns throughout the year. Engage and get support from homeowners (WQTS, 2006c).

MissionQUAL-22: Work with City, County, State, and Federal governments, and the Humane Society to deal with the feral cats and dogs living within the stream corridor. Monitor and remove dead animals within the stream corridor throughout the year (WQTS, 2006c).

MissionQUAL-23: Conduct education and enforcement actions to stop illegal dumping of wastes either to storm drains or directly to surface waters. This dumping may be of portable toilet wastes, recreational vehicle wastes, etc. (WQTS, 2006c).

MissionQUAL-24: The WQTS should encourage the CDHD, Chelan County, Cities, DOH, and Utilities to continue ongoing review and upgrading of ordinances regarding developments and sewage systems technologies (WQTS, 2006c).

MissionQUAL-25: The WQTS and its participating entities should work with the public and homeowners regarding BMPs to reduce fecal coliform runoff. General actions should include public information, education, and technical assistance regarding watering practices, landscaping, stormwater runoff, filtration practices, animal waste, etc. (WQTS, 2006c).

MissionQUAL-26: Work with irrigation districts to implement and enforce policies to prevent illegal fecal coliform discharges to irrigation canals (WQTS, 2006c).

MissionQUAL-27: Work with landowners regarding fecal coliform runoff (WQTS, 2006c).

MissionQUAL-28: Encourage Chelan County and municipalities to develop and implement stormwater policies, standards, and guidelines, utilizing the Eastern Washington Stormwater Manual or equivalent, in comprehensive plans, critical area ordinances, growth management plans, and other appropriate plans (WQTS, 2006c).

MissionQUAL-29: Work with appropriate entities to reduce fecal coliform runoff from impervious surfaces (WQTS, 2006c).

MissionQUAL-30: Work with U.S. Forest Service, Washington State Department of Natural Resources, and private owners on forested lands to restore and protect streams from fecal coliform runoff pollution (WQTS, 2006c).

MissionQUAL-31: Work with wastewater purveyors to examine sewer collection systems to identify problems or damage within them that may contribute fecal coliform loading in the watershed. Correct identified problems as appropriate (WQTS, 2006c).

MissionQUAL-32: Funding assistance should be sought from Ecology through its grants and loans programs to implement actions and ongoing monitoring. Other funding sources should be identified and applications submitted to provide funding for ongoing activities. The WQTS will recommend qualified entities to conduct associated monitoring. Self-sustaining funding mechanisms to reduce fecal coliform inputs should be explored and developed in concert with the Wenatchee Watershed Planning Unit and its participating entities (WQTS, 2006c).

MissionQUAL-33: Work with the wastewater utilities regarding their ordinances to connect unconnected homes in the service area (WQTS, 2006c).

9.2.3 Habitat Recommended Actions

The Mission Creek Sub-watershed has been assigned a Category 3 Habitat Priority. This implies that it is a sub-watershed that supports salmonids, but has experienced substantial degradation and is strongly fragmented by habitat loss, especially due to a loss of connectivity in the mainstem corridor. The strategy in this area is to address the primary factors that cause habitat degradation: sedimentation and obstructions (UCSRB, 2005). Appendix C provides detail on habitat projects current as of June 2005. Habitat recommendations for Mission Creek as reported in the 2005 Draft Upper Columbia Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Plan (UCSRB, 2005) include:

MissionH-1: Re-establish connectivity throughout the assessment unit by removing, replacing, or fixing artificial barriers (culverts and diversions) (UCSRB, 2005).

MissionH-2: Use practical and feasible means to increase stream flows (within the natural hydrologic regime and existing water rights) in Mission Creek (UCSRB, 2005).

MissionH-3: Decrease water temperatures and improve water quality by restoring riparian vegetation along the stream (UCSRB, 2005).

MissionH-4: Reduce unnatural sediment recruitment to the stream by restoring riparian habitat and improving road maintenance (UCSRB, 2005).

MissionH-5: Increase habitat diversity and quantity by restoring riparian habitat, reconnecting side channels and the floodplain with the channel, increasing large woody debris within the channel, and by adding instream structures (UCSRB, 2005).

9.3 Peshastin Sub-watershed

Area Description

The Peshastin Sub-watershed drains an area of 86,291 acres, joins with the Wenatchee River at Wenatchee RM 17.9, and contributes less than 3% of the Wenatchee River's annual flow. Ingalls Creek provides up to 90% of the flow in Peshastin Creek during late summer as it drains Mt. Stuart. The upper portion of the sub-watershed receives close to 40 inches of precipitation per year while the lower portion receives approximately 20 inches per year. The Peshastin Irrigation District diverts a significant portion of Peshastin Creek's streamflow between RM 3 and 4 to supply a number of orchards. Commercial forest is by far the most dominant land use in the sub-watershed (94.8%). Other land uses are rural residential/resource (4%) and a small amount of commercial agriculture (MWG, 2003). There are a number of organic pear orchards along Peshastin Creek. The construction of Highway 97 along Peshastin Creek and the Tronsen Creek tributary from Blewett Pass to the confluence of Peshastin Creek and the Wenatchee River have resulted in a significant amount of channel straightening and loss of pools. The total population in the sub-watershed was 865 people (about 4.7% of the Wenatchee Watershed's population) in 2000.

Native salmonid species in the Peshastin Creek Sub-watershed are spring Chinook, steelhead, rainbow, migratory and resident bull trout, and westlope cutthroat trout. This sub-watershed provides important bull trout and steelhead spawning and rearing habitat, both in the mainstem Peshastin and in its tributaries. Figure 9-3 provides an overview of the sub-watershed, its land uses, stream gage and control point locations, water quality issues, fish barriers, habitat recommendations, and fish presence.

Peshastin Issues

Low late summer flows and limited habitat diversity and quantity for salmonids are the leading issues in the Peshastin Sub-watershed. Low flows also affect water temperatures and impede fish passage in the sub-watershed. Peshastin Creek has exceeded State and federal water quality standards for temperature. Salmonid populations are at risk because of limited habitat diversity and quantity and obstructions within the sub-watershed. The construction of Highway 97 along Peshastin Creek and Tronsen Creek has contributed to the loss of habitat quantity and diversity (i.e., the loss of pools). Long term effects of highway construction on the Creek (such as channelization) are evident.

Water needs in the Peshastin Sub-watershed include that for (1) current water right holders who may have difficulty obtaining water during low flow or dry conditions; (2) future growth outside of water service areas; and (3) providing instream flows to benefit fish and other aquatic resources.

Recommended Actions - Peshastin Sub-watershed

The following actions have been recommended to address water quantity, instream flows, water quality, and habitat issues as they relate specifically to the Peshastin Sub-watershed. The issues and recommended actions are also summarized in Table 2-10. These actions should be implemented along with the watershed-wide actions (Tables 2-1 through 2-7) as discussed in Sections 4 – 8, 10, and 11 in this Watershed Plan. Responsibility for implementing the actions in the Plan is subject to securing necessary funding.

9.3.1 Water Management Recommended Actions

The Peshastin Sub-watershed is currently closed seasonally (June 15 – October 15) to any future surface or groundwater allocation. The new strategy recommends the establishment of new minimum instream flows (management flows) and a revised rule that would change the current closure to August 1 – October 15 thereby allowing allocation of water for storage and seasonal uses, subject to flows, during spring runoff periods. Permit-exempt wells would no longer be exempt from the closure but would be eligible for the reservation in the Peshastin. A maximum allocation, or cap, is also included in the strategy and is applicable for all months where there is no closure (Figure 4-6 and Table 4-5). This revised management strategy uses the Peshastin Creek at Green Bridge gage as the control point. A reservation of 0.1 cfs would also be made available to service future growth in the sub-watershed.

The strategy for Peshastin is based on the need to make water available for future growth while protecting instream resources. Some of the recommendations that have been identified to increase water availability are listed below.

PeshastinQUANT-1: Evaluate passage requirements for fish immediately below the Peshastin Irrigation District diversion (addressing bypass reach/piping).

PeshastinQUANT-2: Consider other instream projects that improve habitat.

PeshastinQUANT-3: As part of Phase IV, Implementation, evaluate alternatives that could increase available water for instream and out-of-stream uses. Clearly address specific water needs in the Peshastin and evaluate water conservation, storage, purchase, lease and transfer of water rights, and other alternatives.

PeshastinQUANT-4: Evaluate and institute programs to increase instream flows through water acquisitions, leases, and transfers.

Various water management alternatives need to be evaluated to determine the most effective methods to fulfill instream and out-of-stream needs and mitigate impacts to habitat, streamflow, and groundwater levels in this sub-watershed. An alternatives analysis of water management options will be conducted as part of the implementation phase of watershed planning (Phase IV). The analysis will clearly address specific water needs in the Peshastin Sub-watershed, and evaluate water conservation, storage opportunities, purchase, lease and transfer of water rights, inter-basin transfer of water and other alternatives to determine the appropriate combination of water management options that could be used to increase water availability in the Peshastin Sub-watershed. Water management alternatives for this assessment are discussed further in Section 5 (watershed-wide water quantity

recommendations). Sub-watershed specific storage opportunities included in the Multi-purpose Storage Assessment (MWG, 2006) for the Peshastin Sub-watershed are presented below.

- Upper Camas Creek Lakes (1-10 acre-feet): Divert water from Camas Creek to an off-channel reservoir located on private land at two small lakes in the upper reaches of the Camas Creek basin at about elevation 2,960 ft.
- Camas Land Off-channel Reservoir (1-10 acre-feet): Divert water from Camas Creek to an off-channel reservoir located on private land owned by a church camp at about elevation 2,900 ft.
- Camas Land Groundwater Level Management (1-10 acre-feet): Remove or block drainage ditches that are located on privately owned land or use other methods to increase groundwater levels in Camas Prairie.
- Campbell Off-channel Reservoir (500-1,000 acre-feet): Water from the existing Tandy pipeline and collected from the canyon can be used to supply an off-channel reservoir in a canyon on the west side of the Peshastin Creek valley.
- Hansel Lane Pond (1-10 acre-feet): Divert water to expand an existing pond located on privately owned land at about elevation 1640 ft to provide additional storage.
- Hansel Creek Off-channel Reservoir (1-10 acre-feet): Divert water from Peshastin Creek or Hansel Creek to an off-channel reservoir located on privately owned land at about elevation 1,760 ft.
- Ingalls Creek Off-channel Reservoir (100-300 acre-feet): Divert water to an off-channel reservoir on private land.
- Tronsen Creek Off-channel Reservoir (50-100 acre-feet): Divert water to an off-channel reservoir on National Forest land.
- Negro Creek Instream Reservoir (100-500 acre-feet): Instream reservoir located on National Forest land.
- Headcut Repairs to Ruby Creek, Lower Camas Creek, Mill Creek, Larsen Creek: Install check structures in the creeks to increase the bed level, thereby increasing bank storage along the creek.

9.3.2 Water Quality Recommended Actions

The sub-watershed-specific water quality actions for temperature in the Peshastin Sub-watershed are listed in Section 7, Water Quality. See Table 2-4 for additional watershed-wide water quality actions.

9.3.3 Habitat Recommended Actions

The Peshastin Creek Sub-watershed has been assigned a Category 2 Habitat Priority. This implies that it is a sub-watershed that supports important aquatic resources and is a stronghold for one or more listed species. Compared to Category 1 areas, Category 2 areas have a higher level of fragmentation resulting from habitat disturbance or loss. In addition, native populations have been lost or are at risk because of limited habitat diversity and quantity, obstructions, and critically low late summer instream flows with associated elevated water temperatures. Restoring ecosystem function and connectivity within this area are priorities (UCSRB, 2005). Appendix C provides detail on habitat projects current as of June 2005. Habitat recommendations from the 2005 Draft Upper

Columbia Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Plan (UCSRB, 2005) include:

PeshastinH-1: Re-establish connectivity throughout the assessment unit by removing, replacing, or fixing artificial barriers (UCSRB, 2005).

PeshastinH-2: Use practical and feasible means to increase stream flows (within the natural hydrologic regime and existing water rights) in Peshastin Creek (UCSRB, 2005).

PeshastinH-3: Reduce water temperatures by increasing stream flows and restoring riparian vegetation along the stream (UCSRB, 2005).

PeshastinH-4: Increase habitat diversity and quantity by restoring riparian vegetation, adding instream structures and large woody debris, and reconnecting side channels and the floodplain with the stream (UCSRB, 2005).

9.4 Chumstick Sub-watershed

Area Description

The Chumstick Sub-watershed drains 52,969 acres above its confluence with the Wenatchee River at Wenatchee RM 23.5, contributing less than 3% of the Wenatchee River's annual flow. However, during periods of low flow, Chumstick Creek's contribution to the Wenatchee River is negligible (Ecology, 1983). This sub-watershed receives an average of 30 inches of precipitation per year. Local irrigation projects were established in the Chumstick and Eagle Creek drainages, and with the exception of a few small diversions, only one major irrigation system brings water from outside the drainage to irrigate the orchards in the lowest portion of the Chumstick Valley (Klinger, personal communication, 2006). Water rights in the Chumstick Sub-watershed were adjudicated in the 1980s, indicating that inadequate water quantity has been an issue in the Chumstick in the past (at least as early as the 1980s and likely earlier). Commercial forestry accounts for 74.5% of land use in the sub-watershed, followed by rural resource lands (22.5%). The total population was 3,665 people (19.8% of the Wenatchee Watershed's population) in 2000 and includes the City of Leavenworth. The Leavenworth Urban Growth Area comprises 1,300 acres in the lower reaches of the sub-watershed. The City of Leavenworth, originally a railroad and logging community, relies on a tourist-based business economy and had approximately 1.5 million visitors in 2001.

Summer steelhead is the only known salmonid species native to the Chumstick Sub-watershed. Chumstick Creek may have supported coho salmon as well, although few records exist. Figure 9-4 provides an overview of the sub-watershed, its land uses, stream gage and control point locations, water quality issues, fish barriers, habitat recommendations, and fish presence.

Chumstick Issues

The leading issues in Chumstick include inadequate water quantity (instream flows), diminished water quality, and lack of geologic and hydrologic data. Chumstick Creek's contribution to the Wenatchee River is negligible during low flow years as the sub-watershed's streams are partially dewatered. Chumstick Creek has exceeded State and federal water quality standards for fecal coliform and temperature. Fecal coliform is a very difficult water quality parameter to address and is also a public health issue. Specific habitat concerns for the summer steelhead population include obstructions that impede fish passage, low stream flows, and high water temperatures.

The Chumstick Sub-watershed lacks the data to evaluate available water and recommended allocation strategies. Hydrogeology is complex and not well understood. There is a need to develop detailed water resource management strategies based on additional data indicating groundwater availability.

Water needs in the Chumstick Sub-watershed include that for (1) current water right holders who may have difficulty obtaining water during low flow or dry conditions; (2) future growth outside of the Leavenworth Urban Growth Area including single and group domestic, and stock water use; (3) improving water quality; and (4) providing instream flows to benefit fish and other aquatic resources.

Recommended Actions - Chumstick Sub-watershed

The following actions have been recommended to address water quantity, instream flows, water quality, and habitat issues as they relate specifically to the Chumstick Sub-watershed. The issues and recommended actions are also summarized in Table 2-11. These actions should be implemented along with the watershed-wide actions (Tables 2-1 through 2-7) as discussed in Sections 4 - 8, 10, and 11 in this Watershed Plan. Responsibility for implementing the actions in the Plan is subject to securing necessary funding.

9.4.1 Water Management Recommended Actions

The control point in the Chumstick Sub-watershed is the Chumstick Creek gage; however, there are no management flows for Chumstick because the synthesized hydrology data were not adequate to assess water availability on the Chumstick. The strategy recommends an interim closure for the Chumstick Sub-watershed for three years while data are collected and alternatives are assessed. Uses that are not subject to the closure (and can continue throughout the three year interim closure) include: fire suppression, domestic use from wells, stock water uses, and seasonal storage, pending evaluation by the Chumstick Water Forum and Ecology. Seasonal storage opportunities and other alternatives in Chumstick will be evaluated by Ecology and the Chumstick Water Forum through the water right application process on a case-by-case basis during the three year interim period. Storage opportunities in Chumstick will be addressed as part of the Chumstick strategy after conclusion of the Forum's three year process and coordinated with the WRIA 45 Multi-Purpose Storage Assessment. This interim closure will be re-evaluated at the end of the three year period by the Chumstick Forum and Ecology.

A reservation needs to be created for the Chumstick Sub-watershed through lease, purchase or transfer of water rights. This strategy for future use includes an interim, three-year reserve of 0.043 cfs that can be used while alternate water sources are identified to achieve the 0.13 cfs that will be needed to sustain future growth until 2025. The availability of the interim 0.043 cfs is conditioned on a number of steps outlined in Section 4.6.6. If the interim reserve is not supplemented by the purchase, lease or transfer of water rights or by other means (eg., conservation, interbasin transfer), within three years of rule adoption, Ecology would close the Chumstick Sub-watershed to further appropriation and existing outdoor water use could be curtailed when flows are not met.

The strategy for Chumstick is based on the need for water for future growth and for instream benefits in an over-appropriated basin. Some of the recommendations that have been identified to increase water availability are listed below.

ChumQUANT-1: Chelan County as lead (with support from Ecology), will convene a Chumstick Water Forum to guide data collection, oversee the proposed water management strategy, and help develop mitigation measures.

ChumQUANT-2: Chumstick Water Forum to assist in developing a data collection plan to monitor surface water flows (specify location) and develop management flows.

ChumQUANT-3: Chumstick Water Forum, with assistance from Chelan County and Ecology, to conduct groundwater monitoring to understand hydraulic continuity and overall impact of exempt wells on groundwater levels and streamflows.

ChumQUANT-4: Recommend that Ecology close the Chumstick Sub-watershed for an interim period of three years while data are collected and alternatives are assessed. Uses that are not subject to the closure (and can continue throughout the three year interim closure) include: fire suppression, domestic use from wells, stock water uses, and seasonal storage, pending evaluation by the Chumstick Water Forum and Ecology. These exempt uses would be limited to a total of 0.043 cfs while studies are being performed to determine future water availability in the Chumstick and a future strategy is assessed. Seasonal storage opportunities and other alternatives in Chumstick will be evaluated by Ecology and the Chumstick Water Forum through the water right application process on a case-by-case basis during the three year interim period. Storage opportunities in Chumstick will be addressed as part of the Chumstick strategy after conclusion of the Forum's three year process and coordinated with the WRIA 45 Multi-Purpose Storage Assessment. This interim closure will be re-evaluated at the end of the three year period by the Chumstick Forum and Ecology. Note that water storage tanks as included in the Chumstick Community Wildfire Protection Program are exempt from this closure.

ChumQUANT-5: Ecology and Chelan County to implement reservation conditions as follows: One third (0.043 cfs) of the 0.13 cfs projected 2025 water needs is available for growth for three years after rule adoption. Allocation of the remainder of the reserve would be considered only after completion of additional instream flow assessments (ChumQUANT-2) and a cumulative impacts study (ChumQUANT-3, 6) and would be subject to appropriate conditions and limitations based on the result of those assessments (ChumQUANT-7). If, after completion of the cumulative impact study, Ecology determines that the cumulative effects of domestic water uses negatively affect water available for instream flows, Ecology will consider allowing only in-house water use from the reservation. If after 3 years, water rights are not purchased or leased to cover the interim reserve of 0.043 cfs or conservation measures that provide additional water are not implemented, Ecology would close the Chumstick Sub-watershed to further appropriation on a seasonal basis, and existing outdoor water use established subsequent to the adoption of WAC 173-545 could be curtailed when flows are not met. Note that the City of Leavenworth will debit any new water from the Lower Wenatchee Reserve and not the Chumstick Reserve.

ChumQUANT-6: A cumulative impact analysis of permit exempt use and uses associated with permits and claims approved since 1983 will be initiated by Ecology as authorized under the 1983 flow rule. Chelan County will partner with Ecology in this study. The cumulative impacts assessment will help to determine whether Ecology will curtail outdoor domestic water use of wells installed after 1983, and whether Ecology will close the Chumstick Sub-watershed to outdoor water use in the future.

ChumQUANT-7: Chumstick Forum, Chelan County and Ecology to re-evaluate a proposed strategy for the Chumstick in three years after rule adoption, when new monitoring data have been collected and assessed and cumulative impact analysis is complete. Consider allowing group domestic groundwater use of deeper aquifer only as part of the Chumstick strategy addressed by the Forum.

ChumQUANT-8: Chelan County will evaluate alternatives to improve fish passage at the North Road culvert, and further pursue replacement of culverts upstream of North Road on Chumstick Creek.

ChumQUANT-9: Metering of all new uses covered under the Chumstick reserve (includes all new domestic uses).

ChumQUANT-10: As part of Phase IV, Implementation, the Planning Unit and the Chumstick Forum (with Chelan County as lead) will evaluate alternatives that could increase available water for instream and out-of-stream uses. Clearly address specific water needs in the Chumstick and evaluate water conservation, storage opportunities, purchase, lease and transfer of water rights, water transfer from other sub-watersheds, and other alternatives. Consider conjunctive use and evaluate pumping from the deep aquifer to augment flows in the Chumstick. Investigate storage options where stored water could be used to augment flows and provide mitigation water.

ChumQUANT-11: Encourage conservation and outreach.

ChumQUANT-12: Chelan County or other entity with agency funding assistance will investigate water rights for purchase or lease as part of the mitigation and enhancement strategy for Chumstick Sub-watershed. The County will seek funding from BPA, Ecology, Washington Rivers Conservancy, Washington Water Trust, and others. As water rights are purchased or transferred for use in the Chumstick reserve to meet a "no net impact" standard, the first purchase(s) will credit the 0.043 cfs interim reserve, then the additional 0.09 cfs will be available for forecasted growth as it is purchased.

Consider information from adjudication records (1982-1984) when investigating water rights for purchase or lease.

Alternatives for future water in the Chumstick are limited. Therefore, various water management alternatives need to be evaluated to determine the most effective methods to fulfill instream and out-of-stream needs and mitigate the impacts to habitat, streamflow, and groundwater levels in this sub-watershed. An alternatives analysis of water management options will be conducted as part of the implementation phase of watershed planning (Phase IV). The analysis will clearly address specific water needs in the Chumstick Sub-watershed, and evaluate water conservation, storage opportunities, purchase, lease and transfer of water rights, inter-basin transfer of water and other alternatives to determine the appropriate combination of water management options that could be used to increase the water availability in the Chumstick Sub-watershed. Water management alternatives for this assessment are discussed further in Section 5 (watershed-wide water quantity recommendations). Sub-watershed specific storage opportunities included in the Multi-purpose Storage Assessment (MWG, 2006) for the Chumstick Sub-watershed are presented below.

- Eagle Creek Tributary Lakes (10-50 acre-feet): Divert water to two small existing lakes or ponds on National Forest land.
- Eagle Creek SW Tributary Lake (10-50 acre-feet): Divert water to two small existing lakes on National Forest land.
- East Van Creek Off-channel Reservoir (10-50 acre-feet): Divert water to two small existing lakes or ponds on National Forest land.
- Small off-channel reservoirs in Chumstick Creek, Little Chumstick Creek and Eagle Creek valleys (1-10 acre-feet each): Divert water during winter or spring to reservoirs

which would be constructed on private land (where land is available) near Chumstick Creek. The water would be released in the summer.

- CMZ Project 19–Irwin Property: Construct a backchannel on an undeveloped floodplain across from the Leavenworth city park to increase storage capacity in the floodplain.
- CMZ Project 20: Provide additional backchannel habitat and increase floodplain storage on a particularly active portion of the floodplain which has one active side channel.
- Ski Hill Wetlands/Stormwater Storage or recharge (1-10 acre-feet): The City of Leavenworth would like to study a project that would help control runoff from the Ski Hill area, and store the water in constructed wetlands and recharge it where possible. The project would be located on city or currently privately owned land.
- Pump from Upper Wenatchee into Little Chumstick Creek (may be able to pump 3-5 cfs): Construct a pump station to pump water from the Wenatchee-Chiwawa Irrigation District ditch or Wenatchee River into a pipeline and over the hill to Little Chumstick Creek, where it would be allowed to recharge the creek valley.

9.4.2 Water Quality Recommended Actions

Chumstick Creek has exceeded State and federal water quality standards for fecal coliform. Fecal coliform is a public health issue and a difficult water quality parameter to address because it requires the identification and subsequent reduction of non-point sources. See Table 2-4 for additional watershed-wide water quality actions.

Fecal Coliform

ChumQUAL-1: Identify sources of fecal coliform pollution to Chumstick Creek Sub-watershed, including Van Creek and Upper Eagle Creek, utilizing the FC technical study. Identify human and nonhuman sources and/or failing on-site septic systems. Plan and implement corrective actions. The CDHD should address failing septic systems. Other entities should address manageable sources of FC pollution as appropriate (WQTS, 2006c).

ChumQUAL-2: Implement and monitor BMPs to meet the Fecal Coliform TMDL Technical Assessment target reductions (WQTS, 2006c).

ChumQUAL-3: CDHD will continue to implement onsite sewage disposal system technical assistance and education programs for homeowners and the industry (WQTS, 2006c).

ChumQUAL-4: The CDHD will continue to permit sewage systems per Washington Administrative Code (WAC), including analyzing soils and technologies suitable for individual sites; review/approve the proposed design, specifications, installation and if required, the ongoing maintenance in accordance with the WAC; provide public information under real estate disclosure laws; and review all land use proposals to ensure that the WAC is properly enforced prior to approval by the County (WQTS, 2006c).

ChumQUAL-5: A grant/loan funding program should be developed and implemented to replace or repair failing septic systems (WQTS, 2006c).

ChumQUAL-6: The CDHD should explore obtaining legal authority from Chelan County to operate a pumper notification program with area septage pumpers as part of its onsite septic system operation

and maintenance program. The septage pumpers would work with the CDHD to appropriately identify and correct failing septic systems (WQTS, 2006c).

ChumQUAL-7: The CDHD and watershed would benefit from the funding, development and maintenance of a digital system for all onsite septic system permits issued in Chelan County, and a GIS database of the onsite septic systems (WQTS, 2006c).

ChumQUAL-8: When the TMDL DIP is developed, the committee should utilize detailed recommendations from the Wenatchee River Watershed Action Plan (WQTS, 2006c).

ChumQUAL-9: Conduct stream walk cleanups along the stream (Fall, Spring, Summer) with area schools, homeowners, and other groups (WQTS, 2006c).

ChumQUAL-10: Conduct ongoing community fecal coliform education/awareness campaigns throughout the year. Engage and get support from homeowners (WQTS, 2006c).

ChumQUAL-11: Work with City, County, State, and Federal governments, and the Humane Society to deal with the feral cats and dogs living within the stream corridor. Monitor and remove dead animals within the stream corridor throughout the year. (WQTS, 2006c).

ChumQUAL-12: Conduct education and enforcement actions to stop illegal dumping of wastes either to storm drains or directly to surface waters. This dumping may be of portable toilet wastes, recreational vehicle wastes, etc. (WQTS, 2006c).

ChumQUAL-13: The WQTS should encourage the CDHD, Chelan County, Cities, DOH, and Utilities to continue ongoing review and upgrading of ordinances regarding developments and sewage systems technologies (WQTS, 2006c).

ChumQUAL-14: The WQTS and its participating entities should work with the public and homeowners regarding BMPs to reduce fecal coliform runoff. General actions should include public information, education, and technical assistance regarding watering practices, landscaping, stormwater runoff, filtration practices, animal waste, etc. (WQTS, 2006c).

ChumQUAL-15: Work with irrigation districts to implement and enforce policies to prevent illegal fecal coliform discharges to irrigation canals (WQTS, 2006c).

ChumQUAL-16: Work with landowners regarding fecal coliform runoff (WQTS, 2006c).

ChumQUAL-17: Encourage Chelan County and municipalities to develop and implement stormwater policies, standards, and guidelines, utilizing the Eastern Washington Stormwater Manual or equivalent, in comprehensive plans, critical area ordinances, growth management plans, and other appropriate plans (WQTS, 2006c).

ChumQUAL-18: Work with appropriate entities to reduce fecal coliform runoff from impervious surfaces (WQTS, 2006c).

ChumQUAL-19: Work with U.S. Forest Service, Washington State Department of Natural Resources, and private owners on forested lands to restore and protect streams from fecal coliform runoff pollution (WQTS, 2006c).

ChumQUAL-20: Funding assistance should be sought from Ecology through its grants and loans programs to implement actions and ongoing monitoring. Other funding sources should be identified and applications submitted to provide funding for ongoing activities. The WQTS will recommend qualified entities to conduct associated monitoring. Self-sustaining funding mechanisms to reduce fecal coliform inputs should be explored and developed in concert with the Wenatchee Watershed Planning Unit and its participating entities (WQTS, 2006c).

9.4.3 Habitat Recommended Actions

The Chumstick Creek Sub-watershed has been assigned a Category 3 Habitat Priority. This implies that it is a sub-watershed that supports salmonids, but has experienced substantial degradation and is strongly fragmented by habitat loss, especially through loss of connectivity with the mainstem corridor. The priority in this area is to rectify the primary factors that cause habitat degradation: obstructions, low stream flows, and high water temperatures (UCSRB, 2005). Appendix C provides detail on habitat projects current as of June 2005. Habitat recommendations for Chumstick Creek as reported in the 2005 Draft Upper Columbia Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Plan (UCSRB, 2005) and the Biological Strategy (UCRTT, 2002) include:

ChumH-1: Re-establish connectivity throughout the assessment unit by removing, replacing, or fixing artificial barriers (culverts and diversions) (UCSRB, 2005).

ChumH-2: Use practical and feasible means to increase stream flows (within the natural hydrologic regime and existing water rights) in Chumstick Creek (UCSRB, 2005).

ChumH-3: Decrease water temperatures and improve water quality by restoring riparian vegetation along the stream (UCSRB, 2005).

ChumH-4: Increase habitat diversity and quantity by restoring riparian habitat, reconnecting side channels and the floodplain with the channel, increasing large woody debris within the channel, and by adding instream structures (UCSRB, 2005).

ChumH-5: Protect remaining floodplain and riparian habitat (UCRTT, 2002).

9.5 Icicle Sub-watershed

Area Description

The Icicle Sub-watershed is the largest sub-watershed in WRIA 45, covering 136,916 acres. The Icicle joins the Wenatchee River at RM 25.6, contributing 20% of the Wenatchee River's annual flow (Wenatchee River Watershed Action Plan Addendum, 1996). Precipitation ranges from 120 inches at the Cascade crest to 20 inches at the mouth of the Icicle (USFS, 1995). Elevation ranges from approximately 9,000 feet at the Cascade Crest to 1,102 feet at the mouth (Wenatchee River Watershed Action Plan Addendum, 1996). The U.S. Forest Service manages 87% of the land in the sub-watershed, and 74% of the sub-watershed is located within the Alpine Lakes Wilderness Area (Wenatchee River Watershed Action Plan, 1998).

The major water diversions on the Icicle are used for irrigation of downstream orchards, municipal drinking water (City of Leavenworth) and the Leavenworth National Fish Hatchery. All of these diversions are located in the lower five miles of Icicle Creek (Ecology, 1983). In dry years, the flow in the lower portion of Icicle Creek is sustained by water releases from Colchuck, Eight Mile, Klonaqua, Square, and Snow Lakes. Although the City of Leavenworth's population is located primarily in the Chumstick Sub-watershed (and accounted for there), a portion of its water supply

originates in the Icicle Sub-watershed. The total population residing in the Icicle Sub-watershed was 723 people (3.9% of the Wenatchee Watershed's population) in 2000. There are also a significant number of part-time residents in the area that may not be accounted for by the US Census. The Icicle Creek area attracts outdoor enthusiasts from all over the world who enjoy camping, backpacking, rock climbing and kayaking.

The upper portion of the Icicle Sub-watershed above RM 5.7 contains high quality aquatic and terrestrial habitat, and is designated as a key watershed by the Northwest Forest Plan. Native salmonid species in the Icicle include steelhead, cutthroat, redband, and bull trout (migratory and resident bull trout spawn in the colder headwater tributaries and migrate within other Wenatchee sub-watersheds and the Columbia River). Spring Chinook currently spawn in the lower Icicle River but their origin is likely from hatcheries (Peven, 1994). The Leavenworth National Fish Hatchery is located on Icicle Creek. The *Wenatchapam* Fishery, a historic fishing area for the Wenatchi Tribe, is located at the confluence of Icicle Creek and the Wenatchee River. This is a very important tribal fishery that is recognized and honored under the Treaty of 1855 which reserved to the Yakama Nation the right to hunt and fish at usual and accustomed places. Figure 9-5 provides an overview of the sub-watershed, its land uses, stream gage and control point locations, water quality issues, fish barriers, habitat recommendations, and fish presence.

Icicle Issues

Seasonal low flows in the lower Icicle between the major diversions and the hatchery return, diminished water quality and limited habitat diversity for salmonids are the leading issues in the Icicle Sub-watershed. Water withdrawals in Icicle Creek (primarily between Rat Creek and the hatchery) likely contribute to low flows and high summer temperatures in lower Icicle Creek. Icicle Creek has exceeded State and federal water quality standards for temperature and DO/pH. Salmonid populations are at risk because of limited habitat diversity and quantity, obstructions and increased sediment loads. The change in the landscape and vegetation after the 1994 Rat Creek Fire has contributed to increased sediment loads in Icicle Creek (MWG, 2006).

Recommended Actions - Icicle Sub-watershed

The following actions have been recommended to address water quantity, instream flows, water quality, and habitat issues as they relate specifically to the Icicle Sub-watershed. The issues and recommended actions are also summarized in Table 2-12. These actions should be implemented along with the watershed-wide actions (Tables 2-1 through 2-7) as discussed in Sections 4 – 8, 10, and 11 in this Watershed Plan. Responsibility for implementing the actions in the Plan is subject to securing necessary funding.

9.5.1 Water Management Recommended Actions

The control point in the Icicle Sub-watershed is at or near the East Leavenworth Bridge. The actual stream gage, Icicle Creek above Snow Creek near Leavenworth, is currently located upstream of the existing control point. The majority of diversions on the Icicle occur between these two locations. Therefore it is recommended that a new stream gage be established at the existing control point on Icicle Creek (WRMS-4c). The strategy includes proposed management flows (Figure 4-7 and Table 4-6) and a maximum allocation subject to those flows. There is also a reservation of 0.1 cfs that would be made available for use in the Icicle Sub-watershed. An additional 0.4 cfs may be allocated to the reservation after flow restoration efforts targeting habitat between the upstream diversions (hatchery, City of Leavenworth and Icicle Irrigation District) and the hatchery return are addressed. Until additional water is credited to the reserve, new water allocation for the City of Leavenworth will be debited to the Lower Wenatchee reservation.

Various water management alternatives need to be evaluated to determine the most effective methods to fulfill instream and out-of-stream needs and mitigate the impacts to habitat, streamflow, and groundwater levels in this sub-watershed. An alternatives analysis of water management options will be conducted as part of the implementation phase of watershed planning (Phase IV). The analysis will clearly address specific water needs in the Icicle Sub-watershed, and evaluate water conservation, storage opportunities, purchase, lease and transfer of water rights, inter-basin transfer of water and other alternatives to determine the appropriate combination of water management options that could be used to increase the water availability in the Icicle Sub-watershed. Water management alternatives for this assessment are discussed further in Section 5 (watershed-wide water quantity recommendations).

Sub-watershed specific storage opportunities included in the Multi-purpose Storage Assessment (MWG, 2006) for the Icicle Sub-watershed are presented below.

- Alpine Lakes Optimization (total lake volume: 5,500 acre-feet): Review the potential to optimize the discharge from the high Alpine Lakes (Snow, Nada, Colchuck, Square, Klonaqua, Eightmile) to retain water longer and provide more flow in late summer and early fall.
- Icicle Creek Recharge Basin (10-50 acre-feet): Divert water in the winter or spring time when flow is sufficient from Icicle Creek or use an existing diversion to a recharge basin that would be constructed on privately owned land in the Icicle Creek valley to augment groundwater supplies.
- Mountain Home Off-channel Reservoirs (350 acre-feet): Divert water to two potential storage reservoir sites on privately owned land.

9.5.2 Water Quality Recommended Actions

There is a need to address the exceedances of State and Federal water quality standards for pH and dissolved oxygen in the Icicle Creek. Both point and non-point sources of phosphorus that affect the pH and DO levels in the Icicle Sub-watershed should be addressed. The sub-watershed-specific water quality actions addressing phosphorus loading are described below. Actions addressing temperature in the Icicle Sub-watershed are listed in Section 7, Water Quality. See Table 2-4 for additional watershed-wide water quality actions.

DO/pH

IcicleQUAL-1: The partnership formed to secure funding for further study of DO and pH (Chelan County, Chelan County PUD and the cities of Cashmere, Leavenworth and Wenatchee) should continue to work together, with the WQTS to acquire funding assistance and work with the WQTS to:

- Facilitate and develop a workable strategy that can be used and ultimately approved by the EPA and in Ecology's TMDL submittal for DO and pH, and
- Review and make suggestions for future improvements to Ecology's technical assessment, summary implementation plan, and adaptive management approaches to meet state water quality standards for these parameters.

IcicleQUAL-2: Strategies to address point and non-point sources of phosphorus as part of the TMDL for DO and pH will be reported during the implementation phase of the Wenatchee Watershed planning effort.

IcicleQUAL-3: Controls should be developed and implemented through new and existing regulatory permits, if needed, to reduce phosphorous inputs to surface and groundwaters from other Wenatchee Watershed point sources. Conduct associated monitoring and adaptive management (WQTS, 2006a).

IcicleQUAL-4: Groundwater discharges to the Wenatchee River, Icicle Creek, and their tributaries affects dissolved oxygen levels and nutrient concentrations. Groundwater is discharged to the river or creeks in some reaches, and is recharged in other reaches. In the Wenatchee basin, groundwater flow and BOD/nutrient concentrations may be elevated due to upland practices such as orchard irrigation and wastewater discharge to groundwater from lagoons and on-site septic systems. Assessments of groundwater contributions and sources of nutrients (phosphorous) should be conducted. Actions should be implemented based on the conclusions and recommendations of these studies to reduce inputs of phosphorous from these areas (WQTS, 2006a).

IcicleQUAL-5: Non-point sources along the length of the river may be contributing BOD and nutrients. Address failing septic systems through actions identified in the Wenatchee Watershed Fecal Coliform TMDL. Continue site specific inspections and enforcement of regulations that restrict placement of on-site septic drain fields from areas deemed to have unsuitable soils. A study should be conducted to assess soils and onsite septic systems. Estimates should be made of the maximum number and density of on-site drain fields that the upper basin can accommodate and still meet the water quality standards, as was done in the Lake Chelan study (Patmont et al., 1989). Conduct associated monitoring and adaptive management (WQTS, 2006a).

IcicleQUAL-6: Nutrients (phosphorous) can enter streams from storm water events. Work with Chelan County and municipalities to reduce storm water inputs, utilizing the Eastern Washington Storm water Manual or equivalent. Encourage appropriate entities to include language that addresses storm water in comprehensive plans and ordinances. Work with developers. (See IcicleQUAL-15). Conduct associated monitoring and adaptive management (WQTS, 2006a).

IcicleQUAL-7: Nutrients (phosphorous) can enter surface and ground water from residential yards and gardens, hobby farms, City and County Parks, business owned landscapes, etc. An education outreach plan should be developed and implemented to heighten awareness and reduce inputs from these sources. Policies and practices should be implemented in City and County Public Works departments. The County and cities should consider implementing a ban on the sale of high phosphate detergents, such as is being considered in Spokane. Conduct associated monitoring and adaptive management (WQTS, 2006a).

IcicleQUAL-8: Nutrients can enter streams from materials used to de-ice, clean, and maintain roads and parking lots. Animal waste from roads and parking lots can enter streams and increase nutrient loading. Work with the County, cities, and businesses to determine if road and parking lot maintenance practices may be contributing to nutrient loading and if necessary investigate ways to reduce nutrient inputs from these practices. Conduct associated monitoring and adaptive management (WQTS, 2006a).

IcicleQUAL-9: Nutrients (phosphorous) can be released to ground and surface waters from development practices, such as disruption of soils during conversions of orchard lands to housing. Actions should be conducted to prevent nutrients from entering ground and surface waters before, during and after construction. Work with developers to implement these actions. Encourage entities to include appropriate language in county and city comprehensive plans, growth management, and critical area ordinances. Conduct associated monitoring and adaptive management (WQTS, 2006a).

IcicleQUAL-10: Consider implementing actions recommended in the Wenatchee River Basin Temperature and Fecal Coliform TMDLs if the actions address problems that have been identified in the Icicle Sub-watershed. Lowering temperatures and reducing nutrient inputs will improve pH and dissolved oxygen levels in the Wenatchee River Watershed (WQTS, 2006a).

IcicleQUAL-11: Reserve load capacities for Biochemical Oxygen Demand (BOD) and nutrients should be established for the Upper Wenatchee River and Icicle Creek. Reserve load capacities are needed because there is no additional assimilative capacity for dissolved oxygen in the upper watershed during critical conditions. A point source regulatory strategy and nonpoint source BMP strategy should be developed to protect the reserve capacities and maintain water quality standards (WQTS, 2006a).

IcicleQUAL-12: Encourage lining of earthen canals where appropriate. Work with irrigation districts to implement BMPs and adaptive management programs to minimize any nutrient loading that is not already being addressed (WQTS, 2006a).

IcicleQUAL-13: Agricultural practices can contribute nutrients to ground and surface waters through crop watering practices, application of fertilizers, and soil disturbance activities. Work with the agricultural community to encourage practices that will reduce nutrient inputs to ground and surface waters while enhancing crop quality and yield. Examples include technical assistance through farm plans and Best Management Practices (BMPs). Conduct associated monitoring and adaptive management (WQTS, 2006a).

IcicleQUAL-14: Funding for these projects should be sought through Department of Ecology Centennial and 319 grants and loans. Identify and access other funding sources through the Planning Unit and other entities. Ongoing adaptive management should be utilized to provide the best use of funds and environmental benefits (WQTS, 2006a).

IcicleQUAL-15: Proper filtration of nutrients through land use practices can have a beneficial effect on nutrient reductions to ground and surface waters. Encourage implementation of wetlands, filter strips, riparian vegetation, bio-swales, drainage basins, pervious surfaces, etc. in residential, commercial, agricultural, industrial, development, and municipal practices. Conduct associated monitoring and adaptive management (WQTS, 2006a).

IcicleQUAL-16: Identify and investigate any non point sources in tributaries that may be contributing to nutrient loads (WQTS, 2006a).

9.5.3 Habitat Recommended Actions

The Icicle Creek Sub-watershed has been assigned a Category 2 Habitat Priority. This implies that it is a sub-watershed that supports important aquatic resources and is a stronghold for one or more listed species. Compared to Category 1 areas, Category 2 areas have a higher level of fragmentation resulting from habitat disturbance or loss. In addition, native populations have been lost or are at risk because of limited habitat diversity and quantity, obstructions and increased sediment loads. Restoring ecosystem function and connectivity within this area are priorities (UCSRB, 2005). Appendix C provides detail on habitat projects current as of June 2005. Habitat recommendations from the 2005 Draft Upper Columbia Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Plan (UCSRB, 2005) and the Biological Strategy (UCRTT, 2002) include:

IcicleH-1: Increase connectivity by improving fish passage over Dam 5 in the lower Icicle Creek (UCSRB, 2005).

IcicleH-2: Reduce sediment recruitment by restoring riparian vegetation between the mouth of the Icicle and the boulder field (RM 0-5.4) (UCSRB, 2005).

IcicleH-3: Improve road maintenance to reduce fine sediment recruitment in the upper watershed (UCSRB, 2005).

IcicleH-4: Increase habitat diversity and quantity by restoring riparian vegetation, reconnecting side channels, and reconnecting the floodplain with the channel in lower Icicle Creek (UCSRB, 2005).

IcicleH-5: Use practical and feasible means to increase stream flows (within the natural hydrologic regime and existing water rights) in Icicle Creek (UCSRB, 2005).

IcicleH-6: Protect remaining floodplain and riparian habitat downstream of Chatter Creek. Emphasis should be placed on habitat downstream of Leavenworth Hatchery (UCRTT, 2002).

9.6 Upper Wenatchee and Chiwaukum Sub-watersheds

Area Description

The 36,301-acre Upper Wenatchee and 32,012-acre Chiwaukum Sub-watersheds encompass the area below Lake Wenatchee to the mouth of Tumwater Canyon (RM 54.2 to RM 23.5). These sub-watersheds receive approximately 50 inches of precipitation per year. The vast majority of the land in these sub-watersheds is in commercial forest use (88%) (MWG, 2003). The Chiwaukum Sub-watershed is primarily wilderness. The town of Plain is located in the Upper Wenatchee Sub-watershed, near its border with the Chiwawa Sub-watershed. The small amount of irrigation in the Plain area uses water from the Chiwawa River. The total population in the Upper Wenatchee, was 624 people (3.4% of the Wenatchee Watershed's population) in 2000. The total population in Chiwaukum was 20 people (0.1% of the Wenatchee Watershed's population) in 2000. There are also a number of part-time residents in the area that may not be accounted for by the US Census.

The Upper Wenatchee Sub-watershed provides an important passage corridor for many species and important spawning habitat for Summer Chinook and steelhead. Native salmonid species in the Upper Wenatchee Sub-watershed are sockeye salmon, spring and Summer Chinook, steelhead, rainbow, westlope cutthroat and migratory and resident bull trout. The forest service has designated the Fish Lake area in the upper portion of the Upper Wenatchee Sub-watershed as a "special interest area" because of the abundance of bogs and wetlands around the lake. The Chiwaukum Sub-watershed contains current and potential habitat for bull trout, Spring and Summer Chinook, and Summer Steelhead. The reach from Lake Wenatchee to the Chiwawa River confluence is designated a Key Watershed in the Northwest Forest Plan. Figure 9-6 provides an overview of the sub-watersheds, their land uses, stream gage and control point locations, water quality issues, fish barriers, habitat recommendations, and fish presence.

Upper Wenatchee and Chiwaukum Issues

Maintaining instream flows, addressing water quality exceedances, and protecting salmonid habitat are the leading issues in the Upper Wenatchee and Chiwaukum Sub-watersheds. Although the Chiwaukum Sub-watershed has 2004 303(d) listings for temperature, it is possible that this exceedance is due to natural conditions. Habitat concerns include improving habitat diversity and removing obstructions to preserve salmonid populations in the sub-watershed.

Recommended Actions – Upper Wenatchee and Chiwaukum Sub-watersheds

The following actions have been recommended to address water quantity, instream flows, water quality, and habitat issues as they relate specifically to the Upper Wenatchee and Chiwaukum Sub-

watersheds. The issues and recommended actions are also summarized in Table 2-13. These actions should be implemented along with the watershed-wide actions (Tables 2-1 through 2-7) as discussed in Sections 4 – 8, 10, and 11 in this Watershed Plan. Responsibility for implementing the actions in the Plan is subject to securing necessary funding.

9.6.1 Water Management Recommended Actions

The existing control point at the Wenatchee River at Plain gage is intended as a measuring point for all sub-watersheds above the age, including Upper Wenatchee and Chiwaukum. The management flows at the Plain gage (Figure 4-4 and Table 4-3) have not been revised for this management program. The flows continue to be set at the levels specified in the 1983 flow rule. The maximum allocation associated with the Plain gage is subject to flows. A reservation of 0.5 cfs to 1.0 cfs is available for the upper portion of WRIA 45, above Leavenworth. This reservation provides water for projected growth in the Upper Wenatchee, Chiwaukum, Nason, Little Wenatchee, White, Chiwawa and Lake Wenatchee Sub-watersheds. In addition, the Chiwaukum Sub-watershed has an associated 0.01 cfs reserve that can utilize a portion of the 0.5 – 1.0 cfs available the upper portion of the WRIA, above Leavenworth.

Various water management alternatives need to be evaluated to determine the most effective methods to fulfill instream and out-of-stream needs and mitigate the impacts to habitat, streamflow, and groundwater levels in the WRIA. Although these sub-watersheds do not have critical water quantity needs, opportunities in these geographic areas may be assessed as part of an alternatives analysis of water management options that will be conducted as part of the implementation phase of watershed planning (Phase IV). Water management alternatives for this assessment are discussed further in Section 5 (watershed-wide water quantity recommendations). Sub-watershed specific storage opportunities included in the Multi-purpose Storage Assessment (MWG, 2006) for the Upper Wenatchee and Chiwaukum Sub-watersheds are presented below.

Upper Wenatchee

- Wenatchee River Off-Channel Reservoir (100-200 acre-feet): Divert or pump water from the Wenatchee River to an off-channel reservoir on National Forest land.
- Upper Wenatchee Recharge Basin (10-100 acre-feet): Divert water from the Wenatchee River or enlarge the Wenatchee-Chiwawa Irrigation ditch to convey water to a recharge basin on private land near Plain.

Chiwaukum

- Canyon Creek Off-Channel Reservoir (50-100 acre-feet): Divert water to a reservoir on National Forest lands to store runoff from Chiwaukum and Canyon Creek.
- Lower Chiwaukum Creek Off-Channel Reservoir (100-200 acre-feet): Divert water to an off-stream reservoir located on private property near the mouth of Chiwaukum Creek.

9.6.2 Water Quality Recommended Actions

There is a need to address the exceedances of State and Federal water quality standards for pH and dissolved oxygen in the Upper Wenatchee River. Both point and non-point sources of phosphorus that affect the pH and DO levels in the Upper Wenatchee Sub-watershed should be addressed. The sub-watershed-specific water quality actions for phosphorus are addressed below. Actions for temperature in the Upper Wenatchee and Chiwaukum Sub-watersheds are listed in Section 7, Water Quality. See Table 2-4 for additional watershed-wide water quality actions.

DO/pH

UpWenQUAL-1: The partnership formed to secure funding for further study of DO and pH (Chelan County, Chelan County PUD and the cities of Cashmere, Leavenworth and Wenatchee) should continue to work together, with the WQTS to acquire funding assistance and work with the WQTS to:

- Facilitate and develop a workable strategy that can be used and ultimately approved by the EPA and in Ecology's TMDL submittal for DO and pH, and

- Review and make suggestions for future improvements to Ecology's technical assessment, summary implementation plan, and adaptive management approaches to meet state water quality standards for these parameters.

UpWenQUAL-2: Strategies to address point and non-point sources of phosphorus as part of the TMDL for DO and pH will be reported during the implementation phase of the Wenatchee Watershed planning effort.

UpWenQUAL-3: Large reductions of phosphorus inputs are needed from point sources in the Wenatchee River Watershed especially waste water treatment plants (WWTPs). A regulatory strategy should be developed and implemented with WWTPs and Ecology to institute controls over time through NPDES permits that will reduce phosphorous discharges to surface and groundwaters. WWTPs to be addressed include the Lake Wenatchee, Stevens Pass, Leavenworth, Peshastin, and Cashmere waste water treatment plants. Conduct associated monitoring and adaptive management (WQTS, 2006a).

UpWenQUAL-4: Controls should be developed and implemented through new and existing regulatory permits, if needed, to reduce phosphorous inputs to surface and groundwaters from other Wenatchee Watershed point sources. Conduct associated monitoring and adaptive management (WQTS, 2006a).

UpWenQUAL-5: Groundwater discharges to the Wenatchee River, Icicle Creek, and their tributaries affects dissolved oxygen levels and nutrient concentrations. Groundwater is discharged to the river or creeks in some reaches, and is recharged in other reaches. In the Wenatchee basin, groundwater flow and BOD/nutrient concentrations may be elevated due to upland practices such as orchard irrigation and wastewater discharge to groundwater from lagoons and on-site septic systems. Assessments of groundwater contributions and sources of nutrients (phosphorous) should be conducted. Actions should be implemented based on the conclusions and recommendations of these studies to reduce inputs of phosphorous from these areas (WQTS, 2006a).

UpWenQUAL-6: Non-point sources along the length of the river may be contributing BOD and nutrients. Address failing septic systems through actions identified in the Wenatchee Watershed Fecal Coliform TMDL. Continue site specific inspections and enforcement of regulations that restrict placement of on-site septic drain fields from areas deemed to have unsuitable soils. A study should be conducted to assess soils and onsite septic systems. Estimates should be made of the maximum number and density of on-site drain fields that the upper basin can accommodate and still meet the water quality standards, as was done in the Lake Chelan study (Patmont et al., 1989). Conduct associated monitoring and adaptive management (WQTS, 2006a).

UpWenQUAL-7: Nutrients (phosphorous) can enter streams from storm water events. Work with Chelan County and municipalities to reduce storm water inputs, utilizing the Eastern Washington Storm water Manual or equivalent. Encourage the appropriate entities to include language that

addresses storm water in comprehensive plans and ordinances. Work with developers. (See UpWenQUAL-16). Conduct associated monitoring and adaptive management (WQTS, 2006a).

UpWenQUAL-8: Nutrients (phosphorous) can enter surface and ground water from residential yards and gardens, hobby farms, City and County Parks, business owned landscapes, etc. An education outreach plan should be developed and implemented to heighten awareness and reduce inputs from these sources. Policies and practices should be implemented in City and County Public Works departments. The County and cities should consider implementing a ban on the sale of high phosphate detergents, such as is being considered in Spokane. Conduct associated monitoring and adaptive management (WQTS, 2006a).

UpWenQUAL-9: Nutrients can enter streams from materials used to de-ice, clean, and maintain roads and parking lots. Animal waste from roads and parking lots can enter streams and increase nutrient loading. Work with the County, cities, businesses, and the WA State Department of Transportation to determine if road and parking lot maintenance practices may be contributing to nutrient loading and if necessary investigate ways to reduce nutrient inputs from these practices. Conduct associated monitoring and adaptive management (WQTS, 2006a).

UpWenQUAL-10: Nutrients (phosphorous) can be released to ground and surface waters from development practices, such as disruption of soils during conversions of orchard lands to housing. Actions should be conducted to prevent nutrients from entering ground and surface waters before, during and after construction. Work with developers to implement these actions. Encourage entities to include appropriate language in county and city comprehensive plans, growth management, and critical area ordinances. Conduct associated monitoring and adaptive management (WQTS, 2006a).

UpWenQUAL-11: Consider implementing actions recommended in the Wenatchee River Basin Temperature and Fecal Coliform TMDLs if the actions address problems that have been identified in the Upper Wenatchee Sub-watershed. Lowering temperatures and reducing nutrient inputs will improve pH and dissolved oxygen levels in the Wenatchee River Watershed (WQTS, 2006a).

UpWenQUAL-12: Reserve load capacities for Biochemical Oxygen Demand (BOD) and nutrients should be established for the Upper Wenatchee River and Icicle Creek. Reserve load capacities are needed because there is no additional assimilative capacity for dissolved oxygen in the upper watershed during critical conditions. A point source regulatory strategy and nonpoint source BMP strategy should be developed to protect the reserve capacities and maintain water quality standards (WQTS, 2006a).

UpWenQUAL-13: Encourage lining of earthen canals where appropriate. Work with irrigation districts to implement BMPs and adaptive management programs to minimize any nutrient loading that is not already being addressed (WQTS, 2006a).

UpWenQUAL-14: Agricultural practices can contribute nutrients to ground and surface waters through crop watering practices, application of fertilizers, and soil disturbance activities. Work with the agricultural community to encourage practices that will reduce nutrient inputs to ground and surface waters while enhancing crop quality and yield. Examples include technical assistance through farm plans and Best Management Practices (BMPs). Conduct associated monitoring and adaptive management (WQTS, 2006a).

UpWenQUAL-15: Funding for these projects should be sought through Department of Ecology Centennial and 319 grants and loans. Identify and access other funding sources through the Planning

Unit and other entities. Ongoing adaptive management should be utilized to provide the best use of funds and environmental benefits (WQTS, 2006a).

UpWenQUAL-16: Proper filtration of nutrients through land use practices can have a beneficial effect on nutrient reductions to ground and surface waters. Encourage implementation of wetlands, filter strips, riparian vegetation, bio-swales, drainage basins, pervious surfaces, etc. in residential, commercial, agricultural, industrial, development, and municipal practices. Conduct associated monitoring and adaptive management (WQTS, 2006a).

UpWenQUAL-17: Identify and investigate any non point sources in tributaries that may be contributing to nutrient loads (WQTS, 2006a).

9.6.3 Habitat Recommended Actions

The Upper Wenatchee and the Chiwaukum Creek Sub-watersheds have both been assigned a Category 1 Habitat Priority, indicating that they represent systems that most closely resemble natural, fully functional aquatic ecosystems. They comprise large, connected blocks of high-quality habitat that support more than two listed species. Exotic species may be present but are not dominant in abundance because of limited habitat diversity. Protecting this area is a priority, although restoration in some areas is also needed which includes removing obstructions (UCSRB, 2005). Appendix C provides detail on habitat projects current as of June 2005. Habitat recommendations from the 2005 Draft Upper Columbia Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Plan (UCSRB, 2005) include:

UpWenH-1: Increase habitat quantity in the Wenatchee River between Tumwater Canyon and Lake Wenatchee by restoring riparian habitat along the river and reconnecting side channels (where feasible) (UCSRB, 2005).

ChiwaukumH-1: Increase connectivity along Skinney Creek (UCSRB, 2005).

ChiwaukumH-2: Increase habitat diversity in Chiwaukum Creek along Tumwater Campground by restoring riparian vegetation, reconnecting the floodplain with the stream, and by increasing large woody debris within the channel (UCSRB, 2005).

9.7 Chiwawa Sub-watershed

Area Description

The Chiwawa Sub-watershed is second largest sub-watershed in WRIA 45, draining 126,271 acres before joining the Wenatchee at RM 58.6, and contributing 15% of the Wenatchee River's annual flow (Wenatchee River Watershed Action Plan Addendum, 1996). The precipitation on the sub-watershed ranges from 30 to 80 inches per year. Elevation ranges between 9,100 feet in the headwaters to 1,850 feet at its confluence with the Wenatchee River (Wenatchee River Watershed Action Plan, 1998). Most of this watershed is in public ownership and protected as Wilderness Area as specified in the Northwest Forest Plan (MWG, 2006). The total population was 406 people (2.2 % of the Wenatchee Watershed's population) in 2000. There are also a significant number of part-time residents in the area that may not be accounted for by the US Census.

Native salmonid species in the Chiwawa Sub-watershed are spring Chinook, steelhead, migratory and resident bull trout and westlope cutthroat trout. Overall, the Chiwawa Sub-watershed supports moderate to high-quality terrestrial habitat (USFS, 1997). The Chiwawa is designated as a key watershed by the Northwest Forest Plan and provides critical spawning and rearing habitat for

multiple species. Figure 9-7 provides an overview of the sub-watershed, its land uses, stream gage and control point locations, water quality issues, fish barriers, habitat recommendations, and fish presence.

Chiwawa Issues

Maintaining instream flows and protecting salmonid habitat are the leading issues in the Chiwawa Sub-watershed. Additional habitat concerns include removing obstructions and decreasing sediment loads to protect salmonid populations in the sub-watershed. Water needs in the Chiwawa Sub-watershed are limited primarily to providing and protecting instream flows to benefit fish and other aquatic resources.

Recommended Actions - Chiwawa Sub-watershed

The following actions have been recommended to address water quantity, instream flows, water quality, and habitat issues as they relate specifically to the Chiwawa Sub-watershed. The issues and recommended actions are also summarized in Table 2-14. These actions should be implemented along with the watershed-wide actions (Tables 2-1 through 2-7) as discussed in Sections 4 – 8, 10, and 11 in this Watershed Plan. Responsibility for implementing the actions in the Plan is subject to securing necessary funding.

9.7.1 Water Management Recommended Actions

The Chiwawa River gage is the control point for Chiwawa River Sub-watershed. The maximum allocation associated with the Chiwawa gage is subject to flows and includes seasonal water for storage and other uses. The strategy allocates 0.1 – 0.5 cfs of the 0.5 – 1.0 cfs available for the entire upper watershed, above Leavenworth, to the Chiwawa Sub-watershed. In addition, it has been recommended that the gage location on the Chiwawa River be reviewed with respect to the locations of withdrawals on the River (WRMS-4d).

Various water management alternatives need to be evaluated to determine the most effective methods to fulfill instream and out-of-stream needs in the WRIA. Although the Chiwawa does not have critical water quantity needs, opportunities in this sub-watershed may be assessed as part of an alternatives analysis of water management options conducted during the implementation phase of watershed planning (Phase IV). Water from the Chiwawa may be used to supplement needs in the Chumstick. Water management alternatives for this assessment are discussed further in Section 5 (watershed-wide water quantity recommendations). Sub-watershed specific storage opportunities included in the Multi-purpose Storage Assessment (MWG, 2006) for the Chiwawa Sub-watershed are presented below.

- Marble Creek Instream Reservoir (50-100 acre-feet): Construct an instream reservoir in the upper reaches of the Marble Creek basin at Marble Meadow on National Forest land at about elevation 5,920 ft.
- Marble Creek off-channel Reservoir (50-100 acre-feet): Divert water to an off-channel reservoir adjacent to Marble Creek on National Forest land at about elevation 2,940 ft.
- Gate Creek Off-channel Reservoir (50-100 acre-feet): Divert water to an off-channel reservoir between Gate Creek and Marble Creek on National Forest land at about elevation 2,560 ft.
- Minnow Creek Off-channel Reservoir (50-100 acre-feet): Divert water to an off-channel reservoir adjacent to Minnow Creek on National Forest land at about elevation 2,860 ft.

- Goose Creek North Tributary Reservoir (10-50 acre-feet): Divert water to an off-channel reservoir in a tributary valley north of Goose Creek on National Forest land at about elevation 2,380 ft.
- Deep Creek Instream Reservoir (10-50 acre-feet): Construct an instream reservoir opposite Morrow Meadow on National Forest land at an elevation of about 2,260 ft.
- Beaver Creek Off-channel Reservoir (10-50 acre-feet): Divert water to an off-channel reservoir located adjacent to Beaver Creek on private land at about elevation 2,240 ft.
- Connection to old oxbows and other floodplain storage areas: There are numerous areas in the Chiwawa River floodplain that may benefit from improving connection between the river and floodplain or constructing side channels or oxbows to increase water storage in the floodplain

9.7.2 Water Quality Recommended Actions

There are no additional sub-watershed-specific water quality actions for the Chiwawa Sub-watershed. See Table 2-4 for applicable watershed-wide water quality actions.

9.7.3 Habitat Recommended Actions

The Chiwawa River Sub-watershed has been assigned a Category 1 Habitat Priority. This implies that this sub-watershed represents systems that most closely resemble natural, fully functional aquatic ecosystems. They comprise large, connected blocks of high-quality habitat that support more than two listed species. Exotic species may be present but are not dominant in abundance because of limited habitat quantity. Protecting this area is a priority, although restoration in some areas is also needed which includes removing obstructions and decreasing sediment loads (UCSRB, 2005). Appendix C provides detail on habitat projects current as of June 2005. Habitat recommendations from the 2005 Draft Upper Columbia Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Plan (UCSRB, 2005) and the Biological Strategy (UCRTT, 2002) include:

ChiwawaH-1: Increase habitat quantity by restoring riparian habitat along the lower 4 miles of the Chiwawa River (UCSRB, 2005).

ChiwawaH-2: Reduce sediment recruitment to the stream by improving road maintenance within the watershed (UCSRB, 2005).

ChiwawaH-3: Improve fish passage in tributaries (UCSRB, 2005).

ChiwawaH-4: Protect remaining floodplain and riparian habitat, particularly around Chikamin Flats (UCRTT, 2002).

9.8 Nason Sub-watershed

Area Description

Nason Creek drains a 69,010 acre area and joins the Wenatchee River at Wenatchee RM 53.6, contributing 18% of the Wenatchee Watershed's annual flow (Wenatchee River Watershed Action Plan Addendum, 1996). The precipitation on this sub-watershed ranges from approximately 40 to 80 inches per year at Stevens Pass. The U.S. Forest Service manages approximately 78% of the sub-watershed (Wenatchee River Watershed Action Plan, 1998). The total population was 144 people (0.8% of the Wenatchee Watershed's population) in 2000. There are small unincorporated

communities located throughout the drainage with service facilities located primarily at Coles Corner, Stevens Pass and near the mouth of Nason Creek.

The Great Northern Railroad was routed up Nason Creek and across Stevens Pass in the 1890s. State Highway 2 also traverses the sub-watershed. Both the highway and railroad follow the creek and have fragmented habitat and constrained channel movement, especially in the lower 8 to 9 miles of the creek. Stevens Pass Ski Resort is located at the upper bound of the sub-watershed and a wastewater treatment plant now operates on Stevens Creek near the east portal of the 2 1/2 mile original Cascade Tunnel. In 1943 the lower four miles of Nason Creek were constrained when State Highway 207 was straightened and relocated through the existing meander zone of the creek from Coles Corner to the headwaters of the Wenatchee River.

Native salmonid species in the Nason Creek Sub-watershed are spring Chinook, steelhead, migratory and resident bull trout, and westlope cutthroat trout (migratory and resident bull trout spawn in the colder headwater tributaries and migrate within other Wenatchee sub-watersheds and the Columbia River). Figure 9-8 provides an overview of the sub-watershed, its land uses, stream gage and control point locations, water quality issues, fish barriers, habitat recommendations, and fish presence.

Nason Issues

Meeting water quality standards, maintaining instream flows and protecting salmonid habitat are the leading issues in the Nason Sub-watershed. Nason Creek has exceeded State and federal water quality standards for temperature. Temperature, along with limited habitat diversity, channel instability, sedimentation, and obstructions could pose risks for salmonid populations in the sub-watershed. Water needs in the Nason Sub-watershed are limited primarily to providing and protecting instream flows to benefit fish and other aquatic resources and possibly to improve water quality.

Recommended Actions - Nason Sub-watershed

The following actions have been recommended to address water quantity, instream flows, water quality, and habitat issues as they relate specifically to the Nason Sub-watershed. The issues and recommended actions are also summarized in Table 2-15. These actions should be implemented along with the watershed-wide actions (Tables 2-1 through 2-7) as discussed in Sections 4 – 8, 10, and 11 in this Watershed Plan. Responsibility for implementing the actions in the Plan is subject to securing necessary funding.

9.8.1 Water Management Recommended Actions

The Nason Creek near mouth gage is used to administer the water resource management strategy this sub-watershed. The maximum allocation associated with the Nason Creek gage is subject to flows. In the case of the Nason Creek Sub-watershed, the strategy includes both a maximum allocation for seasonal water for storage and other uses, and a reservation of 0.1 – 0.16 cfs. The reservation is part of the 0.5 – 1.0 cfs that is available for the entire upper watershed, above Leavenworth

Various water management alternatives need to be evaluated to determine the most effective methods to fulfill instream and out-of-stream needs and mitigate the impacts to habitat, streamflow, and groundwater levels in this sub-watershed. An alternatives analysis of water management options will be conducted as part of the implementation phase of watershed planning (Phase IV). The analysis will clearly address specific water needs in the Nason Sub-watershed, and evaluate water conservation, storage opportunities, purchase, lease and transfer of water rights, inter-basin transfer of water and other alternatives to determine the appropriate combination of water management options that could be used to increase the water availability in the Nason Sub-watershed. Water management

alternatives for this assessment are discussed further in Section 5 (watershed-wide water quantity recommendations). Sub-watershed specific storage opportunities included in the Multi-purpose Storage Assessment (MWG, 2006) for the Nason Sub-watershed are presented below.

- CMZ Project N1: Reconnect an oxbow located to the east of Hwy 207 to the main Nason Creek channel using a culvert to provide high-flow off-channel habitat for juvenile salmonids and increase floodplain storage.
- CMZ Project N2: Reconnect an oxbow located to the east of Hwy 207 using a culvert which has been cut-off to fish access from the main Nason Creek channel to provide high-flow off-channel habitat for juvenile salmonids.
- CMZ Project N3: Reconnect a remnant oxbow to the mainstem by the construction of a proper culvert to provide high-flow off-channel habitat for juvenile salmonids within the N3 and N2 wetland complex. A larger connection would increase floodplain storage.
- CMZ Project N4: Reconnect a remnant oxbow to the mainstem by the construction of a proper culvert to provide high-flow off-channel habitat for juvenile salmonids and increase floodplain storage Channel reconstruction on the west side of Hwy 207 would also be necessary for fish passage to and from the Nason Creek mainstem.
- Nason Creek Floodplain Storage (10-50 acre-feet): Review the feasibility of improving the connection between Nason Creek and the floodplain wetland that is separated from Nason Creek by the railroad embankment or constructing a water level control in the wetland to increase storage.
- Coulter Creek Instream Reservoir (10-50 acre-feet): Potential site for an instream reservoir on National Forest land at elevation 3,300 ft.
- Roaring Creek Tributary Off-channel Reservoir (1-10 acre-feet): Potential site for an off-channel reservoir at the site of a small existing lake on National Forest land at about elevation 5,120 ft.
- Roaring Creek instream reservoir (10-50 acre-feet): Potential site for instream reservoir is at elevation 4,400 ft. Site is located on National Forest land.
- Lanham Lake (10-50 acre-feet): Potential site at small existing lake on National Forest land at about elevation 4,140 ft.
- Nason Creek Off-channel Reservoir (10-100 acre-feet): Divert water to an off-channel reservoir on National Forest land at an elevation of about 2,350 ft near the confluence of Whitepine Creek and Nason Creek.
- Rock Lake (10-50 acre-feet): Potential site at a small existing lake on National Forest land at about elevation 5,900 ft.
- Cresent Lake (10-50 acre-feet): Potential site at a small existing lake on National Forest land at about elevation 5,450 ft.
- Canaan Lake (10-50 acre-feet): Potential site at a small existing lake on National Forest land at about elevation 5,900 ft.
- Merritt Lake (10-50 acre-feet): Potential site at a small existing lake on National Forest land at about elevation 5,000 ft.

- Mill Creek Instream Reservoir (100-500 acre-feet): Construct a large instream reservoir on National Forest land. A potential problem is a railroad tunnel located 200-300 feet under the reservoir site.
- Upper Nason Creek Off-channel Reservoir (50-100 acre-feet): Construct an off-channel reservoir on the north side of Hwy 2 to hold diverted water.

9.8.2 Water Quality Recommended Actions

The sub-watershed-specific water quality actions for temperature in the Nason Sub-watershed are listed in Section 7, Water Quality. See Table 2-4 for additional watershed-wide water quality actions.

9.8.3 Habitat Recommended Actions

The Nason Creek Sub-watershed has been assigned a Category 2 Habitat Priority. This implies that it is a sub-watershed that supports important aquatic resources and is a stronghold for one or more listed species. Compared to Category 1 areas, Category 2 areas have a higher level of fragmentation resulting from habitat disturbance or loss. In addition, native populations have been lost or are at risk because of limited habitat diversity, channel instability, sedimentation, and obstructions. Restoring ecosystem function and connectivity within this area are priorities (UCSRB, 2005). Appendix C provides detail on habitat projects current as of June 2005. Habitat recommendations from the 2005 Draft Upper Columbia Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Plan (UCSRB, 2005) and the Biological Strategy (UCRTT, 2002) include:

NasonH-1: Re-establish connectivity throughout the assessment unit by removing, replacing, or fixing artificial barriers (culverts) (UCSRB, 2005).

NasonH-2: Increase habitat diversity and natural channel stability by increasing in-channel large wood complexes, restoring riparian habitat, and reconnecting side channels, wetlands, and floodplains to the stream (UCSRB, 2005).

NasonH-3: Improve road maintenance to reduce fine sediment recruitment to the stream (UCSRB, 2005).

NasonH-4: Reduce high water temperatures by reconnecting side channels and the floodplain and improving riparian habitat conditions (UCSRB, 2005).

NasonH-5: Protect remaining floodplain and riparian habitat (UCRTT, 2002).

9.9 White River, Little Wenatchee River, and Lake Wenatchee Sub-watersheds

Area Description

The headwaters of the Wenatchee Watershed contain three sub-watersheds: White, Little Wenatchee, and Lake Wenatchee, one of the few remaining large, free flowing, natural lakes in the state. These watersheds contain some of the most pristine habitat found in the state of Washington today. The Little Wenatchee and White Rivers flow into Lake Wenatchee, the outlet of which is the source of the Wenatchee River, at RM 54.2. The White River contributes 25% of the Wenatchee River's annual flow; the Little Wenatchee River, 15% (Wenatchee River Watershed Action Plan Addendum, 1996). The precipitation on these sub-watersheds ranges from 30 to 120 inches per year, and the White River is fed by glaciers along the Cascade Crest. Elevation ranges from 1,870 feet at the lake (MWG, 2003) to above 5,000 feet in the Little Wenatchee River drainage along the Cascade Crest and above 7,000 feet along the Cascade Crest in the White River drainage. The primary land cover in all three sub-

watersheds is forest, which makes up 63.7% of the White, 84.3% of the Little Wenatchee, and 73.4% of the Lake Wenatchee. In the Lake Wenatchee area only 10,322 acres are considered commercial forest.

The total population was 281 people (1.5% of the Wenatchee Watershed's population) in these three sub-watersheds in 2000 based on census data. There are also a significant number of part-time residents in the area that may not be accounted for by the US Census. A number of people camp at the Lake Wenatchee State Park in the summer months. Lake Wenatchee and Fish Lake support recreational activities and tourism, providing opportunities for camping, boating, fishing, hiking, biking horseback riding, golfing, cross country skiing, snowmobiling, and other outdoor activities. The Little Wenatchee and White Sub-watersheds also offer recreational opportunities and allow hikers access to the large wilderness areas.

Native species in these sub-watersheds are sockeye, spring Chinook, steelhead, rainbow, westlope cutthroat and bull trout (migratory and resident bull trout spawn in the colder headwater tributaries and migrate within other Wenatchee sub-watersheds and the Columbia River). The White and Little Wenatchee Sub-watersheds are also designated as key watersheds by the Northwest Forest Plan, and provide critical spawning and rearing habitat for multiple species. The Lake Wenatchee Sub-watershed is a necessary adult holding and juvenile rearing area for sockeye salmon and bull trout. The sub-watershed is located at an important point along the Cascade Range and provides connectivity for terrestrial wildlife for species moving north-south and east-west.

Reconnecting the floodplain area to the wetlands where the Little Wenatchee and White Rivers enter Lake Wenatchee is important for maintaining habitat diversity (UCSRB, 2005). Some National Forest land in these sub-watersheds has been designated as "Riparian Reserve," which protects it from harvest, and protects stream water quality and riparian function. Figure 9-9 provides an overview of the sub-watersheds, their land uses, stream gage and control point locations, water quality issues, fish barriers, habitat recommendations, and fish presence.

White River, Little Wenatchee, and Lake Wenatchee Sub-watersheds Issues

Maintaining the existing pristine conditions found in much of the White and Little Wenatchee Rivers is a key issue. Other issues are improving water quality, reducing erosion, the reduction of high water temperatures found at the mouth of the Little Wenatchee River, maintaining unrestricted fish passage, protecting spawning areas from motorized water craft, and the protection of riparian and upland areas. Within the Lake Wenatchee area possible pollution from fish pens and the reduction of ground cover in wetlands at the western end of the lake are areas of concern. These sub-watersheds are relatively pristine and require protection to maintain the stream channel and flood-plain integrity. Although the Little Wenatchee Sub-watershed has 2004 303(d) listings for temperature, it is possible that this temperature exceedance is due to natural conditions. The White and Little Wenatchee Rivers have been considered for nomination to the status of Wild, Scenic, or Recreational River status.

Water needs in the White, Little Wenatchee, and Lake Wenatchee Sub-watersheds include that for (1) maintaining instream flows to benefit fish and other aquatic resources to maintain a high quality aquatic and terrestrial habitat environment; (2) small domestic water supply to support future growth; and (3) recreational activities.

Recommended Actions – White River, Little Wenatchee, and Lake Wenatchee Sub-watersheds

The following actions have been recommended to address water quantity, instream flows, water quality, and habitat issues as they relate specifically to the White, Little Wenatchee, and Lake Wenatchee Sub-watersheds. The issues and recommended actions are also summarized in Table 2-16. These actions should be implemented along with the watershed-wide actions (Tables 2-1 through

2-7) as discussed in Sections 4 – 8, 10, and 11 in this Watershed Plan. Responsibility for implementing the actions in the Plan is subject to securing necessary funding.

9.9.1 Water Management Recommended Actions

The existing control point at the Wenatchee River at Plain gage is intended as a measuring point for the upper portion of WRIA 45 including the White, Little Wenatchee and Lake Wenatchee Sub-watersheds. The maximum allocation associated with the Plain gage is subject to flows. In the case of these sub-watersheds, the maximum allocation includes seasonal water for storage and other uses, subject to flows, and a reserve of 0.05 cfs for the White and Little Wenatchee Sub-watersheds and 0.1 cfs for the Lake Wenatchee Sub-watershed.

Various water management alternatives need to be evaluated to determine the most effective methods to fulfill instream and out-of-stream needs in WRIA 45. An alternatives analysis of water management options will be conducted as part of the implementation phase of watershed planning (Phase IV). The analysis will clearly address specific water needs in the White, Little Wenatchee, and Lake Wenatchee Sub-watersheds, and evaluate water conservation, storage opportunities, purchase, lease and transfer of water rights, inter-basin transfer of water and other alternatives to determine the appropriate combination of water management options that could be used to increase the water availability in these three sub-watersheds. Water management alternatives for this assessment are discussed further in Section 5 (watershed-wide water quantity recommendations). Sub-watershed specific storage opportunities included in the Multi-purpose Storage Assessment (MWG, 2006) for the White, Little Wenatchee, and Lake Wenatchee Sub-watersheds are presented below.

White

- Connection to old oxbows and other floodplain storage areas: There are numerous areas in the White River floodplain that may benefit from improving connection between the river and floodplain or constructing side channels or oxbows to increase water storage in the floodplain.

Little Wenatchee

- Lake Creek Instream Reservoir (100-500 acre-feet): Construct an instream reservoir on Lake Creek on National Forest land at about elevation 2,600 ft.
- Fish Creek Instream Reservoir (100-500 acre-feet): Construct an instream reservoir Fish Creek on National Forest land at about elevation 2,800 ft.

9.9.2 Water Quality Recommended Actions

The sub-watershed-specific water quality actions for temperature in the Little Wenatchee Sub-watershed are listed in Section 7, Water Quality. There are no additional sub-watershed-specific water quality actions for the White or Lake Wenatchee Sub-watersheds. See Table 2-4 for applicable watershed-wide water quality actions.

9.9.3 Habitat Recommended Actions

The White River, Little Wenatchee, and Lake Wenatchee Sub-watersheds have been assigned a Category 1 Habitat Priority. This implies that these sub-watersheds represent systems that most closely resemble natural, fully functional aquatic ecosystems. They comprise large, connected blocks of high-quality habitat that support more than two listed species. Exotic species may be present but are not dominant in abundance. Protecting this area is a priority (especially from development

pressure in the White River Sub-watershed) although restoration in some areas is also needed due to sedimentation (UCSRB, 2005). Appendix C provides detail on habitat projects current as of June 2005. Habitat recommendations from the 2005 Draft Upper Columbia Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Plan (UCSRB, 2005) and the Biological Strategy (UCRTT, 2002) include:

WhiteH-1: Increase habitat diversity within the lower 2 miles of the White River by reconnecting the floodplain and wetlands to the river (UCSRB, 2005).

WhiteH-2: Protect stream channel, riparian, and floodplain functions. Focus on Panther Creek downstream to mouth (UCRTT, 2002).

WhiteH-3: Protect shorelines along Lake Wenatchee near White River mouth (UCRTT, 2002).

LitWenH-1: Reduce sediment recruitment to the stream by improving road maintenance within the watershed (UCSRB, 2005).

LitWenH-2: Protect stream channel, riparian, and floodplain functions; focus on Little Wenatchee River falls downstream to mouth (UCRTT, 2002).

LkWenH-1: Protect remaining near shore habitat, and develop a means to reduce impacts of bulkheads (UCRTT, 2002).

10.0 PLAN IMPLEMENTATION

Phase IV of the watershed planning process is implementation, which commences when the final plan is adopted by Chelan County and the Planning Unit agrees to apply for Phase IV funding for implementation. Effective implementation, including coordination and oversight, is critical to the success of the watershed planning process. Although the Planning Unit has put years of work into this Watershed Plan, it can only be successful if it is seen through Phase IV. Planning Units are encouraged to develop a detailed implementation plan within one year of the Wenatchee Watershed Plan's adoption. State funding for Implementation is $400,000, distributed over five years, and requires 10% matching funds, which may consist of in-kind goods and services.

10.1 Plan Obligations

The Wenatchee Watershed Planning Unit recommends that voluntary, cooperative measures are preferred over regulatory enforcement approaches to obligate State, local and Tribal governments.

The Planning Unit accepts that any strategies, actions, obligations or potential obligations assigned to local, State or federal agencies and Tribes as a result of this Planning Process and the current Wenatchee Watershed Plan are contingent on securing necessary funding, resources, and legislative authorizations where required, and are subject to applicable regulations including SEPA and NEPA requirements.

The Planning Unit recognizes that many of the implementation actions included in this plan may need additional assessment and planning before implementation can proceed and responsibilities can be assumed. It also recognizes that implementation is subject to budgetary constraints, and that no entity is obligated to implement a prescribed action in this Plan unless adequate funding is available to do so, as described in 2E2SHB 1336. It is expected that Federal entities will support the Plan elements within the limits of available resources.

10.2 Implementation Actions

This plan recommends a number of both watershed-wide and sub-watershed specific actions concerning the water resource management strategy, water quantity, growth and land use, water quality and habitat. There are overall implementation actions that will be necessary to provide the structure under which individual actions can be implemented. These "implementation actions," summarized in Table 2-6, are provided below:

10.2.1 Watershed Planning Administration and Plan Updates

IMP-1: WWPU and Subcommittees will continue to exist and operate under the current operating procedures and will address any needed reorganization to implement the plan as part of Phase IV, Implementation.

IMP-2: Build a revision process and schedule for the Wenatchee Watershed Plan into plan implementation. Ensure that new plan actions and best available science can be integrated in the future. Planning horizon will be 20 years (through 2025). Updates should be scheduled every seven years, also consistent with County comprehensive plan revision schedule. If additional updates are necessary based on the availability of data or unforeseen water-related issues, the process should be designed such that those updates are possible.

Future amendments and additions to the Plan will be approved by the Planning Unit (implementing body) according to an Intergovernmental Agreement, bylaws, and/or operating procedures and will be subject to a public review process including opportunities for comment at meetings of the PU (or other implementing body) and special community or public meetings. *No organization can be obligated to implement an action included in the plan or a plan update, unless they agree to the obligation (RCW90.82.130(3)).*

10.2.2 Funding and Staffing

IMP-3: Prioritize educational needs, projects, policies and management strategies for funding and implementation (may accomplish some prioritization for Aquatic Habitat Actions through salmon recovery).

IMP-4: Continue to identify alternate funding sources (alternate to watershed planning funds).

IMP-5: Consider implementation funding for grant writers.

IMP-6: Develop recommendations (such as cooperative agreements) for formalizing obligations with the entities identified as responsible for Plan actions.

IMP-7: The Chelan County Natural Resource Department (CCNRD) provides a vital link between water availability, land management and the Watershed Planning Unit. The Watershed Planning Unit supports the ongoing efforts of CCNRD to work with the Watershed Planning Unit to ensure natural resource concerns and technical resources and databases are maintained.

10.2.3 Coordination within the Watershed

IMP-8: In developing its implementation plan, the Watershed Planning Unit will support the development and implementation of existing plans and programs occurring within the watershed while striving to avoid inconsistent or duplicative activities and policies.

IMP-9: The Planning Unit can choose to review and provide comment on large projects proposed in the watershed that would likely have an impact on the water resource. This could be a review of project or programmatic level Environmental Impact Statements (EISs) or other documents.

IMP-10: The WRIA 45 Planning Unit members will be involved in the public planning process. The Planning Unit will disseminate information about public comment opportunities to its members. Additionally, the Planning Unit will provide opportunities for public comment on watershed scale studies and plans when, by a vote of the Planning Unit, they are determined to be a priority of the Planning Unit and important to the overall health of the watershed.

10.2.4 Monitoring

IMP-11: Ensure that there is an ongoing coordinated monitoring program consistent with the Intensively Monitored Watershed Program currently being administered through NOAA Fisheries and the RTT. Designate responsible entities, a single data management hub for long term monitoring, and a single custodian to store and manage and generally oversee this effort into the future (requires long term commitment).

10.3 Adaptive Management

Adaptive management, or revising strategies and recommendations as new information is gathered, will be applied to actions in the Phase III Plan during Phase IV, Implementation. Adaptive management has been recognized as an approach to maintain the relevance of the Plan over the 20-year planning horizon. To that effect, specific actions and strategies have been noted that require further development, additional data collection and subsequent modification. The actions and strategies listed below will require further development in Phase IV Implementation.

WRMS-3: The WWPU with Chelan County taking the lead role will participate in the development and implementation of an adaptive management process to support this water resource management strategy. The process should address flexibility in the distribution of the reserve across the WRIA. The details of the adaptive management process will be determined as part of Phase IV Implementation.

WRMS-4c: Recommends a new stream gage be established at the existing control point on the Icicle Creek. Details will be determined during Phase IV, Implementation.

MissionQUANT-1: Chelan County as lead (with support from Ecology), will convene a Mission Creek Forum to assess options to provide water for future growth through the purchase, lease or transfer of existing, valid water rights or from storage (storage opportunities within Mission Sub-watershed or through the Peshastin and/or Icicle Irrigation districts). This will be conducted for the purpose of providing an uninterruptible supply for domestic, municipal and stock water uses. During Phase IV, Implementation, the Mission Creek Forum will determine whether the strategies for Mission are relevant to Brender Creek, and consider assembling separate strategies to address local instream flow concerns and conditions for Brender Creek, if appropriate.

Within two years of rule adoption, the Forum will have developed opportunities and researched funding opportunities for these alternatives.

MissionQUANT-2: As part of Phase IV, Implementation, evaluate alternatives that could increase available water for instream and out-of-stream uses. Clearly address specific water needs in the Mission Creek and evaluate water conservation, storage, purchase, lease and transfer of water rights, water from other sub-watersheds, and other alternatives as appropriate.

PeshastinQUANT-3: As part of Phase IV, Implementation, evaluate alternatives that could increase available water for instream and out-of-stream uses. Clearly address specific water needs in the Peshastin and evaluate water conservation, storage, purchase, lease and transfer of water rights, and other alternatives.

ChumQUANT-10: As part of Phase IV, Implementation, the Planning Unit and the Chumstick Forum (with Chelan County as lead) will evaluate alternatives that could increase available water for instream and out-of-stream uses. Clearly address specific water needs in the Chumstick and evaluate water conservation, storage opportunities, purchase, lease and transfer of water rights, water transfer from other sub-watersheds, and other alternatives. Consider conjunctive use and evaluate pumping from the deep aquifer to augment flows in the Chumstick. Investigate storage options where stored water could be used to augment flows and provide mitigation water.

QUANT-6: Develop an administrative structure for a water bank for WRIA 45. Section 5.1.3 introduces water banks; however, the details of the administration of a water bank in WRIA 45 will be determined in Phase IV, Implementation.

QUANT-8: Chelan County Natural Resource Department will develop and administer a monitoring program to assess actual domestic water use to verify the 380 gpd per household assumption used to debit the reservation and to adjust the amount of water remaining in the reservation at five year intervals, or more frequently if the number of wells drilled or building permits granted indicate that growth is occurring more rapidly than projected in any sub-watershed. These assessments will be conducted based on a statistical sample of new domestic water users (single domestic, group domestic and municipal water use and associated lawn and garden irrigation (some with separate irrigation, some without), some with stock, etc.). Metering data will be incorporated into the water use audit and the accounting system.

This monitoring program will be included as part of the adaptive management element to the water resource management strategy discussed in Section 4.0. If necessary, the per household water use factor used to debit the reservation will be adjusted based on statistical sampling and metering in the WRIA (380 gpd/hh is a guide, an accounting tool).

This water use audit will be further developed during Phase IV, Implementation. As part of this audit, the consumptive portion of the daily household water use factor will be assessed, and may be used to debit the reservation. This will be considered during the first year of implementation.

QUANT-9: Reservation accounting will include the tracking of new exempt wells by Chelan County through the building permit process, septic approval through the Chelan-Douglas Health District (CDHD), tracking new domestic and municipal water rights granted by Ecology and tracking well drilling permits as issued by Ecology. The mechanism for tracking the permitted uses will be determined as part of Phase IV, Implementation. Chelan County is currently developing a method for tracking new permit-exempt wells in WRIA 46. This should also be considered for WRIA 45.

> **QUANT-9b**: New rights that are granted by Ecology for domestic water uses will be tracked by CCNRD. The mechanism for tracking the new permitted uses that will debit the reserve will be determined as part of Phase IV, Implementation.

QUANT-10: The Planning Unit recommends metering be required for all new uses eligible under the reserve. The Planning Unit will further define responsible entities, and staffing, budget and funding considerations of the metering program as part of Phase IV, Implementation. Chelan County, CDHD, Ecology, utilities, and others will work together to structure the program. The following should be addressed as part of phase IV:

- Identify responsible entities, and address staffing, cost and funding concerns
- Consider implementation by an existing utility with an existing metering program
- Consider having water users read their own meters
- Consider use of Ecology's water measuring system and database
- Consider metering options for existing water users and development of a voluntary program that uses existing metering programs' available meters.

QUANT-11: Undertake hydrogeologic studies to assess the influence of groundwater withdrawals on surface water. Identify funding for this study and responsible parties (WWPU to identify sub-areas for study, responsible entity as part of Phase IV, Implementation).

QUANT-14: Credit a water service provider for abandoned and/or decommissioned exempt wells. This action will be further developed in Phase IV, Implementation. The well consolidation process is

addressed in RCW 90.44.105. This statute presumes a credit of 800 gpd/well unless an alternative minimum is established by Ecology in consultation with DOH or there is credible evidence of non-use.

QUANT-15: As part of Phase IV, Implementation, Chelan County and cities should develop policies that can be used to ensure efficient use of water in the event of a land division or new development. These include:

> **QUANT-15a**: For land division applications that have shares in an irrigation district, develop policies requiring that the developer provide tie-ins to the irrigation box; ensure easements; deliver water to parcels, where practicable; and form a Homeowners Association for residential uses. Encourage Irrigation Districts to work with the county and cities to extend infrastructure and irrigation water service where practicable.
>
> **QUANT-15f**: Encourage cluster development, and group domestic over single domestic systems to increase water use efficiency. Explore encouraging group domestic over single domestic use as part of the approval process for land division applications. Further develop this recommendation as part of Phase IV, Implementation.

QUANT-16d: As part of Phase IV, Implementation, convene a forum to investigate conservation strategies and how they could be implemented by irrigation districts, ditches and other private companies. Involve utilities, cities, Chelan County and Ecology when appropriate. There is a need to work with members of irrigation districts, ditches and others to determine ways to save water and ensure that water rights are protected into the future. Items of discussion could include alternative rate structures based on purpose of water use; partnerships with cities and utilities; utility coordination during development; tools to conserve water, improve instream flows and protect water rights at the same time; and distribution of public education materials.

QUANT-18: Encourage the County to provide information and education about water conservation options and fire planning; including: outdoor watering, timing, types of native vegetation that require low water use, lawn size, low flow fixtures, etc. to the new land user. The Municipal Water Law requires that water systems provide education and outreach regarding water conservation. However, water users that are using irrigation ditch water for outdoor use and/or exempt wells will not receive this information. Irrigation systems may also be able to provide materials in monthly billings. The details of this educational program will be determined during Phase IV, Implementation. Realtors should be encouraged to distribute public education materials describing water conservation and efficient water management techniques.

QUANT-20b: Study groundwater in specific areas of the watershed (eg., Mission Creek, Lower Chumstick/Eagle Creek area, Monitor area). Finalize the areas for study as part of Phase IV, Implementation.

QUANT-21: Evaluate the consumptive portion of reserved water uses and determine if recharge credit should be included in the accounting of the reservation.

IMP-12: Revise and refine water quality management strategies for both point and nonpoint source pollutants to reflect new data.

IMP-13: Perform additional studies to fill data gaps and address unanswered questions as determined by the Water Quality Technical Subcommittee. Ecology will partner with stakeholders in the watershed to conduct studies addressing information gaps (eg., monitoring).

QUAL-4: Encourage the Wenatchee Watershed Planning Unit and its other subcommittees (Water Quantity, Instream Flow, Habitat, and Growth and Land Use) to use the information in the TMDL Technical Reports and SISs along with their conclusions, recommendations, and actions for a more holistic approach to restoration, preservation, and enhancement of the watershed for all beneficial uses (WQTS, 2006a; WQTS, 2006b; WQTS, 2006c; WQTS, 2006d).

QUAL-5: Appropriate actions to be used in the appropriate location should be determined to address temperature exceedances in Phase IV, Implementation for all of the temperature-related recommendations in the Plan.

LowWenQUAL-2, **IcicleQUAL-2** and **UpWenQUAL-2:** Strategies to address point and non-point sources of phosphorus as part of the TMDL for DO and pH will be reported during the implementation phase of the Wenatchee Watershed planning effort.

IMP-14: Further analysis and discussion may need to take place in Phase IV, Implementation regarding maximum allocation limits in specific sub-watersheds and the mainstem Wenatchee and the relationship between the allocations, and habitat and channel-forming processes.

IMP-15: All actions specified in the Wenatchee Watershed Plan should be revisited by the Planning Unit during Phase IV, Implementation.

11.0 PUBLIC OUTREACH

A coordinated public outreach effort is necessary to garner support for ongoing watershed management efforts, proposed efforts, and the actions recommended in this plan. Several previous programs have proposed public outreach efforts as part of their implementation: 1998 Wenatchee River Watershed Action Plan, Wenatchee Subbasin Plan, Draft Upper Columbia Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Plan, the Wenatchee TMDL process, Lead Entity Strategy Development, and others. This Plan supports the continued public outreach efforts associated with those efforts and outlines public outreach activities that will support this Plan, are consistent with ongoing efforts, and avoid duplication. The outreach strategies identified in this Watershed Plan are consistent with those identified in the WRIA 45 Integration Framework (Golder, 2004) wherein public outreach tasks were identified and prioritized by the WRIA 45 Public Outreach Subcommittee based on funding and staffing needs.

Some of the outreach-related recommendations proposed in the 1998 Watershed Action Plan are very relevant to actions proposed in this Watershed Plan. They include:

1) "informing the public about on-site septic systems and encouraging available alternatives to on-site septic systems";

2) "informing and educating the public about improving agricultural practices to decrease non-point source pollution";

3) "informing and educating landowners, businesses, and the public about forest rules, regulations, best management practices, and forest issues";

4) "educating the public about the water quality impacts of development, storm water, and erosion and actions that can reduce those impacts"; and

5) "establishing an Environmental Education Committee to oversee public education on water quality issues and actions".

The general actions proposed by this Plan involve public information and education efforts to: 1) promote support for the Plan; 2) involve the stakeholders in the Plan's implementation; 3) encourage water conservation measures and programs that support the water resource management strategy; and 4) promote community awareness about the watershed's ability to support human, biological, ecological, and environmental needs.

Public outreach actions proposed in this plan (Table 2-7) include the involvement of the general public, youth groups, interest groups, elected officials, implementers, funding agencies and entities, and resource industries. The actions, listed in the order in which they appear in the plan, include:

ChumQUANT-11: Encourage conservation and outreach.

NSTQUANT-3: Chelan County and Ecology to provide public information regarding water limitations in Northside Tributaries (Fact Sheets).

QUANT-13: Provide public education as to the roles, responsibilities and regulations pertinent to exempt wells, and encourage the proper entities to enforce/implement (CDHD, DOH, Ecology, County).

QUANT-15e: Provide public information that encourages actions QUANT-15a through QUANT-15d, and explains the benefits (provide this information during subdivision application or preliminary plat comment period).

QUANT-16d: As part of Phase IV, Implementation, convene a forum to investigate conservation strategies and how they could be implemented by irrigation districts, ditches and other private companies. Involve utilities, cities, Chelan County and Ecology when appropriate. There is a need to work with members of irrigation districts, ditches and others to determine ways to save water and ensure that water rights are protected into the future. Items of discussion could include alternative rate structures based on purpose of water use; partnerships with cities and utilities; utility coordination during development; tools to conserve water, improve instream flows and protect water rights at the same time; and distribution of public education materials.

QUANT-18: Encourage the County to provide information and education about water conservation options and fire planning; including: outdoor watering, timing, types of native vegetation that require low water use, lawn size, low flow fixtures, etc. to the new land user. The Municipal Water Law requires that water systems provide education and outreach regarding water conservation. However, water users that are using irrigation ditch water for outdoor use and/or exempt wells will not receive this information. Irrigation systems may also be able to provide materials in monthly billings. The details of this educational program will be determined during Phase IV, Implementation. Realtors should be encouraged to distribute public education materials describing water conservation and efficient water management techniques.

H-11: Efforts that are ongoing in the Wenatchee Watershed to improve or maintain habitat quality need to be encouraged and retained. Recognize and acknowledge achievements in the watershed that have accomplished habitat improvement or protection. Develop a landowner or organization recognition program to recognize habitat improvement projects or achievements in the watershed.

PO-1: Provide support of specific education and outreach programs in the watershed. Programs include: 4H Forestry Education Program, Kids in the Creek, Salmon Fest, Trout Unlimited education programs, Bird Fest, Chelan Douglas Land Trust field trips, Hatchery programs (Leavenworth National Fish Hatchery, and friends of NW Hatcheries), existing noxious weed/native plant education programs, and others.

PO-2: Encourage the 4-H program and CCCD to develop and conduct watershed clean-up education programs.

H-12: Initiate public information efforts to discourage harassment of spawning salmonids (UCRTT, 2002).

LowWenQUAL-9, **IcicleQUAL-7** and **UpWenQUAL-8**: Nutrients (phosphorous) can enter surface and ground water from residential yards and gardens, hobby farms, City and County Parks, business owned landscapes, etc. An education outreach plan should be developed and implemented to heighten awareness and reduce inputs from these sources. Policies and practices should be implemented in City and County Public Works departments. The County and cities should consider implementing a ban on the sale of high phosphate detergents, such as is being considered in Spokane. Conduct associated monitoring and adaptive management (WQTS, 2006a).

MissionQUAL-6: Activities should be identified and undertaken to provide ongoing outreach, education, and technical assistance to growers, streamside landowners, developers, stakeholders, and the general public (WQTS, 2006b).

MissionQUAL-14 and **ChumQUAL-3**: CDHD will continue to implement onsite sewage disposal system technical assistance and education programs for homeowners and the industry (WQTS, 2006c).

MissionQUAL-15 and **ChumQUAL-4**: The CDHD will continue to permit sewage systems per Washington Administrative Code (WAC), including analyzing soils and technologies suitable for individual sites; review/approve the proposed design, specifications, installation and if required, the ongoing maintenance in accordance with the WAC; provide public information under real estate disclosure laws; and review all land use proposals to ensure that the WAC is properly enforced prior to approval by the County (WQTS, 2006c).

MissionQUAL-20 and **ChumQUAL-9**: Conduct stream walk cleanups along the stream (Fall, Spring, Summer) with area schools, homeowners, and other groups (WQTS, 2006c).

MissionQUAL-21 and **ChumQUAL-10**: Conduct ongoing community fecal coliform education/awareness campaigns throughout the year. Engage and get support from homeowners (WQTS, 2006c).

MissionQUAL-23 and **ChumQUAL-12**: Conduct education and enforcement actions to stop illegal dumping of wastes either to storm drains or directly to surface waters. This dumping may be of portable toilet wastes, recreational vehicle wastes, etc. (WQTS, 2006c).

MissionQUAL-25 and **ChumQUAL-14**: The WQTS and its participating entities should work with the public and homeowners regarding BMPs to reduce fecal coliform runoff. General actions should include public information, education, and technical assistance regarding watering practices, landscaping, stormwater runoff, filtration practices, animal waste, etc. (WQTS, 2006c).

PO-3: CCNRD to ensure that summary fact sheets are created by sub-watershed and develop and provide outreach materials for people at different levels: technical, non-technical, etc.

PO-4: Prepare Community Documents by tributary (or sub-watershed) that describe the watershed and the water related management strategies that have been recommended to address specific issues in the individual sub-watersheds. An example was prepared for the Icicle Sub-watershed. Obtain funding to create, produce and distribute these documents.

12.0 STATE ENVIRONMENTAL POLICY ACT (SEPA) GAP ANALYSIS

This Chapter of the Wenatchee Watershed Plan provides documentation of programmatic State Environmental Policy Act (SEPA) compliance specific to the Wenatchee Water Resource Inventory Area 45 (WRIA 45) Watershed Plan for adoption of the Plan by Chelan County.

This Chapter provides the following information:

- A description of the process used to evaluate consistency of the Wenatchee Watershed Plan with the statewide Programmatic Environmental Impact Statement (EIS) for Watershed Planning;
- A summary of the assumptions and judgments used in determining SEPA compliance of Wenatchee Watershed Plan actions; and,
- Documentation of compliance of each action recommended in the Wenatchee Watershed Plan with requirements for programmatic, non-project SEPA review.

12.1 Wenatchee Watershed Plan Approach for Programmatic SEPA compliance

The following options for were considered for SEPA compliance in WRIA 45:

- **Adoption of the statewide programmatic Watershed Planning EIS and Determination of Significance (DS).** This is an option if the statewide programmatic Watershed Planning EIS adequately addresses all probable adverse impacts. The County (as lead SEPA agency) will use all or part of an existing document (the statewide programmatic Watershed Planning EIS) to meet all or part of the proponent's responsibilities under SEPA to prepare an EIS or other environmental document. A Determination of Significance (DS) is a written decision by the lead SEPA agency that the proposal is likely to have a significant adverse environmental impact and therefore an EIS is required (WAC 197-11-310 and WAC 197-11-360).
- **Adoption, DS, and Addendum.** Same as DS option above, with the addition of an addendum which provides local decision makers with additional local information on compliance with the statewide programmatic Watershed Planning EIS.
- **Adoption, DS, and Supplemental EIS.** If the statewide programmatic Watershed Planning EIS addresses some but not all of the probable significant adverse environmental impacts, a supplemental EIS is necessary.
- **Determination of Non-Significance (DNS).** A DNS could be issued if it is determined that there are no probable significant adverse impacts associated with the recommended actions contained in the Wenatchee Watershed Plan. In the event that a DNS includes mitigation measures as a result of the process specified in WAC 197-11-350, a **Mitigated Determination of Non-Significance (MDNS)** could be issued.

The qualifications, assumptions, and consistencies analyzed to achieve programmatic SEPA compliance for the Wenatchee Watershed Plan are included within this Chapter of the Plan (Chapter 12). This Chapter is considered as the addendum to the statewide programmatic Watershed Planning EIS. The purpose of this Chapter is to document the logic used in the SEPA gap analysis and the compliance of each action in the Plan with programmatic SEPA.

After reviewing the Wenatchee Watershed Plan (Plan), Chelan County (as the lead SEPA agency) has determined they will adopt the statewide programmatic Watershed Planning EIS and issue a determination of significance (DS) to meet its responsibility to prepare a SEPA compliant review of the Plan. Adoption of the statewide programmatic Watershed Planning EIS is addressed with this Chapter (Chapter 12) of the Plan. After adoption of the statewide programmatic Watershed Planning EIS, there is a seven (7) day waiting period before an action can be taken to approve the Plan (WAC 197-11-630).

12.2 SEPA and Watershed Planning

The State Environmental Policy Act (SEPA) (Chapter 43.21C RCW) was enacted by the State legislature to ensure that State and local agencies consider likely environmental consequences of proposed actions during decision-making processes concerning such activities. These consequences are considered during the SEPA review process.

Under SEPA rules, non-project actions are defined as governmental actions involving decisions on policies, plans, and programs. Such actions can include the adoption or amendment of policies, programs, and plans, such as Watershed Plans under Chapter 90.82 RCW. Any non-project action must be reviewed under SEPA unless specifically exempted.

The Washington State Department of Ecology (Ecology) published a Final Environmental Impact Statement for Watershed Planning under Chapter 90.82 RCW in August 2003 (Ecology, 2003). A copy of this statewide programmatic Watershed Planning EIS is available for review at the Chelan County Natural Resource Department offices in Wenatchee, WA and on the internet at http://www.ecy.wa.gov/biblio/0306013.html. Actions that could be included in local watershed plans are considered as SEPA "alternatives" in this statewide programmatic Watershed Planning EIS. Probable significant adverse environmental impacts that may be associated with these "alternatives" were also discussed in the statewide programmatic Watershed Planning EIS. If actions in a local watershed plan are consistent with the alternatives listed in the statewide programmatic Watershed Planning EIS, non-project programmatic SEPA requirements can be fulfilled by the statewide programmatic Watershed Planning EIS.

There are three SEPA compliance processes associated with actions in the Wenatchee Watershed Plan:

1) Programmatic coverage of the County Watershed Plan approval process.

   Programmatic coverage of the Wenatchee Watershed Plan is achieved through adoption of the statewide programmatic Watershed Planning EIS and the issuance of a Determination of Significance for the Wenatchee Watershed Plan.

2) SEPA compliance related directly to rule-making by the State. The State may accept an obligation to propose a Water Resource Management rule as an outcome of actions in the Wenatchee Watershed Plan. This SEPA process for rule-making will be implemented by the State when the action is initiated, and is not the responsibility of the Planning Unit or the lead SEPA agency for Watershed Planning.

   SEPA compliance for rule-making will be accomplished through a separate SEPA process, led by the State, at the time the action is implemented.

3) Non-programmatic SEPA for specific actions. Some specific project or non-project actions recommended in the Wenatchee Watershed Plan, such as the initiation of a specific construction or management activity, will go through a separate SEPA review of the

individual action itself at the time the action is implemented. The SEPA review completed at the current programmatic, non-project level of the SEPA process is adequate for County approval. Where alternatives in the statewide programmatic Watershed Planning EIS provide coverage for these actions, some of the documentation needed for the project-level SEPA approval process may reference the statewide programmatic Watershed Planning EIS and this Chapter. However, the extent of the project SEPA process needed for each action is dependent entirely upon the nature of the specific action and its potential adverse environmental impacts. In some cases, these individual actions are in their early planning stages and are not sufficiently developed to make a SEPA judgment at the time of plan adoption by the County.

This non-programmatic SEPA review of specific actions is not a prerequisite for the SEPA compliance necessary to achieve County approval of the Wenatchee Watershed Plan, but will generally be necessary for plan implementation.

In summary, this chapter of the Wenatchee Watershed Plan and adoption of the statewide programmatic Watershed Planning EIS fulfills the programmatic SEPA requirements necessary for County approval of the Wenatchee Watershed Plan. SEPA compliance for individual (project and non-project) actions in the Wenatchee Watershed Plan may also be granted during this approval process; however, some actions will be required to undergo specific project or non-project level review at the time that the individual action is implemented.

For federal actions, NEPA compliance is required when the action is implemented. However, this compliance is not a prerequisite for approval of the Wenatchee Watershed Plan by the County, nor is it necessary during the programmatic SEPA review. Additionally, the Watershed Planning Unit cannot obligate a federal agency to implement any actions, but can make recommendations to a federal agency.

12.3 SEPA compliance for the Wenatchee Watershed Plan

12.3.1 Plan Consistencies with the Statewide Programmatic Watershed Planning EIS

Recommended actions in the Wenatchee Watershed Plan that are consistent with alternatives described in the statewide programmatic Watershed Planning EIS do not require supplemental information or additional consideration to achieve non-project programmatic SEPA compliance. A SEPA gap analysis was conducted where all alternatives in the statewide programmatic Watershed Planning EIS were reviewed and compared with recommended actions in the Wenatchee Watershed Plan.

The alternatives from the statewide programmatic Watershed Planning EIS that were applied to the Wenatchee Watershed Plan are listed below. Further descriptions of these alternatives and potential environmental impacts can be found in the statewide programmatic Watershed Planning EIS.

The following alternatives apply to one or more actions in the Wenatchee Watershed Plan:

Water Quantity

- WP 1 – Develop and implement municipal conservation programs including demand management and operational efficiency measures.
- WP 2 – Develop and implement agricultural water conservation and irrigation efficiency efforts through regional or irrigation district infrastructure improvements.

- WP 3 – Develop and implement on- farm agricultural water conservation and irrigation efficiency efforts.
- WP 4 – Develop and implement industrial conservation measures.
- WP 5 – Request local governments or sewer utilities to construct and operate water reclamation and reuse facilities (for example, reclamation plants and use areas) to provide water for beneficial uses.
- WP 6 – Promote greywater segregation and use in accordance with Department of Health standards.
- WP 7 – Request Ecology to transfer existing water rights for out-of-stream beneficial uses acquired through purchase, lease, voluntary methods, or condemnation to other out-of-stream beneficial uses.
- WP 8 – Request Ecology to transfer existing water rights for out-of-stream beneficial uses acquired through purchase, lease, voluntary methods, or condemnation to instream beneficial uses through the state's Trust Water Right Program.
- WP 9 – Transfer water through interties of public water systems or irrigation systems.
- WP 10 – Request Ecology to allocate additional ground or surface water on a shortterm or long-term basis.
- WP 11 – Request Ecology to adopt a rule to close or partially close a basin or subbasin.
- WP 14 – Request Ecology to increase enforcement against illegal water use within a basin or subbasin.
- WP 16 – Request local governments to adopt regulations or for Ecology to adopt rules to minimize use of exempt wells, to restrict the siting of wells in proximity to streams, and/or to restrict the finished depth of new wells to the second aquifer unit or lower.
- WP 17 – Where adequate public water supplies are available, extend public water system service into areas served by exempt wells and require any new development to connect to such public water supplies.
- WP 18 – Request Ecology to require water users to install, operate, and maintain water quantity monitoring devices such as meters and gauges.
- WP 19 – Construct and operate new on-channel storage facilities.
- WP 20 – Raise and operate existing on-channel storage facilities.
- WP 21 – Construct and operate new off-channel storage facilities.
- WP 22 – Raise and operate existing off-channel storage facilities.
- WP 23 – Use existing storage facilities for additional beneficial uses.
- WP 24 – Construct and operate artificial recharge/aquifer storage projects.

Instream Flow

- WP 26 – Request Ecology to set instream flows by administrative rule (in the Washington Administrative Code, or WAC).

Water Quality

- WP 30 – Request Ecology to incorporate requirements for improving the quality of discharges from existing industries when issuing State Waste Discharge Permits or National Pollutant Discharge Elimination System Permits.
- WP 31 – Request Ecology to increase the level of inspection of commercial dairy operations and enforcement of water quality as appropriate.
- WP 33 – Request conservation districts or irrigation districts to assist in achieving reductions in nonpoint pollution and/or to implement Total Maximum Daily Loads established for specific federal 303 (d) listed water bodies.
- WP 34 – Request conservation districts to modify individual farm plans as necessary to reduce or prevent nonpoint pollution and erosion.
- WP 35 – Request local governments and state agencies to continue to implement or more fully implement existing water quality plans, including plans developed under Chapter 400-12 WAC.
- WP 36 – Develop and implement a water quality public education program intended to prevent or reduce nonpoint pollution with focus on pollution sources associated with an urban setting, or with focus on pollution sources associated with a rural setting.
- WP 37 – Request local governments and Ecology to develop and operate water quality monitoring programs, including installation and maintenance of monitoring devices, to measure the extent of nonpoint pollution and/or measure the effectiveness of nonpoint pollution control measures.
- WP 38 – Request local governments to modify Growth Management Act comprehensive plans and other land use plans to help reduce the potential for nonpoint pollution and/or to implement Total Maximum Daily Loads established for federal 303 (d) listed water bodies.
- WP 39 – Request local governments to amend shoreline master programs to help reduce the potential for nonpoint pollution and/or to implement Total Maximum Daily Loads established for federal 303 (d) listed water bodies.
- WP 40 – Request local governments to modify local regulations such as critical areas ordinances, stormwater regulations, and on-site sewage regulations to help reduce the potential for nonpoint pollution and/or to implement Total Maximum Daily Loads established for federal 303 (d) listed water bodies.

Habitat

- WP 42 – Implement habitat improvement projects involving construction or placement of instream structures, such as cross vanes, vortex weirs, large woody debris, fish screens, or side-channels.
- WP 43 – Implement habitat improvement projects intended to “daylight” streams that are currently contained within enclosed channels.
- WP 45 – Request the Washington Department of Transportation, local governments, or other applicable agencies to remove or replace bridges, culverts, roadways, and other infrastructure as necessary to eliminate or reduce their impacts as fish passage obstructions and/or channel constrictions.

- WP 46 – Support construction of fish passage facilities where such facilities do not currently exist.
- WP 47 – Implement habitat improvement projects involving out-of-stream riparian restoration or enhancement such as replanting or bank stabilization projects. Bioengineering methodologies should be incorporated into bank stabilization projects.
- WP 48 – Move river dikes back from existing river channels to allow for floodplain restoration and channel maintenance.
- WP 49 – Request local governments to amend or modify Growth Management Act comprehensive plans or other land use plans, shoreline master programs, and/or critical areas ordinances to protect habitat or control floodplain development.
- WP 50 – Request local governments to develop regulations or programs to control sources of sediment that are not addressed through critical areas ordinances or other existing regulations and programs.
- WP 52 – Request conservation districts and irrigation districts to assist in achieving protection of habitat including, as appropriate, establishment and maintenance of riparian buffers and control of erosion and sedimentation.
- WP 53 – Request local, state, and federal governments, conservation districts, and private entities to acquire land and/or conservation easements for purposes of protecting habitat.
- WP 54 – Request Ecology and local governments to increase the level of enforcement of Shoreline Management Act violations in critical habitat areas.
- WP 56 – Support implementation of the recommendations of Washington's Forest and Fish Report.

12.3.2 Other SEPA Assumptions and Qualifications

During the SEPA gap analysis, a number of recommended actions in the Wenatchee Watershed Plan were found that are not described explicitly by alternatives in the statewide programmatic Watershed Planning EIS. However, it was determined that all of the actions not explicitly covered by the statewide programmatic Watershed Planning EIS either do not have adverse environmental impacts or do not require additional SEPA coverage at the programmatic level based on the qualifications and assumptions listed below. Therefore an additional EIS is not required.

The following are the qualifications and assumptions that are not specifically discussed in the statewide programmatic Watershed Planning EIS that are relevant to the Wenatchee Watershed Plan:

- Recommended actions that do not have a foreseeable "adverse environmental impact" do not require a SEPA alternative, or a statement of SEPA compliance. The following types of actions are listed in the Wenatchee Watershed Plan and are not expected to have an adverse environmental impact:
    - Recommendations for 1) improving communication between interest/stakeholder groups, government agencies, and/or non-governmental organizations; 2) encouraging entities to work together on specific projects; and/or 3) encouraging entities to work together to formulate strategies to address specific issues in the watershed (Noted in the tables below as **coordination/collaboration**);
    - Recommendations to find funding for new or existing projects (Noted in the tables below as **funding**);

- Recommendations for data gathering, research, data management, and/or project planning (Noted in the tables below as **study)**;
- Recommendations for 1) maintaining, adding, or changing the location of streamflow and groundwater monitoring gages and associated programs; 2) installing water meters; 3) developing a water usage monitoring program; and/or 4) continuing or developing monitoring programs (Noted in the tables below as **monitoring**),
- Recommendations to support existing efforts, programs, and projects (Noted in the tables below as **support**) and,
- Recommendations for 1) convening citizen and stakeholder forums to obtain public input; 2) providing opportunities for public involvement in watershed cleanup activities; 3) developing public outreach programs; 4) supporting existing public outreach programs; and/or 5) developing and distributing educational materials to the public (Noted in the tables below as **public involvement and education**).

- Recommendations that call for enforcement of existing regulations or continuation of existing programs that have undergone SEPA review at the initiation of the regulation or program and would not require further review at this time (Noted in the tables below as **continue existing**).
- Recommendations to evaluate and/or revise a strategy, program, policy or activity based on new or revised information (Noted in the Tables below as **adaptive management**).

  Recommendations for adaptive management are not required to undergo SEPA review at this time. Generally, adaptive management actions in watershed plans that depend upon the outcome of monitoring to direct a policy or program would be expected to have a positive or neutral effect on the environment. Actions such as these are consistent with the intent and spirit of both the Watershed Planning Act and the Watershed Planning EIS. However, this is not explicitly stated in the Watershed Planning EIS.
- Recommended actions that involve review or revision of existing ordinances /policies/programs will go through a SEPA review process during adoption of the revised ordinance/policy/program; therefore, these are not subject to individual SEPA alternative statements at this time (Noted in the tables below as **other SEPA**).
- Actions that require rule-making are not expected to comply with SEPA at this time, as they will undergo a separate SEPA review process lead by the State at the time that the rule is adopted (Noted in the tables below as **State SEPA**).
- For some actions, too little information is provided to make a SEPA judgment at this time because the action has not been fully developed. No foreseeable impacts are evident at this time. The action may undergo project or non-project level SEPA review at a later date or may be covered under statewide programmatic Watershed Planning EIS alternatives (Noted in the tables below as **early planning stages**).

12.3.3 Wenatchee Watershed Plan SEPA Compliance Tables

Tables 12-1 through 12-16 below list each action in the Wenatchee Watershed Plan, along with the statewide programmatic Watershed Planning EIS alternative or other analysis criteria used to achieve non-project programmatic SEPA compliance. The tables include a SEPA analysis of the implementation actions presented in Chapter 10 of this plan (Table 12-15), the public outreach actions presented in Chapter 11 of this plan (Table 12-16) as well as the actions that address the five issue categories (WRMS, water quantity, growth and land use, water quality and habitat) at both a

watershed and sub-watershed scale. The tables are included within the text so that Chelan County can use this Chapter of the Plan (Chapter 12) as supporting information to adopt the statewide programmatic Watershed Planning EIS and issue a determination of significance (DS) to meet its responsibility to prepare a SEPA compliant review of the Plan.

In some cases, more than one Watershed Planning alternative or a combination of qualifications and assumptions and alternatives are consistent with one action. Where combinations of alternatives and/or qualifications or assumptions are used, evidence for SEPA compliance is more robust.

TABLE 12-1

SEPA Analysis for WRMS Recommended Actions

Proposed Water Resource Management Strategy and Adaptive Management

Recommended Action	SEPA Analysis
WRMS-1: Recommends that the State Department of Ecology adopt, in rule, the new water resource management strategy for WRIA 45, including the management flows (revised instream flows) at specified control points, the water reserve, and maximum allocations. The management flows, water reserve and maximum allocation are outlined in more detail in Sections 4.4 through 4.6.	WP 7, WP 10, WP 11, WP 26, State SEPA
WRMS-2: Recommends that the Planning Unit or future implementing body in WRIA 45 be involved with Ecology, in any scoping, study planning, study implementation, alternatives analysis, negotiations or rule development if Ecology undertakes instream flow or related water management studies or rulemaking in the watershed.	Coordination/ Collaboration
WRMS-3: The WWPU with Chelan County taking the lead role will participate in the development and implementation of an adaptive management process to support this water resource management strategy. The process should address flexibility in the distribution of the reserve across the WRIA. The details of the adaptive management process will be determined as part of Phase IV Implementation.	Adaptive Management, WP 10, WP 11
WRMS-4: Implementation of a new or existing instream flow rule in the Wenatchee Watershed will require that flow monitoring continues at all existing and proposed control points on the Wenatchee River and its tributaries. Figure 4-1 shows the locations of all control points and active stream gages in the watershed. The following actions address these requirements. The WWPU:	Study, Monitoring
WRMS-4a: Recommends that Ecology continue to support monitoring at all existing stream gages in the Wenatchee Watershed. Ecology and partners must ensure that the gages and streamflow data are well maintained. Updated data should be made available on the Ecology website in a timely manner for all gages managed by Ecology.	Study, Monitoring
WRMS-4b: Encourages the USGS to continue to maintain USGS gages in the watershed to support implementation of this water resource management strategy.	Monitoring
WRMS-4c: Recommends a new stream gage be established at the existing control point on the Icicle Creek. Details will be determined during Phase IV, Implementation.	Monitoring
WRMS-4d: Review the gage location on the Chiwawa River as related to the impacts on flows from withdrawals.	Study, Monitoring

TABLE 12-2

SEPA Analysis for Water Quantity Recommended Actions

Water Rights, Trusts and Bank

Recommended Action	SEPA Analysis
QUANT-1: Develop recommendations for Ecology regarding the processing of new water right applications and applications for water right changes and transfers in WRIA 45. Create the recommendations through a collaborative approach between the Planning Unit and the Chelan County Water Conservancy Board, and base them on knowledge of water availability, allocation and flows; consistent with the proposed instream flow rule and resulting reservation and maximum allocation requirements for sub-watersheds. Recommendations may include data requirements necessary to evaluate the impacts of an application on surface and groundwater, areas of concern, policy regarding changes and transfers (may link to land use conversions or incentives for agricultural preservation). Recommendations should also consider facilitation of water right transfers or changes that will result in new water for a reservation in flow impaired sub-watersheds such as Mission and Chumstick Creeks.	Coordination/ Collaboration, Study, WP 7, WP 8, WP 10
QUANT-2: Request additional Ecology staff time from the legislature to process WRIA 45 water rights. (Focus may be transfers or new applications).	Funding, WP 7, WP 8, WP 10
QUANT-3: Ecology should enforce existing regulations and policies concerning water rights and use.	Continue Existing, WP 14
QUANT-4: Provide incentives for conserving water rather than using it to avoid losing it. Encourage efficiencies through current water law using tools such as water trusts and/or other innovative techniques. Consider the Irrigation Efficiencies Program, and other incentives programs offered by the state and other entities. Criteria for participation include a demonstration of financial need and environmental benefit, a minimum 10 year lease of the conserved water to the Trust Water Program, and the public investment in the project not exceeding 85% of the total cost. In general, the state offers financial programs and incentives to conserve when there is a public benefit. In many cases, dedication of the conserved water to instream flows has been the legislature's preferred means of securing the public benefit.	WP 1, WP 2, WP 3, WP 4, WP 8
QUANT-5: Consider Ecology's Trust Water Program as an option to temporarily safeguard water rights during times of non-use or reduced use while satisfying the needs of beneficial uses in the watershed. Develop strategies for using trust water to safeguard water that may be used in the future to support a more water-intensive crop type or conversion from agriculture to residential. Use of this program is consistent with the proposed water resource management strategy as described in Section 4.0.	WP 1, WP 2, WP 3, WP 4, WP 8
QUANT-6: Develop an administrative structure for a water bank for WRIA 45. Section 5.1.3 introduces water banks; however, the details of the administration of a water bank in WRIA 45 will be determined in Phase IV, Implementation.	Study, Early Planning Stages, WP 7, WP 8
QUANT-7: Chelan County or other entity with agency funding assistance will investigate water rights for purchase or lease in WRIA 45. The County will seek funding from Washington Water Trust, Washington Rivers Conservancy, BPA, USBOR, NPCC, Ecology and others. Water rights that are purchased or leased can be used to extend the water reservation while adhering to a "no net impacts" standard.	Funding, Study, WP 7, WP 8

Tracking Water Availability and Use

Recommended Action	SEPA Analysis
QUANT-8: Chelan County Natural Resource Department will develop and administer a monitoring program to assess actual domestic water use to verify the 380 gpd per household assumption used to debit the reservation and to adjust the amount of water remaining in the reservation at five year intervals, or more frequently if the number of wells drilled or building permits granted indicate that growth is occurring more rapidly than projected in any sub-watershed. These assessments will be conducted based on a statistical sample of new domestic water users (single domestic, group domestic and municipal water use and associated lawn and garden irrigation (some with separate irrigation, some without), some with stock, etc.). Metering data will be incorporated into the water use audit and the accounting system. See the recommended action in the Plan for more details.	Study, Adaptive Management, Monitoring
QUANT-9: Reservation accounting will include the tracking of new exempt wells by Chelan County through the building permit process, septic approval through the Chelan-Douglas Health District (CDHD), tracking new domestic and municipal water rights granted by Ecology and tracking well drilling permits as issued by Ecology. The mechanism for tracking the permitted uses will be determined as part of Phase IV, Implementation. Chelan County is currently developing a method for tracking new permit-exempt wells in WRIA 46. This should also be considered for WRIA 45.	Study
QUANT-9a: Chelan County Natural Resource Department will track new exempt wells through the building permit process and will coordinate with the CDHD. A joint city/county process will need to be implemented to assist the county in tracking any building permits requiring exempt wells that are issued by other cities (if applicable) within the watershed.	Study, Coordination/ Collaboration
QUANT-9b: New rights that are granted by Ecology for domestic water uses will be tracked by CCNRD. The mechanism for tracking the new permitted uses that will debit the reserve will be determined as part of Phase IV, Implementation.	Study
QUANT-9c: Long-term funding for tracking is required.	Funding
QUANT-10: The Planning Unit recommends metering be required for all new uses eligible under the reserve. The Planning Unit will further define responsible entities, and staffing, budget and funding considerations of the metering program as part of Phase IV, Implementation. Chelan County, CDHD, Ecology, utilities, and others will work together to structure the program. The following should be addressed as part of phase IV: • Identify responsible entities, and address staffing, cost and funding concerns • Consider implementation by an existing utility with an existing metering program • Consider having water users read their own meters • Consider use of Ecology's water measuring system and database • Consider metering options for existing water users and development of a voluntary program that uses existing metering programs' available meters.	Study, Funding, Coordination/ Collaboration, Monitoring, WP 18

Exempt Wells

Recommended Action	SEPA Analysis
QUANT-11: Undertake hydrogeologic studies to assess the influence of groundwater withdrawals on surface water. Identify funding for this study and responsible parties (WWPU to identify sub-areas for study, responsible entity as part of Phase IV, Implementation).	Study, Funding
QUANT-12: Funding should be requested to survey (using GPS) private wells. The CDHD should investigate collaborating with Ecology to include these new data in the water well report log database. Recommend that the county, health district, and Ecology work together to identify, log and provide oversight of exempt wells. As part of this oversight responsibility, the CDHD should work with DOH to survey wells with greater than 3 connections. Chelan County has already conducted a GPS survey and evaluation of Group A systems (> than 14 connections).	Funding, Study, Coordination/ Collaboration
QUANT-13: Provide public education as to the roles, responsibilities and regulations pertinent to exempt wells, and encourage the proper entities to enforce/implement (CDHD, DOH, Ecology, County).	Public Involvement and Education, Continue Existing, WP 14
QUANT-14: Credit a water service provider for abandoned and/or decommissioned exempt wells. This action will be further developed in Phase IV, Implementation. The well consolidation process is addressed in RCW 90.44.105. This statute presumes a credit of 800 gpd/well unless an alternative minimum is established by Ecology in consultation with DOH or there is credible evidence of non-use.	WP 16, WP 17

Conservation and Efficiency

Recommended Action	SEPA Analysis
QUANT-15: As part of Phase IV, Implementation, Chelan County and cities should develop policies that can be used to ensure efficient use of water in the event of a land division or new development. These include:	WP 1, WP 2, Other SEPA
QUANT-15a: For land division applications that have shares in an irrigation district, develop policies requiring that the developer provide tie-ins to the irrigation box; ensure easements; deliver water to parcels, where practicable; and form a Homeowners Association for residential uses. Encourage Irrigation Districts to work with the county and cities to extend infrastructure and irrigation water service where practicable.	WP 1, WP 2, Other SEPA
QUANT-15b: For land division applications on property with individual water rights, Chelan County should develop policies that encourage the developer to provide residential tie-ins to the water source for residential irrigation purposes.	WP 1, WP 2, Other SEPA
QUANT-15c: Encourage cities and Chelan County to develop policies that encourage conservation measures for outdoor water use as a condition of subdivision approval (eg., drought tolerant landscaping, maximum lawn size, stormwater collection systems, residential irrigation system installation). Encourage use of small scale storage, rain barrels, for outdoor irrigation.	WP 1, WP 2, Other SEPA

Recommended Action	SEPA Analysis
QUANT-15d: Encourage cities to develop policy statements that address transfer of water rights from private water right holders in the event of a land use conversion. For example, the City of Cashmere has policies in place that require water rights to be transferred to the City upon land division/service provision by the City's system. This policy helps preserve the City's ability to serve future users within the UGA with water.	WP 9, Other SEPA
QUANT-15e: Provide public information that encourages actions QUANT-15a through QUANT-15d, and explains the benefits (provide this information during subdivision application or preliminary plat comment period).	Public Involvement and Education
QUANT-15f: Encourage cluster development, and group domestic over single domestic systems to increase water use efficiency. Explore encouraging group domestic over single domestic use as part of the approval process for land division applications. Further develop this recommendation as part of Phase IV, Implementation.	WP 1
QUANT-16: Research how different entities in the watershed are implementing conservation measures and acknowledge current efforts. [Note that Leavenworth is metering and employs a rate and fee structure that encourages conservation. Cashmere is currently working on revising their rate structure such that there will be more incentive for conservation.] Encourage additional conservation measures where needed. Encourage incentive based solutions. These may include QUANT-16a through QUANT-16d.	Study, WP 1, WP 2, WP 3, WP 4, WP 5, WP 6

Conservation and Efficiency: Residential, Industrial and Commercial (Public Water System and exempt wells)

Recommended Action	SEPA Analysis
QUANT-16a: Encourage cities and other water providers to implement a rate and fee structure that promotes conservation (similar to Leavenworth's current program and Cashmere's proposed program).	WP 1

Conservation and Efficiency: Irrigation (Districts and Canal Companies)

Recommended Action	SEPA Analysis
QUANT-16b: Encourage funding to line canals or implement other delivery system improvements, where appropriate.	Funding, WP 2
QUANT-16c: Encourage the use of reclaimed water (tertiary treatment) for outdoor irrigation, industrial, and commercial use (see Ecology Watershed Guidance).	WP 3, WP 4, WP 5, WP 6
QUANT-16d: As part of Phase IV, Implementation, convene a forum to investigate conservation strategies and how they could be implemented by irrigation districts, ditches and other private companies. Involve utilities, cities, Chelan County and Ecology when appropriate. There is a need to work with members of irrigation districts, ditches and others to determine ways to save water and ensure that water rights are protected into the future. Items of discussion could include alternative rate structures based on purpose of water use; partnerships with cities and utilities; utility coordination during development; tools to conserve water, improve instream flows and protect water rights at the same time; and distribution of public education materials.	Coordination/ Collaboration, Study, Public Involvement and Education, WP 1, WP 2, WP 3, WP 4

Conservation and Efficiency: On-Farm Efficiencies

Recommended Action	SEPA Analysis
QUANT-17: Encourage on-farm efficiencies and implementation of Best Management Practices (BMPs) to encourage water conservation.	WP 3
QUANT-18: Encourage the County to provide information and education about water conservation options and fire planning; including: outdoor watering, timing, types of native vegetation that require low water use, lawn size, low flow fixtures, etc. to the new land user. The Municipal Water Law requires that water systems provide education and outreach regarding water conservation. However, water users that are using irrigation ditch water for outdoor use and/or exempt wells will not receive this information. Irrigation systems may also be able to provide materials in monthly billings. The details of this educational program will be determined during Phase IV, Implementation. Realtors should be encouraged to distribute public education materials describing water conservation and efficient water management techniques.	Public Involvement and Education, WP 1, WP 2, WP 3

Storage Opportunities

Recommended Action	SEPA Analysis
QUANT-19: Consider funding storage options from the Storage Assessment. See relevant sub-watershed sections (Section 9.0) for specific storage opportunities as listed in the WRIA 45 Storage Assessment Report.	Funding, WP 19, WP 20, WP 21, WP 22, WP 23, WP 24

Projects and Studies

Recommended Action	SEPA Analysis
QUANT-20: CCNRD or other entities to administer studies on water resources throughout the watershed, especially in areas where inadequate data exist to make decisions regarding future water use (eg., Chumstick, Northside Tributaries).	Study
QUANT-20a: Water budgets have been prepared by sub-watershed. These budgets indicate total water use by use type (eg., residential, industrial, commercial, agricultural, fish propagation), but do not provide estimates of consumptive use. A consumptive crop irrigation requirement is presented. Further this study by defining the consumptive portion of the water use in the water budgets. Incorporate water usage rates with varying efficiencies for each water use type. Use this information to develop appropriate and useful water use efficiency requirements on lands that have been converted from agricultural to residential.	Study, WP 1, WP 3
QUANT-20b: Study groundwater in specific areas of the watershed (eg., Mission Creek, Lower Chumstick/Eagle Creek area, Monitor area). Finalize the areas for study as part of Phase IV, Implementation.	Study
QUANT-20c: There is a need to better understand the groundwater – surface water interaction in the watershed. Formalize studies to address this issue.	Study
QUANT-21: Evaluate the consumptive portion of reserved water uses and determine if recharge credit should be included in the accounting of the reservation.	Study

Recommended Action	SEPA Analysis
QUANT-11: Undertake hydrogeologic studies to assess the influence of groundwater withdrawals on surface water. Identify funding for this study and responsible parties (WWPU to identify sub-areas for study, responsible entity as part of Phase IV, Implementation).	Study, Funding
ChumQUANT-2: Chumstick Water Forum to assist in developing a data collection plan to monitor surface water flows (specify location) and develop management flows.	Study, Monitoring
ChumQUANT-3: Chumstick Water Forum, with assistance from Chelan County and Ecology, to conduct groundwater monitoring to understand hydraulic continuity and overall impact of exempt wells on groundwater levels and streamflows.	Study, Monitoring
ChumQUANT-6: A cumulative impact analysis of permit exempt use and uses associated with permits and claims approved since 1983 will be initiated by Ecology as authorized under the 1983 flow rule. Chelan County will partner with Ecology in this study. The cumulative impacts assessment will help to determine whether Ecology will curtail outdoor domestic water use of wells installed after 1983, and whether Ecology will close the Chumstick Sub-watershed to outdoor water use in the future.	Study
ChumQUANT-7: Chumstick Forum, Chelan County and Ecology to re-evaluate a proposed strategy for the Chumstick in three years after rule adoption, when new monitoring data have been collected and assessed and cumulative impact analysis is complete. Consider allowing group domestic groundwater use of deeper aquifer only as part of the Chumstick strategy addressed by the Forum.	Study, Adaptive Management, WP 16
NSTQUANT-1: Future water supply availability should be discussed with Chelan County Public Utility District (PUD) to determine whether they have the capacity and infrastructure to provide backup supply. The East Bank Aquifer Regional Water Supply will only be considered as a source of water for this area if approved by the owners of the Regional Water Supply.	Study, Coordination/ Collaboration
QUANT-8: Chelan County Natural Resource Department will develop and administer a monitoring program to assess actual domestic water use to verify the 380 gpd per household assumption used to debit the reservation and to adjust the amount of water remaining in the reservation at five year intervals, or more frequently if the number of wells drilled or building permits granted indicate that growth is occurring more rapidly than projected in any sub-watershed. These assessments will be conducted based on a statistical sample of new domestic water users (single domestic, group domestic and municipal water use and associated lawn and garden irrigation (some with separate irrigation, some without), some with stock, etc.). Metering data will be incorporated into the water use audit and the accounting system. See the recommended action in the Plan for more details.	Study, Adaptive Management, Monitoring

TABLE 12-3

SEPA Analysis for Growth and Land Use Recommended Actions

Integrating Water Availability in Land Management Decisions (Water for Growth/Land Use)

Recommended Action	SEPA Analysis
GLU-1: As part of reservation accounting, establish a resource base for decision-makers to use to consider technical water resource information when making land use change decisions and when considering land use permit applications. This should include:	Study
GLU-1a: Chelan County Natural Resource Department (CCNRD) will provide technical input regarding the reservation and eligible uses into the decision making process for consideration by city and county land use decision makers.	Coordination/ Collaboration
GLU-1b: Water resource and supply related data for the watershed will be maintained in a database by CCNRD (eg., a water supply dataset including water system boundaries, an exempt well tracking system, on-going tally of water rights and water use per water system, instream flow and groundwater level data, an assessment of whether current water rights can service full build-out based on current zoning, etc.). CCNRD would update this information as a larger population is served in the future and ensure the information is available in a format that is easily understood by the public.	Study
GLU-2: As part of Chelan County's zone change process, water supply and water resource information is available for use from CCNRD.	Study
GLU-3: As there is urban growth in the WRIA, ensure that water availability is considered in UGA boundary decisions for existing and new UGAs. For proposed Urban Growth Area boundary expansions that are outside the jurisdiction of an existing water service area, the proposal for expansion should include documentation of a water purveyor's intention to provide water, their ability to provide water, or the ability of the development to provide water if it is to be self-served.	Early Planning Stages

Consistency between Critical Area Ordinance and WRIA 45 Watershed Plan

Recommended Action	SEPA Analysis
GLU-4: The Wenatchee Watershed Planning Unit is supportive of the goals and intent of the GMA to provide critical area protections, as these are consistent with water quality, quantity and habitat goals of the Wenatchee Watershed Plan and the Watershed Planning Act. The Planning Unit further supports the efforts of local jurisdictions to implement non-regulatory programs that protect critical areas and is interested in exploring potential partnerships in these efforts.	Coordination/ Collaboration, Support
GLU-5: Data, protection measures and strategies relating to critical area protections should be documented as part of the watershed planning process. Encourage local jurisdictions to utilize the data, protection measures and strategies identified in the 2514 Wenatchee Watershed Plan in the development and update of critical area protections under GMA. Ensure that this information is readily available to local jurisdictions.	Study, WP 38, WP 40, Other SEPA

Recommended Action	SEPA Analysis
GLU-6: The protection measures and strategies identified in the 2514 Watershed Plan should be considered by local governments as non-regulatory mechanisms to protect critical areas watershed wide. These approaches include: • Land protection measures such as easements, leases, purchases and other creative measures, such as transfer of development rights to protect remaining floodplain and riparian habitat • Wetland restoration • Fish passage improvements; removal of fish passage barriers • Restore channel function • Reconnect disconnected habitat areas • Restore floodplain function • Maintain forest roads • Control and eradicate noxious weeds	Coordination/ Collaboration, WP 45, WP 46, WP 47, WP 48, WP 53

TABLE 12-4

SEPA Analysis for Watershed-wide Water Quality Recommended Actions

Temperature, Fecal Coliform, pH/DO, and DDT

Recommended Action	SEPA Analysis
QUAL-1: Chelan County Conservation District (CCCD) should continue to oversee and implement recommendations in the Watershed Action Plan, ensure other entities are also implementing voluntary actions in the Watershed Action Plan, and encourage continued funding of these efforts.	Coordination/ Collaboration, Funding, WP 35
QUAL-2: Ecology should continue to work with the local watershed planning group through both implementation of the current TMDL, and on future TMDLs if further listings arise.	Coordination/ Collaboration
QUAL-3: Ecology should continue to work with the local watershed planning group for funding future projects.	Coordination/ Collaboration, Funding
QUAL-4: Encourage the Wenatchee Watershed Planning Unit and its other subcommittees (Water Quantity, Instream Flow, Habitat, and Growth and Land Use) to use the information in the TMDL Technical Reports and SISs along with their conclusions, recommendations, and actions for a more holistic approach to restoration, preservation, and enhancement of the watershed for all beneficial uses (WQTS, 2006a; WQTS, 2006b; WQTS, 2006c; WQTS, 2006d).	Coordination/ Collaboration, WP 35

Temperature

Recommended Action	SEPA Analysis
QUAL-5: Appropriate actions to be used in the appropriate location should be determined to address temperature exceedances in Phase IV, Implementation for all of the temperature-related recommendations in the Plan.	Study

Recommended Action	SEPA Analysis
QUAL-6: Actions to improve shade near surface waters should be implemented, where feasible. Shade management practices should involve the development of mature riparian vegetation. The WQTS should use the information provided in the temperature technical report and Planning Unit studies (FLIR, LIDAR, PHABSIM, etc.) to create a prioritized list of locations and plan for establishing riparian vegetation. Associated monitoring should be planned and implemented over time, as full riparian vegetation requires many years to become established. The upper watershed should be addressed first as it has the most potential for shade improvements and water temperature reductions. An evaluation of the 303(d) listed waters in the upper watershed should be conducted to see if they should be dropped from the 303(d) list due to natural conditions (Chiwaukum Creek, Little Wenatchee River). The WQTS should coordinate with the Planning Unit's other subcommittee conclusions, recommendations, and actions to reduce water temperatures (WQTS, 2006d).	Study, Coordination/ Collaboration, Monitoring, WP 35
QUAL-7: For U.S Forest Service land, the riparian reserves prescriptions in the Northwest Forest Plan should be implemented for the establishment of mature riparian vegetation, where appropriate. The U.S. Forest Service should be the primary implementing agency. The WQTS and the Department of Ecology should coordinate with the U.S. Forest Service (WQTS, 2006d).	Coordination/ Collaboration, WP 35
QUAL-8: For State and privately owned forest land, the riparian vegetation prescriptions in the Forests and Fish Report (Washington State Department of Natural Resources (DNR), 1999) should be implemented for all perennial streams. Load allocations are included in this TMDL for forest lands in accordance with the section of the Forests and Fish Report entitled "TMDLs produced prior to 2009 in mixed use watersheds." The WQTS and the Department of Ecology will coordinate with the Department of Natural Resources (WQTS, 2006d).	Coordination/ Collaboration, WP 35, WP 56
QUAL-9: For areas that are not managed in accordance with either the Forest Plan or the Forests and Fish Report, voluntary programs to increase and protect riparian vegetation should be developed, such as riparian buffers and conservation easements. The WQTS and the Department of Ecology should work with private forested landowners, agencies, and stakeholders to develop and monitor the projects (WQTS, 2006d).	Study, Coordination/ Collaboration, Monitoring, WP 35
QUAL-10: Stream temperature is related to the amount of instream flow, and increases in flow generally result in decreases in temperatures. The WQTS should work with the Planning Unit and watershed entities to encourage projects that have the potential to increase and protect surface and groundwater flows. Voluntary retirement, purchase, leasing of existing water rights, or other conservation methods to preserve and enhance instream flow should be encouraged. In addition, water storage opportunities that have the potential to increase instream flows during critical periods should be considered (WQTS, 2006d).	Coordination/ Collaboration, WP 8, WP 19, WP 20, WP 21, WP 22, WP 23, WP 24, WP 35
QUAL-11: Adaptive management activities to control potential channel widening processes should be encouraged. Reductions in channel width are expected as mature riparian vegetation is established. For example, activities that reduce sediment runoff to surface waters from upland and channel erosion can affect channel width and temperatures (WQTS, 2006d).	Adaptive Management, WP 35

Recommended Action	SEPA Analysis
QUAL-12: Actions to improve hyporheic exchange flows and groundwater-surface water recharge should be identified and implemented to improve the current temperature regime and reduce maximum daily instream temperatures. Factors that influence hyporheic exchange flow include the vertical hydraulic gradient between surface and subsurface waters as well as the hydraulic conductivity of streambed sediments. Activities that reduce instream flows, hyporheic exchange and hydraulic conductivity of streambed sediments can increase stream temperatures, such as drilling of wells along streams and connected ground water reservoirs, and development in the flood plain. The WQTS should work with the Planning Unit and its subcommittees to identify and implement management activities designed to protect and enhance instream flow and subsurface water exchange with streams. Actions should be identified and implemented to reduce upland and channel erosion and avoid sedimentation of fine materials in the stream substrate (WQTS, 2006d).	Coordination/ Collaboration, Study, WP 35
QUAL-13: Ecology should continue existing temperature monitoring, and expand the current temperature monitoring program such that it is consistent with flow monitoring actions recommended in WRMS-4a and WRMS-4c.	WP 37
QUAL-14: The WQTS should work with the Planning Unit in the development of proposed water storage, irrigation, habitat, and development projects to provide input regarding shade, riparian vegetation, and engineering to reduce water temperatures (WQTS, 2006d).	Study, Coordination/ Collaboration, WP 35
QUAL-15: To determine the effects of management strategies within the Wenatchee River Basin, regular monitoring is recommended. Continuously-recording water temperature monitors should be deployed from July through August to capture the critical conditions. The following locations should be targeted for a minimal sampling program: Wenatchee River near mouth, Icicle Creek near mouth, Nason Creek near mouth, Peshastin Creek near mouth, and Mission Creek near mouth. Monitoring will be conducted associated with BMPs to track progress toward shade and water quality targets. Water temperature monitoring should be conducted and coordinated with associated BMP projects over time (WQTS, 2006d).	Study, WP 35, WP 37
QUAL-16: Funding assistance should be sought from Ecology through its grants and loans programs to implement actions and ongoing monitoring. Other funding sources should be identified and applications submitted to provide funding for ongoing activities. The WQTS will recommend qualified entities to conduct associated monitoring (WQTS, 2006d).	Funding, WP 35, WP 37

TABLE 12-5

SEPA Analysis for Habitat Recommended Actions

Habitat Protection and Restoration/Enhancement

Recommended Action	SEPA Analysis
H-1: Implementation of watershed planning will be coordinated with the Salmon Recovery Implementation Schedule (the Implementation Plan Matrix is Appendix H in UCSRB (2005)) and the Upper Columbia Salmon Recovery Implementation Team. The Wenatchee Habitat Subcommittee will serve as the local coordinating body for implementation of salmon recovery habitat actions across the watershed. Chelan County Natural Resource Department is currently developing a habitat project database that will be available to the subcommittee in the near future to list past projects, track current projects, and evaluate what future habitat actions should take place.	Coordination/ Collaboration, Study
H-2: The WRIA 45 Planning Unit supports implementation of projects identified in the Wenatchee River and Nason Creek Channel Migration Zone Study (Jones and Stokes, 2004).	Support
H-3: The WRIA 45 Planning Unit supports implementation of the actions in the Wenatchee Subbasin Plan (Subbasin Plan sections 7.4 to 7.8 (NPCC, 2004)), and supports the Subbasin Plan approach to evaluation and monitoring of terrestrial and aquatic ecosystems in the Wenatchee Watershed. Section 2.5.1 of the Wenatchee Subbasin Plan which lists key findings from the Terrestrial Assessment is reproduced in Appendix C. The Planning Unit asks the co-planners and co-managers to seek funding from Bonneville Power Administration (BPA) and other sources for implementation of these actions.	Support, Funding
H-4: The Habitat Subcommittee with Chelan County as lead should coordinate with funding organizations and action agencies to maintain a publicly accessible database of past and current habitat projects for the Wenatchee Watershed.	Coordination/ Collaboration, Study, Funding
H-5: The Planning Unit will provide opportunities for public comment on watershed scale studies and plans when, by a vote of the Planning Unit, they are determined to be a priority of the Planning Unit and important to aquatic health and habitat.	Public Involvement and Education
H-6: The mainstem Wenatchee River provides habitat *important to the entire watershed* for many life stages of spring and summer Chinook, steelhead, bull trout and other culturally important species, and needs to be protected, enhanced, and restored. All remaining intact areas on the mainstem should be maintained. Where possible, floodplain function should be restored, particularly from the Mission Creek confluence downstream to the Columbia River confluence.	WP 48, WP 49, WP 52, WP 53
H-7: All property owners and managers in the watershed are encouraged to continue to cooperate in maintaining forest roads. Opportunities for inter-agency or multiple owner cooperation in roads management should continue to be supported (Additional and background information on forest roads in presented in Appendix C).	Coordination/ Collaboration
H-8: Noxious weeds threaten aquatic and terrestrial ecosystems throughout the Wenatchee Watershed. The Planning Unit supports efforts toward noxious weed control and eradication.	Support
H-9: Consider using the Icicle Fund "Natural Resource Profile" as a tool to identify terrestrial habitat opportunities (Pacific Biodiversity Institute, 2002).	Study

Recommended Action	SEPA Analysis
H-10: A fish barrier inventory has been conducted in many areas of the watershed; however, key inventory data regarding each barrier is not always consistent (i.e. whether it is a partial or full barrier, etc.). A method for updating the inventory should be established and funded. The Chelan County fish barrier inventory should be integrated with fish barrier information collected by other land managers, such as the Forest Service. Look at SalmonScape as a starting point for integrating barrier information. The organization has been able to integrate barrier information from other land managers. In addition, the Habitat Subcommittee should try to address the need to include irrigation diversions, specifically pump diversions, in the Chelan County Fish barrier inventory using appropriate funding sources.	Study, Funding, Coordination/ Collaboration
H-11: Efforts that are ongoing in the Wenatchee Watershed to improve or maintain habitat quality need to be encouraged and retained. Recognize and acknowledge achievements in the watershed that have accomplished habitat improvement or protection. Develop a landowner or organization recognition program to recognize habitat improvement projects or achievements in the watershed.	Public Involvement and Education, Support
H-12: Initiate public information efforts to discourage harassment of spawning salmonids (UCRTT, 2002).	Public Involvement and Education
H-13: Salmon habitat restoration and protection actions should be coordinated with the Wenatchee Habitat Subcommittee to ensure consistency with watershed-wide strategies as identified in the watershed plan and other plans. Additionally, all other actions related to salmon recovery, including hatchery, harvest and hydropower activities, should be coordinated with the Wenatchee Habitat Subcommittee. Hatchery, harvest and hydropower activities that have a negative or adverse affect on local habitat restoration or protection actions must be carefully considered in the context of the local habitat strategy.	Coordination/ Collaboration

Short-term

Recommended Action	SEPA Analysis
H-14: Address passage barriers (UCSRB, 2005).	WP 45
H-15: Address diversion screens (UCSRB, 2005).	WP 42
H-16: Reduce the abundance and distribution of brook trout through feasible means (e.g., increased harvest) (UCSRB, 2005).	Early Planning Stages
H-17: Protect and maintain stream and riparian habitats within Category 1 assessment units (UCSRB, 2005).	WP 49, WP 52, WP 53
H-18: Protect, maintain, or enhance beneficial stream and riparian habitat conditions established by implementing Short-term Actions within assessment units (UCSRB, 2005).	WP 42, WP 43, WP 45, WP 49, WP 52, WP 53
H-19: Where feasible and practical, maintain connectivity throughout the historical distribution of the species (UCSRB, 2005).	WP 45, WP 46

Administrative/Institutional

Recommended Action	SEPA Analysis
H-20: NOAA Fisheries, U.S. Fish and Wildlife Service (USFWS), the Army Corp of Engineers, and State agencies should improve the permitting process for projects specific to recovery actions by reducing the time, cost, and review process requirements. These entities should also implement programmatic consultations for actions related to the implementation of the Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Plan and improve their review of species recovery projects with the local governments (UCSRB, 2005).	Other SEPA, Coordination/ Collaboration

Research and Monitoring

Recommended Action	SEPA Analysis
H-21: Wenatchee Habitat Subcommittee members can attend an annual Upper Columbia Monitoring Coordination Workshop for regular updates on all watershed-wide and other monitoring programs. In addition, the Subcommittee will be updated by the Regional Technical Team, as available, to ensure consistency across planning processes as well as to evaluate the effect of habitat improvement projects in the watershed.	Coordination/ Collaboration

Hatchery Related

Recommended Action	SEPA Analysis
H-22: The effects of hatchery practices in the Upper Columbia Basin on productivity are currently unknown. Research on reproductive success of hatchery produced fish that spawn in the wild is needed to assess effects on productivity (UCSRB, 2005).	Study
H-23: Additionally, future hatchery facilities will support recovery goals, and minimize and mitigate any impacts (including goals within other hatchery, harvest and hydropower activities). This list should not be considered all inclusive and specific actions will be determined and negotiated by the responsible parties (UCSRB, 2005).	Early Planning Stages, Support
H-24: Determine whether supplementation programs in the Wenatchee Sub-basin affect the viable salmonid population (VSP) parameters of spring Chinook (UCSRB, 2005).	Study
H-25: Develop, maintain, and provide a comprehensive inventory of habitat projects and their costs and benefits (effectiveness) to the public annually (UCSRB, 2005).	Study

TABLE 12-6

SEPA Analysis for the Lower Wenatchee River Sub-watershed Recommended Actions

Water Availability in the Northside Tributaries area

Recommended Action	SEPA Analysis
NSTQUANT-1: Future water supply availability should be discussed with Chelan County Public Utility District (PUD) to determine whether they have the capacity and infrastructure to provide backup supply. The East Bank Aquifer Regional Water Supply will only be considered as a source of water for this area if approved by the owners of the Regional Water Supply.	Coordination/ Collaboration, Study
NSTQUANT-2: PUD and Chelan County to consider pumping from Wenatchee Valley and a potential PUD hookup in Nahahum.	Study, WP 17
NSTQUANT-3: Chelan County and Ecology to provide public information regarding water limitations in Northside Tributaries (Fact Sheets).	Public Involvement and Education
NSTQUANT-4: Chelan County and Ecology to work with local community to design and implement a groundwater monitoring program in existing wells to determine trends in groundwater levels.	Coordination/ Collaboration, Study, Monitoring
NSTQUANT-5: Alternatives Analysis for Northside Tributaries to include options such as use of out-of-basin water, pumping from lower Wenatchee reserve, PUD hookup, deep groundwater, storage, and water right purchase.	Study, WP 7, WP 8, WP 10, WP 16, WP 17, WP 19, WP 20, WP 21, WP 22, WP 23, WP 24

pH/ DO

Recommended Action	SEPA Analysis
LowWenQUAL-1: The partnership formed to secure funding for further study of DO and pH (Chelan County, Chelan County PUD and the cities of Cashmere, Leavenworth and Wenatchee) should continue to work together, with the WQTS to acquire funding assistance and work with the WQTS to: • Facilitate and develop a workable strategy that can be used and ultimately approved by the EPA and in Ecology's TMDL submittal for DO and pH, and • Review and make suggestions for future improvements to Ecology's technical assessment, summary implementation plan, and adaptive management approaches to meet state water quality standards for these parameters.	Coordination/ Collaboration, Funding, Study
LowWenQUAL-2: Strategies to address point and non-point sources of phosphorus as part of the TMDL for DO and pH will be reported during the implementation phase of the Wenatchee Watershed planning effort.	Study, Early Planning Stages
LowWenQUAL-3: Large reductions of phosphorus inputs are needed from point sources in the Wenatchee River Watershed, especially waste water treatment plants (WWTPs). A regulatory strategy should be developed and implemented with WWTPs and Ecology to institute controls over time through National Pollutant Discharge Elimination System (NPDES) permits that will reduce phosphorous discharges to surface and groundwaters. WWTPs to be addressed include the Lake Wenatchee, Stevens Pass, Leavenworth, Peshastin, and Cashmere waste water treatment plants. Conduct associated monitoring and adaptive management (WQTS, 2006a).	Study, Adaptive Management, WP 30, WP 35, WP 37

Recommended Action	SEPA Analysis
LowWenQUAL-4: Controls should be developed and implemented through new and existing regulatory permits, if needed, to reduce phosphorous inputs to surface and groundwaters from other Wenatchee Watershed point sources. Conduct associated monitoring and adaptive management (WQTS, 2006a).	Continue Existing, Study, Adaptive Management, WP 30, WP 35, WP 37
LowWenQUAL-5: Large reductions of phosphorus inputs are needed from nonpoint sources in the Wenatchee River Watershed. Mass-balance modeling showed that two reaches of the lower Wenatchee River exhibit higher diffuse phosphorous loading than other reaches. One reach brackets the community of Dryden and the other brackets the city of Cashmere. Studies should be done in these two reaches, focusing on groundwater-surface water interaction and land-uses that may be contributing phosphorus inputs to the river. Actions should be implemented based on the conclusions and recommendations of these studies to reduce inputs of phosphorous from these areas (WQTS, 2006a).	Study, Early Planning Stages, WP 33, WP 34, WP 35, WP 36, WP 37, WP 38, WP 39, WP 40
LowWenQUAL-6: Groundwater discharges to the Wenatchee River, Icicle Creek, and their tributaries affects dissolved oxygen levels and nutrient concentrations. Groundwater is discharged to the river or creeks in some reaches, and is recharged in other reaches. In the Wenatchee basin, groundwater flow and Biochemical Oxygen Demand (BOD)/nutrient concentrations may be elevated due to upland practices such as orchard irrigation and wastewater discharge to groundwater from lagoons and on-site septic systems. Assessments of groundwater contributions and sources of nutrients (phosphorous) should be conducted. Actions should be implemented based on the conclusions and recommendations of these studies to reduce inputs of phosphorous from these areas (WQTS, 2006a).	Study, Early Planning Stages, WP 33, WP 34, WP 35, WP 36, WP 40
LowWenQUAL-7: Non-point sources along the length of the river may be contributing BOD and nutrients. Address failing septic systems through actions identified in the Wenatchee Watershed Fecal Coliform TMDL. Continue site specific inspections and enforcement of regulations that restrict placement of on-site septic drain fields from areas deemed to have unsuitable soils. A study should be conducted to assess soils and onsite septic systems. Estimates should be made of the maximum number and density of on-site drain fields that the upper basin can accommodate and still meet the water quality standards, as was done in the Lake Chelan study (Patmont et al., 1989). Conduct associated monitoring and adaptive management (WQTS, 2006a).	Study, Continue Existing, Adaptive Management, WP 35, WP 37
LowWenQUAL-8: Nutrients (phosphorous) can enter streams from storm water events. Work with Chelan County and municipalities to reduce storm water inputs, utilizing the Eastern Washington Storm water Manual or equivalent. Encourage the appropriate entities to include language that addresses storm water in comprehensive plans and ordinances. Work with developers. (See LowWenQUAL-18). Conduct associated monitoring and adaptive management (WQTS, 2006a).	Coordination/ Collaboration, Adaptive Management, Other SEPA, WP 35, WP 37, WP 40
LowWenQUAL-9: Nutrients (phosphorous) can enter surface and ground water from residential yards and gardens, hobby farms, City and County Parks, business owned landscapes, etc. An education outreach plan should be developed and implemented to heighten awareness and reduce inputs from these sources. Policies and practices should be implemented in City and County Public Works departments. The County and cities should consider implementing a ban on the sale of high phosphate detergents, such as is being considered in Spokane. Conduct associated monitoring and adaptive management (WQTS, 2006a).	Public Involvement and Education, Adaptive Management, Other SEPA, WP 35, WP 36, WP 37, WP 40

Recommended Action	SEPA Analysis
LowWenQUAL-10: Nutrients can enter streams from materials used to de-ice, clean, and maintain roads and parking lots. Animal waste from roads and parking lots can enter streams and increase nutrient loading. Work with the County, cities, businesses, and the WA State Department of Transportation to determine if road and parking lot maintenance practices may be contributing to nutrient loading and if necessary investigate ways to reduce nutrient inputs from these practices. Conduct associated monitoring and adaptive management (WQTS, 2006a).	Coordination/ Collaboration, Adaptive Management, Study, WP 35, WP 37
LowWenQUAL-11: Nutrients (phosphorous) can be released to ground and surface waters from development practices, such as disruption of soils during conversions of orchard lands to housing. Actions should be conducted to prevent nutrients from entering ground and surface waters before, during and after construction. Work with developers to implement these actions. Encourage entities to include appropriate language in county and city comprehensive plans, growth management, and critical area ordinances. Conduct associated monitoring and adaptive management (WQTS, 2006a).	Coordination/ Collaboration, Adaptive Management, Other SEPA, WP 35, WP 37, WP 38, WP 40
LowWenQUAL-12: The operation of Columbia River dams apparently backs up the Wenatchee River from its mouth approximately one mile. It has been hypothesized that this back-water may contribute to the exceedances of pH and dissolved oxygen levels in that reach. Work with the Chelan PUD to conduct an assessment of the possible back-water effect that may be created by operation of the Rock Island dam. Implement actions from the report's conclusions and recommendations to improve water quality (WQTS, 2006a).	Study, Early Planning Stages, WP 35
LowWenQUAL-13: Consider implementing actions recommended in the Wenatchee River Basin Temperature and Fecal Coliform TMDLs if the actions address problems that have been identified in the Lower Wenatchee. Lowering temperatures and reducing nutrient inputs will improve pH and dissolved oxygen levels in the Wenatchee River Watershed (WQTS, 2006a).	WP 35
LowWenQUAL-14: Reserve load capacities for Biochemical Oxygen Demand (BOD) and nutrients should be established for the Upper Wenatchee River and Icicle Creek. Reserve load capacities are needed because there is no additional assimilative capacity for dissolved oxygen in the upper watershed during critical conditions. A point source regulatory strategy and nonpoint source BMP strategy should be developed to protect the reserve capacities and maintain water quality standards (WQTS, 2006a).	WP 30, WP 31, WP 33, WP 34, WP 35, WP 37, WP 38, WP 39, WP 40
LowWenQUAL-15: Encourage lining of earthen canals where appropriate. Work with irrigation districts to implement BMPs and adaptive management programs to minimize any nutrient loading that is not already being addressed (WQTS, 2006a).	Adaptive Management, WP 33, WP 34, WP 35
LowWenQUAL-16: Agricultural practices can contribute nutrients to ground and surface waters through crop watering practices, application of fertilizers, and soil disturbance activities. Work with the agricultural community to encourage practices that will reduce nutrient inputs to ground and surface waters while enhancing crop quality and yield. Examples include technical assistance through farm plans and Best Management Practices (BMPs). Conduct associated monitoring and adaptive management (WQTS, 2006a).	Adaptive Management, WP 33, WP 34, WP 35, WP 37

Recommended Action	SEPA Analysis
LowWenQUAL-17: Funding for these projects should be sought through Department of Ecology Centennial and 319 grants and loans. Identify and access other funding sources through the Planning Unit and other entities. Ongoing adaptive management should be utilized to provide the best use of funds and environmental benefits (WQTS, 2006a).	Funding, Adaptive Management, WP 35
LowWenQUAL-18: Proper filtration of nutrients through land use practices can have a beneficial effect on nutrient reductions to ground and surface waters. Encourage implementation of wetlands, filter strips, riparian vegetation, bio-swales, drainage basins, pervious surfaces, etc. in residential, commercial, agricultural, industrial, development, and municipal practices. Conduct associated monitoring and adaptive management (WQTS, 2006a).	Adaptive Management, WP 33, WP 34, WP 35, WP 37
LowWenQUAL-19: Identify and investigate any non point sources in tributaries that may be contributing to nutrient loads (WQTS, 2006a).	Study, WP 35

Habitat Restoration/Enhancement

Recommended Action	SEPA Analysis
LowWenH-1: Use practical and feasible means to increase stream flows (within the natural hydrologic regime and existing water rights) in the Wenatchee River (UCSRB, 2005).	WP 1, WP 2, WP 3, WP 4, WP 8, WP 19, WP 20, WP 21, WP 22, WP 23
LowWenH-2: Reduce water temperatures by restoring riparian vegetation along the river (UCSRB, 2005).	WP 35, WP 47
LowWenH-3: Increase habitat diversity and quantity by restoring riparian habitat along the Wenatchee River, reconnecting side channels and the floodplain with the river, and increasing large woody debris in the side channels (UCSRB, 2005).	WP 42, WP 47, WP 48
LowWenH-4: Protect existing riparian habitat and channel migration floodplain function (UCRTT, 2002).	WP 49, WP 52, WP 53

TABLE 12-7

SEPA Analysis for the Mission Creek Sub-watershed Recommended Actions

Water Availability

Recommended Action	SEPA Analysis
MissionQUANT-1: Chelan County as lead (with support from Ecology), will convene a Mission Creek Forum to assess options to provide water for future growth through the purchase, lease or transfer of existing, valid water rights or from storage (storage opportunities within Mission Sub-watershed or through the Peshastin and/or Icicle Irrigation districts). This will be conducted for the purpose of providing an uninterruptible supply for domestic, municipal and stock water uses. During Phase IV, Implementation, the Mission Creek Forum will determine whether the strategies for Mission are relevant to Brender Creek, and consider assembling separate strategies to address local instream flow concerns and conditions for Brender Creek, if appropriate. Within two years of rule adoption, the Forum will have developed opportunities and researched funding opportunities for these alternatives.	Coordination/ Collaboration, Study, Funding, WP 7, WP 8, WP 9, WP 19, WP 20, WP 21, WP 22, WP 23, WP 24

Recommended Action	SEPA Analysis
MissionQUANT-2: As part of Phase IV, Implementation, evaluate alternatives that could increase available water for instream and out-of-stream uses. Clearly address specific water needs in the Mission Creek and evaluate water conservation, storage, purchase, lease and transfer of water rights, water from other sub-watersheds, and other alternatives as appropriate.	Study, WP 1, WP 2, WP 3, WP 4, WP 7, WP 8, WP 10, WP 19, WP 20, WP 21, WP 22, WP 23, WP 24
MissionQUANT-3: One quarter (0.03 cfs) of the 0.12 cfs projected 2025 water needs is available for growth for two years after rule adoption. If, after two years, water rights are not purchased or leased to cover the interim reserve of 0.03 cfs or conservation measures that provide additional water are not implemented, Ecology would close the Mission Sub-watershed to further appropriation on a seasonal basis, and existing outdoor water use established subsequent to the adoption of WAC 173-545 could be curtailed when flows are not met. All water allocated to the City of Cashmere will be debited to the Lower Wenatchee Reserve and not to the Mission Reserve.	WP 8, WP 10, WP 11
MissionQUANT-4: Consider storing water in Icicle/Peshastin and use that water to augment flows and provide mitigation water in Mission Creek.	WP 19, WP 20, WP 21, WP 22, WP 23, WP 24
MissionQUANT-5: Consider storage opportunities within Mission Sub-watershed (See Section 5.5).	WP 19, WP 20, WP 21, WP 22, WP 23, WP 24
MissionQUANT-6: Metering of all new uses covered under the Mission reserve (includes all new domestic uses).	Monitoring
MissionQUANT-7: Evaluate out-of-kind mitigation and enhancement projects over time, if appropriate. Identify habitat and water quality improvements to mitigate additional reserve water.	Study
MissionQUANT-8: Chelan County or other entity with agency funding assistance will investigate water rights for purchase or lease as part of the mitigation and enhancement strategy for Mission Sub-watershed. The County will seek funding from BPA, Ecology, Washington Rivers Conservancy, Washington Water Trust, and others. As water rights are purchased or transferred for use in the Mission reserve to meet a "no net impact" standard, the first purchase(s) will credit the 0.03 cfs interim reserve, then the additional 0.09 cfs will be available for forecasted growth as it is purchased.	Study, Funding, WP 7, WP 8

DDT

Recommended Action	SEPA Analysis
MissionQUAL-1: Significant reductions in DDT loads may be achieved by preventing bank erosion or by other means of limiting transport of upland soils to streams. BMPs such as riparian buffers and wetlands can also filter and uptake DDT from surface and groundwater. Many BMPs are currently being implemented in the watershed. BMPs should be continued, refined, expanded, and monitored to further reduce erosion, surface runoff, TSS in the water column, and groundwater transport of DDT. BMPs include farm practices, storm water runoff, riparian vegetation planting, orchard conversions, residential practices, riparian buffers, wetlands, etc. These and other appropriate BMP actions and locations should be identified and implemented in coordination with the Planning Unit and its committees (WQTS, 2006b).	Coordination/ Collaboration, Study, WP 35, WP 37

Recommended Action	SEPA Analysis
MissionQUAL-2: A phased monitoring approach should be conducted to assess the effectiveness of BMPs and DDT-TSS (Total Suspended Solids) reduction efforts. This may take time to achieve and, as TSS loads are reduced and DDT levels are monitored, TSS targets may be adjusted to correspond to DDT targets (WQTS, 2006b).	Study, Adaptive Management, WP 35, WP 37
MissionQUAL-3: Evaluation of soil transport to streams should be conducted during large rainfall events when visual observations can be made and/or sections of streams with high sediment runoff and TSS can be isolated. An assessment should be conducted to investigate if any other events contribute soil to streams such as spring thaw processes or irrigation practices (WQTS, 2006b).	Study, WP 35
MissionQUAL-4: More comprehensive groundwater monitoring should be conducted, including further assessment of the relationship between surface water, groundwater, and DDT fate and transport (WQTS, 2006b).	Study, WP 35, WP 37
MissionQUAL-5: Assessments are recommended for all irrigation systems in the watershed to identify any mechanisms that may contribute to sediment transport which are not yet being addressed by BMPs. Actions should be identified and implemented to address the findings. Lining of earthen canals should be encouraged (WQTS, 2006b).	Study, WP 31, WP 33, WP 34, WP 35
MissionQUAL-6: Activities should be identified and undertaken to provide ongoing outreach, education, and technical assistance to growers, streamside landowners, developers, stakeholders, and the general public (WQTS, 2006b).	Public Involvement and Education, WP 35, WP 36
MissionQUAL-7: Funding assistance should be sought from Ecology through its grants and loans programs to implement actions and ongoing monitoring. Other funding sources should be identified and applications submitted to provide funding for ongoing activities. The WQTS will recommend qualified entities to conduct associated monitoring (WQTS, 2006b).	Funding, WP 35, WP 37
MissionQUAL-8: Development over old orchards is a primary concern. Measures should be implemented to prevent DDT laden orchard soils disturbed during construction from being transmitted to streams and lakes in the watershed. Language requiring measures to prevent DDT laden soils from entering the waterways during and after construction should be developed by the WQTS and included in County and municipality development ordinances, growth management plans, and critical area ordinances. The Stormwater Management Manual for Eastern Washington or an equivalent document should be utilized in developing ordinances, and guiding municipal, private, and construction storm water practices (WQTS, 2006b).	Other SEPA, WP 35, WP 38, WP, 39, WP 40
MissionQUAL-9: Assessments are recommended for stormwater control systems in the watershed to identify any mechanisms that may contribute to sediment transport which are not yet being addressed by BMPs. Actions should be identified and implemented to address the findings through a list of prioritized projects (WQTS, 2006b).	Study, WP 35

Fecal Coliform

Recommended Action	SEPA Analysis
MissionQUAL-10: Identify sources of fecal coliform (FC) pollution to Mission Creek Sub-watershed, utilizing the FC technical study. Identify human and nonhuman sources and/or failing on-site septic systems. Plan and implement corrective actions. The Chelan-Douglas Health District (CDHD) should address failing septic systems. Other entities should address manageable sources of FC pollution as appropriate. See the complete action in the plan for the areas in which assessment should be conducted (WQTS, 2006c).	Study, WP 35
MissionQUAL-11: Implement and monitor BMPs to meet the Fecal Coliform TMDL Technical Assessment target reductions (WQTS, 2006c).	Monitoring, WP 35
MissionQUAL-12: Utilizing this report, City of Cashmere, and Ecology information, work with the city of Cashmere to identify sewer system root intrusion in areas near streams. Repair and upgrade sewer collection and delivery system (WQTS, 2006c).	Coordination/ Collaboration, Study, WP 35
MissionQUAL-13: The CDHD will continue to work with consenting homeowners to conduct monitoring of on-site wells in areas of fecal coliform exceedances to help identify the source/s. Utilize this assessment (July 2003) to help identify locations for testing (WQTS, 2006c).	Study, WP 35, WP 37
MissionQUAL-14: CDHD will continue to implement onsite sewage disposal system technical assistance and education programs for homeowners and the industry (WQTS, 2006c).	Public Involvement and Education, WP 35, WP 36
MissionQUAL-15: The CDHD will continue to permit sewage systems per Washington Administrative Code (WAC), including analyzing soils and technologies suitable for individual sites; review/approve the proposed design, specifications, installation and if required, the ongoing maintenance in accordance with the WAC; provide public information under real estate disclosure laws; and review all land use proposals to ensure that the WAC is properly enforced prior to approval by the County (WQTS, 2006c).	Continue Existing, Public Involvement and Education, WP 35
MissionQUAL-16: A grant/loan funding program should be developed and implemented to replace or repair failing septic systems (WQTS, 2006c).	Funding, WP 35
MissionQUAL-17: The CDHD should explore obtaining legal authority from Chelan County to operate a pumper notification program with area septage pumpers as part of its onsite septic system operation and maintenance program. The septage pumpers would work with the CDHD to appropriately identify and correct failing septic systems (WQTS, 2006c).	Study, Other SEPA, WP 35
MissionQUAL-18: The CDHD and watershed would benefit from the funding, development and maintenance of a digital system for all onsite septic system permits issued in Chelan County, and a Geographic Information Systems (GIS) database of the onsite septic systems (WQTS, 2006c).	Funding, Study, WP 35
MissionQUAL-19: When the TMDL DIP is developed, the committee should utilize detailed recommendations from the Wenatchee River Watershed Action Plan (WQTS, 2006c).	WP 35
MissionQUAL-20: Conduct stream walk cleanups along the stream (Fall, Spring, Summer) with area schools, homeowners, and other groups (WQTS, 2006c).	Public Involvement and Education, WP 35, WP 36

Recommended Action	SEPA Analysis
MissionQUAL-21: Conduct ongoing community fecal coliform education/awareness campaigns throughout the year. Engage and get support from homeowners (WQTS, 2006c).	Public Involvement and Education, WP 35, WP 36
MissionQUAL-22: Work with City, County, State, and Federal governments, and the Humane Society to deal with the feral cats and dogs living within the stream corridor. Monitor and remove dead animals within the stream corridor throughout the year (WQTS, 2006c).	Coordination/ Collaboration, Monitoring, WP 35
MissionQUAL-23: Conduct education and enforcement actions to stop illegal dumping of wastes either to storm drains or directly to surface waters. This dumping may be of portable toilet wastes, recreational vehicle wastes, etc. (WQTS, 2006c).	Public Involvement and Education, Continue Existing, WP 35, WP 36
MissionQUAL-24: The WQTS should encourage the CDHD, Chelan County, Cities, DOH, and Utilities to continue ongoing review and upgrading of ordinances regarding developments and sewage systems technologies (WQTS, 2006c).	Continue Existing, Other SEPA, WP 35
MissionQUAL-25: The WQTS and its participating entities should work with the public and homeowners regarding BMPs to reduce fecal coliform runoff. General actions should include public information, education, and technical assistance regarding watering practices, landscaping, stormwater runoff, filtration practices, animal waste, etc. (WQTS, 2006c).	Public Involvement and Education, WP 35, WP 36
MissionQUAL-26: Work with irrigation districts to implement and enforce policies to prevent illegal fecal coliform discharges to irrigation canals (WQTS, 2006c).	WP 33, WP 35
MissionQUAL-27: Work with landowners regarding fecal coliform runoff (WQTS, 2006c).	WP 31, WP 33, WP 34, WP 35, WP 36
MissionQUAL-28: Encourage Chelan County and municipalities to develop and implement stormwater policies, standards, and guidelines, utilizing the Eastern Washington Stormwater Manual or equivalent, in comprehensive plans, critical area ordinances, growth management plans, and other appropriate plans (WQTS, 2006c).	Other SEPA, WP 35, WP 38, WP 39, WP 40
MissionQUAL-29: Work with appropriate entities to reduce fecal coliform runoff from impervious surfaces (WQTS, 2006c).	Coordination/ Collaboration, WP 35
MissionQUAL-30: Work with U.S. Forest Service, Washington State Department of Natural Resources, and private owners on forested lands to restore and protect streams from fecal coliform runoff pollution (WQTS, 2006c).	Coordination/ Collaboration, WP 35
MissionQUAL-31: Work with wastewater purveyors to examine sewer collection systems to identify problems or damage within them that may contribute fecal coliform loading in the watershed. Correct identified problems as appropriate (WQTS, 2006c).	Coordination/ Collaboration, Study, WP 35
MissionQUAL-32: Funding assistance should be sought from Ecology through its grants and loans programs to implement actions and ongoing monitoring. Other funding sources should be identified and applications submitted to provide funding for ongoing activities. The WQTS will recommend qualified entities to conduct associated monitoring. Self-sustaining funding mechanisms to reduce fecal coliform inputs should be explored and developed in concert with the Wenatchee Watershed Planning Unit and its participating entities (WQTS, 2006c).	Funding, WP 35, WP 37

Recommended Action	SEPA Analysis
MissionQUAL-33: Work with the wastewater utilities regarding their ordinances to connect unconnected homes in the service area (WQTS, 2006c).	WP 35, WP 40

Habitat Restoration/Enhancement

Recommended Action	SEPA Analysis
MissionH-1: Re-establish connectivity throughout the assessment unit by removing, replacing, or fixing artificial barriers (culverts and diversions) (UCSRB, 2005).	WP 45
MissionH-2: Use practical and feasible means to increase stream flows (within the natural hydrologic regime and existing water rights) in Mission Creek (UCSRB, 2005).	WP 1, WP 2, WP 3, WP 4, WP 8, WP 19, WP 20, WP 21, WP 22, WP 23
MissionH-3: Decrease water temperatures and improve water quality by restoring riparian vegetation along the stream (UCSRB, 2005).	WP 35, WP 47
MissionH-4: Reduce unnatural sediment recruitment to the stream by restoring riparian habitat and improving road maintenance (UCSRB, 2005).	WP 45, WP 47, WP 50, WP 52
MissionH-5: Increase habitat diversity and quantity by restoring riparian habitat, reconnecting side channels and the floodplain with the channel, increasing large woody debris within the channel, and by adding instream structures (UCSRB, 2005).	WP 42, WP 47, WP 48

TABLE 12-8

SEPA Analysis for the Peshastin Creek Sub-watershed Recommended Actions

Water Availability

Recommended Action	SEPA Analysis
PeshastinQUANT-1: Evaluate passage requirements for fish immediately below the Peshastin Irrigation District diversion (addressing bypass reach/piping).	Study, WP 45, WP 46
PeshastinQUANT-2: Consider other instream projects that improve habitat.	WP 42, WP 48
PeshastinQUANT-3: As part of Phase IV, Implementation, evaluate alternatives that could increase available water for instream and out-of-stream uses. Clearly address specific water needs in the Peshastin and evaluate water conservation, storage, purchase, lease and transfer of water rights, and other alternatives.	Study, WP 1, WP 2, WP 3, WP 4, WP 7, WP 8, WP 10, WP 19, WP 20, WP 21, WP 22, WP 23, WP 24
PeshastinQUANT-4: Evaluate and institute programs to increase instream flows through water acquisitions, leases, and transfers.	WP 8

Habitat Restoration/Enhancement

Recommended Action	SEPA Analysis
PeshastinH-1: Re-establish connectivity throughout the assessment unit by removing, replacing, or fixing artificial barriers (UCSRB, 2005).	WP 45
PeshastinH-2: Use practical and feasible means to increase stream flows (within the natural hydrologic regime and existing water rights) in Peshastin Creek (UCSRB, 2005).	WP 1, WP 2, WP 3, WP 4, WP 8, WP 19, WP 20, WP 21, WP 22, WP 23
PeshastinH-3: Reduce water temperatures by increasing stream flows and restoring riparian vegetation along the stream (UCSRB, 2005).	WP 1, WP 2, WP 3, WP 4, WP 8, WP 19, WP 20, WP 21, WP 22, WP 23, WP 35, WP 47
PeshastinH-4: Increase habitat diversity and quantity by restoring riparian vegetation, adding instream structures and large woody debris, and reconnecting side channels and the floodplain with the stream (UCSRB, 2005).	WP 42, WP 47, WP 48

TABLE 12-9

SEPA Analysis for the Chumstick Creek Sub-watershed Recommended Actions

Water Availability

Recommended Action	SEPA Analysis
ChumQUANT-1: Chelan County as lead (with support from Ecology), will convene a Chumstick Water Forum to guide data collection, oversee the proposed water management strategy, and help develop mitigation measures.	Coordination/ Collaboration, Study
ChumQUANT-2: Chumstick Water Forum to assist in developing a data collection plan to monitor surface water flows (specify location) and develop management flows.	Study, Monitoring
ChumQUANT-3: Chumstick Water Forum, with assistance from Chelan County and Ecology, to conduct groundwater monitoring to understand hydraulic continuity and overall impact of exempt wells on groundwater levels and streamflows.	Study, Monitoring

Recommended Action	SEPA Analysis
ChumQUANT-4: Recommend that Ecology close the Chumstick Sub-watershed for an interim period of three years while data are collected and alternatives are assessed. Uses that are not subject to the closure (and can continue throughout the three year interim closure) include: fire suppression, domestic use from wells, stock water uses, and seasonal storage, pending evaluation by the Chumstick Water Forum and Ecology. These exempt uses would be limited to a total of 0.043 cfs while studies are being performed to determine future water availability in the Chumstick and a future strategy is assessed. Seasonal storage opportunities and other alternatives in Chumstick will be evaluated by Ecology and the Chumstick Water Forum through the water right application process on a case-by-case basis during the three year interim period. Storage opportunities in Chumstick will be addressed as part of the Chumstick strategy after conclusion of the Forum's three year process and coordinated with the WRIA 45 Multi-Purpose Storage Assessment. This interim closure will be re-evaluated at the end of the three year period by the Chumstick Forum and Ecology. Note that water storage tanks as included in the Chumstick Community Wildfire Protection Program are exempt from this closure.	Study, Coordination/ Collaboration, Adaptive Management, Continue Existing, WP 10, WP 11, WP 19, WP 20, WP 21, WP 22, WP 23, WP 24
ChumQUANT-5: Ecology and Chelan County to implement reservation conditions as follows: One third (0.043 cfs) of the 0.13 cfs projected 2025 water needs is available for growth for three years after rule adoption. Allocation of the remainder of the reserve would be considered only after completion of additional instream flow assessments (ChumQUANT-2) and a cumulative impacts study (ChumQUANT-3, 6) and would be subject to appropriate conditions and limitations based on the result of those assessments (ChumQUANT-7). If, after completion of the cumulative impact study, Ecology determines that the cumulative effects of domestic water uses negatively affect water available for instream flows, Ecology will consider allowing only in-house water use from the reservation. If after 3 years, water rights are not purchased or leased to cover the interim reserve of 0.043 cfs or conservation measures that provide additional water are not implemented, Ecology would close the Chumstick Sub-watershed to further appropriation on a seasonal basis, and existing outdoor water use established subsequent to the adoption of WAC 173-545 could be curtailed when flows are not met. Note that the City of Leavenworth will debit any new water from the Lower Wenatchee Reserve and not the Chumstick Reserve.	Study, WP 1, WP 2, WP 3, WP 4, WP 7, WP 8, WP 10, WP 11
ChumQUANT-6: A cumulative impact analysis of permit exempt use and uses associated with permits and claims approved since 1983 will be initiated by Ecology as authorized under the 1983 flow rule. Chelan County will partner with Ecology in this study. The cumulative impacts assessment will help to determine whether Ecology will curtail outdoor domestic water use of wells installed after 1983, and whether Ecology will close the Chumstick Sub-watershed to outdoor water use in the future.	Study
ChumQUANT-7: Chumstick Forum, Chelan County and Ecology to re-evaluate a proposed strategy for the Chumstick in three years after rule adoption, when new monitoring data have been collected and assessed and cumulative impact analysis is complete. Consider allowing group domestic groundwater use of deeper aquifer only as part of the Chumstick strategy addressed by the Forum.	Study, Adaptive Management, WP 16
ChumQUANT-8: Chelan County will evaluate alternatives to improve fish passage at the North Road culvert, and further pursue replacement of culverts upstream of North Road on Chumstick Creek.	Study, WP 45
ChumQUANT-9: Metering of all new uses covered under the Chumstick reserve (includes all new domestic uses).	Monitoring

Recommended Action	SEPA Analysis
ChumQUANT-10: As part of Phase IV, Implementation, the Planning Unit and the Chumstick Forum (with Chelan County as lead) will evaluate alternatives that could increase available water for instream and out-of-stream uses. Clearly address specific water needs in the Chumstick and evaluate water conservation, storage opportunities, purchase, lease and transfer of water rights, water transfer from other sub-watersheds, and other alternatives. Consider conjunctive use and evaluate pumping from the deep aquifer to augment flows in the Chumstick. Investigate storage options where stored water could be used to augment flows and provide mitigation water.	Study, WP 1, WP 2, WP 3, WP 4, WP 5, WP 6, WP 7, WP 8, WP 9, WP 10, WP 16, WP 19, WP 20, WP 21, WP 22, WP 23, WP 24
ChumQUANT-11: Encourage conservation and outreach.	Public Involvement and Education
ChumQUANT-12: Chelan County or other entity with agency funding assistance will investigate water rights for purchase or lease as part of the mitigation and enhancement strategy for Chumstick Sub-watershed. The County will seek funding from BPA, Ecology, Washington Rivers Conservancy, Washington Water Trust, and others. As water rights are purchased or transferred for use in the Chumstick reserve to meet a "no net impact" standard, the first purchase(s) will credit the 0.043 cfs interim reserve, then the additional 0.09 cfs will be available for forecasted growth as it is purchased. Consider information from adjudication records (1982-1984) when investigating water rights for purchase or lease.	Funding, Study, WP 7, WP 8

Fecal Coliform

Recommended Action	SEPA Analysis
ChumQUAL-1: Identify sources of fecal coliform pollution to Chumstick Creek Sub-watershed, including Van Creek and Upper Eagle Creek, utilizing the FC technical study. Identify human and nonhuman sources and/or failing on-site septic systems. Plan and implement corrective actions. The CDHD should address failing septic systems. Other entities should address manageable sources of FC pollution as appropriate (WQTS, 2006c).	Study, WP 35, Early Planning Stages
ChumQUAL-2: Implement and monitor BMPs to meet the Fecal Coliform TMDL Technical Assessment target reductions (WQTS, 2006c).	Monitoring, WP 35
ChumQUAL-3: CDHD will continue to implement onsite sewage disposal system technical assistance and education programs for homeowners and the industry (WQTS, 2006c).	Public Involvement and Education, WP 35, WP 36
ChumQUAL-4: The CDHD will continue to permit sewage systems per Washington Administrative Code (WAC), including analyzing soils and technologies suitable for individual sites; review/approve the proposed design, specifications, installation and if required, the ongoing maintenance in accordance with the WAC; provide public information under real estate disclosure laws; and review all land use proposals to ensure that the WAC is properly enforced prior to approval by the County (WQTS, 2006c).	Continue Existing, Public Involvement and Education, WP 35
ChumQUAL-5: A grant/loan funding program should be developed and implemented to replace or repair failing septic systems (WQTS, 2006c).	Funding, WP 35

Recommended Action	SEPA Analysis
ChumQUAL-6: The CDHD should explore obtaining legal authority from Chelan County to operate a pumper notification program with area septage pumpers as part of its onsite septic system operation and maintenance program. The septage pumpers would work with the CDHD to appropriately identify and correct failing septic systems (WQTS, 2006c).	Study, Other SEPA, WP 35
ChumQUAL-7: The CDHD and watershed would benefit from the funding, development and maintenance of a digital system for all onsite septic system permits issued in Chelan County, and a GIS database of the onsite septic systems (WQTS, 2006c).	Study, Funding, WP 35
ChumQUAL-8: When the TMDL DIP is developed, the committee should utilize detailed recommendations from the Wenatchee River Watershed Action Plan (WQTS, 2006c).	WP 35
ChumQUAL-9: Conduct stream walk cleanups along the stream (Fall, Spring, Summer) with area schools, homeowners, and other groups (WQTS, 2006c).	Public Involvement and Education, WP 35, WP 36
ChumQUAL-10: Conduct ongoing community fecal coliform education/awareness campaigns throughout the year. Engage and get support from homeowners (WQTS, 2006c).	Public Involvement and Education, WP 35, WP 36
ChumQUAL-11: Work with City, County, State, and Federal governments, and the Humane Society to deal with the feral cats and dogs living within the stream corridor. Monitor and remove dead animals within the stream corridor throughout the year. (WQTS, 2006c).	Coordination/ Collaboration, Monitoring, WP 35
ChumQUAL-12: Conduct education and enforcement actions to stop illegal dumping of wastes either to storm drains or directly to surface waters. This dumping may be of portable toilet wastes, recreational vehicle wastes, etc. (WQTS, 2006c).	Public Involvement and Education, Continue Existing, WP 35, WP 36
ChumQUAL-13: The WQTS should encourage the CDHD, Chelan County, Cities, DOH, and Utilities to continue ongoing review and upgrading of ordinances regarding developments and sewage systems technologies (WQTS, 2006c).	Continue Existing, Other SEPA, WP 35
ChumQUAL-14: The WQTS and its participating entities should work with the public and homeowners regarding BMPs to reduce fecal coliform runoff. General actions should include public information, education, and technical assistance regarding watering practices, landscaping, stormwater runoff, filtration practices, animal waste, etc. (WQTS, 2006c).	Public Involvement and Education, WP 35, WP 36
ChumQUAL-15: Work with irrigation districts to implement and enforce policies to prevent illegal fecal coliform discharges to irrigation canals (WQTS, 2006c).	WP 33, WP 35
ChumQUAL-16: Work with landowners regarding fecal coliform runoff (WQTS, 2006c).	WP 31, WP 33, WP 34, WP 35, WP 36
ChumQUAL-17: Encourage Chelan County and municipalities to develop and implement stormwater policies, standards, and guidelines, utilizing the Eastern Washington Stormwater Manual or equivalent, in comprehensive plans, critical area ordinances, growth management plans, and other appropriate plans (WQTS, 2006c).	Other SEPA, WP 35, WP 38, WP 39, WP 40
ChumQUAL-18: Work with appropriate entities to reduce fecal coliform runoff from impervious surfaces (WQTS, 2006c).	Coordination/ Collaboration, WP 35

Recommended Action	SEPA Analysis
ChumQUAL-19: Work with U.S. Forest Service, Washington State Department of Natural Resources, and private owners on forested lands to restore and protect streams from fecal coliform runoff pollution (WQTS, 2006c).	Coordination/ Collaboration, WP 35
ChumQUAL-20: Funding assistance should be sought from Ecology through its grants and loans programs to implement actions and ongoing monitoring. Other funding sources should be identified and applications submitted to provide funding for ongoing activities. The WQTS will recommend qualified entities to conduct associated monitoring. Self-sustaining funding mechanisms to reduce fecal coliform inputs should be explored and developed in concert with the Wenatchee Watershed Planning Unit and its participating entities (WQTS, 2006c).	Funding, WP 35, WP 37

Habitat Restoration/Enhancement

Recommended Action	SEPA Analysis
ChumH-1: Re-establish connectivity throughout the assessment unit by removing, replacing, or fixing artificial barriers (culverts and diversions) (UCSRB, 2005).	WP 45
ChumH-2: Use practical and feasible means to increase stream flows (within the natural hydrologic regime and existing water rights) in Chumstick Creek (UCSRB, 2005).	WP 1, WP 2, WP 3, WP 4, WP 8, WP 19, WP 20, WP 21, WP 22, WP 23
ChumH-3: Decrease water temperatures and improve water quality by restoring riparian vegetation along the stream (UCSRB, 2005).	WP 35, WP 47
ChumH-4: Increase habitat diversity and quantity by restoring riparian habitat, reconnecting side channels and the floodplain with the channel, increasing large woody debris within the channel, and by adding instream structures (UCSRB, 2005).	WP 42, WP 47, WP 48
ChumH-5: Protect remaining floodplain and riparian habitat (UCRTT, 2002).	WP 49, WP 52, WP 53

TABLE 12-10

SEPA Analysis for the Icicle Creek Sub-watershed Recommended Actions

Water Resource Management Strategy

Recommended Action	SEPA Analysis
WRMS-4c: Recommends a new stream gage be established at the existing control point on the Icicle Creek. Details will be determined during Phase IV, Implementation.	Monitoring

DO/pH

Recommended Action	SEPA Analysis
IcicleQUAL-1: The partnership formed to secure funding for further study of DO and pH (Chelan County, Chelan County PUD and the cities of Cashmere, Leavenworth and Wenatchee) should continue to work together, with the WQTS to acquire funding assistance and work with the WQTS to: • Facilitate and develop a workable strategy that can be used and ultimately approved by the EPA and in Ecology's TMDL submittal for DO and pH, and • Review and make suggestions for future improvements to Ecology's technical assessment, summary implementation plan, and adaptive management approaches to meet state water quality standards for these parameters.	Coordination/ Collaboration, Funding, Study
IcicleQUAL-2: Strategies to address point and non-point sources of phosphorus as part of the TMDL for DO and pH will be reported during the implementation phase of the Wenatchee Watershed planning effort.	Study, Early Planning Stages
IcicleQUAL-3: Controls should be developed and implemented through new and existing regulatory permits, if needed, to reduce phosphorous inputs to surface and groundwaters from other Wenatchee Watershed point sources. Conduct associated monitoring and adaptive management (WQTS, 2006a).	Continue Existing, Study, Adaptive Management, WP 30, WP 35, WP 37
IcicleQUAL-4: Groundwater discharges to the Wenatchee River, Icicle Creek, and their tributaries affects dissolved oxygen levels and nutrient concentrations. Groundwater is discharged to the river or creeks in some reaches, and is recharged in other reaches. In the Wenatchee basin, groundwater flow and BOD/nutrient concentrations may be elevated due to upland practices such as orchard irrigation and wastewater discharge to groundwater from lagoons and on-site septic systems. Assessments of groundwater contributions and sources of nutrients (phosphorous) should be conducted. Actions should be implemented based on the conclusions and recommendations of these studies to reduce inputs of phosphorous from these areas (WQTS, 2006a).	Study, Early Planning Stages, WP 33, WP 34, WP 35, WP 36, WP 40
IcicleQUAL-5: Non-point sources along the length of the river may be contributing BOD and nutrients. Address failing septic systems through actions identified in the Wenatchee Watershed Fecal Coliform TMDL. Continue site specific inspections and enforcement of regulations that restrict placement of on-site septic drain fields from areas deemed to have unsuitable soils. A study should be conducted to assess soils and onsite septic systems. Estimates should be made of the maximum number and density of on-site drain fields that the upper basin can accommodate and still meet the water quality standards, as was done in the Lake Chelan study (Patmont et al., 1989). Conduct associated monitoring and adaptive management (WQTS, 2006a).	Study, Continue Existing, Adaptive Management, WP 35, WP 37
IcicleQUAL-6: Nutrients (phosphorous) can enter streams from storm water events. Work with Chelan County and municipalities to reduce storm water inputs, utilizing the Eastern Washington Storm water Manual or equivalent. Encourage appropriate entities to include language that addresses storm water in comprehensive plans and ordinances. Work with developers. (See IcicleQUAL-15). Conduct associated monitoring and adaptive management (WQTS, 2006a).	Coordination/ Collaboration, Adaptive Management, Other SEPA, WP 35, WP 37, WP 40

Recommended Action	SEPA Analysis
IcicleQUAL-7: Nutrients (phosphorous) can enter surface and ground water from residential yards and gardens, hobby farms, City and County Parks, business owned landscapes, etc. An education outreach plan should be developed and implemented to heighten awareness and reduce inputs from these sources. Policies and practices should be implemented in City and County Public Works departments. The County and cities should consider implementing a ban on the sale of high phosphate detergents, such as is being considered in Spokane. Conduct associated monitoring and adaptive management (WQTS, 2006a).	Public Involvement and Education, Adaptive Management, Other SEPA, WP 35, WP 36, WP 37, WP 40
IcicleQUAL-8: Nutrients can enter streams from materials used to de-ice, clean, and maintain roads and parking lots. Animal waste from roads and parking lots can enter streams and increase nutrient loading. Work with the County, cities, and businesses to determine if road and parking lot maintenance practices may be contributing to nutrient loading and if necessary investigate ways to reduce nutrient inputs from these practices. Conduct associated monitoring and adaptive management (WQTS, 2006a).	Coordination/ Collaboration, Adaptive Management, Study, WP 35, WP 37
IcicleQUAL-9: Nutrients (phosphorous) can be released to ground and surface waters from development practices, such as disruption of soils during conversions of orchard lands to housing. Actions should be conducted to prevent nutrients from entering ground and surface waters before, during and after construction. Work with developers to implement these actions. Encourage entities to include appropriate language in county and city comprehensive plans, growth management, and critical area ordinances. Conduct associated monitoring and adaptive management (WQTS, 2006a).	Coordination/ Collaboration, Adaptive Management, Other SEPA, WP 35, WP 37, WP 38, WP 40
IcicleQUAL-10: Consider implementing actions recommended in the Wenatchee River Basin Temperature and Fecal Coliform TMDLs if the actions address problems that have been identified in the Icicle Sub-watershed. Lowering temperatures and reducing nutrient inputs will improve pH and dissolved oxygen levels in the Wenatchee River Watershed (WQTS, 2006a).	WP 35
IcicleQUAL-11: Reserve load capacities for Biochemical Oxygen Demand (BOD) and nutrients should be established for the Upper Wenatchee River and Icicle Creek. Reserve load capacities are needed because there is no additional assimilative capacity for dissolved oxygen in the upper watershed during critical conditions. A point source regulatory strategy and nonpoint source BMP strategy should be developed to protect the reserve capacities and maintain water quality standards (WQTS, 2006a).	WP 30, WP 31, WP 33, WP 34, WP 35, WP 37, WP 38, WP 39, WP 40
IcicleQUAL-12: Encourage lining of earthen canals where appropriate. Work with irrigation districts to implement BMPs and adaptive management programs to minimize any nutrient loading that is not already being addressed (WQTS, 2006a).	Adaptive Management, WP 33, WP 34, WP 35
IcicleQUAL-13: Agricultural practices can contribute nutrients to ground and surface waters through crop watering practices, application of fertilizers, and soil disturbance activities. Work with the agricultural community to encourage practices that will reduce nutrient inputs to ground and surface waters while enhancing crop quality and yield. Examples include technical assistance through farm plans and Best Management Practices (BMPs). Conduct associated monitoring and adaptive management (WQTS, 2006a).	Adaptive Management, WP 33, WP 34, WP 35, WP 37

Recommended Action	SEPA Analysis
IcicleQUAL-14: Funding for these projects should be sought through Department of Ecology Centennial and 319 grants and loans. Identify and access other funding sources through the Planning Unit and other entities. Ongoing adaptive management should be utilized to provide the best use of funds and environmental benefits (WQTS, 2006a).	Adaptive Management, Funding, WP 35
IcicleQUAL-15: Proper filtration of nutrients through land use practices can have a beneficial effect on nutrient reductions to ground and surface waters. Encourage implementation of wetlands, filter strips, riparian vegetation, bio-swales, drainage basins, pervious surfaces, etc. in residential, commercial, agricultural, industrial, development, and municipal practices. Conduct associated monitoring and adaptive management (WQTS, 2006a).	Adaptive Management, WP 33, WP 34, WP 35, WP 37
IcicleQUAL-16: Identify and investigate any non point sources in tributaries that may be contributing to nutrient loads (WQTS, 2006a).	Study, WP 35

Habitat Restoration/Enhancement

Recommended Action	SEPA Analysis
IcicleH-1: Increase connectivity by improving fish passage over Dam 5 in the lower Icicle Creek (UCSRB, 2005).	WP 45, WP 46
IcicleH-2: Reduce sediment recruitment by restoring riparian vegetation between the mouth of the Icicle and the boulder field (RM 0-5.4) (UCSRB, 2005).	WP 35, WP 47, WP 50
IcicleH-3: Improve road maintenance to reduce fine sediment recruitment in the upper watershed (UCSRB, 2005).	WP 45
IcicleH-4: Increase habitat diversity and quantity by restoring riparian vegetation, reconnecting side channels, and reconnecting the floodplain with the channel in lower Icicle Creek (UCSRB, 2005).	WP 47, WP 48
IcicleH-5: Use practical and feasible means to increase stream flows (within the natural hydrologic regime and existing water rights) in Icicle Creek (UCSRB, 2005).	WP 1, WP 2, WP 3, WP 4, WP 8, WP 19, WP 20, WP 21, WP 22, WP 23
IcicleH-6: Protect remaining floodplain and riparian habitat downstream of Chatter Creek. Emphasis should be placed on habitat downstream of Leavenworth Hatchery (UCRTT, 2002).	WP 49, WP 52, WP 53

TABLE 12-11

SEPA Analysis for the Upper Wenatchee River and Chiwaukum Creek Sub-watershed Recommended Actions

DO/pH

Recommended Action	SEPA Analysis
UpWenQUAL-1: The partnership formed to secure funding for further study of DO and pH (Chelan County, Chelan County PUD and the cities of Cashmere, Leavenworth and Wenatchee) should continue to work together, with the WQTS to acquire funding assistance and work with the WQTS to: • Facilitate and develop a workable strategy that can be used and ultimately approved by the EPA and in Ecology's TMDL submittal for DO and pH, and • Review and make suggestions for future improvements to Ecology's technical assessment, summary implementation plan, and adaptive management approaches to meet state water quality standards for these parameters.	Coordination/ Collaboration, Funding, Study
UpWenQUAL-2: Strategies to address point and non-point sources of phosphorus as part of the TMDL for DO and pH will be reported during the implementation phase of the Wenatchee Watershed planning effort.	Study, Early Planning Stages
UpWenQUAL-3: Large reductions of phosphorus inputs are needed from point sources in the Wenatchee River Watershed especially waste water treatment plants (WWTPs). A regulatory strategy should be developed and implemented with WWTPs and Ecology to institute controls over time through NPDES permits that will reduce phosphorous discharges to surface and groundwaters. WWTPs to be addressed include the Lake Wenatchee, Stevens Pass, Leavenworth, Peshastin, and Cashmere waste water treatment plants. Conduct associated monitoring and adaptive management (WQTS, 2006a).	Study, Adaptive Management, WP 30, WP 35, WP 37
UpWenQUAL-4: Controls should be developed and implemented through new and existing regulatory permits, if needed, to reduce phosphorous inputs to surface and groundwaters from other Wenatchee Watershed point sources. Conduct associated monitoring and adaptive management (WQTS, 2006a).	Continue Existing, Study, Adaptive Management, WP 30, WP 35, WP 37
UpWenQUAL-5: Groundwater discharges to the Wenatchee River, Icicle Creek, and their tributaries affects dissolved oxygen levels and nutrient concentrations. Groundwater is discharged to the river or creeks in some reaches, and is recharged in other reaches. In the Wenatchee basin, groundwater flow and BOD/nutrient concentrations may be elevated due to upland practices such as orchard irrigation and wastewater discharge to groundwater from lagoons and on-site septic systems. Assessments of groundwater contributions and sources of nutrients (phosphorous) should be conducted. Actions should be implemented based on the conclusions and recommendations of these studies to reduce inputs of phosphorous from these areas (WQTS, 2006a).	Study, Early Planning Stages, WP 33, WP 34, WP 35, WP 36, WP 40

Recommended Action	SEPA Analysis
UpWenQUAL-6: Non-point sources along the length of the river may be contributing BOD and nutrients. Address failing septic systems through actions identified in the Wenatchee Watershed Fecal Coliform TMDL. Continue site specific inspections and enforcement of regulations that restrict placement of on-site septic drain fields from areas deemed to have unsuitable soils. A study should be conducted to assess soils and onsite septic systems. Estimates should be made of the maximum number and density of on-site drain fields that the upper basin can accommodate and still meet the water quality standards, as was done in the Lake Chelan study (Patmont et al., 1989). Conduct associated monitoring and adaptive management (WQTS, 2006a).	Study, Continue Existing, Adaptive Management, WP 35, WP 37
UpWenQUAL-7: Nutrients (phosphorous) can enter streams from storm water events. Work with Chelan County and municipalities to reduce storm water inputs, utilizing the Eastern Washington Storm water Manual or equivalent. Encourage the appropriate entities to include language that addresses storm water in comprehensive plans and ordinances. Work with developers. (See UpWenQUAL-16). Conduct associated monitoring and adaptive management (WQTS, 2006a).	Coordination/ Collaboration, Adaptive Management, Other SEPA, WP 35, WP 37, WP 40
UpWenQUAL-8: Nutrients (phosphorous) can enter surface and ground water from residential yards and gardens, hobby farms, City and County Parks, business owned landscapes, etc. An education outreach plan should be developed and implemented to heighten awareness and reduce inputs from these sources. Policies and practices should be implemented in City and County Public Works departments. The County and cities should consider implementing a ban on the sale of high phosphate detergents, such as is being considered in Spokane. Conduct associated monitoring and adaptive management (WQTS, 2006a).	Public Involvement and Education, Adaptive Management, Other SEPA, WP 35, WP 36, WP 37, WP 40
UpWenQUAL-9: Nutrients can enter streams from materials used to de-ice, clean, and maintain roads and parking lots. Animal waste from roads and parking lots can enter streams and increase nutrient loading. Work with the County, cities, businesses, and the WA State Department of Transportation to determine if road and parking lot maintenance practices may be contributing to nutrient loading and if necessary investigate ways to reduce nutrient inputs from these practices. Conduct associated monitoring and adaptive management (WQTS, 2006a).	Coordination/ Collaboration, Adaptive Management, Study, WP 35, WP 37
UpWenQUAL-10: Nutrients (phosphorous) can be released to ground and surface waters from development practices, such as disruption of soils during conversions of orchard lands to housing. Actions should be conducted to prevent nutrients from entering ground and surface waters before, during and after construction. Work with developers to implement these actions. Encourage entities to include appropriate language in county and city comprehensive plans, growth management, and critical area ordinances. Conduct associated monitoring and adaptive management (WQTS, 2006a).	Coordination/ Collaboration, Adaptive Management, Other SEPA, WP 35, WP 37, WP 38, WP 40
UpWenQUAL-11: Consider implementing actions recommended in the Wenatchee River Basin Temperature and Fecal Coliform TMDLs if the actions address problems that have been identified in the Upper Wenatchee Sub-watershed. Lowering temperatures and reducing nutrient inputs will improve pH and dissolved oxygen levels in the Wenatchee River Watershed (WQTS, 2006a).	WP 35

Recommended Action	SEPA Analysis
UpWenQUAL-12: Reserve load capacities for Biochemical Oxygen Demand (BOD) and nutrients should be established for the Upper Wenatchee River and Icicle Creek. Reserve load capacities are needed because there is no additional assimilative capacity for dissolved oxygen in the upper watershed during critical conditions. A point source regulatory strategy and nonpoint source BMP strategy should be developed to protect the reserve capacities and maintain water quality standards (WQTS, 2006a).	WP 30, WP 31, WP 33, WP 34, WP 35, WP 37, WP 38, WP 39, WP 40
UpWenQUAL-13: Encourage lining of earthen canals where appropriate. Work with irrigation districts to implement BMPs and adaptive management programs to minimize any nutrient loading that is not already being addressed (WQTS, 2006a).	Adaptive Management, WP 33, WP 34, WP 35
UpWenQUAL-14: Agricultural practices can contribute nutrients to ground and surface waters through crop watering practices, application of fertilizers, and soil disturbance activities. Work with the agricultural community to encourage practices that will reduce nutrient inputs to ground and surface waters while enhancing crop quality and yield. Examples include technical assistance through farm plans and Best Management Practices (BMPs). Conduct associated monitoring and adaptive management (WQTS, 2006a).	Adaptive Management, WP 33, WP 34, WP 35, WP 37
UpWenQUAL-15: Funding for these projects should be sought through Department of Ecology Centennial and 319 grants and loans. Identify and access other funding sources through the Planning Unit and other entities. Ongoing adaptive management should be utilized to provide the best use of funds and environmental benefits (WQTS, 2006a).	Funding, Adaptive Management, WP 35
UpWenQUAL-16: Proper filtration of nutrients through land use practices can have a beneficial effect on nutrient reductions to ground and surface waters. Encourage implementation of wetlands, filter strips, riparian vegetation, bio-swales, drainage basins, pervious surfaces, etc. in residential, commercial, agricultural, industrial, development, and municipal practices. Conduct associated monitoring and adaptive management (WQTS, 2006a).	Adaptive Management, WP 33, WP 34, WP 35, WP 37
UpWenQUAL-17: Identify and investigate any non point sources in tributaries that may be contributing to nutrient loads (WQTS, 2006a).	Study, WP 35

Habitat Protection

Recommended Action	SEPA Analysis
UpWenH-1: Increase habitat quantity in the Wenatchee River between Tumwater Canyon and Lake Wenatchee by restoring riparian habitat along the river and reconnecting side channels (where feasible) (UCSRB, 2005).	WP 47, WP 48
ChiwaukumH-1: Increase connectivity along Skinney Creek (UCSRB, 2005).	WP 45, WP 46
ChiwaukumH-2: Increase habitat diversity in Chiwaukum Creek along Tumwater Campground by restoring riparian vegetation, reconnecting the floodplain with the stream, and by increasing large woody debris within the channel (UCSRB, 2005).	WP 42, WP 47, WP 48

TABLE 12-12

SEPA Analysis for the Chiwawa River Sub-watershed Recommended Actions

Water Resource Management Strategy

Recommended Action	SEPA Analysis
WRMS-4d: Review the gage location on the Chiwawa River as related to the impacts on flows from withdrawals.	Study, Monitoring

Habitat Protection

Recommended Action	SEPA Analysis
ChiwawaH-1: Increase habitat quantity by restoring riparian habitat along the lower 4 miles of the Chiwawa River (UCSRB, 2005).	WP 47
ChiwawaH-2: Reduce sediment recruitment to the stream by improving road maintenance within the watershed (UCSRB, 2005).	WP 45
ChiwawaH-3: Improve fish passage in tributaries (UCSRB, 2005).	WP 45, WP 46
ChiwawaH-4: Protect remaining floodplain and riparian habitat, particularly around Chikamin Flats (UCRTT, 2002).	WP 49, WP 52, WP 53

TABLE 12-13

SEPA Analysis for the Nason Creek Sub-watershed Recommended Actions

Habitat Restoration/Enhancement

Recommended Action	SEPA Analysis
NasonH-1: Re-establish connectivity throughout the assessment unit by removing, replacing, or fixing artificial barriers (culverts) (UCSRB, 2005).	WP 45
NasonH-2: Increase habitat diversity and natural channel stability by increasing in-channel large wood complexes, restoring riparian habitat, and reconnecting side channels, wetlands, and floodplains to the stream (UCSRB, 2005).	WP 42, WP 35, WP 47, WP 48
NasonH-3: Improve road maintenance to reduce fine sediment recruitment to the stream (UCSRB, 2005).	WP 45
NasonH-4: Reduce high water temperatures by reconnecting side channels and the floodplain and improving riparian habitat conditions (UCSRB, 2005).	WP 35, WP 47, WP 48
NasonH-5: Protect remaining floodplain and riparian habitat (UCRTT, 2002).	WP 49, WP 52, WP 53

TABLE 12-14

SEPA Analysis for the White River, Little Wenatchee River, and Lake Wenatchee Sub-watersheds Recommended Actions

Habitat Protection

Recommended Action	SEPA Analysis
WhiteH-1: Increase habitat diversity within the lower 2 miles of the White River by reconnecting the floodplain and wetlands to the river (UCSRB, 2005).	WP 42, WP 48
WhiteH-2: Protect stream channel, riparian, and floodplain functions. Focus on Panther Creek downstream to mouth (UCRTT, 2002).	WP 49, WP 52, WP 53
WhiteH-3: Protect shorelines along Lake Wenatchee near White River mouth (UCRTT, 2002).	WP 54
LitWenH-1: Reduce sediment recruitment to the stream by improving road maintenance within the watershed (UCSRB, 2005).	WP 45
LitWenH-2: Protect stream channel, riparian, and floodplain functions; focus on Little Wenatchee River falls downstream to mouth (UCRTT, 2002).	WP 49, WP 52, WP 53
LkWenH-1: Protect remaining near shore habitat, and develop a means to reduce impacts of bulkheads (UCRTT, 2002).	Study, WP 54

TABLE 12-15

SEPA Analysis for Implementation Recommended Actions

Watershed Planning Administration and Plan Updates

Recommended Action	SEPA Analysis
IMP-1: WWPU and Subcommittees will continue to exist and operate under the current operating procedures and will address any needed reorganization to implement the plan as part of Phase IV, Implementation.	Continue Existing
IMP-2: Build a revision process and schedule for the Wenatchee Watershed Plan into plan implementation. Ensure that new plan actions and best available science can be integrated in the future. Planning horizon will be 20 years (through 2025). Updates should be scheduled every seven years, also consistent with County comprehensive plan revision schedule. If additional updates are necessary based on the availability of data or unforeseen water-related issues, the process should be designed such that those updates are possible. Future amendments and additions to the Plan will be approved by the Planning Unit (implementing body) according to an Intergovernmental Agreement, bylaws, and/or operating procedures and will be subject to a public review process including opportunities for comment at meetings of the PU (or other implementing body) and special community or public meetings. *No organization can be obligated to implement an action included in the plan or a plan update, unless they agree to the obligation (RCW90.82.130(3)).*	Adaptive Management, Early Planning Stages

Funding and Staffing

Recommended Action	SEPA Analysis
IMP-3: Prioritize educational needs, projects, policies and management strategies for funding and implementation (may accomplish some prioritization for Aquatic Habitat Actions through salmon recovery).	Study, Funding
IMP-4: Continue to identify alternate funding sources (alternate to watershed planning funds).	Study, Funding
IMP-5: Consider implementation funding for grant writers.	Funding
IMP-6: Develop recommendations (such as cooperative agreements) for formalizing obligations with the entities identified as responsible for Plan actions.	Coordination/ Collaboration
IMP-7: The Chelan County Natural Resource Department (CCNRD) provides a vital link between water availability, land management and the Watershed Planning Unit. The Watershed Planning Unit supports the ongoing efforts of CCNRD to work with the Watershed Planning Unit to ensure natural resource concerns and technical resources and databases are maintained.	Study

Coordination within the Watershed

Recommended Action	SEPA Analysis
IMP-8: In developing its implementation plan, the Watershed Planning Unit will support the development and implementation of existing plans and programs occurring within the watershed while striving to avoid inconsistent or duplicative activities and policies.	Coordination/ Collaboration, Support
IMP-9: The Planning Unit can choose to review and provide comment on large projects proposed in the watershed that would likely have an impact on the water resource. This could be a review of project or programmatic level Environmental Impact Statements (EISs) or other documents.	Coordination/ Collaboration
IMP-10: The WRIA 45 Planning Unit members will be involved in the public planning process. The Planning Unit will disseminate information about public comment opportunities to its members. Additionally, the Planning Unit will provide opportunities for public comment on watershed scale studies and plans when, by a vote of the Planning Unit, they are determined to be a priority of the Planning Unit and important to the overall health of the watershed.	Public Involvement and Education

Monitoring

Recommended Action	SEPA Analysis
IMP-11: Ensure that there is an ongoing coordinated monitoring program consistent with the Intensively Monitored Watershed Program currently being administered through NOAA Fisheries and the RTT. Designate responsible entities, a single data management hub for long term monitoring, and a single custodian to store and manage and generally oversee this effort into the future (requires long term commitment).	Coordination/ Collaboration, Study, Monitoring

Adaptive Management

Recommended Action	SEPA Analysis
WRMS-3: The WWPU with Chelan County taking the lead role will participate in the development and implementation of an adaptive management process to support this water resource management strategy. The process should address flexibility in the distribution of the reserve across the WRIA. The details of the adaptive management process will be determined as part of Phase IV Implementation.	Adaptive Management, WP 10, WP 11
WRMS-4c: Recommends a new stream gage be established at the existing control point on the Icicle Creek. Details will be determined during Phase IV, Implementation.	Monitoring
MissionQUANT-1: Chelan County as lead (with support from Ecology), will convene a Mission Creek Forum to assess options to provide water for future growth through the purchase, lease or transfer of existing, valid water rights or from storage (storage opportunities within Mission Sub-watershed or through the Peshastin and/or Icicle Irrigation districts). This will be conducted for the purpose of providing an uninterruptible supply for domestic, municipal and stock water uses. During Phase IV, Implementation, the Mission Creek Forum will determine whether the strategies for Mission are relevant to Brender Creek, and consider assembling separate strategies to address local instream flow concerns and conditions for Brender Creek, if appropriate. Within two years of rule adoption, the Forum will have developed opportunities and researched funding opportunities for these alternatives.	Coordination/ Collaboration, Study, Funding, WP 7, WP 8, WP 9, WP 19, WP 20, WP 21, WP 22, WP 23, WP 24
MissionQUANT-2: As part of Phase IV, Implementation, evaluate alternatives that could increase available water for instream and out-of-stream uses. Clearly address specific water needs in the Mission Creek and evaluate water conservation, storage, purchase, lease and transfer of water rights, water from other sub-watersheds, and other alternatives as appropriate.	Study, WP 1, WP 2, WP 3, WP 4, WP 7, WP 8, WP 10, WP 19, WP 20, WP 21, WP 22, WP 23, WP 24
PeshastinQUANT-3: As part of Phase IV, Implementation, evaluate alternatives that could increase available water for instream and out-of-stream uses. Clearly address specific water needs in the Peshastin and evaluate water conservation, storage, purchase, lease and transfer of water rights, and other alternatives.	Study, WP 1, WP 2, WP 3, WP 4, WP 7, WP 8, WP 10, WP 19, WP 20, WP 21, WP 22, WP 23, WP 24
ChumQUANT-10: As part of Phase IV, Implementation, the Planning Unit and the Chumstick Forum (with Chelan County as lead) will evaluate alternatives that could increase available water for instream and out-of-stream uses. Clearly address specific water needs in the Chumstick and evaluate water conservation, storage opportunities, purchase, lease and transfer of water rights, water transfer from other sub-watersheds, and other alternatives. Consider conjunctive use and evaluate pumping from the deep aquifer to augment flows in the Chumstick. Investigate storage options where stored water could be used to augment flows and provide mitigation water.	Study, WP 1, WP 2, WP 3, WP 4, WP 5, WP 6, WP 7, WP 8, WP 9, WP 10, WP 16, WP 19, WP 20, WP 21, WP 22, WP 23, WP 24
QUANT-6: Develop an administrative structure for a water bank for WRIA 45. Section 5.1.3 introduces water banks; however, the details of the administration of a water bank in WRIA 45 will be determined in Phase IV, Implementation.	Study, Early Planning Stages, WP 7, WP 8

Recommended Action	SEPA Analysis
QUANT-8: Chelan County Natural Resource Department will develop and administer a monitoring program to assess actual domestic water use to verify the 380 gpd per household assumption used to debit the reservation and to adjust the amount of water remaining in the reservation at five year intervals, or more frequently if the number of wells drilled or building permits granted indicate that growth is occurring more rapidly than projected in any sub-watershed. These assessments will be conducted based on a statistical sample of new domestic water users (single domestic, group domestic and municipal water use and associated lawn and garden irrigation (some with separate irrigation, some without), some with stock, etc.). Metering data will be incorporated into the water use audit and the accounting system. See the recommended action in the Plan for more details.	Study, Adaptive Management, Monitoring
QUANT-9: Reservation accounting will include the tracking of new exempt wells by Chelan County through the building permit process, septic approval through the Chelan-Douglas Health District (CDHD), tracking new domestic and municipal water rights granted by Ecology and tracking well drilling permits as issued by Ecology. The mechanism for tracking the permitted uses will be determined as part of Phase IV, Implementation. Chelan County is currently developing a method for tracking new permit-exempt wells in WRIA 46. This should also be considered for WRIA 45.	Study
QUANT-9b: New rights that are granted by Ecology for domestic water uses will be tracked by CCNRD. The mechanism for tracking the new permitted uses that will debit the reserve will be determined as part of Phase IV, Implementation.	Study
QUANT-10: The Planning Unit recommends metering be required for all new uses eligible under the reserve. The Planning Unit will further define responsible entities, and staffing, budget and funding considerations of the metering program as part of Phase IV, Implementation. Chelan County, CDHD, Ecology, utilities, and others will work together to structure the program. The following should be addressed as part of phase IV: • Identify responsible entities, and address staffing, cost and funding concerns • Consider implementation by an existing utility with an existing metering program • Consider having water users read their own meters • Consider use of Ecology's water measuring system and database • Consider metering options for existing water users and development of a voluntary program that uses existing metering programs' available meters.	Study, Funding, Coordination/ Collaboration, Monitoring, WP 18
QUANT-11: Undertake hydrogeologic studies to assess the influence of groundwater withdrawals on surface water. Identify funding for this study and responsible parties (WWPU to identify sub-areas for study, responsible entity as part of Phase IV, Implementation).	Study, Funding
QUANT-14: Credit a water service provider for abandoned and/or decommissioned exempt wells. This action will be further developed in Phase IV, Implementation. The well consolidation process is addressed in RCW 90.44.105. This statute presumes a credit of 800 gpd/well unless an alternative minimum is established by Ecology in consultation with DOH or there is credible evidence of non-use.	WP 16, WP 17

Recommended Action	SEPA Analysis
QUANT-15: As part of Phase IV, Implementation, Chelan County and cities should develop policies that can be used to ensure efficient use of water in the event of a land division or new development. See QUANT-15a to QUANT-15f for a list of the policies.	Other SEPA, WP 1, WP 2
QUANT-15a: For land division applications that have shares in an irrigation district, develop policies requiring that the developer provide tie-ins to the irrigation box; ensure easements; deliver water to parcels, where practicable; and form a Homeowners Association for residential uses. Encourage Irrigation Districts to work with the county and cities to extend infrastructure and irrigation water service where practicable.	Other SEPA, WP 1, WP 2
QUANT-15f: Encourage cluster development, and group domestic over single domestic systems to increase water use efficiency. Explore encouraging group domestic over single domestic use as part of the approval process for land division applications. Further develop this recommendation as part of Phase IV, Implementation.	WP 1
QUANT-16d: As part of Phase IV, Implementation, convene a forum to investigate conservation strategies and how they could be implemented by irrigation districts, ditches and other private companies. Involve utilities, cities, Chelan County and Ecology when appropriate. There is a need to work with members of irrigation districts, ditches and others to determine ways to save water and ensure that water rights are protected into the future. Items of discussion could include alternative rate structures based on purpose of water use; partnerships with cities and utilities; utility coordination during development; tools to conserve water, improve instream flows and protect water rights at the same time; and distribution of public education materials.	Coordination/ Collaboration, Study, Public Involvement and Education, WP 1, WP 2, WP 3, WP 4
QUANT-18: Encourage the County to provide information and education about water conservation options and fire planning; including: outdoor watering, timing, types of native vegetation that require low water use, lawn size, low flow fixtures, etc. to the new land user. The Municipal Water Law requires that water systems provide education and outreach regarding water conservation. However, water users that are using irrigation ditch water for outdoor use and/or exempt wells will not receive this information. Irrigation systems may also be able to provide materials in monthly billings. The details of this educational program will be determined during Phase IV, Implementation. Realtors should be encouraged to distribute public education materials describing water conservation and efficient water management techniques.	Public Involvement and Education, WP 1, WP 2, WP 3
QUANT-20b: Study groundwater in specific areas of the watershed (eg., Mission Creek, Lower Chumstick/Eagle Creek area, Monitor area). Finalize the areas for study as part of Phase IV, Implementation.	Study
QUANT-21: Evaluate the consumptive portion of reserved water uses and determine if recharge credit should be included in the accounting of the reservation.	Study
IMP-12: Revise and refine water quality management strategies for both point and nonpoint source pollutants to reflect new data.	Adaptive Management
IMP-13: Perform additional studies to fill data gaps and address unanswered questions as determined by the Water Quality Technical Subcommittee. Ecology will partner with stakeholders in the watershed to conduct studies addressing information gaps (eg., monitoring).	Study, Coordination/ Collaboration, Monitoring

Recommended Action	SEPA Analysis
QUAL-4: Encourage the Wenatchee Watershed Planning Unit and its other subcommittees (Water Quantity, Instream Flow, Habitat, and Growth and Land Use) to use the information in the TMDL Technical Reports and SISs along with their conclusions, recommendations, and actions for a more holistic approach to restoration, preservation, and enhancement of the watershed for all beneficial uses (WQTS, 2006a; WQTS, 2006b; WQTS, 2006c; WQTS, 2006d).	Coordination/ Collaboration, WP 35
QUAL-5: Appropriate actions to be used in the appropriate location should be determined to address temperature exceedances in Phase IV, Implementation for all of the temperature-related recommendations in the Plan.	Study
LowWenQUAL-2, **IcicleQUAL-2** and **UpWenQUAL-2:** Strategies to address point and non-point sources of phosphorus as part of the TMDL for DO and pH will be reported during the implementation phase of the Wenatchee Watershed planning effort.	Study, Early Planning Stages
IMP-14: Further analysis and discussion may need to take place in Phase IV, Implementation regarding maximum allocation limits in specific sub-watersheds and the mainstem Wenatchee and the relationship between the allocations, and habitat and channel-forming processes.	Study, Adaptive Management
IMP-15: All actions specified in the Wenatchee Watershed Plan should be revisited by the Planning Unit during Phase IV, Implementation.	Adaptive Management

TABLE 12-16

SEPA Analysis for Public Outreach Recommended Actions

Water Quantity

Recommended Action	SEPA Analysis
ChumQUANT-11: Encourage conservation and outreach.	Public Involvement and Education
NSTQUANT-3: Chelan County and Ecology to provide public information regarding water limitations in Northside Tributaries (Fact Sheets).	Public Involvement and Education
QUANT-13: Provide public education as to the roles, responsibilities and regulations pertinent to exempt wells, and encourage the proper entities to enforce/implement (CDHD, DOH, Ecology, County).	Public Involvement and Education, Continue Existing, WP 14
QUANT-15e: Provide public information that encourages actions QUANT-15a through QUANT-15d, and explains the benefits (provide this information during subdivision application or preliminary plat comment period).	Public Involvement and Education, WP 1, WP 2, WP 9
QUANT-16d: As part of Phase IV, Implementation, convene a forum to investigate conservation strategies and how they could be implemented by irrigation districts, ditches and other private companies. Involve utilities, cities, Chelan County and Ecology when appropriate. There is a need to work with members of irrigation districts, ditches and others to determine ways to save water and ensure that water rights are protected into the future. Items of discussion could include alternative rate structures based on purpose of water use; partnerships with cities and utilities; utility coordination during development; tools to conserve water, improve instream flows and protect water rights at the same time; and distribution of public education materials.	Coordination/ Collaboration, Study, Public Involvement and Education, WP 1, WP 2, WP 3, WP 4

Recommended Action	SEPA Analysis
QUANT-18: Encourage the County to provide information and education about water conservation options and fire planning; including: outdoor watering, timing, types of native vegetation that require low water use, lawn size, low flow fixtures, etc. to the new land user. The Municipal Water Law requires that water systems provide education and outreach regarding water conservation. However, water users that are using irrigation ditch water for outdoor use and/or exempt wells will not receive this information. Irrigation systems may also be able to provide materials in monthly billings. The details of this educational program will be determined during Phase IV, Implementation. Realtors should be encouraged to distribute public education materials describing water conservation and efficient water management techniques.	Public Involvement and Education, WP 1, WP 2, WP 3

Habitat

Recommended Action	SEPA Analysis
H-11: Efforts that are ongoing in the Wenatchee Watershed to improve or maintain habitat quality need to be encouraged and retained. Recognize and acknowledge achievements in the watershed that have accomplished habitat improvement or protection. Develop a landowner or organization recognition program to recognize habitat improvement projects or achievements in the watershed.	Public Involvement and Education, Support
PO-1: Provide support of specific education and outreach programs in the watershed. Programs include: 4H Forestry Education Program, Kids in the Creek, Salmon Fest, Trout Unlimited education programs, Bird Fest, Chelan Douglas Land Trust field trips, Hatchery programs (Leavenworth National Fish Hatchery, and friends of NW Hatcheries), existing noxious weed/native plant education programs, and others.	Public Involvement and Education, Support
PO-2: Encourage the 4-H program and CCCD to develop and conduct watershed clean-up education programs.	Public Involvement and Education
H-12: Initiate public information efforts to discourage harassment of spawning salmonids (UCRTT, 2002).	Public Involvement and Education

Water Quality

Recommended Action	SEPA Analysis
LowWenQUAL-9, **IcicleQUAL-7** and **UpWenQUAL-8**: Nutrients (phosphorous) can enter surface and ground water from residential yards and gardens, hobby farms, City and County Parks, business owned landscapes, etc. An education outreach plan should be developed and implemented to heighten awareness and reduce inputs from these sources. Policies and practices should be implemented in City and County Public Works departments. The County and cities should consider implementing a ban on the sale of high phosphate detergents, such as is being considered in Spokane. Conduct associated monitoring and adaptive management (WQTS, 2006a).	Public Involvement and Education, Adaptive Management, Other SEPA, WP 35, WP 36, WP 37, WP 40
MissionQUAL-6: Activities should be identified and undertaken to provide ongoing outreach, education, and technical assistance to growers, streamside landowners, developers, stakeholders, and the general public (WQTS, 2006b).	Public Involvement and Education, WP 35, WP 36

Recommended Action	SEPA Analysis
MissionQUAL-14 and **ChumQUAL-3**: CDHD will continue to implement onsite sewage disposal system technical assistance and education programs for homeowners and the industry (WQTS, 2006c).	Public Involvement and Education, WP 35, WP 36
MissionQUAL-15 and **ChumQUAL-4**: The CDHD will continue to permit sewage systems per Washington Administrative Code (WAC), including analyzing soils and technologies suitable for individual sites; review/approve the proposed design, specifications, installation and if required, the ongoing maintenance in accordance with the WAC; provide public information under real estate disclosure laws; and review all land use proposals to ensure that the WAC is properly enforced prior to approval by the County (WQTS, 2006c).	Continue Existing, Public Involvement and Education, WP 35
MissionQUAL-20 and **ChumQUAL-9**: Conduct stream walk cleanups along the stream (Fall, Spring, Summer) with area schools, homeowners, and other groups (WQTS, 2006c).	Public Involvement and Education, WP 35,WP 36
MissionQUAL-21 and **ChumQUAL-10**: Conduct ongoing community fecal coliform education/awareness campaigns throughout the year. Engage and get support from homeowners (WQTS, 2006c).	Public Involvement and Education, WP 35,WP 36
MissionQUAL-23 and **ChumQUAL-12**: Conduct education and enforcement actions to stop illegal dumping of wastes either to storm drains or directly to surface waters. This dumping may be of portable toilet wastes, recreational vehicle wastes, etc. (WQTS, 2006c).	Public Involvement and Education, WP 35, WP 36
MissionQUAL-25 and **ChumQUAL-14**: The WQTS and its participating entities should work with the public and homeowners regarding BMPs to reduce fecal coliform runoff. General actions should include public information, education, and technical assistance regarding watering practices, landscaping, stormwater runoff, filtration practices, animal waste, etc. (WQTS, 2006c).	Public Involvement and Education, WP 35, WP 36

Sub-watersheds

Recommended Action	SEPA Analysis
PO-3: CCNRD to ensure that summary fact sheets are created by sub-watershed and develop and provide outreach materials for people at different levels: technical, non-technical, etc.	Public Involvement and Education, WP 36
PO-4: Prepare Community Documents by tributary (or sub-watershed) that describe the watershed and the water related management strategies that have been recommended to address specific issues in the individual sub-watersheds. An example was prepared for the Icicle Sub-watershed. Obtain funding to create, produce and distribute these documents.	Public Involvement and Education, Funding, WP 36

12.4 Summary

This chapter (Chapter 12) of the Wenatchee Watershed (WRIA 45) Management Plan (Plan) provides documentation of compliance of the WRIA 45 Plan with statewide programmatic SEPA requirements. This chapter (Chapter 12) is to be attached to the Determination of Significance filed for the Plan adoption action by Chelan County and provides local information relevant to the WRIA 45 Plan that is not explicitly included in the statewide programmatic Watershed Planning EIS (Ecology, 2003).

13.0 REFERENCES

Andonaegui, C. 2001. Salmon, steelhead, and bull trout habitat limiting factors for the Wenatchee subbasin (Water Resource Inventory Area 45) and Portions of WRIA 40 within Chelan County (Squilchuck, Stemilt and Colockum drainages). Final draft report. WSCC.

Association of Cities. 1999. Draft Guide to Watershed Planning and Management. Washington State Department of Ecology Publication No. 99-106. Internet: http://www.ecy.wa.gov/pubs/99106.pdf

Boulton, A.J. 2000. River ecosystem health down under: Assessing ecological condition in riverine groundwater zones in Australia. Ecosystem Health 6:108-118.

Burgoon, Peter S. and Michael Rickel. 2003a. Assessment of Sources of Fecal Coliform in Mission and Brender Creeks. WRIA 45 Watershed Planning—Supplemental Water Quality Planning 2003. July 15, 2003.

Burgoon, Peter S. and Michael Rickel. 2003b. Pesticide Use and Toxicity Assay in Mission, Brender, and Yaksum Creeks. WRIA 45 Watershed Planning—Supplemental Water Quality Planning 2003. July 15, 2003.

Carroll, J. and S. O'Neal. 2005a. Wenatchee River Basin Fecal Coliform Bacteria Total Maximum Daily Load Study, Washington State, Olympia, WA. Publication no. 05-03-012.

Carroll, J. and S. O'Neal. 2005b. Wenatchee River Basin Dissolved Oxygen, pH, and Phosphorus Total Maximum Daily Load Study (draft - in review), Washington State, Olympia, WA.

Chelan County. 2000 (last amended 2005). Chelan County Comprehensive Plan. Full report available online at: http://www.co.chelan.wa.us/bl/data/compplan.pdf

Chelan County. 2001. Chelan County Fish Barrier Inventory. Chelan County Natural Resources Department.

Chelan County. 2002. Memorandum of Understanding between Chelan County Planning and Cities regarding UGA population allocations.

Chelan County. 2005. Chelan County Assessor database, dated June 6, 2005.

Chelan County Conservation District (CCCD). 2005a. Leavenworth Area Community Wildfire Protection Plan. Prepared by Chelan County Conservation District with assistance from Washington Department of Natural Resources, Chelan County Fire District #3, United States Forest Service and concerned citizens of Chelan County. December 2005.

Chelan County Conservation District (CCCD). 2005b. Peshastin Creek Drainage Community Wildfire Protection Plan. Prepared by Chelan County Conservation District with assistance from Washington Department of Natural Resources, Chelan County Fire District #6, United States Forest Service and concerned citizens of Chelan County. September 2005.

Chelan County Planning. 2005. Personal communication to Lisa Dally Wilson. June 3, 2005.

Clifford, Peggy, Clay Laundry, and Andrea Larsen-Hayden. 2004. Analysis of Water Banks in the Western States. Washington State Department of Ecology Publication No. 04-11-011. Internet: http://www.ecy.wa.gov/pubs/0411011.pdf

Cristea, N. and G. Pelletier. 2005. Wenatchee River Temperature Total Maximum Daily Load Study, Washington State , Olympia, WA. Publication no. 05-03-011.

EES Consulting Inc. 2005a. Bull Trout Habitat Suitability Data from the Upper Wenatchee River Basin. Prepared for Chelan County Natural Resource Department and WRIA 45 Planning Unit.

EES Consulting Inc. 2005b. Final Technical Report Lower Wenatchee River PHABSIM Studies. EES Consulting Inc. and Thomas R. Payne and Associates. Prepared for: Chelan County Natural Resources Department and WRIA 45 Watershed Planning Unit. February 2005.

Gix, Bob. 2006. Personal communication, Bob Gix, Blue Star Growers.

Golder Associates, Inc. (Golder) in association with Sound Resolutions and Cascadia Consulting Group. 2003. Final Draft Decision Framework for an Instream Flow Workplan for the Wenatchee Basin. Submitted to: Chelan County Watershed Program, WRIA 45 Instream Flow Subcommittee, and WRIA 45 Planning Unit. August 7, 2003.

Golder Associates, Inc. (Golder). 2004. WRIA 45 Integration Framework. Proposed Wenatchee River Watershed Natural Resources Plan Integration Framework. Submitted to Chelan County Natural Resources. May 18, 2004.

Golder Associates, Inc. (Golder). 2005a. Technical Memorandum RE: WRIA 45 Summary of Groundwater/Surface Water Interaction and Groundwater Resources References. Submitted to Chelan County WRIA 45 Planning Unit. January 6, 2005.

Golder Associates, Inc. (Golder). 2005b. Wenatchee Watershed Planning Phase II Closeout Report Habitat Component. Submitted to: Chelan County Natural Resources and WRIA 45 Watershed Planning Unit. February 15, 2005.

Golder Associates, Inc. (Golder). 2005c. WRIA 45 Watershed Management Plan Final Draft Habitat Component. Submitted to: WRIA 45 Watershed Planning Unit and Chelan County Natural Resources. June 30, 2005.

Jones & Stokes. 2004. Chelan County Natural Resource Program, Final Wenatchee River Channel Migration Zone Study – Phase II. April 16. (J&S 01243.01) Bellevue, WA. Prepared for the Chelan County Natural Resource Program, Wenatchee, WA.

Klinger, David. 2006. Personal communication, March 21, 2006.

Mayer, Kirk. 2006. Personal communication, Washington Growers Clearinghouse Association, March 13, 2006.

Montgomery Water Group (MWG), Environment and Engineering Services, and Pacific Groundwater Group. 2003. Wenatchee River Basin Watershed Assessment. Prepared for: Wenatchee Watershed Planning Unit and Chelan County Natural Resources Program, 411 Washington Street, Wenatchee, WA 98801.

Montgomery Water Group (MWG). 2006. Draft Multi-Purpose Water Storage Assessment in the Wenatchee River Watershed. Prepared for: Chelan County Natural Resource Department. March 8, 2006.

Myers, B. 1983. Chumstick Visit of August 23, 1983, WRIA 45. Memorandum to Mike Wilson. Washington State Department of Ecology.

Natural Resources Conservation Service (NRCS). 2005. Washington State Irrigation Guide. U.S. Department of Agriculture, Washington D.C. First Published September 1997. Amended January 2005.

Nicodemus, Megan. 2005. Department of Health Office of Drinking Water. E-mail to Lisa Dally Wilson regarding Department of Health water system information. June 13, 2005.

Northwest Power and Conservation Council (NPCC). 2004. Wenatchee Subbasin Plan. Prepared for the Northwest Power and Conservation Council. Lead organizations: Chelan County and the Yakama Nation.

Pacific Biodiversity Institute. 2002. Metro Resource Information and Conservation Decision Support for the Wenatchee River Basin. Prepared at the request of the Icicle Fund. November 2002.

Patmont, C.R., G.J. Pelletier, E.B. Welch, and C.C. Ebbesmeyer. 1989. Lake Chelan Water Quality Assessment. Prepared by Harper Owes, Inc. for Washington State Department of Ecology, Olympia, Washington.

Peven Consulting. 2004. Supplement to the Wenatchee Subbasin Plan's Management Plan. Chuck Peven, 3617 Burchvale Road, Wenatchee, WA 98801.

Peven, C.M. 1994. Spring and summer Chinook spawning ground surveys on the Wenatchee River basin, 1993. Chelan County P.U.D. Fish and Wildlife Operations. Wenatchee, Washington.

RH2 Engineering. 2004. Cashmere Comprehensive Water System Plan. March 2004.

Serdar, D. and B. Era-Miller. 2004. DDT Contamination and Transport in the Lower Mission Creek Basin, Chelan County: Total Maximum Daily Load Assessment, Washington State, Olympia, WA. Publication no. 04-03-043.

Smith, P. 1998. Washington Water Laws—A Primer. Washington State Department of Ecology Publication No. 98-152. Full report available online at http://www.ecy.wa.gov/pubs/98152.pdf

Smith, Tim. 2005. Personal communication, Washington State University Extension Office.

U.S. Bureau of Reclamation (USBOR). 2005. Technical Memorandum Instream Flow Assessment of Icicle Creek, Washington.

Upper Columbia Regional Technical Team (UCRTT). 2002. A Biological Strategy to Protect and Restore Salmon Habitat in the Upper Columbia Region, A Report to the Upper Columbia River Salmon Recovery Board. June 2002. Available from the Upper Columbia Salmon Recovery Board, Chelan, Washington.

Upper Columbia Salmon Recovery Board (UCSRB). 2005. Draft Upper Columbia Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Plan. December 2005.

USFS. 1997. Chiwawa River Watershed Analysis. Leavenworth Ranger District, Wenatchee NF: Leavenworth, Washington.

USFS. 1995. Icicle Creek Watershed - Watershed Assessment. Leavenworth Ranger District, Wenatchee NF: Leavenworth, Washington.

Varela and Associates. 2002. City of Leavenworth Water System Plan. November, 2002.

Washington Conservation Commission (WCC). 2001. Salmonid and Steelhead Habitat Inventory and Assessment Project (SSHIAP).

Washington State Department of Ecology (Ecology). 1983. Wenatchee River Basin Instream Resources Protection Program including Proposed Administrative Rules (WAC 173-545) and Supplemental Environmental Impact Statement. W.I.R.P.P. Series No. 26. December 1982. Reprinted July 1983.

Washington State Department of Ecology (Ecology). 2003. Final Environmental Impact Statement for Watershed Planning under Chapter 90.82 RCW. Washington Department of Ecology, Shorelands and Environmental Assistance Program, Ecology Publication #03-06-013, July 18, 2003.

Washington State Department of Ecology (Ecology). 2004. Guidance: Setting Instream Flows and Allocating Water for Future Out-of-Stream Uses. September 2004.

Washington State Department of Ecology (Ecology). 2005. Draft Wenatchee River Total Maximum Daily Load Study. March 2005. Final Report expected late 2005.

Washington State Department of Ecology (Ecology) and Washington Department of Fish and Wildlife (WDFW). 2003. Washington Water Acquisition Program: Finding Water to Restore Streams. Ecology Publication #03-11-005. March 2003.

Washington State Department of Fish and Wildlife (WDFW). 2005. Priority Habitat and Species Data.

Washington State Department of Natural Resources (DNR). 1999. Forests and Fish Report. Final Report Subject to Caucus Ratification. April 29, 1999.

Water Quality Technical Subcommittee (WQTS). 2006a. Dissolved Oxygen/pH DRAFT Summary Implementation Strategy (SIS). March 22, 2006 Draft.

Water Quality Technical Subcommittee (WQTS). 2006b. Mission Creek DDT DRAFT Summary Implementation Strategy (SIS). February 16, 2006 Draft.

Water Quality Technical Subcommittee (WQTS). 2006c. Wenatchee River Basin Fecal Coliform Bacteria TMDL DRAFT Summary Implementation Strategy (SIS). March 22, 2006 Draft.

Water Quality Technical Subcommittee (WQTS). 2006d. Wenatchee River Temperature TMDL DRAFT Summary Implementation Strategy (SIS). February 16, 2006 Draft.

Wenatchee River Watershed Action Plan Addendum. 1996. Wenatchee River Watershed Steering Committee and Technical Advisory Committee. Wenatchee River Watershed Ranking Report Addendum. Technical Supplement 1. Developed with support from the Chelan County Conservation District. Draft. August 1996.

Wenatchee River Watershed Action Plan. 1998. Wenatchee River Watershed Steering Committee. Developed with support from the Chelan County Conservation District. Final. March 1998.

Wenatchee Watershed Planning Unit (WWPU). 2003. Wenatchee River Watershed WRIA 45 Draft Operating Procedures manual. December 2003.

Wildrick, L. 1979. Hydrogeology and Ground-Water Conditions in the Chumstick Drainage Basin: Washington State Department of Ecology, Water Resources Program, Open-File Technical Report 79-1.

Wiley, Anthony J. and Bruce Cleland. 2003. Wenatchee National Forest Water Temperature Total Maximum Daily Load Technical Report. November 2003. Washington State Department of Ecology Publication No. 03-10-063.