

BEAR CREEK WATERSHED ASSESSMENT

Phase II - Bear Creek Tributary Assessment

SUMMARY

Prepared for

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

A. Purpose and Approach.

In 1995, the Rogue Valley Council of Governments (RVCOG) completed the Bear Creek Watershed Assessment and Action Plan, Phase I. The purpose of the assessment was: (a) to present a multi-level ecosystem model of the Bear Creek valley to enable watershed assessment; (b) to describe the historical and current conditions of the watershed and water related resources within the Bear Creek valley; (c) describe the trends of change in these resources; and (d) identify the opportunities available and needed to create a more viable, healthy, and productive watershed. The Phase I plan sought to place the watershed within the context of the larger Klamath Basin Ecological Province, and adjacent watersheds in the Rogue Basin. Due to limited information available at the time, and time constraints, the first assessment focused primarily upon the Bear Creek mainstem and upslope conditions.

Phase II is intended to expand the assessment to incorporate information on tributaries, water quality, fishery habitat conditions, and address federal and state regulatory mandates implemented in recent years. The Phase II assessment is being prepared by the Rogue Valley Council of Governments under the auspices of the Bear Creek Watershed Council, supported by the Jackson Creek Stakeholders Advisory Committee (Jackson Creek sub-watershed), Ashland Watershed Partnership (Ashland and Neil Creek sub-watersheds), and Friends of Greensprings (Emigrant and Walker Creek sub-watersheds). The project is funded through a Grant from the Oregon Watershed Enhancement Board, and municipal governments in the Bear Creek valley.

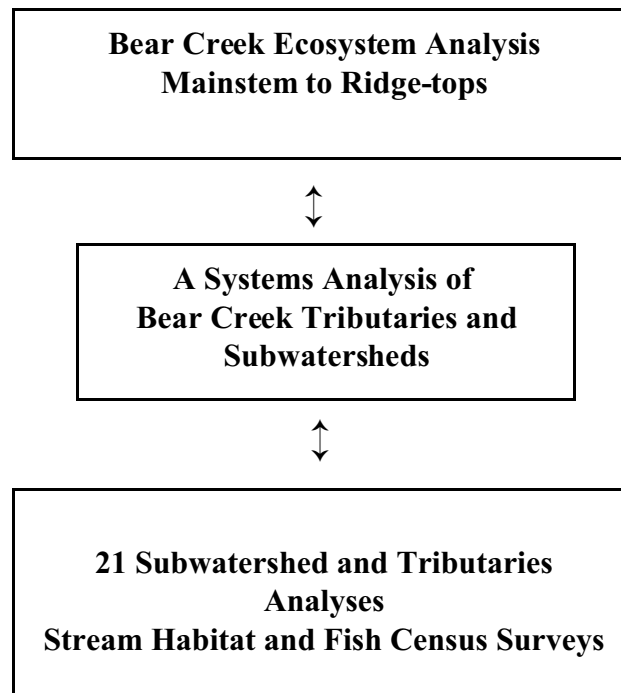
A.1. Context of this Study.

A strategy emerged as a result of the several years of study within the Bear Creek valley that unifies diverse activities that extend across political boundaries, agency jurisdictions, private land, and other interests. The unified strategy began to take shape in 1995 when water resources staff at the Rogue Valley Council of Governments completed the first general Bear Creek Watershed Assessment and Action Plan.

Following the Phase I ecosystem presentation, several state and federal agencies have conducted additional watershed analyses and water quality data collection efforts within the Bear Creek valley. The Oregon Department of Fish and Wildlife (ODFW) has accumulated additional information on fish habitat and distribution. Oregon Department of Environmental Quality (ODEQ) and the RVCOG collected stream morphology, riparian habitat, and water quality data at multiple points on Bear Creek and selected tributaries. The United States Forest Service completed watershed analyses on upper Neil Creek, and Wagner Creek, and initiated an analysis on Ashland Creek. The Friends of Greensprings prepared an assessment

of Emigrant and Walker Creeks in the upper watershed. The Bureau of Land Management prepared an analysis of the Upper Bear Creek Watershed (Emigrant and Walker Creeks), and is conducting subwatershed analyses encompassing tributaries on federal lands on the westside Siskiyou slope of Bear Creek.

Although these studies contain valuable information, they are fragmented in approach and reflect a need for a “systems analysis” of the Bear Creek watershed. The analysis would link the multiple subwatershed plans and show the relationships between the tributaries and subwatersheds to the watershed level ecosystem presentation in the 1995 Bear Creek Watershed plan. Graphically, the strategy can be presented as below:



The conceptual basis for this strategy is to identify high-priority protection and restoration activities across multiple landscape types within the subwatersheds.¹ It provides a logical train of reasoning by multi-disciplinary groups to identify areas and activities that can best protect and restore salmon and their watersheds. A team of watershed professionals from multiple specialties, and citizen

¹ The conceptual basis for this presentation was derived from Bill Bradbury, Handbook for Prioritizing Watershed Protection and Restoration To Aid Recovery of Native Salmon, Oregon State Senate, Salem, Oregon, November 1995.

groups representing multiple interests and stakeholder groups evaluate current watershed conditions and compare them with historical conditions and anticipated future trends. Based on the historic trends and future needs, priorities for protection and restoration are formulated. It is an eco-system approach, that seeks to maximize the effective and efficient use of resources in implementing restoration actions. In the Bear Creek valley, the Bear Creek Watershed Council has been designated to coordinate watershed assessment and restoration activities.

B. Organization of the Bear Creek Watershed Assessment.

The Bear Creek Watershed Assessment is divided into three Parts, plus Appendices:

Part I describes the *Purpose and Context of this Study*, and the *Mission and Goals of the Bear Creek Watershed Council*. It then describes the *History, Physiography, and Physical Structure of the Bear Creek watershed*, the *socio-economic structure and demographic characteristics* of the people who live in the Bear Creek valley, the *sources of water supply, distribution, and use* in the Bear Creek watershed, recent data and findings from RVCOG on *water quality and riparian habitat* in Bear Creek and selected tributaries, and the current *status of the anadromous fishery* in the valley from ODFW. Part I concludes with a description of EPA/ODEQ *Regulatory Mandates* applicable to the Bear Creek watershed, a description of the *socio-economic structure and demographic characteristics* of the people who live in the Bear Creek valley, and *Remaining Issues* to be dealt with in the future

Part II reports on ODEQ data developed since 1995 on *Bear Creek mainstem channel morphology, and riparian habitat conditions*, and other information on subwatershed characteristics *within* each of the 21 hydrologic sub-watersheds in the Bear Creek valley. A Technical Committee has *evaluated* the environmental and ecological conditions within each subwatershed, and *Prioritized* the problems for restoration into high-medium-low rankings.

Part III concludes with a comparison of and technical prioritization of environmental and ecological conditions *across* the subwatersheds, to be used by the watershed councils to formulate watershed-wide priorities for restoration action (in the spirit of Bradbury's model for *Formulating Priorities for Watershed Restoration*). In this fashion, it presents a *multi-level analysis* that provides a basis for watershed councils to make decisions and *select* watershed restoration actions, both within subwatersheds, and for the watershed as a whole.

Additional data and information relevant to the assessment, and criteria for evaluation are included in Appendix A.

Methodology. The Bear Creek watershed assessment of tributaries begins with a presentation

and update of information gathered on Bear Creek mainstem since the 1995 watershed assessment. The assessment presumes a *systems model*, in that Bear Creek is a receiver stream from the 21 subwatersheds surrounding the mainstem.

The 21 subwatersheds and tributaries are then assessed in sequence, beginning on the lower western side of the Bear Creek watershed. Since some contiguous subwatersheds share similar ecological and topographical features, they are grouped and described as 7 sub-areas, which include the Western Lowlands (Willow, Jackson, and Griffin Creeks), the Siskiyou Slope subwatersheds (Coleman, Anderson, and Wagner Creeks), the Mt. Ashland subwatershed (Ashland and Neil Creek Creeks), Upper Bear Creek (Emigrant and Walker Creeks), the East Cascade subwatersheds (Gaerky, Kitchen, Butler, Myer, Jeffery, Kenutchen, and Payne Creeks), Eastern Urban Interface subwatersheds (Larson, Lazy, and Lone Pine Creeks) and the Eastern Delta subwatersheds (Upton and Whetstone Creeks). Data on the hydrologic and riparian conditions, water quality, and fishery status are compiled for each subwatershed, and used by the Technical Team to formulate ratings of *Subwatershed Ecological Integrity, Aquatic Diversity, and Limiting Factors*. The descriptive information and evaluations are then integrated to *Prioritize Limiting Factors and Restoration Needs* for each subwatershed into high-medium-low rankings. The prioritized limiting factors and restoration needs are then to be used by watershed councils to formulate *Recommended Restoration Actions* for streams within the subwatersheds (which is the *Action Planning* stage of the study process).

Part III of the Bear Creek Watershed Assessment takes the aggregated technical ratings of environmental quality, and integrates them into a table for the whole watershed, to portray watershed conditions and the priority restoration needs, both within, and across the watershed. These needs provide the basis for the Bear Creek Watershed Action Plan, which follows this assessment.

C. Issues Affecting The Bear Creek Valley.

Although multiple issues might be selected that apply to the Bear Creek watershed, the most controversial issues within the valley are:

Water Supply.

Although agricultural water use in the Bear Creek valley has decreased slowly through the years, residential and commercial consumption is increasing dramatically. The original Medford water supply has been expanded to supply Central Point, Jacksonville, Phoenix, Talent, and supplement Ashland's needs. The present municipal water supply from Butte Springs, while abundant, now has to be supplemented by increased withdrawals from the Rogue River during summer months. Preliminary studies suggest that additional supply of municipal water will be needed in the Bear Creek valley over the next 50 years.

Further, a coalition of Federal agencies, the Klamath Tribes, irrigation districts, and individual water users in the Klamath Basin have filed for adjudication of some 800 claims for water rights for water transferred into the Bear Creek valley, and stored in Emigrant Lake. The claims are for prior in-stream water rights, which could amount to major portions of the allocated in-stream water supply. Bear Creek irrigation districts have imported water for over a century, which is a significant portion of the water used for irrigation supply. Some of the irrigation return flows supply a significant portion of Bear Creek flows during summer months. (Reference: "Letter makes irrigators wonder," Mail Tribune, March 18, 2000, (P. 2A).

Forest Fire Management.

Historically, low intensity wildfires burned through the Bear Creek watershed approximately every 20 years. These fires played a critical role in shaping the ecological diversity of the area by naturally thinning forests, encouraging native plant succession, and providing habitat diversity for animals. Fire suppression management since the 1950s has resulted in a major increase in fuel loads within the upper watershed. As a result, when fires occur, they create super-heated infernos that scour the landscape. Although Federal land management agencies are increasing efforts at controlled burning and forest thinning, the problem in most of the upper watershed is still increasing.

There is considerable disagreement among various interest groups about forest and fire management strategy, which often results in inaction rather than resolution. The Mt. Ashland and Upper Bear Creek watersheds are at particular risk and worsening yearly. The designation of the Cascade Siskiyou National Monument may further limit fire management in portions of the upper Emigrant watershed. A unified strategy of fuels and fire management is needed within the Bear Creek valley. (See: "Burning question: forest or the trees?", Mail Tribune, August 19, 2001).

Implementation of TMDLs Throughout the Watershed.

The Department of Environmental Quality is expected to complete the Bear Creek Water Quality Management Plan (WQMP) for the Bear Creek valley in Spring 2002, which will extend the application and enforcement of TMDLs to upland areas within the watershed. The present levels of enforcement have primarily affected the main waterways of the watershed, but future regulations will be applied more extensively to private and agricultural lands. The application of the WQMP will be of concern to a much broader population, and require changes in private land management within the valley.

Residential and Commercial Development.

Within the past decade, residential and commercial development have increased dramatically in the Bear Creek valley, both through the addition of new subdivisions, and in-filling of open lands. As a result there is increased encroachment into riparian areas on private lands. Several Bear Creek tributaries (Jackson Creek, Wagner Creek, Larson, Lazy, and Lone Pine Creeks) are being developed rapidly and water quality problems and fish and wildlife habitat degradation are increasing in these areas. Although there are zoning restrictions and riparian setbacks, there is increased need for riparian vegetation conservation and management throughout the Bear creek watershed.

Floodplain Connectivity and Management.

Flooding has always been a problem in the Bear Creek valley, and the problem has been worsened by residential and commercial development. There is a major increase in the proportion of impervious surfaces within urban areas, increased channel confinement and obstructions within streams, and a decrease in wetland and off-stream water storage areas. Floodplain connectivity has been incised by roads and paved parking lots.

City governments are seeking to be responsive to the problem, and some developers are designing flood management facilities into their developments. However, more remediation needs to be done.

D. Bear Creek Subwatershed Findings

Since the Bear Creek mainstem possesses unique aquatic and riparian habitat different than other subwatersheds, the mainstem is analyzed as a subwatershed in itself.

D.1. Key Findings For the Bear Creek Mainstem.

- 1. Priority Watershed Restoration Needs:** The Technical Committee ranked the limiting factors and watershed restoration needs for the Bear Creek mainstem, and identified summer stream flows, summer stream temperature, and water quality as the highest priority. Sedimentation, riparian habitat quality, and aquatic habitat quality were ranked as medium priority. Channel stability, floodplain connectivity and in-stream barriers were ranked as low priority for Bear Creek.
- 2. Stream Flow Conditions:** Development in the valley has altered the nature of water distribution and use in Bear Creek, creating problems of reduced water quality, unnatural flow and flood patterns, and reducing native fishery habitat. During summer months natural flows in Bear Creek are augmented by releases from Emigrant Reservoir to support irrigation and municipal withdrawals, which produce an unnatural and irregular flow regime. In past years, Bear Creek flows were actually observed to reverse near major diversion points. Currently Bear Creek does not always meet the target flow of 10 cfs established by ODFW throughout its entire length and has essentially gone dry at times (which occurred on 8/5/94, 8/19/94, 9/23/94). In recent years, the irrigation districts have sought to reduce the effects of augmented flows and irrigation diversions, with some measurable success.
- 3. Streambank Stability/Erosion, and Sediment:** Bear Creek has had a long-term problem with erosion and sediment. Prior to European settlement Bear Creek contained multiple striated channels that meandered across the Bear Creek valley and allowed sediment deposition and filtering. Development since the turn of the century has confined the stream channel, which reduced energy dissipation and increased stress and erosion of streambanks. Further, Bear Creek is a collector stream, that receives the sediment from upslope tributaries and from urban run-off. Large quantities of granitic sediment used to move into Bear Creek from Ashland, Neil, Wagner Creeks and the Upper Bear Creek watershed, but sediment flow in the mainstem has been reduced in recent years by check dams built by the City of Ashland and the construction of Emigrant Reservoir.

Currently, sediment load levels in Bear Creek are not measured, but turbidity is measured. Bear Creek does exceed turbidity standards during high flow or storm events.

- 4. Riparian Habitat Quality:** Riparian conditions across Bear Creek mainstem vary from excellent (only a few areas) to devoid of any large woody vegetation. The

majority of the system is in poor (the lower 1/3) to fair (middle 1/3) condition. Riparian stands have generally moderate shade density and buffer widths less than 25 feet. There are however, pockets of dense riparian forest stands in agricultural/orchard lands that indicates a potential to manage a riparian forest stand for high shade density, while coexisting with agricultural production.

- 5. Water Quality:** ODEQ criteria indicate that water quality at the mouth of Bear Creek is impaired in the summer for temperature, fecal coliform levels, and total phosphorous. In the winter, the creek is impaired for phosphorous, and moderately impaired for dissolved oxygen, turbidity, and fecal coliform. Fecal coliform bacteria levels were found to exceed standards more than fifty percent of the time at almost all sites in the summer, and exceeded standards more than 50% during the winter. Total phosphorous was found to be the largest problem in the basin with over 50 percent exceedence at all sites, year round. This condition may be alleviated when the new Ashland Wastewater Treatment plant is operational. Turbidity and pH data revealed only a few sites that showed moderate exceedence.
- 6. Fishery Habitat:** For most of this century, fishery habitat quality and anadromous fish populations in Bear Creek have declined steadily, from problems associated with reduced riparian habitat, decreased water quality and quantity, and instream barriers. Aquatic diversity is currently low throughout the mainstem, and there is great potential for improvement. There are some indications that fish production may be improving in recent years, however, it is too early to substantiate the trend. Habitat improvements in side channels, off-channel habitat, and removing in-stream barriers are needed.
- 7. Invasion of Exotic Species:** Although exotic plant species have been introduced to the Bear Creek valley since the period of original settlement, the frequency and extent of invasion has increased rapidly in recent years, in no small part a result of increased mobility of the population. People import exotic species for landscaping, which escape to adjoining lands (e.g., blackberries). Seeds are unknowingly imported by the constant flow of vehicles along I-5 and other roads (e.g., starthistle). These plant populations are out-competing and replacing native plant populations, which reduces natural diversity.
- 8. 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.

9. Key issues concerning the Bear Creek Mainstem are:

- **Recreational Access/Use of Bear Creek and Health Effects.** Each summer ODEQ and the Jackson County Health Department issues a public warning about potential health effects from exposure to *E. coli* in Bear Creek and tributaries, and advise against recreational use of the waterways. Several parks and the Greenway are located along Bear Creek, and the stream is an attraction for recreational use.
- **Repair of Channel Confinement Structures on Private Land, and Flood Damage.** High water events regularly damage floodwalls and bridge structures in Bear Creek, and private landowners often want to replace/repair these structures. Such actions may however, modify stream channels, which are regulated by the U.S. Army Corps of Engineers and state and local riparian ordinances.
- **Medford Urban Renewal Plan.** Entities within the city of Medford have proposed to rehabilitate sections of Bear Creek that pass through the downtown urban area.. While there is general public support for the proposed Bear Creek Urban Renewal Plan, there are multiple concepts of the design and process of implementation, particularly private landowners adjacent to the stream, what will be the projects, who will bear the costs and be affected by the new uses. The concept has been presented to the Bear Creek Watershed Council for their consideration and involvement.
- **Pollution from Municipal and Agricultural Lands.** The ODEQ will be issuing new criteria for management of run-off and drainage in the Bear Creek watershed in 2002, which are described in the Water Quality Management Plan. There is still controversy over the management of phosphorous discharge by the Ashland Wastewater Treatment Plant into Bear Creek.

D.2. Key Findings for the Western Lowland Unit.

The Western Lowland Unit includes the Willow, Jackson, and Griffin Creek subwatersheds. Key findings affecting the Western Lowland Unit are:

- 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 releases, there would be hardly any flow in some stream reaches at times. These flows are also a major (and critical) source of water supply for wetlands in the 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 (e.g., blackberries). Restoring native riparian habitat would improve water quality, reduce erosion and sediment levels, and enhance 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.

- **Floodplain Connectivity and Management.** A major problem in Bear Creek valley is flood control and surface drainage. Stream channels must be left open for flood drainage, but many sections are clogged by large patches of blackberry vines. Residential and commercial development limit opportunities for management. Actions to maintain open channels for flood flows often conflict with goals for fish-friendly habitat. The public works departments of cities need access to stream channels to maintain flood drainage, but private landowners have extensively altered channels and floodplains. The cities have very limited jurisdiction and enforcement ability upon landowner actions. Central Point is seeking to develop floodwater holding basins and wetlands (some designed as day use parks) in open areas as a partial solution.
- **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 significant affects summer stream flow in some reaches, and may even improve water quality in lowest flow periods. Stormwater drainage and subsurface flows adds poor quality water in some stream 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, inserting sediment traps in stormwater channels and catch basins, increasing park and riparian areas, and limiting effects of development upon water quality, wetlands,

and riparian areas. Several areas have been designated for vegetative filtering wetland areas. Rogue River Valley Irrigation District (RRVID) has developed and is implementing a water conservation plan for the area, which reduces tail water return and improves efficiency of water use.

- **Regulation of Riparian Areas.** The cities of Central Point and Jacksonville are moving to comply with State Planning Goal 5, and using the Medford City riparian ordinance as a model. Creek side variance is yet to be defined. There has also been significant encroachment by private landowners into riparian areas, often through the addition of fencing, out-buildings, and landscaping.
- **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.
- **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.
- **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. Present management practices are not meeting the changing needs, and there is controversy about forest management policy on public lands in the upper watershed.

D.3. Key Findings for the Siskiyou Slope Unit.

The Siskiyou Slope Unit includes the Coleman, Anderson, and Wagner Creek subwatersheds. Key findings affecting the Siskiyou Slope Unit are:

1. **Priority Watershed Restoration Needs:** The Technical Committee ranked the limiting factors and watershed restoration needs for Coleman, Anderson, and Wagner Creeks, and identified riparian habitat, summer stream flows, and water quality as the highest priority problems in the subwatersheds. Aquatic habitat quality, and stream water temperature were selected as medium priority concerns, and channel stability, floodplain connectivity and sediment control were ranked as low priority concerns.
2. **Water Supply and Use:** Irrigation transport and return flows are a significant portion of the water supply for the lower portions of Siskiyou Unit streams during the summer months. They are also a source of pollution, affecting water quality and fish distribution. These flows are also a major (and critical) source of water supply for

wetlands in the subwatersheds.

- 3. Streambank Stability/Erosion, and Sediment:** Stream channels in the lower sections of Coleman, Anderson, and Wagner Creeks have been extensively modified since settlement, and most valley floor channel sections are constricted by development. The streambanks are generally stable, with some erosion during high water events. There is considerable erosion and sediment transport from granitic soils in the uplands. There is a moderate problem from irrigation induced sediment generation in the agricultural lands, and considerable pollution from urban run-off in Coleman and Anderson Creeks. 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 rated as the highest priority need for restoration in the Siskiyou Slope subwatersheds, particularly in agricultural and residential areas. Riparian areas have been altered by residential and agricultural development in the lower reaches. Restoring native riparian habitat would improve water quality, reduce erosion and sediment levels, and enhance local fisheries.
- 5. Water Quality:** Water quality is a particular problem in Coleman and Anderson 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. Water quality in Wagner Creek is better.
- 6. Fishery Habitat:** Coleman and Anderson Creek fish production is severely 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. Multiple roads and canals cross the streams, with extensive residential development. Wagner Creek has better water quality and riparian habitat, supports a viable anadromous fishery, and is a critical stream for Bear Creek fishery production. Habitat improvements in side channels, off-channel habitat, and removing in-stream barriers are needed in all stream systems.
- 7. Forest Management:** The upland forests on the Siskiyou Slope have been harvested, some cut-over twice, in the past century. Species composition has changed from natural distribution, and fuels accumulation has become intense in many areas. Fire risk in the forests is high, and increasing.
- 8. Key issues concerning the Siskiyou Slope subwatersheds.**
 - **Pollution from Municipal and Agricultural Lands.** Water quality is a major concern for the Siskiyou Slope subwatershed. The ODEQ will be issuing new

criteria for management of run-off and drainage in the Bear Creek watershed in 2002, which are described in the Water Quality Management Plan. The periodic applications of insecticides to orchards and herbicides into the irrigation canals to control unwanted vegetation combine with run-off from city streets, parking lots, and buildings, and pose a threat to stream aquatic organisms.

Irrigation canal water also carries nutrients and other agrochemicals from surface runoff and irrigation returns. Both TID and MID try to keep irrigation water separate from natural stream flow as one of their long-term goals, and are actively managing tailwater to minimize stream runoff.

- **High Levels of Fecal Coliforms.** The 1991-92 Water Quality Data Report for the Bear Creek Basin (ODEQ) listed high levels of fecal coliforms in Wagner Creek as a serious problem, and although not measured, is likely to be an even greater concern for Coleman and Anderson Creeks. Sources include failing septic systems, leaking sewage tanks, and animals grazing near streams.

The Wagner Creek subbasin lowlands has a high water table. Major residential sections around Phoenix and Talent are not connected to the Bear Creek Valley Sanitary Authority, and septic systems may cause some pollution of the groundwater supply (1980, City of Talent Comprehensive Plan).

- **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. Present management practices are not meeting the changing needs, and there is considerable controversy about forest management policies on public lands in the upper watershed.
- **Planned Timber Harvest in the Watershed.** Road building and logging expose soil and increase sediment levels in streams. The USFS Wagner Gap Timber Sale is planned for 1999-2004, and will consist of thinning and natural fuel reduction through under-story burning. The Forest Service plan provides for a cut of 2-3 million board feet of timber, and construction of 0.8 mi of road. The project may affect surface run-off and increase sedimentation and turbidity until vegetation is reestablished.
- **Road Construction and Stormwater Management.** There are over 170 miles of roads in the Bear Creek valley, not including Forest Service roads. As residential development expands and impervious surfaces such as roads increase, the hydrology and surface runoff patterns change. Within the City of Talent, surface run-off collects into storm drains that channel water into Wagner Creek, and stormwater from the Phoenix area drains into Anderson and Coleman Creeks. The cities are upgrading their stormwater management programs, but presently drainage facilities are constructed on a case by case basis as the need arises (1980

City of Talent Comprehensive Plan). Oil, soil, and litter is frequently washed into streams, and some poorly positioned storm drains erode stream banks. Additional storm sewers are needed in Talent and Phoenix.

- **Illegal Dumping.** Currently trash, building materials, yard waste, appliances, and other materials are being dumped onto the banks or directly into creeks. Unpermitted dumping and general litter damage habitat conditions for fish and wildlife, and may pose a public health hazard. In addition, larger man-made debris may clog culverts and bridges and increase the level or intensity of flooding. Often funds available from local municipalities are inadequate to allow for cleanup and enforcement of dumping regulations, thus the situation should be addressed through education programs.

D.4. Key Findings for the Mt. Ashland Unit.

The Mt. Ashland Unit consists of the Ashland and Neil Creeks subwatersheds. Key findings concerning the Mt. Ashland Unit are:

- 1. Priority Watershed Restoration Needs:** The Technical Committee ranked the limiting factors and watershed restoration needs for Ashland and Neil Creek subwatersheds, and the highest priority needs for restoration in the Ashland Creek subwatershed were identified as riparian habitat, water quality, and channel stability; stream flows, water temperature, and sedimentation were identified as medium level priorities; and in-stream barriers, aquatic habitat and floodplain connectivity were identified as low priority concerns. These ratings are unusual, because upper Ashland Creek has very high quality stream habitat conditions, while lower Ashland Creek has lower quality habitat conditions; thus the range of conditions had to be taken into account in the priority rankings and selection of priority needs.

For Neil Creek, streamwater flow, water temperature, and riparian habitat were identified as priority restoration needs, other water quality factors, sedimentation, and floodplain connectivity were selected as medium priority concerns, and aquatic habitat, channel stability, and in-stream barriers were ranked as low priority concerns. Since Neil Creek is a prime anadromous fishery stream with high quality conditions, the decisions reflect the primary concern of maximizing the highest productive potential of the stream.

- 2. Streambank Stability/Erosion, and Sediment:** Although riparian conditions are generally very good, there is considerable erosion and sediment transport from granitic soils in the uplands. There is a moderate problem from irrigation induced sediment generation in the agricultural lands, and considerable pollution from urban run-off and flooding in the lower subwatersheds. Streams are observed to exceed turbidity standards during high flow or storm events several times a year.

3. **Riparian Habitat Quality:** Riparian habitat is rated as high quality in the upper reaches of the streams, but the highest priority need for restoration is in the lower reaches of the Mt. Ashland subwatersheds, particularly in agricultural and residential areas. Riparian areas have been degraded by residential and agricultural development in the lower reaches. Restoring native riparian habitat would improve water quality, reduce erosion and sediment levels, and enhance fisheries.
4. **Wetlands:** The upper Ashland subwatershed contains a proportionately large number of high-quality wetlands, many of which contain rare and sensitive species. The condition and function of these wetlands needs to be documented.
5. **Water Quality:** Water quality is a serious problem in the lower Ashland subwatershed, which is impaired in the summer by water temperature, fecal coliform, and total phosphorous levels. Fecal coliform bacteria levels were found to exceed standards over fifty percent of the time in the lower subwatershed. The conditions are exacerbated by low summer flows, irrigation inflows, residential pollution, and run-off during flood events. Water quality in Neil Creek is better, but Neil Creek is also more valuable for the anadromous fishery, thus it needs continued protection.
6. **Fishery Habitat:** Neil and Ashland Creeks support some of the most highly valued and productive fishery habitat in the Bear Creek watershed, but habitat quality is still limited at times by low flows, high temperatures, low water quality, poor riparian habitat, and multiple barriers in the lower reaches of the subwatersheds. Aquatic diversity is very good in most of the system, but potential exists for improvements in the lower reaches. Multiple roads and canals cross the streams, with extensive residential development. Habitat improvements in side channels, off-channel habitat, and removal of in-stream barriers are needed in all stream systems.
7. **Forest Management:** The upland forests on the Ashland watershed have been harvested, some cut-over twice in the past century. Species composition has changed from natural distribution, and fuels accumulation has become intense in many areas. Fire risk is high, and increasing. There is considerable controversy within the local community about forest management policy on public lands in the upper watershed.
8. **Key issues concerning the Mt. Ashland subwatersheds.**
 - **Growth/urbanization:** Increasing urbanization is a threat to watershed health in creating increased runoff, flooding, decreased water quality, and loss of riparian habitat.
 - **Ecosystem Condition and Biodiversity: vulnerability to natural disturbance mechanisms:** The Mt. Ashland Watershed Area is in a very unstable condition

due to overstocked vegetative conditions which have severely lowered the ecosystem's resistance to natural disturbance mechanisms. The major disturbance mechanisms of concern for the area are: wildfire, insects and disease, human activities, and erosion/slope failures.

- **Forest management policy/fire control:** There is considerable controversy among local organizations about forest management policy, harvest, thinning to reduce fuel accumulation, and public access/use. The upper Ashland municipal watershed is managed as Late-Successional Reserve, which affects numerous management decisions on both public and private land, and recreational use.
- **Domestic Water Supply:** Access to the Ashland watershed for recreational use is restricted to protect water quality and supply to Reeder Reservoir. Growth in the Ashland area has increased water demand from Reeder Reservoir, and water supply is limited in drought years.
- **Stream Management and Restoration within Ashland urban boundary:** The City of Ashland is currently considering adopting a riparian ordinance and stormwater management policy, which will affect floodplain management activities. These policies will also affect future residential and commercial development, and land use in Ashland. Ashland Creek water quality is affected by pollution from commercial development and public access to Lithia Park.
- **Mt. Ashland Ski Area:** There is considerably local controversy about the consequences of expansion of the Mt. Ashland Ski Area., which was developed in 1964. Some groups support expansion of use, while others prefer ecological preservation of the upper watershed. The Ski Area has developed an erosion control and land restabilization plan, but has not acquired final approval for the proposed development.

D.5. Key Findings for the Upper Bear Creek Unit.

The Upper Bear Creek Unit consists of the Emigrant and Walker Creeks subwatersheds. Key findings concerning the Upper Bear Creek Unit are:

1. **Priority Watershed Restoration Needs:** The Technical Committee ranked the limiting factors and watershed restoration needs for Emigrant and Walker Creek subwatersheds, and identified stream flows, stream water temperature, and in-stream barriers as the highest priority problems in the Emigrant Creek subwatershed, other water quality parameters, riparian habitat, and aquatic habitat as medium level priorities, and sedimentation, channel stability, and floodplain connectivity as low priority concerns. The primary in-stream barrier is Emigrant Dam, which blocks anadromous fish migration. There is considerable fishery habitat above Emigrant

Lake, and by-passage could make this available. Fish ladders could increase fish migration to the upper watershed.

For Walker Creek, stream temperature, riparian habitat, and floodplain connectivity were identified as priority restoration needs, stream flows, other water quality factors and aquatic habitat quality were selected as medium priority concerns, and sediment, channel stability, and in-stream barriers were ranked as low priority concerns.

- 2. Streambank Stability/Erosion, and Sediment:** There is considerable erosion and sediment transport from mineral soils in the Upper Bear subwatershed. There is a moderate problem from livestock exposure in the uplands, and irrigation run-off in the lower subwatersheds. Streams are observed to exceed turbidity standards during high flow or storm events, which may occur several times a year.
- 3. Riparian Habitat Quality:** Riparian habitat quality has been altered extensively by human land uses, and forest management, but is rated as potentially high quality in the upper reaches of the streams. Restoring native riparian habitat would improve water quality, reduce erosion and sediment levels, and enhance fisheries.
- 4. Wetlands:** The Upper Bear Creek subwatersheds contains a proportionately large number of special wetlands, which may contain rare and sensitive species. The condition and function of these wetlands needs to be documented.
- 5. Water Quality:** Water quality monitoring by the Friends of the Greensprings (FOG) and RVCOG on Emigrant and Walker Creek since 1996 indicate that water quality parameters for dissolved oxygen, nitrogen, and pH met current standards, but there remain potential problems with bacteria, phosphorous, sediment, turbidity, and algae. Ground-disturbing activities such as road building, logging, land clearing, agriculture, and unmanaged livestock grazing contribute sediment to streams. Irrigation withdrawals also lower streamflows and contribute to increased stream temperatures. Logging and road construction have resulted in low levels of large woody material in the stream and reduced riparian vegetation.
- 6. Fishery Habitat:** Anadromous fish habitat has been blocked by Emigrant Dam since 1924, which changed the Emigrant Creek fishery. Overall, the interrelated aquatic and riparian habitats in the Upper Bear Creek subwatershed are in fair to good condition, but remain below their potential for trout production. Much of the habitat lacks quality pools and large woody material necessary for maintenance of pools, cover, spawning material, and bank stability. There are very few deep pools (over 3 ft. depth) or hiding cover that can be used for resting and rearing and fine gravel for spawning is limited to small deposits. Bedrock areas are extensive.

Improvements in watershed conditions could enhance stream flow and reduce water temperature, create more aquatic habitat, produce greater stream channel complexity, and reduce introduction of sediment.

7. Forest Management: The upland forests on the Upper Bear Creek subwatersheds have been harvested, some cut-over twice, in the past century, and have been altered by forest management practices. Species composition has changed from natural composition, and fuels accumulation has become intense in many areas. Fire risk is high, and increasing. There is considerable controversy about forest management policy on public lands in the upper watershed, particularly within the Cascade Siskiyou National Monument.

8. Key issues concerning the Upper Bear Creek subwatersheds:

The most controversial issues pertaining to the Emigrant and Walker Creek subwatersheds pertain to the changes in human uses of the area, and management practices. Prominent among these concerns are:

- **Cascade Siskiyou National Monument:** The Monument was created in 2000, and incorporated almost 53,000 acres of public and private lands in the Upper Bear Creek subwatersheds. Almost 2/3 of the lands were already under federal management (BLM, and three designated protected areas). Over a hundred private landholders are affected by this designation as it will impose new federal management requirements, and limit access and traditional uses of some private lands. Some landholders favor the change in designation, while others oppose the inclusion of private lands.
- **Ecosystem Condition and Biodiversity: vulnerability to natural disturbance mechanisms:** The Upper Bear Creek subwatersheds are in a very unstable condition due to overstocked vegetative conditions, which have severely lowered the ecosystem's resistance to natural disturbance mechanisms. The major disturbance mechanisms of concern for the area are: wildfire, insects and disease, human activities, and erosion/landshifts.
- **Forest management policy/fire control:** There is considerable controversy among local organizations about forest management policy, harvest, thinning to reduce fuel accumulation, and public access/use. Most of the upper Emigrant and Walker Creek subwatersheds are managed as Late-Successional Reserve, which affects numerous management decisions on both public and private land, and recreational use.

D.6. Key Findings for the East Cascade Subwatershed Unit.

The East Cascade Subwatersheds Unit consist of Gaerky, Butler, Myer, Jeffery, Kenutchen, and Payne subwatersheds. Key findings concerning the East Cascade Unit are:

- 1. Priority Watershed Restoration Needs:** The Technical Committee ranked the limiting factors and watershed restoration needs for the East Cascade subwatersheds, and identified stream flows, stream water temperature, and water quality as the highest priority for restoration in the East Cascade streams. This is primarily because the upper portions of the streams are ephemeral and lack riparian habitat, and the lower subwatersheds are affected by extensive agricultural and residential development. Some lower portions of the streams are used to transport irrigation water, and carry return flows, which affects stream water quality.

A second level of priority is riparian and aquatic habitat, and stream channel stability and sedimentation. Floodplain connectivity and fish barriers are lowest priority, primarily because of the critical importance of stream water flows and quality, and habitat quality.

- 2. Streambank Stability/Erosion, and Sediment:** There is considerable erosion and sediment transport from mineral soils in the uplands of the East Cascade subwatersheds. There is a moderate problem from livestock exposure in the uplands, and irrigation run-off in the lowlands. Streams exceed turbidity standards during high flow or storm events several times a year.
- 3. Riparian Habitat Quality:** Riparian habitat quality has been altered extensively by human land uses and agricultural development in the East Cascade subwatersheds. Restoring native riparian habitat would improve water quality, reduce erosion and sediment levels, and enhance the fisheries.
- 4. Water Quality:** Water quality monitoring in the East Cascade subwatersheds is not systematic, and potential problems remain with bacteria, phosphorous, sediment, turbidity, and algae. Ground-disturbing activities such as road building, logging, land clearing, agriculture, and unmanaged livestock grazing has contributed sediment to streams, and irrigation withdrawals also lower streamflows and contribute to increased stream temperatures.
- 5. Fishery Habitat:** Overall, the interrelated aquatic and riparian habitats in the East Cascade subwatershed are in marginal to poor condition and are below their potential for trout production. Much of the habitat lacks quality pools and large woody material necessary for maintenance of pools, cover, spawning material, and bank stability. There are very few deep pools (over 3 ft. depth) that can be used for resting and rearing and hiding cover is lacking. Bedrock areas are extensive, and fine gravel for spawning is limited to small deposits.

6. Key issues concerning the Eastern Cascade subwatersheds.

- There is considerable controversy over land use for residential and commercial development and protection of open space for flood control and surface drainage.

D.7. Key Findings for the Eastern Urban Interface Subwatersheds.

The Eastern Urban Interface Unit consists of the Larson and Lone Pine subwatersheds. Both subwatersheds have extensive residential and commercial development in the lower portions.

- 1. Priority Watershed Restoration Needs:** The Technical Committee ranked the limiting factors and watershed restoration needs for the Eastern Urban Interface subwatersheds, and identified the highest priority for restoration is stream water temperature, riparian habitat, and water flow/quality. A second level of priority is aquatic habitat, and stream channel stability and sedimentation. Floodplain connectivity and fish barriers are lowest priority, primarily because of the critical importance of the water flows and quality, and habitat quality.
- 2. Streambank Stability/Erosion, and Sediment:** There is erosion and sediment transport from mineral soils in the foothills, and from urban run-off in lower portions of the subwatersheds. Streams exceed turbidity standards during high flow or storm events, which may occur several times a year.
- 3. Riparian Habitat Quality:** Riparian habitat quality has been altered extensively by human land uses and agricultural development in the Eastern Urban Interface subwatersheds. Restoring native riparian habitat would improve water quality, reduce erosion and sediment levels, and enhance the fisheries.
- 4. Water Quality:** Water quality monitoring in the Eastern Urban Interface subwatersheds is not systematic, and potential problems remain with bacteria, phosphorous, sediment, turbidity, and algae. Ground-disturbing activities such as road building, subdivision development, land clearing, and agriculture have contributed sediment to streams.
- 5. Fishery Habitat:** Overall, aquatic and riparian habitats in the Eastern Urban Interface subwatersheds are in marginal to poor condition and are below their potential for fish production. Much of the habitat lacks adequate stream flows, water quality, quality pools, and large woody material necessary for maintenance of pools, cover, spawning material, and bank stability. There are few deep pools (over 3 ft.depth) and hiding cover that can be used for resting and rearing. Bedrock areas are extensive, and fine gravel for spawning is limited to small deposits.

6. Key issues concerning the Eastern Urban Interface subwatersheds.

- There is considerable controversy over land use for residential and commercial development and protection of open space for surface drainage and flood control.
- Medford is in the process of adopting Goal 5 compliance measures for wetlands, and have adopted an riparian ordinance for fish bearing streams, yet only minimal set-backs exist for other streams.

D.8. Key Findings for the Eastern Delta Subwatersheds.

The Eastern Delta Subwatershed Unit consists of the Upton and Whetstone subwatersheds. The area supports extensive agriculture and commercial development.

- 1. Priority Watershed Restoration Needs:** The Technical Committee ranked the limiting factors and watershed restoration needs for the Eastern Delta subwatersheds, and identified the highest priorities for restoration in the Eastern Delta subwatershed streams are riparian habitat, channel stability, and floodplain connectivity. A medium level of priority is aquatic habitat, water quality, and sedimentation. Stream flows, water temperature, and fish barriers are lowest priority.
- 2. Streambank Stability/Erosion, and Sediment:** There is erosion and sediment transport from urban run-off in lower portions of the subwatersheds. Streams exceed turbidity standards during high flow or storm events, which may occur several times a year.
- 3. Riparian Habitat Quality:** Riparian habitat quality has been altered extensively by land uses and agricultural development in the Eastern Delta subwatersheds. The Delta subwatersheds have high potential for restoring high quality wetlands. Restoring native riparian habitat would improve water quality, reduce erosion and sediment levels, and enhance the anadromous fisheries.
- 4. Water Quality:** Water quality monitoring in the Eastern Delta subwatersheds is not systematic, and there are potential problems with bacteria, phosphorous, sediment, turbidity, and algae. Ground-disturbing activities such as road building, commercial and subdivision development, land clearing, and agriculture have contributed sediment to streams.
- 5. Fishery Habitat:** Overall, the interrelated aquatic and riparian habitats in the Eastern Delta subwatersheds are in marginal to poor condition and are below their potential for anadromous fish production.
- 6. Key issues concerning the Eastern Delta subwatersheds.**
 - There is considerable controversy over land use for residential and commercial development and protection of open space for flood control and surface drainage.

- The cities of Central Point and unincorporated White City are likely to adopt Goal 5 compliance measures for a riparian ordinance. Riparian corridor widths are yet to be determined.

E. Priority Needs for Restoration in the Bear Creek Watershed.

Data on the hydrologic and riparian conditions, water quality, and fishery status were compiled for each subwatershed, and used by the Technical Team to formulate ratings of *Subwatershed Ecological Integrity, Aquatic Diversity, and Limiting Factors*. The descriptive information and evaluations were then integrated to *Prioritize Limiting Factors and Restoration Needs* for each subwatershed. The prioritized limiting factors and restoration needs will then used to formulate *Recommended Restoration Actions* for streams within the subwatersheds.

The “High-Medium-Low” ratings for each subwatershed can be converted to a numeric scale to portray and compare the relative prominence of each environmental element in the Bear Creek watershed (High=3; Medium=2; Low=1). Ratings were converted to the numeric value, summed by the environmental element column, then the mean average score computed for each element. The scores are reported in the “total” row, at the end of Table III.1 below.

Table III.1. Prioritization of Limiting Factors and Restoration Needs for Bear Creek and Tributaries.

| Stream | <i>Priority Limiting Factors and Restoration Needs</i> | | | | | | | | |
|-----------------|--|--------------------|---|---------------|------------------|-----------------|-------------------|-------------------------|--------------------|
| | Stream Flows | Stream temperature | (303d list) Water Quality-303d toxics, bacteria, nutrients, | Sedimentation | Riparian habitat | Aquatic habitat | Channel stability | Floodplain connectivity | In-stream barriers |
| Bear Creek | H | H | H | M | M | M | L | L | L |
| 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 |
| Coleman Creek | M | H | H | L | H | M | L | L | M |
| Anderson Creek | H | M | H | L | H | M | L | M | L |
| Wagner Creek | H | M | M | M | H | H | L | L | L |
| Ashland Creek | M | M | H | M | H | L | H | L | L |
| Neil Creek | H | H | M | M | H | L | L | M | L |
| Emigrant Creek | H | H | M | L | M | M | L | L | H |
| Walker Creek | M | H | M | L | H | M | L | H | L |
| Gaerky Creek | H | H | H | L | M | M | M | L | L |
| Butler Creek | H | H | H | L | M | M | L | L | M |
| Myer Creek | H | H | H | L | M | M | M | L | L |
| Jeffery Creek | H | H | H | M | M | M | L | L | L |
| Kenutchen Crk. | H | H | H | L | M | M | L | L | M |
| Payne Creek | H | H | H | M | M | M | L | L | L |
| Larson Creek | H | H | M | L | H | M | M | L | L |
| Lone Pine Creek | M | H | H | M | H | M | L | L | L |
| Upton Creek | L | L | H | M | H | M | M | H | L |
| Whetstone Crk. | L | L | H | M | H | M | M | H | L |
| Total Score | 2.62 | 2.66 | 2.62 | 1.43 | 2.285 | 1.95 | 1.33 | 1.28 | 1.47 |

E.1. Restoration Need for Environmental Elements.

Although Bear Creek watershed summary scores do not reflect the variability and diversity of separate streams within the watershed, they do reflect the general environmental conditions of the greater landscape.

For the entire Bear Creek watershed, stream water temperature, water quality, stream flows, and riparian habitat are the highest priority needs for restoration in the valley. These priority needs are shared by most subwatersheds, except for the Eastern Delta subwatershed which functions largely as a floodplain for the Rogue River.

The environmental elements of aquatic habitat quality, in-stream barriers, sedimentation, floodplain connectivity, and channel stability are a second level priority. These environmental elements are important to the integrity of the Bear Creek watershed, but their problems are superceded by the critical nature of Level 1 priorities to the anadromous fisheries.

F. Action Planing Process/ Future Steps.

1. Prepare an Action Plan. The Bear Creek Watershed Assessment is the first part of the Action Planning process, and is intended to provide the technical basis for identifying and ranking subwatershed restoration actions. The Action Planning process will follow the watershed assessment.

The Bear Creek Watershed Council is responsible for evaluating the Bear Creek Watershed Assessment and developing and implementing the Action Plan. The watershed restoration and protection ratings provide the basis for identifying and implementing watershed restoration actions for the near future. The action plan will evaluate the restoration needs, and develop an action plan for implementation and funding. The action plan will also address existing data needs, and design a monitoring plan for filling data gaps and assessing the effectiveness of projects completed in the watershed.

The Action Plan will:

1. Identify geographically how issues will be addressed within the watershed, including identification of reach enhancement areas and prioritization of actions.
2. Identify and prioritize restoration actions and protections that link to goals and objectives of the Council, and address data gaps and issues.
3. Identify community organizations and programs that will respond to actions identified.
4. Identify and implement continuing assessment and monitoring of environmental conditions in the Bear Creek watershed.
5. Solicit partners and cooperators in the watershed for project restoration activities.
6. Implement conservation activities in the watershed.

2. Monitoring. Current monitoring of environmental conditions should continue, and future monitoring needs should be initiated as soon as possible to fill data gaps.

3. Prepare Subwatershed Assessments for Remaining Areas. Subwatershed assessments have been prepared for the Jackson, Wagner, Ashland, Neil, and Emigrant subwatersheds. Assessments for the remaining subwatersheds in the Bear Creek watershed are needed.