Ice Caves Grazing Allotment EA
Aquatic Conservation Strategy Objectives

Introduction

The Aquatic Conservation Strategy (ACS) is an integral part of the 1994 Northwest Forest Plan. The ACS was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems within public lands. The ACS includes four components (Key Watersheds, Watershed Analysis, Watershed Restoration and Riparian Reserves) and has nine objectives toward meeting the goal of healthy ecosystems and watersheds. Aquatic Conservation Strategy Objectives are applied over time at watershed and broader scales.

The Gifford Pinchot National Forest proposes to continue authorization of grazing on the Ice Caves Horse and Cattle Allotment located in the Cave-Bear Creek and the Little White Salmon subwatersheds. Management of the Ice Caves Allotment would involve some activities within riparian reserves established by the Northwest Forest Plan. Activities within riparian reserves are analyzed at the landscape level for purposes of this ACS analysis. The exact location of the fences and pipeline are to be determined in a future NEPA document. The site-specific analysis for those activities within riparian reserves would be re-evaluated for ACS following completion of the EA. Below is a summary of the activities within riparian reserves under each alternative that would be further analyzed for purposes of addressing ACS at the site-specific scale, Table 1.

Table 1. Summary of activities within Riparian Reserves under each alternative.

Alt A	Alt B	Alt C
Approximately 1 mi of lower Lost Creek protected with drift fence	Approximately 1.8 mi of lower Lost Creek and S. Praire Lake/Tribs protected with drift fence	None of Lost Creek or South Prairie Lake/Tribs would be impacted by grazing
Sensitive C and E channel types with grazing impacts reduced from 3.65 to 2.45 mi	Sensitive C and E channel types with grazing impacts reduced from 3.65 to 1.5 mi	Sensitive C and E channel types would not receive grazing impacts
Approximately 14.5 ac of riparian area protected	Approximately 26.1 ac of riparian area protected	No riparian areas would be impacted from grazing
0.1 mile of Cave Creek added to existing exclosure	0.1 mile of Cave Creek added to existing exclosure	Exclosure would be removed, but no grazing would occur near Cave Creek
No piping of diversion, water diversion site continues in it's existing condition	Pipe existing ditch, necessary diversion upgrades assessed at a later time	Ditch would no longer be diverted for grazing

Key Watersheds

The Ice Caves Grazing Allotment is located within the White Salmon River 5th field watershed, which is designated as a Tier 1 Key Watershed. Key Watersheds are intended to serve as refugia for at risk stocks of native and anadromous fish. Although the Ice Caves allotment is located in the headwaters of the White Salmon River watershed where there are no at risk stocks of anadromous fish, native fish are found in perennial streams. Activities to protect and restore aquatic habitat in Key Watersheds are higher priority than similar activities in other watersheds. Activities that would occur within the riparian reserve of the White Salmon River Key Watershed as a result of the proposed action involve building a fence and piping an existing ditch. However, these activities would be further assessed with site-specific information. The magnitude of the management of Ice Caves Grazing Allotment within the key watershed is small to the degree that the proposed action is considered neither a benefit nor a detriment at the key watershed scale but conceivably a benefit at the local scale due to the riparian exclosure and improvement of a water diversion site.

Watershed Analysis

Watershed analysis was conducted between 1995 and 1999 for watersheds on the Gifford Pinchot National Forest. The Ice Caves allotment is located in two 5th field watersheds, the White Salmon River and the Little White Salmon River watersheds. Approximately two-thirds of the Allotment lies within the Cave-Bear Creek 6th field subwatershed of the White Salmon River watershed. Watershed analyses were conducted for both Cave-Bear Creek subwatershed and the Little White Salmon watershed and both discussed the presence and management of grazing. The Cave-Bear Creek Watershed Analysis (USDA 1997a) included the specific recommendations relevant to the Ice Caves Grazing Allotment. Most of the streams in the Cave-Bear sub-watershed are intermittent, and during most of the year there is no surface water discharge to the White Salmon River (Cave-Bear Watershed Analysis, 1996).

Watershed Restoration

Watershed restoration is an integral part of the Aquatic Conservation Strategy to aid recovery of fish habitat, riparian habitat and water quality. The Little White Salmon River Watershed Analysis identified noxious weed control as a potential restoration project (USDA 1995, p. 95) that addresses effects from grazing. Associated improvements to the landscape as a result of continuing management of the Ice Caves Grazing Allotment includes establishing a 30% limit on utilization, building a drift fence, piping an existing ditch, and potentially improving fish passage at a water diversion site.

Riparian Reserves

Alternative A – Limited Change to Current Management

<u>Objective 1</u>: Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.

The proposed action is expected to maintain the current distribution, diversity, and complexity of watershed scale features. Alternative A improves the riparian conditions at the project scale by excluding grazing on approximately 14.5 acres. A new drift fence would be placed on lower Lost Creek within the allotment, thereby reducing grazing impacts. An existing exclosure fence along Cave Creek would be maintained. An additional 0.10 miles of Cave Creek would be added to the existing exclosure on Cave Creek.

Although Alternative A has restorative benefits, the amount of acreage within the allotment that drains into Lost Creek, Cave Creek, and South Prairie Lake are limited in scope. Riparian conditions at the watershed scale would be maintained or degraded over time at the project scale given the amount of limited restoration that would take place under alternative A. Flat reach sections of fish bearing streams within the allotment (South Prairie Lake South Tributary, South Prairie Lake East Tributary, and Cave Creek) that do not have a fence exclosure would continue to be accessible to livestock. These easily accessible flat stream reaches may continue to have instability problems as a result of streamside cattle grazing and trampling. Therefore, resident fish populations and riparian communities along the flat reaches of South Prairie Lake and tributaries, and Cave Creek within the Ice Caves Grazing Allotment would be maintained at the watershed scale and potentially degrade over a long period at the project scale.

<u>Objective 2</u>: Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.

Spatial connectivity is maintained in the proposed action as the restoration of early to mid seral components are allowed to grow and establish within riparian areas that are fenced or managed by 1) enhancing shrub growth in previously heavily grazed areas, 2) inter-planting with native species and 3) creating or maintaining native vegetation within areas that have invasive species. Restoration under alternative A is particularly prominent in the riparian reserves of Lost Creek and Cave Creek.

Spatial and temporal connectivity within and between watersheds will be maintained at current conditions. A water diversion that acts as a physical barrier to fish would continue to exist on Lost Creek. Lost Creek is a resident trout fish bearing stream. The water diversion site located at river mile 4.8 on Lost Creek is an upstream fish migration barrier at low flow. Low flow in summer often establishes an upper limit on the quality and quantity of fish habitat. The present use of the diversion negatively affects aquatic habitat in the lower 4.08 miles (76% of stream length) of Lost Creek by decreasing the amount of water flow and stream length and by elevating water temperatures. By not upgrading or improving fish passage at the water diversion, existing spatial and temporal connectivity would not be restored but maintained in it's existing condition. Because the lower sections of Lost Creek are dry during summer months, holding pools upstream

of the physical barrier may serve as important refugia for fish in the long term should habitat conditions improve as a result of fencing.

The water diversion itself is considered a small "dam" and would continue to act as a migration barrier blocking all species and ages of trout from migrating upstream at low flows when five cfs is being diverted. The dam would likely be a barrier at low stream flow regardless of the diversion. Washington State law RCW 75.16.060 requires fishways in dams and obstructions. Hence, the dam would need to modified to allow fish passage.

None of the streams with the cattle grazing impacts have above surface flow into another stream or into the Little White Salmon or the White Salmon Rivers. The Lost Creek drainage, which includes its major tributary Dry Creek (west), flows subterranean into the Big Lava Bed. Cave Creek, which includes intermittent tributaries Coyote, Bear, Dry (east), and Lost Meadow Creek, flows into the Trout Lake valley where it is diverted into numerous irrigation ditches and eventually disappears before reaching the White Salmon River. The South Prairie Lake tributaries flow into South Prairie Lake, which drains into surrounding meadows and the Big Lava Bed during high flows. Because of this lack of connection of streams in the allotment area with any other downstream water body, there should be no detectable hydrologic, water quality, or aquatic species effects from grazing at the 5th field watershed scale.

Objective 3: Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

Unstable streamside conditions found in the allotment are not likely created by livestock grazing alone, but grazing is a contributing factor to channel conditions. Areas of particular concern include Cave and Lost Creeks. Lost Creek, Cave Creek, and South Prairie 7th field drainages have altered flows which affects streambank integrity, they are more vulnerable to streambank degradation from overgrazing. Streams where bank failure, bare ground along streamsides, and/or riparian vegetation damage due to cattle grazing is evident include Lost Creek, Cave Creek, and the East and South Tributaries to South Prairie Lake. Channel stability surveys have resulted in a fair rating for the majority of streams within the allotment with the exception of Lost Creek, which rated fair to poor due to 31% to 35% of streambank erosion. Fence exclosures and grazing utilization limits will maintain and restore the physical integrity of the aquatic systems in lower Lost Creek. South Prairie Lake and tributaries would probably continue at current conditions even under a 30% grazing utilization limit.

Objective 4: Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.

Stream temperatures in Lost Creek do not meet the Washington State standard of 16 degrees Celsius. The diversion of water may contribute to lower stream temperatures in lower Lost Creek. Stream temperature monitoring has not taken place in the remainder of the streams within the allotment so it is not known whether Cave Creek, South Prairie Lake and tributaries meet State standards. The effect of continuing the water withdrawal at Lost Creek would include a decreased amount of available habitat for fish and other aquatic species, and contribute to higher water temperatures and lower dissolved oxygen levels below the diversion.

Monitoring of nutrients and pathogens, as well as sediment or turbidity, in streams within the allotment area has not been conducted because there are no known domestic water uses affected by grazing. A spring at Peterson Prairie is currently piped to the Peterson Prairie Campground for recreational campers and it is not accessible to cattle. Cave Creek itself is diverted into multiple ditches in the town of Trout Lake.

Water quality within the allotment area may be maintained at current conditions and degrade over time at the landscape scale as a result of global climate change. Decreases in coliform and other bacteria and nutrients from livestock waste would be expected to occur in the area of Lost Creek that is excluded from grazing by fencing.

Objective 5: Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.

Active and potential mass wasting sites mainly exist in riparian reserves within the allotment. Because water is very limited in the allotment area overall, protection of streambanks from trampling and overgrazing will help maintain and restore the physical integrity of aquatic system. Fence exclosures and a 30% grazing utilization limit will generally improve riparian conditions in the allotment. Stream reaches that are not fenced may have short-term increases in turbidity and suspended sediment levels from streambank trampling, which would be evident at the immediate trampling site.

It is expected that areas within the fence exclosure would begin to re-vegetate within one growing season. The sediment increases from the existing road network are greater at the landscape scale than the immediate short term trampling duration. Streambanks that would be trampled heavily as a result of limited areas will more than likely result in some sediment but it is expected to be diluted and move downstream in random pulses. Because road density within the allotment is already high and a major contributor of sediment, these short term effects may be exacerbated at the immediate site. Sediment as a result of streambank trampling will not be discernible against the range of variation of sediment processes at the watershed scale. Therefore, the sediment regime under which the aquatic ecosystem has evolved within the allotment would be maintained at current conditions at the landscape scale.

Alternative A would decrease any chronic erosion source associated with streambank trampling in lower Lost Creek by establishing a drift fence. However, the remainder of riparian areas in the allotment, especially sensitive flat reaches, may degrade over a longer period of time.

Objective 6: Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.

Past management activities have contributed to elevated peak flows. Peak flows above normal conditions are predicted to occur in the Lost Creek, Cave Creek, and South Prairie 7th field drainages. Because these drainages have altered flows which affects streambank integrity, they are more vulnerable to streambank degradation from overgrazing. Streams where bank failure, bare ground along streamsides, and/or riparian vegetation damage due to cattle grazing is evident include Lost Creek, Cave Creek, and the East and South Tributaries to South Prairie Lake.

Under Alternative A, five cfs would continue to be diverted from Lost Creek into the Lost Creek diversion ditch from mid-June through September. This would decrease the volume of water in Lost Creek below the stream diversion (approximately 4 miles) by approximately 14 to 18 percent during the summer months which may not sustain proper in-stream flows for aquatic organisms. Approximately 76 percent of the stream channel length of Lost Creek lies below the diversion dam and would therefore be affected by the decrease in water discharge. Continued removal of this volume of water from the stream channel would be especially critical in late summer when stream flows are at their lowest and water temperatures are at their highest.

Objective 7: Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

Cave Creek below Forest Road 8620 receives heavy grazing usage in the early summer but by late summer this section of Cave Creek is dry and cattle move to other areas in the allotment. Approximately 0.5 miles of Cave Creek is fenced above Forest Road 8620 which excludes livestock usage along this portion of the stream. Some of Cave Creek which lies inside the fence is thickly forested and contains several beaver dams which have created multiple channels and wetlands. This reach of Cave Creek where livestock grazing is currently excluded by fencing (wildlife are not excluded) does not have the streamside trampling and riparian vegetation removal as found in the section of Cave Creek below Forest Road 8620 where livestock grazing is occurring.

The perimeter of South Prairie Lake and its tributary streams would continue to exhibit some livestock trampling and cattle trails. However, much of the streamside is vegetated with shrubs and small trees.

Lower Lost Creek in the vicinity of Forest Road 6615 is an area of elevated concern due to the length of its poor habitat condition and high stream temperatures. Under Alternative A, approximately 1.2 miles of lower Lost Creek would be fenced to exclude cattle which would reduce grazing impacts on sensitive flat stream reaches by about 33 percent. Immediately above the proposed fence on Lost Creek, streamsides are more heavily forested and steeper making cattle access difficult. Little to no riparian damage from cattle has occurred in the past from the point above the proposed fence to the water diversion site located at river mile 4.8. The area of Lost Creek below the proposed fence and below Forest Road 6615 currently utilized by livestock would continue to be open to cattle grazing. Therefore, the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands would be maintained at the landscape.

Objective 8: Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

By eliminating approximately 1.2 miles of grazing along the lower section of Lost Creek more pressure would be placed on the riparian areas not protected by fencing, which would include upper Lost Creek, Lost Creek below Forest Road 6615, South Prairie Lake, and portions of Cave Creek. The harvest units along upper Lost Creek (about 0.5 mile below Forest Road 6030-080) contain an area of approximately 0.4 miles

of stream length currently showing areas of downcutting and degradation, as well as 1.2 miles of Cave Creek. In these two reaches much of the stream margins are being grazed and trampled and bank failures are common. Grazing has contributed to reduced plant cover and root stability along the stream margins likely resulting in an increased level of sediment input and may have contributed to changes in stream morphology. The impacts exhibited along these stream channels would be expected to persist or may degrade further from present conditions if livestock stay in these areas longer than currently due to the elimination of a portion of the lower part of the allotment.

It is expected that the structural diversity of plant communities in the limited riparian areas would be maintained at the landscape level and potentially degrade over a longer period of time along areas that are not fenced. However, the 30 % grazing utilization limit may keep the riparian areas from degrading.

Objective 9: Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.

The proposed action provides for the development of habitat conditions within the fenced riparian and meadow areas to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species at the project and to some extent the landscape scale. Riparian areas that are not fenced will continue at their conditions. Impacts would be mitigated by project mitigation measures that include a 30% grazing utilization limit.

Continuous grazing would be avoided in riparian areas, meadows and wetlands. Shortduration grazing would be applied as feasible to provide greater opportunity for future regrowth. Utilization standards would be based on the ecological range conditions in the AOI. Utilization of the current year's growth on key species would be 30 percent in these areas. The Landscape Appearance Method will be used to determine the forage utilization. Cattle would be physically removed from these areas as utilization levels dictate. Utilization of woody species would be limited. Livestock would be moved from riparian areas and wetlands if they begin to show a preference for woody species.

Alternative B – Drift Fence (Adaptive Management)

Objective 1: Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.

The proposed drift fence under Alternative B would eliminate cattle use from approximately 1.8 miles of lower Lost Creek, the entire South Prairie Lake and its tributary streams, and an additional 0.1 miles of Cave Creek. The number of cattle would be reduced and the fence would be built to exclude cattle from the entire lower section of the Allotment. Sensitive flat stream reaches exhibiting channel impacts from livestock grazing and trampling would be reduced by 59%. Approximately 26.1 acres of riparian area would be protected from cattle grazing impacts.

A strategy for long-term recovery of streams and riparian areas in the allotment involves a maximum utilization standard of 30 percent in all riparian areas. This grazing strategy would be adjusted if substantive improvements are not evident in streambanks currently degraded by grazing and hoof trampling, and in the regrowth of streamside herbaceous and woody species vegetation.

Stream reaches where numerous areas of bare ground, cattle trails and trampled stream banks exist would be restored. Restoration would consist of planting vegetation (native grasses, hardwoods and conifers) and creating log barriers to direct cattle away from sensitive streamside areas under restoration. Passive restoration would occur along Lost Creek adjacent to the harvest unit located on the west side of the Creek above the 6615 bridge. Active restoration (planting, seeding, barriers to access would occur along upper Lost Creek adjacent to the old harvest units below Forest Road 6030-080. Along Cave Creek, restoration would occur adjacent to the harvest units below Forest Road 8620. Actions under Alterntiave B will maintain the distribution, diversity, and complexity of watershed and landscape-scale features at the watershed scale, and have restorative benefits at the site-scale within the allotment.

<u>Objective 2</u>: Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.

Spatial connectivity is maintained in the proposed action as the restoration of early to mid seral components are allowed to grow and establish within riparian areas that are fenced or managed by 1) enhancing shrub growth in previously heavily grazed areas, 2) inter-planting with native species and 3) creating or maintaining native vegetation within areas that have invasive species.

Use of the Lost Creek Ditch would be discontinued and instead water would be piped from Lost Creek to water trough(s). Approximately one mile of piping will be required. It is estimated that the pipe would be four inches in diameter, and up to 1 cfs at a time can go down a pipe of this size. Therefore, there could be a decrease of up to four or more cfs being diverted from Lost Creek. Water troughs would be equipped with a float valve so that when full, they would no longer draw water.

Piping the water from the diversion site and not using the Lost Creek Ditch would be expected to improve aquatic habitat conditions in Lost Creek by increasing the volume of water entering the stream below the stream diversion (approximately four miles) by approximately four cfs during the summer months. Approximately 76 percent of lower Lost Creek would receive more water discharge during the critical warm temperature/low flow time of year. Less water diverted would have a positive effect on the amount and quality of aquatic habitat in Lost Creek, and should lower water temperatures in lower Lost Creek during the low flow time of year. Higher water volume would signify more quality habitat available for fish and other aquatic species.

Since the entire lower Lost Creek would be fenced under Alternative B, obtaining water from the traditional "hot spots" along the stream would no longer occur, making water troughs more valuable. The diversion dam would have a higher volume of water flowing over it by piping the water. If the dam is still considered to be a migration barrier the dam would be breached to allow for up and downstream migration of all species and ages of trout at all times of the year. Maintaining free migratory access is important as resident salmonids often make substantial movements within streams to reproduce (USDA 1985) and seek optimal habitat. Spatial and temporal connectivity within and between watersheds will be maintained at current conditions at the watershed scale, and if the dam diversion is modified to allow full passage then connectivity would be restored at the project scale.

<u>Objective 3</u>: Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

By eliminating the lower section of the Allotment to cattle grazing, more pressure would be placed on the riparian areas not protected by fencing, which would include 0.4 miles of stream length in harvest units along upper Lost Creek (below Forest Road 6030-080) and 1.2 miles of Cave Creek. Much of the stream margins in these two areas are grazed and trampled resulting in bank failures. It is not expected that the reduced number of livestock alone in both Lost and Cave Creeks would result in a great improvement in streamside conditions currently degraded along Lost Creek and Cave Creek. Favorite grazing "hot spots" with the best available forage would continue to be "hot spots". It is possible that cattle would try to remain in riparian areas for a longer period of time due to higher forage/animal availability. A decrease in number of cattle alone may not lead to an improvement in riparian area condition. Riparian areas would continue to be the first choice for cattle grazing and watering.

Stream restoration is proposed on areas impacted by cattle grazing that will not be protected by fencing. The restoration would consist of re-vegetating areas of bare soil (planting woody species and seeding native forbsand grasses), and placing log barriers along upper stream banks to direct cattle away from impacted areas to chosen less sensitive watering sites. The goal of this restoration would be to reduce the area of disturbed soils in direct proximity to stream channels and to allow for vegetative growth along stream banks. Well vegetated banks would help to provide fish cover, reduce stream bank erosion, control water velocities and temperatures, and supply terrestrial foods for aquatic organisms. This in turn should reduce the introduction of sediment into stream channels. Priority areas for restoration would occur along upper Lost Creek adjacent to the old harvest units about 0.5 mile below Forest Road 6030-080 and along Cave Creek adjacent to the harvest units below Forest Road 8620. The impacted riparian areas along Lost Creek and the tributaries to South Prairie Lake protected by the new fence exclosure would be allowed to recover naturally. Therefore, Alternative B will restore the physical integrity of the aquatic system within the allotment and maintain at the watershed scale.

<u>Objective 4</u>: Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.

Under Alternative B, stream temperatures in Lost Creek may continue to not meet the Washington State standard of 16 degrees Celsius. The diversion of water may contribute to lower stream temperatures in lower Lost Creek since sampling occurred during periods of 5 cfs diversion. Lost Creek is the only stream in the Allotment where stream temperature monitoring has been done.

Streams in the Allotment have not been monitored for nutrients and pathogens because there are no known domestic water uses affected by grazing. The only domestic drinking water source in the Allotment is the Peterson Prairie spring which is piped to the Peterson Prairie campground for use by campers. The spring is not accessible to cattle. Cave Creek is diverted into multiple ditches in the town of Trout Lake.

Water quality within the allotment area may be maintained at current conditions and degrade over time at the landscape scale as a result of global climate change. Decreases in coliform and other bacteria and nutrients

from livestock waste would occur in the areas of Lost Creek and South Prairie Lake that would be excluded from livestock use from fencing.

Objective 5: Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.

No sediment or turbidity monitoring has been done in streams which lie within the Allotment. The largest sources of sediment above natural levels are related to roads, harvest units, and stream bank cutting. Stream crossings by roads are often a major contributor to sediment. Lost Creek, South Prairie, and Cave Creek have high road densities. Stream bank erosion is being accelerated by livestock grazing in some reaches, especially along streambanks where timber harvest has removed the riparian forest. By fencing Lost Creek, South Prairie and tributaries, and an additional 0.10 mile of Cave Creek there will no longer be a chronic source of sediment as a result of cattle trampling.

Fence exclosures and a 30% grazing utilization limit will generally improve riparian conditions in the allotment. Stream reaches that are not fenced may have short-term increases in turbidity and suspended sediment levels from streambank trampling, which would be evident at the immediate trampling site. It is believed that grazing has contributed to reduced plant cover and root stability along areas in upper Lost Creek (below Forest Road 6030-080) and 1.2 miles of Cave Creek. These stream margins are likely resulting in an increased level of sediment input and may be experiencing changes in stream morphology. The impacts exhibited along these stream channels would be expected to persist or may degrade further from present conditions if livestock stay in these areas longer than at present. However, stream restoration is proposed on areas impacted by cattle grazing that will not be protected by fencing. This in turn should reduce the introduction of sediment into stream channels.

Lost Creek disperses into several incised channels (which are dry during summer months) adjacent to South Prairie. A few of these incised channels flow into South Prairie, where the stream dumps the sediment load it is carrying into parts of the prairie. This flooding of South Prairie by Lost Creek helps to maintain it as an open meadow. Under Alternative B, the sediment regime under which aquatic ecosystems evolved will be maintained at the watershed and project scale.

Objective 6: Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.

The Cave Creek drainage has a high risk of increased peak flows above natural conditions based on road densities, elevation, and vegetation age classes (USDA 1997a). The two year flood in the Lost Creek and South Prairie drainages are estimated to be greater than ten percent above natural conditions (USDA 1995) based on modeling of stream flows under both current and “natural” forest cover scenarios. Because these drainages have altered flows which affects streambank integrity, they are more vulnerable to streambank degradation from grazing. Streams where bank failure, bare ground along streamsides, and/or riparian vegetation damage due to cattle grazing is evident include Lost Creek, Cave Creek, and the East and South Tributaries to South Prairie Lake. A fence exclosure along these streams will prevent further streambank degradation from grazing and allow for riparian vegetation to re-establish.

Sensitive flat stream reaches within the allotment (5.4 river miles of Cave Creek, 3.75 river miles of Lost Creek, 2.0 river miles of Dry Creek, 0.75 river miles of South Prairie Lake East tributary, 0.3 river miles of South Prairie Lake South tributary, and 0.4 river miles of Lost Meadow Creek) are alluvial streams that are highly sensitive to physical bank disturbance and to increases in stream flows. The fence exclosure and restoration proposal will allow the riparian area to revegetate in order to hold stream banks together during high flows, which would keep channels from eroding and down cutting.

Flows within the allotment are expected to be maintained at the watershed scale. In-stream flows would improve at the project scale for lower Lost Creek as a result of decreasing the amount of water diverted for water troughs.

Objective 7: Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

Lost Creek disperses into several incised channels (which are dry during summer months) adjacent to South Prairie. A few of these incised channels flow into South Prairie, where the stream dumps the sediment load it is carrying into parts of the prairie. This flooding of South Prairie by Lost Creek helps to maintain it as an open meadow. This area would be expected to be maintained and protected behind the drift fence.

Summer low flows are a concern in Lost Creek because of 5 cfs being diverted from the stream all summer. Under Alternative B, the amount of water being diverted would decrease, thus keeping more water in the system. However, the very lower section of Lost Creek would likely be dry in most years regardless of the diversion. The use of Lost Creek Ditch would no longer exist. Meadow and wetlands would be protected by the fence exclosure. The mitigation measures and restorative actions under Alternative B would maintain the timing, variability, and duration of floodlplain inundation and water table elevation in meadows and wetlands.

Objective 8: Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

By eliminating approximately 1.8 miles of grazing along the lower section of Lost Creek, South Prairie Lake and tributaries, and 0.10 mile of Cave Creek, more pressure would be placed on the riparian areas of upper Lost Creek and portions of Cave Creek because they would not be protected by fencing. The harvest units along upper Lost Creek (about 0.5 mile below Forest Road 6030-080) contain an area of approximately 0.4 miles of stream length currently showing areas of downcutting and degradation, as well as 1.2 miles of Cave Creek. In these two reaches much of the stream margins are being grazed and trampled and bank failures are common. Grazing has contributed to reduced plant cover and root stability along the stream margins likely resulting in an increased level of sediment input and may have contributed to changes in stream morphology. The impacts exhibited along these stream channels would be expected to persist or may degrade further from present conditions if livestock stay in these areas longer than currently due to the elimination of a portion of the lower part of the allotment.

Fencing riparian areas would have the best chance for stream rehabilitation because they would have complete rest from cattle grazing. The fence exclosure would enable a greater area of streamside forbs, shrubs and trees to become established than under Alternative A. As riparian areas become well vegetated, stream bank vegetation may provide fish cover, reduce stream bank erosion, control water velocities and temperatures, and supply terrestrial foods. Improvements in stream morphology may be seen as root structures become established. It is expected that the structural diversity of plant communities in the limited riparian areas would be maintained at the landscape level and potentially degrade over a longer period of time along areas that are not fenced. However, the 30 % grazing utilization limit, mitigation measures, and restoration components of the proposed action may keep the riparian areas from further degrading.

Objective 9: Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.

Under Alternative B, a drift fence would be constructed to prevent grazing livestock from entering the South Prairie area to protect botanical sites, Mardon skipper butterfly sites, and riparian areas in Lower Lost Creek. Riparian areas that are not fenced will be maintained at their current conditions and have the possibility of degrading at the immediate site in "hot spots". Continuous grazing would be avoided in riparian areas, meadows and wetlands. Impacts would be mitigated by project mitigation measures that include a 30% grazing utilization limit. The proposed action provides for the development of habitat conditions within the riparian areas and across the landscape to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species at the project and watershed scales

Alternative C – No Grazing

Objective 1: Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.

Under this alternative, no permitted livestock grazing would occur on the Ice Caves Grazing Allotment. Existing fences and corrals would be removed. Cattle disturbances (trampling and foraging) in riparian areas, including the most disturbed reaches of Lost Creek, South Prairie Lake tributaries, and Cave Creek, would cease. Approximately 76 percent of Lost Creek below the water diversion site (dam) would receive more water discharge during the critical warm temperature/low flow time of year. Less water diverted would have a positive effect on the amount and quality of aquatic habitat in Lost Creek, and should lower water temperatures in lower Lost Creek during the low flow time of year.

South Prairie Lake and tributaries and Cave Creek will be allowed to revegetate and recover but will need restorative actions to recover to desired future conditions. Therefore, the distribution, diversity, and complexity of watershed and landscape-scale features will be maintained at the watershed scale and project scale.

Objective 2: Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.

Under Alternative C, there would be no future need to divert water from Lost Creek for grazing. Keeping water in Lost Creek would result in higher water volume creating more deep pool habitat, increasing fish hiding cover and thermal retreat areas. The migration barrier dam at the Lost Creek diversion intake would be modified if the dam is determined to be a barrier with the ditch closed. This would allow trout free up and downstream passage to seek optimal spawning and rearing habitat.

Of the three sub-watersheds (Lost Creek, Cave Creek and South Prairie Lake) with livestock riparian impacts, none have above surface flow into another stream or into Little White Salmon or White Salmon rivers. Without a connection of streams to any other downstream water bodies in the grazing Allotment, hydrologic, water quality, and aquatic species effects would not be expected at the 5th field watershed scale. Thus, Alternative C would maintain spatial and temporal connectivity within and between watersheds at the watershed scale, and restore connectivity at the project scale.

Objective 3: Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

Stream reaches where numerous areas of bare ground, cattle trails and trampled stream banks exist would be restored. Restoration would consist of planting vegetation (native grasses, hardwoods and conifers). Specific restoration actions would be covered by separate NEPA analysis and decision.

A trend toward recovery of streambanks and riparian vegetation and an improvement in aquatic habitat in the sensitive flat stream reaches would be expected under Alternative C. Over time, riparian vegetation would be expected to grow to a height and density where stream shade is provided and wood input into streams is increased. Input of organic detritus and food sources for stream organisms would also be expected to be enhanced. Alternative C allows for the natural passive recovery of riparian areas which would likely take several years. The physical integrity of the aquatic system will be maintained at the watershed scale and restored at the project scale over a long period of time.

Objective 4: Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.

Stream temperatures in Lost Creek may continue to not meet the Washington State standard of 16 degrees Celsius. However, water quality in lower Lost Creek will improve for aquatic biota because water withdrawal will no longer be needed.

No nutrient or pathogen monitoring has been done in the Allotment, and it is unknown if levels meet state standards. No monitoring of these contaminants has been done because there are no known threats to domestic water uses. If the riparian areas within the Allotment are no longer grazed, pathogens, i.e. fecal coliform, and nutrients (nitrates and phosphates) from cow feces in streams would decrease.

Elimination of the Lost Creek water withdrawal and streamside grazing should contribute to a decrease in water temperatures in the Allotment streams. If riparian vegetation grows to a height and density where stream shade is provided, stream temperatures and sediment would most likely continue to decrease while

streamside stability would increase. Over time channel morphology should improve as riparian vegetation re-establishes and reduces the velocity and erosive energy during peak flows. Improved fish habitat could be expected as the streams narrow, deepen and stabilize, providing cooler water temperatures, increased cover from predators and decreased sediment input. Water quality necessary to support healthy riparian, aquatic, and wetland ecosystems will be maintained at the watershed and potentially restored at the project scale.

Objective 5: Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.

It is anticipated that riparian vegetation would be allowed to grow to a healthy level where the velocity and erosive energy during peak flows is reduced, stream banks are more stable, and sediment input into stream courses is lessened. However, because of high road densities and past land management activities, the sediment regime is expected to be maintained at the watershed and project scale.

Objective 6: Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.

Past management activities have contributed to elevated peak flows within the allotment. Peak flows above normal conditions are predicted to occur in the Lost Creek, Cave Creek, and South Prairie 7th field drainages. Peak flows are expected to be maintained at the watershed and project scale.

The four miles of stream channel below the water diversion site on Lost Creek would receive approximately 14 percent or more water volume than it currently receives during the summer. This increase in water volume in the main channel would be expected to decrease water temperatures and increase oxygen availability and the amount and diversity of habitat for aquatic organisms.

Lower Cave Creek, Coyote, and Bear Creeks have no stream flow during the summer months, so there is no surface discharge from these streams for several months each year. Ditch systems were constructed in the Cave-Bear watershed as early as the late 1800's. In 1908 the Lost Creek ditch was constructed to bring water from the Little White Salmon watershed to the Cave-Bear Creek subwatershed. The lack of water in the Cave-Bear watershed is likely attributable in part to the highly porous basalts underlying much of the watershed (USDA 1996). It is likely the water from the Cave-Bear subwatershed re-emerges as seeps and springs along the White Salmon River below the town of Trout Lake. Therefore, in-stream flows are expected to be maintained at the watershed scale and restored in Lost Creek.

Objective 7: Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

The flooding of South Prairie by Lost Creek will continue to maintain an open meadow in South Prairie. The exclusion of cattle from all riparian areas and the elimination of water withdrawal, will maintain the timing, variability, and duration of floodplain inundations and water table elevation in meadows and wetlands.

<u>Objective 8</u>: Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

Riparian areas would no longer need to be fenced because there would no longer be any cattle needing to be excluded from sensitive flat stream reaches. "Hot spots" would have the best chance for stream rehabilitation because they would have complete rest from cattle grazing. As riparian areas become well vegetated, stream bank vegetation may provide fish cover, reduce stream bank erosion, control water velocities and temperatures, and supply terrestrial foods. Improvements in stream morphology may be seen as root structures become established. It is expected that the structural diversity of plant communities in the Allotment would be maintained at the watershed level due to the need to treat invasive plants that would more than likely become established before native plant species. Thus, species composition and structural diversity of plant communities in riparian area and wetlands will be maintained at the watershed level and and potentially restored at the project level over a longer period of time.

<u>Objective 9</u>: Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.

A trend toward recovery of streambanks and riparian vegetation and an improvement in aquatic habitat in sensitive flat stream reaches would be expected under Alternative C. Riparian vegetation would be allowed to grow to a healthy level where the velocity and erosive energy during peak flows is reduced, stream banks are more stable, and sediment input into stream courses is lessened. Over time, riparian vegetation would be expected to grow to a height and density where stream shade is provided and wood input into streams is increased. Input of organic detritus and food sources for stream organisms would also be expected to be enhanced. Numerous studies have demonstrated that range riparian-stream habitats degraded by livestock over-grazing can be rehabilitated once grazing has ceased (Platts 1984, Platts 1981). This alternative allows for the natural passive recovery of these riparian areas which would likely take several years.

SUMMARY

Overall, management activities under the Ice Cave Grazing Allotment will help restore riparian vegetation and aquatic conditions within certain streams by establishing a drift fence, protecting sensitive flat stream reaches from grazing, and establishing a 30% grazing utilization limit in riparian areas that are not fenced. Mitigation measures address impacts from heavy grazing in areas that would not be fenced.

Streamside vegetation, stream channel morphology, water quality (sediment, water temperature, nutrients and pathogens), and stream bank soil structure would improve in areas where active restoration takes place. The magnitude of restoration varies under each alternative. Alternative A would only fence the lower portion of Lost Creek, while Alternative B doubles the amount of riparian area to be protected and restored from cattle grazing. In addition, the modification of the water diversion dam will improve aquatic habitat conditions for aquatic biota in Lost Creek. Riparian areas under Alternative C would no longer be influenced by cattle use within the Allotment boundaries. Riparian areas may quickly improve when cattle

are excluded, but stream morphology improves slowly and fish populations may or may not be improved. Bare ground conditions would also become susceptible to invasive plants. Complete removal of cattle may not address the sediment regime and peak flows in the Little White Salmon and White Salmon River because of current road densities and past timber harvest activities. Therefore, the varying degrees to which active and passive restoration takes place under the three Alternatives will improve conditions at the site-specific scale and maintain them at the watershed scale.