

9.0 RECOMMENDATIONS

9.1 INTRODUCTION

This chapter is the heart of the WRIA 46 Management Plan. The Watershed Assessment Entiat Analysis Area (USFS WNF 1996), Entiat River Inventory and Analysis (CCCD 1998), and Final Coordinated Resource Management Plan/First Draft WRIA 46 Plan (CCCD 2002) provide the foundation for this document. Significant issues identified during the watershed assessment work conducted over the last ten years are documented here. This chapter describes existing conditions underlying each of these issues and, most importantly, details recommended actions that best respond to issues. Other management strategies specifically tailored to address resource issues on National Forest System and BLM lands in WRIA 46 are documented in the [Chapter 2](#) Synthesis Summary Tables.

The Planning Unit deems that all of the data, methodologies and assessments contained in this document are the best science available given the time and funding expended to date. Therefore, the EWPU recommends that the results from these studies be used to move forward with the actions contained in this chapter.

Recommendations in this chapter are designed to help attain the community, economic, and ecologic objectives captured in the Vision and Goals of the Planning Unit. This chapter includes recommendations for:

- implementation of actions to address issues;
- monitoring to evaluate resource conditions and the results of our actions; and
- additional studies needed to better understand some priority resource conditions.

Section 9.2, General Recommendations, outlines actions that are needed to maintain the basic framework necessary for implementation of this plan. Sections 9.3 through 9.5 group recommendations by analysis component (water quantity, instream flow, habitat and water quality) and references are provided to the chapter(s) in the plan where supporting information is contained. Section 9.6 includes a set of additional issues that span multiple resource issues.

Although this chapter categorizes recommendations, it is important to recognize that all recommendations are intertwined and compliment one another. An action like changing channel geometry (shape), listed in the “Habitat” section, will improve habitat but also help water quality and instream flow conditions, as well as mitigate for future water uses.

The strength of this plan derives from two fundamental points:

- 1) ***Development of the plan occurred via a local effort to address both community and ecological issues.*** Recommendations have been designed to help meet resident's goals that include retaining the quality of life and rural feel of the Entiat valley, supporting agricultural production, avoiding further reduction of the tax base, and promoting community unity and moderate growth in the years to come; and
- 2) ***Implementation has been locally driven and collaborative.*** The participation of many landowners, agencies, tribes and other stakeholders has enabled the development of strategic partnerships and coordinated action. Projects must continue to be implemented in an informed and coordinated manner, recognizing the many linkages that exist between components in this plan.

Projects proposed in the Entiat WRIA by groups involved with development and implementation of activities stemming from other planning efforts should look to the recommendations provided in this document for overall guidance and strategic direction. It is critical for the successful implementation of this plan that these groups communicate/coordinate their actions with the CCCD/EWPU. Care must be taken not to implement one recommendation independent of the other recommendations without consideration of how singular action may affect other related actions. The Planning Unit hopes to continue serving in an advisory capacity throughout the implementation of this plan in order to assure that future projects are complementary and cost-efficient.

9.1.1 Overarching Principles

The Entiat has a long history of citizen participation in resource management efforts. The Planning Unit recognizes the close connection between community well-being and watershed conditions, and as a result a set of basic principles regarding the past, present and future of WRIA 46 became clear during this planning process. The Planning Unit therefore acknowledges the following overarching principles:

- Continued community participation and involvement with the EWPU is necessary to ensure its future success and achievement of the group's vision and goals;
- Future projects proposed in the WRIA need to be communicated to and coordinated with the CCCD/Planning Unit in order to reduce duplication of effort and assure compatibility with this strategic plan;
- Monitoring and continual feedback are key to the design of future projects and tracking progress towards the achievement of desired results;
- Surface and ground water in the subbasin have a high degree of connectivity; therefore surface and groundwater in the watershed should be treated as one source for all water quality, quantity, habitat and instream flow actions;
- The upper Entiat River watershed from RM 10.5 (Mad River confluence) upstream is highly functioning and the priority should be anti-degradation and protection of existing conditions, particularly in the stillwater reach;

- The lower Entiat River from the Mad River confluence (RM 10.5) downstream has been most influenced by past activities and should be the priority area for active restoration projects; and
- The tributaries to the mainstem Entiat River are in relatively good condition with respect to water quality; however, variability in habitat and water quality conditions exists.

9.2 GENERAL RECOMMENDATIONS

The following general recommendations outline the framework necessary for successful implementation of this plan:

- The base structure for plan implementation (Phase 4) should at a minimum consist of continuing the Planning Unit's role as the overall coordination and advisory group, and the CCCD's role of administrative and project support;
- The EWPU should encourage expansion of participation on the Planning Unit via outreach to other stakeholders/community members in order to assure its continued success and support of plan recommendations;
- The EWPU and CCCD should continue to promote and implement collaborative projects and perform monitoring;
- The CCCD and EWPU should continue their support of legislation, project grant proposals, etc. submitted by others for actions or activities that contribute to achievement of WRIA 46 plan goals and recommendations;
- County planning regarding land use should be coordinated with the EWPU and reflect the science in the Entiat Plan;
- Community vitality of the Entiat valley should be addressed during County land use planning and other land development and protection activities;
- State, Federal, Tribal, Local Government, Foundations, local contributions and other funding sources should be secured to continue to support the Planning Unit coordination, administration and facilitation roles of the CCCD, and to fund District staff technical assistance supporting development and implementation of plan recommendations;
- The CCCD should continue to develop and support the Entiat Geographic Information System (EGIS) and maintain its role as primary clearinghouse for WRIA 46 GIS data;
- The Planning Unit should continue to use EGIS for information sharing and analysis, and further explore potential of the tool;
- Monitoring in the Entiat River watershed should be done using protocols consistent with Upper Columbia Salmon Recovery Board (UCSRB) Regional Technical Team (RTT) "Monitoring Strategy for the Upper Columbia Basin" (Hillman 2003, *draft*); and
- The CCCD, on behalf of the Planning Unit, should pursue funding to implement monitoring according to the above strategy.

9.3 WATER QUANTITY AND INSTREAM FLOWS

Recommendations in this section are based on information contained in Chapters 4 and 5 of this document, the Entiat Coordinated Resource Management Plan/First Draft WRIA 46 Plan (CCCD 2002) and other supporting technical documents.

- 1) At present there is no formal program established directing the management of water resources in the Entiat River subbasin. Recognizing the need for a system of managing water resources that balances the instream and out-of-stream needs for water in the subbasin and other resource management objectives, the Planning Unit has developed water resource management recommendations and instream flow recommendations as part of the WRIA 46 watershed planning process. The WDOE, Chelan County and the Planning Unit should work together to implement these recommendations as a complete package:
 - WDOE and the Planning Unit should initiate rule making (Chapter 173-546 WAC and/or other) within one (1) year of adoption of this plan by Chelan County to create a water resource management program that includes a reserve of water for future uses prioritized by use type, qualifying criteria for accessing reserve water, and to establish minimum instream flows in WRIA 46 based on proposed Administrative Instream Flow regimes (see Chapter 5 for biological rationale, percent exceedence values, and additional data pertinent to proposed Administrative Instream Flows listed in the table below);

Recommended Administrative Instream Flows

Time Period	Lower Entiat River, Tied to Keystone Gage	Upper Entiat River, Tied to Stormy Gage	Mad River, tied to Mad at Ardenvoir Gage
January	185	175	32
February	185	175	32
March 1-15	185	175	32
March 16-31	250	285	68
April 1-15	250	325	100
April 16-30	350	375	100 Plus 25 cfs limit on new water rights.
May 1-15	474 Plus a 100 cfs limit on new rights.	375 Plus a 100 cfs limit on new water rights.	100 Plus a 25 cfs limit on new water rights
May 16-31	720 Plus a 100 cfs limit on new water rights.	375 Plus a 100 cfs limit on new water rights.	100 Plus a 25 cfs limit on new water rights
June 1-15	898 Plus a 100 cfs limit on new water rights.	325 Plus a 100 cfs limit on new water rights.	100 Plus a 25 cfs limit on new water rights.
June 16-30	617 Plus a 100 cfs limit on new water rights.	325 Plus a 100 cfs limit on new water rights.	100 Plus a 25 cfs limit on new water rights.

July 1-15	359 Plus a 67 cfs limit on new water rights.	275 Plus a 67 cfs limit on new rights.	68
July 16-31	268	275	68
August 1-15	185	275	68
August 16-31	185	275	51
September	185	175	32
October	185	175	32
November	185	175	32
December	185	175	32

- The WDOE and the Planning Unit should consider rulemaking to implement Planning Unit Instream Flow recommendations and associated habitat and water quality actions to assure compliance with the Clean Water Act, the Salmon Recovery Act and/or other non-water resource management programs and laws; (see Chapter 5 for biological rationale and additional data pertinent to proposed Planning Unit Instream Flows listed in the table below);

Proposed Planning Unit Instream Flows

Time Period	Lower Entiat River Range, tied to Keystone Gage	Upper Entiat River Range, tied to Stormy Gage	Mad River Range, tied to Mad at Ardenvoir Gage
January	130 (130-145)	120 (110-130)	25 (20-30)
February	130 (130-145)	120 (110-130)	25 (20-30)
March	130 (130-145)	120 (110-130)	31 (30-35)
April	270 (260-290)	240 (240-325)	70
May	474	480	70
June	540 (520-580)	480	55
July	165	275	55
August	165	180	40
September	165	125 (120-135)	25 (20-30)
October	165 (150-185)	120 (110-130)	25 (20-30)
November	130 (130-145)	120 (110-130)	25 (20-30)
December	130 (130-145)	120 (110-130)	25 (20-30)

- The State of Washington, Chelan County, and others responsible for administration of water resources in the Entiat River subbasin shall allow continuation of permit-exempt wells and associated uses as a legal means of appropriating water;

- The Planning Unit should continue to work with the WDOE to set priorities for future water allocations and reserve water use; determine method for processing pending applications and handling of previously conditioned water rights; define how State Trust Water Program, USBR water leasing, and other banking options will be used; outline procedures for use of conserved water and use of stored water; and making determination of water availability. This program should be documented in the detailed implementation plan within one (1) year of initiation of implementation plan development;
 - The Planning Unit recommends that any reserve established in rule should be split into categories for management and tracking purposes. For example “residential” use should be split between “in-house domestic” and “domestic irrigation” water use components and higher priority should be assigned to “in-house domestic” use to assure certainty of future in-house domestic use well into the future; and
 - The Planning Unit recommends that reserve water for new commercial, agricultural and light industrial enterprises should be limited to use in the lower Entiat River, below the stillwater area (RM 16.2), but that residential water use continue to be allowed above this point.
- 2) There is a great deal of disparity between actual water use and the amount of water represented by rights and claims. Documentation that most closely reflects actual water use is necessary for effective water resource management:
- A priority action is for the Department of Ecology to work with the planning unit to develop the most defensible means to address uncertainties in the water rights and claims record, such as on a case-by-case basis, general adjudication, or other legal means that may become available to clean up the paper record. The Department of Ecology and Planning Unit should agree to a course of action within one (1) year of initiation of implementation plan development;
 - The WDOE and Planning Unit should host community workshops to share information about the WRIA 46 water rights and claims data, and water resource management goals in the Entiat subbasin;
 - WDOE should continue to provide technical assistance and cost share on equipment for water metering;
 - WDOE should continue to provide education and technical assistance to residents to assure reporting is done in a timely manner, and using formats and procedures to facilitate the rapid transfer of information to interested persons like the members of the Planning Unit;
 - The Planning Unit should promote community water metering to record actual water use and provide a means to monitor gains in efficiency and losses attributable to new uses or changes in system operation;
 - The CCCD, on behalf of the Planning Unit should establish a reporting mechanism / agreement between Chelan County and the CCCD/Planning Unit to share information on permit exempt wells associated with new construction. This should be done within one (1) year of initiation of implementation plan development; and
 - The Planning Unit should work with willing citizens in the watershed to meter single household domestic permit exempt wells throughout a representative cross-section of the watershed to refine in-house domestic water use estimates and plan content.

- 3) Some water right holders in the Entiat River watershed may not currently be exercising some/all of their water right, yet they want to prevent relinquishment while others need water:
- The Planning Unit should host and the State of Washington and partners should support a State Trust Water Program workshop, available to all Entiat valley landowners defining the trust water program, water acquisition program, water right lease options, water transfer option, and related opportunities (USBR). This workshop should be held within one (1) year of adoption of this plan by Chelan County, so that a specific program can be included in the detailed implementation plan; and
 - The Planning Unit should work with the Department of Ecology to develop a detailed water conservation, trust water, and water acquisition program for the Entiat River subbasin in order to help assure adequate water for community growth in the future, and include said program in its detailed implementation plan.
- 4) Water conservation in the Entiat River watershed will help meet management goals and provide additional water for instream and out-of-stream uses:
- The Planning Unit and local partners should continue to pursue water conveyance efficiency improvements throughout the Entiat watershed;
 - The Planning Unit, U.S. Bureau of Reclamation (USBR), the Natural Resource Conservation Service (NRCS), and the CCCD should continue to work on alternative projects to consolidate the Knapp-Wham and Hanan-Detwiler irrigation ditches ;
 - The Planning Unit should encourage all Entiat River watershed water users to work to convert open irrigation systems to piped systems as assisted by local, state, federal, and tribal partners;
 - The CCCD and Planning Unit should continue to seek funding from USBR and partners to upgrade inefficient/ineffective surface water diversion structures;
 - The Planning Unit should explore use of the voluntary Comprehensive Irrigation District Management Process (CIDMP) and other resources available to Districts, either through the existing Entiat Irrigation District and/or potential new district;
 - The CCCD and Planning Unit should work with the City of Entiat and Entiat Irrigation District to obtain funds for a feasibility study for extending City of Entiat municipal water system and Entiat Irrigation District irrigation distribution systems upstream to serve new uses, and to consolidate existing uses;
 - The Planning Unit recommends that water users in the Entiat River watershed continue conversion of surface water diversions to ground water / well withdrawals when/where feasible;
 - The NRCS and other partners should continue to provide technical and financial assistance to improve on-farm irrigation application efficiency, scheduling, and promote/improve water conservation.
 - Encourage Federal Government to fully fund farm bill programs and other cost-share programs supporting water conservation work;
 - The State should continue to fund Referendum 38 (improvements to public water-supply systems and public irrigation districts);
 - The Planning Unit and partners should promote water efficient landscaping, and host a workshop and/or trade show available to local water users; and

- The City of Entiat and appropriate system managers should solicit training from the Department of Ecology and other appropriate entities, within six (6) months of adoption of this plan by Chelan County, regarding reclaimed water use.
- 5) While the existing entities responsible for resource management in the Entiat River watershed are working well together through the Entiat WRIA Planning Unit, institutional changes or creation of additional institutions may be necessary to more fully implement water and other natural resource management recommendations in the Entiat subbasin:
- Local irrigators should explore the potential of consolidating the Knapp-Wham, Hanan-Detwiler, and possibly other systems into a single irrigation district under Chapter 87.03 Revised Code of Washington (RCW). Recommendations regarding organization under Chapter 87.03 RCW should be included in the detailed implementation plan within one (1) year of adoption of this plan by Chelan County; and
 - The Planning Unit recommends that a local water advisory group be established, potentially as a sub-committee of the Planning Unit, to track implementation of the water resources management program, recommended instream flows, and related activities that will be codified in Chapter 173-546 (and/or other chapter) WAC.
- 6) This plan has determined that if the recommended water resource program is fully implemented, water will be available for storage in the Entiat River subbasin. However, suitable storage sites and feasibility of their construction have not yet been fully explored:
- The CCCD, on behalf of the Planning Unit, should assure that a study or studies be completed to explore surface water and ground water storage options and identify potential locations either on the surface or in sub-surface confined or unconfined alluvial aquifers, in order to provide additional water for future community growth and beneficial out-of-stream uses; and
 - Any potential storage sites and estimates of costs required to establish the sites should be included in the detailed implementation plan.
- 7) Areas of surface water-groundwater interchange and subsurface water movement affect the ability of water managers to carefully manage water resources, water quality, instream flow, and habitat programs in the watershed. These interchange and sub-surface flow areas are not fully understood:
- The CCCD should work with WDOE and other staff to update NWI data to reflect known, field checked wetlands in the WRIA (to help show areas of interaction);
 - The CCCD, on behalf of the Planning Unit, should assure that areas of subirrigated pasture identified by CWU assessment are adequately checked against actual conditions;
 - The CCCD, on behalf of the Planning Unit, should pursue funding of a study of flows through alluvial fans;
 - The CCCD, on behalf of the Planning Unit, should pursue opportunities for additional gain loss study work during July (highest irrigation use month) and October (lowest flow period), prior to rains if possible, to capture data after most irrigation ends;

- The CCCD, on behalf of the Planning Unit, should seek funding for a study of water exiting the watershed as surface water vs. groundwater; and
- The Planning Unit should use the supplemental assessments described above to refine water resource, instream flow, habitat, and water quality recommendations. The CCCD should continue providing planning unit members new information when collected, convening the Planning Unit, and facilitating and documenting plan revisions.

9.3.1 Monitoring - water quantity and instream flows

Recommendations in this section are based on information contained in Chapter 4, Water Quantity and Chapter 5, Instream Flows, as well as Chapter 10, Monitoring. These monitoring recommendations pertain specifically to future water resource management in the Entiat subbasin, and are therefore contained as a subsection of 9.3. It is essential to monitor and evaluate water resource actions over time in order to help assure that goals and objectives are being met and determine the efficacy of actions. Additionally, this feedback is necessary for the development of future projects and refinement of plan recommendations.

- The CCCD, on behalf of the Planning Unit, should pursue state, federal, tribal, local, foundation, and other funding to continue monitoring at all existing streamflow and ambient gages. Priority is assigned to assuring that the three (3) USGS streamflow gages (Keystone, Stormy, and Mad at Mill Camp) continue over the long term as administrative and planning unit instream flow recommendations are associated with these gages;
- The CCCD and City of Entiat, on behalf of the Planning Unit, should find funding and willing participants to continue domestic well monitoring and try to fill in geographic gaps in the network with new participants;
- The CCCD, on behalf of the Planning Unit, should continue monitoring population growth on an annual basis using the State of Washington (OFM estimates) and on a decadal basis using federal census data to refine growth, land-use, and water use projections and recommended actions;
- The CCCD, on behalf of the Planning Unit, should track exempt well development annually using WDOE data and proposed County tracking mechanism to assist the to-be-established local water advisory group's efforts to assure full implementation of this plan and to recommend changes as necessary;
- The CCCD, on behalf of the Planning Unit, should monitor new construction occurring using County Planning Department permit data, and provide this information to the to-be-established local water advisory group to assure full implementation of this plan and to recommend changes as necessary;
- The CCCD, on behalf of the Planning Unit, should track new water right applications, permits, certificates, claims and associated geographic and water volumes annually in coordination with WDOE. This information should be provided to the to-be-established local advisory group to assure full implementation of this plan and to recommend changes as necessary;

- The CCCD, EWPU, USFS and partners should support reactivation of the Entiat Experimental Forest project in order to collect additional data, and data collected subsequent to reactivation should be shared with the Planning Unit on an annual basis; and
- Chelan County should reassess land use and the Planning Unit should find funding to reassess water use every 5 years, and the CCCD, on behalf of the Planning Unit, should provide this information to the to-be-established local advisory group to assure full implementation of this plan and to recommend changes as necessary.

9.4 HABITAT

Habitat recommendations contained in this section are based on information in Chapter 7 of this plan, and supporting documents. They incorporate and build upon recommended actions that have already been committed to by the Planning Unit, such as those contained in the Entiat River Inventory and Analysis (CCCD 1998; see Reports folder on the CD) and Final Entiat Coordinated Resource Management Plan (CCCD 2002).

- 1) Stream channel geometry (shape) in the upper Entiat River (RM 16.2 to RM 33.8) has not been significantly affected by human actions in the watershed. Channel geometry in the lower Entiat River (RM 16.2 to mouth) has been modified by past human activities including bank armoring, channelization, woody debris removal, and removal of riparian vegetation particularly from the Mad River confluence (RM 10.5) downstream to the confluence of the Entiat and Columbia Rivers.
 - The CCCD and partners should seek funding, permitting, means to monitor and otherwise fully implement Ecosystem Diagnosis and Treatment (EDT) Alternative 5, on behalf of the Planning Unit. This alternative incorporates the strategic actions (instream structures, revegetation) outlined in Alternative 4 of the Entiat River Inventory and Analysis, and includes additional steps modeled with EDT such as the reconnection of off channel habitats, placement of large woody debris structures in the stillwater reach of the upper Entiat, and habitat protection (see table below).

EDT Alternative Management Scenarios

Actions	Cross Vanes or other instream structures (Reaches 2-9)	Riparian Plantings (Reaches 2-9)	Log / LWD Placement	Side Channel Connection (Reach 3)	Irrigation Ditch as Habitat	Habitat Protection and Restoration (Reaches 10,11,12)
Alternatives	(structures)	(lineal feet)	(sites)	Yes / No	Yes / No	(sites)
1	20	10,000	5	No	No	No
2	40	20,000	10	No	No	No
3	80	40,000	20	No	No	No
4	80	40,000	20+	Yes / No	Yes / No	Yes / No
5	80	50,000	40	Yes / No	Yes / No	Yes / No

- Habitat protection projects such as the establishment of conservation easements, leases, and other options should first be pursued with willing landowners rather than outright property acquisition (in order to preserve community tax base);
 - The CCCD and partners, on behalf of the Planning Unit, should continue active restoration work in the “Bridge to Bridge” reach (~RM 3.2 - 4.5) to capitalize on connectivity to existing instream habitat restoration sites, and proceed upstream from there;
 - The CCCD, NRCS, USFWS, BLM, landowners, and partners, on behalf of the Planning Unit, should continue cooperative monitoring of existing instream structures, associated channel geometry, and fish species utilization on an annual basis; and
 - The CCCD, NRCS, USFWS, BLM, landowners, and partners should pursue funding and/or use existing partnerships to monitor new habitat improvement projects; and
 - Monitoring results should be used to refine management recommendations as necessary.
- 2) Riparian condition has been altered by natural (fire) and human disturbances. Riparian vegetation is necessary for bank stabilization, large woody debris recruitment, and stream temperature moderation.
- The CCCD and partners, on behalf of the Planning Unit, should implement targeted riparian restoration and enhancement projects, based on priorities established by the Entiat River Inventory and Analysis data, CWU vegetation community classification study, and ground truthing by CCCD staff as described in this plan (see tables below and on the following page);

General streambank planting recommendations from 1995 NRCS study.

Reach	Length (miles)	Reach Description	Canopy Cover (%)	Potential Planting Sites (feet)	Dominant Plant Community
1	2.3	End of slackwater to Fire Station bridge.	0-10	4700	cottonwood/ red osier dogwood
2	3.0	Fire Station bridge to Old Hatchery bridge.	0-10	5900	cottonwood/ red osier dogwood/ erect willow
3	2.7	Old Hatchery Bridge to Johnson/Steven's bridge.	0-10	3900	cottonwood/ erect willow
4	3.0	Johnson/Steven's bridge to bridge near Mud Creek.	0-10	2900	cottonwood/ alder
5	2.2	Bridge near Mud Creek to Ryan/Small bridge.	10-20	2000	cottonwood/alder conifer/alder
6	2.2	Ryan/Small bridge to terminal moraine at Shorty's	0-10	10,350	mixed conifer/ alder
7	2.2	Terminal moraine at Shorty's to USGS gaging station.	0-10	6600	river birch/ broadleaf sedge
8	2.5	USGS gaging station to USFS boundary (section 14).	20-30	3600	cottonwood/ river birch/ red osier dogwood
Total	20.1			39,950 (7.6 miles)	

Additional priority planting recommendations not previously detailed by 1995 NRCS study.

Approximate location	Description of site/rationale
RM 1.2 - 3.2	Keystone Ranch to Fire Station Bridge near rock cross vane
RM 3-5 and RM6-7	Areas shown by CWU study to have largest decrease in riparian area from 1945-1998.
RM 4.2	Old Naumes warehouse site
RMs 7-9	Near Roaring Creek to Morical Canyon
RM 10.2	Mad River confluence old Mill site
RMs 11-13	Near Mud Creek confluence to Medsker Canyon
RMs 14-16	McKenzie Canyon to Potato Creek moraine – heavy Tyee Fire effects.

- The CCCD and partners, on behalf of the Planning Unit, should perform public outreach to inform community members about the reasons for and benefits of maintaining riparian vegetation. This work should begin within six (6) months of adoption of this plan by Chelan County;
 - The CCCD, on behalf of the EWPU, should inform community members about the Conservation Reserve Enhancement Program (CREP) and other options for cost-share on revegetation projects or easement renting;
 - The CCCD and partners, on behalf of the Planning Unit, should develop streamside revegetation partnerships with willing landowners. Documentation of the first of these partnerships should be included in the detailed implementation plan due one (1) year after initiation of implementation planning;
 - The CCCD and partners, on behalf of the Planning Unit, should pursue conservation easement, lease, and options other than outright property acquisition (in order to preserve community tax base) with willing landowners to protect larger, undisturbed riparian areas, and include a prioritized list of area in the detailed implementation plan to be completed one (1) year after initiation of implementation plan development;
 - The CCCD and partners, on behalf of the Planning Unit, should assure monitoring of streambank planting projects, and report progress to the Planning Unit.
- 3) Wetlands along the upper mainstem Entiat River adjacent to the reach above the Potato Creek moraine serve important hydrologic and biologic functions in the Entiat River. Wetlands along the lower reach of the river have been modified by flood control work and development and only a few wetlands exist.
- The County, Corps of Engineers, and State of Washington should assure that landuse actions comply with existing regulations related to wetlands protection, and provide periodic update to the Planning Unit upon request of the Planning Unit;
 - Local, state, federal, and other partners should assist landowners with voluntary maintenance of existing wetlands, or enhancement of the few remaining wetlands and their function; and,
 - Local, State, federal, and other partners should work with the CCCD to assure that updates to existing NWI maps are included in the EGIS.

- 4) Some existing surface water diversions and culverts in the Entiat River watershed are problematic for fish:
- The Planning Unit should use information contained in the 1997 WDFW study, and proposed for collection by the WDFW under Bonneville Power Administration funding, to prioritize surface water diversion/withdrawal point corrections. The Planning Unit should include the project identification and prioritization schedule in its detailed implementation plan;
 - The CCCD and Planning Unit should continue to seek funding from USBR, WDFW and other sources to screen and/or upgrade existing screens on pumps/diversion intakes;
 - The Planning Unit should continue to show support for Congress granting the USBR construction authority for screening and barrier removal projects;
 - The Planning Unit should use information contained in the 2000 County culvert assessment, and proposed for collection by the WDFW under Bonneville Power Administration funding, to prioritize culvert corrections; and
 - The County, USFS, WDFW, USFWS, CCCD and partners should continue to seek funds for repairs (or directly fund repairs) of culverts that present fish passage problems.
- 5) Fish habitat in the Entiat River watershed is adversely affected by excessive fine sediment, which can suffocate redds and cause substrate embeddedness.
- USFS and partners should continue fine sediment monitoring using McNeil core sampling, and implement probabilistic monitoring described in the UCSRB-RTT “Monitoring Strategy for the Upper Columbia River Basin” (Hillman, T.W. 2003);
 - Reporting of results to the Planning Unit should be continued; and
 - The Planning Unit should use monitoring results to refine management recommendations as necessary.
- 6) Winter habitat conditions have been identified as a factor limiting salmonid survival in the Entiat River watershed. Of particular concern are the effects of cold water temperatures and anchor ice on egg and fry survival.
- USFS, WDOE and CCCD, on behalf of the Planning Unit, should continue thermograph deployment and monitoring of winter temperatures, and the effects of anchor ice on salmonid survival. An update of potential causes and actions to remediate effects of cold temperatures on salmonid survival should be provided to the Planning Unit on an annual basis, or on a schedule requested by the Planning Unit so that the Planning Unit can use the information to prioritize plan actions;
 - The CCCD, on behalf of the Planning Unit, should pursue grant funding to implement riparian planting and channel geomorphology restoration projects in the bridge-to-bridge reach and other areas where enhancement of riparian and geomorphic condition might significantly enhance over-winter and other salmonid habitat conditions; and
 - The CCCD and implementing partners, on behalf of the Planning Unit, should monitor the effects of additional riparian vegetation and in-channel projects on winter water temperatures and anchor ice formation. The CCCD and implementing partners should report findings to the Planning Unit to enable re-prioritization of plan actions.

- 7) The Entiat subbasin is utilized by salmonids protected as threatened and endangered under the Endangered Species Act (ESA). Protection and restoration of fish habitat sufficient to assure adequate habitat for salmonid recovery and to provide certainty for land and water users in the watershed under the ESA are goals of the Planning Unit. Implementation of a comprehensive watershed protection and restoration effort like the program recommended in this plan is intended to work toward, or reach these goals.
- CCCD, on behalf of Planning Unit, will assure that actions are taken to Implement aforementioned channel geometry and riparian restoration recommendations, irrigation diversion structure improvements, and screening improvements;
 - CCCD, USFS, WDOE, WDFW, USFWS, BLM, Yakama Nation, and other partners, on behalf of the Planning Unit, should continue habitat monitoring (fine sediment, temperature, channel geometry, etc.), and sharing information with the CCCD for inclusion in EGIS and sharing with the full Planning Unit;
 - USFS, USFWS, and the Chelan County PUD, on behalf of the Planning Unit, should continue spring and late run Chinook, steelhead, and bull trout surveys and monitoring in the Entiat River Watershed. Monitoring information should be provided to the CCCD for inclusion in EGIS, and distribution to Planning Unit members to assure new information influences prioritization of plan actions to be implemented;
 - USFS, USFWS, and partners, on behalf of the Planning Unit, should continue fish distribution, abundance, and redd mapping in the Entiat River watershed, and provide such information to the CCCD for inclusion in EGIS and distribution to the full Planning Unit. The Planning Unit should use monitoring information to adjust priorities of plan recommendations;
 - The USFWS should continue monitoring of salmonid outmigrants via smolt traps, and potentially expand monitoring efforts consistent with the Upper Columbia Basin monitoring strategy (Hillman, T.W. 2003);
 - Subbasin planning and Upper Columbia Salmon Recovery Unit partners should perform additional EDT model runs for steelhead and other fish species, and provide copies of results to the CCCD for inclusion in EGIS and for distribution to the full Planning Unit. The Planning Unit should use new information to make any necessary adjustments to plan recommendations or priorities as new information becomes available;
 - Current and future regulatory programs developed by the County to protect and restore fish and wildlife habitat and other critical areas should be coordinated with the EWPU, and should take into account current and future restoration and protection projects being undertaken; and
 - The CCCD and partners, on behalf of the Planning Unit, should work to develop a Habitat conservation Plan (HCP) and/or salmon recovery plan to gain certainty under the ESA.
- 8) It is important to consider not only the habitat requirements of threatened and endangered salmonids and other species when developing a watershed restoration plan, but it is also important to consider the genetic makeup of stocks managed to best understand how to protect the genetic integrity of the species of concern. The genetic makeup of fish currently utilizing the Entiat River watershed is not well understood.

- The USFWS and partners, on behalf of the Planning Unit, should continue annual salmon carcass collection and DNA sampling. Results of genetic analyses should be provided to the CCCD on an annual basis for inclusion in the EGIS and distribution to the full Planning Unit;
 - The Planning Unit should support USFWS proposal for bull trout genetic studies;
 - The USFWS and USFS should pursue abundance and distribution studies on native fish species of interest (lamprey, cutthroat); and
 - The Planning Unit should use genetic stock information to make any necessary adjustments to plan elements or priorities, as appropriate, based on new information received.
- 9) Watershed and riverine resource management is driven by a number of natural processes including sediment. The sediment budget, bedload transport dynamics, and its relationship to channel geomorphology in the mainstem Entiat River are not completely understood.
- The Yakama Nation, USFS and partners, on behalf of the Planning Unit, should initiate sediment budget, sediment transport, and/or analysis of bedload dynamics using acceptable methods (e.g. scour chains) to improve our understanding of this aspect of the system. Data should be provided to the CCCD for inclusion in EGIS and distribution to the full Planning Unit;
 - The Planning Unit should continue its support of the ongoing assessment of gravel clusters, and results of the study should be presented to the EWPU; and
 - The Planning Unit should consider this information in its evaluation of efficacy of plan recommendations, and for adjustment of plan recommendations or priorities.
- 10) Roads on forest lands were built primarily for timber access. Riparian vegetation has been reduced and sediment delivery to streams has increased as a result of many unpaved roads being located close to streams. The rehabilitation of roads by forest land managers is a watershed restoration priority.
- The USFS, BLM, State, County, Longview Fibre Co., and partners, on behalf of the Planning Unit, should coordinate road management with major land owners in intermingled ownership areas to help reduce erosion and sediment from road sources.
- 11) Noxious weed infestations are common in disturbed areas throughout the WRIA, especially along roads and right of ways, and in abandoned pastures and cultivated fields. Noxious weeds reduce the biotic integrity and diversity in the watershed effecting quality of life for people, fish, and wildlife.
- The CCCD, NRCS, USFS, State, County, and partners, on behalf of the Planning Unit, should develop a comprehensive weed control program with landowners, the County Weed Control Board, and State and other federal agencies. Parties responsible for developing the weed control program, and a schedule for implementation should be included in the detailed implementation plan due one (1) year after initiation of implementation plan development;
 - The CCCD and NRCS, on behalf of the Planning Unit, should encourage voluntary landowner efforts to control noxious weeds on their properties; and

- The Planning Unit should explore potential for use of biological agents (e.g., weevils) for noxious weed control, and update management recommendations as necessary.
- 12) Wildlife species protected as threatened or endangered under the Endangered Species Act use habitat on public lands and some private lands within the Entiat WRIA.
- The Planning Unit should host a workshop providing guidance to landowners in the Entiat River subbasin as to the means to promote land practices that are beneficial for wildlife; protect and restore riparian and terrestrial lands; and provide information about how to mitigate land use actions such that riparian and terrestrial species thrive;
 - The CCCD and partners, on behalf of the Planning Unit, should continue to apply for grant funds for priority riparian and terrestrial habitat projects;
 - The CCCD and project proponents should continue to monitor the success of habitat improvement projects. Monitoring information obtained should be provided to the CCCD for inclusion in EGIS, and distribution to the full Planning Unit; and
 - The Planning Unit should use the new monitoring information to make any necessary adjustment to plan recommendations or priorities.
- 13) Plant species that are listed under the ESA and/or are species of concern for State and Federal agencies are present within the Entiat WRIA. Plants with cultural resource significance also exist.
- The Planning Unit should provide information to the public regarding the identification, significance, and protection of plant resources in the Entiat WRIA.
- 14) Benthic macroinvertebrates (aquatic insects) can be a powerful indicator of watershed health, habitat quality, and water quality. Some macroinvertebrate sampling has been done in the Entiat River watershed. In 1992 the USFS sampled one site in the lower Mad River and one site in the lower Entiat River. In 2002 the WDOE sampled one site in the lower Entiat River near Keystone gage. Results indicate that the benthic macroinvertebrate community condition is generally healthy; however, additional sampling is warranted to be able to make stronger inferences about watershed health, habitat quality, and water quality.
- The CCCD and partners, on behalf of the Planning Unit, should seek funding to implement a probabilistic survey (n=50 minimum) of the macroinvertebrate community and other relevant parameters, consistent with UCSRB monitoring protocol to assess overall health of the subbasin (Hillman, T.W. 2003).

9.5 WATER QUALITY

Additional information related to this suite of recommendations may be found in Chapter 8, Water Quality. Analysis of ambient water quality monitoring data collected near the Keystone gage (WDOE station 46A070) and elsewhere throughout the subbasin has shown that overall there are very few water quality problems in the Entiat or Mad Rivers and their tributaries.

- 1) The WDOE ambient water quality station 46A070 has contributed the most long-term data to the overall water quality record for the subbasin.
 - The WDOE should continue monitoring all water quality parameters for which data are currently collected at this site; and
 - The CCCD, on behalf of the EWPU, should explore implementation of a probabilistic water quality monitoring program within the Entiat subbasin as outlined in the Monitoring Strategy for the Upper Columbia Basin (Hillman, T.W. 2003).

- 2) Water temperature monitoring has indicated that summer water temperatures in some tributaries (North Fork Entiat, Mad River near Tillicum Creek) and the mainstem Entiat River periodically exceed State standards.
 - The CCCD, WDOE, USFS and partners, on behalf of the Planning Unit, should continue current water temperature monitoring via thermograph deployment and gages to assess conditions and trends;
 - The CCCD and partners, on behalf of the Planning Unit, should use existing FLIR data to help evaluate cold-water influences as thermal refugia for salmonids and other cold-water species during periods of high water temperature within the system, and to enhance technical staff and Planning Unit knowledge of temperature regimes. The CCCD and partners should incorporate finding in EGIS and share finding with the full Planning Unit. The Planning Unit should use new information to make any appropriate changes to plan recommendations or priorities; and
 - The CCCD and partners should pursue funding, permits, etc to fully implement priority items identified with SNTEMP, EDT (Alt 5), and the Entiat River Inventory and Analysis (Alt. 4) to help mitigate summer temperatures and guide improvements including:
 - Any proposed projects that include an aggressive approach to increasing the current riparian shade conditions throughout the watershed to achieve site potential shade, given the natural limitations of climax vegetation;
 - Any projects that work to achieve a 50% increase in canopy cover system-wide over the long term;
 - Any projects that work towards a system-wide goal of 25-30% increase in canopy cover in the short term;
 - Any projects in the upper river where current riparian shade is already estimated to be 20-30% (RMs 18-34), it is probably infeasible to increase these conditions by 50% (thus achieving 80% canopy cover), and therefore the goal in these reaches should be to increase these conditions up to the site potential shade; and
 - If resources are available, any project that results in decreases to channel width in the lower 10 RMs in conjunction with changes in shade (SNTEMP Alternative Action 4) should be implemented; thus, in the lower 10 RMs, the goal is to increase shade 50% and decrease channel width 50% in order to effect the most significant change to water temperatures.

- 3) Nutrient loading caused by fertilization has not been identified as a problem in the Entiat River; however, the percentage of scraper life-history type macroinvertebrates (32%) indicates that artificially enhanced nutrient-driven periphyton production may be occurring. Although periphyton occurs naturally in the Entiat and other watersheds, exceedingly high levels may lead to pH and other water quality problems.

- The WDOE should continue ambient water quality monitoring of nutrients in the Entiat River at site 46A070 and should report findings to the CCCD on an annual basis for inclusion in EGIS;
 - The CCCD should provide regular update to the full Planning Unit so that the Planning Unit can make any necessary adjustments to plan actions and/or priorities; and
 - The CCCD/NRCS should inform community members about farm bill programs related to nutrient management and potential cost-sharing.
- 4) Recent monitoring has indicated that pH levels occasionally exceed State standards in the lower mainstem Entiat River. The pH increases may be related to photosynthetic activity of periphyton communities, although pH excursions above 8.5 were relatively infrequent (Ehringer 1994).
- The WDOE should continue pH monitoring at ambient monitoring site 46A070 and report findings on an annual basis to the CCCD for inclusion in the EGIS;
 - The CCCD should provide periodic update of pH findings to the full Planning Unit to facilitate any necessary adjustments of plan recommendations or priorities; and
 - The CCCD, on behalf of the Planning Unit, should explore implementation of probabilistic nutrient monitoring (nitrogen, phosphorous) using Upper Columbia protocol (Hillman, T.W. 2003).
- 5) The Entiat National Fish Hatchery has a National Point-source Discharge Elimination System (NPDES) permit associated with its production facility.
- USFWS should continue to monitor its water discharges for compliance with NPDES permit guidelines. Monitoring results should be shared with the EWPU on an annual basis; and
 - The Planning Unit should use ENFH hatchery water quality monitoring data as appropriate to update plan management recommendations.
- 6) In 1994 whole fish samples from two suckers collected approximately 0.5 RM upstream from the mouth of the Entiat River indicated elevated levels of t-DDT and PCBs. No fillet samples were collected to assess human health risks.
- The WDOE or an appropriate contractor should conduct supplemental studies that include collection of additional whole-fish samples at a site or sites more representative of conditions in the mainstem Entiat to confirm the levels of DDT and PCB contamination. Finding should be reported to the CCCD for inclusion in the EGIS and reporting to the full Planning Unit;
 - The WDOE or an appropriate contractor should collect fillet samples from sport fish from a site or sites representative of the watershed to evaluate potential human health risk. Findings should be reported to the CCCD for inclusion in the EGIS and to be shared with the full Planning Unit; and
 - The Planning Unit should use updated whole-fish and fillet sample information to make any necessary changes to plan recommendations or priorities.
- 7) Recent federal court decisions have called into question the ability of landowners to use pesticides, and maintain economically viable businesses. Pesticide application practices

have improved significantly over the past several decades but are again challenged by recent changes.

- Landowners should continue use of established standards and best management practices for pesticide applications;
- The Planning Unit should host a workshop regarding pesticide use and recent federal decisions, and potential effects on best management practices in the Entiat River watershed; and
- The CCCD, on behalf of the Planning Unit, should pursue funding for a study of the levels of pesticides of concern that are used in the subbasin. Monitoring results should be used to update management recommendations.

8) Fecal coliform bacteria and nitrate ambient water quality monitoring results do not indicate water quality problems associated with leaking/failing septic systems, or livestock inputs to streams. Compliance with septic upgrade requirements has been good, although the number of septic systems that have been installed in the valley has increased greatly over the past decade. Continued high-density development of private lands may pose a threat to future water quality, as could future increases to livestock if given unrestricted access to streams.

- The CCCD, on behalf of the Planning Unit, should work with County Department of Health and partners to inform the public about sanitation issues, e.g. septic systems and the importance of proper septic location; livestock BMPs (see 9.6, item 2).
- The WDOE should continue ambient water quality monitoring of nitrate and fecal coliform levels in the Entiat River. The WDOE should provide an annual report of findings to the CCCD for inclusion in the EGIS and for distribution to the full Planning Unit;
- The Planning Unit should use monitoring information to make any appropriate changes to plan recommendations or priorities; and
- If septics in need of upgrades are documented, the CCCD and partner agencies should help interested community members identify and secure funding to assist with upgrade costs.

9.6 ADDITIONAL MANAGEMENT ISSUES

This section covers topics that have implications for multiple resource issues; as such, they do not fit directly within one of the previous categories. Supporting information for this section is found throughout the WRIA 46 plan.

1) New residence and subdivision construction along the river is a concern as it has the potential to degrade the condition of streamside areas and alter the land's ability to mitigate flood flows. There are safety problems associated with construction in the floodplain and on alluvial fans. Dense development could also affect water quality and change the rural feel of the Entiat valley. Chelan County Comprehensive Plan (adopted February 2000) zoning designations now determine property minimum lot sizes and subdivisibility, and other regulations dictate structure and septic placement requirements, riparian setbacks, and other land use restrictions.

- All construction should follow Chelan County Code requirements for zoning, building permits, structure and septic placement, setbacks, and other land uses;
 - All future land use changes should follow appropriate comprehensive plan designation amendment procedures;
 - Chelan County, FEMA, and partners, on behalf of the Planning Unit, should inform the public about hazards of construction in flood-prone areas, particularly where new construction is in or adjacent flood-prone areas; and
 - Agencies/entities should continue enforcement of their respective codes.
- 2) An assessment done in 1996 indicated that livestock have unrestricted access to streams and mainstem Entiat River in a few locations, which has denuded stream banks and could affect water quality.
- The CCCD, on behalf of the Planning Unit, should reassess livestock access to streams, map the information, include the information in EGIS, and provide an update to the full Planning Unit;
 - The Planning Unit should use updated information to change and/or re-prioritize plan elements;
 - The CCCD and NRCS, on behalf of the Planning Unit, should encourage and assist landowners to develop comprehensive farm plans including livestock management planning; and
 - The CCCD and NRCS, on behalf of the Planning Unit, should encourage private landowner use of cost-share programs to fence sites where livestock have unlimited access to river, to develop off-stream stock watering sources, or to allow only limited access to streams for watering livestock consistent with comprehensive farm plans.
- 3) Timber harvest and other silviculture practices on state and private lands are currently at a low level, with little potential for immediate expansion.
- Timber managers should comply with State of Washington Forest Practices Act and obtain appropriate permits, should use Best Management Practices (BMPs), and should go through SEPA review as necessary for any proposed projects.
- 4) Fire in the rural interface poses a threat to public safety, private property, and watershed resources. Wildfires in the valley have occurred regularly in the past, and are expected to continue on a periodic basis in the future.
- The CCCD, USFS, State, Fire District 8, and partners should provide the public with information regarding fire prevention, planning and protection (e.g. development of a defensible space and fireproofing structures) with priority given to the wildland-urban interface;
 - The CCCD, on behalf of the Planning Unit, and interested community members should apply for community fire prevention/protection grants;
 - The Chelan County Sheriff and other appropriate groups should continue public education of disaster management and evacuation protocols; and
 - The Planning Unit should inform the public about the Columbia Breaks Fire Interpretive Center.

- 5) Forest road maintenance needs typically exceed annual budgets and there is a concern about federal roads being closed for management and economic reasons. Some roads to private homes are unsafe for firefighter use. Adequate existing road access is needed for firefighting to ensure quick initial attack and safe escape routes.
- The USFS, BLM, State, Fire District 8, and other partners should continue cooperation with rural fire departments to assure adequate and reasonable road access to homes for wildfire protection; and
 - Chelan County should continue to assure that county roads meet fire access standards.