TRENDS

SOIL

Erosion Processes

Although accelerated erosion continues to occur on some areas of the watershed where off-road vehicles have pioneered trails and roads, where bed-grounds and driveways occur, and where naturally erodible geologic formation occur, other restoration and management practices are improving vegetation conditions and improving ground cover that helps protect soils from erosion. Ecological units in the watershed have been rated for erosion potential based on the erosion factor and slope shown in Table G.

Table 31: Erosion Potential for Ecological Units in Fall Creek Watershed.

Ecological Unit	Landform Position	Erosion Factor (Kw)*	Potential Erosion	Acres
1219	**Mountains and Ridges**	**0.05-0.20**	**Low**	**10,044**
1294	**Mountains and Ridges**	**0.37-0.49**	**Moderate to High**	**947**
1303	**Mountains and Ridges**	**0.15-0.37**	**Low to Moderate**	**29,323**
1332	**Basins and Valleys**	**0.28-0.43**	**Moderate to High**	**6,936**
1333	**Basins and Valleys**	**0.28-0.43**	**Moderate to High**	**5,844**
1505	**Foothills**	**0.37-0.49**	**Moderate to High**	**125**
1507	**Foothills**	**0.05-0.24**	**Low to Moderate**	**298**
2606	**Drainages**	**0.02-0.37**	**Low to Moderate**	**919**
1970	**Mountains and Ridges**	**0.20-0.49**	**Moderate to High**	**5,505**

*Kw is a relative value that quantifies the susceptibility of the soils, including rock fragments, to be detached by water.

Basin and Foothill Soils

Soils in the Fall Creek Basin have moderate to high erosion potential, however these soils have good protective ground cover that reduces actual erosion considerably. The trend appears to be stable or slightly upward under the current management strategy. Similarly, soils that formed beneath forested vegetation appear to be stable with little erosion occurring due primarily to canopy cover and ground cover. Unauthorized roads and trails created by recreation users continue to reduce ground cover and create erosion on these soils.

Mountain and Ridge Soils

Conversely, soils on the ridges and mountain sideslopes in sagebrush/mountain brush have low to moderate erosion potential but tend to erode more rapidly when ground cover is removed. Areas identified as a concern are unauthorized OHV trails and roads on many of the lower Fall Creek drainage canyons, sheep bed-grounds and livestock driveways located on Commissary Ridge and other ridges. These areas, though not extensive in the watershed, have potential to produce large amounts of sediment into nearby streams and reduce long-term site productivity. When considering watershed improvement projects applied to these areas, the uplands are in an upward trend but continued projects are warranted. From this analysis, approximately 500 acres of rangeland is in deteriorated condition. Forested areas at the head of Pritchard and Garden Creeks have been severely

burned from recent prescribed fires and have yet to establish vegetation. Also the risk for noxious weed invasion is increased on these sites. Natural erosion rates from erodible geologic formations on the uplands will continue and management strategies are unlikely to improve these natural conditions.

Drainageway Soils

Livestock trampling has caused some riparian soils to be in detrimental conditions (pedestals and bank shearing) as identified in some of the tributaries to Fall Creek (Camp Creek, Monument Creek, Haskin Creek and others). Grazing and recreation use has also compacted soils and reduced ground cover along Fall Creek. The trend appears for these conditions to continue without changes in current management strategies.

Ground Cover

Using ground cover as a measure of stable watershed conditions, most areas of the watershed appear to be stable with a slight upward trend, except for those areas of concern mentions above. Adequate ground cover occurs on most of the cattle allotments but is less abundant on the sheep allotments. Areas that have the least ground cover are previously disturbed sites where prescribed fire has occurred, sites where low sagebrush occurs and areas where soils are shallow or geology is exposed. Based on ground cover measurements taken in the 1970's and 1980's, most of the ecological types in the watershed are within properly functioning condition criteria for ground cover.

Mass Stability

Soils that formed on unstable landforms are identified on the Ecological Unit Inventory Map (See Figure 6.) Unstable ecological units are 1175, 1219, 1507 and 1970. Unstable geologic formations are those that tend to erode easily and have experienced past mass failures. Few landslides have been initially identified within the watershed. No mass failures in the watershed have been identified as a result of management activities except for small cut-slope failures associated with road construction. Climate is the primary factor that determines the occurrence of landslides in a natural setting. Natural landslides will continue to occur on these areas when climatic conditions cause the surface mantle to become saturated with water, combined with slope stability factors of gravity and surface friction. Table H gives the acres of unstable landform hazard rating for each ecological unit within the Fall Creek Watershed analysis area.

Table 32: Ecological Unit Stability Hazard Ratings For Fall Creek Watershed.

Ecological Unit	Hazard Rating	Acres
1112	No Hazard	26
1175	Unstable	41
1219	Unstable	10,044
1294	No Hazard	947
1303	No Hazard	29,323
1332	No Hazard	6,936
1333	No Hazard	5,844
1505	No Hazard	125
1507	Unstable	298
1970	Unstable	5,505
2606	No Hazard	919
3000	No Hazard	28
Total		60,036

WATER

This section evaluates the changes between historic and current conditions. The headings correspond to those found in the previous chapter.

CLIMATE – PRECIPITATION

- The entire watershed falls within the snowmelt-dominated zone. Therefore, activities that alter snow accumulation or melt rates could affect the magnitude of the associated runoff response.

- Elevation appears to be important in this watershed. It drives total precipitation, total snowfall, and the time the area is snow free. Activities in this watershed should consider elevation in the planning process.

- Droughts and wet seasons appear to be cyclical occurring on 5-8 year cycles. We have just left a wet cycle and are in the second year of a dry cycle.

- Summer thunderstorms in the lower watershed can increase sediment delivery where soils are exposed. Vegetative cover and high infiltration rates should be maintained at this time.

- Snowmelt systems can produce saturated springtime soils. This can then affect stream bank stability, as wet soils with high silt contents are more susceptible to deformation than dry soils. Therefore, springtime cattle grazing can affect stream bank stability.

- While summer thunderstorms may add some moisture to soils, summer soils are dry and evapotranspiration rates are high. Therefore, these storms do not create the moisture conditions found during snowmelt and the risk of bank deformation is low.

WATERSHED CONDITIONS

Overall Watershed Ratings (IWWI)

Five changes to the current ratings are warranted:

1. An escaped prescribed fire reduced the geomorphic integrity and water quality of Garden Creek to “Moderate.” Philbin found bank instability at 50% through the burnt over area.

2. The composite for “Lower Fall” should be raised to moderate. While sediment is a problem, this material is being generated in the “Upper Fall” and “South Fork”

units. Relatively speaking, little sediment is being generated from this subwatershed.

3. The geomorphic integrity of "Upper Fall" should be changed to low. Bank instability is severe from the Forks to June Creek.

4. Water quality of "Upper Fall" should be changed to low. Sediment impairs about 80% of the surveyed reach. Abundant aquatic plant growth also suggests nutrient problems.

5. The composite rating for "Upper Fall" should be lowered to low. Streams in this area are highly impacted and non-functional.

Table 33: New Ratings

	Prichard	Garden	Lower Fall	Upper Fall	SF Fall
Watershed Vulnerability	High >50% Sensitive	High >50% Sensitive	High >50% Sensitive	High >50% Sensitive	High >50% Sensitive
Geomorphic Integrity	High All streams fully functioning	Moderate <20% Not fully functioning	Moderate <20% Not fully functioning	Low >20% Not fully functioning	Moderate <20% Not fully functioning
Water Quality	Moderate <20% Impaired	Moderate <20% Impaired	Low >20% Impaired	Low >20% Impaired	Moderate <20% Impaired
Composite	Moderate	Moderate	Moderate	Low	Moderate[1]

[1]This moderate level of impacts is the result of natural conditions.

Interpretations:

- Since the watershed vulnerability for all subwatersheds is high, care should be taken to minimize adverse effects. This is especially true in this sediment impaired watershed.

- "Garden", "Lower Fall", and "South Fall" are moderately impaired with regard to their geomorphic integrity. The assumption behind this rating is that watersheds of moderate integrity can see short-term recovery either naturally or through revised management with minimal capital investment.

- "Prichard", "Garden", and "South Fall" are moderately impaired with regard to water quality. Since water quality is primarily tied to sediment, and bank erosion is a primary sediment source, the same premise as for geomorphic integrity applies to water quality.

- "Upper Fall" is severely impaired with regard to its geomorphic integrity and water quality. Capital investments will be required to recover this segment.

Watershed Conditions Resulting from Disturbance

- The effects of roads and trails is increasing as new "user created' paths are being pioneered annually. This is primarily a problem in the "Lower Fall" area.

- Dispersed campsites will continue affecting bank erosion and sediment filtration so long as vehicles have access all the way to the stream. This is primarily a problem in the "Lower Fall" area.

- Grazing is degrading watershed condition in the Upper Fall Creek area. These conditions will continue to decline under current management.

- The conditions in the "Garden" area (related to the escaped fire) will recover as soil conditions improve and ground cover re-establishes.

RIPARIAN CONDITIONS

Flood Plain and Wetland Conditions

- Agricultural activities have greatly reduced the amount and function of wetlands at the mouths of Garden, Prichard, and Fall creek. These activities included wetland conversion to crops and farmsteads, channalizing the streams, and diverting water for irrigation. Some of these old wetlands still support seasonal wetlands that should be protected.

Riparian Vegetation / Conditions

- The density and type of vegetation has been altered from historic conditions. For the most part this represents a reduction in willow and carex and an increase in thistle. These reductions are expected as these species are very important in maintaining water temperatures (willow) and channel stability (carex and willow). As a stream's stability declines the vegetation can move further away from historic conditions. This is a common situation in this watershed.

- The vigor and age classes of willow and aspen are also altered along many reaches. In many areas there is not enough large willow or other woody vegetation to maintain stable beaver dams. This has lead to channel down-cutting, soil moisture reductions and a change in riparian conditions.

- The cumulative effect of dispersed recreation and cattle grazing have degraded several riparian areas along Lower Fall Creek. The dispersed recreation removes vegetation and prevents its re-establishment from banks and adjacent lands. The cattle than get an open grassy area with easy access to the channel for watering. These unvegetated banks, many located on high terraces, are than subject to

sloughing and stream scour. The hydrologic implications of altered riparian areas are discussed throughout the section on “Stream Conditions.”

- Streams with impacted riparian areas include:
    1. Upper Fall Creek;
    2. Fall Creek;
    3. Lower South Fork Fall Creek;
    4. Garden Creek;
    5. Camp Creek

STREAM CONDITIONS

Stream Flow Regime

- It is unlikely that flows from these drainages are discernable in the South Fork Snake River. Fall Creek, the largest of the three, makes up only 1.7% the total flow of the South Fork at their confluence. Therefore when conducting future cumulative effects analyses for flow the analyst only needs to consider down to the mouth of these streams.

- Since there are no reservoirs on these streams the timing of runoff is likely close to historic conditions.

- The reduction in wetland and beaver pond storage could affect soil and ground water recharge/storage and base flows.

- The South Fork is the most important subwatershed in terms of water production.

Channel Erosion

- Channel erosion has been substantially increased in Fall, Upper Fall, Camp, Monument, Gibson, and Garden creeks.
- Channel erosion in upper Fall Creek is the primary sediment source in the entire watershed. This is the result of naturally unstable banks/side slopes, very high riparian utilization, and bank trampling.
- The cumulative effect of dispersed recreation and grazing is the primary cause of increased channel erosion in the “Lower Fall” subwatershed.
- The escaped prescribed fire is the primary cause for increased bank erosion in Garden Creek.
- The high levels of channel erosion, found in the South Fork Fall Creek, is mostly natural.
- Floods in the mid-1980s “blew out” several beaver dams causing channel scour and sediment releases.

Mass Wasting

- The frequency of mass wasting, in the “Upper Fall” subwatershed has been increased due to a decrease in riparian vegetation and from cattle and motorized trails.

Surface Erosion

- Surface erosion is a concern in the “Lower Fall” (roads and recreation) and “Upper Fall” (grazing and roads) areas. However, it is secondary to bank erosion in both cases.

Turbidity

- Turbidity is likely not an issue in this drainage except in extreme events. However, the old name “Muddy Creek” suggests that high turbidity levels are possible.

Sediment Transport

- Upper Fall Creek is a source and depositional reach, the South Fork is a source and transport reach, and lower Fall Creek is a deposition reach. This is important in determining the fate of sediment delivered to these segments.

- The current sediment pulses are larger than what was found historically. This is because the majority of the basin’s sediment is now being stored in short-term bed features, as opposed to in long-term beaver complexes. In addition, the sediment transport efficiency of many project area streams has been reduced. This combination creates an abundant supply of sediment that is not being held back. These conditions were caused by a reduction in beaver dam storage and wider streams that are less efficient at transporting sediment. The first is a watershed wide issue while the second is in the “Upper Fall” area.

- The quality and quantity of building materials for beaver dams are poor. This is important because when a dam fails, a large pulse of water and sediment may be released. If many dams fail at once, as they did in the mid 1980s, this could cause a significant impact.

Stream Channel Morphology/Stability

The first section evaluates the differences between the historic and current conditions. The second section evaluates how sensitive the various streams are to future disturbances.

Stream Evaluations and Trends

Lower Fall: Stream conditions were likely at their worst following the Current Creek fire. At this time large areas of riparian vegetation was burned off and channel erosion was severe. This past erosion is shown by the old "high banks" present in the lower portion of the subwatershed. Over the past 10-20 years, new banks have formed at the toe of the old eroded banks. These are fairly well vegetated by willow. These new banks and vegetated channel bars indicate improving trends. However, the substrate will not substantially improve until sediment source are reduced in upstream areas and at dispersed campsites.

South Fall: Stream conditions are mostly the result of natural instability. Therefore, conditions are fair and trends are static.

Upper Fall: While upper Fall Creek has a high degree of natural instability, this problem has been exacerbated by cattle grazing and motorized recreation. It's likely that conditions were improving in the 1970's and early 1980's following a reduction in grazing impacts. However, a large flood event in the mid-1980's washed out several beaver dams causing substantial channel impacts. This resulted in a highly sensitive channel that cannot handle even today's reduced levels of grazing. As a result, current conditions are now poor and trends are declining. This is shown by very high levels of bank erosion, accelerated bar development, huge sediment pulses, and little revegetaion of banks and bars.

Garden: Conditions in Garden Creek were degraded following an escaped prescribed fire in 2000. However, trends are improving as new willows are sprouting along the stream banks. This will stabilize the channel and reduce sediment production.

Sensitivity to Future Disturbances

Watershed, riparian, and stream alterations have reduced stream resiliency in all subwatersheds. As a result, the sensitivity to peak flows alterations and sediment delivery has been increased in Fall Creek, as well as almost all of its tributaries. The relative condition of these basins can be rated from best to worst as Prichard, Garden, Lower Fall, South Fall, and Upper Fall. Table 9 summarizes current stream stability, sensitivities to future disturbances, and the priority for restoration. These variables were developed based upon the inherent sensitivity of the stream and changes in watershed, riparian, and stream conditions. The extent of the change from historic conditions defines the magnitude of the sensitivity. The following bullets provide the interpretation for table 4-1. Where sensitivities are different for sediment and flows, the interpretation applies to the variable being evaluated.

- Streams with fair physical stability and moderate sensitivities are streams that show impacts but are still functioning. These streams would become impaired if a large disturbance or alteration were to occur.

- Streams with fair physical stability and high sensitivities are streams that show impacts but are still functioning. These streams cannot handle any additional impacts.

- Streams with poor physical stability and high/extreme sensitivities are unstable streams that cannot handle the level of disturbance or alterations they're currently receiving. Impacts should be reduced or the stream will continue declining in condition.

Table 34: Stream Summary

	Key Stream	Physical	Sensitivity to Changes in		Restoration
	Type	Stability	Stream Flow	Sediment	Priority
Fall Creek (Sfork-LCurrent)	C4	Fair	Moderate	High	Moderate
Fall Creek (LCurrent-SFall)	C4/6	Fair	Moderate	Extreme	Moderate
Fall Creek (SFall-June)	C4/6	Fair	Moderate	Extreme	Moderate
Upper Fall Creek (June-Haskins)	C4	Poor	High	Extreme	High
Upper Fall Creek (Haskins-Forks)	C3	Poor	High	Extreme	High
South Fall Creek	B4	Fair	Mod-High	High	Low
Garden Creek	B4	Fair	High	High	Mod-Low
Prichard Creek	Data Gap	Data Gap	Data Gap	Data Gap	Data Gap

Poor = Not Functioning or Functioning at Risk – declining trend

Fair=Functioning at Risk

Restoration

Improving riparian conditions is a high priority since this is where a great deal of the sediment originates. These efforts should concentrate on riparian restoration, expanding beaver populations, and sediment reductions through improved land management practices. With the exception of rehabilitating specific and severe bank problems, instream work should be deferred until problem areas in the upper watershed are addressed. These problems include degraded riparian conditions, a reduction in the size and spatial extent of beaver complexes, upstream bank erosion, poor rangeland conditions, and erosion from roads and trails. Treating these problems is the only way to ensure long-term success. The priority for treatment can be summarized as "Upper Fall", "Lower Fall", "Garden", "South Fork", and "Prichard".

- "Upper Fall" has the highest priority because it is the primary sediment source for this sediment limited (303d listed) watershed and its recovery potential is good. The restoration should center on reducing cattle impacts on the stream banks, improving riparian conditions through improved grazing management, and enhancing beaver habitat.

- "Lower Fall" is the second priority because it will be added to the states 303(d) list and its recovery potential is good. Since most of the sediment impairing this reach originates in the upper drainage, it would not make sense to address this area first. The restoration should center on reducing the impacts of dispersed camping and motorized recreation, improving riparian conditions, and converting the thistle back to native species.

- "Garden" is third because it was impacted by human disturbances and its recovery potential is good. Restoration should center on stabilizing the banks and establishing ground cover along and adjacent to the burned over reach.

- "South Fall" is fourth because most of the problems associated with this drainage are natural. Restoration should center on improving the fords and reducing the thistle near the confluence with Fall Creek.

- "Prichard" is fifth due to a lack of information.

Water Quality Limited Segments (303(d))

- It seems clear that Fall Creek is indeed water quality impaired by sediment from its mouth to the Forks. The South Fork is not impaired by anthropogenic sediment.

Temperature

- Water temperature is a major concern in this watershed. In 2001, Fall Creek exceeded state standards for 42% of the sampling period (July and August). This can be attributed to reduced willow cover, wider and shallower streams, and little topographical shading.

- Spot sampling found Camp Creek to be right at State temperature standards. Therefore, temperature may be an issue in this stream.

FIRE

Fire performs many roles within the Fall Creek ecosystem and plant communities. Topography, elevations, soils and climate work in concert with fire to influence these plant communities and play an integral role within the ecosystem. These factors influence plant community composition, drive vegetation succession, regulate fuel accumulations and nutrient cycling, influence the scale of vegetation disturbance, affect wildlife habitat, interact with insect and diseases, and influence ecosystem productivity. Certainly the size, severity and frequency of fires will result in varying degrees of impact on each of these “fire effects. Removing fire from the ecosystem processes will also effect plant communities.

The geographic characters of the area influence fire behavior. The high mountain ridges and steep dissected canyons of the area make fires terrain divide. Diurnal slope and canyon winds make fires spread uphill and up canyon indicated in the photo below.

Figure 108: Current Creek Fire 1966

The Fall Creek analysis area is aligned northwest to southeast in the Snake River drainage with the prevailing winds from the south. This can channel and strengthen winds as they flow up canyon contributing to wind driven fire spread. The watersheds within the analysis area that flows into the Snake River drainage are generally oriented eastwest/northeast. This forms an alternating pattern of the generally south and southwest facing slopes intermixed with slopes facing north and northeast. However, the numerous tributaries and side drainages within the watershed form a complex dendritic pattern. This results in all aspects being represented in the analysis area. Fires tend to burn more rapidly on the high energy aspects (South Aspects) due to flasher fuels, higher temperatures, higher isolation and lower relative humidity.

Weather events dictate when fires will occur within the analysis area. The climate of this area is inland empire, with an average annual precipitation ranging from 20 inches >

depending storm tracks and elevation. Overall the climate is cool and dry, with periods of heavy snow in the winter followed by spring rains. A hot dry period usually dominates through late June to September. Lightning associated with thunderstorms are common during late July through August, with these thunderstorms are common during this period and cause many fires.

Fire suppression over the last fifty years has increased fuel loads within the analysis area overall. Combined with management activities such as grazing and vegetative manipulation in specific areas, has in some cases decreased the fuel loads in the range and shrub lands, and increased fuel loads in area where commodity uses have taken place as depicted in this picture of Rash Canyon firewood area.

Figure 109: Firewood cutting area Rash Canyon Plot #13.
38.22 Tons/Acre Down & Woody

Figure 110: Plot 71 3.49 Tons/Acre
Typical upland grazing area.

Insect and disease within the Fall Creek analysis area continues to increase the amount of standing dead and ladder fuels. Down woody material will continue to increase the fuel bed loads as the standing timber falls to the ground as indicated in the picture below.

Figure 111: Identification Picture Rash Canyon

Approximately in the next twenty years, almost 25% of the analysis area will be outside its historical fire interval. Fuel loadings are increasing in all habitats and fire regimes. This could set the stage for large, uncontrollable wildfires. Douglas-fir, subalpine fir and lodgepole pine forest may be limited to incidental trees or groups of trees unless prescribed fire and/or harvest methods are employed to restore stand structure and fire's natural role within the ecosystem. The cost of fighting large wildfires is getting increasingly more expensive, while the availability of money for treatment of natural fuels is more readily available.

FORESTS

Timber stands, including aspen, continue to age. Natural cycles for the stands mortality including insect/disease, and fire, can be expected. Stand composition will shift towards later successional species, i.e. Douglas fir and Alpine fir. On a landscape bases, timber stands including aspen will move away from Properly Functional Conditions as defined by Region 4 PFC Plan. This would particularly true as to stand structure and compositions. Most aspen stands are starting to fall apart because of age and invading conifers. This trend in stand condition is expected to continue until some activity, either timber harvesting or fire reverse the direction of the aging process of the stands.

Insect population can be expected to grow with an aging stand and increase stress from dry water years. This situation is already evident in the conifer stands as the Douglas Fir Bark Beatle is attaching more and more Douglas-fir patches. Without some management actions mortality levels will increase.

Disease activity will likely remain similar to current conditions, but may also see a slight increase as drought stress occurs to the timber stands in the analysis area.

It is unlikely that timber demand and prices will encourage future entry to many of the stands in this area. Stands are too isolated and inaccessible to foresee the possibility for harvesting many if not most of the stands. Some stands are large enough in the upper part of Fall Creek Drainage, which might be feasible for harvesting activities. Even these will be marginal for harvesting activities in the future unless the market has a significant change upward. Small harvest sales, where road building is not required, will likely be the only management activity available for timer removal.

Although slight, water yield will decrease as conifers invade aspen sites. A Conifer tree create more transpiration than a similar aspen tree, hence more water is drawn from the soil from a conifer stand than aspen stand. Soil characteristics will change as conifers invade aspen sites. Soil will then favor the invading conifer stand.

Conifers will continue to encroach on sage and grasslands over time.

Stands within the analysis area are mature and over mature in age class. The Targhee National Forest Management Plan states that 96% of stand on the forest are mature to over mature in age class. The analysis area fits that statistic. Stands are currently past culmination of mean annual increment. Continual loss of optimum growth of the stand can be expected.

RANGELANDS

Differences between reference and current conditions of rangeland vegetation is a result of plant succession and disturbances related to human and natural occurrences. Climatic conditions have changed somewhat. Historically the winters of the early 1900s up to mid fifties were much wetter, accumulating significantly more snow than the winters after the fifties.

The heavy grazing of livestock in the early 1900s also had an effect on vegetation composition especially in the riparian zones where cattle prefer to graze and congregate. These areas however are quick to respond to proper management due to the irrigated sites that they are. Today most of the riparian areas are fair/good condition and in an upward trend. The head waters of main Fall Creek has unstable stream banks, cattle seem to aggravate these already sensitive areas. Some of the tributaries of upper Fall Creek such as Camp, Monument, and Haskin Creeks still lack willow cover. The beaver dams that once pooled up the flow of water have blown out and with the lack of good dam building materials (such as mature aspen adjacent to streams) available it will be some time before the dams can be reestablished. The other streams within the analysis area seem to be stable and functioning.

Treatment of sagebrush and mountain brush has been occurring in the analysis area since 1945. Prior to human suppression of wildfire the area had burned several times within the last 200 years judging by the old fire scars. Some of the sagebrush treatments have included mechanical, chemical and fire as methods of brush removal. The cycle required for treatment of sagebrush to maintain a desired canopy of 25 to 30% seems to be approximately 20 years. There are several locations in the analysis area where sagebrush canopy has reached that density.

Prescribed fire was initiated in the Garden and Pritchard Creek drainages in 1999. Approximately 2624 acres were burned. Species burned were conifer timber, aspen, and mountain brush. At this time mountain brush, aspen, willow, as well as grass and forb species are on the rebound, except in isolated sites where fire was hot enough to sterilize the soil. Canadian thistle has invaded in some areas of the burn where the fire was the hottest. Control efforts have been initiated to reduce and prevent the spread of this weed.

The private land in Garden Creek has traditionally been rangeland for grazing by cattle. In recent years the land has been sold to a developer and the area is presently being subdivided. This is the trend with most of the private land in the analysis area and especially along the South Fork of Snake River.
Noxious weed control is in effect through the analysis area. Most infestations are adjacent to travel routes such as roads and trails. Weed species found in the area are Canadian thistle (common across the area), musk thistle (isolated plants), leafy spurge

(several sites usually next to private agricultural lands), knapweed (along roadways). The invasion of exotic species is a threat but with present weed program of inventory, monitoring and treatment the weed problem is being controlled.

FISHERIES

Fall Creek

Observations from Payne (2001) and Haderlie (2001) indicated a decrease in the Fall Creek beaver population. This is a concern because beaver and cutthroat trout have evolved together in the Fall Creek watershed. In fact, cutthroat trout are somewhat dependent upon beaver ponds to survive summer droughts such as we are experiencing this year. In addition, juvenile cutthroat trout use the ponds for rearing. This decrease in beaver populations comes at a time when willows are increasing, so available forage does not appear to be the problem. Rod Payne (2001) suggested he has observed an increase in trapping over the last 2 decades and this may account for the decrease in beaver. This trend is a concern.

There is an overall increase in nonnative brook trout within Fall Creek. This population was established with only 2 stockings in the 1960's. In 2 fish surveys in the 1980's by Idaho Department of Fish & Game (Moore 1980, Moore and Schill 1984), no brook trout were observed. It wasn't until the 1999 fish distribution survey by the Caribou-Targhee National Forest (USDA Forest Service 1999) that brook trout were documented. In 1999, brook trout were the dominant salmonid in the Fall Creek salmonid community. This trend is a concern.

Figure 112: Cutthroat trout and brook trout captured in Fall Creek 1999 survey.

After 6 decades of stocking rainbow trout in Fall Creek, their stocking was discontinued in 1987. Genetic samples were collected from Fall Creek trout to determine the degree of introgression between rainbow trout and cutthroat trout. The samples have not been analyzed yet. The discontinued stocking of rainbow trout in Fall Creek is a favorable trend.

Motorized vehicle use has increased in Fall Creek since the 1960's (Brunson 2001). This is an undesirable trend where this increase in motorized vehicle use has impacted aquatic and riparian habitat. These impacts are most visible at fords (e.g. Rash Canyon and

South Fork Crossing), roadside riprap sites (e.g. FS Road 077), and where roads and trails parallel streams closely (e.g. Upper Fall Creek Road/Trail, FS Road 077 and 085).

Although dispersed campsite locations were apparently not well documented in the past, it is assumed they have increased in frequency and size since the 1960's due to an increase in use and number of vehicles. Cut stream banks are associated with some of these sites. This trend has the potential of becoming negative (from a fish and riparian habitat perspective) if it continues.

Stream bank erosion and sedimentation, partially natural in upper (East Fork) Fall Creek, has been exacerbated by cattle. This was documented in 1980 and 1999 stream surveys and reinforced by the 2000 aquatic macroinvertebrate surveys.

Pritchard Creek

Pritchard Creek has apparently never been stocked with nonnative fish. This is a beneficial trend. It is uncertain what effect the stocking of Yellowstone cutthroat trout between 1948 and 1965 has had upon the genetics of the Pritchard Creek Yellowstone cutthroat trout population.

Pritchard Creek Yellowstone cutthroat trout population density was estimated in 1979, 1980, and 1999. The densities were 59, 41, and 48 fish per 100 meters of stream, respectively. Accounting for natural population fluctuations, these fish densities were relatively consistent throughout. This flat trend is a concern because one would expect to see some improvement in fish population density with the attention Pritchard Creek received during this time period, including the placement of brush revetments and fish ladders and exclosure fences.

The return of fluvial Yellowstone cutthroat trout to Pritchard Creek after the correction of an impassable drainage structure under Highway 26 and the blowout of the Ostrecamp Dam in 1984 is a beneficial trend. These fish help in genetic diversity and have the potential of refounding resident populations in case of future extirpation.

According to the 1999 stream survey notes and observations by Capurso in 2001, exclosures constructed in lower Pritchard Creek appear to be successful in helping to recover the riparian area around Pritchard Creek. This is a beneficial trend.

Figure 113: Trend towards recovery in BLM exclosure, 9/01.

Grazing on Forest land between the BLM exclosure and the old reservoir bed has maintained extremely impacted riparian and stream channel conditions for more than a decade. Grazing impacts include denuding riparian vegetation, streambank trampling, sedimentation, and maintaining streambank instability. With the impacts associated with grazing, the brush bundles placed by Trout Unlimited did not have the ability to work and are, as a whole nonfunctional today. Raw stream banks continue to provide sediment to the stream and healing is not allowed due to cattle grazing impacts that include trampling and overgrazing.

Figure 114: Stream bank trampling and riparian vegetation overgrazing on Pritchard Creek, 9/01.

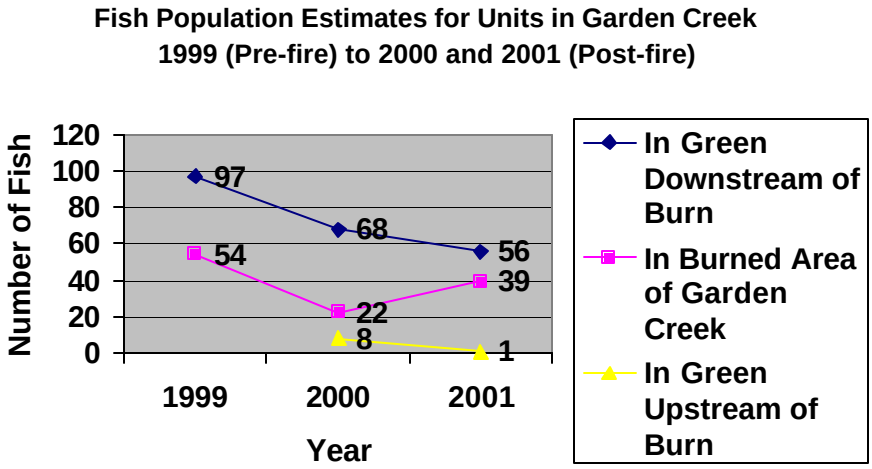
Garden Creek

Although brook trout and rainbow trout were stocked in Garden Creek on 2 occasions each, they apparently did not establish naturally reproducing populations and the limited rainbow and cutthroat trout stocking did not likely affect the native cutthroat trout population genetics. This is a beneficial trend.

Figure 115: Measuring a Yellowstone cutthroat trout in Garden Creek, 7/01.

Over the last 50 years, fires in the Garden Creek watershed were extremely limited, prior to the escaped prescribed burn in 1999. The 1999 wildfire had immediate negative effects upon the Garden Creek cutthroat trout population, but long term impacts may be positive with an increase in large instream wood and a setback of the riparian vegetation, including vigorous new growth, provided the associated fine sediment works its way out of the system. The following analysis is based upon 3 years of data; 1 before the 1999 fire and 2 after. Although 3 data points limit the opportunity for analysis, there are some opportunities for preliminary interpretation. Future data points will aid our understanding of the effects this fire has had upon fish and their habitat.

Figure 116:



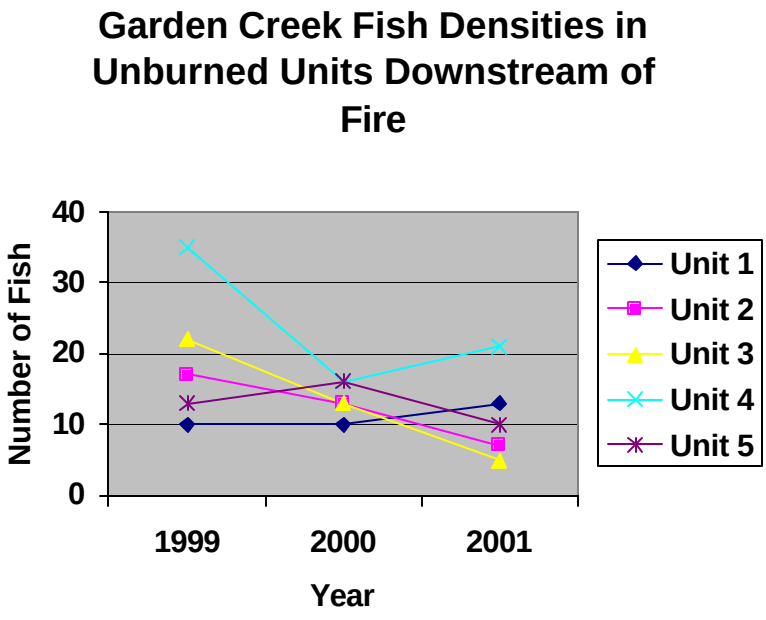
The graph above depicts fish population estimates for sample units in Garden Creek before and after the escaped prescribed fire burned across the watershed. The fire occurred between the 1999 and 2000 data points. Between 1999 and 2000, there were significant decreases in fish populations in and downstream of the burned area. The rates (slope) of these population decreases in both of these reaches were similar. This was likely due to 2 factors; the direct effects of the fire and the beginning of a new drought

cycle. There were reports and photos of fish killed within the burned area immediately after the fire. This population decrease is reflected in decreases both in and downstream of the area.

The population of cutthroat trout within the burned area was less than downstream of the burned area even prior to the fire. This may be due to less habitat quality and quantity.

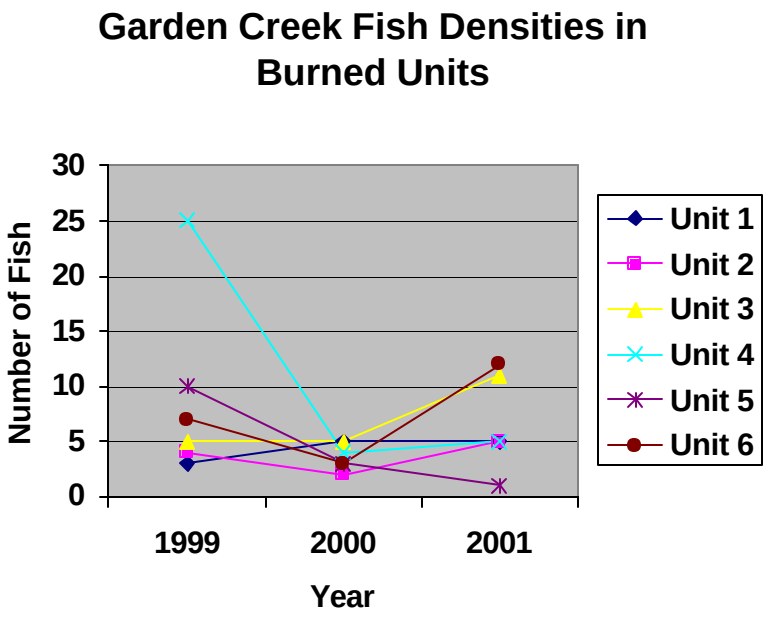
One and a half years after the fire (2001), the populations in the burn increased slightly. This increase may be due to an increase in habitat complexity. The fire contributed high amounts of instream large wood to the stream. Stream nutrients may have increased due to the fire also, influencing forage opportunities. However, instream fine sediment increased due to the fire and is well documented in both 2000 and 2001 data. It is likely this increase in sediment will affect future fish reproductive success. The continued decrease in population density downstream of the burn between 2000 and 2001 may reflects the decrease in reproductive success. Many juveniles produced upstream would have drifted downstream to populate the unburned area. The 2000 to 2001 fish density decrease in the reach upstream of the burn may reflect the continued drought and simple lack of habitat after 2 relatively dry winters.

Figure 117:



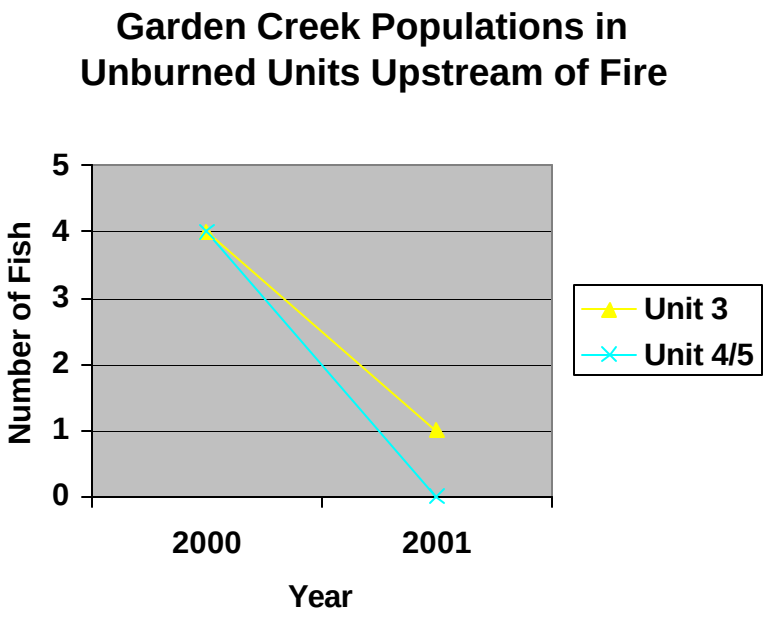
Fish densities in most units within the unburned reach remained relatively constant between 1999 and 2001. The exception is Unit 4. That unit was reported to have excellent habitat quality with great vegetative cover. The excellent habitat allowed more fish to populate this unit between 2000 and 2001, likely from units with degraded habitat quality within the burn.

Figure 118:



There were slight increases in population densities documented in Units 6, 3, and 2 in the burned areas between 2000 and 2001. These slight increases were likely due to an increase in habitat complexity. The fire contributed more instream wood to these units and overhanging cover still existed in parts of this reach. There is a concern about the high frequency of instream sediment in this reach, also contributed from the fire. The sediment may be reflected in future population decreases due to its effects on reproductive success.

Figure 119:



The decreases in population density between 2000 and 2001 in Units 3, 4, and 5 is likely due to less available habitat from the drought, including a relatively dry winter.

Ranching activities on private land in the lowest reach of Garden Creek have impacted the Yellowstone cutthroat trout in the stream for nearly 100 years. These impacts are from water diversions and pond developments, affecting some upstream access of fluvial Yellowstone cutthroat trout and likely increasing mortality of young downstream-migrants as they are entrained in diversions.

WILDLIFE

1. Quaking Aspen clones are suffering and conifer is encroaching and taking over. Fire hazard in the timber types is increasing as the conifer stands are aging and dying creating a lot of standing and down dead wood. Wildlife species like cavity nesting owls and other species still present (eg. fisher like old forests, but may not be present) should be getting to a population high compared to the 1800s when fire was a natural part of the ecosystem. There may be some aspen being impacted by browsers in winter range. Refer to the figures and aerial photos below showing the aspen/ conifer changes over the last half century in Pritchard Creek.

Figure 120: Photo in July 2001 of north facing forested habitat that is south east of the old Pritchard Creek dam site.

Figure 121: Note the encroaching conifer trees in the aspen clones. This ecological succession is happening throughout the watershed where fire has been excluded. Note dying conifer from insect and disease. The fuel is building for a future wildfire that could be catastrophic.

Figure 122: Aerial photo on Sept. 14, 1951 where Pritchard Creek leaves the National Forest boundary below Pritchard Dam and flows through the Conant Valley Ranch. Note forested stand to southeast of Pritchard dam is predominately aspen with scattered conifer. A large part of the Garden, Pritchard and Fall Creek watersheds are characterized by forested north slopes and south slope elk and deer winter range with grass, brush and mahogany. There is 160 acres of private farmland within the NF boundary on east (right side of photo). This is where Merrill (2001) and a rancher saw grizzly tracks in the early 1990's.

2. The beaver decline caused in the early 1800s by over-trapping probably caused a dewatering of the watershed (eg. dry stream beds in late summer in dry years) causing damage during high water events and spring runoff in heavy snow years. This lack of beaver along with the heavy livestock rates in the late 1800s and early 1900s probably caused Fall Creek particularly to start down cutting and become entrenched. Thus, it was a beginning to increased erosion rates and loss of willow wildlife habitat. The beaver's habitat was then impacted by not having higher water tables to grow enough willow to keep a sustainable population. The fact that the earliest trappers called it "Muddy Creek" indicates that it has always had some level of sedimentation prior to the heavy beaver trapping. The negative trend was fueled by the advent of motorized vehicles in the 20th

century when roads were added to the streamside. Today the encroachment of Fall Creek road 077 is a problem for a good part of the stream impacting riparian wildlife habitat. Riparian habitat is in fairly good condition is some places such as mid Fall Creek, Pritchard Creek, but is in poor condition in places in lower Fall and upper Fall Creek.

3. Motor access density has increased dramatically on both legal and illegal routes and impacting both summer and winter wildlife. Prior to 1960s and 70s snowmobiles had not come on the scene to impact wildlife. Prior to mid 80s 4x4 ATVs had not been on the scene. This trend is increasing direct damage to both upland and riparian habitats. The increase motorized use is impacting the way game use the habitat and game are being displaced during heavy use periods like during the hunt season. The trend is that the motorized vehicle damage to animals and habitat will continue to increase as the population of vehicle riders increases, unless the FS increases its law enforcement effort to implement the new Travel Plan. Illegal cross country routes will probably continue to increase.

4. Research data in this specific area indicate displacement of elk during summer and fall seasons from the Fall Creek watershed to Unit 66A to the south on the Soda Springs District. Correlation of radio tracked elk from 1998 to 2000 and from previous collar studies strongly indicated that the high motorized use in Fall Creek, Pritchard and adjacent areas are forcing the animals to move to more a remote location.

5. Dispersed camping has and is continuing to impact riparian habitat in Fall Creek. Riparian willow damage appears to have increased somewhat in the past 16 yrs (Alford 2001). Additional camping spots don't seem to have increased that much but the impacts seem heavier in each spot. The trend for good riparian willow is not getting any better.

6. Sage and bitterbrush appear to be recovering from past burns 15-20 yrs ago or more in the upper Fall Creek basin.

7. Big game winter range on some south slopes of Fall Creek appear to have less brush than 30 yrs ago. This may be caused by the wildfires in '60s. Other places on the slopes where microclimate is not as harsh have stands of sagebrush. Recent burns such as in Pritchard and Garden Creeks have decrease sagebrush stands. Is the trend toward more sage under fire control management? How do we also account for habitat needs for sagebrush dependent non-game and sage grouse?

Figure 123: A south facing slope in lower Fall Creek has a good stand of sagebrush mixed with grass for wintering animals.

8. Snowmobile travel on designated routes through the Fall Creek critical winter range has a moderate effect within the corridor. The trend of violations of snowmobilers traveling crosscounty off the designated route had been about the same each year. It is continuing to happen whereever machines can get off the trail (eg not steep slopes). Newer more powerful machines allow some to climb steeper hills than in the past. Those going far off the trail into wintering herds like on Fourth of July Ridge for example could be causing significant harm to elk and deer.

9. Fire suppression has favored late seral species in woody habitats, both forest and brushlands. But, increasing use of prescribed fire in the watersheds have kept some stands in early seral stages, such as in Garden Creek forest stands and Pritchard Creek sagebrush stands. Fire in forested stands in Garden Creek has favored some species (eg. the Three toed woodpecker). Fire in sagebrush has favored elk forage sources, but this may not be too good since it is the mule deer population that is not doing as well now and elk populations are doing well as far as the total number in the herd.

10. Species basically missing from these watershed ecosystems that were here prior to 1812 include: grizzly bear, gray wolf, bison, antelope, rocky mountain bighorn sheep, fisher, Canada lynx and wolverine. There may be some that travel through the area from time to time such as a single wolf, grizzly bear, wolverine or even lynx. It is unlikely that many will return anytime in the near future in viable numbers in the watershed for various reasons. It is very likely that gray wolf packs will return to the basin. Big game herds would provide a ready food supply for them year round. A fisher could be here today, but it would probably take a transplant to get a viable population anytime soon. Sage grouse are present in a small number and that may have been the extent of the population historically. It could be they have expanded their range in response to the

expansion of sagebrush due to fire control around the watershed on state, BLM and private lands. Bighorn sheep probably won't return until domestic sheep are phased out and there are no plans for that. A occasional bighorn will show up in the Palisades from the Teton range. If bison returned it would have to be part of a grazing operation. If and when the wolves show up wolverine may be seen more often also.

11. Adjacent private farms and pastures have diversified habitat for edge loving wildlife and provided spring and summer forage for big game on the adjacent forest. The trend along the South Fork has been more urbanization and construction of human dwellings which are replacing farm and ranchland. Some private lands in the watershed have already been approved by Bonneville County to be re- zone for urban housing from the existing agricultural zone. This trend for the Quarter Circle O property (640 acres) in the Upper Fall Creek basin could be very bad for wildlife year round if it is sold and developed. Currently, it is grazing land and part of both winter range and transitory range for big game. If this particular property is developed the Fall Creek road 077 under county control will probably continue to be up graded. It could become a year round road rather than a snowmobile trail in winter. This could be both good and bad for herds wintering in Fall Creek. Increased vehicle speeds could kill more animals, but they may have less harrassment from snowmobiles. If the FS does a land exchange for Quarter Circle O then a better future may be in store for wildlife.

12. The trend for nesting bald eagles along the river in the watershed will increasingly be tight. That is, eagles will need to adjust their nesting territory as development occurs. This has been the trend for the 2 eagle territories just up river from the Conant eagle pair.

Figure 124: Photo from Fall Creek upstream toward the Swan Valley bald eagle territory. Fall Creek is the territory boundary with the Conant eagles. The Swan Valley birds had to move their nest site around for about a decade now as development on private lands has encroached. As this trend continues will the last resort for the Conant

birds be National Forest habitat which has many competing uses in the river interface with the watershed?

RECREATION

Dispersed Camping

Dispersed recreation growth in the analysis area is following the normal population growth of the surrounding communities. Which means public use at the campsites is increasing, but not faster than the surround community population growth rate. Hunting camping appears static and may be declining slightly. However summer use is increasing along Fall Creek and those areas accessible to RV use. Group camping has become very popular and is expected to continue to be the largest type use for summer dispersed camping. However, the overall rate of growth seems to be relatively slow and directly related to ATV use. The number of camping sites along Fall Creek is not increasing, but the number of people at one time in the camping sites (group use) does seem to be increasing. Group camping change, which is a general trend on the Palisades District where RV access is open, is the most significant change in dispersed camping in the analysis area. Because of the limited potential sites for RV use in the analysis area, it is expected that the increased dispersed camping along Fall Creek will eventually slow and level off in the future. Hunting camping will remain constant. The number of camping sites along Fall Creek will not increase, but each site will be used longer during the season as summer recreation increases. Dispersed site condition will be more impacted as summer use duration increases. Dispersed camping in the more remote areas (not accessible by vehicle) should see little change from current use.

Motorized Travel

Motorized use is increasing as more people move into southeastern Idaho and ATV sales continue to increase. This condition started in the mid 1990s and is still running strong at this time. Technology has improved greatly and is probably the major reason for the continued success of the industry. People need places to ride and the analysis area offers terrain suitable for the beginner and moderate rider. ATV use will continue to grow as an aging population using ATVs. Motorcycles use will increase slightly, but because of the skill required to operate motorcycles, the increase will be slower and restricted to better and younger riders. Illegal off trail/road use will increase and be difficult to control. More management emphasis must be placed on this problem in order to check the illegal use. Riders tend to explore trails made by the previous rider. As hunters using ATVs (mostly done by hunters) and summer users pioneer new trails, other users will follow and the trail will be improved eventually becoming an established used trail. Most ATV users want to be able to travel into the Forest Backcountry. The analysis area offers a quality experience for these users. Horse ownership (traditional means of access) is limited by space and dollars for many of the general public, so the traditional methods of accessing the backcountry has and will change more from horse use to motorized use. This is general true for most of the Forest, but is particularly true for the analysis area due to the type of terrain and open vegetation patterns.

Developed Facilities

There are no planned developed facilities in the analysis area. This is expected to remain unchanged for many years with no future developments in the planning process. The one exception to development planning is around the Falls Creek Falls. The South Fork Activities and Operation Plan identified a need for walks ways and view platforms for the falls. It has been low priority for the Forest for funding and no immediate funding is expected. It is doubtful that any action will be taken prior to the next Forest planning period.

Outfitting

Commercial outfitting is not expected to change much in the coming years. The area is currently roaded and trailed so that the general public does not need the services of an outfitter to access the resources of the analysis area. Current outfitting business has not shown tend for increased outfitting services. User days reported by permitted commercial outfitters do not show increases in demand that would be shown if public demand were high. There is some possibility for adjacent private land development, which might generate requests for commercial outfitting on National Forest. This has occurred one time in the past for the analysis area, but even that demand has been small and does not indicate growth. It is unlikely any development of this type will occur in the near future, which might present a demand for use on the National Forest