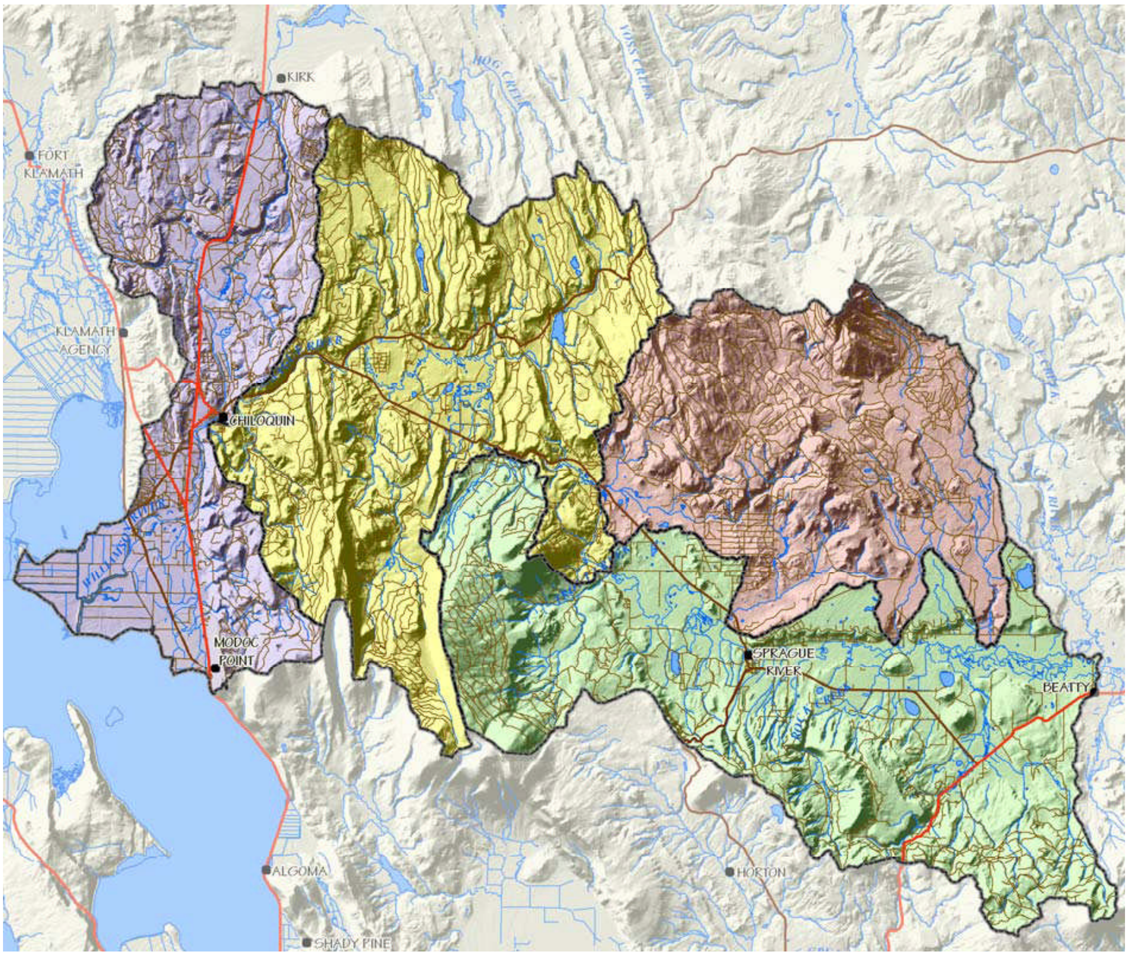
LOWER SPRAGUE/LOWER WILLIAMSON WATERSHED ACTION PLAN



Prepared for

Lower Sprague/Lower Williamson River Working Group

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WITH SUPPORT FROM

The US Fish and Wildlife Service
The Oregon Watershed Enhancement Board

AND

The good people of the Lower Sprague/Lower Williamson River Watershed

Table of Contents

Introduction

When it comes to natural resource issues, there has been a lot of conflict and misunderstanding in the Upper Klamath Basin. Some people say the water is dirty, and others say it's not. Some say the fish are going extinct, and others say there are more now than there ever were before. Some say the wetlands are mostly gone, others don't agree. And the list goes on. Despite these disagreements, there has been progress in addressing natural resource concerns, but people on all sides of the issue feel uncertain about the future.

The reason for the Lower Sprague/Lower Williamson River Action Plan is to help us all move past this situation. In the spring of 2009 the Lower Sprague/Lower Williamson Watershed Assessment was finalized, with input from many partners, which helped us get a handle on all the existing data and information about the sub-basin. It also got us out on the landscape itself, talking to each other about the realities of land use and habitat, and cross-referencing the conclusions of the scientists with what we saw at specific sites within the watershed. The Watershed Assessment gave us a good sense of current watershed conditions. It also helped us understand where conditions may not be up to potential. Finally, it helped us understand what we really don't know about the watershed, and gave us some good questions to ask, questions we need answered before we draw any conclusions about what we should or shouldn't do on the ground.

The Lower Sprague/Lower Williamson Watershed Action Plan is the tool that will help us turn the information in the Watershed Assessment into real accomplishments in actual places on the landscape. First, the analysis contained in the Lower Sprague/Lower Williamson Watershed Assessment is summarized. Second, major restoration projects and other accomplishments are described. Third, general watershed improvement strategies for future action are listed and prioritized. And finally, based on these prioritized strategies, site-specific, on-the-ground watershed improvement and research projects are listed.

This Action Plan is a working document, and if everything goes right, will need to be updated before long, because we will have done the research, restoration and stewardship projects it describes, and will have discovered other projects and strategies to implement for the benefit of the people and the resources of the Lower Sprague/Lower Williamson River Watershed.

Background

General Action Plan Goals

1) Identify Restoration Strategies that provide the most benefit for the resource and landowners.
2) Identify Restoration Projects that provide the most benefit for the resource and landowners.
3) Coordinate further investigation or data collection as necessary to monitor trends and fill information gaps.
4) Document actions taken to improve watershed conditions, and monitor the short and long term effects of those actions.
5) Preserve and promote economically and ecologically sustainable agriculture and natural resource use.

SUMMARY OF THE LOWER SPRAGUE/LOWER WILLIAMSON WATERSHED ASSESSMENT

Throughout this document, certain principles have been emphasized, principles that have emerged from the watershed assessment process itself. These principles include:

- The conviction that scientific understanding must be joined with social and economic understanding to produce lasting solutions that have solid community support.
- The insight that overall watershed condition and function—in both riparian areas and in the uplands—are the result of dynamic interactions between soil, water and vegetation.
- The importance of basing restoration, management planning and even regulatory actions on site-specific analysis, rather than just on generalized judgments about conditions at the watershed scale.
- The importance of focusing on "trend over time," which allows resource managers to determine whether fundamental processes are in place that will produce a stable—but dynamic— landscape over the long term.

Although conditions have clearly changed from pre-settlement times, the goal is to try to determine whether, and to what extent, watershed function has been compromised. Return to pre-settlement condition is not necessarily possible, or even desirable. Ultimately, the goals of future natural resources management actions and watershed restoration should focus on improving and restoring stable but dynamic function to the extent that is practical. This can be achieved in incremental steps over a longer term to obtain a balance of healthy watershed conditions and needs of other beneficial uses.

GENERAL GEOGRAPHIC CHARACTERISTICS

The Lower Sprague-Lower Williamson subbasin covers 599.6 square miles and drains a varied landscape, from steep-sloped reaches to low gradient floodplains. Within the assessment area lie a variety of aquatic features including perennial, intermittent and ephemeral streams, constructed ditches, lakes and marshes. Only 23 percent of the streams in the subbasin are perennial. Most streams are intermittent or ephemeral. The major streams within the watershed flow generally from east to west and north to south. The Lower Sprague River continues from Beatty Gap west to its confluence with the Williamson River. The Lower Williamson River continues south from Kirk reef and then southwest from the Sprague River confluence until it reaches its delta at Upper Klamath Lake. Elevations within the watershed range from 4,143 feet at the Williamson River Delta to approximately 7,268 feet at Swan Lake Point.

Average annual precipitation ranges from 12 to 16 inches in the valleys, 16 to 25 inches in nearby hills, and 30 to 40 inches at higher elevations. About 41 percent to 46 percent of the precipitation in the survey area occurs in winter. Snowfall accounts for 30 percent of the annual precipitation in the valleys and as much as 50 percent in the mountains.

Prior to the settlement of European Americans in the late nineteenth century, human activity in the Lower Sprague River and Lower Williamson River watersheds consisted primarily of seasonal subsistence hunting and gathering by Native Americans. Native Americans may have used fire intentionally to encourage certain types of flora and fauna that they considered desirable. Suppression of fire in the late nineteenth and early twentieth centuries had a significant effect on flora, fauna and the hydrology of the assessment area.

In the late nineteenth century, the nature of human dependence upon the area's natural resources began to change. The Bureau of Indian Affairs promoted intensive livestock grazing—including horses, mules, sheep and cattle—as early as the 1870s. About the same time, European settlers began to arrive in greater numbers, establishing livestock and hay operations and sawmills and box companies. Many of the negative effects on riparian vegetation and stream channel function can be traced to the late 1800s through the mid-1900s.

GEOLOGIC PROCESSES

Although erosion is a natural process, an increase in the amount of erosion due to human activities can compromise stream function because an abundance of fine sediment can fill the spaces in streambed gravel and reduce the habitat quality for fish. Soils within the assessment area are typically high in phosphorous. Streambank erosion is an important concern in some areas within this subbasin, due in part to concerns about phosphorous loading in downstream habitats. There appears to be limited data available on active bank erosion within the assessment area.

Roads are another potential source of excessive sedimentation. There are approximately 2,300 miles of roads in the Lower Sprague-Lower Williamson subbasin, at an average road density of 3.8 miles of road per square mile. Approximately 31 percent of the stream miles in the Lower Sprague River subbasin are within 200 feet of a road.

HYDROLOGY AND WATER USE

The available data indicate that changes in vegetation and soil conditions in the Lower Sprague-Lower Williamson subbasin—including forest structure, the prevalence of fire, riparian vegetation conditions and juniper ecology—may have reduced the capacity for the watershed to retain and safely release available precipitation.

Water is currently withdrawn from both the Lower Sprague and Lower Williamson rivers for a variety of beneficial uses. Water is used for irrigating crops or forage for livestock, and for domestic use. Most diversions are for irrigation. It is difficult to establish the precise effect of diversions on stream flow because of the return and reuse of tailwater, and the complicated interaction of groundwater and surface water.

Where favorable permeable zones for fracture are intersected by streams, groundwater is discharged by large springs. There are some data suggesting that development of irrigation wells to substandard specifications may be negatively affecting flow from springs. In some cases, groundwater pumped for irrigation may supplement surface flows.

Water is a limited resource within the watershed. The water is currently over-allocated between beneficial uses. Eventually, if it has not already, the landscape will reach a carrying capacity for the amount of water available in the system.

TERRESTRIAL VEGETATION

At the time of European settlement, the Lower Sprague-Lower Williamson subbasin consisted of a mosaic of coniferous forests, marshes, shrublands and grasslands. Ponderosa pine and lodgepole pine coexisted in the pumice region in the northern reaches of the Williamson River watershed, the West Sprague River watershed and the North Sprague River watershed. Outside of the pumice region, ponderosa pine forests graded into ponderosa pine dominant mixed conifer forests (*Abies concolor* and *Abies lasciocarpa* becoming more abundant) at their upper limits. At the forests lower elevational limits, they abutted with sagebrush shrublands or western juniper-sagebrush woodland. Riparian shrublands were exhibited in a band following rivers, streams and shorelines of lakes. At the mouth of the Williamson River, where the entire subbasin drained into Upper Klamath Lake, a 12-square-mile delta rich in sediments sustained a vast network of marshes.

As a result of tree harvesting and a dramatically altered fire regime, climax species such as white fir and grand fir were able to grow in much greater densities as compared with pre-settlement conditions. Stream function has been affected because of the reduction in the availability of large wood. Fire suppression also led to increased fuel loadings and more widespread mixed-species (ponderosa pine dominant) stands. Although data from other regions indicate that changes in stand composition and structure increase susceptibility to insect outbreak, historical records have shown that severe insect outbreaks occurred before significant timber harvest began. Throughout the twentieth century, the range and density of juniper increased dramatically, due to fire suppression and reduction in fine fuels.

Site-specific assessments of the uplands by the Working Landscapes Alliance (WLA) indicated opportunities for land managers who may not have streams or wetlands to contribute to the overall functionality of the watershed. Juniper- dominated sites that were assessed were found to be functioning at risk or nonfunctioning hydrologically. As part of the loss of hydrologic function have come losses in plant vigor and productivity and in plant community diversity.

Noxious weeds are a concern both in the upland and riparian areas. Landowners have been working to control and limit the spread of noxious weeds.

RIPARIAN AREAS

The straightening and diking of significant reaches of the Sprague River and some of its tributaries constituted substantial modifications to riparian and wetland areas. Removal of native riparian vegetation increased bank erosion. These actions reduced or eliminated the ability of certain key stream segments to dissipate the high energies of peak flows by spreading these flows out over a floodplain, or by accessing secondary high flow channels. These actions also reduced the viability of in-stream fish habitat by simplifying streambed topography and flow dynamics.

The data gathered for the watershed as a whole have indicated some general changes in riparian condition, including erosion of channels both outward and downward, local lowering of the water table, disconnection of stream channels from their floodplains, shifts in vegetation communities and changes in certain key fish habitat features.

As a result of the involvement of the National Riparian Service Team (NRST) and the WLA, considerable attention was devoted to riparian areas during this Assessment. The involvement of the NRST and the WLA has allowed the large-scale data to be supplemented in this Assessment with information gathered during specific site visits on public and private lands.

Some key findings emerged from specific site assessments conducted during the 2007 field season. First, there was wide variability with regard to riparian conditions and function across the watershed, and even within a particular site. Second, there was evidence at most sites that major changes had taken place in the early part of the last century, and that riparian conditions and functions have been gradually improving since that early disturbance. Third, there was clear evidence at each site of the potential for substantial and rapid recovery of vegetation conditions with relatively minor shifts in management. And finally, it gradually became clear over the course of the field season that in riparian areas where vegetation conditions and hydrologic function had declined, forage production for livestock had also declined. This fact was considered to be of critical importance, because strategies could be developed that would simultaneously contribute to the functionality of the riparian area, as well as to the economic viability of the agricultural operation.

WETLANDS

According to available data (National Wetland Inventory), wetlands cover about 28,140 acres (7.3 percent) of the Lower Sprague-Lower Williamson subbasin. The largest amount of wetland area is located in the valley reaches of the Lower Sprague River.

Wetland conditions have changed since pre-settlement times as a result of draining, diking, grazing, forestry and irrigation. Some of the former willow and woody vegetation has been replaced in many lowland areas by wetland/sedge/wet pasture and meadow/grass/pasture vegetation types.

The engineered flood control projects implemented by the U.S. Army Corps of Engineers during the 1950s caused significant changes in wetlands in the assessment area. In particular, the main stem of the Lower Sprague River was diked, straightened and isolated from its floodplain. As part of this same effort, wetland and riparian vegetation—including native willows, sedges and rushes—were removed.

CHANNEL CHARACTERISTICS

Channel conditions include the cross-sectional profile, the longitudinal profile, the ratio of width to depth, the connection of the channel to its floodplain, the sinuosity (or meandering pattern) and vegetation conditions. Each of these components is directly related to how the channel is functioning in terms of its ability to dissipate the energy of high flows. Each is also related to the quality of habitat for fish, because proper function with regard to these conditions results in the development of key habitat features for native species. Modifications of channel characteristics can result either from intentional reconfiguration of channel form to serve other purposes (dikes, reservoirs, dams, etc.) or from a gradual erosive process stemming from management of riparian areas.

The most intensive channel modifications in the assessment area, resulting from federal flood control projects, have already been discussed.

There are stream channels throughout the Lower Sprague-Lower Williamson subbasin that have experienced substantial channel modification, and some of this modification has been associated with excessive erosion. Such changes to the channel morphology are associated with a variety of activities, including over-grazing, beaver trapping, removal of riparian vegetation, land clearing, wildfires and loss of wetlands.

WATER QUALITY

Water quality is directly associated with the viability of habitat for aquatic organisms, as well as other beneficial uses. At the screening level of this Assessment, water quality in the major streams of the Lower Sprague-Lower Williamson subbasin would be considered impaired with respect to Oregon Department of Environmental Quality (ODEQ) statewide water quality standards for temperature, pH, phosphorus, bacteria and possibly dissolved oxygen. ODEQ has conducted extensive analyses on water quality parameters within the assessment area.

Most streams listed by the state as water quality limited are listed for temperature. Reduced streamside vegetation, reduced wetlands and channel widening may contribute to elevated stream temperatures. Groundwater pumping and flood-irrigated pastures may contribute to late-season lowering of water temperatures if return flows are subsurface. However, if return flows are on the surface, then they can contribute to increased water temperatures.

The streams and groundwater of the Lower Sprague-Lower Williamson subbasin are relatively high in dissolved phosphorus, due in part to erosion of soils and volcanic bedrock that are naturally high in phosphorous.

AQUATIC SPECIES AND HABITAT

The major focus of habitat quality issues within the Lower Sprague-Lower Williamson subbasin concerns native fish species. In particular, the influence of habitat quality on Klamath largescale sucker (Federal Species of Concern), Lost River Sucker, shortnose sucker (the latter two are Federally listed Endangered Species), redband trout and two currently extinct species of anadromous salmonids—chinook salmon and steelhead trout. Historical evidence suggests that fish populations in the Lower Sprague-Lower Williamson subbasin were different from those which exist today.

A variety of factors have contributed to the changes that have occurred. The construction of Chiloquin Dam interrupted normal passage, and the introduction of non-native fish species resulted in competition and hybridization. The loss in stream-side riparian zones may have led to changes in fish habitat due to changes in channel form and flow dynamics, alteration of vegetation cover and increases in stream temperature.

TERRESTRIAL WILDLIFE AND HABITAT

The Lower Sprague-Lower Williamson subbasin is noteworthy from a wildlife perspective because it contains a high diversity of species and because it is home to many species that have been classified as rare or deserving of special conservation status. Both of these factors are due, at least in part, to the location of this subbasin at the intersection of five different ecological regions. It is estimated that over 200 species of vertebrates occur in, or have been extirpated from, the assessment area.

Key issues that limit wildlife diversity include a reduction in vegetation complexity (multiple vegetation layers, including large trees), scarcity of snags and downed logs, and increasing abundance of noxious invasive plants.

In some cases, irrigated pastures result in benefits to certain species by providing additional vegetation for a longer period during the year. In other cases, grazing can diminish habitat quality for wildlife that depend upon the vegetation structure of shrubs or feed upon the associated plant species.

CONCLUSION

The Lower Sprague-Lower Williamson subbasin has experienced significant changes over the last century. Some of these changes have been positive, and others have been negative. And, in some cases, whether a given change is positive or negative has changed based on a better understanding of how the natural systems in the area function.

Healthy rivers, streams, riparian zones, wetlands, forests and uplands are critical to maintaining the economic, social and ecological benefits that residents receive from the watersheds within the subbasin. Although there is growing agreement concerning the benefits provided by watershed functions, there is considerable disagreement about the current condition of the natural resources, appropriate use of these resources, treatments and tools that can be used to restore and maintain healthy ecosystems, and prioritization of ecological and economic concerns.

Disagreement over the management and use of natural resources has recently led to litigation and regulatory actions, which sometimes exclude those most affected by management decisions. Increasingly, collaborative approaches are attempting to build capacity in local communities to confront complex natural resource problems in an integrated fashion.

The assessment process has indicated that local landscapes can be highly responsive to relatively modest shifts in management. Riparian areas and stream channels, in particular, have proven to respond in ways that result in short-term and long-term benefits for both the human and nonhuman inhabitants of the watersheds. In some cases, more intensive or costly projects may be needed to affect some watershed conditions. Overall, it is important to make progress by employing good management practices, changing practices when needed and working together across ownership boundaries.

Actions

Accomplishments to Date

The people of the Lower Sprague/Lower Williamson River subbasin recognized long ago that there were things they could do to improve their landscape and rivers. The restoration work that has been ongoing in the subbasin for decades now has taught us many lessons about what does and does not work and what forms of restoration are most effective. Historic and ongoing restoration efforts within the subbasin involve the application of best management practices on private and public lands. Through collaboration, restoration efforts have improved, rehabilitated, and maintained the health and vigor of natural resources on both a site specific and landscape level.

Projects

Projects completed within the Lower Sprague/Lower Williamson River subbasin have varied in size, type, and scope. Improvements in irrigation efficiency, livestock management, riparian rehabilitation, dryland crops, rangeland restoration, forestry, fish habitat improvements, and stream channel restoration are some of the project scopes that have been implemented. Best management practices utilized to achieve results have included but have not been limited to:

1. Irrigation system upgrades
2. Irrigation water banking
3. Cross fencing,
4. Off-stream watering
5. Grazing management
6. Riparian planting
7. Riparian fencing
8. Dryland farming/ planting
9. Juniper thinning
10. Rangeland seeding
11. Forest thinning and planting
12. Large wood placement in streams
13. Levee breaching
14. Stream channel restoration
15. Fish barrier removal
16. Spring reconnections

Collaboration efforts have lead to the implementation of large projects within the Lower Sprague/ Lower Williamson subbasin. These projects affect the health of the Sprague and Williamson River watersheds and play a large role in the restoration of the Lost River and Shortnose suckers in the Klamath Basin. Two such projects include the Chiloquin Dam Removal and the Williamson River Delta Restoration.

Chiloquin Dam Removal
In 2008 the Chiloquin Dam was removed near the town of Chiloquin, Oregon. This momentous project was the result of decades of collaboration efforts between tribes, agencies, and working groups. Removal of the dam permitted endangered Lost River and shortnose suckers to travel from Upper Klamath Lake into the Sprague River system.

Williamson River Delta Restoration
Approximately 5,500 acres of wetland and riparian habitat has been restored on the Williamson River Delta. In 2006 The Nature Conservancy initiated a three year, $8.9 million project to restore over 5500 acres of historic riparian and wetland habitats at the Williamson River Delta. The main goals of the project were to 1) restore the river-delta wetland ecosystem, 2) improve water quality conditions in Upper Klamath Lake, and 3) restore habitat for larval and juvenile Lost River and shortnose suckers. Approximately 22 miles of levee were built surrounding the Delta during the 1940's and 1950's in order to convert the historic Delta wetlands to agricultural lands, eliminating the connectivity of the Delta to the river and lake and leading to aquatic and habitat degradation. Through the effort and dedication put forth by The Nature Conservancy and project partners, those lands are once again connected to the river and lake in an effort to restore the wetlands and riparian habitats. Intense construction activities were needed to undertake this massive restoration effort.

Restoration Strategies

The Upper Williamson Watershed Assessment resulted in a list of restoration and stewardship strategies that are intended to focus on those elements that may have the greatest benefit to the aquatic and riparian resources within the upper Williamson River subbasin.

Strategy Prioritization

Prioritization of the following strategies was established based on the natural resource needs and expected benefits, as well as on the input of a broad diversity of interested parties. The criteria used include:

- Degree of resource need or concern
- Extent of expected resource benefits
- Whether threatened or endangered species are effected
- Community Support
- Cost Effectiveness
- Potential for Mitigation of the effects of Climate Change
- Landowner Support

Prioritized Restoration Strategies (In ranked order)

29.10 Restore riparian vegetation (native – tulles, sedges, rushes, willows, cottonwood
27.70 Stream bank stabilization
26.50 Reduce fuel loading by thinning forests
24.70 Provide livestock watering sources away from wetlands
23.20 Fish habitat-Improving fish passages
23.00 Connectivity-Reconnect springs
22.50 Connectivity-Reconnect streams
22.50 Fish habitat-Placing snags and large downed wood near streams - slows water, traps sediment and creates fish habitat
22.30 Vegetation management-Juniper Management - Paired watershed study shows increase in spring flow and subsurface flow – groundwater recharge
21.60 Vegetation management-Control invasive plants
21.50 Connectivity-Reconnect streamside wetlands to river
20.70 Water Quality-Tail water recycle/reuse or treatment wetland
18.40 Connectivity-Reconnect floodplain
18.00 Water Quality-Build artificial/treatment wetlands to treat irrigation return flow
18.00 Water Quality-Reduce erosion – road drainage

17.40 Water Quality-Erosion control on steep slopes
17.30 Vegetation management-Promote ponderosa pines
16.80 Vegetation management-Lodge pole Management in riparian areas
16.78 Vegetation management-Reed Canary Grass Management
15.40 Vegetation management-Increase diversity of plants, especially in wetlands & riparian areas
13.90 Vegetation management-Protect aspen stands
10.80 Climate Change
10.70 Beaver Management
8.86 Assessment for "dryside" of Oregon

RESEARCH PROJECTS

The following research projects are intended to provide information to support implementation of the preceding restoration strategies. It should be noted, however, that there are many specific restoration projects that can be developed and implemented without additional data or information.

Prioritized Research Projects (In ranked order)

33.50 ID at risk areas/site types (conditions) -Identify & protect wetlands (fence etc.)
27.33 ID at risk areas/site types (conditions) -Noxious Weeds - Can we identify priority problem areas?
26.50 ID at risk areas/site types (conditions) -Juniper management
23.90 ID at risk areas/site types (conditions) -Roads – we should access existing inventories, quantify site by site
22.90 ID at risk areas/site types (conditions) -Stream crossings (Roads)
13.00 ID at risk areas/site types (conditions) -Meth labs and pollutants in the water

WATRERSHED IMPROVEMENT PROJECTS

Project Prioritization

The following table summarizes prioritized, site-specific restoration projects that implement the strategies developed through the Lower Sprague-Lower Williamson Watershed Assessment.

The following criteria, in addition to the criteria used to prioritize restoration strategies, were used to prioritize these projects:

- Feasibility (logistics, probability of completion)
- Cost
- Degree of connectedness (number of strategies the project addresses)
- Likelihood of achieving objectives

For all improvement actions, pre- and post-project monitoring is considered essential in order to measure project success.

This list is not meant to be inclusive of all restoration activity that is needed, and it is one of the goals of this assessment process to add to this list as more project areas become available for consideration. The assessment process is a dynamic process, and will need to be adapted as we move forward, when new information is available, when public perception about issues changes, and when realities on the ground change.

Prioritized Improvement Projects (In ranked order)

32.63	Chiloquin Mill Site treatment wetland development
30.86	Education-Factors Affecting Fish Populations
29.33	Klamath County OSU Extension technical consultation
28.88	Large Wood Placement on Sprague River-Mike Love
27.75	PFCs for landowners
27.29	Education-KWP will provide books
26.38	Large Wood Placement on Lower Williamson (Kirk Springs to Collier Park)
26.25	Weed grant program (Oregon Department of Agriculture) –Weed Management Area – make this a priority area for funding
25.75	Noxious Weeds
25.75	Kids workforce (Scout badges)
24.38	Weed Tour (OSU Extension) late June
23.14	Education-Tour the Williamson River Wetlands
21.86	Education-Wetlands are protected by law
19.25	Endangered Plants -Fence/protect
17.33	Adopt an area

APPENDIX: WATERSHED ACTION OPPORTUNITY WORKSHEET

Watershed:

Your Name: Date:

Sub-basin:	
Location:	
Sec-TS-Range	
Channel Type:	
Land Use:	
Fish Use:	
Summary:	
Specific Issues:	
Contributing factors	
Field Observations	
Initial Recommendation	
Monitoring & Assessment Needs	