

Chapter 6. Data Gaps and Recommendations

The overriding goal of the Phase II Level 1 Assessment is to document what is known regarding water resources and habitat in WRIA 31 based on available information, determine what further data are needed to characterize those resources, and thereby identify data gaps, priorities, and recommendations for Phase II Level 2 data collection and/or analyses as needed to fill those data gaps. Because there is a 4-year limit between receipt of the Phase II grant funding and submittal of the Phase III Watershed Management Plan, the Level 2 Assessment focuses on short-term studies to inform decision making in the Plan development. Implementation of a Watershed Management Plan (Phase IV) likely would include additional longer-term data collection.

Therefore, this chapter:

- Summarizes data gaps identified based on our current technical understanding of watershed water quantity, water quality, and instream habitat using the existing available information;
- Prioritizes the relative importance of the data gaps in terms of being able to initiate development of the Management Plan; and
- Makes recommendations for Level 2 Assessment to fill the high priority data gaps such that development of the Management Plan can proceed and be completed within the mandatory schedule.

Data gaps and recommendations for water quantity, water quality, and instream habitat are included in Sections 6.1, 6.2, and 6.3, respectively. Future data collection efforts should include detailed scoping to identify the specific type and amount of information required to address the priority data gaps. Note that supplemental water quality and water storage projects for WRIA 31 have begun. These supplemental studies will provide additional information to be factored into the Management Plan. Information to be collected during these supplemental studies is noted in the sections below.

6.1 Water Quantity Assessment Data Gaps and Recommendations

6.1.1 *Surface Water Quantity*

This Level 1 surface water quantity assessment relied on limited available streamflow records from WRIA 31. As noted in Section 3.1, there is a limited network of streamflow gages in the WRIA and none of the subbasins have a gage with ten or more years of data, which is often considered the minimum for statistical analysis of streamflow records. Therefore, the interpretation of the surface water quantity assessment should include consideration of the following data gaps:

- All of the streamflow data used in this assessment were collected within a cool/wet Pacific Decadal Oscillation (PDO) phase. As a result, long-term average streamflow

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conditions based on the available gage records are therefore anticipated to be overestimated. The average flow for a given month is predicted as being higher than it would have been had the proportion of cool/wet and warm/dry years been the same.

- No continuous streamflow data are available for either the Glade/Fourmile or Kennewick subbasins. Limited peak flow and miscellaneous measurements exist for the Glade/Fourmile subbasin.
- No systematic streamflow data collection has taken place since 1983. It is difficult to assess the current surface water resources in the WRIA, and changes over the past 20 years, without more current streamflow data.

Despite the sparse streamflow data, the available data do indicate that all WRIA 31 streams are ephemeral (lack dry season flow) except in localized spring-fed reaches (e.g., near mouth of Alder Creek). The primary continuous streamflow data are for Rock Creek and Alder Creek, dating from the 1960s. These data reflect streamflow in the wetter (western) subbasins of WRIA 31 (see Section 2.4); the rest of the WRIA has less precipitation and thus generally lower natural runoff and streamflow. There was not significant development in these subbasins during the 1960s, and therefore limited water demand.

The collective information indicates that the observed intermittent nature of WRIA 31 streams is the natural hydrologic condition, unaffected by human development. Late-season streamflow in the Glade/Fourmile subbasin is supplied by irrigation return flow.

Nevertheless, streamflow data are fundamental information for understanding watershed conditions and could be valuable for salmonid-bearing streams (e.g., Rock, Chapman, and Wood Gulch creeks) if the Planning Unit has interest in better understanding instream habitat limiting factors and opportunities to restore or enhance such habitat, particularly in the lower reaches of those streams. To that end, the following Level 2 data collection would be recommended:

- Reactivate the continuous streamflow gaging station on Rock Creek (#14036600), which has continuous records from the 1960s.
- Establish new continuous streamflow gaging stations on Chapman and possibly Wood Gulch creeks, preferably near the creek mouths.

In the event that a more complete hydrologic instrumentation of WRIA 31 is desired, the following Level 2 data collection would be recommended:

- Reactivate the continuous streamflow gaging station on Alder Creek (#14034350).
- Reactivate discontinued peak flow gaging stations on Fourmile Canyon (#14034100) and East Branch Glade Creek (#14034270) or, preferably, establish continuous gaging stations there.
- Establish new continuous streamflow gaging stations at other WRIA 31 locations based on specific watershed planning objectives (e.g., at the mouth of Glade Creek to assess the amount of irrigation return flow in the Glade/Fourmile creeks basin).

6.1.2 Groundwater Quantity

The occurrence and distribution of the major aquifer systems in WRIA 31 are relatively well understood for the assessment stage of watershed planning. The Saddle Mountains and Wanapum Basalts are the primary sources for larger irrigation withdrawals. The shallow Alluvial Aquifer supplies domestic uses, while the deeper Grande Ronde is largely unexplored.

The productivity of different aquifer units at different locations can be highly variable depending on characteristics of individual basalt flows (local stratigraphy) as well as structural folds and faults. Because of this complexity, watershed-wide detailed characterization of aquifer productivity is not practical. Rather, this information should be collected as warranted for site-specific water resource projects.

Ecology Central Regional Office's groundwater level monitoring program provides an exceptional long-term (30+ year) record of groundwater level changes in the basalt aquifers across WRIA 31. We recommend that the Planning Unit coordinate with Ecology to ensure that this program continues, and ideally expand it to include additional wells in the multiple aquifer units. Existing information indicates considerable withdrawal pressure on the Wanapum Aquifer, particularly in the northern area of the Glade/Fourmile subbasin. Water level trends combined with information on annual pumpage is key to assessing the future sustainability and potential overdraft of that resource.

Given the extensive reliance on the Wanapum Aquifer for irrigation supply and the observed decline in water levels, assessment of the development potential – in terms of water quantity and water quality – may be appropriate in evaluation of future water supply options in addition to the potential feasibility of aquifer storage and recovery (ASR). In addition to understanding aquifer conditions, other constraints including water rights would need to be assessed as part of an exploration program.

Hydraulic continuity between shallow groundwater and streams in WRIA 31 is relatively well understood based on fairly comprehensive mapping of springs (groundwater discharge locations). With few exceptions, the quantity of spring discharge is insufficient to maintain any significant streamflow into the dry season. Hydraulic continuity between the basalt aquifers and the Columbia River is inferred based on regional groundwater flow directions and comparison of aquifer and river bathymetric elevations.

The WRIA 31 supplemental water storage project involves evaluating the feasibility of applying ASR within the Kennewick and Glade/Fourmile subbasins of WRIA 31. The project involves more detailed evaluation of hydrogeologic conditions within the City of Kennewick service area and areas of the Glade/Fourmile subbasin. Under the general category of groundwater quantity, determining hydrogeologic feasibility of applying ASR in target areas is recommended as a principal area of focus for watershed management planning.

6.1.3 Water Use

In general, the estimates of current actual water use on the subbasin scale are considered adequate to support watershed planning. Estimates of irrigation water use, the largest use category for the watershed, benefited greatly from the IRZ Consulting (2004) information

generated for this assessment. The City of Kennewick's Water System Plan provides reliable current use estimates for the population center of the WRIA. The least reliable estimates of current water use are for the non-residential (commercial/industrial) use sector, except that supplied by the City of Kennewick's water system. However, this component of the current total water use outside of Kennewick is relatively small, so the uncertainty is not critical for development of the Watershed Management Plan.

Better estimates of future water demand by subbasin may be warranted to begin planning for future water appropriation as part of the Management Plan. City of Kennewick's Water System Plan provides reliable planning-level estimates for each of its major use categories. Irrigation is expected to remain the largest water use in WRIA 31, but the quantity of additional irrigation use that could occur if new water sources were available is uncertain. Applications for new irrigation water rights in Ecology's WRTS total 612 cfs instantaneous (annual volume not recorded for applications). This comprises 85 percent of all new applications for WRIA 31. The greatest instantaneous quantity of new water rights (all uses) are currently applied for in the Glade/Fourmile subbasin (560 cfs), with smaller quantities applied for in Wood/Alder (96 cfs), Kennewick (64 cfs), and Rock Creek (1 cfs) subbasins.

Increase in water use, particularly outside the Kennewick subbasin, would largely need to be supplied through increased diversions from the Columbia River – which accounts for the majority of the existing supply. Resolution of pending water right issues associated with expanded withdrawals from the Columbia River is the key constraint in expanding available supplies. With the recent decision not to proceed to rule making, the future outcome of the Columbia River Initiative (CRI) remains unclear. It may be appropriate to pursue clarification of water supplies under the John Day – McNary Pool Reach of the Columbia River (WAC 173-531A).

6.2 Water Quality Assessment Data Gaps

Based on the findings of this Level 1 Assessment, the primary areas of interest for water quality in WRIA 31 are:

- Water quality, particularly water temperature, in Rock Creek, which is the most important WRIA 31 stream in terms of instream habitat; and
- Nitrate in shallow groundwater of the Glade/Fourmile Subbasin. This is potentially a public health concern for people obtaining their water supply from shallow wells in this subbasin.

The WRIA 31 supplemental water quality project is being initiated to manage and assess existing data and collect new data related to each of these subbasin-specific issues.

The objectives of the supplemental water quality project for the Rock Creek subbasin are to:

- Compile, manage, and analyze the existing East Klickitat Conservation District's (EKCD) water temperature data for Rock Creek to document baseline water temperature conditions relative to riparian plantings and other BMPs implemented;

- Develop a user-friendly water quality data management system (database) for EKCD to maintain as future data are collected. The database will include data analysis routines to facilitate ongoing analysis of the data;
- Analyze readily available aerial photographs to assess historical changes in riparian vegetation (flood related); and
- Conduct surface water sampling to evaluate concentrations of nitrate and fecal coliform in Rock Creek, as requested by the Rock Creek Watershed Group.

The objective of the supplemental water quality project for Glade/Fourmile subbasin is to collect data to document current groundwater and surface water quality (nitrate) in this subbasin, and thereby evaluate whether changes to irrigation practices are resulting in measurable water quality improvement (e.g., reduced nitrate concentrations).

With the exception of obtaining water quality of the Grande Ronde aquifer to assess its viability as a potable water supply source, the two subbasin-specific projects funded by the supplemental grants will provide the necessary water quality information to allow development of the Management Plan. An outcome of the supplemental water quality project may be recommendations for additional information collection or assessment. Therefore, no additional Level 2 data collection activities beyond continuation of ongoing monitoring by Eastern Klickitat Conservation District and Ecology pertaining to WRIA 31 water quality are recommended at this time.

6.3 Habitat Assessment Data Gaps

6.3.1 *Fish Distribution*

The fish species present and the distribution of those species are speculative for all streams except parts of the headwaters of Rock Creek and the lower 2 miles of Dead Canyon Creek. Surveys of the other streams could be conducted to determine the species present, the distribution of juveniles and adults, and the seasonality of distribution. Electrofishing and/or snorkeling are recommended to determine species presence and relative density. Where anadromous fish are known or suspected, redd surveys should be conducted using repeated surveys. Fish surveys should be coordinated with the Washington Department of Fish and Wildlife (WDFW). WDFW currently intends to conduct surveys in some of the streams in the WRIA within the year.

6.3.2 *Fish Habitat*

- **Physical Habitat Features:** The information available regarding current fish habitat conditions is negligible. Habitat surveys that quantify the amount of suitable spawning habitat present during the spawning season and the amount of suitable rearing habitat during the rearing periods would provide a means to estimate carrying capacity of each subbasin and would facilitate the identification of the primary habitat components that have the greatest effect on the production of each subbasin.
- **Passage Barriers:** A few culverts are either known or believed to hinder upstream passage of fish (Section 5.5.1). Additional culverts that hinder or block migration may exist. Surveys of culverts would help to identify the location of blocking

culverts. Surveys of habitat upstream of these culverts would provide information regarding the benefit of replacing those culverts.

- **Stranding:** All of the streams in the WRIA become spatially intermittent during summer. Fish habitat is limited to isolated reaches and/or pools. Some portion of the fish spawned in each tributary likely die due to stranding in areas that later become dry. Where pools are perennial, survival may be low due to high levels of predation and/or excessively high water temperatures. Quantification of the amount of mortality occurring in spatially intermittent streams would provide insight into the overall suitability of habitat in the basin.
- **Land Use Effects on Habitat:** There are no assessments available that address the effects of land use on fish habitat in any of the streams. There are several methods that can be used to complete these assessments. Assessments should be focused on streams that contain significant viable salmonid habitat. The Washington Department of Natural Resources has a tool that can be used to assess the effects of roads on habitat (www.dnr.wa.gov/forestpractices/adaptivemanagement/warsem) and identify which roads, if any, are having the greatest effect on habitat. Effects of land use on surface erosion, riparian habitat, wood recruitment, and hydrology can be assessed through tools developed for the Washington Department of Natural Resources Watershed Analysis process or the Oregon Watershed Assessment process (www.oweb.state.or.us/publications/wa_manual99.shtml). In addition to these tools, there are many other alternative assessment approaches that could be used.
- **Current Condition of Rock Creek Riparian Vegetation and Trends over Time:** The current condition of Rock Creek riparian vegetation has not been mapped. An effort to map the current condition using aerial photographs with ground truthing is recommended. Preliminary evaluation of riparian vegetation changes in Rock Creek over time, using aerial photographs available from NRCS, is a component of the WRIA 31 supplemental water quality project. This mapping would provide a baseline that could be used to help monitor changes over time. If more detailed evaluation of riparian habitat is desired in selected streams, riparian vegetation should be characterized in terms of some categorization of size and vegetation type (e.g. conifer, deciduous trees, brush). Measures of shade could also be made for a subset of stream channels during the dry season. Shade measurements should be stratified by vegetation type and size, and by channel width. Channel width affects the attainable level of shade over the channel and therefore should be factored into any assessment of trends.

6.3.3 Restoration

Until the current distribution of fish and fish habitat in the various subbasins is better known, and the effects of land use are better understood, it is difficult to make recommendations regarding instream habitat restoration or enhancement. A few situations are known and could be addressed immediately. These include:

Culverts: Known passage barriers associated with blocked or hanging culverts should be addressed.

Riparian Vegetation: In areas where riparian vegetation is currently poor, planting of stream-adjacent vegetation is encouraged in streams where instream habitat is of interest.

This was conducted by NRCS and EKCD in a portion of the Rock Creek drainage in 2000. If land management activities are affecting the survival of riparian vegetation, actions could be undertaken to minimize the effects (develop grazing management approach that addresses the situation, modify roads, limit all terrain vehicle (ATV) access, or adopt other measures appropriate to the situation). Primary areas of emphasis would be along streams that contain salmonids in summer and wetted stream segments upstream of fish bearing waters. These are the areas that would be most benefited from shade. Areas that are not wet in summer would also benefit through the trapping of sediments from upland sources, inputs of wood to enhance habitat, and reinforcement of the channel bottom to hinder channel incision.

6.3.4 Preservation

Willows and other stream-side vegetation along creeks that flow over deep soils help to keep the channels from incising. When a channel incises, the quality of habitat may be affected. Where creeks flowing over deep soils are present, efforts to maintain or enhance existing vegetation are therefore encouraged.

6.4 Prioritization and Recommendations

Based on the results of this Level 1 Assessment and communications with the WRIA 31 Planning Unit, the following water resource-related issues are identified as priorities to allow development of the Watershed Management Plan:

- Additional water supply is needed to expand irrigated agriculture, the primary economy of WRIA 31. The primary water supply source options to meet future demand include expanded withdrawals from the Columbia River, ASR and other water storage opportunities (likely using Columbia River source water), and potential exploration and development of the Grande Ronde aquifer (if viable).
- The Columbia River is a primary water source to supply future population and economic growth in WRIA 31. The seasonal availability of new supplies of Columbia River water is currently uncertain. With the recent decision by the state not to pursue rule making on the Columbia River Initiative and uncertainty regarding appropriation of the John Day – McNary Pools reserve (WAC 173-531A), resolution of pending applications for new water rights is uncertain.
- Groundwater is the other water source available to supply future population and economic growth in WRIA 31. Potential source availability for each major aquifer may be summarized as follows:
 - Where present, the Alluvial Aquifer may be sufficiently productive for domestic supplies, but it is vulnerable to water quality degradation.
 - Productivity of the Saddle Mountains can be limited in areas, largely from erosional dissection of the aquifer, and it can also be vulnerable to water quality degradation.
 - In areas of WRIA 31 where large-scale irrigation pumpage is not currently occurring, additional water could likely be supplied from the Wanapum Basalt.

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Conversely, irrigation pumpage has resulted in overdraft of the Wanapum in irrigated areas supplied by groundwater.

- The Grande Ronde Basalt remains largely unexplored in terms of water supply potential (quantity and quality) across WRIA 31. Further data on the aquifer yield potential and water quality are needed to assess the viability as a water supply source for both potable and non-potable (irrigation) uses.
- Water storage, including aquifer storage and recovery (ASR), using seasonally available Columbia River source water, will likely be a viable strategy to meet future water demands in portions of this arid watershed. The economics of conveying Columbia River water for storage in areas many miles from the river is a key constraint to implementing this strategy.
- The ongoing supplemental water quality project (Rock Creek and Glade/Fourmile subbasins) is expected to provide sufficient water quality information to proceed with Management Plan development.
- Salmonid distribution is limited to the western portion of the WRIA - Rock, Chapman, and Wood Gulch creeks. We assume these streams would be the priorities for instream habitat evaluation. In all cases, the natural hydrology (ephemeral streams) may be a limiting factor for instream habitat. Renewed streamflow gaging for Rock Creek (recommended above), coupled with evaluation of the extensive water temperature data collected to date (part of supplemental water quality project for Rock Creek), will help verify hydrologic conditions in Rock Creek. This information can help better put in perspective the instream habitat potential of Rock Creek, and thus its prioritization within the Management Plan.