

8. Sawmill Well Sites

The effects for the west well site would be the same as those described under Alternative 1, the Partial Retention Visual Quality Objective could be met. The central and south wells would not be drilled.

9. East Creek Well Site

This well would not be drilled.

PIONEER PLANNING UNIT

10. Glendale Well Site

The effects would be the same as for Alternative 4. The VQO could be met.

FISHERIES

INTRODUCTION

The fisheries resource is concerned with effects on fish habitat and the quality and quantity of water, and how that then affects fish populations. Water quality and quantity are the premier elements in establishing basic fish life. Without enough clean water, fish, and the aquatic life on which fish depend, would not exist no matter how good the other required habitat features were.

Petroleum products are extremely toxic to fish and aquatic organisms. Water quality and fish can be directly affected by petroleum spills resulting from drilling and/or road and pad construction (Woodward et al. 1988). The effects can extend far downstream, depending on the volatility of the petroleum and the physical characteristics of the waters receiving the spill (Jackson, personal communication). Latent effects on fish include reduced growth and gill pathology in fish (Woodward et al. 1981), reduced aquatic insect diversity (Woodward et al. 1983) and displacement until the effects of the petroleum have diminished to a non-toxic level.

Water quantity can be affected by the withdrawal of water from fish-bearing streams to below the minimum level required for fish survival. Withdrawing water can result in dewatering important sections of a stream, and elevating water temperatures within the stream.

As with water, when stream channel features (fish habitat) which are important to the fishes' lives be-

come degraded, then some degree of fish population reduction can be expected. In the case of oil and gas exploration, the main type of fish habitat modification we expect would come from sediment introduced to streams from either the drilling process or construction of drill pads and/or access roads. Embryonic fish can be affected, and survival is largely determined by the amount of fine sediment in the spawning gravel. Studies have shown survival is highest when fines (sediment particles smaller than 6.3mm) are less than 20 to 25% and that survival declines rapidly with increasing fines (Meehan 1991). Too much sediment can also affect the numbers and types of aquatic insects and aquatic-dependant species in the stream. An increase in sediment can decrease the amount of aquatic insects available as fish food. In addition to loss of pool and spawning habitat, extreme amounts of sediment can upset the hydrologic balance of streams, causing channel meandering and stream course changes.

The effects of sediment from oil and gas exploration and development on fish populations and aquatic insects depends on the amount of sediment entering the stream; hydrologic function of the stream; and current amounts of fine sediment in important fish habitat areas such as pools and spawning areas. In order to predict effects, site-specific information is needed about: existing hydrologic function; existing sediment; exact locations of proposed roads and drill pads; and existing fish populations.

By following Best Management Practices and specialist mitigation designed to reduce stream sedimentation, oil and gas exploration and development activities can be carried out within Forest Plan standards. These mitigation measures would also need to be followed during drill pad and access road reclamation to keep sediment produced within forest standards and to meet the Forest Plan's fisheries objectives.

RECOMMENDED MITIGATION AND MONITORING

Mitigation Common to All Action Alternatives

All Fish and Other Aquatic-Dependant Species

For all intermittent and perennial streams and lakes;

1. Do not permit petroleum based substances or drilling fluids to enter streams and lakes through surface or ground water sources.
2. Use appropriate drill site locations and sediment trapping methods to minimize the risk of sed-

iment from roads and drill pads entering streams and lakes.

3. Do not allow water withdrawal from lakes or streams for drilling or road operational purposes to exceed the minimum required to sustain the existing fish population or aquatic ecosystem in the lake or stream.
4. For Standard Terms, locate drill pads and ancillary facilities at least 200 meters (656 ft.) from all lakes and perennial and intermittent streams.

In streams containing pure westslope cutthroat trout or fluvial arctic grayling or any sensitive, aquatic-dependant vertebrate:

1. Do not permit water withdrawal.
2. Minimize sediment introduction at stream crossings by using bridges.

EFFECTS COMMON TO ALL ALTERNATIVES

Introduction

No direct impacts are expected. Direct impacts, the immediate death of fish, would result only from a petroleum spill into the stream. A petroleum spill into a stream is unlikely due to modern drilling technology and equipment and the required minimum distance location from streams and riparian areas.

Effects on Fisheries Habitat by Leasing Stipulation

Standard Terms

This stipulation allows us to move the proposed ground disturbing activity up to 200 meters (656 ft.) to protect resources. This is the least restrictive stipulation, and would permit us to locate the edge of the drill site up to 656 feet from any stream. One of the features common to all alternatives found in Chapter II points out that we will enforce our ability to move proposed activity within the Standard Terms stipulation in all riparian areas.

Indirect effects: Some sediment might reach streams, primarily from road construction and stream crossings. Because the drill pads would be located at least 200 meters from streams, the likelihood of sediment reaching a stream from a pad is lower than from a road. With this stipulation there is some risk that sediment would be produced and that it could reach a stream.

Controlled Surface Use

This stipulation allows us to relocate, require special design, and require additional on- and off-site mitigation to prevent sensitive fish populations from being decreased as a result of oil and gas activities.

CSU would allow control of activities beyond that allowed in Standard Terms for identified resource needs.

Indirect effects: The location of roads and drill sites in proper areas, in some instances farther from streams than Standard Terms allow, would reduce the risk of sediment being produced and/or reaching the stream. With this stipulation there is still a risk sediment could reach a stream, but the risk is less than that of Standard Terms. The requirement of additional mitigation (see Lease Notice) could result in no net loss or an increase in fish habitat.

Controlled Surface Use applied for resources other than fisheries may not be beneficial to fish, and in some cases could be detrimental to the fisheries resource.

No Surface Occupancy

This stipulation prohibits the disturbance or occupancy of an area by the lessee. NSO in Alternative 1 is defined differently from NSO in the other alternatives (See NSO Alternative 1 in Chapter II).

Indirect effects: For NSO in Alternatives 2-7, there would be No Surface Occupancy or disturbance by the lessee, and no effects to fish or their habitats.

No Lease

No Lease means the land would not be offered for oil and gas lease at this time.

Indirect effects: Since there would be no oil and gas activity, there would be no effects on the fisheries resource.

Forest-wide Indirect Effects on Sensitive Fish Species: Westslope Cutthroat Trout and Fluvial Arctic Grayling

Potential sediment from road, pad, and facility construction entering into the streams is expected to be the major indirect impact to the fish and aquatic life within streams. Best management practices (BMPs) designed to reduce or prevent sedimentation from entering streams, and which would be used in Stand-

ard Terms (ST) and Controlled Surface Use (CSU), are about 80% effective (Salo, personal communication). Locating a road or pad farther away from a stream or placing them in a site to reduce the potential of sediment reaching a stream (CSU), combined with BMPs would reduce the risk of sedimentation more than Standard Lease Terms. Not allowing a road or a pad to occupy an area (NSO), would reduce the risk of stream sedimentation to zero, similar to no leasing or having the area not available for lease.

The effects on the westslope populations for the different alternatives, in some instances, would be difficult to determine without knowledge of the existing stream condition, expected increase in sediment load, and the specific stream's hydrologic parameters. A general assumption can be made that as the risk of additional sediment input to a stream increases, the risk to the fish population and aquatic ecosystem also increases.

Cumulative Effects

Introduction

To determine cumulative effects for fisheries, we analyze the effects of oil and gas activities together with all other past, present, and planned activities within the drainage. Any mitigation measures that apply to the alternatives would also be considered in the cumulative effects analysis.

Past, Present, and Reasonably Foreseeable Actions and Their Effects

Livestock grazing will continue on most of the forest. In the past, grazing was an important negative factor in modifying stream channel morphology and fisheries habitat. Both native and non-native fish species have been affected, with westslope cutthroat trout populations showing the most decline. Forest-wide, allotment plans have been revised at a rate of about 3 to 6 per year. Approximately 8% of the 166 total allotments have been revised since 1991 (de Golia, personal communication).

Forty-eight allotments on the forest contain streams with westslope cutthroat populations to be managed as pure (95-100% pure).

With the use of the Beaverhead's Riparian Guidelines, we expect to reverse the downward trend in fish habitat and population numbers and to improve riparian habitat. The Beaverhead's riparian guidelines have been in place for about 3 years and are included in some allotment management plans. It is too soon

for the effects of following the guidelines to be evident in improved fish habitat and population numbers. Allotment administration and positive permittee commitment will be an important factor in the guidelines' effectiveness in restoring riparian and westslope cutthroat trout habitat.

We expect all forest grazing allotments to address Forest Plan standards and guidelines within 6 to 10 years. By the year 2005, all allotments on the forest will be required to meet fisheries and riparian standards and guidelines.

Depending on the AMP implemented, the current allotment condition, and the recovery rate potential, the beneficial effect to the fisheries and aquatic resources will take at least 10 years to appear, once on-the-ground management begins. By the year 2005, we expect to see an upward trend in fisheries/riparian habitat conditions along some of the faster recovering channel and vegetation types, with a corresponding increase in fish population densities.

Timber harvest will continue on the forest. In the past, in some cases, timber harvest and road construction impacted fish habitat. In the future, using ecosystem management approaches, timber harvest could be used as a tool to change vegetation on a broader scale. Best management practices need to be applied to timber harvest activities to minimize impacts to other resources. It is expected that sediment introduction caused by timber harvest activities will be reduced.

Mining will continue on the forest. Past placer mine operations, primarily in the late 1800's and early 1900's, had significant adverse effects on fish habitat and population numbers. Currently, operational restrictions and reclamation of activities along riparian areas have helped to reduce the immediate and long term effects of new mining on Forest Service administered lands. The effects of old placer mines have not been monitored, but fisheries surveys have shown these effects are still visible on stream channel morphology and in some cases still continue to affect fish numbers. Some areas of past mining have revegetated, decreasing their effect on fisheries.

The old Elkhorn mine is continuing to produce acid water, but at a reduced acidity from when it started flowing into Elkhorn Creek seventy years ago (Svoboda, personal communication). No date for the reclamation of the acid water situation has been proposed by the EPA. The acid water in Elkhorn Creek serves as a chemical barrier which prevents non-native trout from moving upstream into the westslope

cutthroat trout population in the upper reaches of Elkhorn Creek.

Recreational use of National Forest lands is expected to increase. Recreational use of streams for activities like fishing, washing, digging, and by crossings has impacted fish and fish habitat at specific sites. It is expected this impact will continue, and most likely increase as the number of recreationists increases. Except for sport fishing, these impacts are usually limited to small areas and are usually not significant to the overall fish population. Although the Montana Sport Fishing regulations encourage releasing cutthroat trout, there is currently no requirement to do so. Within the native cutthroat range, the daily and possession limit is 5 cutthroat. Keeping westslope cutthroat trout can have a direct adverse effect on a population when adult numbers are low.

All fish, especially salmonids, can be affected to some degree by fine sediment in streams. Rainbow, hybridized cutthroat, and genetically pure westslope cutthroat are similarly affected by excessive fine sediment even though one fish is classified as sensitive and the others are not. Sensitivity reflects how rare the fish is in comparison to its historical range, and was discussed in Chapter III, Fisheries. Non-sensitive trout, including rainbow, brook, brown, and hybridized cutthroat have been impacted by past land management habitat changes and sport fishing. Because many of the stream's existing habitat conditions are marginal for supporting trout, the introduction of additional sediment could result in decreased population levels. Due to the oil and gas sediment mitigation measures, it is highly unlikely sediment entering the streams would be enough to eliminate a non-sensitive trout population, but some decline in population densities could result.

Westslope cutthroat trout, a sensitive species, has continued to decline due to land management habitat modifications, sport fishing, competition with non-native fish, and hybridization with rainbow and Yellowstone cutthroat trout. The forest is attempting to improve the westslope's habitat by using the riparian guidelines, or equivalent options, when revising allotment management plans. Impacts due to sport fishing, competition with non-natives and hybridization are yet to be resolved. Resolution of these problems will take a coordinated effort and plan by the Forest Service, Montana Department of Fish, Wildlife and Parks, BLM and private land owners. Even if the habitat was in ideal condition to support the maximum density of westslope cutthroat trout where it occurs, competition and hybridization with non-native trout will continue to keep the westslope population on a

downward trend. This condition will remain regardless of oil and gas activity.

The Big Hole River fluvial arctic grayling, a Category I species for listing as a threatened or endangered species, has been affected by dewatering, overfishing, competition with non-native trout, and in some areas, sediment. The fluvial arctic grayling workgroup is developing a recovery plan to address these issues (Fluvial Arctic Grayling Restoration Plan). In addition, the plan has identified streams where the introduction of grayling has a good probability of succeeding (Kaya 1992). The upper Ruby River above Ruby Dam and the Madison River are two recovery sites that could be influenced by oil and gas activities on the forest. The major threat to these grayling populations would be from water quality contamination resulting from a petroleum spill. Currently, hundreds of motorized vehicles drive along the Big Hole, Madison, and Ruby Rivers without causing petroleum contamination to the resident fish species.

EFFECTS OF INDIVIDUAL WELL SITES

Introduction

Baseline information was not gathered for each of the hypothetical drill sites because; a) the probability of a hypothetical well site becoming the exact site for drilling at the APD stage is remote, b) the expense of obtaining baseline information for the hypothetical sites would be wasted since such data would probably not be useful at the APD stage, and c) the use of models and currently available information is adequate, at the leasing stage, to provide the decision maker and the public with expected effects on the fisheries resource from activities at the RFD sites. Detailed baseline information will be gathered and site analyses performed for sites identified in Applications for Permits to Drill.

We've used the WATSED model, an estimate of the amount of sediment that is predicted to be delivered to the streams from road and drill pad construction, to assist in estimating the risks of the hypothetical drill sites (RFD) on the fisheries resource and aquatic ecosystem. The WATSED model is explained more fully in the Chapter III and IV Hydrology sections (pages III-41 and IV-46-50). WATSED gives a relative comparison of the existing condition from roads and timber harvest units and predicted sediment input for the different well sites and associated roads.

The Forest Plan standard for sediment is to not exceed 50% over natural. From a fisheries perspective,

even though oil and gas leasing may not exceed the forest plan standard, the existing sediment condition in the stream could be at a level where any increase in sediment would result in a significant embryonic fry mortality. For most of the streams that would be affected by the RFD sites, we do not have baseline sediment information. With the habitat and species information we have, we can assess the risk to the fisheries resource from activities at the RFD sites. We can say which sites might have a higher risk of sediment introduction and if that may affect the existing fisheries resource.

The lease terms and stipulations which apply to each alternative are displayed in Table II-4, page II-16.

ALTERNATIVE 1

Description of NSO as Applied to Alternative 1

Roads and pipelines would be allowed to cross NSO land.

Explanation of Fisheries Effects

Streams and lakes in Alternative 1 are buffered 500 feet from drill pads; roads could be allowed within the buffers. Outside of the NSO buffer, in areas leased with Standard Terms, we may move activities an additional 200 meters, if needed.

GRAVELLY PLANNING UNIT

1. Crockett Lake Well Site

Indirect effects: The model predicts a 1.6% increase in sediment over natural. Sediment would be expected to reach French Creek and then Warm Springs Creek from the road and drill pad (see Figure IV-4). The existing sediment condition for Warm Springs Creek is 40.2% fines. The existing estimated embryo survival for the cutthroat/rainbow hybrids is 26% (Weaver & Fraley 1993) and 38% for brook trout (Witzel & MacCrimmon 1983, as modified by Brad Shepard). The indirect effects of leasing would pose a low risk of affecting the already low population densities.

2. Ledford Well Site

Indirect effects: The model predicts a 7.9% increase in sediment over natural. The baseline sediment level and habitat conditions are not known, but there would probably be a low risk of sediment significantly affecting fish population densities.

3. Cliff Lake Well Site

Indirect effects: The model predicts a 7.2% increase in sediment over natural. The baseline sediment level and habitat conditions are not known, but there would probably be a low risk of sediment significantly affecting fish population densities.

4. West Fork Well Site

North and Center Well Sites

Indirect effects: The model predicts a 15.7% increase in sediment over natural. The existing sediment condition for Coal Creek is 42.2% fines. The existing estimated embryo survival for the cutthroat/rainbow hybrids is 25% (Weaver & Fraley 1993). The indirect effects of leasing would pose a moderate risk of affecting the already low embryo survival rates in Coal Creek. There would also be an increase in sediment into the Upper Ruby River but the effects of that sediment would be masked by the naturally occurring sediment in the upper Ruby system.

South Well Site

Indirect effects: The model predicts a 6.8% increase in sediment over natural. The existing sediment condition for the West Fork Madison River is 28.5% fines. The existing estimated embryo survival for the cutthroat/rainbow hybrids is 35% (Weaver & Fraley 1993). The indirect effects of leasing would pose a moderate risk of affecting the already low embryo survival rates in the West Fork of the Madison River.

5. Antone Well Site

In Alternative 1, this site falls within an area of No Surface Occupancy. No drill pad or access road would be built, therefore, there would be no effect on fisheries.

LIMA PLANNING UNIT

6. Sourdough Well Site

Indirect effects: The model predicts a 15.7% increase in sediment over natural. At this time we do not know if there are any fish in this creek, its baseline sediment levels, or fish habitat condition. If any trout were present, they would likely experience decreased embryonic survival and some decline in population. Aquatic insect species and densities would also decrease.

7. Lima Peaks Well Site

Indirect effects: The model predicts a 74.5% increase in sediment over natural, which is beyond Forest Plan standards. There would be no effect on fish because Alder Creek is dry most of the year and reportedly does not support fish.

8. Sawmill Well Sites

West Well Site

Indirect effects: The model predicts a 27.5% increase in sediment over natural. Because of the high amount of visually observed surface fines, there is a high risk that embryo survival of the hybridized westslope cutthroat trout (94%, introgressed) would decrease, and densities and species of aquatic insects would decrease or change as well. We could expect a decline in the numbers of cutthroat found in this stream.

Central and South Well Sites

Indirect effects: The model predicts a 29.3% increase in sediment over natural. Because of the low gradient, and the impounding of water due to beaver activity resulting in the settling out of fine sediment in the stream, there is a high risk that embryo survival of the westslope cutthroat trout (97% pure, to be managed as pure) would decrease, and densities and species of aquatic insects would decrease or change as well. We could expect a decline in the numbers of westslope found in this stream.

9. East Creek Well Site

In Alternative 1, this site falls within an area of No Surface Occupancy. No drill pad or access road

would be built, therefore, there would be no effect on fisheries.

PIONEER PLANNING UNIT

10. Glendale Well Site

Indirect effects: The model predicts a 2.5% increase in sediment over natural. The existing condition of the stream is not known. There is a risk of a slight downward effect on the brook and hybridized trout populations in the stream.

Forest-wide Indirect Effects on Westslope Cutthroat Trout Streams: Alternative 1

In Alternative 1, all perennial streams are covered by the "forest plan NSO lease stipulation" which keeps the drill pads at least 500 ft. from a stream or lake, but has no restrictions on road or stream crossing locations.

In this alternative, 26% of the drainages containing sensitive fish would be leased under Standard Lease Terms, which could pose a moderate risk of sedimentation (Table IV-12). Sixteen percent of the sensitive fish drainages are stipulated CSU. Because these CSU stipulations are for resources other than fish, they may not afford the protection needed for westslope cutthroat trout, and there is a moderate risk of sediment affecting the fish. Twenty-seven percent of the sensitive fish drainages are stipulated NSO. The roads allowed under the Forest Plan NSO definition could cause moderate sediment risk. Well pads would not be allowed and, therefore, would not affect fish. Thirty percent of the drainages with sensitive fish are Not Available for lease, and would not be affected by oil and gas activities.

Table IV-12

Total Acres of Westslope Cutthroat Trout and Arctic Grayling Drainages Affected by Lease Stipulations from All Resources

Alt	Standard Terms (%)	Controlled Surface Use (%)	No Surface Occupancy (%)	Not Available (%)	No Lease (%)	Total
1	225,600 (26)	146,200 (16)	242,300 (27)	263,400 (30)	0 (0)	877,500
2	482,300 (55)	131,800 (15)	0 (0)	263,400 (30)	0 (0)	877,500
3	0 (0)	0 (0)	0 (0)	0 (0)	877,500 (100)	877,500
4	51,600 (6)	348,200 (40)	213,100 (24)	263,400 (30)	1,200 (>1)	877,500
5	248,100 (28)	295,100 (34)	70,900 (8)	263,400 (30)	0 (0)	877,500
6	75,000 (8)	0 (0)	0 (0)	323,300 (37)	479,200 (55)	877,500
7	0 (0)	358,300 (41)	255,800 (29)	263,400 (30)	0 (0)	877,500

Cumulative Effects of Alternative 1

Because range management has had the most serious and wide-ranging effects on riparian conditions of all the forest's activities, the expected improvement in riparian conditions resulting from the revision of the forest's range allotments will cause a noticeable improvement in fisheries, aquatic habitat and fish population densities. Therefore, cumulatively, fish habitat would improve and populations would increase.

The Crockett Lake, Ledford, Cliff Lake, and Glendale drill sites would be expected to produce a sediment increase of 1.6 to 7.9% over natural, resulting in a low risk of a small population decline. By the year 2020, primarily as a result of improved grazing management, it is expected there would be an upward trend in the riparian habitat and aquatic ecosystem with a corresponding increase in fish population densities.

The West Fork and Sourdough drill sites would be expected to produce a sediment increase of 6.8 to 15.7% over natural, resulting in a moderate risk of a further population decline. Sediment entering the Upper Ruby from oil and gas leasing would be relatively small compared to the natural sediment load. The naturally high sediment load and low embryo survival rate in Coal Creek would not change. Any sediment produced from oil and gas activities should be offset by expected sediment reduction from better livestock management in the Upper Ruby drainage, from a recently revised, functioning AMP. Cumulatively, there would be a reduction in man-caused sediment, but that reduction is relatively insignificant and masked by the river's natural sediment load. The Upper Ruby River is a candidate for the introduction of fluvial arctic grayling (Montana Fluvial Arctic Grayling Restoration Plan). The existing habitat is not considered degraded for grayling reintroduction (Kaya 1992). Reduction in the overall sediment load of the Upper Ruby River would have a positive effect on the survival of the grayling (Byorth, Personal Communication).

Lima Peaks and the three Sawmill sites would be expected to produce a sediment increase of 27.5 to 74.5% over natural, resulting in a high risk of a further population decline. Revising grazing allotments on the National Forest will cause an improvement in the riparian habitat. At the Lima Peaks site, sediment could reach Alder Creek, an intermittent stream which is on private land. Livestock management along Alder Creek is not expected to change. There are no fish in the stream, and with very little seasonal

flow, the risk of sediment moving to a perennial stream is slight.

In Sawmill and Deep Creeks, because of improved livestock management, the hypothetical westslope cutthroat trout habitat and population levels would increase over present levels. Although sediment from the drill sites would cause a decrease in embryo survival, the sediment levels would be high for only a year and then gradually subside to the natural level after 10 years (see Hydrology, Chapter IV). Timing of sediment input from oil and gas with the recovery of the riparian areas as a result of AMP revisions is critical. If the riparian area has not recovered, additional sediment from the oil and gas operations would have a high risk of affecting the westslope populations. If the riparian area and fish habitat have recovered, there would be a moderate risk of affecting the population below the well sites. If the fish habitat was in good condition, the fish could successfully spawn further upstream and avoid the spawning areas with higher than ideal sediment. Sport fishing, especially along Sawmill Creek would remove adult fish from the population. There would be no negative interaction with non-native species.

Analysis of Oil and Gas Production Activities at the West Fork and Sawmill Sites

For this analysis, we've assumed the West Fork sites would produce oil and the Sawmill sites would produce gas.

The West Fork site oil field would be expected to produce oil for twenty years. The oil would be trucked year long to a facility off the forest. It's expected there would be one round-trip every other day from the well sites. The effects of oil production would be the same as for exploration, with moderate amounts of sediment produced in the initial set-up and drilling and a fast decline in sediment after the first year. The trucking of oil has the potential to produce road sediment into streams when traveling during the wet time of the year. The access roads going up the ridges have the potential to produce more sediment to streams than the more level Centennial-Divide Road.

At the Sawmill site, the gas field would be expected to produce for forty years. The gas would be piped through a buried, small diameter pipe, 4 inches or less, for about 20 miles to a facility capable of receiving the gas. The gas line would be drilled to pass under any stream so there would be no sediment at stream crossings except when the equipment crossed. Sediment from brief equipment crossings

would be of moderate intensity for only a brief period of time. No sediment would be expected to result from the pipe-laying operation. During the gas production phase, there would be no more sediment produced than what was generated during the exploration phase and the effects would be similar.

ALTERNATIVE 2

The effects of implementing Alternative 2 would be the same as those described for Alternative 1 for all but two of the hypothetical well sites. The sites for which the effects are the same are: Crockett Lake, Ledford, Cliff Lake, West Fork Sites, Sourdough, Lima Peaks, Sawmill Sites, and Glendale.

Antone Well Site

Indirect effects: The model predicts a 3.9% increase in sediment over natural. The existing condition of the stream is not known. There is a risk of a slight downward effect on the brook and hybridized trout populations in the stream.

East Creek Well Site

Indirect effects: The model predicts an 8.8% increase in sediment over natural in East Creek. The existing condition of the stream is not known. There is a risk of a slight downward effect on the brook trout population in East Creek.

The model predicts a 24.5% increase in sediment over natural in the Middle Fork of Little Sheep Creek as a result of road construction in that drainage. There would be a high risk of a downward effect on the introgressed (94% in lower reaches) westslope cutthroat trout in that stream. This is an example of a high amount of fine sediment affecting a non-sensitive trout species.

Forest-wide Indirect Effects on Westslope Cutthroat Trout Streams: Alternative 2

In this alternative, 55% of the drainages containing sensitive fish are leased with Standard Lease Terms, which could pose a moderate risk of sedimentation. Fifteen percent of the sensitive fish drainages are stipulated CSU. Because these CSU stipulations are for resources other than fish, they may not afford the protection needed for westslope cutthroat trout, and there is a moderate risk of sediment affecting the fish. None of the sensitive fish drainages are stipulated NSO. Thirty percent of the drainages containing sen-

sitive fish are Not Available for lease, and would not be affected by oil and gas activities.

Cumulative Effects of Alternative 2

The cumulative effects of implementing Alternative 2 would be similar to those discussed for Alternative 1. The difference would be the addition of impacts from exploration activities at the Antone and East Creek sites.

For the Antone drill site, the risk of a slight decline in trout habitat and embryo survival would be offset by the expected improvement in riparian habitat due to AMP revisions. There would be an improvement in fish habitat and fish population densities.

The East Creek drill site could introduce a small amount of sediment into East Creek. The combined effects of this sediment, countered by the expected grazing allotment improvement, would result in an increased population density of the brook trout in East Creek. Sport fishing in East Creek, influenced by the close proximity of the East Creek campground, would result in the loss of some brook trout adults. Cumulatively, the brook trout population should show an increase. The road to the East Creek site has the potential to produce a high amount of sediment which could reach the Middle Fork of Little Sheep Creek. Only half of the stream channel contains water and fish. The combined sediment from the road, offset by the expected riparian improvement from the presently ongoing AMP revision, and the re-routing of hiking trails to one side of the creek is expected to result in less sedimentation, an increase in fish habitat and an increase in fish population densities.

ALTERNATIVE 3

Indirect effects: This is a no lease alternative. There would be no effects on the fisheries resource at any of the hypothetical drill sites.

Forest-wide Indirect Effects on Westslope Cutthroat Trout Streams: Alternative 3

In Alternative 3, no leasing would take place, therefore, 100% of the streams' lengths have no risk of sedimentation or reduction in population densities.

Cumulative Effects of Alternative 3

Riparian habitat problems caused by grazing will be reduced and overall fish populations will increase, but sport fishing for westslope cutthroat will continue.

Depending on how popular the Sawmill area gets for fishing, there could be a decline in adult fish that could eventually affect the overall population level.

A population of fluvial arctic grayling will likely be stocked on the Beaverhead National Forest in the Upper Ruby drainage, and elsewhere off the forest, in its traditional range in southwest Montana, resulting in additional viable populations.

Brook trout will expand their range and densities as they effectively compete against rainbow and cutthroat trout due to better adaptability, higher spawning success in less than ideal gravel, and from the general riparian improvement from AMP revisions.

Rainbow trout, hybridized trout, and amphibians will likely increase their numbers and/or expand their range due to improved riparian habitat conditions. Aquatic macroinvertebrates will adjust their species and densities in response to changes in the aquatic habitat that favor certain species over others.

ALTERNATIVE 4

One of the items considered in analyzing this alternative is the Lease Notice alert for activities near waters where sensitive aquatic-dependant vertebrate species are found. Activities within 200 meters of a stream or lake can be highly restricted, special road and well pad designs may be required, and stream improvements may be necessary to offset any existing habitat problem, or potential sediment increase in the stream due to oil and gas exploration or development.

GRAVELLY PLANNING UNIT

For the hypothetical Crockett Lake, Cliff Lake, and West Fork well sites, the effects would be the same as those described for Alternative 1.

The Ledford and Antone sites fall within areas of No Surface Occupancy. No drill pad or access road would be built, therefore, there would be no effect on fisheries.

LIMA PLANNING UNIT

The effects of the hypothetical Sourdough and Lima Peaks well sites would be the same as those described for Alternative 1.

The Sawmill and East Creek sites fall within areas of No Surface Occupancy. No drill pad or access road

would be built, therefore, there would be no effect on fisheries.

PIONEER PLANNING UNIT

The effects of the hypothetical Glendale well site would be the same as those described for Alternative 1.

Forest-wide Indirect Effects on Westslope Cutthroat Trout Streams: Alternative 4

In this alternative, 6% of the drainages containing sensitive fish are leased with Standard Lease Terms, which could pose a moderate risk of sedimentation. Forty percent of the sensitive fish drainages are stipulated CSU. Because these CSU stipulations are for resources other than fish, they may not afford the protection needed for westslope cutthroat trout, and there is a moderate risk of sediment affecting the fish. Twenty-four percent of the sensitive fish drainages are stipulated NSO. No occupancy would be permitted for well pads or linear features, and thus there would be no effects on fish. Thirty percent of the drainages containing sensitive fish are Not Available for lease, and would not be affected by oil and gas activities. An insignificant amount of sensitive fish drainages are designated No Lease and would not be affected.

Cumulative Effects of Alternative 4

Crockett Lake, Cliff Lake, the West Fork sites, Sourdough, Lima Peaks, and the Glendale site would have the same cumulative effects as described for Alternative 1. Ledford, Antone, East Creek and the Sawmill sites would not be drilled, therefore, their cumulative effects would be the same as Alternative 3.

The significant aspect of Alternative 4 from a fisheries perspective is not the number of wells drilled or not drilled. It is the fact the Sawmill sites which contain pure and introgressed westslope cutthroat trout would not be disturbed due to the NSO stipulation applied for a different resource. Because the populations of westslope cutthroat trout in Sawmill and Deep Creeks would not be impacted by oil and gas exploration, the cumulative effects would be the same as Alternative 3.

ALTERNATIVE 5

One of the items considered in analyzing this alternative is the Lease Notice alert for activities near waters

where sensitive aquatic-dependant vertebrate species are found. Activities within 200 meters of a stream or lake can be highly restricted, special road and well pad designs may be required, and stream improvements may be necessary to offset any existing habitat problem, or potential sediment increase in the stream due to oil and gas exploration or development.

The effects of implementing Alternative 5 are identical to those described for Alternative 1 for all hypothetical sites except Antone, the Sawmill sites, and East Creek. Sawmill south falls within an area of No Surface Occupancy. No drill pad or access road would be built, therefore, there would be no effect on fisheries. For the other two Sawmill sites the Lease Notice would be in effect. Oil and gas activities would be highly restricted to minimize the risk of sediment input into the stream or lake. Fish habitat rehabilitation would be required to offset any fish habitat and/or sediment problem. Westslope cutthroat trout habitat would improve and allow population densities to increase. Westslope populations would remain static outside of the enhancement site(s).

The effects of implementing Alternative 5 on the hypothetical Antone and East Creek sites would be identical to those described for Alternative 2.

Forest-wide Indirect Effects on Westslope Cutthroat Trout Streams: Alternative 5

In this alternative, 28% of the drainages containing sensitive fish are leased with Standard Lease Terms, which could pose a moderate risk of sedimentation. Thirty-four percent of the sensitive fish drainages are stipulated CSU. Because these CSU stipulations are for resources other than fish, they may not afford the protection needed for westslope cutthroat trout, and there is a moderate risk of sediment affecting the fish. Eight percent of the sensitive fish drainages are stipulated NSO. No occupancy would be permitted for well pads and linear features, and thus there would be no effects on fish. Thirty percent of the drainages with sensitive fish are Not Available for lease, and would not be impacted by oil and gas activities.

Cumulative Effects of Alternative 5

All the sites except Antone, the Sawmill sites and East Creek would have the same cumulative effects as those described for Alternative 1. The cumulative effects of oil and gas exploration activities at the Antone and East Creek sites would be the same as those described for Alternative 2.

The Sawmill south site would not be drilled, and would have the same cumulative effects as Alternative 3. The other two Sawmill sites would have an increase in westslope cutthroat habitat and population densities, but a little below the level described in Alternative 3. The effects of sport fishing would be the same as Alternative 3.

ALTERNATIVE 6

All of the hypothetical well sites except West Fork south fell in areas requiring No Lease or not available for leasing. For these sites, there would be no effect on the fisheries resource.

The effects of implementing Alternative 6 for the West Fork south site would be the same as those described for Alternative 1.

Forest-wide Indirect Effects on Westslope Cutthroat Trout Streams: Alternative 6

In Alternative 6, 28% of the streams' lengths are leased with Standard Terms, with a moderate risk of sedimentation and affects on the fish population. Seventy-two percent of the streams' lengths have no risk.

Cumulative Effects of Alternative 6

In this alternative, 8% of the drainages containing sensitive fish are leased with Standard Lease Terms, which could pose a moderate risk of sedimentation. None of the sensitive fish drainages are stipulated CSU or NSO. Thirty-seven percent of the drainages containing sensitive fish are Not Available for lease, and would not be impacted by oil and gas activities. Fifty-five percent of the drainages containing sensitive fish would be designated No Lease, and would not be impacted by oil and gas activities.

ALTERNATIVE 7

The sensitive species issue for westslope cutthroat trout was a primary impetus for developing this alternative (Stipulation Package: To Address Westslope Cutthroat Trout Issues in the Beaverhead National Forest Oil and Gas EIS, Appendix J). Because the Big Hole River fluvial Arctic grayling, also a sensitive species, is found within the Beaverhead Forest, it too was incorporated into the development of this alternative.

For Alternative 7, Standard Lease Terms would apply to the Crockett Lake, Ledford, Cliff Lake, West Fork (North & Central) and Glendale well sites, and the

effects would be the same as those stated in Alternative 1 for these sites.

The sites at Antone, Sourdough, Lima Peaks and Sawmill (West) are stipulated CSU and require there be no increase in sediment over the existing condition and no decrease in water quality and quantity. For the Sawmill West site, the pad is CSU for fisheries, but the road leading to the pad is NSO for soils and hydrology. If roads leading to the pad could not meet the no increase in sediment requirement, then access to the pad would need to be by some other non-sediment producing way, such as by helicopter. The risk of affecting fish at these well sites is very low.

The sites at West Fork (South), Sawmill (Central & South) and East Creek are stipulated NSO. Because the wells would not be drilled and the roads would not be built, fisheries would not be affected by oil and gas activities at these sites.

Forest-wide Indirect Effects on Westslope Cutthroat Trout Streams: Alternative 7

This alternative was designed to respond to comments on the Draft EIS, which included concerns about westslope cutthroat trout. In Alternative 7, none of the drainages containing sensitive fish are leased with Standard Lease Terms. Forty-one percent of the sensitive fish drainages are stipulated CSU. These CSU stipulations have been designed specifically for hybridized westslope cutthroat trout (90-94% pure), pure westslope in the low to moderate risk of extinction group, unsurveyed streams that may contain westslope cutthroat populations, a fluvial grayling recovery site, and areas needing extra protection to prevent sedimentation into important grayling habitat. This CSU stipulation requires no net increase in sediment, and no adverse effects to water quality and quantity.

Twenty-nine percent of the sensitive fish drainages are stipulated NSO. These drainages contain populations of pure, for management purposes (95-100% pure), westslope cutthroat. Because no occupancy is allowed, fish would not be affected. Thirty percent of the drainages containing sensitive fish are Not Available for lease, and would not be impacted by oil and gas activities. This alternative poses an extremely low risk of affecting sensitive fish.

Cumulative Effects of Alternative 7

The cumulative effects for the Crockett Lake, Ledford, Cliff Lake, West Fork (North & Central), and Glendale

well sites would be the same as those described for these sites in Alternative 1.

The Antone, Sourdough, Lima Peaks and Sawmill (West) sites would cause no increase in sediment over the existing condition and no decrease in water quality and quantity. Combining this with expected improvements from better range management in riparian areas should result in an upward trend in fish habitat conditions and population densities.

The West Fork (South), Sawmill (Central & South) and East Creek are stipulated NSO. These wells would not be drilled, so the cumulative effects on the fisheries resource around the well sites would be the same as those described for Alternative 3.

AIR QUALITY

EFFECTS COMMON TO ALL ACTION ALTERNATIVES

Potential air quality impacts from oil and gas development include: 1) Dust during construction and from vehicle traffic on unpaved roads; 2) carbon monoxide, hydrocarbons, and nitrogen oxide emissions from service vehicles (primarily pickup trucks and vans); 3) carbon monoxide and oxides of nitrogen from gasoline and diesel engines (including vehicle engines and stationary engines, such as electric generators); and, 4) hydrogen sulfide and sulfur dioxide from flaring and/or treater firing.

The two major factors which would determine the effects of a wildcat well on air quality within the analysis area are:

1. Generation of particulate matter is primarily a function of the amount of heavy truck traffic on dry, unpaved roads. An important variable is the distance of unpaved road to each site.
2. The topography adjacent to the access roads and the analysis wells influences local air movement and the relative dispersion rate of emissions and particulates.

The effects of an exploratory well on air quality include temporary increases in dust, from road and pad construction, and use of the drilling facilities. Some smoke can occur from burning clearing slash. Engine exhaust from construction equipment, transport vehicles, and drill rig engines would contribute pollutants to the air. Some underground gases might