Fisheries

Introduction

Information for this analysis has been gathered from a variety of sources. Since 1983, the Flathead National Forest, MDFW&P, and research contractors have conducted 49 fish population inventories and 30 fish habitat condition assessments throughout the analysis area. In addition, four habitat survey locations have been monitored to assess changes in habitat condition. This data, which is the basis for this analysis, is stored in files at the Swan Lake Ranger District Office and summary data is available in Project File Exhibits L-1 and L-2. In addition, peer-reviewed scientific literature has been used as the primary source of information regarding the life histories and habitat requirements of the aquatic organisms and the effect of natural and human-caused disturbances upon those organisms.

Analysis Area Description

Spatial Bounds

The project area falls within (from north to south) Alder Creek, Meadow Creek, Pony Creek, Cat Creek, Dog Creek, Simpson Creek, Condon Creek, Falls Creek, Smith Creek, Cooney Creek, and Rumble Creek Watershed. Smith Creek includes a large, unnamed tributary nicknamed “Smith Flats.” Therefore, the affected area is all fish-bearing habitats within these watersheds and any connected, small tributaries that discharge into fish-bearing streams. There are numerous isolated wetlands in the project area, but none have fish and are not included in the analysis area. McKay Creek is intermittent and has no surface water connectivity to any other stream. This fishless stream is not included in the analysis area. Map 3-5 illustrates the analysis area for the Fisheries Resource.

The fish population within the analysis area contributes to and interacts with a much larger population due to the migratory nature of fish. All of the streams in the analysis area are tributaries to the Swan River, which in turn discharges into Swan Lake. Native bull trout (*Salvelinus confluentus*) spawn and rear in headwater streams but migrate downstream to Swan Lake to mature. Westslope cutthroat trout (*Orcorhynchus clarki lewisi*) are more variable in that some individuals never leave their natal streams but other individuals will migrate back and forth from the Swan River. Fish seldom migrate downstream of Swan Lake and the Bigfork Dam also prevents any fish from migrating between Swan Lake and Flathead Lake. Therefore, although the analysis area only covers from Alder Creek basin to Rumble Creek basin, the implications of any cumulative effect to these streams reflects on the viability of the Swan River fish stocks as a whole.

Temporal Bounds

The temporal bound is 11 years after the beginning of project implementation (approximately 2019). This is based on the possibility that it may take 10 years to fully implement all the prescribed burns due to the difficulty in scheduling with such narrow weather and fuel condition requirements. As detailed below, the potential impacts from a prescribed burn could be felt for 1 year after the burn. Therefore, up to 10 years to implement all the burns, plus 1 year for impacts, equates to 11 years from the start of project implementation. The vegetation management and associated road construction or maintenance is likely to happen within 5 years of the decision. Water yield modeling on vegetation management and associated road work suggests that water yields will return to existing

conditions in just a few years after completion. Therefore, the 11-year time span is the greater number and selected as the temporal bounds.

Affected Environment

A. Westslope Cutthroat Trout

Westslope cutthroat trout are native to the analysis area and the Swan River Valley. They have co-existed with bull trout for thousands of years and are well adapted to thrive in cold, clean and relatively unproductive streams found in the Swan River Valley.

Westslope cutthroat trout (hereafter called cutthroat trout) probably historically occupied every perennial stream in the Swan Valley, at least part of the year, unless they were blocked by a waterfall. This means cutthroat trout were historically abundant in Alder, Meadow, Pony Creek, Dog, Cat, Simpson, Condon, Falls, Smith, “Smith Flats,” Cooney, and Rumble Creeks. Cutthroat trout generally used the steeper headwaters for spawning and rearing habitat during the spring and summer. During the harsh winter season, most of the fish would head downstream to lower gradient, slow moving waters. The numerous beaver ponds in the valley floor of Alder, Meadow, Pony, Smith, “Smith Flats”, and Condon Creeks would have been excellent places for the trout to grow large and survive the winter periods. During the warm summer periods, the cutthroat trout may have temporarily moved out of beaver ponds only to return during more favorable periods. Even small, intermittent tributaries probably got some occasional use by trout during the right flows. During temporary catastrophic events such as a flood or wildfire, the trout simply moved out of the area altogether and returned the following year when conditions improved. Cutthroat trout are highly mobile and depend on good access to a wide range of habitat conditions in order to thrive.

Cutthroat trout spawn in early spring when temperatures rise to 10°C, and fry typically emerge from the spawning beds in late July. Migratory juveniles leave the natal streams at age 2 or 3 and travel downstream to the Swan River to mature before returning to spawn around age 4 or 5. Other individual cutthroat trout never leave their natal streams. These “resident” fish do not grow as large, but they are numerous.

Cutthroat trout are no longer as numerous as found historically, and are not found in every stream in the Swan Valley. This is a common problem across the entire range of the species. Cutthroat trout are a species of special concern identified by the Regional Forester, the State of Montana, and the Montana Chapter of American Fisheries Society. There are four primary reasons for cutthroat trout decline across its range:

1. Competition from non-native species,
2. Hybridization with non-native species,
3. Habitat degradation, and
4. Over-fishing

Non-native Brook trout were stocked in the Swan River in the 1930s and 1940s. They have since become self-sustaining and spread throughout the Swan Valley. Juvenile brook trout can out-compete juvenile cutthroat trout (Novinger and Rahel 1999). Over time this causes the cutthroat trout population to dwindle due to poor juvenile survival rates. In some streams in the Swan Valley, brook

trout have completely replaced cutthroat trout, but on other streams, cutthroat trout have held ground, mostly in the headwaters. For some reason, brook trout have not successfully established themselves in Cooney, upper Cat, upper Dog, upper Condon or upper Smith Creeks. They are present in low numbers, but not abundant.

Another serious threat to cutthroat trout is hybridization with non-native rainbow trout and non-native Yellowstone cutthroat trout. Yellowstone cutthroat trout were once stocked in Pony Lake and Cat Lake, although genetic testing has found these genes are no longer present and not a threat in the analysis area. Rainbow trout were stocked decades ago in the Swan River and are now a self-sustaining population. They have not spread as widely as brook trout but they can hybridize with cutthroat trout. The progeny are fertile and over the years, the population becomes further and further hybridized. The hybridization tends to migrate slowly upstream, with the low elevation areas hybridizing first. Genetic samples have found that the cutthroat trout in the headwaters of Cat Creek are 95 to 98 percent pure with 2 to 5 percent rainbow trout genes. In the headwaters of Pony Creek, the cutthroat trout are 99 percent pure with 1 percent rainbow trout genes. Genetic testing is not available for the cutthroat trout of upper Dog, Condon or Cooney Creek and it is assumed they are also slightly hybridized. However, the Smith Creek population has been tested and found to be still 100 percent pure westslope cutthroat trout. This is somewhat surprising since there is no known barrier to block hybrids from invading the pure population. Upper Smith Creek has the only known, endemic genetically pure population of cutthroat trout in the analysis area but it is not “secure” because there is nothing to prevent invasion in the future.

The third threat to cutthroat trout throughout its range is declining fish habitat conditions. Fish habitat conditions in the Cooney McKay Analysis Area are detailed in the following discussions. Finally, while overfishing is a common concern in other drainages, there is no indication that this has taken place anywhere in the analysis area. Montana Department of Fish, Wildlife and Parks have not felt any reason to adjust fishing regulations to protect cutthroat trout on streams in the analysis area.

As a result of the impacts described above, cutthroat trout are currently abundant in about 29 percent of available fish habitat in the analysis area. They are still numerous in Cat, Dog, Cooney, and also upper Pony, upper Condon, and upper Smith Creeks. About 6 percent of the total fish habitat is blocked by poorly designed culverts; cutthroat trout are present but sparse upstream of these culverts. The remainder of the analysis area (about 65 percent) is dominated by non-native brook trout. The District Fish Biologist estimates that only 22 of 63 streams in the Swan Valley still could be considered strongholds of genetically pure or nearly pure cutthroat trout. The Cooney McKay Analysis Area has six of the 22 streams with cutthroat trout strongholds.

B. Bull Trout

Bull trout are listed as “threatened” under the ESA due to habitat degradation, competition and predation by non-native species, over fishing and other causes throughout their historic range.

Bull trout are native to the Swan Valley. Bull trout can exist under two life history forms; 1) resident or 2) migratory. Resident bull trout spend their entire lives in their natal streams, while migratory bull trout travel downstream around age 2 or 3 to Swan Lake to mature. Bull trout spawning occurs in the fall when water temperature is about 9°C, and the eggs incubate in the stream gravel until hatching in January. The yolk-sac fry (alevins) remain in the gravel for several more months and emerge as fry in early spring. Bull trout are generally considered sensitive to good water quality in that they require fairly clean spawning gravels (not covered with silt) and prefer cold temperatures. Resident bull trout

remain small, but migratory adults can live 8 to 15 years and commonly weigh over 15 pounds. Local Fisheries Biologists believe that the Swan Valley is dominated by migratory bull trout, and there are no documented resident populations. Yet, it is possible that some resident bull trout population could exist. It is difficult to determine if small sized bull trout in streams are, in fact, resident adults or migratory juveniles; it is possible that resident populations have not been correctly classified.

Figure 3-1 illustrates the long-term monitoring of bull trout redds throughout the Swan Valley. A 1996 status assessment found the Swan Valley population was one of the few strongholds in Montana and needed a “conservation” strategy rather than “restoration” (Montana Bull Trout Scientific Group 1996). Swan Lake is still considered to have a population strong enough to sustain some angling pressure. The single greatest threat to bull trout in the Swan Valley is the new introduction of non-native lake trout in Swan Lake. So far it appears the lake trout population is still too small to have an impact on bull trout. The District Fisheries Biologist estimates it will take about 10 years before any bull trout population decline is detected. A multiple agency panel has concluded that if left unchecked, the lake trout will replace bull trout as the dominate piscivore (an animal that mainly eats fish) in the Swan Valley. Research is underway to determine the lake trout population size and to study feasibility of lake trout suppression.

Despite the healthy numbers of bull trout in the Swan Valley, they are scarce in nearly every stream in the Cooney McKay Analysis Area. Bull trout have been occasionally captured in Condon, Cat, Dog and Meadow Creeks. The densities of bull trout captured are very low, on average less than 1 fish per 100 m (328 feet) of sampling effort. The 1939 stocking report also mentions that Condon, Pony, Cat, Dog, and Rumble Creeks contained bull trout, but is silent about the fish composition of all the other streams (USDA Forest Service, 1939). There are no records of bull trout in Falls, Simpson, or Smith Creeks, but the sampling effort is insufficient to prove absence.

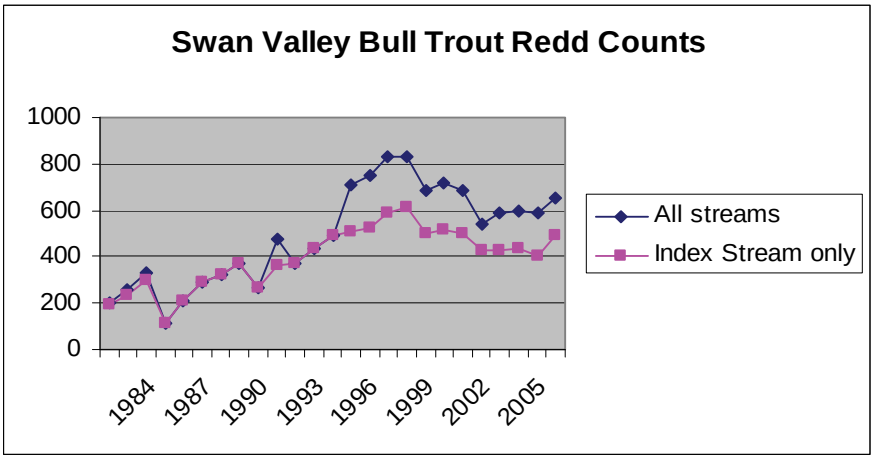

Figure 3-1. Swan Valley Bull Trout Redd Counts.
Total redd counts of Swan Valley bull trout from 1982-2006. Four index streams have been monitored annually. Several other streams have been included in recent years. None of these streams are located in the Cooney McKay Analysis Area.

Cooney Creek is the only stream in the analysis area with bull trout spawning and rearing habitat. Cooney Creek has fairly abundant small sized bull trout, which implies successful spawning and rearing takes place. Even a stocking report prepared around 1939 mentions that Cooney Creek was

closed to fishing and had “dolly vardens,” a previous name for bull trout (USDA Forest Service, 1939). These fish may be either juvenile progeny from big migratory fish or perhaps a resident bull trout population.

Cooney Creek has never been considered a priority bull trout watershed (INFS designation). The stream has no special fishing regulations. The USFWS has not designated any critical habitat anywhere in Cooney Creek.

Cooney Creek does not appear to have an upward trend, while the rest of the Swan Valley population is increasing. This may be due to lack of data and the inability to find any redds on Cooney Creek to date. However, it may also reflect that the Highway 83 culvert of Cooney Creek is blocking bull trout migration and restricting opportunities for population growth.

Another threat to bull trout in the analysis area is the overwhelming numbers of non-native brook trout. Brook trout can hybridize with bull trout. Genetic samples of bull trout in Goat, Squeezer, and Lion Creeks (key spawning streams just north of the analysis area) were collected in 1994 and 2006. Preliminary results found that about 20 percent of bull trout are first generation hybrids, with hybridization especially prominent in low elevation reaches. This suggests that brook trout pose a significant impact on displacing bull trout but the hybrids are not fertile (Wade Fredenberg, USFWS, personal communication). This is opposite of what is occurring in Mission Creek located in the nearby Confederated Salish and Kootenai Indian Reservation. In Mission Creek, the hybrids are fertile and over time the pure bull trout population was extirpated. The Tribal Biologist speculates the key difference is that migratory bull trout of Swan Valley are much larger than the resident, small-sized bull trout of Mission Creek. (Barry Hanson, Confederated Salish and Kootenai Tribes, Personal Communication).

No genetic sampling has been done on Cooney Creek. Brook trout are present in Cooney Creek but in fairly low numbers. If the bull trout of Cooney Creek are resident fish, then they are at risk of hybridization with brook trout. This raises additional concern that the Montana Highway 83 culvert could be creating an artificial resident bull trout population and that population is at risk of hybridization.

The discussion on the existing condition of fish habitat will be organized by the key habitat components that could be affected by the Cooney McKay Project: <u>sedimentation, stream channel morphology, and habitat connectivity.</u>

1. Sedimentation

Sedimentation into trout streams is considered a key concern and the most frequently cited type of pollutant in streams of the Pacific Northwest (Bauer and Ralph 2001). In 2004, the DEQ identified sedimentation from tributaries of the Swan Valley as one of the reasons for concern about water quality in Swan Lake (DEQ 2004). In discussions about local fisheries habitat, sedimentation is narrowly focused on the amount of silt, sand, clay and small gravels that are less than 6.35 mm (0.25 inch) in diameter. This is based on local fisheries research (Weaver and Fraley 1991) and commonly referred to as “fine sediments.”

The amount of fine sediments in a stream can profoundly affect the quality of fish habitat. The native trout species lay their eggs in between gravel substrate and if these eggs are covered with fine sediments, they suffocate (McIntyre and Rieman 1995) (Weaver and Fraley 1991). Furthermore, the vast majority of aquatic insect species depend on cobble and gravel substrate that is not “embedded”

or stuffed with fine sediments. In extreme cases, where fine sediment is very thick, it can fill in pool habitat and bury logs that fish need for cover and rest. The exact relationship of fine sediment to fish population density is notoriously hard to correlate since fish respond to many habitat variables. Nevertheless, it is commonly accepted that limiting sedimentation is an important way to maintain the health of aquatic resources.

Though fine sediment is an important parameter, there are no regulatory standards and no consensus on how to quantify the effects (Bauer and Ralph 2001). The challenge comes from the extremely dynamic nature of substrate conditions as it can vary naturally from stream to stream, riffle to riffle, and year to year (Everest et al. 1987).

Pebble counts have been widely used throughout the Flathead National Forest to measure fine sediment and are the basis for this effects analysis. Pebble counts consist of measuring the average diameter of at least 100 samples within a riffle. Pebble counts have been widely accepted as reproducible data (Kondolf 1997) and it is the professional opinion of the District Fisheries Biologist that local pebble count data has done an adequate job to minimize variability caused by time of year and observer bias (Olsen et al. 2005).

The available information suggests that 7 of 23 stream reaches in the analysis area have fine sediments levels typical of reference streams. Three of the 23 reaches have more sediment than expected and 13 stream reaches do not have sufficient information to judge. The three stream reaches with excessive sedimentation are Pony Creek Foothills, Smith Creek Foothills and possibly Dog Creek Valley Floor (a borderline situation). Two other stream reaches, namely Pony Creek Valley Floor and Cooney Creek Headwaters, were within range of reference streams but are on the upper edge and approaching a level of concern. Project File Exhibits L-2 and L-3 provide the details on the existing condition and how it is used to compare to reference streams.

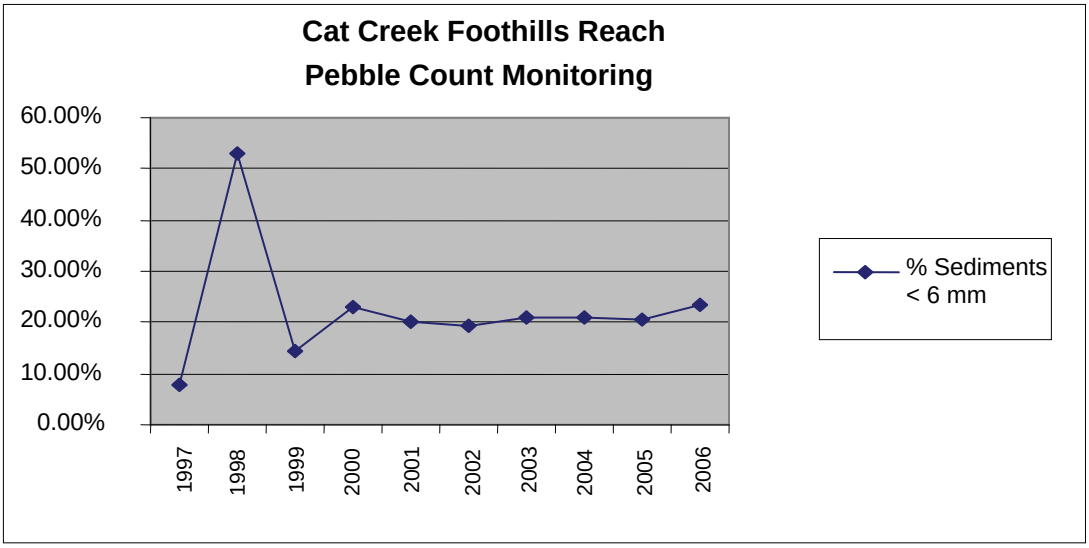

Figure 3-2. Cat Creek Foothills Reach – Pebble Count Monitoring.
Pebble count monitoring on Cat Creek Foothills Reach conducted from 1997-2006 as outlined in the Meadow Smith FEIS. This location on Cat Creek was selected as a “control” since it is assumed to be fairly insensitive to sedimentation.

Four stream reaches have had repeated monitoring of pebble counts since the late 1990s. Cat Creek Foothills and Dog Creek Valley Floor have been monitored annually since 1997 to describe a baseline trend for the planned (but not yet implemented) “Meadow Smith” land management activities. Cat Creek’s study site was selected in an area assumed to be fairly insensitive to change and acts as a “control.” Dog Creek’s study site was selected in a sensitive, depositional area that would respond to changes in the watershed. As displayed in Figures 3-2 and 3-3, Cat Creek had some initial variability but has otherwise been very stable. Dog Creek has a declining trend to fine sediments (r2 = .659). This suggests that the pebble counts are useful for detecting trends and Dog Creek’s fish habitat has improved since 1997. Dog Creek has improved from excessive sedimentation, and now nearly meets the objective of reference stream fine sediment levels. The foothills of Condon Creek have also been monitored once and have fewer fines since the initial year 2000 assessment. The foothills of Smith Creek have been monitored twice since 1999 with no clear trend observed. All of these monitoring samples suggest that the streams are either slowly improving or staying the same since the late 1990s. There is no indication that sedimentation is getting worse.

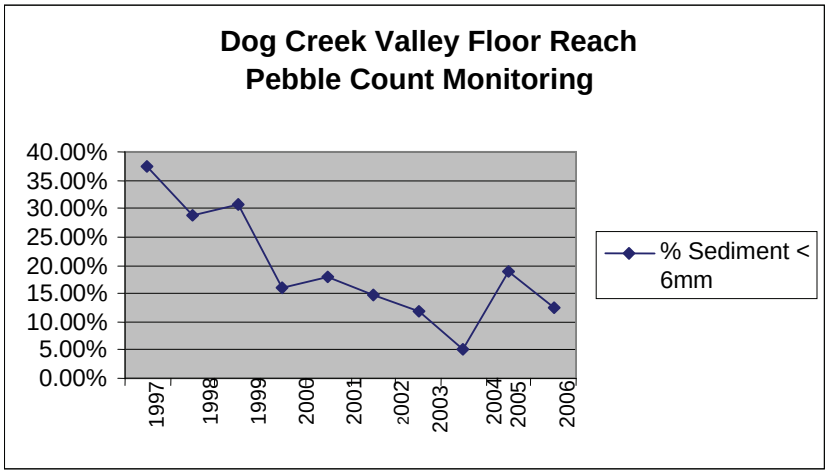

Figure 3-3. Dog Creek Valley Floor Reach Pebble Count Monitoring.
Pebble count monitoring on Dog Creek Valley Floor Reach conducted from 1997-2006 as outlined in the Meadow Smith FEIS. This location was selected to monitor the impacts of Meadow Smith land management because it is assumed to be sensitive to change. Meadow Smith land management has not taken place yet.

There are several possible explanations for the stream reaches that have high levels of fine sediment. First, it could be natural since all streams have some natural levels of fine sediments. Eroding hillsides, toppled trees, avalanches and other natural events move sediment into the channel. Wildfires also can contribute sediment, although there has been no significant fire in the analysis area for decades. As described earlier, there is so much variability from stream to stream and year to year, it is impossible to link fine sediment measures to any one particular up-slope input (Bauer and Ralph 2001).

It is reasonable to conclude that past and present activities have and are contributed some degree of sedimentation to the streams. There are three observations that support this. All headwater reaches appear to have normal levels of fine sediment. Since there has been very little land management activity in the headwaters, this supports the hypothesis. The hypothesis is also supported by noting that several (but not all) stream reaches with high road densities do indicate that fine sediment levels

are higher than expected. Finally, the improving or steady trend suggests that watersheds may be recovering from past events. The following discussion reviews the past land management activities that may have contributed sediment to channels.

Research has found the most profound source of sediment tends to be from forest roads (Everest et al. 1987). While the headwaters are not roaded, the rest of the watersheds have roads that were built to provide logging access on both Federal and PCTC lands, plus also to reach other small private landowners. The exact year the roads were built is not recorded, but it is reasonable to assume most were built in the 1960s to 1980s to accommodate logging. Logging activity peaked at the end of the 1980s, and it is assumed that harvest since then has not needed many more roads (with the exception of recent road construction in Dog Creek watershed by PCTC). Figure 3-4 illustrates the total timber harvest acreage in the Cooney McKay Area over the years. It is assumed that road construction roughly paralleled the harvest activity.

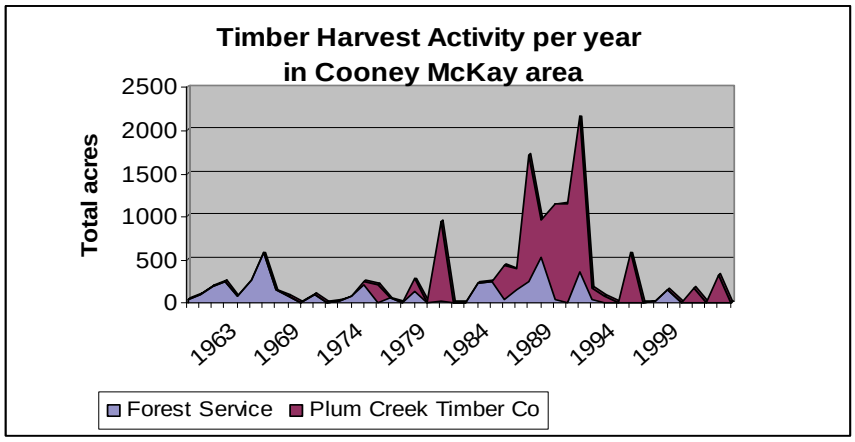

Figure 3-4. Timber Harvest Activity per year in Cooney McKay Area.
Total timber harvest activity by FS and PCTC in the Cooney McKay Area. Information gathered from available records from 1959-2002. Total acreage is displayed of all types of activities, such as thinning or clearcuts. Older timber harvest activities may have occurred but are not on file. No FS activity has taken place since 2002 and PCTC has not yet provided information on activity since 2002.

During initial construction of roads, it is likely a lot of fine sediment washed down into the streams. The greatest source of sedimentation is where a road crosses a stream. There are at least 81 stream crossings in the analysis area, maybe more since not all roads on private lands are mapped.

Some erosion is still actively taking place on the roads today. In 2002, the DEQ funded a study in order to develop a TMDL for Swan Lake. This study examined numerous road/stream intersections in the Swan Valley in order to estimate the total amount of sedimentation entering into the Swan Lake. The TMDL study examined 35 of the 81 known road/stream intersections in the analysis area (surveys in McKay Creek Basin are not included in this analysis) (DEQ 2004). These 35 sites have been modeled as eroding a total of 44.42 tons per year, which equates to about 33 cubic yards or three dump trucks per year. This is about 9 percent increase of the annual tonnage being routed through the streams than what existed historically (based on WATSED Modeling in Table 3-35).

One particular stream crossing needs a special description. Forest Development Road #889 has two twin culverts in place across Pony Creek. These culverts are not currently significant sources of

erosion, but they are at “high risk” of failure. The culverts are barely passing spring flows in average years and could easily wash out in a flood. If the culverts wash out, it is estimated they would erode about 43 tons of sediment (more than doubling the amount of sediment normally carried by the stream).

Roads also have a more subtle, indirect impact to fish habitat in that roads can alter a stream’s natural flow regime. Roads can capture water that would have otherwise moved underground and bring it to the surface. The ditches along a road, then, can transport this water into a stream. The cumulative effect is that the stream can experience higher-than-normal runoffs during the spring and then less-than-normal flows during the summer and winter. As a result, the stream banks erode and the channel widens in order to accommodate flows. Thus, a high density of roads can indirectly contribute fine sediment. However, the existing condition of all but one stream indicates that the banks are stable and mimic what is expected in reference streams. Thus, with the possible exception of Smith Creek Foothill stream reach, it appears unlikely that the high road density is currently a source of sediment. In other words, the initial construction of the road may have had an impact but existing road density does not appear to be an indirect factor.

Another possibility is that past timber harvest practices contributed sediment to channels. As displayed on Figure 3-4, timber has been harvested since the late 1950s and peaked at the end of the 1980s. Timber harvest practices up until 1991 routinely included harvesting of riparian areas. This likely resulted in surface erosion from equipment operations that flushed into the streams. Residual trees left near the stream may have also toppled over and contributed sediment. With the passage of the Streamside Management Zone Law (SMZ) in 1991, harvest practices were more carefully implemented and had less risk of sedimentation. Private landowners, including PCTC, still conduct some timber harvest activity in riparian areas but audits have generally found implementing the SMZ Law is effective in curtailing sediments (see Water Resources section for further information). The Flathead National Forest has not conducted any timber harvest activities in any riparian areas in the analysis area since 1995. The “INFISH” Regulatory Framework (a Forest Plan amendment) created buffers designed to be wide enough to filter and trap any adjacent sedimentation from timber harvest activities (USDA Forest Service, 1995).

The removal of trees in the past may have reduced the amount of precipitation that groundwater captured and increased the surface runoff. This in turn would have an indirect effect on increasing peak flows in streams. This could lead to scoured stream banks and increased sediment. However, as the years go by, the harvested stand would regenerate with new trees and the water regime return to normal. The District Hydrologist reports that about 70 percent of water yields recover within the first 15 to 20 years after harvest, although full recovery may take many decades. A WATSED Model was used to estimate the residual increase of annual flows from historic timber harvest activities for each watershed as compared to a fully forested, baseline condition. The Hydrologist also used a Pfankuch Channel Stability Survey to monitor trends and interpret WATSED Model results. In summary, four streams may still be experiencing some impact from past harvest. Alder, Meadow, Pony and Falls Creeks have conditions that indicate concern based on modeling and survey data. Details on the modeling and channel surveys are found in the Water Resources Section.

Private land development may or may not have contributed sediment to streams. Sedimentation is possible if landowners clear riparian vegetation, build poorly designed roads (especially if located near streams), and build structures too close to streams. The District Fisheries Biologist reviewed 2003 aerial photographs and concluded that nearly all development to date has been sufficiently far from streams and probably had little impact.

Summary: It is concluded that the overall condition of fine sediment is a limiting factor in a few streams (namely Smith, Pony, and possibly Dog Creeks). Modeling and field observations also suggest that Meadow, Alder, Simpson, and Falls Creeks may also have high levels of fine sediment. These may be a result of past land management. The majority of this is likely from initial road construction and older harvest practices. Some lingering sedimentation may still be taking place from poorly maintained roads.

2. Stream Channel Morphology

Stream channel morphology refers to the complexity and dimensions of in-channel habitat features such as riffles and pools. Fish require a mixture of habitat features, for example, fish need pool habitat for cover but also riffle habitat for a source of insect production (food). The more complex the channel morphology, the greater the carrying capacity for fish. A stream with degraded channel morphology would have few pools of low quality, broad and shallow stream banks, and poor trend of channel stability (from Pfankuch Surveys as described in Water Resources Section). Similar to the discussion on sedimentation, a stream's channel morphology has a natural range that varies by geology, gradient and discharge. Channel morphology can also be influenced by disturbance such as a wildfire or a flood. Channel morphology of reference streams is used for comparison to determine the health and condition of streams in the analysis area (Project File Exhibit L-3).

There are several ways to characterize channel morphology. Residual pool depth is a quantitative measure that denotes the difference between the maximum pool depth and the pool outlet depth. A deep pool (one with a high residual pool depth value) offers superior fish habitat and is especially valuable for wintertime habitat. Residual pool depths are considered sensitive to land management changes (Bauer and Ralph 2001). Land management activities that result in increased runoff, sedimentation and/or less woody debris would affect the stream by filling in pools (reducing the residual pool depth). Despite the sensitivity of residual pool depths, there can be a long time-lag in response. It may take years or even decades before average residual pool depth increases or decreases.

Another method to characterize channel morphology is to describe the frequency of pool habitat types. While all habitat features are important, pool habitat tends to be the most limited. Therefore a stream with a high frequency of pool habitats is superior fish habitat.

A third method to characterize channel morphology is to monitor the trend of the channel's width and depth. A permanent "cross-section" consists of precise elevation measurements of a channel's width and depth at a select point. A single "cross-section" by itself is meaningless, and it does not have value until it is monitored over time. Width and depth measurements change gradually and it usually takes 5 to 20 years to observe change (Roper et al. 2004).

A fourth method is to monitor changes in Pfankuch Stability Ratings. These subjective ratings are conducted by a Hydrologist or trained Technician who compile scores on indices like moss, moving bedloads, rocky and armored banks and other items. A single Pfankuch survey by itself does not fully characterize channel morphology, but repeated monitoring can detect a trend. The Water Resource Section provides further information on Pfankuch Stability Ratings.

The existing condition of stream channel morphology in the analysis area is highly variable. Some streams have sufficient numbers of pools but shallow residual depths. Others have the opposite with few pools but good residual depths. Some have stable trends in Pfankuch stability ratings and others

have declining trends. The three permanent “cross-sections” with repeat monitoring surveys also found a mixed pattern. Smith Creek Foothills had a slightly improving trend with narrower width and increased depth. However, both Dog and Condon Creeks had a slightly deteriorating trend. Data from all these surveys are available in Project File Exhibit L-2. All streams currently exhibit fair to good channel morphology conditions. However, it appears that Meadow, Simpson, Condon, Falls, and Smith Creeks have declining trends of channel morphology. Table 3-34 summarizes the findings for each stream reach.

The causes for these small changes in channel morphology are very similar to the discussion on sedimentation. There has been no significant disturbance event (fire or flood) in the area since about 1919. Channel morphology can be altered by changes in water yields and/or changes in the riparian vegetation. Past timber harvest may have increased peak flows, and the older harvest also cleared riparian vegetation. Past and present road networks can collect water in ditches and discharge them into streams. Private land development can also reduce the acreage of vegetative ground due to the construction of roads and buildings. All these things can ultimately fill in pools and widen the channel. The key difference between the cumulative effects of channel morphology and sediment is time. The majority of historic events that caused sedimentation have recovered and are no longer contributing sediment to streams. Streams can flush out sediment and return to baseline conditions within a few years (depending of course on the timing of flushing flows). But, changes to channel morphology can be very slow, possibly taking several decades (Bauer and Ralph 2001). The existing condition in the analysis area may reflect the effects of activities that began in the 1960s.

3. Habitat Connectivity

Habitat connectivity describes the ability of fish to migrate freely to all available fish habitat. In undisturbed systems, fish can travel between spawning habitat to rearing habitat, and from summer to winter habitat. Cutthroat trout and bull trout are well known to migrate great distances due to their complex life histories. Most individual fish are thought to return to the same stream, even the same pool, year after year, but a few fish stray into other areas. These straying individuals prevent genetic isolation and can help rebuild a population that collapsed (such as following a catastrophic flood or fire). Fish populations with unlimited connectivity are more resilient than fragmented, isolated populations (Rieman and McIntyre 1993). Small isolated populations, such as those above a waterfall or culvert in the stream headwaters, are at extreme risk and probably cannot be considered viable. Either the population will suddenly collapse after a catastrophic event or the population will slowly decline due to inbreeding and loss of genetic variability.

While historically, there may have been some temporary barriers here and there created by beaver dams, it is assumed that fish had historically unlimited habitat connectivity up to natural waterfalls. Currently, there are at least 11 known barriers, all created by humans in the Cooney McKay Analysis Area. One is a private water diversion on the North Fork Rumble Creek and the other ten are associated with road culverts.

Poorly designed culverts can block fish by creating a waterfall on the outlet or having too much velocity. Not all fish have equal swimming ability. Adult trout can leap several feet, but weak-swimming fish such as sculpins or even juvenile trout need gentle, natural flows to pass through a culvert. A juvenile trout is defined as a fish not yet sexually mature, usually 1 to 4 years old. A 2003 inventory of culverts found 10 of the 27 in the analysis area are blocking some or all upstream migrating fish. All 10 of the barriers were ultimately due to the same problem, the culverts are simply

too small to adequately convey water and subsequently had high velocities and outlet waterfalls. The following table itemizes the fish migration barriers, listed from north to south.

TABLE 3-37.
LOCATIONS, IMPACTS, AND POTENTIAL SOLUTIONS TO KNOWN FISH MIGRATION BARRIERS

Stream Name	Road	Type of Barrier	Impact to Fish	Remedy
Pony Creek	901	Culvert outlet is waterfall.	Blocks all cutthroat trout to headwater spawning area.	Proposed to be replaced with bridge in 2008 as part of Meadow Smith Project.
Cat Creek	9647A	Slight waterfall at culvert outlet.	Juvenile trout and sculpin cannot pass but adult brook trout and cutthroat trout can still migrate upstream.	Proposed to be removed and road decommissioned in 2008 as part of Meadow Smith Project.
Cat Creek	901	Culvert outlet is waterfall.	Blocks all cutthroat trout to headwater spawning area.	Proposed to be replaced with bridge in 2008 as part of Meadow Smith Project.
Condon Creek	9706	Velocity in culvert may be too high in springtime.	Uncertain. May impact juvenile brook trout and cutthroat trout and sculpins.	On Plum Creek Road. No FS jurisdiction.
Condon Creek	901	Culvert outlet is waterfall.	Blocks all cutthroat trout to headwater spawning area.	Proposed in this decision to be replaced with bridge.
Condon Creek	124	Beavers have plugged screen at culvert inlet.	Uncertain. Likely blocks brook trout, suckers and possibly whitefish during low flows.	Proposed in this decision to be replaced with bridge.
Smith Creek	9762	Slight waterfall at culvert outlet.	Juvenile trout and sculpins cannot pass but adult cutthroat trout can still migrate upstream.	Proposed in this decision to be replaced with bridge or large culvert.
Cooney Creek	Highway 83	Slight waterfall at culvert outlet.	Uncertain. May block juvenile cutthroat trout and possibly bull trout.	State Highway. No FS jurisdiction.
Rumble Creek	Highway 83	Baffles in culvert have big jumps.	Uncertain. May impact juvenile brook trout and cutthroat trout.	State Highway. No FS jurisdiction.
North Fork Rumble Creek (2 barriers)	560	Culvert outlet is waterfall. Private water diversion 30' downstream is also barrier.	Both barriers block all brook trout to headwater spawning area.	FWP may work to mitigate private water diversion barrier. Proposed in this decision to replace culvert.

As summarized on Table 3-37 the loss of habitat connectivity has impacted multiple species, but most especially cutthroat trout. Now, cutthroat trout are blocked from headwater spawning areas in Cat, Pony, Condon, and Smith Creeks. This is nearly 18 percent of all habitat left to cutthroat trout in the analysis area. Furthermore, while culverts on lower Condon, Cooney and Rumble Creeks do permit upstream passage of adult fish, they are blocking juvenile cutthroat trout. These types of barriers are referred to as "partial" barriers. Juvenile cutthroat trout need to be able to migrate up and downstream to find food and cover in various flow conditions year round. Fish that cannot move upstream and downstream become crowded and die. A stream with "partial" barriers and/or full barriers has fewer fish than it historically supported (reduced carrying capacity). Thus loss of habitat connectivity greatly

reduces the population size but also long-term population fitness due to inbreeding and vulnerability to catastrophic events.

In some situations, a barrier can be beneficial to cutthroat trout if it blocks invasion of non-native fish. Fisheries managers do occasionally install or retain existing barriers if it can protect a genetically pure cutthroat trout population upstream. This is not the situation in the analysis area. All of the culvert barriers in the analysis area are harmful; none are beneficial. Project File Exhibit L-4 has further details on this evaluation. This is the same conclusion reached in the 1999 Meadow Smith EIS. The decision maker decided to remove all barriers on Cat Creek and Pony Creek and the uppermost barrier on Condon Creek as funding permits.

The culvert barriers are also likely having an adverse impact on native sculpins, whitefish and suckers, as well as non-native brook trout. No research is available to ascertain the passage capability of sculpins, suckers and whitefish and so the impacts are assumed just as harmful as they are to cutthroat trout. The “partial” culvert barriers on lower Cat, Condon, Cooney, and Rumble Creeks have the same adverse impact to brook trout as they do to cutthroat trout. Brook trout are rarely found in the headwater reaches and, thus, the total barriers in those reaches do not impact brook trout. Only one culvert may be impacting bull trout. The Highway 83 crossing of Cooney Creek may be hampering bull trout migration but this is not verified. Since bull trout only occasionally forage in the other streams of the analysis area, the other 10 barriers are presumed to have practically no effect to bull trout.

The following table itemizes the existing condition for each stream reach, as reviewed above.

TABLE 3-38.
EXISTING CONDITION SUMMARY OF FISH HABITAT FOR STREAM REACHES, LISTED FROM NORTH TO SOUTH

Stream Reach	Road Density	WATSED Model of Water Yields	Data Source	Fine Sediment	Channel Morphology	Habitat Connectivity	Interpretation – Limiting Factor to Fish Productivity
Alder Creek Valley Floor	6.32 miles/sq mile.	9% increase over baseline. Channel May be sensitive due to fine soils.	2006 Pfankuch Survey.	Unknown	No concern. Good channel stability	No concern.	Channel may be sensitive but no concerns raised at present.
Meadow Creek Valley Floor	5.89 miles/sq mile.	Not modeled (included with Alder). May be sensitive due to fine soils.	Visual, qualitative survey in 2006.	Some concern.	Some concern. Fair channel stability	No concern.	High road density and qualitative survey suggest degraded channel morphology is limiting factor.
Pony Creek Headwaters	Very low. Almost roadless.	Not modeled.	1997 Habitat Survey.	No concern.	No concern. Pools are plentiful and deep	Culvert at FR 901 is a total barrier.	Poor habitat connectivity is limiting factor.
Pony Creek Foothills	2.17 miles/sq mile.	Not modeled.	1998 Habitat Survey.	Excessive fine sediment.	No concern. Pools are plentiful and deep.	No concern.	Sedimentation is limiting factor.
Pony Creek Valley Floor	2.53 miles/sq mile.	4% increase over baseline. May be sensitive since banks are scoured.	1998 Habitat Survey.	Acceptable but on upper end of reference range.	Some concern. Pools are plentiful but shallow.	No concern.	Channel may be sensitive to sedimentation.
Cat Creek Headwaters	Very low. Almost roadless.	Not modeled.	1983 qualitative Survey	No concern.	No concern	Culvert at FR 901 is a total barrier.	Poor habitat connectivity is limiting factor.
Cat Creek Foothills	2.04 miles/sq mile.	Not modeled.	1997 and 1998 Habitat surveys. Plus annual pebble count monitoring.	No concern.	No concern. Pools are plentiful and deep.	Culvert at FR 9547A is a partial barrier.	Poor habitat connectivity may be limiting factor.

TABLE 3-38.
EXISTING CONDITION SUMMARY OF FISH HABITAT FOR STREAM REACHES, LISTED FROM NORTH TO SOUTH

Stream Reach	Road Density	WATSED Model of Water Yields	Data Source	Fine Sediment	Channel Morphology	Habitat Connectivity	Interpretation – Limiting Factor to Fish Productivity
Dog Creek Headwaters	Low but new roads just built by Plum Creek (not mapped)	Not modeled.	1997 and 1998 Habitat Surveys.	No concern.	No concern. Pools are plentiful and deep.	No concern.	Fully functional, no limiting factor.
Dog Creek Foothills	1.38 miles/sq mile.	Not modeled.	No surveys available.	No concern.	No concern.	No concern.	Fully functional, no limiting factor.
Dog Creek Valley Floor	2.79 miles/ sq mile.	4% increase over baseline.	1997 and 2003 habitat monitoring. Plus annual pebble count monitoring	Excessive but is moving towards reference condition.	Some concern. Pools are plentiful and deep. But deteriorating trend of width/depth.	No concern.	Channel may be sensitive to sedimentation and degraded channel morphology, but no clear limiting factor.
Simpson Creek Foothills	3.81 miles/sq mile.	Not modeled.	1999 Habitat Survey. 1997 and 2006 Pfankuch Survey	Some concern.	Concern. Few pools and shallow depths. Declining trend of channel stability ratings.	No concern.	Degraded channel morphology is limiting factor.
Simpson Creek Valley Floor	3.81 miles/sq mile.	7% over baseline.	1997 Habitat Survey.	No concern.	Concern. Few pools and shallow depths.	No concern.	Degraded channel morphology is limiting factor.
Condon Creek Headwaters	2.04 miles/sq mile.	Not modeled.	1994 Habitat Survey.	No concern.	Some concern. Pools deep but infrequent.	Culvert at FR 901 is a total barrier.	Poor habitat connectivity is limiting factor.
Condon Creek Foothills	2.04 miles/sq mile.	3% increase over baseline.	2000 Habitat Survey and 2005 monitoring.	No concern.	Concern. Pools are plentiful but shallow. Deteriorating trend of width/depths.	Culvert at FR 9706 may be a partial barrier.	Poor habitat connectivity and degraded channel morphology are limiting factors.

TABLE 3-38.
EXISTING CONDITION SUMMARY OF FISH HABITAT FOR STREAM REACHES, LISTED FROM NORTH TO SOUTH

Stream Reach	Road Density	WATSED Model of Water Yields	Data Source	Fine Sediment	Channel Morphology	Habitat Connectivity	Interpretation – Limiting Factor to Fish Productivity
Condon Creek Valley Floor	3.88 miles/sq mile.	5% increase over baseline.	1983 qualitative survey.	Some concern.	No concern.	Culvert at FR 124 has beaver screen that is partial barrier.	Poor habitat connectivity may be a limiting factor.
Falls Creek Foothills	4.95 miles/sq mile.	Not modeled.	1999 Habitat Survey, 1997 and 2006 Pfankuch Survey.	Some concern.	Concern. Pools are plentiful but shallow. Declining trend of channel stability ratings	No concern.	Degraded channel morphology is limiting factor.
Falls Creek Valley Floor	4.95 miles/sq mile.	8% increase over baseline. May be sensitive since channel stability is declining.	No survey available.	Assumed like foothills reach, some concern.	Assumed like foothills, concern.	No concern.	Degraded channel morphology is limiting factor.
Smith Headwaters	Very low, almost roadless.	Not modeled.	1983 qualitative survey.	No concern.	No concern.	Culvert at FR 9762 is a partial barrier.	Poor habitat connectivity may be limiting factor.
Smith Foothills	1.38 miles/sq mile.	2% increase over baseline.	1999 Habitat Survey and 2006 monitoring.	Excessive fines. Deteriorating trend.	Concern. Pools infrequent and shallow and deteriorating trend. Declining channel stability rating. But improving trend on width/depth	No concern.	Sedimentation and degraded channel morphology are limiting factors.
Smith Valley Floor	4.05 miles/sq mile.	4% increase over baseline.	2000 Habitat Survey.	Unknown.	Concern. Pools very shallow.	No concern.	Degraded channel morphology is limiting factor.
Cooney Headwaters	0 (roadless)	Not modeled.	2006 Habitat Survey.	No concern but on high end of reference range.	Some concern. Pools are plentiful but shallow.	No concern.	Fully functional, no limiting factors.

TABLE 3-38.
EXISTING CONDITION SUMMARY OF FISH HABITAT FOR STREAM REACHES, LISTED FROM NORTH TO SOUTH

Stream Reach	Road Density	WATSED Model of Water Yields	Data Source	Fine Sediment	Channel Morphology	Habitat Connectivity	Interpretation – Limiting Factor to Fish Productivity
Cooney Foothills	1.44 miles/sq mile.	1% increase over baseline.	1983 qualitative survey.	No concern.	No concern.	Culvert at Highway 83 is partial barrier.	Poor habitat connectivity may be limiting factor.
Rumble Headwaters	Low, almost roadless.	Not modeled.	No survey available.	Unknown.	Unknown.	Culvert at FR 560 and private water diversion are total barriers.	Poor habitat connectivity is limiting factor.
Rumble Foothills	Not modeled.	Not modeled.	1983 qualitative survey.	Some concern.	Unknown.	Culvert on Highway 83 maybe a partial barrier.	Poor habitat connectivity may be limiting factor.

Environmental Consequences

Alternative 1 – No Action
Direct and Indirect Effects

A. Sedimentation

This alternative does not directly result in any new contribution of sediment to streams. There is no temporary road construction, no culvert replacement, no BMP application along existing roads and no prescribed burns, which could result in erosion. However, this alternative could have some indirect effects to stream sedimentation, since the alternative does not improve the condition of the sediment sources found on some roads in the project area. The 2002 Survey estimates that over 44 tons of sediment erodes annually from stream crossings in the Cooney McKay Area. This is about 4 percent of all the estimated tonnage eroding from roads in the Swan Valley (DEQ, 2004). The No Action Alternative does not address the situation; therefore, the annual erosion would continue. This alternative also does not address the twin culverts of FDR #899 at Pony Creek. If the culverts should wash out, they could potentially erode another 43 tons of sediment. It is not known exactly when these culverts will fail, but there is a “high risk” of failure within the analysis timeframe.

Alternative 1 does not reduce fuel levels on the landscape scale. If a wildfire escaped initial suppression, it could grow into a large, stand-replacing fire. Some large size, stand-replacing fires lead to considerable, short-term erosion. The 2003 Crazy Horse Fire in upper Swan River Valley was estimated to have generated 7,663 tons of sediment the first year after the fire. Other fires are small and do not scorch the soil and result in only trivial erosion. There is no way to forecast what type of fire could happen in the Cooney McKay Project Area, since that depends on unpredictable things such as weather and location of origin. The probability of larger fires is greater in the No Action Alternative than other alternatives (See Fire Section), but the consequences to fish habitat cannot be predicted.

B. Stream Channel Morphology

Alternative 1 would have no direct effect on stream channel morphology. Actions that could directly impact stream channel morphology, such as temporary road construction and timber harvest, are not included in this alternative.

The indirect effects of this alternative on stream channel morphology are difficult to project. By not adding to any road density or timber harvest, it is logical to conclude that gradually stream channel morphology will recover. Streams will evolve with the flow regimes and the channels will eventually stabilize as they accommodate the new flow regimes. Stream banks would become stable and strong, new pools would form, and the channel width and depth would stabilize. This could happen quickly or it may take decades.

On the other hand, this alternative does result in some increased risk of a large-sized, stand-replacing fire. Dependent on location and intensity of the fire, some fires can erode stream banks, which in turn can widen the stream channels and fill in pools. This is a normal condition and was observed on the 2003 Crazy Horse Fire (Project File Exhibit Q-8). The consequence of such a fire is a short-term decrease in quality of fish habitat. Over the long-term, a wildfire could result in new recruitment of trees, new pools and new habitat complexity. Thus a large sized, stand-replacing fire can have short-

term harm but over the long term could rejuvenate and improve fish habitat (Minshall et al. 1989). There is no certainty that such a fire would take place and it is possible that no large fires would burn in the analysis timeframe.

C. Habitat Connectivity

Alternative 1 does not restore or further degrade habitat connectivity. No existing fish barriers would be fixed, and no new culverts installed. Eventually other undersized culverts that currently pass fish may become fish barriers as the outlet drop gradually grows taller. However, this would likely take decades and is beyond the temporal bounds of this analysis.

Alternative 1 does have some increased risk of a large size fire as discussed in the Fire Section of this chapter. It is possible that fish populations may not be able to recover as quickly as they did historically due to the existence of the 11 fish barriers. Fish populations that can access multiple streams are more resilient and can survive wildfires (Rieman and Clayton 1997). The continued existence of the barriers threatens the resiliency of fish. There is no certainty if and where a large-sized fire would burn in the analysis area. Alternative 1 simply poses some risk to long-term population viability because it has an increased risk of wildfires, and it does not correct any existing fish barriers.

Alternative 1- No Action
Cumulative Effects

The Cumulative Effects Worksheet (Project File Exhibit L-5) considers and describes proposed activities in addition to the past, present, and reasonably foreseeable activities listed in Chapter 3. Those activities that cumulatively contribute indiscernible effects on the Fisheries Resource are not included in this section, but are discussed in the Cumulative Effects Worksheet. Discussion of those activities that cumulatively affect Fisheries appear below. When considering the past, present, and reasonably foreseeable activities, Alternative 1 has a cumulative effect.

The Meadow Smith Project is expected to improve fish habitat (Project File Exhibit Q-7) by fixing two existing fish migration barriers on Cat Creek and one on Pony Creek. This will open up over 1 mile of fish habitat that is currently blocked, a 10 percent increase of available habitat to cutthroat trout. The project will also complete BMP improvements on haul routes. Over the long-term, BMP improvements should be very effective in reducing erosion from those particular roads, as demonstrated in a recent audit (Montana Department of Natural Resources & Conservation 2006). The Meadow Smith BMP improvements are estimated to ultimately reduce about 5.4 tons of sediment from 8 point-source locations identified in the TMDL Report. The Meadow Smith Project also has about 1,029 acres of timber harvest activities and 2.9 miles of road reclamation. The Condon Fuels Project is another reasonably foreseeable action located in the analysis area. This small timber sale is not anticipated to have any cumulative impact on fish habitat (Project File Exhibit Q-15). The Condon Fuels Project Decision authorizes 2.9 miles of BMP work, none of which have point-sources of erosion found in the TMDL study.

WATSED model projections for the cumulative effects Alternative 1 indicate no increase of water yield in any watershed except Simpson Creek. Annual water yields on Simpson Creek would increase from 7 to 8 percent over baseline for 2 years, and then return to current conditions (See Water Resources Project File Exhibit K-11 for details). This is too small to result in adverse impacts to fish habitat. All

streams, including ultimately Simpson Creek, are modeled to gradually decline in water yields and return to more historic conditions.

Private land development could have a potential impact to sediment as riparian areas are cleared, structures are built and roads are created. Plum Creek Timber Company has begun to divest their landholdings in the Swan Valley, and this has increased property values, increasing the rate of residential development throughout the valley. It is assumed that this trend of increasing development would continue during the 11-year analysis timeframe.

With these considerations in mind, a portion of Cooney, “Smith Flats,” and Rumble Creeks have large parcels of land with potential to be further developed. The Forest Service is not aware of any petitions for subdividing in the analysis area. Thus, there is no specific reasonably foreseeable development, but rather just the potential. Due to existing land use regulations that prohibit residential dwellings within a 100-year floodplain, the likelihood of sediment from actual building construction would be very low. However, some road construction and clearing of vegetation is possible, and this may impact stream channel morphology and cause sedimentation. This is assumed a minor and gradual change. This conclusion is supported by the recognition that past development appears to have had only a minor impact on fish habitat and that that any foreseeable development would be similarly regulated by State and County development regulations.

Private land development is expected to increase. Although PCTC has sold 15,704 acres to private parties since 2002, about 76 percent has been sold to conservation buyers or with conservation easements. It is assumed this pattern will continue in the future. Plum Creek Timber Company has identified they may sell another 5,196 acres in the future (1 percent of the Swan Valley watershed), but not all of this is likely to be developed. At locations where private land is developed, it may deteriorate stream channel morphology (due to increased water yields from cleared land), and it may result in some sedimentation (due to road construction). These impacts are anticipated to be fairly small, and the land management actions by the other 3 primary landowners probably more than compensate. A more detailed analysis of the potential cumulative effect of current and potential changes in landownership patterns in the Swan Valley is found in the Recreation/Lands Section in this chapter.

Other Foreseeable Actions: Given that the potential cumulative area includes the entire Swan Valley, several generalizations are needed about other reasonably foreseeable actions. It is assumed that the overall condition of fish habitat in the valley will remain fairly stable or even improve slightly within the next 11 years.

The Swan River State Forest, PCTC, and the Forest Service own about 75 percent of all lands in the Swan Valley. The recent trend of these three landowners to improve fish migration through road culverts is positive as many barriers have been removed within the past decade, and more are proposed. The development of a TMDL has resulted in recent grants to improve roads to BMP standards in Cold Creek and Glacier Creek watershed, and more grants are likely in the future. The Habitat Conservation Plan (HCP) used by PCTC is considered to have a greater benefit to native fish habitat than the previous way the company managed its lands (USFWS and USDC National Marine Fisheries Service 2000). The Three Creeks Timber Sale proposed on Swan River State Forest was concluded to have minor short-term impacts to fish habitat, but ultimately should reduce about 54 tons of sedimentation due to BMP work on 56 miles of roads (DNRC 2006(b)). The reasonably foreseeable Winter Blowdown sale by Swan River State Forest has only preliminary plans, but the District Fisheries Biologist assumes it will have little impact to fish habitat since it is salvage of dead

and dying materials on 240 acres. The reasonably foreseeable White Porcupine Sale also has only preliminary plans. This sale is assumed to have some potential impact on channel morphology, but it may also ultimately restore several badly eroding roads in the area.

In general, Alternative 1 does increase the potential for a large, stand-replacing fire. Aquatic ecosystems with roads, habitat fragmentation, non-native fish, and other stressors are not as resilient to a fire as they were in historic times (Rieman and Clayton 1997) (Rieman et al. 2005). Research following the 2000 Bitterroot Valley Fires found that most native fish populations with good habitat connectivity recovered (although one stream inexplicably did not recover), (Sestrich 2005). The reasonably foreseeable Meadow Smith Project does help correct 3 of the 11 known fish barriers. The potential harm of a large wildfire is still of concern but somewhat mitigated by these reasonably foreseeable actions.

There is no reasonably foreseeable action to replace the culvert on Highway 83 at Cooney Creek. This is the only culvert barrier in the analysis area that may be impacting bull trout migration.

Despite the stable or positive trend on fish habitat, the overall trend of native cutthroat trout and bull trout is downward. The reality is that the biological impacts of introduced species probably have far more impact to native fish than habitat conditions.

As described in the “Existing Condition,” brook trout compete with cutthroat trout and rainbow trout hybridize with cutthroat trout. There is no reasonably foreseeable proposal to remove either brook trout or rainbow trout anywhere in Cooney McKay Area or the Swan Valley. Over time, it is expected that hybridization would continue to progress upstream and eventually all the headwater cutthroat trout populations would become hybridized. Smith Creek, which is the only pure cutthroat trout stronghold in the project area, is vulnerable. This loss of numbers and purity of cutthroat trout has already taken place across much of the Swan Valley. Alternative 1 has some benefit to cutthroat trout, primarily by means of bolstering populations in Cat and Pony Creeks through better habitat connectivity (via the Meadow Smith Timber Sale). This should help slow, but not reverse, the downward trend of cutthroat trout.

As described in the “Existing Condition,” bull trout numbers are stable in Cooney Creek and strong throughout the Swan Valley. Brook trout are adversely impacting bull trout, but the threat does not seem to be getting worse. The primary concern is the potential spread of lake trout. Work is underway to study feasibility, but there is no reasonably foreseeable action to suppress lake trout. Bull trout numbers may start to decline within 10 years. Alternative 1 does not affect lake trout or brook trout populations, and therefore, it neither hastens nor slows the future decline of bull trout.

Alternatives 2, 3, and 4
Direct and Indirect Effects

Activities associated with these alternatives that could contribute effects to Aquatic Resources are temporary road construction, culvert replacements, and prescribed burns. These are detailed below. Weed treatments would follow the established guidelines in the NIWC DN (Project File Exhibit Q-5). Weed treatments have been determined to have no impact to aquatic resources and this document is incorporated by reference. Hand planting would also have no impact, since it is extremely minor ground disturbance. Therefore, neither weed treatment nor hand planting will be reviewed further.

A. Sedimentation

The Cooney McKay Project would have several impacts on sedimentation in stream channels, both positive and negative. First, there are 5 culverts that are proposed to be replaced with new bridges or larger culverts:

- Condon Creek at FDR #901,
- Condon Creek at FDR #124,
- Smith Creek at FDR #9762,
- Pony Creek at FDR #899 and
- (North Fork) Rumble Creek at FDR #560.

Funding to replace all five culverts is not secure; in fact, it is only likely that one or two would be addressed within the next 11 years. The highest priority culverts are the Condon Creek and Smith Creek sites. The other three culverts are lower priority. All five culvert replacements are included in this analysis in the event that funding becomes available.

If all five culverts are replaced, there would be a short-term increase of sediment. Replacing these culverts is the single largest input of sediment from the action alternatives. Removing and replacing a culvert stirs up stream banks and exposes raw stream beds. Heavy machinery could track sediments into the channel and erode the surrounding hill slopes, especially at locations with steep hillsides and deep fill over the culverts. The five culverts are buried under moderate amounts of fill (ranging from 2 to 6 feet in height). All five culverts are located on perennial streams; and, therefore, the disturbed soil is immediately transported downstream, and there is no means to capture it and remove it. The action alternatives have several Design Criteria to minimize the amount of sedimentation (See Table 2-14). The culverts would only be replaced during low flow periods and an effort would be made to de-water the channel as much as possible. Exposed stream banks under a new bridge would be stabilized with rock armor. These Design Criteria would help reduce sedimentation. Based on the amount of fill over the existing culverts, it is estimated that removing the culverts could generate a short-term input of 7 cubic yards to Condon Creek, 3 cubic yards to Smith Creek, 3 cubic yards to Pony Creek, and 2 cubic yards to Rumble Creek. The values were derived from the professional judgment of the District Fisheries Biologist and modeling used in the Moose Fire Salvage analysis (USDA Forest Service, 2002).

A special notation is needed for the Pony Creek culverts on FDR #899. These twin culverts are the only known “high risk culverts” in the project area. The culverts are vulnerable to failure; and if they did wash out, could generate about 43 cubic yards of sediment. The action alternatives propose to replace the culverts with a bridge. Thus, the Cooney McKay Project could generate 3 cubic yards of sediment into Pony Creek during implementation.

In Alternatives 2 and 3, temporary road construction would require one new stream crossing at Alder Creek (no stream crossings proposed in Alternative 4). The topography at this stream crossing is very flat and the road prism is already in place, but the culvert was removed decades ago. It is estimated that installing a new culvert would result in approximately 0.5 cubic yards of sediment. Its removal a few years later would result in another 0.5 cubic yards of sediment. No other direct or indirect sedimentation is expected from the construction or obliteration of temporary roads. Other than Alder

Creek, the temporary roads are upland and far from stream channels; therefore, there is no means for sediment to enter the streams.

In addition to planned temporary roads, it is possible that up to 1 to 2 miles of further unplanned temporary roads could be built. During the sale layout, it is commonly discovered that several short “jump-up roads,” “excavated skid trails,” or additional temporary roads are needed to facilitate timber haul. These actions are assumed to have the same ecological impact as planned temporary roads. To mitigate the impact of these roads, Design Criteria were identified so no temporary roads would enter or cross any riparian habitat (See Table 2-14). Thus, no sedimentation from unplanned temporary roads is anticipated.

The vegetation management associated with the action alternatives is anticipated to have no direct or indirect impact on sedimentation. No direct sedimentation from harvest activity is expected since streamside vegetative buffers would be retained. As suggested by INFS, a Design Criteria of the Cooney McKay Project is no harvest activity in riparian areas. The undisturbed vegetation by the streamside would be highly effective at capturing any overland soil erosion before it reaches the stream (Castro and Rickendorf 1995) (USDA Forest Service, 1995). There is no indication that vegetative buffers need to be any wider than proposed by INFS. The Forest Soils Scientist does not consider the analysis area to be vulnerable to mass failure. Furthermore, recent monitoring after post-fire salvage of the 2003 Crazy Horse Fire found no case where direct surface erosion traveled through the riparian buffers (data available at Swan Lake Ranger District Office Fisheries Files).

To estimate the effect of indirect sedimentation from timber harvest, the District Hydrologist is using a WATSED model to estimate the amount of water yield increase as a result of canopy removal. A potential increase of water yield could cause the stream banks to scour and widen in order to accommodate the new flows. This in turn could lead to sedimentation in the channel. The modeling found that each watershed had only 0 to 1 percent increase in estimated annual flows from the existing condition as a result of the action alternatives. The District Hydrologist determined that this is too small to affect stream channels and generate sediment. For further discussion on the WATSED Model, modeling results, and the Hydrologist’s interpretation, see the Water Resources Section in this chapter.

Table 3-39 calculates the estimated amount of sedimentation that could result from the prescribed burns for each watershed. The acreage of the watershed is calculated using GIS from upstream of the most recent habitat survey. These locations all have potential fish spawning habitat. They also have baseline data on the current condition of fine sediment. Cat Creek was not modeled. This burn is upstream of Cat Lake. Any potential sedimentation would settle out in the lake, and no sedimentation is expected downstream. Documentation of the model assumptions, validation and the parameters selected in this exercise are in the Project file Exhibit L-6.

The action alternatives include applying BMPs on an estimated 18 to 21 miles of existing roads depending on the alternative. These fines can transport to a stream during the first few months after the project, but then stabilize as vegetation returns or the soils compact. The amount of short-term sedimentation is unknown because it can vary so much due to differences in location and weather. For lack of any other model or research, it is assumed the worse the existing situation, the more sediment would result during the BMP implementation. For example, a severely eroding ditch beside a stream would have more sediment during the BMP implementation than a level upland area hundreds of feet away from a stream. It is assumed that the short-term impact would be about half of the annual erosion rate that takes place without BMP application.

**TABLE 3-39.
CALCULATED INCREASES OF SEDIMENT AS A RESULT OF THE PRESCRIBED BURNS**

Watershed	Acreage Upstream of Habitat Survey	Estimated Burn Acreage	Percentage of Burn Acreage in Watershed	WEPP Model Sediment at Base of Burns	Estimated Sediment at Habitat Survey	One Year Tonnage of Sediment
Condon	1756 acres	137 acres	7.8%	12% increase	1% increase	0.3 tons
Smith	2105 acres	230 acres	10.9%	12% increase	1.4% increase	0.4 tons
Cooney	2913 acres	343 acres	11.8%	12% increase	1.4% increase	0.7 tons

Over the long term, BMP applications are considered very effective in reducing erosion from roads (DNRC, 2006). Thus, the application of BMPs is a short-term increase of sediment, followed by a long-term reduction of sediment below the existing condition. As described earlier, a TMDL study examined 35 of the 81 known road/stream intersections in the fisheries analysis area. These 35 sites eroded a total of 44.42 tons per year. The action alternatives would address BMPs at 20 of the 35 inventoried sites. This would result in a long-term reduction of 35.06 tons per year. This is nearly 5 percent of the TMDL objective for the entire Swan Valley (DEQ 2004). There is no difference among the action alternatives, as they all would address the same 20 inventoried sites from the TMDL study.

The action alternatives may reduce the likelihood of a large-sized, stand-replacing fire. Such a fire would probably contribute substantial amounts of sediment for a few years. However, as described earlier, there is no means to predict when and where such a fire would have occurred, and it is impossible to analyze the impact on fish habitat.

All of these short-term and long-term changes to sedimentation are displayed in Table 3-40 (in cumulative effects discussion). Based upon the District Fisheries Biologist's recommendation, a two percent increase of sediment as a threshold to detect any changes will be used. This value is well below what Archer et al. (2004) estimated as a confidence interval during observations of riffles all summer long. Local annual pebble count monitoring on Cat Creek, a "control" stream for Meadow Smith monitoring, is also valuable. Cat Creek monitoring has observed large annual variation from 1997 to 2000, but only two to three percent annual variation in more recent years. Considering the mild runoffs since year 2000, annual variations of two to three percent seems to reflect normal conditions. Thus, as shown in Table 3-40, the only streams with any anticipated short-term, measurable increase of sediment are Pony, Condon, Falls, Smith and Rumble Creeks.

B. Stream Channel Morphology

The action alternatives could potentially have a minor, indirect impact to stream channel stability. Stream channel stability could be either directly impacted by modification of the riparian area or indirectly affected by timber harvest, road construction or disturbance events such as fires or floods. The action alternatives do not have any actions that modify riparian areas. However, these alternatives do include between 802 and 921 acres of commercial timber harvest and about 1.25 miles of temporary road construction.

As reviewed in the "Existing Condition," the WATSED modeling suggests that Alder, Meadow, Pony, and Falls Creek may be sensitive to past timber harvest and road construction impacts. The action

alternatives are modeled to increase annual water yields by only 0 to 1 percent, which is too small to change stream channels.

Quigley and Arbelbide (1997) and the USFWS (1998) used large-scale studies and noted that when road density increased beyond about 1 mile per square mile, native fish habitat quality decreased. It is uncertain what the causal mechanism is for road density impacting fish habitat. It is possible that road density simply is an indicator of land management, rather than the source of problems. Luce et al. (2001) noted that simply attempting to manage road density does not necessarily restore aquatic ecosystems since roads can vary widely in their ecological impact. In addition to these considerations, local information on existing road density and residual depths of pools was examined. As reviewed in Project File L-5, there is a trend of shallow residual pool depth (as compared to a reference range) correlating with road density, but it is a very weak correlation.

The construction of temporary roads would increase road density for approximately 8 years. The temporary roads are likely to be in use for about 3 years during the project implementation, and then reclaimed. It is assumed it will take about 5 years after reclamation for sufficient vegetation to mediate soil compaction and water permeability. New temporary roads would be located in Meadow, Condon, and Cooney Creek watersheds (the Alder Creek road already exists). The location of the temporary road in Meadow Creek should have no impact to the stream since it is at low elevation and the soil type is highly permeable and thus not considered further.

The Condon and Cooney Creek temporary roads are on glacial tills and are located in mid-elevation, foothills area. The temporary roads would increase road density on Condon Creek from 2.04 to 2.1 miles per square mile, and increase from 1.44 to 1.54 miles per square mile on Cooney Creek. This may equate to residual pool depths of Condon Creek decreasing from 0.27 to 0.17 meters (0.9 to 0.6 feet). Likewise, the residual pool depths of Cooney Creek may decrease from 0.34 to 0.26 meters (1.5 to 0.85 feet). These projections, along with the delayed water yield recovery, suggest that the action alternatives may have a slight indirect effect on channel morphology. However, Archer et al. (2004) determined the observed variability of residual pool depths was 0.08 meters (0.26 feet) (confidence interval). The amount of change in Condon Creek and Cooney Creek is 0.08 to 0.1 meters (0.26 to 0.33 feet), and thus, probably too small of a change to detect with current methodology. Therefore, it is concluded that the indirect impacts of the action alternatives are not likely to have a measurable change to channel stability but rather delay recovery. Since Cooney Creek currently has good channel morphology, the only potential impact is a recovery delay in Condon Creek.

The action alternatives do reduce the likelihood of a large-sized, stand-replacing fire in the analysis area. Such a type of fire could dramatically impact channel morphology. The action alternatives may prevent changes in channel morphology due to fire.

C. Habitat Connectivity

The action alternatives could remove four known barriers to fish migration (if all are funded). If the highest priority barrier (Condon Creek at FDR #901) is removed, this would open up approximately one mile of spawning and rearing habitat for cutthroat trout. The next priority is Smith Creek at FDR #9762, which would open up about a 0.5 mile of spawning and rearing habitat for cutthroat trout. Lower Condon Creek at FDR #124 is the next priority. This culvert is only a seasonal or partial barrier at this time; depending on how compacted the beaver screen is which keeps beavers from plugging the culvert. Replacing this culvert with a bridge would provide easier fish passage for all species in all

flows to entire Condon Creek (about 4 miles). The lowest priority is Rumble Creek (north fork) at FDR #560. Replacing this culvert by itself would not be effective since there is another total barrier about 30 feet downstream. Although no plans are reasonably foreseeable at this time, MDFW&P hopes to mitigate this private water diversion sometime in the future. If both the private water diversion and the culvert at FDR #560 are mitigated, it is estimated this would provide about 0.25 mile of spawning and rearing habitat for brook trout.

The impact of restoring habitat connectivity is very beneficial to cutthroat trout. Cutthroat trout are currently abundant in upper Condon Creek and upper Smith Creek and opening up fish passage would increase their stronghold by 11 percent more than the current condition. A few cutthroat trout do currently exist upstream of the culverts, but they are a fragmented and vulnerable population. Barriers that disrupt fish migration are a serious threat to the long-term persistence of cutthroat trout (Fausch et al. 2006). Removing these two barriers would help allow juvenile fish to move upstream and take advantage of the habitat, thus improving survival rates. Removing these barriers would also prevent genetic inbreeding and loss of fitness for those fish currently upstream of the culvert. The overall population size would increase. The population would also be more resilient to survive any future disturbance such as a fire or flood.

Addressing the partial barrier of lower Condon Creek at FDR #124 would probably only have a minimal benefit to cutthroat trout since they are sparse in this reach. It would, however, be beneficial to brook trout and native suckers that are found in this reach. Replacing the culvert barrier on Rumble Creek would benefit only brook trout since they are the only species found in the headwaters. None of the culvert replacements would have much impact to bull trout. Bull trout are only potentially blocked by the culvert on Montana Highway 83 at Cooney Creek, and this is not proposed for replacement.

Alternatives 2, 3, and 4
Cumulative Effects

As described in Alternative 1, it is possible that a portion of private lands on Cooney, “Smith Flats,” and Rumble Creeks could be further developed. Development could include actions like road construction and clearing of vegetation. This could impact stream channel morphology and cause sedimentation. This is assumed to be a minor and gradual change.

The Meadow Smith Timber Sale is anticipated to have a very slight, short-term increase of sediment, primarily due to work associated with roads. This short-term sedimentation is projected to occur in the valley floor reaches of Alder, Meadow, Pony, Dog and Condon Creeks. The Meadow Smith Project and Condon Fuels Project, along with the Cooney McKay action alternatives, are ultimately expected to decrease sedimentation through BMP work on roads. These projects would cumulatively address 28 known point-sources of erosion, reducing sedimentation by 40.5 tons. This is 91 percent of all known erosion point-sources in the analysis area. As displayed on Table 3-40, the cumulative effects of all these projects is expected to result in a measurable, long-term decrease of sedimentation in Alder, Simpson, Condon, Falls, and Rumble Creeks.

The WATSED Model was used to compare the cumulative effects of Alternative 1 (which includes the Meadow Smith and Condon Fuels Projects) against the cumulative effects of the action alternatives. The immediate difference between the alternatives was only 1 pecent increase of annual flows in a few watersheds. This is too small to alter stream channels and affect fish habitat.

A more subtle difference was that the combination of reasonably foreseeable actions, along with the action alternatives, essentially delayed the recovery of water yields by a few years when compared to Alternative 1. The rate of delay varied from 4 years (Falls Creek) to no difference (Smith Creek) (Project File Exhibit K-11). The existing condition suggested some concern about annual water yields in Alder, Meadow, Pony and Falls Creek. As reviewed in the Water Resources Section, the modeled water yields are not anticipated to impair water quality or stream bank stability, and therefore fish habitat should be unchanged from current conditions. The delay of water recovery is simply a delay in improvements for fish habitat conditions.

The action alternatives may reduce the potential for a large size, stand-replacing fire. Such a fire would have dramatic changes to channel morphology, even though it is a natural occurrence. The action alternatives reduce the potential, but do not eliminate it altogether. By reducing the likelihood of a large fire, the action alternatives help keep the existing condition of channel morphology about the same. It is expected to neither improve nor degrade further in the analysis timeframe.

The reasonably foreseeable actions are a positive trend for habitat connectivity. The Meadow Smith Timber Sale combined with the Cooney McKay action alternatives would greatly improve habitat connectivity. The Meadow Smith Project will provide better fish migration access in Pony Creek and Cat Creek. The action alternatives could potentially provide better fish migration access to 4 miles of Condon Creek and a 0.5 mile of Smith Creek. Providing access to upper Rumble Creek could someday increase fish habitat by 0.25 miles, but since no action on the private water diversion is reasonably foreseeable, the cumulative effects on Rumble Creek are meaningless. Still, both the Meadow Smith and Cooney McKay action alternatives combined would improve fish access to about 7.25 miles of habitat. This is a significant improvement and addresses 7 out of 11 known migration barriers. This results in opening up of nearly 18 percent of all available fish habitat in the analysis area. For cutthroat trout in particular, it would increase the amount of stronghold from 29 percent of the analysis area to 35 percent of the analysis area.

The action alternatives could benefit cutthroat trout, primarily by means of improving fish habitat connectivity in Condon and Smith Creeks. It is uncertain if funding can be found to replace culvert barriers. If they are replaced, the cumulative effects of the action alternatives would be an increase of cutthroat trout populations in Cat, Pony, Condon, and Smith Creeks. These four streams would produce more cutthroat trout, although slightly hybridized. The population would increase to a certain carrying capacity and then excess cutthroat trout would emigrate downstream and increase the overall Swan Valley population. The action alternatives may also increase brook trout numbers but their range is not expected to grow further nor increase competition with cutthroat trout. The cutthroat trout population increase in the analysis area is not enough to reverse the overall downward population trend, but it would help slow the downward trend. It is logical that strengthening populations from tributary streams, even if they are slightly hybridized, would help slow the loss of cutthroat trout. This is one of the key tenets of the management strategy to conserve cutthroat trout in the State of Montana (MDFW&P 1999). Improving the population structure of these four streams is helpful. These are 4 streams out of 22 total in the Swan Valley that still have numerous cutthroat trout.

Bull trout are relatively un-impacted by the cumulative effects of the action alternatives. As described in the “Existing Condition,” bull trout numbers are currently stable throughout the Swan Valley but they are vulnerable to due a new introduction of non-native lake trout and continued threat from brook trout. The only spawning and rearing stream in the analysis area is Cooney Creek. The cumulative effects of the action alternatives are a one year, immeasurable increase of sediment in Cooney

Creek, and no other change. This is not expected to alter bull trout population dynamics or viability. The overall projection of improving habitat conditions, but deteriorating bull trout numbers due to non-native species, would be unchanged by the cumulative effects of the action alternatives.

TABLE 3-40.
SUMMARY OF CUMULATIVE EFFECTS OF SEDIMENTATION IN STREAMS

Watershed	Baseline-historic tonnage annually routed by stream (WATSED Model)	Existing situation of fine sediment in stream channel	Short-term impacts from culvert replacements and temporary roads	Short-term impacts from BMP application	Short-term impacts from Prescribed burns	Long-term impacts from BMP application	Gradual, long-term impacts from residential development	Short-term and Long-term impacts from Meadow Smith	Interpretation of Cumulative Effects. (Changes <2% are not measurable)
Alder	67 tons	Unknown, may be sensitive channel	1.7 tons (Alt 4 has 0 tons)	0	0	0	0	Slight increase in short-term. Reduce 3.9 tons long term	0 to 2.5% short-term increase followed by 5.8% decrease.
Meadow	67 tons (included with Alder)	Unknown, may be sensitive channel	0	0	0	0	0	Slight increase in short term.	No change
Pony	31 tons	Excessive fine sediment in foothills reach and upper threshold on valley floor	4 tons	< 0.1 ton	0	Reduce < 0.1 ton. Also prevents potential of 43 tons	0	Slight increase in short term. Reduction of 0.4 tons	13.2% short-term increase followed by 1.6% decrease from existing
Cat	67 tons (included with Dog)	No concern	0	0	0	0	0	Reduction of 0.7 tons	1% decrease
Dog	67 tons	Excessive fine sediment but improving to almost acceptable range	0	< 0.1 tons	0	Reduce 0.1 tons	0	Slight increase in short-term. Reduction of 0.3 tons in long-term	0.6% decrease
Simpson	27 tons	Uncertain, no reference range to compare	0	0	0	0	0	0.1 tons in short term. Reduction of 1.3 tons	4.8% decrease
Condon	26 tons	No concern	9 tons	0.2 tons	0.3 tons	Reduce 2.7 tons	0	Slight increase.	36.5% short-term increase followed by 10.4% decrease from existing
Falls	22 tons.	Uncertain, no reference range to compare	0	0.8 tons	0	Reduce 7.7 tons	0	0	3.6% increase followed by 35% decrease
Smith and “Smith Flats”	31 tons	Excessive fine sediment in foothills reach	4 tons	0.1 tons	0.4 tons	Reduce 0.8 tons	Slight increase possible	0	14.5% increase followed by 2.6% decrease
Cooney	51 tons	No concern but on upper threshold	0	0.1 tons	0.7 tons	Reduce 0.7 tons	Slight increase possible	0	1.6% increase followed by 1.4% decrease
Rumble	Not modeled. Assume like Cooney 51 tons	Unknown	0	1.7 tons	0	Reduce 17.2 tons	Slight increase possible	0	About 4% increase followed by 33.7% decrease

The action alternatives do not have any measurable impact on bull trout. The project activities, even those in Cooney Creek, are not expected to alter population dynamics or viability of bull trout. As described earlier, the overall status of bull trout in the Swan Valley is vulnerable due to the threat of non-native species. The action alternatives do not hasten or slow the potential decline of bull trout.

Regulatory Framework and Consistency

All alternatives comply with directions and goals set forth in the Forest Plan including Amendment #3 and the INFS amendment. The alternatives do not lead to “unacceptable fish losses.” The alternatives do not impair any key bull trout stream. The alternatives do not have any activity in INFS riparian habitat conservation areas” and they do not retard the attainment of riparian management objectives.

Bull trout are listed as a Federally threatened species. None of the streams in the project area are critical habitat or identified as priority watersheds. A BA is required for significant Federal actions that may impact bull trout. This project is consistent with protection of the species. A BA for action alternatives has been completed and determined “**May affect, not likely to adversely impact bull trout”** (Project File Exhibit L-7). This is due to the conservative nature of a BA. A small amount of sedimentation is anticipated in the Cooney Creek Watershed, which presumably has some bull trout spawning and rearing. However, the amount of sedimentation is too small to be measured or to affect population size.

The Forest Service has listed Westslope cutthroat trout as a sensitive species to prevent population declines that would lead to listing as a Federally threatened or endangered species. A BE has been prepared for each alternative. The findings are “no impact” for Alternative 1. The findings for the action alternatives determined that they **“May Impact Individuals or Habitat, but Will Not Likely Result in a Trend Towards Federal Listing or Reduced Viability for the Population or Species”** (Project File Exhibit L-12). This is because of anticipated short-term sedimentation in certain watersheds. Over the long term, the project is anticipated to be beneficial in reducing sediment and, if certain culverts are replaced, restoring habitat connectivity.