

BEAR CREEK WATERSHED ASSESSMENT

Phase II - Bear Creek Tributary Assessment

PART II - BEAR CREEK and TRIBUTARIES

Western Lowlands Unit

Willow, Jackson, and Griffin Subwatersheds

Prepared for

**Bear Creek Watershed Council
Rogue Valley Council of Governments**

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C. The Western Lowlands

Willow - Jackson - Griffin Creek Subwatersheds

C.1. Key Findings for the Willow, Jackson, and Griffin Creek Subwatersheds.

Willow, Jackson, and Griffin Creeks are contiguous and share a common landscape and land use pattern, and they also possess similar environmental conditions.

- 1. Priority Watershed Restoration Needs:** The Technical Committee ranked the limiting factors and watershed restoration needs for Willow, Jackson, and Griffin Creeks, and identified summer stream flows, summer stream temperature, and in-stream barriers as the highest priority in the subwatersheds. Riparian and aquatic habitat quality, and other water quality components were selected as medium priority concerns, and channel stability, floodplain connectivity and sediment control were ranked as low priority concerns. Most sediment problems occurred from the operation of irrigation check dams, or erosion created during high flow events; thus were an intermittent condition.
- 2. Water Supply and Use:** Irrigation transport and return flows are a significant portion of the water supply for Western Lowland streams during the summer months. They are also a source of pollution, affecting water quality and fish distribution, but without irrigation flows, there would be hardly any flow at times in some stream reaches. These flows are also a major (and critical) source of water supply for wetlands in subwatersheds.
- 3. Streambank Stability/Erosion, and Sediment:** Stream channels in the Western Lowlands have been extensively modified since settlement, and most channels are constricted by development. The streambanks are generally stable, with some erosion during high water events. There is a moderate problem from irrigation induced sediment generation. Currently, sediment load levels in Willow, Jackson, and Griffin Creeks are not measured, but streams are observed to exceed turbidity standards during high flow or storm events, which may occur several times a year.
- 4. Riparian Habitat Quality:** Riparian habitat is marginal throughout the watersheds, particularly in agricultural and residential areas. There is considerable invasion of non-native species (i.e., blackberries). Restoring native riparian habitat would improve water quality, reduce erosion and sediment levels, and enhance the fisheries.
- 5. Water Quality:** Water quality is a particular problem in Willow, Jackson, and Griffin Creeks, and is impaired in the summer for temperature, fecal coliform levels, and total phosphorous. Fecal coliform bacteria levels were found to exceed standards over fifty percent of the time at almost all sites in the summer, and winter exceedences were over 50% for dissolved oxygen. The conditions are exacerbated by low summer flows,

irrigation inflows, residential pollution, and septic tank outflow.

- 6. Fishery Habitat:** Each of the subwatersheds supports anadromous fish, but production is limited by low flows, high temperatures, low water quality, poor riparian habitat, and multiple barriers. Aquatic diversity is currently low throughout the system, and potential exists for great improvements. Habitat improvements in side channels, off-channel habitat, and removing in-stream barriers are needed.
- 7. Floodplain connectivity:** Floodplain connectivity and off-stream wetlands have been modified extensively by development in the valley, reducing stream alcoves and natural storage areas. This trend has worsened the damage from high water events, and reduced riparian quality.
- 8. Key Issues for the Western Lowland Subwatersheds.**

Public Works managers of the cities of Central Point and Jacksonville were interviewed to identify issues, and current actions relating to the watersheds. Both cities are undertaking floodplain and drainage management actions and construction, and incorporating fish passage and water quality improvements.

- 1. Floodplain Connectivity and Management.** A major problem for the area is flood control and surface drainage. River channels must be left open for flood drainage, but are confined by large patches of blackberry vines. Residential and commercial development limits opportunity for management. Actions to maintain open channels for flood flows often conflict with goals for fish-friendly riparian overstory. The cities are seeking to manage river access to maintain flood drainage, but considerable alteration of river channels and floodplains has been done by private landowners. Central Point is seeking to develop floodwater holding basins and wetlands (some designed as day use parks) in open areas as a partial solution. The cities have very limited jurisdiction and enforcement ability upon landowner alteration actions.
- 2. Irrigation Induced Water Quality Problems.** Major portions of Western Lowlands streams are used for irrigation transport and stormwater drainage. Water quality and flow conditions vary considerably by stream reach and seasonality, creating high variability in temperature, turbidity, contaminants, sediments, and streambank erosion. Irrigation overflows and drainage contributes a significant amount to summer stream flow in some reaches, and may even improve water quality in lowest flow periods. Subsurface and stormwater drainage adds poor quality water in some developed areas, which is highly variable in frequency and volume. Some streamside residents have used the streams to dispose of garbage and trash, contaminating several stream reaches.

Fluctuations in irrigation flows can cause some sections of streams to dry up in

summer months , and pool structure does not support native fisheries in many reaches. Cities are constructing new culverts to enhance fish passage, sediment traps in stormwater channels, catch basins, increase park and riparian areas, and limit effects of development upon water quality, wetland, and riparian areas. Several areas are designated for vegetative filtering wetland areas.

3. **Regulation of Riparian Areas.** The cities of Central Point and Jacksonville are considering adopting Goal 5, and using the Medford City riparian ordinance as models. Creek side variance is yet to be defined. There is also encroachment by private landowners into riparian areas, through adding fencing, out-buildings, and landscaping (and corresponding pollution).
4. **Vegetation Control.** There is considerable invasion of exotic plant species in riparian areas (blackberries, etc.) which limits access for improving stream and wetland environments. Central Point and Jacksonville have encouraged private landowners to control or remove vines and brush in stream areas, but these practices can also affect riparian habitat quality.
5. **Contamination of Shallow Wells.** An unknown number of private property wells are contaminated by surface and subsurface water inflows. Cities are implementing upgrades to sewage, septic tank, and stormwater systems, but only about one-third of needed improvements have been addressed. City governments are encouraging residents to connect to municipal water systems.
6. **Forest Fuels Management.** There is considerable fuels accumulation on both private and public forest lands that increases the risk of catastrophic fire in the watershed. However, present management practices are not meeting the changing needs, and there is considerable controversy about forest management policy on public lands in the upper watershed.

C.2. Western Lowlands Subwatershed Description and Characterization.

C.2.a. The Western Lowlands Landscape.

The Willow - Jackson - Griffin Creek subwatersheds are located on the western downslope in the Bear Creek watershed, with natural surface and subsurface drainage into and through the area (see Figure C.1.). At the turn of the century, the area was known as the “wet triangle,” and the natural drainage supplied farmlands and scattered wetlands. In recent decades considerable commercial and residential development has occurred, changing land use, drainage, and the environmental integrity of the watershed. Now, farmland is being converted to subdivisions and residential acreage, irrigated agriculture is decreasing, and the character of streams in the watersheds is being altered. The change in water use has multiple extended effects throughout the landscape, including vegetation cover, groundwater levels, wetlands, flood control, and water quality. Some public works managers feel that the flooding problem is more acute today than a century ago, because of residential development and loss of natural overflow floodplain area.

Upslope Environment. The western upslope of the watershed is forested in oak, madrone, and conifers, interspersed by residential development. Upslope lands are managed by the Rogue River National Forest, BLM, and private landowners. The forestland has been harvested several times in the past century, and is currently in a state of early regeneration seral stage. Upslope erosion and sediment transport remains a potential problem in the upper stream areas. The forested areas are at high risk for fire, with considerable undergrowth and high density forests. Portions of the area have burned several times in the past century, and BLM is currently initiating controlled burns in selected areas.

C.2.b. Jurisdictions Affected:

Jackson County, Cities of Central Point, Jacksonville, and Medford, Bureau of Land Management, Jackson Soil and Water Conservation District, Bear Creek Watershed Council, Jackson Creek Stakeholders Advisory Committee, Medford Irrigation District, Rogue River Irrigation District, Bear Creek Valley Sanitary Authority.

C.2.c. Western Lowlands Hydrology.

A hydrologic assessment of the Willow - Jackson - and Griffin Creek watershed was conducted to identify land use activities that have the potential to impact the hydrology of the catchment (See: Jackson Creek Watershed Assessment, March 2001).

Figure C.1. The Western Lowlands - Willow, Jackson, Griffin Creek Subwatersheds.

C.2.c.i. Land and Water Use. The impacts of timber harvest, agricultural/rangeland development, and urban/residential development were analyzed to assess the effects upon potential flooding conditions.

Impact of Timber Harvest. The peak flow generating processes for each of the sub-basins were analyzed to determine the impacts of timber harvest on runoff. Findings indicated that less than 25% of each of the sub-basins may be characterized as inhibiting rain-on-snow or spring snowmelt properties, and it was assumed that the potential risk of peak-flow enhancement due to timber harvest on the watershed was not appreciable.

Impact of Agricultural and Rangeland Development. The two-year, 24-hour precipitation was used to assess the impacts of agriculture and rangeland on watershed runoff. The typical rainfall volume for a storm of this magnitude on the catchment is 2.5 inches. The difference between the background and present day runoff depth was less than 0.5 inches, thus it was assumed that the potential risk of peak-flow enhancement due to agriculture and rangeland on watershed runoff was low.

Impact of Urban and Residential Development. The percentage of impervious surfaces in the Jackson Creek watershed was calculated to assess the impacts of urban and residential development on runoff. The potential risk for peak-flow enhancement was found to be negligible for each of the sub-basins except for Jacksonville. For the Jacksonville sub-basin, the potential risk was assumed to be high. Monitoring of runoff from the Jacksonville area must therefore be a priority in order to evaluate the potential impacts for flooding and water quality degradation in Jackson Creek.

For most of the past century, stream reaches of Jackson and Griffin Creeks have been used to convey irrigation water, and multiple diversion structures were constructed. In several stream reaches, surplus irrigation/return flows have become a significant portion of summer stream flows, affecting water quality and fish distribution. In recent years, the Medford Irrigation District (MID) and Rogue River Valley Irrigation District (RRVID) have undertaken considerable effort to upgrade their distribution system to reduce system flow losses and reduce irrigation return flows. These changes have had considerable effect upon the streams and their ecological integrity.

C.3 Willow Creek Subwatershed.

C.3.a. Willow Creek Subwatershed Description and Characterization.

The Willow Creek subwatershed is 9.5 square miles in the farmland and foothills north and west of Central Point. The watershed is adjacent to the Rogue River, and contains multiple wetlands (~25 acres) around the confluence of Bear Creek with the Rogue River. Lane Creek is a tributary to Willow Creek.

C.3.b. Willow Subwatershed Hydrologic Condition Assessment.

C.3.b.1. Stream Morphology. Empirical data of Willow Creek stream morphology and flow has not been compiled, however stream morphology conditions were estimated by visual survey and comparison with adjacent streams (within ½ mile).

C.3.b.2. Land and Water Use. There are multiple residential acreages within the watershed, major aggregate mining and farming operations, and developing commercial operations. Several farmers in the subwatershed irrigate directly from Willow Creek and Bear Creek. Two-thirds of the watershed (3,137 acres) is upslope forestland.

C.3.b.3. Streambank Stability and Sediment Condition. According to ODEQ data, Willow Creek bank stability is rated as stable and generally satisfactory, although surges of sediment occur when irrigation board dams are removed. There is some streambank erosion from livestock, which needs riparian protection and restoration.

C.3.c. Willow Creek Riparian Condition and Wetlands. Willow Creek was not surveyed by ODEQ, thus no technical information is available. Most of the subwatershed is located within private lands, which have eliminated most riparian habitat in the lower reaches. The upper reaches into the foothills are generally forested.

C.3.c.1. Wetlands. There are 24 designated wetland areas listed on the National Wetland Inventory map for Willow Creek subwatershed, 15 of which are 1 acre or less in size, and 9 greater than 1 acre. Several wetland areas are supplied by irrigation overflows, which may diminish as irrigation delivery system efficiency is upgraded.

C.3.d. Water Quality.

Although Willow Creek has not been listed on the ODEQ 1998 303(d) list, summer water temperatures of 76°F have been reported. It is likely that Willow Creek will be listed in future evaluations. Summer stream flows are very limited, and agricultural operations contribute pollution to the stream.

Table C.1. Characteristics of Willow Creek Subwatershed. (Stream data are estimated)

<p> Land use: Area 9.5 sq. miles Conveyance: Canals None Wetlands: 15 wetlands ≥ 1 Acre; Aggregate 274 A. Roads 18.8 miles 9+ wetlands ≤ 1 Acre Commercial 5 A. Streams 8.8 miles Farm 1,652 A. Forest 3,137 A. Industrial 188 A. Rural 679 A. Suburban 141 A. </p>					
Stream	Channel Type/Condition (Estimated) Stream Class-Fishery Status-Rosgen Type- Gradient	Rosgen Level 1 Channel (%)	Ave. Flow Winter - Oct-Apr Summer - May-Oct	OWEB Channel Confinement (%)	Bank Stability (% stable)
Willow Creek (Estimated) Length: 5.5 Miles	Lower 1/3: Class MF, Rosgen G; 2-4%. Narrow shallow managed channel, slow flows, developed area, ag/livestock exposure, minimum riparian area. Middle 1/3: Class SN, Rosgen B-G; 2-4%. Narrow shallow managed channel, slow flows, developed area, ag/livestock exposure, minimum riparian area. Upper 1/3: Class SN, Rosgen A; 10%+. Narrow shallow channel, upland forested area, seasonal ephemeral flows, ag/livestock exposure, riparian area adequate.	N.D.	W- ≥15 cfs (e) S- ≥10 cfs (e)	N.D.	Stable
Lane Creek (Estimated) Length: 2.9 Miles	Lower - Class MF, Rosgen F; 2% . Narrow shallow channel, seasonal flows, ag/livestock exposure, developed, confined channel, minimum riparian area. Upper: Class SN, Rosgen A; 4-10%. Narrow shallow channel, upland area, seasonal ephemeral flows, ag/livestock exposure, riparian area adequate.	N.D.	Small-Variable W- ≥10 cfs (e) S- ≥ 2 cfs (e)	N.D.	Stable
Middough Cr.* (Estimated) Length: 3.3 Miles	Class MF, Rosgen F; 2% . Narrow shallow channel, seasonal flows, ag/livestock exposure, developed, confined channel, minimum riparian area.	N.D.	W- ≥10 cfs (e) S- ≥ 2 cfs (e)	N.D.	Stable

* Middough Creek is located in the Willow Creek subbasin, but flows directed into the Rogue River at Gold Ray Dam.

C.3.e. Willow Creek Fisheries.

The lower portion of Willow Creek contains some 2.5 miles of summer steelhead habitat, and 3.5 miles of trout habitat, and some warm-water species. Lane Creek is not reported to be an active fishery, but may contain some warm-water species.

Table C.2. Fishery Status and Limiting Factors for Willow Subwatershed.

Stream	Fish Species:* Chinook, Coho, Steelhead, Trout	In-stream Barriers	Major Limiting Factors (Flow, temp, barriers, sediment, habitat quality, connectivity to downstream impacts)
Willow Creek	2.5 m Sum Stlhd 3.5 m Trout	RM 3.1	Limited stream flow, water temperature exceeds 303d criteria, marginal aquatic and riparian habitat quality, considerable residential development and encroachment, channel confined in many sections. Irrigation has affected water quality.
Lane Creek	None Identified	RM 3.5	Limited stream flow, water temperature exceeds 303d criteria, Steep upland stream channel

* Fish distribution data provided by Oregon Department of Fish and Wildlife, Bear Creek Distribution Query, November 15, 1999; Limiting factors identified by the Technical Committee.

C.4. Jackson Creek Subwatershed

Note: Information for this section was taken from the Jackson Creek Watershed Assessment (March 2001), prepared by the Jackson Creek Stakeholders Advisory Committee. The report is available through the Rogue Valley Council of Governments, and on the internet at www.rvcog.org.

C.4.a. Jackson Creek Subwatershed Description and Characterization.

The Jackson Creek watershed is located on the lower northwest side of Bear Creek, and enters Bear Creek about two miles northeast of Central Point. The catchment is 16,139 acres in size, and is characterized by agricultural lands, forest, residential and commercial lands, and the municipalities of Jacksonville and Central Point. Maximum relief in the watershed is 2,634 feet, and the average slope steepness of the upland area is about 21 percent. The mean elevation of the Jackson Creek watershed is 2,004 feet. The area of the catchment above 3,000 feet elevation comprises about 11 percent of the drainage. Mean annual precipitation for the watershed is slightly less than 635 mm (25 inches).

C.4.b. Jackson Creek Hydrologic Condition Assessment.

C.4.b.1. Stream Morphology. Jackson Creek is varied in stream channel morphology, starting the valley lowlands, then ascending into the Siskiyou foothills. The ODEQ assessed stream morphology and riparian habitat conditions of the Jackson Creek subwatershed through stereoscopic photo interpretation, and developed the following information. Data are included in Appendix A.

Table C.3. Characteristics of Jackson Creek Subwatershed.

<p> Land use: Area: 25 sq. miles Conveyance: Canals 8.5 miles Wetlands: 61 wetlands ≥ 1 Acre; Aggregate 222 A. Roads 77 miles 10+ wetlands ≤ 1 Acre Commercial 2 A. Streams 35 miles Farm 4,267 A. Forest 7,924 A. Industrial 7 A. Rural 2,048 A. Suburban 1,105 A. City 565 A. </p>					
Stream	Channel Type/Condition Stream Class-Fishery Status-Rosgen Type- Gradient	Rosgen Level 1 Channel (%)	Ave. Flow Winter - Oct-Apr Summer - May-Oct	OWEB Channel Confinement (%)	Bank Stability (% stable)
Jackson Creek (Measured) Length: 23.2 Miles	Lower 1/3: Class LF, Rosgen G-A; 2-4%. Narrow shallow managed channel, slow flows, developed area, ag/livestock exposure, minimum riparian area. Mid 1/3: Class MF, Rosgen G-F; 2-4%. Narrow shallow managed channel, slow flows, developed area, ag/livestock exposure, minimum riparian area. Upper 1/3: Class SN, Rosgen A; 10%+. Narrow shallow channel, upland forested area, seasonal ephemeral flows, ag/livestock exposure, riparian area adequate.	A - 29.6 Aa - 9.5 B - 13.7 C - 1.4 F - 12.2 G - 33.6	Win: 18.5 cfs (m) Sum: 1.75 cfs (m)	N.D.	91%
Dean Creek (Measured) Length: 2.3 Miles	Class MF, Rosgen F; 2%. Narrow shallow channel, seasonal flows, ag/livestock exposure, developed, confined channel, minimum riparian area.	N. D.	Small-Variable W- ≥ 10 cfs (e) S- ≥ 2 cfs (e)	N. D.	Stable
Horn Creek (Estimated) Length: 2.7 Miles	Lower: Class MN, Rosgen B-F. Narrow shallow managed channel, major sections confined, slow flows, irrigation inflows, developed area, ag/livestock exposure, variable riparian area. Upper: Class SN, Rosgen A. Narrow shallow channel, upland area, seasonal ephemeral flows, ag/livestock exposure, riparian area adequate.	N. D.	Small-Variable W- ≥ 10 cfs (e) S- ≥ 2 cfs (e)	N. D.	Stable

Stream	Channel Type/Condition Stream Class-Fishery Status-Rosgen Type- Gradient	Rosgen Level 1 Channel (%)	Ave. Flow Winter - Oct-Apr Summer - May-Oct	OWEB Channel Confinement (%)	Bank Stability (% stable)
S. Fork J. Cr. (Measured) Length: 2.5 Miles	Class MN; SN, Rosgen A; 4-10%. Narrow shallow channel, upland flows, forested area, seasonal ephemeral flows, ag/livestock exposure, riparian area adequate.	N. D.	Small-Variable W- ≥ 10 cfs (e) S- ≥ 2 cfs (e)	N. D.	Stable
Niedermeyer Cr. (Estimated)		N. D.	Small-Variable W- ≥ 10 cfs (e) S- ≥ 2 cfs (e)	N. D.	Stable
Sailor Creek (Estimated)	Class SN, Rosgen Aa-A; 4-10%. Narrow shallow channel, upland flows, forested area, seasonal ephemeral flows, ag/livestock exposure, riparian area adequate.	N. D.	Small-Variable W- ≥ 10 cfs (e) S- ≥ 2 cfs (e)	N. D.	Stable
Walker Creek (Measured)	Lower: Class MF, Rosgen G-C; 0-2%. Narrow shallow managed channel, ag/livestock exposure, variable riparian area. Upper: Class SF, Rosgen B-A; 2-10%. Narrow shallow channel, upland area, seasonal ephemeral flows, ag/livestock exposure, riparian area adequate.	N. D.	Small-Variable W- ≥ 10 cfs (e) S- ≥ 2 cfs (e)	N. D.	Stable
Miller Gulch, Norling Gulch, Cantrall Gulch (Measured)	Class SN, Rosgen Aa-A; 4-10+% . Upland habitat, seasonal ephemeral flows, ag/livestock exposure, riparian area adequate.	N. D.	Ephemeral	N. D.	Stable

C.4.b.2. Land and Water Use. There is considerable residential, commercial, and agricultural development in the Jackson Creek watershed, which affect water quality, floodplain connectivity, and riparian habitat areas. Most stream channels on the valley floor are confined and/or altered to adapt to land uses.

Water use in the Jackson Creek Watershed includes surface water, ground water, and a small amount of reservoir storage. Jacksonville Reservoir is small (originally about 76 acre-feet), and has filled with sediment and does not contribute significant stormwater storage, river flows, or municipal water supply. A report of the OWRD WRIS system shows 31 primary diversions for surface water, 37 for ground water, and 6 for reservoir storage. Secondary diversions include 3 for surface water and 3 for ground water. The primary and secondary diversions consist of all the non-canceled water rights on Jackson Creek and its tributaries. The earliest surface water right on record with OWRD for the watershed is a 0.16 cfs right dated 12/31/1853. The earliest ground water right on record is a 115 gpm right dated 12/31/1920.

Considerable differences may be noted between the streamflow values measured on Jackson Creek from reach to reach, reflecting the influence of water transfer from irrigation canals to Jackson Creek that occurs during the irrigation season. Irrigation comprises about 72% of the surface water use, industrial (4%), and domestic (<1%). Irrigation and agriculture account for about 80% and 20%, respectively, of the ground water use in the watershed.

The Jackson Creek subwatershed is particularly rich in wetlands (~71 identified wetlands), several of which are fed by irrigation overflows in farmland areas. Wetlands in this area are important in moderating flood flows, providing summer stream flows, and serving as vegetation filters for contaminated inflows.

C.4.b.3. Streambank Stability and Sediment Condition. Streambank stability is rated by ODEQ as generally satisfactory, although surges of sediment occur when irrigation board dams are removed. Several sections of lower Jackson Creek have deep channel erosion that can be contributed to a number of possible factors. Channel straightening has occurred to define and fit agricultural, grazing and urban needs, and consequently, the stream is a mostly straight channel with restricted side-to-side movement. This has resulted in downward erosion, creating the high banks and narrow channel that typify this stream. The channel depth for the lower one-third of the stream was 13 feet, with a maximum depth of 30 feet. As the water erodes the streambed to bedrock, bank undercutting occurs that can add sediment to the stream, which can impair fish and aquatic invertebrate habitat. Some upper steep sections of Jackson Creek and tributaries are prone to stream and road erosion, which needs riparian protection and restoration.

C.4.c. Jackson Creek Riparian Condition and Wetlands.

The ODEQ assessed riparian habitat condition of the Jackson Creek subwatershed through stereoscopic photo interpretation, and developed the following information. Data are reported in Appendix A.

Table C.4. Jackson Creek Riparian Habitat Conditions.

Stream System	Existing % Shade	Site Potential % Shade (Reach Weighted)	Change in % Shade	Years to Recovery
Jackson Creek - Total Length: 23.2 miles Lower 1/3 Middle 1/3 Upper 1/3	46 % Range 13 - 72 % 5 - 72 % 33 - 76 %	54% Range 77 - 81 % 77 - 97 % 20 - 98 %	39% Average	80
Dean Creek (Measured) Length: 2.3 miles	0 - 87 %	81 - 88 %	9 - 88 %	20 - 80
S. Fork J. Cr. (Measured) Length: 2.5 miles	69 - 77 %	88 - 97 %	5 - 20 %	59 - 72
Walker Creek (Measured)	1 - 79 %	86 - 100 %	17 - 96 %	50 - 105
Miller Gulch, Norling Gulch, Cantrall Gulch (Measured)	40 - 88 %	81 - 100 %	19 - 96 %	50 - 93

Source: TMDL Assessment Report: Riparian Shade. ODEQ, May 2000.)

Habitat quality in Jackson Creek and tributaries is highly variable, largely depending upon the land use and location. Sections of farmland and residential development typically have very little riparian vegetation, and many riparian areas are covered with blackberry vines and non-native brush. There is considerable potential to improve riparian habitat quality (almost 40%), and emphasis should be placed upon planting mixed conifers and native vegetation.

C.4.c.i. Wetlands. There are 71 designated wetland areas listed on the National Wetland Inventory map for Jackson Creek subwatershed, 61 of which are 1 acre or less in size, and 10 greater than 1 acre. Several wetland areas are supplied by irrigation overflows, which may diminish as irrigation delivery system efficiency is upgraded.

C.4.d. Water Quality.

Water quality in Jackson Creek is highly variable, and often poor in quality, particularly where impacted by irrigation and residential development. The Jackson Creek subwatershed has been listed by ODEQ 1998 303(d) list for violating fecal coliform and temperature standards. Fecal coliforms have been found to range between 386 - 623, and water temperature measured at 73°F. The conditions are exacerbated by low summer flows, irrigation inflows, residential pollution, and septic tank outflow.

C.4.e. Jackson Creek Fisheries.

Fish habitat and access to habitat in the Jackson Creek subwatershed have been degraded by a number of factors related to human development in this watershed. While anadromous and resident fish are believed to inhabit portions of Jackson Creek every year, fishery productivity would likely increase with improved water quality and riparian conditions. Residential development along Jackson Creek has affected vegetation in riparian areas associated with the creek, reducing shade, future habitat recruitment, and sediment control. City public works departments have removed debris from stream channels to prevent its accumulation in culverts. This practice is used to decrease flooding, but is counter-productive in that the same debris provides fish cover and pool creation from scouring.

Table C.5. Fishery Status and Limiting Factors for Jackson Subwatershed.

Stream	Fish Species: Chinook, Coho, Steelhead, Trout	In-stream Barriers	Major Limiting Factors (Flow, temp, barriers, sediment, habitat quality, connectivity to downstream impacts)
Jackson Creek	0.5 m Chinook 4.4 m Sum Stlhd 7 m Trout	RM 0.5 RM 3.9 RM 4.4 bridges 8.6	Limited stream flow, water temperature exceeds 303d criteria, marginal aquatic and riparian habitat quality, considerable residential development and encroachment, channel confined in many sections. Major impacts from irrigation water - conveyance, return flows, etc.
Jackson Ck. Trib A	1.4 m Sum Stlhd		Water quality parameters
S. Fork J. Cr.	None identified	RM 0.9	Limited stream flow, water temperature exceeds 303d criteria, Steep upland stream channel.
Dean Creek	2 m Sum Stlhd		Limited stream flow, water temperature exceeds 303d criteria, marginal aquatic and riparian habitat quality, considerable residential and agricultural development and encroachment, channel confined in many sections.
Dean Ck. Trib A	0.3 m Sum Stlhd Trout	Barrier	N.D.
Miller Creek	- (Barrier)		Limited stream flow, water temperature exceeds 303d criteria, steep upland stream channel.
Sailor Creek	- (Barrier)		Limited stream flow, water temperature exceeds 303d criteria, steep upland stream channel.
Walker Creek	No fish identified	RM 3.8 RM 1.2	Limited stream flow, steep upland stream channel. Lowlands - considerable residential development and encroachment, channel confined in many sections.

* Fish distribution data provided by Oregon Department of Fish and Wildlife, Bear Creek Distribution Query, November 15, 1999; Limiting factors identified by the Technical Committee.

Major limiting factors affecting Jackson Creek and tributaries are limited stream flow, high water temperature, and marginal aquatic and riparian habitat quality. Extensive residential development has resulted in encroachment into riparian areas, and confined channels in many sections.

Fish use in Jackson Creek was documented to the Hanley Road crossing at river mile 4.4 where juvenile steelhead were observed just downstream from the riffle near this structure. This road crossing is not adequate to pass fish at most if not all stream flows. Steelhead and Green Sunfish were also documented in Horn Creek at river mile 1.4. Fish use in Dean Creek extended to a diversion dam at river mile 2.0. Steelhead were observed below the structure. Green sunfish were found above the structure, but no salmonids. Two unnamed tributaries to Dean Creek were also documented with steelhead presence. Steelhead were found in “Trib A to Dean Creek” up to an irrigation ditch at RM 0.3. Steelhead were observed in “Trib C to Dean Creek” up to RM 0.1. Above this, landowner access was denied and the upstream limit of fish use could not be determined. An adult Fall Chinook was observed in Jackson Creek by ODFW staff in 1997 downstream from the Interstate 5 culvert. In 1997, three sites on Jackson Creek in and above the town of Jacksonville were surveyed for fish use and found not to be fish bearing. No fish were observed in South Fork Jackson Creek or Cantrall Gulch during 1997 surveys.

Summer steelhead spawning is concentrated from January to March. Fall chinook spawning is concentrated from September through October. Coho Salmon have not been documented in Jackson Creek, but were likely present historically. Coho Salmon were listed as “Threatened” in the Rogue Basin under the Endangered Species Act in 1997. In order to protect the limited fish production, there is no angling allowed on Bear Creek or tributaries.

Water flow in Jackson Creek is sometimes regulated by local irrigation districts during the irrigation season to meet the needs of district water users. Fish passage is also stopped at RM 1.5-2 from April 1-October 31, when the irrigation districts install flash board dam structures to divert water into irrigation canals. Other obstacles to fish passage include the culverts at Interstate 5, Highway 99, and Taylor Road, which are seasonal barriers depending on flow conditions. There are efforts underway to provide fish passage around these structures.

C.5. Griffin Creek Subwatershed¹

C.5.a. Griffin Creek Subwatershed Description and Characterization.

Griffin Creek (approximately 17 miles long) flows from the lower west side of Bear Creek Valley, and is an anadromous fish waterway that drains approximately 22 square miles (14,244 acres) in the Bear Creek watershed. The headwaters start in the lower mountains of the Rogue River National Forest, then passes through multiple small agricultural and residential areas. Griffin Creek drains Griffin Canyon along Griffin Creek Road south of Jacksonville, through the west side of Medford and Central Point. Griffin Creek enters Bear Creek approximately 4 miles from the Rogue River. The lower section of Griffin Creek parallels Jackson Creek.

C.5.b. Griffin Creek Hydrologic Condition Assessment.

C.5.b.1. Stream Morphology. Griffin Creek can be generally described as a deeply cut, mostly straight channel with minimal surrounding vegetation, high water temperatures, and frequent flow additions and diversions. The lack of riparian vegetation, in particular the lack of trees, leaves water exposed to direct sunlight in many sections, which increases temperatures. The inflows from canals and irrigation returns have a major effect upon water flows, and water quality.

The ODEQ assessed Griffin Creek stream morphology through stereoscopic photo interpretation, and developed the following information. Stream morphology data are presented in Appendix A.

C.5.b.2. Land and Water Use. There is considerable residential, commercial, and agricultural development in the Griffin Creek watershed, which affect water quality, floodplain connectivity, and riparian habitat areas. Most stream channels on the valley floor are confined and/or altered to adapt to land uses. Water use in the Griffin Creek watershed includes surface water and ground water. Considerable differences may be noted between the streamflow values measured on Griffin Creek from reach to reach, reflecting the influence of water transfer from irrigation canals that occurs during the irrigation season, and stormwater inflows. Irrigation and agriculture account for about 80% and 20%, respectively, of the ground water use in the watershed.

C.5.b.3. Streambank Stability and Sediment Condition. Streambank stability is rated by ODEQ as generally satisfactory, although surges of sediment occur when irrigation board dams are removed. Many sections of Griffin Creek have an erosion problem, that can be

¹ Multiple sources of information are aggregated for this summary. One primary source of data is "Griffin Creek Stream Survey and Assessment," Caitlin Quinby, William Meyers, and Steve Smith, Rogue Valley Council of Governments, November 1998. 30 pp.

contributed to a number of possible factors. Channel straightening has occurred to define and fit agricultural, grazing and urban needs, and consequently, the stream is a mostly straight channel with restricted side-to-

Table C.6. Characteristics of Griffin Creek Subwatershed.

<p> Land use: Area 22 sq. miles Conveyance: Canals 7.5 miles Wetlands: 33 wetlands ≥ 1 Acre; Aggregate 15 A. Roads 79 miles 10 + wetlands ≤1 Acre Commercial 8 A. Streams 25 miles Farm 3,523 A. Forest 7,587 A. Industrial 8 A. Rural 1,182 A. Suburban 528 A. City 1,392 A. </p>					
Stream	Channel Type/Condition Stream Class-Fishery Status-Rosgen Type- Gradient	Rosgen Level 1 Channel (%)	Ave. Flow Winter - Oct-Apr Summer - May-Oct	OWEB Channel Confinement (%)	Bank Stability (% stable)
Griffin Creek (Measured) Length: 17.3 Miles	Lower 1/3: Class LF, Rosgen G-A; 2-4%. Narrow shallow managed channel, slow flows, developed area, ag/livestock exposure, minimum riparian area. Mid 1/3: Class MN, Rosgen B-G; 2-4%. Narrow shallow managed channel, slow flows, developed area, ag/livestock exposure, minimum riparian area. Upper 1/3: Class SN, Rosgen A; 10%+. Narrow shallow channel, upland forested area, seasonal ephemeral flows, ag/livestock exposure, riparian area adequate.	A - 41% G - 31% B - 22% C - 5%	Win: 15.5 cfs (m) Sum: 11.8 cfs (m)	N.D.	86 %
Daisy (Estimated) Length: 3.2 Miles	Class SN, Rosgen B-A; 2%-10%. Narrow shallow channel, managed channel, slow flows, developed area, ag/livestock. Upper portion has upland flows, forested area, seasonal ephemeral flows, riparian area adequate.	N.D.	Small-Variable W- ≥10 cfs (e) S- ≥ 2 cfs (e)	N.D.	Stable
N. Fork G. Cr. (Measured)	Class MF-SN, Rosgen C,G,B,A. Narrow shallow channel, upland forested area, seasonal ephemeral flows, ag/livestock exposure, riparian area adequate.	N.D.	Small-Variable W- ≥10 cfs (e) S- ≥ 2 cfs (e)	N.D.	Stable
Murphy Creek (Estimated) Length: 2 Miles	Class SN, Rosgen A; 8-10% Narrow shallow channel, upland forested area, seasonal ephemeral flows, ag/livestock exposure, riparian area adequate.	N.D.	Small-Variable W- ≥10 cfs (e) S- ≥ 2 cfs (e)	N.D.	Stable

Stream	Channel Type/Condition Stream Class-Fishery Status-Rosgen Type- Gradient	Rosgen Level 1 Channel (%)	Ave. Flow Winter - Oct-Apr Summer - May-Oct	OWEB Channel Confinement (%)	Bank Stability (% stable)
Hanley Creek (Estimated)	Class SN, Rosgen A; 6-8%, Narrow shallow channel, upland forested area, seasonal ephemeral flows, ag/livestock exposure, riparian area adequate.	N.D.	Small-Variable W- ≥10 cfs (e) S- ≥ 2 cfs (e)	N.D.	Stable
Elk Creek* (Estimated)	Class SN, Rosgen B,F; 2-4%. Narrow shallow managed channel, drainage or confined channel, slow flows, urban/ developed area, ag/livestock exposure, mixed riparian area. Stream is piped west of I-5.	N.D.	Small-Variable W- ≥10 cfs (e) S- ≥ 2 cfs (e)	N.D.	Stable
Mingus Creek* (Estimated)	Class SN, Rosgen B,F; 2-4%. Urban area, used for storm water drainage; channelized west of I-5; channel modified by landowners.	N.D.	Small-Variable W- ≥10 cfs (e) S- ≥ 2 cfs (e)	N.D.	Stable

*Streams not a tributary to Griffin Creek, but are within the subwatershed.

side movement. This has resulted in downward erosion, creating the high banks and narrow channel that typify this stream. The average channel depth for the lower one-third of the stream was 13 feet, with a maximum depth of 30 feet. One-fifth of the reaches had depth estimations of 20 feet or greater. As the water erodes the streambed to bedrock, bank undercutting occurs. This creates acute bank erosion which could result in the damage of streamside structures on the banks (i.e., homes, bridges, etc.) as well as severe sediment input into the stream which can greatly impair, or even eliminate, fish and aquatic invertebrate habitat.

C.5.c. Griffin Creek Riparian Condition and Wetlands.

Water quality and streambank erosion problems are of concern in the lower stretch of Griffin Creek, due to impacts from urban, agricultural, and private landowner alteration of stream channel and riparian areas. The upper 50% of Griffin Creek is forested, interspersed with small acreage rural residences, which contribute some sediment problems to Griffin Creek.

The ODEQ assessed riparian habitat condition of the Griffin Creek subwatershed through stereoscopic photo interpretation. Data are reported in Appendix A.

Table C.7. Griffin Creek Riparian Habitat Conditions.

Stream System	Existing % Shade (Reach Weighted)	Site Potential % Shade (Reach Weighted)	Change in % Shade	Years to Recovery
Griffin Creek Length: 17.3 miles Lower 1/3 Middle 1/3 Upper 1/3	47 % Range 13 - 74 % 14 - 79 % 14 - 88 %	85% Range 72 - 81 % 74 - 88 % 56 - 98 %	38% Average	71
Daisy Creek Length: 3.2 miles	N.D.	N.D.	N.D.	N.D.
N. Fork G. Cr.	14 - 88 %	77 - 97 %	16 - 77 %	72 - 83
Murphy Creek Length: 2 miles	N.D.	N.D.	N.D.	N.D.
Hanley Creek	N.D.	N.D.	N.D.	N.D.
Elk Creek*	Major sections piped/ channel confined	N.D.	N.D.	N.D.
Mingus Creek *	Channelized/ confined	N.D.	N.D.	N.D.

*Streams not a tributary to Griffin Creek, but are within the subwatershed.

Source: TMDL Assessment Report: Riparian Shade. ODEQ, May 2000.)

Habitat quality in Griffin Creek and tributaries is highly variable, largely depending upon the land use and location. Sections of farmland and residential development typically have very little riparian vegetation, and many riparian areas are covered with blackberry vines and non-native brush. There is considerable potential to improve riparian habitat quality (almost 40% increases are attainable), and emphasis should be placed upon planting mixed conifers and native vegetation.

The average riparian width of 15-16 feet is a critical problem, in that the narrow width provides minimal maintenance for most riparian functions such as bank stabilization, filtering sediment and toxins, supporting fish and wildlife species, etc. (Johnson, Ryba 1992). The effect that the type of riparian vegetation has on the stream's ecosystem varies, but a higher habitat value could be attained with increased tree cover. Revegetation projects would decrease water temperatures, increase bank stability, provide natural in-stream structures to improve habitat as well as improve the aesthetic quality of the stream.

C.5.c.1. Wetlands. There are 43 designated wetland areas listed on the National Wetland Inventory map for Griffin Creek subwatershed, 33 of which are 1 acre or less in size, and 10 greater than 1 acre. Several wetland areas are supplied by irrigation overflows, which may diminish as irrigation delivery system efficiency is upgraded.

C.5.d. Water Quality. Griffin Creek is currently listed on the 1998 303(d) list for exceeding temperature and fecal coliforms standards, and has been found to have out-of-compliance nutrient levels as well. Fecal coliforms levels of 2800 were reported in 1982, and temperature levels as high as 77°F have been recorded. The primary sources for pollution are residential septic tanks (some of which are older disconnected systems), and residential animal waste. Griffin Creek has been identified as a priority stream for assessment and restoration as part of the Bear Creek watershed non-point source TMDL program. The cities of Central Point and Medford are encouraging residents to connect to municipal waste water treatment systems to reduce local area water pollution.

C.5.e. Griffin Creek Fisheries. There are 17 separate barriers within Griffin Creek and tributaries. Current estimates from Oregon Department of Fish and Wildlife indicate that summer steelhead and rainbow trout use the lower 9 miles of Griffin Creek (Ritchey, 1998). There is considerable opportunity to enhance fishery habitat in all stream reaches. Major problems are limited stream flow, high water temperature, and marginal aquatic and riparian habitat quality. Extensive residential and agricultural development has resulted in encroachment into riparian areas, and stream channels are confined in many sections.

Table C.8. Fishery Status of Griffin Subwatershed.

Stream	Fish Species:* Chinook, Coho, Steelhead, Trout	In-stream Barriers	Major Limiting Factors (Flow, temp, barriers, sediment, habitat quality, connectivity to downstream impacts)
Griffin Creek	9 m Sum Stlhd 9 m Trout	RM 0.1, RM 1.0 RM 1.1, RM 1.8 RM 9.1, RM 9.9 RM 10.5, RM 11.8, RM 12.4	Limited stream flow, water temperature exceeds 303(d) criteria, marginal aquatic and riparian habitat quality, considerable residential development and encroachment, channel confined in many sections. Major effects from irrigation flows, conveyance.
Daisy Creek	Barrier, no fish identified		Limited stream flow, water temperature exceeds 303(d) criteria, marginal aquatic and riparian habitat quality, considerable residential development and encroachment, channel confined in many sections.
N. Fork G. Cr..	Barrier, no fish identified	RM 0.9, RM 1.2 RM 1.5	Limited stream flow, steep upland channel habitat.
Murphy Creek	Barrier, no fish identified	RM 0.8, RM 1.1 RM 1.3, RM 1.4 RM 1.6	Limited stream flow, steep upland channel habitat.
Hanley Creek			N.D.
Elk Creek	Channel Confined - piped	None Reported	Limited stream flow, water temperature exceeds 303(d) criteria, marginal aquatic and riparian habitat quality, considerable residential development and encroachment, channel confined in many sections.
Mingus Creek	Channel piped - no fish identified	None Reported	Limited stream flow, water temperature exceeds 303(d) criteria, marginal aquatic and riparian habitat quality, considerable residential development and encroachment, channel confined in many sections.

* Fish distribution data provided by Oregon Department of Fish and Wildlife, Bear Creek Distribution Query, November 15, 1999; Limiting factors identified by the Technical Committee.

C.6. Western Lowlands Subwatershed Evaluation.

C.6.a. Evaluation of Stream Quality and Aquatic Habitat. The Technical Committee ranked the stream quality and aquatic habitat condition and needs for restoration for Willow, Jackson, and Griffin Creeks, and formulated a trend line for the future. The ratings are presented in Table C.9.

Table C.9. Ratings of Ecological Integrity and Aquatic Habitat Quality for Willow, Jackson, and Griffin Creek Subwatersheds.

Stream	Subwatershed Ecological Integrity <i>Human caused disturbances, pollution, urban development, land use, road density/ natural features</i> Trend line: <i>Declining, stable, improving, good</i>	Aquatic habitat diversity/ quality High-Med-Low rating
Willow Creek	Lower 2/3 located in agricultural/residential area/ confined channels/ contaminated by surface runoff/ limited pool structure/gravel/ high road density/ multiple culverts Trend line: Stable/ needs improvement in WQ and riparian areas.	Low riparian quality Low water quality Low fishery habitat quality Potential for improvement: Low
Jackson Creek	Lower 2/3 located in agricultural/residential area/ confined channels/ contaminated by surface runoff/ limited pool structure/gravel/ high road density/ multiple culverts/ riparian area variable, uplands adequate, limited floodplain connectivity with regular flooding. Trend line: Stable/declining water quality for turbidity, fecal coliform, phosphorous. Needs improvement in riparian areas, remove barriers.	Low riparian quality Low water quality Low fishery habitat quality Conditions higher in the watershed are more favorable. High potential for restoration of fish habitat.
Griffin Creek	Lower 2/3 located in agricultural/residential area/ confined channels/ contaminated by surface runoff/ limited pool structure/gravel/ high road density/ multiple culverts Trend line: Stable/ needs improvement in WQ and riparian areas. Fecal coliform level is improving, but turbidity and phosphorous levels are worsening.	Low riparian quality Low water quality Low fishery habitat quality Conditions lower in the watershed are unfavorable. High potential for restoration of fish habitat.

* These ratings were compiled by the Watershed Technical Committee.

C.6.b. Technical Prioritization of Restoration Needs for Willow, Jackson, and Griffin

Subwatersheds.

The ratings of restoration needs were then grouped into high-medium-low priority, which is presented in both the subwatershed assessment, and integrated to prepare a watershed assessment (in Part III). It should be noted that an environmental condition and priority for restoration are independent, and that a condition that is poor in quality will not necessarily mean that the watershed council will decide it is a *priority* for restoration funding and action. The prioritization process adds the consideration of the council's Mission, Goals, and Objectives to the technical evaluation process, and is oriented toward decision-making rather than evaluation. Thus, it is an indicator of *what is most important to do* to improve watershed health from a technical perspective, rather than simply representing the worst quality condition.

Table C.10. Technical Ranking of Limiting Factors and Restoration Needs for Willow, Jackson, and Griffin Creeks.

Stream	Priority Ranking of Limiting Factors and Restoration Needs								
	Stream Flows	Stream temperature	Water Quality-303d (303d list) toxics, bacteria, nutrients,	Sedimentation	Riparian habitat	Aquatic habitat	Channel stability	Floodplain connectivity	In-stream barriers
Willow Creek	H	H	H	L	M	M	L	L	M
Jackson Creek	H	H	M	L	M	M	L	L	H
Griffin Creek	H	H	M	L	M	M	L	L	H

* The prioritization of restoration and protection needs are defined by the Technical Team, for use by the watershed council.

The Technical Committee ranked the limiting factors and watershed restoration needs for Willow, Jackson, and Griffin Creeks, and identified summer stream flows, summer stream temperature, and in-stream barriers as the highest priority problems in the subwatersheds. Riparian and aquatic habitat quality, and other water quality components were selected as medium priority concerns, and channel stability, floodplain connectivity and sediment control were ranked as low priority concerns. Most sediment problems occurred from the operation of irrigation flash dams and erosion created during high flow events, thus were an intermittent condition.

C.7. Future Monitoring Needs/Data Gaps.

Continued monitoring of water quality, flow data, riparian and aquatic habitat quality, and fishery productivity is needed in the Willow, Jackson, and Griffin Creek subwatersheds. In particular, there is virtually no information about wetlands or off-stream habitat areas adjacent to streams. There is also very little information about macro-invertebrates, which are critical indicators of stream health. There is some information about pollution in shallow wells, but is very limited.

Monitoring schemes should include a comprehensive, coordinated study of:

- **Water Quality**, including water volume and flow patterns, temperature, dissolved oxygen, soluble organics and inorganics, heavy metals and toxic compounds, etc.
- **Riparian Habitat Structure**, riparian cover/shade, species composition, encroachment, diversity of small-scale habitats, and spawning, nursery and hiding habitat areas.
- **Fish Distribution and Age Class**. Data on production, species use, and habitat quality. Collect baseline data on macroinvertebrates populations to determine the biotic integrity of stream habitats.
- **Monitor Residential Shallow Wells** for surface flow and septic tank contamination and water quality safety in the lower subwatersheds.