Chapter 5

Interpretations and Trends

Middle Fork Willamette Downstream Tributaries Watershed

This chapter compares the current and reference conditions and explains the causes of the significant differences, similarities, or trends of the processes and functions.

This chapter compares the significant differences, similarities and trends of the ecosystem functions and processes. It also identifies the capability of the Watershed to achieve management objectives.

There are many processes affecting the MFWDT. Until now, the discussion has focused on the processes relating to the specific issues of the Watershed. These processes are complex and can not be artificially separated by specific issues. To provide the broadscale look at the MFWDT and its processes the discussion now focuses on the identified functions and processes.

Habitat Diversity

Habitat diversity in both forested and non-forested stands **has declined** with vegetation manipulation replacing fire as the dominant disturbance factor. Fires of varying intensities and diverse temporal and spatial extent resulted in a complex mosaic of forest composition and stand age structure. This complexity of forest composition and structure created a diversity of habitats for biological organisms. Fire-tolerant and disturbance-tolerant species were selected for.

The **patchy distribution** of clearcut harvest units provides a **highly fragmented** forest environment. A great number of young single-aged stands with reduced habitat complexity compose this fragmented environment. This increase in young stands results in a higher percentage of sites where early pioneer species may survive. **Species composition has shifted** from a diverse species mixture **towards favoring crop trees in managed stands.** During the past decade the emphasis has been on reforesting with a mixture of species.

Effects of the patchy seral stage distribution pattern are **increases in edge-related species** in the mature, old-growth habitats. The patchy distribution of harvest units, generally 40 acres or less, **disrupts the foraging home range** of wildlife species associated with any of the seral habitat stages.

Diversity has decreased in many managed plantations, due to past managed practices that favored crop trees, during precommercial thinning, and commercial thinning. Reduction in stand diversity **reduced wildlife and botanical species richness.**

Table 43 represents the change of the current seral stages from the reference timeframes.

Table 43: Changes in Seral Conditions

Seral Stage	Current Acres	1835 – 1855 Acres	1876 – 1915 Acres	1947 Acres
Stem Initiation	34,046	23,000	18,447	370
Stem Exclusion	14,708	1,000	19,550	11,568
Understory Reinitiation and Mature, Old-Growth	50,515	82,328	67,581	93,993

The **effect vegetation manipulation** has on species featured in Table C-3 of the ROD is **unknown**. The majority of these species are associated with either old-growth and/or riparian habitats. The **amounts of these habitats have decreased** in acreage and structural complexity with the greatest decrease over the past 30 years. With the current S&G's some wildlife and plant species are expected to be maintained in Matrix lands. Some other species are expected to be reduced in numbers in the Matrix but provided for in the LSR's.

Vegetation management directly effected one subpopulation of the Sensitive Thompson's mistmaiden in the Dinner Ridge area. This population is below a landing created for a unit in Orcal Timber Sale.

The **only known population of mountain lady's slipper in the MFWDT was eradicated** when a clearcut removed the overstory and associated mycorrhizal fungus composition of the site. This made it impossible for the species to survive (see files on Salix Timber Sale, 1980).

Prescribed fire might work well in stimulating the uncommon fire-dependent species, woodland milkvetch and branching montia, populations. These species were discovered respectively in the Warner Creek and Shady Beach fire areas that burned in the fall. It is **unknown whether spring fires will stimulate these species to germinate** or whether an early spring burn will affect growth and reproduction of other species. **Continued fire suppression results in conversion of species** to plants less resistant to fire.

Fire suppression benefits some TE&S species and does not benefit others. Fire suppression does not benefit peregrine falcons, due to the **gradual loss of open forest habitats and meadows** that provide a diversity of prey species.

Fire suppression benefits spotted owls. Gradual increase in LWM and understory of natural stands promote the prey habitat and characteristics of spotted owl habitat. Conversely, fire suppression gradually increases the fire

hazard in the LSR. There is an **upward trend for the remaining spotted owl habitat in the LSR**, as the increase in large woody material enhances prey habitat, and younger habitats are permitted to grow toward suitable foraging habitat. There is also an **increase in fire hazard** in owl habitat of the LSR 0222 and the smaller 100-acre LSRS within the matrix that could negatively affect the owls.

Increase in LWM is a benefit for forest amphibians, such as the red-legged frog. LWM is used as cover from predators and provides moist refugia during dry summer months. Possibly a **slight upward trend for red-legged frog** populations **in the LSR**, as fire suppression increases large woody material. There may be a **slight downward trend in Matrix** with programmed harvest.

Elk **herds have increased substantially from the reference conditions**. The increase is from the institution of regulated hunting and the management of their habitats. The **current management objectives for elk emphasis areas will be difficult to meet for the High and possibly the Moderate emphasis areas while still meeting objectives for multiple species and site productivity**. Reasons for this difficulty are: the tradition of using KV funds that are tied to a specific timber sale area that's only a small part of a larger elk emphasis area; infrequent timber sale entries; de-emphasis on broadcast burning, seeding non-native forage species; and potential conflicts in meeting road density objectives.

During the next 10 years there will be a **decrease in Habitat Effectiveness Index (HEI) for forage** in the MFWDT. This results from increased acreage of **lower forage quality**, on assumption that less broadcast fuel burning, seeding of non-natives and fertilization might occur.

During the next 10 years there will be a **downward trend in the geometric mean** of the four habitat effectiveness indexes for the Dry Pine High Elk Emphasis Area. This is due **mainly to increasing acreage of hiding cover in relation to optimum thermal cover** and to **reduced forage quality**.

During the next 10 years there will be a **downward trend in the geometric mean** of the four habitat effectiveness indexes for the Coffeepot Head Moderate Elk Emphasis Area due mainly to **reduced forage quality**.

During the next 10 years there will be a **downward trend in forage acreage and size and spacing** index for Gray, Larison, Coal Head, and Packard emphasis areas, due to the designation of the LSR.

Forest habitats will have gradual shifts. Fire exclusion has permitted the **gradual reduction in open forest habitats**. There will be a **continued loss of large acreage blocks of similar aged forest habitats** as a result of future

harvest in the Matrix. With the projected program of timber harvest, there will be a **loss in acreage of mature and old-growth ponderosa pine/Douglas-fir** habitats.

A **reduction in abundance and structure** of the hardwood components in mid-seral mixed hardwood-conifer forest habitats, namely managed plantations, is due to past emphasis on treatments favoring "crop tree" production.

Timber harvest, fire suppression, and grazing have affected special habitats. Timber harvest has indirectly affected these habitats by roads cutting across wet areas, meadows and ridgelines. Grazing has affected all of the meadows along the Calapooya Mountains as well as the Moon Lake, Joe's Prairie, and Warner Mountain area. Some natural meadows have become fully forested. There will be a **continued loss in dry, non-forested habitats** with conifer encroachment resulting from **fire suppression**.

There will be an **increase in high intensity fire hazard** of remaining mature, old growth forest habitats, with the increasing levels of ground and ladder fuels.

LSR 0222 will show **decreased fragmentation** during the next three decades as the early seral habitats grow into pole-size and small timber habitats. There will be an **increase** toward **large acreage blocks** of **late seral forest habitats**. There will also be an **increase in fire hazard**, due to fire suppression and accumulation of fuels in natural stands.

A **reduction in early and mid-seral forest structure**, due to past emphasis on density stocking and even spacing of crop trees.

Habitat Connectivity

Connectivity was wide spread in the reference condition. Currently, **Hills Creek Lake and the large private holding in the Packard Creek area are major obstacles** to connectivity. The Lake impedes the river corridor. Hills Creek Lake and the private lands holding impede east-west landscape connectivity. The drainages impacted are Packard Creek and Larison Creek on the west and Hills Creek, Modoc Creek, Bull Creek, and Willow-Coffeepot Creek on the east.

Past harvest units **highly fragment** the **remaining connectivity**. There is a **state of slow recovery** to the extent provided by the Forest Plan.

At the Watershed level, **riparian connectivity will slowly improve** with growth of regenerated harvest units.

Matrix inter-riparian ridgeline connections between adjoining drainages will **continue a downward trend** until older managed stands can contribute to connectivity.

Matrix upslope terrestrial connectivity will continue downward with programmed harvest. Reliance will be on existing non-harvested, forested habitats, such as the Green Tree Retention clumps, forested lands unsuited for timber management, and the 100-acre LSRS.

LSR inter-riparian connections across ridges **will have an upward trend** with ingrowth of regenerating harvest units.

LSR upslope terrestrial connectivity will have a **slow upward trend** with growth of regenerating harvested units.

Upslope terrestrial and ridgeline terrestrial connectivity between LSR 0222 and LSR 0221 **will decrease in the Matrix** for connections between riparian areas. This will occur for the next several decades until older managed stands contribute towards connectivity. **Riparian area** connectivity between the two LSR's will **slowly increase.**

Interior Habitat

Timber harvest and associated road building over the past 30 years left a **highly fragmented** Watershed. Large unfragmented blocks, similar to historical stands in character, survive in the Late Successional Reserve. The center of the MFWDT is **highly fragmented, especially east of the MFW River.** Fragmentation is an issue because of the "edge effect". This means the microclimate is different on the edge of a stand than the interior. (Research suggests it takes 500 feet to reach interior conditions.)

Species needing interior forested habitat include the old-growth associated C-3 species in the ROD. We **know certain C-3 species need closed canopies and can not survive in young stands.**

Riparian areas in forested habitats were harvested from the 1950's to the 1980's. **Some rare plants** like the giant chain fern **could have been affected** by this practice. **Some riparian-dependent C-3 species**, especially the moss and liverworts associated with maple, **probably experienced decreases** in population size.

Dispersed timber harvest units **substantially reduced** the **acreage of interior mature, old-growth habitat** from reference conditions. Increased edge effects lower the true acres of remaining interior habitat blocks.

For the next five to six decades, until managed stands in the LSR mature, there will be a continuing **loss of interior mature and old growth forest habitats in Matrix lands.**

Ecological Site Productivity

Most of the **current managed units** have **reduced ecological site productivity** as a result of past removal of LWM and snags. Ecological site productivity **is functional in natural stands surrounding the older managed units** and is distributed across the landscape.

Riparian habitats harvested between the early 1970's and the late 1980's are **assumed to be deficit in LWM and snags**, rendering those areas unsuitable for species such as the red-backed vole and northern flying squirrels.

There will be a **slight increase in ecological site productivity in the LSR**, as the older harvested units mature and are influenced by the surrounding mature forest.

Probable static trend in Matrix lands. Continued harvest will be offset with the S&G for LWM and Wildlife and Green Tree Retention.

Riparian Habitat

Past harvest activity within the current riparian buffer allocations for class I through IV streams indicate the MFWDT has **47% of the total riparian area less than 55 years of age.** This is **especially significant when harvest occurred on both sides of the stream.** Areas with both sides of the stream harvested can be assumed to have **no LWM in the creek or available** from the terrestrial riparian area for future LWM recruitment. Streams flowing through private land can be expected to have little or no LWM in or available to the stream. Streams with extensive harvest within the riparian area include Packard, Stony, Snow, Big Willow, Buck, Coffeepot, Windfall, Bohemia, Spring Butte, Indian, Coal and Estep Creeks.

There will be **slow recovery over the next 55 to 200 years** as young stands reach a size to provide stream channel complexity and relative stability. **Thinning** within these managed stands **would accelerate the growth** of remaining individual trees. Strategic **placement of LWM in the stream** and floodplain would improve short term aquatic habitat and complexity, and stream and floodplain function.

Past harvest activity within the current riparian buffer allocations for class I through III streams indicate the MFWDT has **29% of the stream length less than 35 years of age**. This does not include small face streams along the MFW River and Hills Creek Lake. These young stands **will continue to steadily recover**.

Vegetation Manipulation Potential

In Matrix lands, the desired future condition is to increase diversity and ecological function while providing quality timber and other commodity production. On allocations that provide for timber production and associated riparian lands the following table shows the stand ages. These acres were developed from a GIS "What's Available" extraction. The process starts with the total matrix acres and eliminates the buffered acres for special habitats, lakes, roads, the LSRS's, the no harvest land allocations, and unsuited soils. This provides an estimate of acres available for harvest in Matrix lands.

Table 44: Potential Acres Available in Matrix

Matrix	0--5 years	6-15 years	16-25 years	26-50 years	51-80 years	81-200 years	200+ Years	Total Acres
Non-Riparian Acres	2,735	4,519	3,204	5,549	2,720	1,211	12,578	32,516
Riparian Acres*	452	1,092	918	1,327	427	104	766	5,086

*Vegetation manipulation activities are for the sole purpose of benefiting riparian resources.

13,789 acres in the 81-200+ acres may be reduced 2000 acres by further identification of special habitats and their associated buffers. They may be further reduced by 532 acres from Slinky, Stonepot, Boulderdash and Weeping Timber Sales and the 15% green tree retention. This **leaves 9569 acres for PSQ** on matrix lands. The PSQ acres are primarily in Subwatersheds 21-2 and 21-3 (Appendix H, Vegetation Documents).

Table 45: Non-riparian matrix acres:

Subwatershed	Acres of 80+ years
21-4	769
21-3	8,506
21-2	4,126
21-1	388

In the LSR and LSRS, the desired future condition is the development and protection of late-successional and old-growth characteristics. Development of these characteristics should focus on stands under 80 years of age. Treatments should be assessed for any stands that are prone to insect, wind, or fire disturbances to prevent large scale disturbances.

The desired future condition of the Riparian Reserves is to sustain a physically complex and stable riparian and wetland vegetation along with restoring large conifers and providing connectivity.

Individual Subwatershed acres are in Appendix H. The summary below shows acreage where potential vegetation manipulation projects for habitat improvement can be done and commodity removal may be a result of the treatment.

Table 46: LSR Acres

LSR	0-5 Years	6-15 Years	16-25 Years	26-50 Years	51-80 Years
Non-Riparian Acres	1,090	2,635	1,619	2,354	536
Riparian Acres	175	631	509	555	49
Total	1,265	3,266	2,218	2,909	585

Over 24% of the LSR for the scenic allocations and previously general forest allocations are under 80 years of age. **About 4531 acres** are in age class 0 - 15 years and **may be suitable for release and precommerical thinning**. A portion of these may have already been treated. **About 5622 acres** are in the age class 16-80 and **may be suitable for post and pole or commercial thinning**. Some small acreage in special habitats may have vegetation treatment opportunities. See Appendix H for LSR Current conditions by Subwatershed.

Fire Pattern, Behavior and Intensity

Fire suppression activities remain the same. There will be **less fuel management treatments** of harvested stands because of reduced programmed harvest.

Increased fuel accumulation will increase the likelihood of extreme fires. Carefully **controlled prescribed fires may** be an effective way to **reduce fuels** in harvest units and natural stands **and to perpetuate desired plant communities** in the area. Compared to wildfires, prescribed burns are

generally much smaller and less intense. This reduces the impacts on other resources.

Wildlife and Plant Habitat Quality

Roads have a great effect on plant populations along the Calapooya Mountains. Road 5850 runs through a series of meadows (Holland, Johnson, Gertrude Lake, Bristow, Bradley and Loletta Lake basins) as well as rocky ridgetops. At the eastern edge of the MFWDT, the meadows around Groundhog and Little Groundhog Mountains and Joe's Prairie have also been dissected and had drainage patterns disrupted. **Roads are also vectors along which noxious weeds travel.**

Road fills are normally drier and promote dry-site plant species. Often, these alterations in soil and moisture regime **promote off-site species to invade** into the habitats.

Under current standards and guides, **new road construction would not affect** additional special habitat, unless an assessment determined that any specific special habitat was insignificant for maintaining biodiversity.

Fire Suppression Response Time

The **present transportation system provides good access.** An ATM process needs to consider administrative access for fire suppression response time and safety.

Wildlife and Botanical Disturbance

Four elk emphasis areas are **above the maximum open road density**. About 71 miles of open roads within these four areas need closed to achieve the elk emphasis Habitat Effectiveness objectives. Additionally, **several** of the other Moderate Elk Emphasis Areas, with **High Elk Use Areas, need roads closed** to meet the verbal agreement with ODFW.

Open roads have a **negative effect on habitat quality** for big game. The effects are increased human access, both in numbers and frequency: and the resulting consequences of disturbance and hunting of elk and deer. The disturbance result relates to energy expenditures. Increased disturbances also affect calving sites for elk. Direct effects to survival of elk calves are very low.

The **elk population has grown substantially over the past decades despite the coinciding increase in road mileage.** During the mid-1980's, ODFW studied elk's reproductive success. The study included Rigdon Ranger District. Results showed **reproductive success of the elk was within**

normal range at about 72%. Currently, the **rate of population growth has slowed and appears to have flattened.**

The Larison Moderate Emphasis Area is almost completely within the LSR and private land. Coal Head Moderate Emphasis Area falls completely in the LSR. The **opportunity to meet the road density and/or forage objectives is limited**.

One road within the vicinity of a bald eagle nest area **has disturbance potential** during nesting season.

The **effects to other wildlife species should remain static** with a static trend in new road mileage.

One population of the Sensitive plant, Thompson's mistmaiden, is below Road 2106445. The road was constructed at the top of a special habitat. The area **seems to have maintained its hydrological integrity** since the plant was located after construction. We should monitor these populations. One other rare plant that has **probably been affected by roads and/or quarries** is spring phacelia. Further road-building or quarry activity needs to take these species into account.

Forest Use

Reductions in the ability to maintain the current road system will require a plan to redirect or consolidate maintenance efforts. Plans to develop an Access and Travel Management Plan may resolve the dilemma of road mileage exceeding the ability of road maintenance funds to maintain.

Non-Native Species Composition

The **increase in** noxious weeds **is directly attributable to increased management and use** of the national forest. Timber management, from clearcuts to landings to the roads that allow the truck haulers' access, facilitates both the growth and movement of these species. **Approximately 30% of the Watershed is infested**, not counting the roadside populations. These species will eventually be outcompeted by the shading of young trees. Until the trees overtop the weeds, they will be making and distributing seed via the wind, birds, deer and elk.

Past grazing by livestock has **decreased the native vegetation** to the point that **non-native species have been able to outcompete** a number of the native species. This problem is especially evident in the Little Groundhog Mountain area and Bristow Prairie.

Introduced species, Scotch broom, tansy, St. Johnswort, Canada and bull thistle, **are now** established members of our flora. These species are particularly prevalent on the meadows that were heavily grazed and commonly seeded with "good forage," probably non-native species. The native grasses here are bunchgrasses that leave the ground in between them somewhat open and easily colonized by weeds. This **can be detrimental to biodiversity and decrease natural forage** for deer and elk.

New invaders **continue to enter the forest**, by seeds caught on the undersides of vehicles, in lawn clippings dumped near the reservoir, in horse droppings along trails. Continue prevention efforts through public education, eradication of the new invaders, where possible, and continuation of biological control releases on established infestations.

Bullfrogs and barred owls are the main non-native wildlife species of concern. The **expansion in range of both has negative effects to native species.** Bullfrogs prey on native turtles and amphibians' populations. Barred owls displace and interbreed with spotted owls. There is **an increase of these non-native populations** as they continue to expand farther into the Watershed. This results in a decrease in native species.

With programmed timber harvest in the Matrix, the **barred owl will likely become the dominate Strix species**. The barred owl will continue expansion in the LSR until the recent harvested units grow out of early seral habitat. The populations should then level off and begin to decline in the LSR.

Riparian Habitat Quality

Using stream Classes I, II, and III intersections with existing roads, there is a **loss of 806 acres (4%) of riparian reserves** in the MFWDT. **Impacts initially appear minor** to overall riparian habitat quality. Riparian reserve acres for Class IV stream were not assessed. Usefulness of this information is as a component for assessing overall conditions of riparian reserves.

There **will be an increase** in acres of riparian reserves **impacted** by roads **if** analysis **includes** the road intersection with **Class IV** stream riparian reserves. There will be a **slight decrease in riparian reserves acres** due to new road construction as we continue harvest **in the Matrix**.

Riparian Habitat Quality And Migration

This process illustrates the **change from a stream system to a lake**. This change **is permanent until removal of Hills Creek Dam**. The results have been a **change in migration patterns for most terrestrial wildlife, especially riparian associated species, and a total blockage for most**

riparian species, Spring chinook and Bull trout. In addition to the blockage of migration, Bull trout were eradicated from the system prior to lake filling. Whether there is a **viable population of Bull trout is unknown**. Continued monitoring efforts are underway by the Forest Service and OFDW to locate the remaining population.

Riparian Structure

Fuel loadings within riparian reserves **are increasing**. This **increases the risk of stand replacement fires**. High intensity stand replacement fires in riparian zones may jeopardize some of the resource values of riparian zones.

As the risk of stand replacement fire increases, the risk of **significant impacts to** water quality and quantity **increases**. High intensity fire in the riparian zone and adjacent slopes would tend to increase peak flows. Surface erosion would increase due to soil exposure. Erosion of the stream channel and banks would likely increase without the resistance normally provided by vegetation.

Although wildfires and hot slash fires can affect stream conditions, **research indicates** that **prescribed burning**, judiciously applied with awareness of potential impacts, **can be used without significant changes in water quality or quality** (Beschta, 1990).

Landslides

The MFWDT has a **240% increase above natural conditions in harvest related debris slide occurrence**. These landslides have occurred on steep ground with shallow, rocky soil, generally soon after clearcut harvesting. Including Private land, approximately 11,720 acres of the MFWDT has been clearcut in the past 15 years in this geomorphic setting. Roughly half of that was harvested within the past 10 years. This indicates a **strong likelihood that harvest related slope failures will continue at some level above natural background** until root strength and canopy intercept of precipitation is reestablished.

The **frequency of harvest related debris slides are expected to approach natural conditions** with the retention of more trees per acre. This assumes that the effects of increased groundwater levels and loss of root strength are incorporated into the analysis and prescription. This also applies to harvest activities on or upslope of clayey soils which have a tendency toward deep seated slope failure.

Sidecast road construction techniques on steep ground with shallow, rocky soil have resulted in **a 350% increase in debris slides** above natural conditions. The majority of road related debris slides occurred in the Little Pine

West Subwatershed and affected Windfall, Bohemia and Gold Creeks the most frequently with 5 or more occurrences each since 1959. The next most impacted stream is Coal Creek with 3 occurrences during the same period.

The frequency of occurrence appears to be declining. However, numerous locations on the road system in steep ground are showing signs of outside edge cracking, presumably associated with the decomposition of organic material in the sidecast fills. The emphasis of maintenance activities in these areas has been to control road surface runoff. This is accomplished by insloping and frequent cleaning of the ditches. The **frequency and distribution of slope movement** in clayey soil **have mimicked the construction history** (roads and spurs). Slope failure tends to occur relatively soon after construction. Many of the older cut and fill failures have been stabilized with surface and subsurface drainage modification, buttresses, and biotechnical techniques. Some have been of a scale too large to deal with effectively (Tufti Mountain and Powder Creek).

There is relatively recent road construction in clayey soils in the Shady Beach Fire and Packard Creek areas. **Expectation is these areas have the greatest likelihood of future slope movement**. Although the failure mechanism is less dramatic than a debris torrent, slope failure in this geomorphic setting generates persistent fine-grained sediment.

In recent years, the declining maintenance budget has lead to a decision to perform minimum levels of maintenance. This kept the majority of the road system open. This approach leads to a **general degrading of the road system, especially of the maintenance level two roads**. Many of these roads are brushing in or showing signs of neglect or increased risk of failure due to lack of proper maintenance. **Declining maintenance funds** as a result of declining timber sale collections and appropriated money is expected to **result in less frequent maintenance and an increase in road related landslides.**

42% of Rigdon Ranger District's 1200 miles of road are within the MFWDT. Using an average road maintenance cost of $660 per mile and the expected funding level, 314 miles of road per year could be maintained at their current maintenance level on Rigdon. That is approximately 25% of Rigdon's road system.

Hydrologic Recovery

The cumulative harvested acreage of the last 35 years created a landscape with a larger percentage of land occupied by young stands than within the mid 1800's through the mid 1900's. **Currently 37% of the MFWDT is vegetated by stands less than 35 years of age. Historically 1 to 21%** of this area was in a hydrologically unrecovered state. A large portion of the forested area is young and contributing more water to the stream system and groundwater. This is

riparian species, Spring chinook and Bull trout. In addition to the blockage of migration, Bull trout were eradicated from the system prior to lake filling. Whether there is a **viable population of Bull trout is unknown.** Continued monitoring efforts are underway by the Forest Service and OFDW to locate the remaining population.

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Sidecast road construction techniques on steep ground with shallow, rocky soil have resulted in **a 350% increase in debris slides** above natural conditions. The majority of road related debris slides occurred in the Little Pine

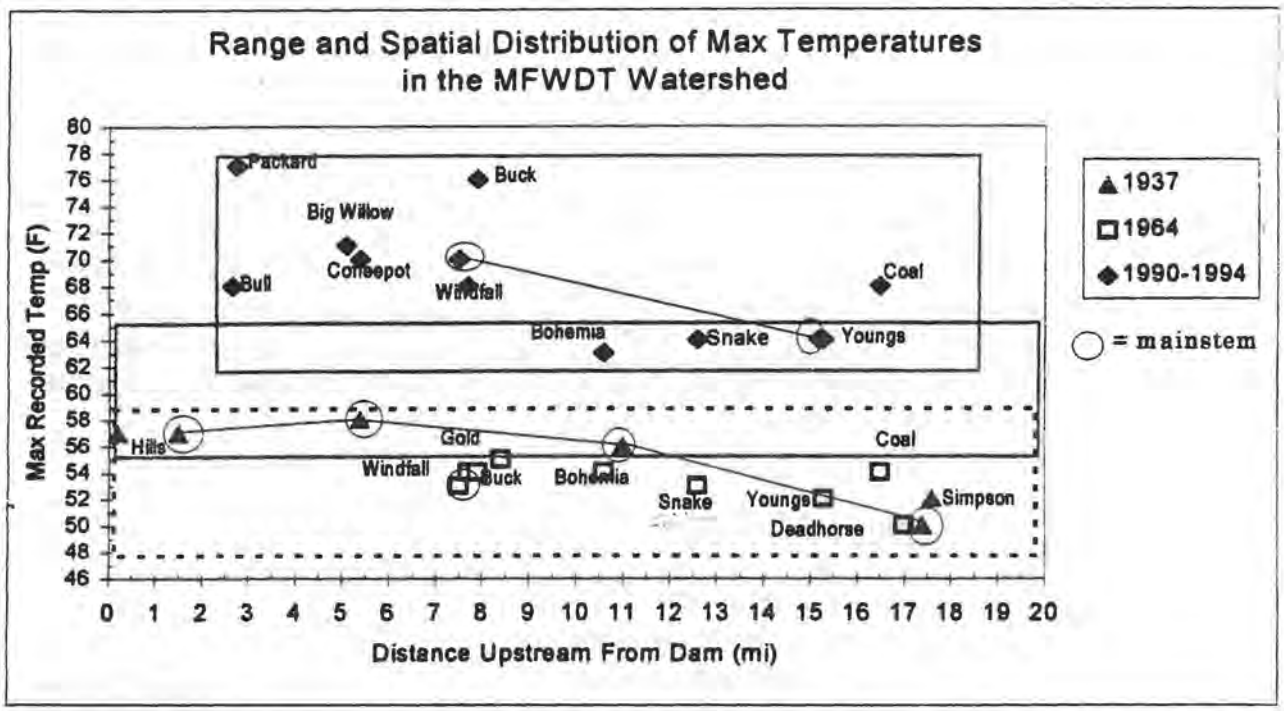
important because the **majority of the Watershed has a high runoff rate** producing flashy stream responses to storm events. These high flow events expend a great deal of energy moving through the system, eroding channel banks and beds, and redepositing materials downstream. The repercussion of this activity intensifies where prior harvest activity has removed the rooting strength that formerly held the floodplain and channel morphology together.

Hydrologic recovery is expected to improve over the next several decades as the young stands within the riparian buffers and LSR continue to grow. Periodic harvest of the private lands is expected. We expect that riparian buffers will be left along the streams with the current Oregon State Forest Practices Act regulations. Currently, these **private land riparian areas have a deficit of timber greater than 10 to 20 years old**, and **have little to no LWM** present in the streams.

Wood Recruitment And Shading

Figure 40 was constructed from limited available data from three decades to portray the range of variability in temperature conditions of the MFWDT watershed. The dashed box on the graph outlines the range of the earlier values. These data points **are almost certainly below the true maximum** due to several factors (Appendix G). The range should be adjusted upward, perhaps by approximately six degrees as shown by the center box outlined in gray. This would put the upper boundary of the range at 64 degrees that is generally consistent with the temperature tolerance of salmonids.

Figure 40: Range and Spatial Distribution of Maximum Temperatures



With these considerations in mind, rough comparisons can be made. The upper end of the range from earlier decades slightly overlaps the lower end of the range in the 1990's. This suggests the **center of the range has shifted upward significantly.** The range of recorded temperatures is 14 degrees in the contemporary decade and 8 degrees in the earlier decades that suggests the **amount of variability has increased**. In terms of the spatial distribution of maximum temperatures, there is a **slight general pattern of decreasing temperatures in the upstream direction** in earlier decades for both the mainstem and tributaries. In the 1990's, the pattern is present for the mainstem but is scrambled for many tributaries.

Buck Creek shows the **single most extreme change in maximum recorded temperature**, an increase of 22 degrees. Stream temperatures are thought to reach a theoretical upper limit near the maximum average air temperature for a given region and elevation (DEQ,1994). In the Western Cascades, maximum average air temperatures at 2000 feet (the elevation at the mouth of Buck Creek) were found to be around 74 degrees. The high value recorded in 1992 may be near the theoretical maximum at this location. In contrast, in 1937 the stream temperature in Buck Creek was 54 degrees when the air temperature was 70 degrees. This suggests there has been **a substantial decline in the moderating influence of the riparian zone on the thermal regime of Buck Creek.**

Figures 41 and 42 present a view of the range of temperatures required during different life history stages for Spring Chinook salmon and Bull Trout. The graphs also show a plot of daily minimum and maximum temperature recorded in 1973-1974 at the Sand Prairie gauging station. These years are the most recent two years without a temperature data gap. A review of Figure 26 in the Current Conditions Chapter shows these to be relatively though not uncommonly warm years. Life stage indicators were redrawn from originals created by Dave Buckanan (DEQ,1994).

Figure 41 Annual Temperature Regime of MFW at Sand Prairie with Temperature Requirements of Spring Chinook Life Stages

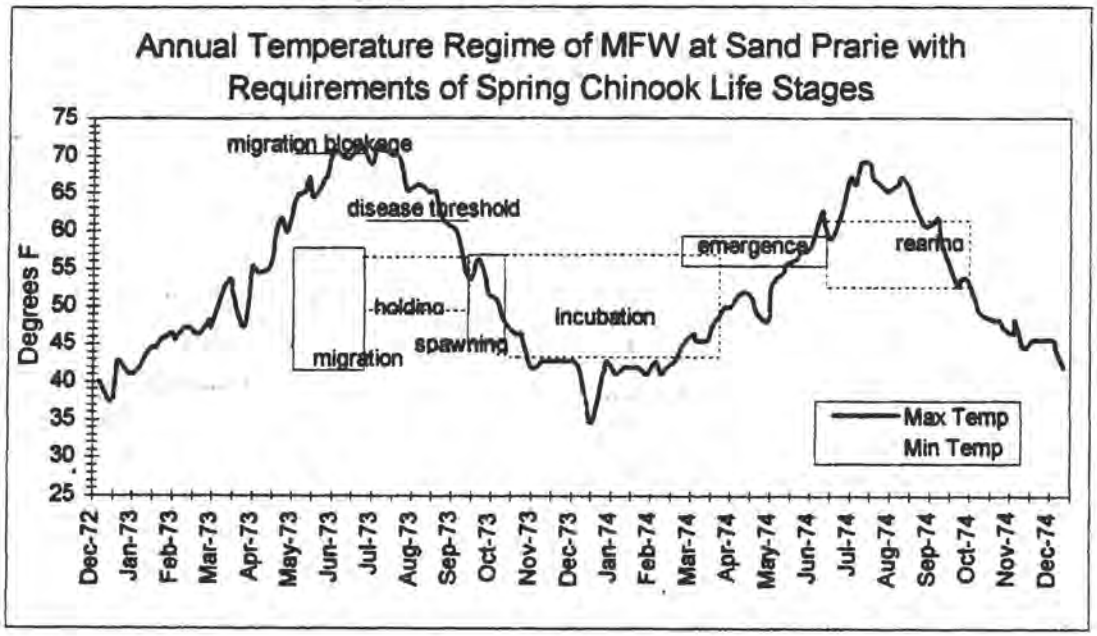
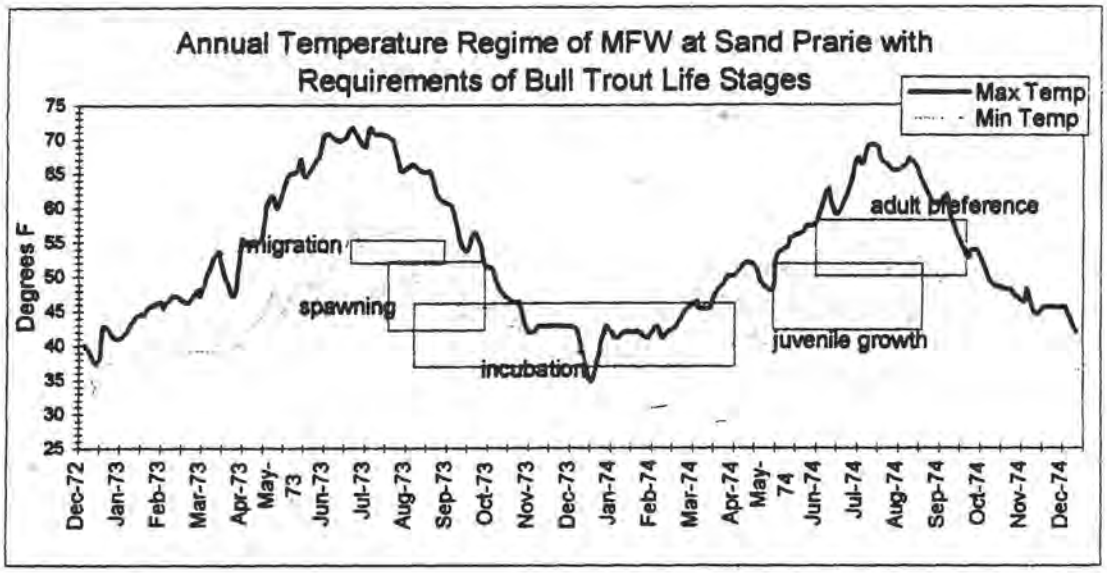


Figure 42 Annual Temperature Regime of MFW at Sand Prairie with Requirements of Bull Trout Life Stages



Minimum and maximum temperatures fall well outside the suitable range for at least one life stage of each species. Concepts of natural selection imply that the range of environmental conditions will not frequently be far outside the range of suitable conditions for naturally adapted species. The range of biologically suitable conditions for these species is a conservative approximation of the natural range of variability in environmental factors. This biological evidence of intolerable conditions for several life stages of two historically present species supports the claim that the **temperature regime in this part of the MFW is outside the previous range of natural variability.**

There is enough evidence of **widespread occurrence of abnormally high summer** stream temperatures to warrant investigation and corrective action. High priority stream for monitoring and restoration are Snake, Young, Coal and the MFW River. This is based on current stream temperatures, historic Spring Chinook use and terrestrial connectivity. Vegetation manipulation is a likely causal factor, but available data is inadequate to determine the magnitude of its direct impact and interaction with other factors

Habitat Complexity

The MFW River morphology and vegetation is **dominated foremost by the natural variation in streamflow. Harvest of riparian vegetation** and **removal of LWM** from the channel and floodplain is the **second factor**. The **third factor** is the **increase in the percent** of **hydrologically unrecovered** forested land within the Watershed.

In 1945 a significant flood event occurred that cleaned out LWM and vegetation. It **simplified the stream pattern** to a single and double threaded channel as seen in the 1946 photos. In 1964, an even larger flood event occurred. Piles of LWM were either removed or burned in subsequent years.

Air photos from 1985 and 1994 show that in some sections a more complex braided channel network is being developed. This development is in response to the influx and retention to smaller substrate sizes related to the occurrence of smaller magnitude flows, roading and harvest of riparian forest. In addition, the **dominant substrate currently is cobble sized alluvial deposits** (Unthank et al.,1992). This **compares to the large rubble** reported in the 1938 U.S. Fisheries Bureau Survey. Floodplain and channel bars continue to revegetate.

The management direction of **no more riparian harvest for timber production will aid in stabilizing the channel banks and floodplains**. This will reduce the amount of sediment transported to the MFW River. LWM recruitment from the riparian will take time to recover naturally. Decreased harvest activity in the upland terrestrial and a slight decrease in the timing of peak flow will help reduce channel erosion. Natural flood events of large magnitude may happen at any time and further rearrange the channel and floodplain. This makes it **important to maintain the structural integrity of the channel and flooplain**.

The comparison of the reference conditions to existing conditions show that **vegetation manipulation impacted channel processes. Riparian harvest has reduced** the amount of streamside vegetation available for **future wood recruitment** into the stream and for **stream shading**. Stream cleanout associated with timber harvest reduced the amount of large wood left in the stream for habitat complexity. **Harvest related debris slides** have **introduced sediment and distributed wood unevenly** throughout most streams. The documentation of monitoring of rehabilitation of these processes by riparian or upland planting and or fertilization has been lacking.

Streams in the MFWDT have been impacted by vegetation manipulation, fire, floods, stream cleanout, and landslides and their associated sediment. These processes all work independently and cumulatively to change channel habitats. Vegetation manipulation also reduced the amount of large seral stage vegetation located along the stream channel. That reduced wood recruitment into the stream. Historical fires influenced the seral stage along the riparian and upslope habitats. Loss of riparian vegetation and increased stream bedload from timber harvest and associated road building resulted in channel widening and canopy opening in several drainages. A summary of channel sensitivity to these processes by channel type is in Table 46. The trend of each channel type will depend on the rate of change in each process.

Table 46: Expected Channel Response to Process

Channel type	Valley Type	Riparian Vegetation	Landslides	Peak flow	LWM
A	8	Low Not essential for stability and energy dissipation of overbank flows and debris torrents	Low Sediment temporarily stored, then transported downstream. Little or no change in channel morphology expected	Low Little or no change in channel morphology expected. Simple expansion of flow, rather than physical channel adjustment	Low Not primary roughness element
B	3 6 10	Moderate Contributes to stream-bank stability and/or energy dissipation of overbank flows and debris torrents	Moderate A minor adjustment in channel width, depth of scour, median bed particle size, bar development and/or pool volume expected. A very large, persistent increase required to trigger significant changes in channel morphology.	Low Little or no change in channel morphology expected. Simple expansion of flow, rather than physical channel adjustment	Moderate Contribute to pool formation, sediment trapping, formation of steps and gravel cleansing, other roughness elements, such as boulders are also available.
C	1	High Critical in providing root strength for streambank stability energy dissipation during overbank flood flows, and/or reductions of energy and travel distance of debris torrents.	High Significant increases in channel width, depth of scour and/or bar development expected. Bed material size and pool volume would be reduced. Channel aggradation and conversion from pool-riffle to plane-bed or even braided channel type could occur.	High Significant increase in bedload transport, depth of scour and/or bank erosion expected. Coarsening of streambed and channel widening or incision, depending on channel confinement and base-level control.	High Critical for forming pools, trapping sediment, creating scour that cleanses gravel and/or dissipating stream energy via steps and deflection

Channel Type

- A Generally steep, high gradient stream
- B Moderate entrenchment and gradient gradient
- C Low gradient alluvial channel

Valley Segment Type

1 - Lower alluvial valley
3 - Steeply incised valley/moderate channel
6 - Moderate-slope bound valley
8 - Valley wall/headwall tributary
10- Alluviated mountain valley

Table 47 summarizes the dominant processes effecting channel conditions that vary slightly across the Watershed. Subwatersheds with similar dominant processes are presented together. An **indicator of channel complexity is the change in the amount of LWM by channel type**. Other parameters, such as the stream width to depth ratio or substrate type and size could also be used. A correlation between process and pools per mile was not evident at this level of analysis with the data available. Generally, the **amount of LWM decreased with increases in the number of processes** occurring in the MFWDT. An exception is in Subwatershed 21-2 East where debris slash remained in the stream after harvest.

Table 47: Dominant Processes Effecting Channel Condition

Sub-watershed	Dominant Process	Channel Type	LWM/ Mile Reference	LWM/ Mile Current	Forest Plan	PAC Fish >24" x 50"
21-4	Riparian Harvest Fire	A	ND	49	NA	80
		B	196	50-64	105	80
21-3 21-2 West	Riparian Harvest Landslides	A	66	16	NA	80
		B	ND	28-38	105	80
		C	ND	12	105	80
21-2 East 21-1	Riparian Harvest Fire Landslides	A	41-46	12-162*	NA	80
		B	ND	18-136	105	80
		C	ND	8-16	105	80

ND -- No Data

*As the stream passes through clearcuts, the abundance of slash overlaying the stream increases dramatically. Fish were not seen in these areas although there was an abundance of frogs.

Surface Runoff And Routing

The **extensive road network** effectively **doubles the drainage density throughout the MFWDT (**Table 34**).** This decreases time it takes for precipitation and snow melt events to reach the stream channel. The **effect** on the channel **is an increased erosive activity, deposition, and widening of the channel**. This impact to the stream channel and floodplain is exacerbated where past harvest activities have removed the structural integrity provided by large trees and LWM in the riparian area.

The **trend of obliterating some roads** will alleviate some of the disrupted flow patterns on a site by site basis. There may **only be a slight improvement** because of the number of the roads left open for administrative and recreational access.

Culvert Carrying Capacity

Only 8% of the culverts within the MFWDT installed in Class 1 through 4 stream channels have been analyzed for flow capacity relative to a 100-year flood event. Preliminary results show that **approximately 40% represent a strong likelihood of water overtopping the fill**. This value is consistent with results from culvert analyses outside the Watershed on Oakridge and Rigdon Districts. The risks associated with overtopping these culverts, as well as those upslope, have not been fully analyzed. This analysis, combined with the value of the downstream aquatic habitat and the need for fish passage, is essential in developing a prioritization strategy for retrofitting or replacement of culverts.

Species Distribution and Migration Corridor

Roughly 1/3 of the culverts analyzed were on Road 21 that parallels the Middle Fork Willamette River. This road encourages recreation and commercial travel as well as being the main arterial for accessing the Middle Fork basin. These culverts affect movement of fish into and out of the main stem.

One-hundred percentage of the velocities modeled in the inventoried culverts **block anadromous and resident fish migration**. In many cases, vertical drop at the outlet also contributes to blockage. For many fish, migration is essential to survival. Many resident fish species migrate throughout the stream during their life cycle seeking a variety of aquatic habitats. Although these migrations may only be a few miles, they are important for the long term survival of the species and maintenance of fish production. Migration is blocked until the culverts are passable.

Spring chinook were recently reintroduced into the stream system. Historically, Spring chinook migrated throughout this section of the MFW River during spawning. It is **important to re-open passage in the tributaries** to the MFW River that serve as refugia for migrating juveniles. These streams are listed in priority as: Coal, Indian, Snake, Pine, Bohemia, and Estep. Temperature monitoring of these streams would establish if temperatures were suitable for juvenile life stages. The **trend is increased migration passage over time.**

Bull trout migrated through this section to cool water refugia upstream of this Watershed. The **migration corridors for Bull trout are unaffected**. It is unknown if these tributaries were used more extensively historically.

It is assumed that resident cutthroat trout **have established isolated populations** above most of the blocked culverts that will reseed downstream populations. Some of those populations are increasing. These isolated

populations would be lost and not re-established if the stream dries during any particular year.

Species composition

The creation of Hills Creek Lake introduced various warm water fish species and the abundance of rough fish species. In the last 5 years, large and small mouth bass, crappie, yellow bullhead and bluegill have been added to the aquatic system. How these new species interact and compete for limited food resources are poorly understood. **The impact** of these fish on remaining Bull trout or introduced Spring Chinook populations **is unknown**. It is assumed that the piscivorous bass may prey on juvenile Chinook and bull trout. The presence of Hills Creek Dam resulted in decrease in Spring Chinook and Bull trout. The **continuing trend is low numbers of Bull trout and increasing numbers of exotic fish.**

Lake Turbidity

Lake **turbidity increases with increased shoreline exposure** at lower lake levels. Several shoreline erosion control projects have been taken to reduce the amount of sediment contributing to the lake. The effectiveness of the projects is currently being monitored by the USFS Supervisor's Office. There is a need to standardize monitoring procedures.

Downstream Habitat Complexity

Very **little is known about the habitat downstream of Hills Creek Dam** and associated species complex. Loss of wood and spawning gravel simplified and channelized the system. Fishing pressure has increased with the increased boating use. There is a need to assess habitat and species composition and conditions for reintroduction of Spring Chinook into this reach. There is a **continuing lack of LWM and spawning gravel in MFW River downstream of Hills Creek Lake**.

Sedimentation

Trail mileage peaked in the 1940's and 1950's from approximately 120 miles to the current 31.5 miles. Trail condition **surveys do not indicate significant erosion problems** associated with trail tread for the 18 miles of trail that are on highly erosive soil types. Localized muddiness in wet areas limits trail use. Condition surveys indicate that waterbars or puncheons are satisfactory for prevention of trail tread degradation. The **major portion of the trail system is quite stable** as noted from past years of maintenance. The **trail system**, regardless of the location, has an **insignificant impact** on the Watershed resources due to the low impact of the tread structure. This low impact is due to

the fact that trail routes generally are on the slope contour with a two-foot wide tread, tree canopy is left intact, and stream flows and patterns are undisturbed. The **proposed increase in trail mileage will not have a significant impact** on sedimentation.

Resource Integrity and Function

The facilities are developed campgrounds, dispersed campsites, trails, Oakridge Sewage Treatment Plant, powerlines and telephone lines. **Hills Creek Dam's and the transportation system impacts are discussed under separate processes.** Most of these above mentioned facilities have been in existence for over thirty years. These facilities occupy approximately 278 acres or almost 2 percent of the riparian reserves. No facilities, except trails, are in the LSR. The facilities do not present barriers to wildlife and are not a significant source of sedimentation. **Developed campgrounds, dispersed campsites, trails, the Sewage Treatment Plant, powerlines and telephone lines are an insignificant impact** in the MFWDT. The existing and planned facilities will be consistent with the objectives of the the Aquatic Conservation Strategy.

As visitor numbers increase, **greater demands are being placed** upon developed and dispersed campsites, especially those adjacent to water. Available camp sites remains static while user numbers increase. The results are **campground sites filled more often,** there is a greater **reduction of vegetation** in dispersed campsites, and **more user created dispersed campsites** are appearing.

Acreage committed to facilities has not changed. As recreation use continues to increase in the Oakridge area, greater demands for use of National Forest System land will result. The closeness of the area south of the MFW River and the city will have greater demands placed upon it. The proposed Greenwaters Foot Bridge and trail system of the slopes south of town will increase use of that portion of the LSR.

The effluent discharged into the MFW River from the sewage treatment plant is monitored weekly. Due to the high quality and assimilative capacity of the river and to the improvements to the plant, the **discharge does not significantly reduce water quality** in the MFW River.

Some of the negative affects of developed campsites and dispersed campsites being in the riparian reserves, are bank erosion and loss of vegetation. The random placement of dispersed campsites and additional trails has caused conflicts with other recreation users such as hikers. There are increasing numbers of user created dispersed campsites and recreation use continues to increase.

Existing facilities

Trends in forest visitor use indicate **increasing recreational use**. Water oriented recreational pursuits are extremely popular in the Hills Creek Lake area. Improvement of the fisheries and waterfowl habitat in the upper pool, above the upper crossing bridge, has apparently been successful. This is indicated by the increase in the number of fishing boats now using this area. There is increased demand for more recreational facilities and **existing ones may need upgrading**. Current user fees in developed campgrounds have caused a shift in use to other non-fee areas on Hills Creek Lake.

There are at least two heavily used dispersed campsites adjacent to the lake shore at Coffeepot Creek. **Restoration is needed at Coffeepot Campsite to accommodate current use**. There are **two other dispersed sites** uplake from the upper crossing bridge. Constant camping and day use result in toilet paper lilies near the dispersed sites along with degradation of the vegetation at the site and enlargement of bare soil areas. Environmental Protection Agency personnel evaluated similar sites elsewhere on the forest. The EPA's conclusion is that the **low volume and the biodegradability of the waste does not constitute a threat to water quality**. The sites remain a visual and social concern.

Proposals to place and maintain vault or pit toilets are currently beyond recreation staffing and funding levels. Alternatives could range from portable toilets to limiting access to these sites. Installation and maintenance funding could take the form of water quality improvements.

Eventually, **more** campsites **on Hills Creek Lake** will be needed to accommodate additional campers and day users. There is a need to survey the existing campsites.

The road system around Hills Creek Lake has brought management challenges. The **roads and upslope timber harvest** have **increased the instability of natural slide areas, especially the Modoc Creek slide.**

Recreational Use

Trends in forest visitor use as noted in RRIS indicate **increasing recreational use**. Eventually **more campsites on Hills Creek Lake will be needed**. This rise in Hills Creek Lake recreation use **could conflict with bald eagle management** on the Lake. **Other conflicts could** arise from other water needs and uses or other management objectives for the timing of Hills Creek Lake **pool levels**.

As the Oakridge area expands, its recreational opportunity base in such areas as fishing, mountain biking and being a recreation destination point, more area businesses will realize an increase in income from tourists. One of the goals of the city is to make the area a destination for mountain biking. The area is already being noticed by horse packers, mountain biking, and fishing outfitters and guides.

When **Hills Creek Lake is at full pool, the increased use** indicates another campground may be necessary to meet the demand for water recreational activities. This is provided that full pool levels are maintained until the Labor Day weekend. Proposal to increase the level of recreational use need to be accessed with compatibility of the Hills Creek Bald Eagle Management Plan.

Beginning in 1998, the Corps of Engineers plan to let the first of two contracts to start construction of water temperature control towers at Cougar and Blue River Lakes. The **effects on Hills Creek Lake would be an earlier release of downstream water** to the MWF River to meet minimum flow requirements at Albany and Salem, Oregon. During low flow conditions a decrease in Hills Creek Lake water surface elevation is expected to occur near the end of July. This would mean that C.T. Beach and Bingham Boat Ramps would not be available for use. It is estimated that 60 percent of the general recreationists will seek substitute recreation at another lake. Estimates from other COE Lakes show that approximately 90% of day users will substitute another lake.

Chapter 6

Recommendations

Middle Fork Willamette River Downstream Tributaries Watershed

This chapter presents proposals for managing this Watershed

Five objectives were identified in the Project Initiation Letter for the Middle Fork Willamette River Downstream Tributaries Watershed. Information was to be collected to support future site specific project analysis for:

- Recreation Activities
- Access and Travel Management Plan
- Restoration and enhancement projects
- Vegetation Management activities
- Riparian Reserve management activities

Opportunities and recommendations are given by function or process that will help move the Middle Fork Willamette Downstream Tributaries processes and functions toward the desired conditions and trends.

Habitat Diversity

Priority -- Assess and develop management strategies **to maintain functions of open forest habitats in the ponderosa pine/Douglas-fir area.**

Priority -- During planning efforts, **inventory stand types and plant species in the Calapooya Mountains**. This information will be used to verify the areas high biodiversity.

Priority - Develop implement, and monitor **a prescribed fire plan** outside of the riparian reserves to:

1) **maintain open forest habitats**, with priority emphasis to the ponderosa pine/Douglas-fir area.
2) **encourage germination of fire dependent species** such as Woodland Milkvetch and branching montia in the area east of the MFW River
3) **reduce high fuel hazards** especially in the Fuel Model 10 areas. See Figure 29 in Current Conditions for general location of FM10 areas.
4) **treat areas of diseased trees and insect infestations** especially in the ponderosa pine/Douglas-fir area.

Priority - Develop management strategies in matrix lands to **provide large blocks of forest habitats**, with priority emphasis to the ponderosa pine/Douglas-fir habitats. Use general concepts of J. Franklin's "large, sloppy harvest units".

Priority - Develop and implement **a meadow management plan**. Beginning with Groundhog, Johnson, Bristow, Holland, Lower Coal, Joe's Meadows and Gertrude Lake area.

During precommercial and commercial thinnings, apply silvicuture prescriptions which **promote or maintain what would normally be anticipated up to 10% of the units' site potential in hardwood trees.**

Diversify, or vary, stocking densities during reforestation, precommercial thinnings and commercial thinnings **toward representations of sites' natural tendencies**. Strategies would include maintaining small openings that are difficult to reforest, vary spacing during reforestation, vary spacing during precommercial and commercial thinnings, which include no-thin areas, maintain diversity of tree species during thinnings, and maintain some defective trees during thinnings.

Use mitigation measures outlined in FEAT, Appendix J of the Forest Plan and the forthcoming measures from the REO to **ensure survival of C3 species.** This is especially necessary in Matrix lands and where riparian areas do not provide dispersal corridors.

Underplant and modify understory vegetation to begin **development of multistory stands** in LSR and Riparian Reserves.

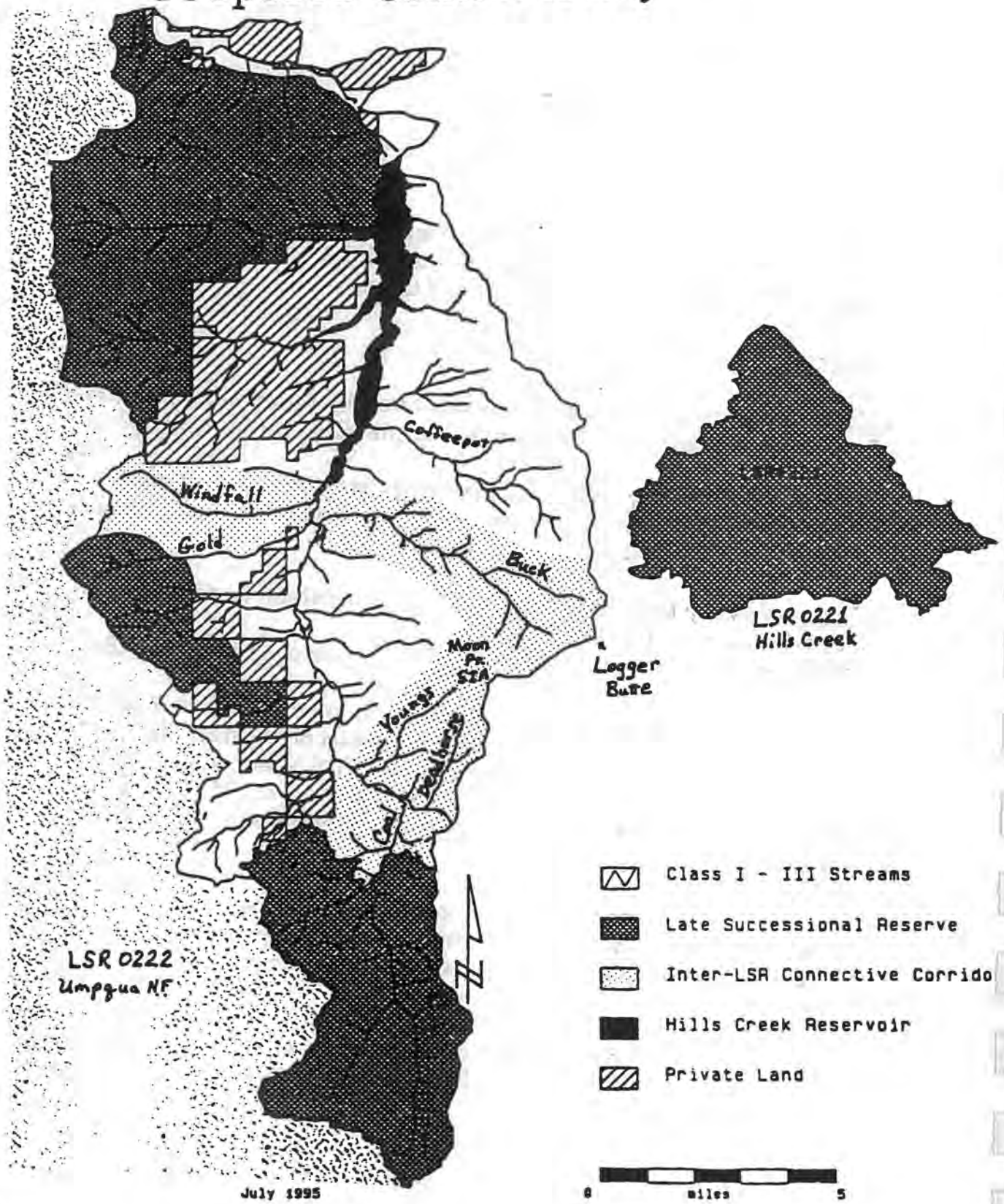
Assess the LSR and LSRS's for fuel loadings and the appropriate area for **reintroduction of low intensity fire**. This will help maintain diversity of Late Successional habitats and for reduce the potential for catastrophic fires.

Habitat Connectivity

<u>Priority</u> -- For connectivity between LSR 0222 and LSR 0221, **design a connectivity strategy for the two routes of Windfall Creek/Buck Creek drainages and Coal Creek/Youngs Creek-Deadhorse Creek drainages,** including riparian and upslope terrestrial habitats. This strategy will stay within the current Standards and Guides. Figure 43 represents the corridors.

Figure 43: Middle Fork Willamette Downstream Tributaries

Proposed Connectivity



Interior Habitat

<u>Priority</u> -- **Assess Matrix** lands **for remaining stands of interior habitats** for attributes of quality and landscape distribution. Then **develop a strategy for prioritizing and managing** timber around those to the extent feasible, considering other resources needs.

Silviculturally treat managed units in LSR, which are <80 years of age, to promote growth and structural diversity leading to late successional forest habitat characteristics, including riparian and upslope terrestrial areas. Priority of managed units are those that likely existed as late successional habitats over many centuries.

Dense, young forest habitats have likely occurred within the LSR. An **assessment is needed to identify** the need for retaining some managed units with such habitat characteristic.

Ecological Site Productivity

<u>Priority</u> -- Prioritize drainages that are not linking the LSR and LSRS. Restore the LWM component of these sites by enhancing the growth of large trees for future LWM recruitment. Restore LWM in units harvested along the mainstem of Indian, Estep, Snake, Coffeepot, Big Willow, Gold Creeks. **Use the Ridgeline Interconnection Map** (Figure 44) as a guide in developing a connectivity plan between riparian areas of different drainages. These areas need to promote characteristics of mature, old-growth habitats and have adequate LWM. Design the retention of LWM, Green Tree Retentions, and Wildlife Trees to facilitate connectivity in interconnection areas with a proposed final harvest.

Vegetation Manipulation Potential

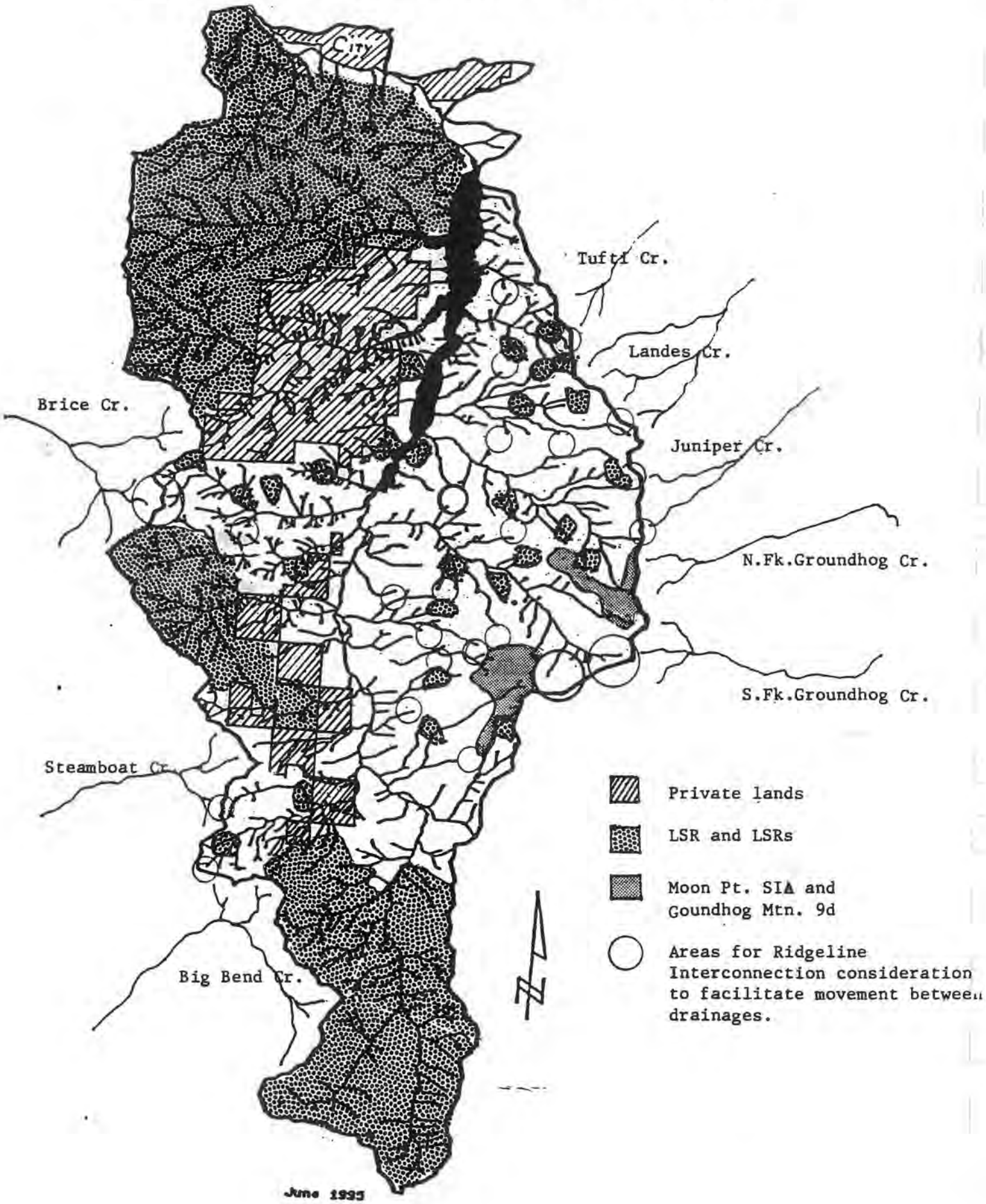
<u>Priority</u> - Look at Matrix lands in **Subwatersheds 21-2 and 21-3** for the majority of **regeneration harvest with tree reserves and commercial thinning and post and pole opportunities.** .

Exams should be done to regional standards to facilitate project scheduling. Exams need to be standardized to be consistent across districts.

Prune to increase product quality and improve tree vigor or to meet other objectives.

Figure 44: Middle Fork Willamette Downstream Tributaries

RIDGELINE INTERCONNECTIONS; MATRIX



Reforest for establishment, stocking level maintenance, stand diversity development. Cone and other vegetative collections may be utilized.

Release or removal of vegetation as stand density management, to promote vigor, tree size, stocking protection, or forest user safety or maintaining forest health.

Seedling protection projects such as animal control.
Remove snags and logs along roads, developed campgrounds and dispersed campsites to reduce hazards and utilize in areas deficient of LWM, commodity contract or restoration.

Harvest Special Forest Products when there is no effect or no significant adverse impacts to other resources.

Prioritize vegetation treatments on the 5622 acres of 16 -- 80 year old trees **in the LSR.**

Fire Pattern, Behavior and Intensity

In Matrix lands, **run the current behavior models for Fuel Model 10** areas. Use the results of the behavior models to develop and implement fuel treatment plans to **reduce fuel loadings especially in Fuel Model 10 areas** and to perpetuate desired plant communities.

Wildlife and Plant Habitat Quality

<u>Priority</u> - Apply treatments to **reduce or eliminate off-site species** invading special habitats along roads.

Close and rehabilitate the **section of Road 2106445** to restore the hydrologic regime for the Thompson's mistmaiden population on Dinner Ridge adjacent to the Orcal Timber Sale landing.

Identify and rehabilitate non-essential roads to a condition compatible with surrounding special habitats. **Priority areas are**: Loletta Lakes, Little Groundhog Mountain, Holland Meadows and the Gertrude Lake area. Study and implement road rehabilitation efforts to restore meadow habitat and hydrologic regime during ATM and SIA Management planning efforts.

Fire Suppression Response Time

Develop an Access and Travel Management Plan, including the LSR. Will need to balance fire suppression access priorities and need to reduce risks of human caused fires and damage to other late successional resources.

Wildlife and Botanical Disturbance

<u>Priority</u> - **Seventy-one** (71) **miles of open roads**, in four elk emphasis areas, **need closed to meet the Standards and Guidelines** for maximum densities.

Coffeehead in 21 2: ~14 miles to close; Willow Creek to Buck Creek.
Dry Pine in 21 3: ~42 miles to close; Cone Creek to Deadhorse Creek.
Larison in 21 2: ~6 miles; Larison Creek drainage.
Snake Fir in 21 3: ~10 miles; Snake Creek and Fir Creek drainages.

<u>Priority</u> - Submit **Forest Plan Amendment to change** Larison and Coal Head Moderate Elk Emphasis Area **to low emphasis.** Our ability to manage these emphasis areas is limited because **they are mostly within the LSR and private land.**

Close the one open **road** above the **vicinity of one eagle nest**, to alleviate potential disturbance.
Continue **monitoring** the **Coal Creek population** of **Thompson's mistmaiden** to ensure that the hydrologic regime remains intact. Conduct an extensive **survey to delineate** the whole population.

Determine which **roads need closed in the High Elk Use Areas** within moderate and low elk emphasis areas **to meet habitat effectiveness** per verbal agreement with ODFW. Need to **set up a meeting** with ODFW, Herb Wick, South End Ranger Team, and Rigdon Wildlife Biologist **to discuss** the **verbal agreement**.

Non-Native Species Composition

<u>Priority</u> - **Promote native seed production program** for revegetation purposes for restoration and general erosion and forage projects

<u>Priority</u> - **Promote recovery** of managed plantations **in LSR** in a manner that would deter expansion of barred owls.

Control new invader noxious weeds at the following locations:

Common Name	Location
Spotted knapweed	Packard CG 21/2135 2102 2120 21
Diffuse knapweed	21/2135
Meadow knapweed	21/2127
Giant knotweed	2106/105,107 2127/180,188

Monitor effectiveness of biological controls on St. Johnswort on Little Groundhog Prairie. If effective, **use same treatment** at Bristow Prairie.

Use the ATM process for possible **roads to decommission** to prevent further travel routes of noxious weeds.

Test and monitor the use of **prescribed fire** to eradicate noxious weeds.

Inventory blackberry and reed canary grass invasion in riparian reserves around Hills Creek Lake. Reed canary grass was planted along Hills Creek Lake for bank stabilization during the 1980's. It has moved up the riparian corridors into the natural stream systems.

Curtail expansion of bullfrogs into the Watershed above Hills Creek Dam.

Riparian Habitat Quality

Apply and monitor silvicultural treatments such as thinning and pruning to enhance growth and structural diversity and to vary stand density.

Retain and replant diverse tree species.

Only modify riparian reserves after an interdisciplinary **site specific** analysis.

Rehabilitate unneeded roads in riparian reserves as determined in the ATM process.

Apply silvicultural treatments to the dense, overstocked young conifers between the high pool line and the road system on **both sides of the lake** to promote growth and canopy structure. Opening these stands by thinning would hasten their development to large trees with deep canopies and facilitate passage around the lake by those species that can or could utilize the shoreline for dispersal and migration.

Manage coves inhabited by the **western pond turtle** for protection from plinkers. For example, plant vegetation for a screen.

Apply habitat enhancement practices within the coves and upslope areas for nesting **to maintain the turtle population** within the lake.

Test low intensity prescribed underburns in some riparian reserves for effectiveness in reducing the 0" - 3" fuel loadings to better reflect historical levels of fuels. This may also help meet the Aquatic Conservation Strategy objective of restoring species composition and structural diversity of plant communities in the riparian area and restoring a less obstructed connectivity route for riparian - dependent species.

Landslides

<u>Priority</u> -- **Stabilize slope failures** on harvested slopes in Coal and Modoc Creek area and road 5850.

<u>Priority</u> -- Develop an inventory of road failure indicators. Develop a simple form for employees and the public to carry with them when traveling in the MFWDT.

Retain live trees, snags, and distribution of LWM to aid slope stability on harvested units.

Monitor sedimentation amounts from known sources

Hydrologic Recovery

Priority - As supported in this document, the **TSZ should be extended to include the ridgelines** throughout the Watershed.

Priority - **Conduct site specific cumulative effects analysis** by stream watershed of landslide activity, aquatic habitat and riparian vegetation to determine the appropriate threshold for spatial hydrologic recovery. **Until the analysis is complete, do not harvest greater than 35%** of the canopy closure in areas **where more than 35%** of the ground **is in a hydrologically unrecovered state.**

Wood Recruitment and Shading

Priority -- **Conduct site evaluations** of streams having past harvest activities on both sides **for placement of LWM and regeneration success.** Youngs and Coal Creek, the MFW River, and Buck Creek are the high priority areas.

Priority -- Develop and implement a long-term comprehensive **water temperature monitoring program.** Priority areas are the mainstem MFW River, the mouths of major tributaries throughout MFWDT, including private land, and in areas of thermal refuge.

Develop and implement **a monitoring protocol for riparian planting.** See Appendix F, Aquatic Document for areas.

Provide shade for pump chances, excluding area needed for access.

Aquatic Habitat Complexity

Priority - **Add LWM to the MFW River and low gradient tributaries** to aid in short-term recovery and reconnect side channels where appropriate.

Evaluate and implement **placement of LWM in MFW River.**

Evaluate effectiveness of **past restoration efforts.**

Surface Runoff and Routing

Prioritize and implement **maintenance of roadway drainage structures**.

Prioritize **decommissioning of roads** to minimize impacts to stream channels.

Culvert Carrying Capacity

<u>Priority</u> - **Hydraulic analysis of culverts** with potential to affect streams with high aquatic value.

If fish passage is not an immediate need, but a desired future condition, less expensive **improvements to accommodate a 100-year flood** (such as the addition of mid-fill culverts and retrofitting the existing culvert) should be considered until such time as a funding opportunity occurs for replacement.

Plan and implement a **program of culvert cleanout.**

Species Distribution & Migration

<u>Priority</u> - **Modify or replace existing culverts** in the high priority areas of Coal, Indian, Snake, Pine, Bohemia and Estep Creeks.

Design new **culverts for fish passage**.

Establish baseline information to **identify migration timing and flow characteristics** for design of high priority culverts.

Design and implement a monitoring protocol for **existing culvert enhancements**

Continue to monitor species abundance and distribution

Species Composition

<u>Priority</u> -- Continue to **monitor bull trout and Spring Chinook populations**.

<u>Priority</u> --**Complete Hills Creek Lake Management Plan**

Hills Creek Lake Turbidity

Work with the Corps of Engineers to **develop monitoring protocol**.

Continue Challenge Cost Share with Corps of Engineers to **continue shoreline stabilization**

Downstream Habitat Complexity

Complete R6, level two survey of habitat below Hills Creek Dam.

Recreational Use

<u>Priority</u> - To accommodate Hills Creek Lake recreationists, **maintain** the water surface at **full pool** until Labor Day Weekend.

Evaluate the **need for additional camping capacity** in the form of developed campgrounds on Hills Creek Lake. This evaluation will need to look at the **impacts of additional recreation facilities** on bald eagle management on Hills Creek Lake.

Investigate the opportunity for **construction of** a hardened surface **bike trail** loop around Hills Creek Lake.

Resource Integrity and Function

<u>Priority</u> -- Using the Limits of Acceptable Change inventory method, **evaluate all dispersed camping site locations on the MFW River** for condition and appropriate location to reduce conflicts with other recreation users and riparian reserve values. **Rehabilitate** sites as needed.

Control poison oak in developed sites

Sell land used for the sewage treatment plant at fair market value to the City of Oakridge.

Evaluate **condition and ability of existing facilities** to meet recreation needs.

Riparian Reserve Widths

The interim riparian reserve widths, as stated in the Northwest Forest Plan, will be maintained until a site specific analysis is conducted and presented through the appropriate NEPA decision-making process. Use of the interim widths will begin the process of restoration and/or maintenance of riparian health for riparian-dependent species and resources in the MFWDT.