CHAPTER 1. INTRODUCTION

A WATERSHED

A watershed is an area of land that contributes to the flow of water at a given point. A watershed reaches from one mountain ridge to the next, and includes all of the area in between. Watersheds are nested within one another. Tiny watersheds are grouped in small watersheds, which are grouped in larger watersheds.

The Lower Sprague-Lower Williamson Watershed Assessment area includes the lands that cover all the territory downstream of Beatty Gap on the Sprague River and downstream of Kirk reef on the Williamson River in Klamath County, Oregon (see Maps 3-1 and 3-2). These rivers are the reflection of geology, soils and vegetation, farms and ranches, cities and towns, and attitudes and economies that fill their basins and watersheds. With respect to this Watershed Assessment, only the lower portion of the Sprague River and Williamson River watersheds are included. The Upper Sprague and Sycan Watershed Assessment and Upper Williamson Watershed Assessment were already conducted. The next portion of the watershed to be assessed, moving downstream, is the Upper Klamath Lake Basin.

A watershed consists of three basic physical components: the uplands, riparian/wetland areas and the aquatic zone. The uplands generally comprise up to 95 to 98 percent of a watershed's surface area, receiving and processing a corresponding percentage of the precipitation (rain and snow) that falls in the watershed. Uplands are commonly represented by toe slopes, alluvial fans, side slopes, and shoulders and ridges of mountains and hills, and include plains and terraces in valley bottoms not influenced by groundwater or by occasional flooding.

Riparian areas are transitional areas positioned between permanently saturated water bodies and uplands. They exhibit vegetation and physical characteristics reflective of permanent subsurface water or seasonal surface water. Lands along, adjacent to, or contiguous with perennial and intermittently flowing rivers and streams are referred to as lotic (flowing water) riparian areas, while those associated with potholes, lakes and reservoirs with stable water levels are referred to as lentic (standing water) systems. When functioning properly, lotic riparian areas trap sediment during high flows, help maintain appropriate stream channel width-to-depth ratios, attenuate flood flows and store water. Lentic riparian areas protect banks from the erosive effects of wave action and support water quality by filtering water and trapping sediments.

Wetlands are areas inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted to life in saturated soil conditions. The aquatic zone is an area of open water including streams, rivers, ponds and lakes (Prichard 1998).

WATERSHED FUNCTION

When functioning properly, each of the physical components of a watershed (uplands, riparian/wetland areas and the aquatic zone), working in concert, optimize the watershed's ability to capture, store and safely release the precipitation it receives.

Capture of moisture is directly related to the proportion of the precipitation that is not lost through interception in the uplands. Once water strikes the earth's surface, it may take one of many pathways depending on temperature, slope of the land, geology, soils or vegetation cover. The process in which water moves into the soil profile is called infiltration. The factors that affect infiltration are the passage of moisture from the atmosphere, through the soil surface and into the soil profile. Riparian/wetland areas serve many important roles: storing moisture, trapping sediment, and attenuating flood flows during high flow and flood events.

Storage relates to the retention/detention of moisture in the soil profile once that moisture has entered the soil following infiltration. This moisture, once surpluses have percolated past the root zone, is available for plant growth and the maintenance of soil organisms. Once at field capacity, loss of soil moisture in this process is through evapotranspiration.

Safe release includes the processes of the percolation of excess moisture deep into the soil profile or to fractured bedrock and eventual groundwater recharge; lateral flow down-slope to the riparian area, wetland or stream; and the use of moisture by plants and soil organisms. Safe release brings the eventual yield of long duration flows of quality water to support the needs of fish, wildlife and humans.

HISTORY OF LOWER SPRAGUE-LOWER WILLIAMSON WATERSHED ASSESSMENT

Watershed assessments are based on science, which also includes landowner knowledge. The watershed assessment process was developed by coalitions of farmers, ranchers, environmentalists, scientists, foresters, agency personnel, tribes, business people and many others. Assessments were intended to give local communities and resource managers the information and tools they need to document their understanding of the various factors that affect watershed function, and the associated social, cultural, historical and economic context. With this information, individuals may be empowered to take actions that will increase the capacity of the natural environment and provide a sustainable livelihood. This process, which was pioneered here in the state of Oregon, grew out of the recognition that it takes input from all stakeholders to successfully manage natural resources to the best extent possible for multiple uses.

Starting in 2003, three different organizations—the Hatfield Working Group, Klamath Watershed Council (KWC), and Klamath Basin Ecosystem Foundation (KBEF)—started collaborating on watershed assessments in the Upper Klamath Basin. The diverse interest groups represented by these three organizations worked together to secure grants for the development of a watershed assessment from the Oregon Watershed Enhancement Board (OWEB) and the Klamath Falls field office of the U.S. Fish and Wildlife Service.

The first step was to develop a strategy for conducting the assessments across the entire Upper Klamath Basin. Since the Upper Klamath Basin is a very large area, doing the assessments at the scale and pace that they have been done in other parts of the state would take around 60 years and cost somewhere between six and seven million dollars. No one was interested in this timeframe and cost, so the partnership devised a strategy that balanced the need for detailed analysis with the need to be expedient and responsible with taxpayer dollars.

The Upper Klamath Basin was divided into seven "Assessment Units," or subbasins: the Upper Williamson, the Upper Sprague/Sycan, the Lower Sprague-Lower Williamson, Upper Klamath Lake, Upper Lost River, Lower Lost River/Klamath Project and the Klamath River Canyon (DEA 2004). The plan was to work systematically through the subbasins, conducting watershed assessments in a reasonable timeframe, for a reasonable cost. Stakeholders acknowledged the importance of including local knowledge with the science from published studies and reports in the assessment document.

To accomplish the watershed assessment, guidance was provided by the OWEB and its Watershed Assessment Manual (WPN 1999). This manual is geared toward incorporating community involvement in the assessment process. This process was used in the Upper Williamson assessment (DEA 2005), and then refined and improved upon for the Upper Sprague/Sycan River assessment (KBEF and OSU KBREC 2007) and subsequently this Lower Sprague-Lower Williamson Watershed Assessment, by incorporating a series of public field days covering various parts of the watershed. Field days were held on private and public property, usually with private landowners interested in improving management practices and land conditions. Some of the discussions included sharing progress and best management practices that have already been implemented.

Technical support during the field days was provided by the Working Landscapes Alliance (WLA). The WLA is a group of natural resource specialists with decades of experience in the management of natural resources in the western United States. Their approach to stream assessment and enhancement is called "Proper Functioning Condition" or "PFC" (Prichard 1998). PFC assessment refers to a methodology for assessing the physical functioning of riparian-wetland areas including hydrology, vegetation, and erosion/deposition (soils) attributes and processes. Whereas PFC is one of numerous methods used to assess the riparian area and stream conditions, it is the preferred method for purposes of this Watershed Assessment. WLA also has a collaborative, adaptive management philosophy and works to create a common vocabulary about riparian-wetland function within communities.

As early as 1995, local producer groups, in cooperation with the Oregon Cattlemen's Association, Oregon State University (OSU) and the Klamath Watershed Council (KWC), had been sponsoring workshops teaching the principles of PFC. The PFC methodology became popular among professionals because it focused on actual conditions of specific stream reaches, describing in detail how soil, vegetation and water interact to dissipate the stream energies that cause erosion. This dissipation results in more stable stream channels, improved fish habitat, cleaner water and even improved forage production. The information gathered through this approach is documented in a way that can contribute to the overall watershed assessment by serving as a "cross-reference" for the published studies.

One criticism of PFC is that it does not place enough focus on the majority of the watershed that is not in the riparian zone—the uplands. WLA met this need by including in its group a specialist in range management and upland function who focuses on the ability of upland landscapes to "capture, store, and safely release" precipitation.

This Watershed Assessment was compiled using the process described in the OWEB Watershed Assessment Manual for reviewing existing data and published studies, and using PFC to look more closely at specific riparian sites. For this Watershed Assessment, a combination of contractors was used to compile and present existing data. E&S Environmental Chemistry gathered data and

prepared figures, tables and maps, and Rabe Consulting provided text and included landowner perspectives. A technical advisory group (TAG) was developed to oversee the technical content of the Assessment. The TAG was composed of professionals from different focus areas, including hydrology, fish, wildlife, soils, botany, wetlands, riparian, vegetation and water quality. Another layer of review included the Assessment Team (AT), which included the TAG members as well as other resource specialists, Tribal members, and landowners living in the assessment area. In addition to the technical review and input, landowners were interviewed and public meetings were held to gather landowner perspectives. Landowners' viewpoints are included as much as possible, because often landowners can impart valuable first-hand knowledge of the watershed.

Action plans and assessments are a no-brainer really, to have a long-term plan. It's kind of scary, though, to think about who will control things over the long-term because landowners don't have control over the whole watershed.

Agriculture as a whole in the Klamath Basin—the AG community— has really stepped up. When there is a challenge, the community bonds together quite well.

--Tom Mallams, Rancher

In July of 2007, the Klamath Watershed Council and the Klamath Basin Ecosystem Foundation combined to form one organization, the Klamath Watershed Partnership. The partnership has coordinated the various contractors, technical advisors and team members, and completed this process and document.

THE OWEB PROCESS AND ISSUE IDENTIFICATION

In short, the OWEB watershed assessment process is as follows:

1. Define the area and items to be assessed.
2. Assess this area based on available data and knowledge.
3. Plan actions based on data gaps or issues identified in the assessment.
4. Implement the action plan.

For many, the item of most interest is the action planning, with a focus on implementing projects on the ground, while there is little interest in assessment alone. However, this assessment document covers only steps 1 and 2 in the list above. Steps 3 and 4 will come later, as the community works together to develop and implement the action plan. Although it may be frustrating to take the time to complete the assessment, it is essential to providing sound direction for the action plan.

Action planning uses information from the assessment document to make a prioritized list of the practical actions necessary to meet the identified needs in the watershed. Projects could include fencing the riparian areas, setting up off-stream watering, planting trees or gathering more information on topics or in areas where the existing information was not complete.

To complete Steps 1 and 2 for the Lower Sprague-Lower Williamson Watershed Assessment, which covers all the territory downstream of Beatty Gap on the Sprague River and downstream of Kirk reef on the Williamson River, kick-off field days were held May 25 to 26, 2006, and July 25 to 26,

2006. During these field days, the WLA discussed riparian and upland systems and issues with landowners and other stakeholders. The field days included one day of indoor discussion, followed by a day in the field assessing a landowner's property.
Subsequently, an "Issue Identification" workshop was held on September 18, 2007, at the Community Center in Chiloquin. People attending the workshop included landowners, Klamath Tribe representatives, agency personnel and private industry representatives.

At the workshop, participants assembled into small groups to generate and rank lists of as many potential issues for the watershed as possible. Participants spent part of the time developing issues from viewpoints different from their own, and part of the time identifying issues that affected them directly.

The ranking process allowed each participant to indicate the top three issues within the watershed area, and then identify a group of the next seven most important. Issues were ranked according to the total number of votes received. In the case of ties, issues were ranked equally.

There were 94 issues raised, and these issues were classified into 12 categories. The issues were ranked based on the number of votes within categories and also ranked regardless of category. Of the 94 issues identified during the workshop, 38 (nearly 40 percent) received only one vote. These 37 are numbered (57-94) in Table 1-2, but they have equivalent rankings. The top issues reflected concerns about noxious weeds, sustaining rural communities, impacts of wells on artesian flow and groundwater, and government regulations.

The following tables summarize the input received. Table 1-1 lists all the issues raised ranked within their categories by number of votes. Table 1-2 lists the issues ranked by the total number of votes.

Table 1-1 Issues raised during the Issues Identification Workshop ranked by votes within categories.

Category	**I**ssue	**T**ally
WATER QUANTITY		
	What impact are wells having on artesian flow and groundwater	10
	Having enough water to grow hay and water cattle	7
	A true balance of water delivery	6
	Irrigation water supply	5
	Who owns the water can affect my lifestyle and maybe even livelihood	4
	In-stream flow needs for channel maintenance, biotic support, refugia and migration for healthy riparian function	4
	Are the water rights such that there is enough water left in channel for physical ecological processes and biology to flourish	3
	Weeds and invasive species consume more water and are outcompeting native species	3
	Tribal rights are reduced by over-allocated water resources	2
	Mid-elevation uplands are in fair to poor hydrologic condition	2

	(sagebrush/grass, sagebrush/grass/juniper, juniper/grass/shrub)	
	Water rights adjudication creates uncertainty about water for irrigation and fish and wildlife	1
	Need to settle adjudication ASAP	1
	Not addressing groundwater in upper basin. Future impacts on domestic and overall supply, impacts to surface water. Lack of information on groundwater and groundwater pumping.	1
	Juniper encroachment may affect water availability for Sprague system	1
	Irrigation water and Tribal rights	1
	How do we manage annual fluctuations in water amount	1
	How much water can be saved through irrigation water management, and also what is impact on forage production and water quality	1
RANCH		
	Rising land values affect opportunities for agricultural landowners to own and retain land	5
	Presence of endangered species on my land may retard use and profit	5
	How will this info increase my bottom line	3
	Forage production	3
	Conservation of open space	3
	River and riparian restoration may affect economic viability of ranching and farming operations	2
	Grazing allotment reform	2
	Increase public land grazing	1
	Access to public lands for grazing	1
WATER QUALITY		
	Poor water quality issues including temperature, sediment, dissolved oxygen, pH, nutrients	6
	Water quality, including temperature and chemistry, is a problem for fish recovery	2
	Streambank erosion affecting water quality	2
	Need improved water quality by reducing impacts of livestock, roads, forest practices	2
	How do land management activities affect water quality	1
	Need to preserve wild and scenic qualities of the waters	1
RIPARIAN		
	Functional soil, water and vegetation to sustain creation of what we value	6
	Stream and riparian degradation can be caused or influenced by on-site management, and upland or upstream management; it	4

	takes critical thinking to determine cause and effect	
	Restoration of previous wetland and riparian areas	4
	Geomorphology issues including lack of floodplain connectivity, lateral and vertical stability, sediment loads, channel geometry	3
	Bank stability	2
	What limitations does the agriculture water quality management plan impose	1
	Current conditions of riparian area is very poor	1
	Floodplain connectivity	1
	What regulations control managing riparian areas on private lands	1
CULTURE		
	How will the information influence the way we make management decisions	6
	Tribal culture and heritage is not respected by nontribal groups	3
	Truthful representation of biology	3
	Local participation	3
	Dignity, economy and biology go hand in hand	2
	Communicate to general public	1
	Educate land user	1
	Lack of knowledge: Landowners do not know what water law means, need an overview of federal law, how are Tribes still separate governments	1
	Agency people do not understand community connection to land, have bad reputation with landowners	1
	Too much agency and lawyer involvement, not enough community decision-making	1
	Private property rights	1
	Community trust	1
	Want to sustain our Tribal culture by getting lands back	1
	Lack of understanding: What's the big deal	1
RECREATION		
	Preserve open lands for public use	4
	Eco-tourism	1
FISH HABITAT		
	Relationships with landowners and agencies who are managing the fish habitat so that we all get what we need and want for the watershed	5
	Fish habitat	4

	Maintaining traditional hunting and fishing areas under ESA requirements	2
	Suckers live in the mud, who cares	2
	Fish populations are too low: (1) redband, (2) bull trout, (3) sucker	1
BIOLOGICAL DIVERSITY		
	Noxious weeds	11
	Maintain plant and animal diversity and viability	4
WETLAND		
	What federal and other programs assist people who want to improve streams	4
	Does the Sycan Marsh reduce water flows to downstream areas	2
REGULATORY		
	Government regulations on water and land usage and how they are affecting the next generation of agriculturalists	9
	Is there a way to recover the watershed while providing protection of private landowners	9
	Government agency intrusion	4
	Landowner is responsible for land, not government, but need freedom to take care of their property	1
	Policy and regulations (state and federal) conflict with watershed recovery (e.g., diking)	1
ECONOMICS		
	Sustaining rural communities	11
	Loss of private lands and rapid sale to developers	4
	Land values/forcing out future generations	1
	Economic viability/diversity of restoration projects	1
	Sustaining Tribal economies	1
	No time to work on these things and make a living	1
FOREST AND UPLANDS		
	Make the forest healthy, sustainable and resistant to fire	9
	Keep forests healthy and productive	7
	Need to cover uplands, the other 98% of the watershed	5
	The mismanagement of timber resources yielding less production and unhealthy forest stands	4
	Need to increase timber harvest to reduce fuel loads and release suppressed stands	3
	Timber harvest	3
	Insect degradation leads to stand degradation	3

	Does cutting juniper and pine forest increase stream flow	2
	What are primary barriers to forest health thinning	2
	High danger of catastrophic fire (especially near USFS and BLM)	2
	Timber: juniper encroachment into historically nonjuniper areas	2
	Regulatory issues—Oregon Forest Practices Act	1
	Lack of prescribed fire	1
	Need to preserve late and old succession forest	1
	Preserve all unroaded areas	1
	Roads can act like stream channels if not designed, constructed, maintained	1
	Timber thinning to release suppressed stands and provide biomass for electricity generation	1

Table 1-2 Watershed issues ranked by total votes cast by workshop participants.

Rank	Issue	Votes
1.	Noxious weeds	11
2.	Sustaining rural communities	11
3.	What impact are wells having on artesian flow and groundwater	10
4.	Government regulations on water and land usage and how they are affecting the next generation of agriculturalists	
5.	Is there a way to recover the watershed while providing protection of private landowners	9
6.	Make the forest healthy, sustainable and resistant to fire	9
7.	Having enough water to grow hay and water cattle	7
8.	Keep forests healthy and productive	7
9.	A true balance of water delivery	6
10.	Poor water quality issues including temperature, sediment, dissolved oxygen, pH, nutrients	6
11.	Functional soil, water and vegetation to sustain creation of what we value	6
12.	How will the information influence the way we make management decisions	6
13.	Irrigation water supply	5
14.	Rising land values affect opportunities for agricultural landowners to own and retain land	5
15.	Presence of endangered species on my land may retard use and profit	5
16.	Relationships with landowners and agencies who are managing the fish habitat so that we all get what we need and want for the watershed	5
17.	Need to cover uplands, the other 98% of the watershed	5
18.	Who owns the water can affect my lifestyle and maybe even livelihood	4

Rank	Issue	Votes
19.	In-stream flow needs for channel maintenance, biotic support, refugia and migration for healthy riparian function	4
20.	Stream and riparian degradation can be caused or influenced by on-site management, and upland or upstream management; it takes critical thinking to determine cause and effect	4
21.	Restoration of previous wetland and riparian areas	4
22.	Preserve open lands for public use	4
23.	Fish habitat	4
24.	Maintain plant and animal diversity and viability	4
25.	What federal and other programs assist people who want to improve streams	4
26.	Government agency intrusion	4
27.	Loss of private lands and rapid sale to developers	4
28.	The mismanagement of timber resources yielding less production and unhealthy forest stands	4
29.	Are the water rights such that there is enough water left in channel for physical ecological processes and biology to flourish	3
30.	Weeds and invasive species consume more water and are outcompeting native species	3
31.	How will this info increase my bottom line	3
32.	Forage production	3
33.	Conservation of open space	3
34.	Geomorphology issues including lack of floodplain connectivity, lateral and vertical stability, sediment loads, channel geometry	3
35.	Tribal culture and heritage is not respected by nontribal groups	3
36.	Truthful representation of biology	3
37.	Local participation	3
38.	Need to increase timber harvest to reduce fuel loads and release suppressed stands	3
39.	Timber harvest	3
40.	Insect degradation leads to stand degradation	3
41.	Tribal rights are reduced by over-allocated water resources	2
42.	Mid-elevation uplands are in fair to poor hydrologic condition (sagebrush/grass, sagebrush/grass/juniper, juniper/grass/shrub)	2
43.	River and riparian restoration may affect economic viability of ranching and farming operations	2
44.	Grazing allotment reform	2
45.	Water quality, including temperature and chemistry, is a problem for fish recovery	2
46.	Streambank erosion affecting water quality	2
47.	Need improved water quality by reducing impacts of livestock, roads, forest practices	2

Rank	Issue	Votes
48.	Bank stability	2
49.	Dignity, economy and biology go hand in hand	2
50.	Maintaining traditional hunting and fishing areas under ESA requirements	2
51.	Suckers live in the mud, who cares	2
52.	Does the Sycan Marsh reduce water flows to downstream areas	2
53.	Does cutting juniper and pine forest increase stream flow	2
54.	What are primary barriers to forest health thinning	2
55.	High danger of catastrophic fire (especially near USFS and BLM)	2
56.	Timber: juniper encroachment into historically nonjuniper areas	2
57.	Water rights adjudication creates uncertainty about water for irrigation and fish and wildlife*	1
58.	Need to settle adjudication ASAP	1
59.	Not addressing groundwater in Upper Basin. Future impacts on domestic and overall supply, impacts to surface water. Lack of information on groundwater and groundwater pumping.	1
60.	Juniper encroachment may affect water availability for Sprague system	1
61.	Irrigation water and Tribal rights	1
62.	How do we manage annual fluctuations in water amount	1
63.	How much water can be saved through irrigation water management, and also what is impact on forage production and water quality	1
64.	Increase public land grazing	1
65.	Access to public lands for grazing	1
66.	How do land management activities affect water quality	1
67.	Need to preserve wild and scenic qualities of the waters	1
68.	What limitations does the agriculture water quality management plan impose?	1
69.	Current conditions of riparian area are very poor	1
70.	Floodplain connectivity	1
71.	What regulations control managing riparian areas on private lands	1
72.	Communicate to general public	1
73.	Educate land user	1
74.	Lack of knowledge: Landowners do not know what water law means, need an overview of federal law, how are Tribes still separate governments	1
75.	Agency people do not understand community connection to land, have bad reputation with landowners	1
76.	Too much agency and lawyer involvement, not enough community decision-making	1
77.	Private property rights	1
78.	Community trust	1

Rank	Issue	Votes
79.	Want to sustain our Tribal culture by getting lands back	1
80.	Lack of understanding: What's the big deal	1
81.	Eco-tourism	1
82.	Fish populations are too low: (1) redband, (2) bull trout, (3) sucker	1
83.	Landowner is responsible for land, not government, but need freedom to take care of their property	1
84.	Policy and regulations (state and federal) conflict with watershed recovery (e.g., diking)	1
85.	Land values/forcing out future generations	1
86.	Economic viability/diversity of restoration projects	1
87.	Sustaining Tribal economies	1
88.	No time to work on these things and make a living	1
89.	Regulatory issues—Oregon Forest Practices Act	1
90.	Lack of prescribed fire	1
91.	Need to preserve late and old succession forest	1
92.	Preserve all unroaded areas	1
93.	Roads can act like stream channels if not designed, constructed, maintained	1
94.	Timber thinning to release suppressed stands and provide biomass for electricity generation	1

* NOTE: Number 57 to Number 94 only received one vote each (should all be ranked as Number 57).

These prioritized lists of issues were used to guide the assessment work, although in some cases, such as for the "Culture" or "Economics" categories, it was difficult to address certain unrelated issues. It also should be acknowledged that the issue identification process may not have resulted in the best possible representation of community concerns in the assessment area, because it did not gather input from everyone, and because it was limited to a brief period of time during the fall of 2007.

Restore health, structure and function of the watershed. This will help us more effectively address the array of issues raised.

--Don Gentry, Klamath Tribes

THE WORKING LANDSCAPES ALLIANCE

Proper Functioning Condition Assessment Process

The Working Landscapes Alliance (WLA) is an interdisciplinary team of scientists partnering together, from the National Riparian Service Team, private sector specialists, and Sustainable Northwest, with expertise in hydrology, riparian-wetland vegetation, soils and biology. As part of both the Upper and Lower Sprague Watershed Assessment processes in 2005 and 2006, WLA conducted community workshops on assessing riparian-wetland health using Proper Functioning

Condition (PFC) Assessment, and facilitated public field days. WLA has a collaborative adaptive management philosophy and works to create a common vocabulary about riparian-wetland function within local communities. The WLA was also requested to walk stream reaches during private ranch visits, and provided their perspectives on riparian-wetland condition and possible management practices to landowners.

The public field days were hosted by several private landowners, The Nature Conservancy, and the U.S. Department of Agriculture (USDA) Forest Service. The community was invited to participate with WLA in an assessment and discussion of riparian-wetland condition and management on a reach of stream, in the context of where that property was located in the watershed. This led to an on-the-ground understanding of site conditions and potential.

The PFC Assessment refers to a methodology for assessing the physical functioning of riparian-wetland areas, including hydrology, vegetation, and erosion/deposition attributes and processes. Discussions about which attributes and processes are in a working order, and which ones are not, helps clarify what a landowner can do—or cannot do for that matter—about the conditions of the stream. In some cases, site assessments led to a recommendation that management practices be changed or modified, in others monitoring was recommended, and in others the recommendation was that landowners just keep doing what they are doing.

The WLA reviewed a broad range of stream conditions, from functional conditions on a few reaches to some that very much needed a change in management to allow for recovery of riparian-wetland vegetation. Management of riparian vegetation should be considered the highest need overall, but there were some places noted where active restoration along with vegetation management was important to reduce meander cut-offs in the main-stem Sprague River. On the tributaries reviewed by the WLA, a change in livestock management to reduce growing season pressure was the priority need, where streams were assessed as "functioning-at risk" with no apparent trend or a downward trend. Some tributary reaches, including ones deemed highly important for recovery of the ESA-listed suckers, were in excellent condition.

Several things were particularly striking about what we learned on these field days, at almost every site visited:

- People in the watershed are seeing that stream restoration can occur through natural recovery processes, and there is a desire by landowners to receive assistance on management practices that will lead to natural recovery where possible. These landscapes and streams are truly resilient and responsive. So often we approach environmental issues feeling that they are enormously complicated and difficult. But we saw over and over again how with a little better understanding of how these systems function, and some relatively minor adjustments in management, these riparian sites will bounce back both quickly and dramatically.

- There are reaches of the Sprague river system that were channelized for flood control to protect housing developments, and protection from floods is still a need for those areas. There are other diked areas that are associated with controlling flooding on pasture land that can be looked at on a site-by-site basis to determine whether reconnecting to the floodplain would be beneficial or not.

- Legacy effects from many different kinds of past management degraded riparian-wetland areas in the watershed. Once a riparian-wetland area is degraded, it is easier to keep it in poor condition with just a few head of livestock, than it is to take a good condition riparian-wetland area and degrade it. Some landowners changed grazing management many years ago, and it led to the natural recovery of physical function, which was a good test of our hypothesis. We found other riparian-wetland areas that will respond to improved management.
- In some cases, improved management leads to the establishment of reed canarygrass (*Phalaris arundinacea*). Most people consider it non-native to eastern Oregon. While possibly native to North America, European cultivars have been widely introduced for use as hay and forage on the continent; there are no easy traits known for differentiating between the native plants and European cultivars. The species grows so vigorously that it is able to inhibit and eliminate competing species. Since it often forms persistent monocultures, it does pose a challenge to establishing native sedges and rushes.

One general recommendation for all the areas the WLA viewed was to first focus on regaining or maintaining the health of the riparian vegetation communities, and to establish benchmark conditions through a process such as Greenline Composition sampling (Winward 2000), accompanied by photo-point documentation. Riparian vegetation is critical to the long-term health of the alluvial systems in the Sprague, and increasing the vigor and quantity of diverse species should be paramount in recovery actions.

Another interesting thing learned was how often a recommended action benefited both the natural system and the landowner. Often it is presumed that, in order to improve the natural systems, there must be a long-term negative impact on agricultural operations (or vice-versa). But the field visits showed that sites where the stream was not working well were often also the sites where forage production had gone down. Since stream stability is invariably linked to the amount and vigor of the vegetation on the site, the solution to the stream problem often results in more forage as well.

CONCLUSION

Although this document is printed and bound, the Lower Sprague-Lower Williamson Watershed Assessment will continue to be a work in progress. The landscapes are always changing, and so are the human interactions with the natural resources. As new information and management practices surface, they can be included in this document to keep the document up to date and usable for the landowners and land managers within the Lower Sprague-Lower Williamson River subbasin. It is just as important to include failures in land management methods as it is to include successes, because they can often provide even more significant learning opportunities.

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