Executive Summary: A planning specialist report was compiled to address the following issues not addressed by other resource specialists:
Key Issue: Identification of a need for commercial and personal forest product harvest opportunities, including sawlogs, houselogs, firewood, and post and poles.
Analysis Issue: Concern about use of heavy equipment and suggestion for use of smaller equipment, such as horse logging.
Analysis Issue: Effects of project implementation to the West Fork Road.
Analysis Issue: Effects to local economy, with consideration of viability of forest products and costs/benefits of mitigations.
Analysis Issue: Effects of project on climate change.

Changes between Draft and Final:
Not applicable.

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

KEY ISSUE: Identification of a need for commercial and personal forest product harvest opportunities

Introduction: Public comment expressed a need for providing commercial and personal forest product harvest opportunities during implementation of the Beartooth Front Storm Damage Clean-up and Fuels Reduction HFRA project. It is important to note that the purpose of this project is to improve public and firefighter safety by removing hazard trees and reducing fuels in the project area. Providing opportunities for forest product harvest is not the purpose of this project. Forest product harvest is a tool that can be utilized to meet the project purpose and need. Analysis for this issue discloses potential for the proposed action and no-action alternatives to provide forest product harvest opportunities.

Regulatory Framework for Identification of a need for commercial and personal forest product harvest opportunities:
Custer Forest Plan Management Standards (USDA 1986) specify that "The utilization of small diameter material and sawlog byproducts will be encouraged. Commercial harvest for firewood and other small products will be used to accomplish timber stand improvement where applicable" (page 24) and that on unsuitable forest lands "Harvest of wood or plant products may occur to further management area goals. In sensitive areas such as visual corridors, developed recreation areas, woody draws, and riparian zones, harvest of wood products will occur only to the extent necessary to maintain or enhance the special values of the areas" (page 25).

The Forest Plan Management Standards (page 25) also address firewood harvest:
"1) Firewood harvesting of dead or down timber is an accepted management practice; however, local conditions and management area goals may preclude this practice in some areas. Priority for available firewood will be: a) personal use firewood and b) commercial firewood.

2) Harvest of live trees for firewood may be used to meet management area goals. Standing dead trees (snags) may be reserved from harvest to provide wildlife habitat. Optimum spacing will be 2 snags/acre.
3) There will be a charge permit for the harvesting of personal and commercial firewood. The option exists to designate free-use areas for harvesting personal firewood based on supply, demand, and management of resources."

Christmas tree and ornamental plant harvest is also addressed (page 25).

Forest Plan Management Area R direction specifies that "Small tree products such as posts, poles, fuelwood, Christmas tree, and transplant materials may be harvested. Timber management activities such as thinning, regeneration cutting, and selection cutting to enhance or perpetuate existing watershed, recreation and visual values or provide for public safety are permitted. Cutting activities will be managed to assure high water quality is maintained." (USDA 1986, page 91).

Forest Plan Management Area F Timber Management Standards (page 62) are:
"a. Harvest within developed recreation sites will normally be for removal of hazardous trees and protection of improvements. Timber within the recreation corridors is suitable for timber management as long as the goal of the management area can be met.
b. Post, poles, fuelwood, sawlogs, and other wood products may be harvested from within developed sites and along access corridors providing that the recreation setting is maintained or enhanced, and the visual quality objective is achieved. Type of harvest, design of sale unit and slash treatment will be instrumental in meeting these requirements. Harvest activities will be scheduled to minimize impacts on the recreation experience."

Assumptions, Methodology & Scientific Accuracy, and Information Used for Identification of a need for commercial and personal forest product harvest opportunities:
Qualitative descriptions of existing and predicted harvest opportunities were assessed to disclose project effects to commercial and personal use forest product harvest opportunities.

Description of Spatial Bounds used for effects analysis
Areas accessible for forest product removal adjacent to the West Fork comprise spatial bounds.

Description of Temporal Bounds used for effects analysis
Because project implementation could take several years and because standing or dead firewood would still be useable for several years, a 15 year period was used.

Past, Present, & Reasonably Foreseeable Future Actions considered for cumulative effects analysis
Past and ongoing forest product harvest in the West Fork.

Special Forest Order closing portions of the Cascade Fire area to personal use firewood harvest (USDA 2009).

Affected Environment of Identification of a need for commercial and personal forest product harvest opportunities

Numerous residents in and around Red Lodge heat homes with firewood. Due to close proximity to Red Lodge, West Fork Rock Creek is a popular firewood collection area. There are numerous other roaded areas along the Beartooth Front that are also popular firewood harvest locations. Because an individual firewood permit is sold for the entire Northern Region of the Forest Service, it is not possible to quantify the number of permits sold or the amount of firewood harvested on the Beartooth District. To prevent resource impacts in the Cascade Fire area, a special Forest Order closing portions of the Cascade Fire area to personal use firewood harvest is currently in place (USDA 2009).

Four commercial bough permits per year have been sold in recent years in the Palisades campground area as part of ongoing fuel reduction efforts. Fourty permits for personal use post and pole harvest in designated units on the Beartooth District are sold annually, including permits in West Fork Rock Creek. Area tribal members have treaty rights which allow for harvest of teepee poles. In the past, occasional teepee pole harvest occurs under permit on the District and in the West Fork and tribal members have expressed interest in establishing new areas for such harvest.

Ongoing commercial tree bough harvest has been occurring in the Palisades Campground area, northeast of the West Fork Project area. Similar opportunities exist in the unburned portions of the West Fork drainage, but are very limited because the few places with adequate concentrations of Douglas-fir boughs are not near existing roads. No other commercial forest product harvest opportunities are currently in place in the West Fork Rock Creek.

Identification of a need for commercial and personal forest product harvest opportunities – Environmental Consequences:

EFFECTS OF NO ACTION ALTERNATIVE

Mitigations Included in No Action for Identification of a need for commercial and personal forest product harvest opportunities

None identified.

Direct and Indirect Effects of No Action Alternative on Identification of a need for commercial and personal forest product harvest opportunities

No additional opportunities for commercial and personal forest product harvest would be made available. Ongoing collection of Christmas trees, and posts and poles would continue to be harvested under personal use permits in the West Fork project area. Due to recent special Forest Order, firewood harvest would continue to occur only in unburned areas. In the event that resource damage is occurring from these activities,

additional special Forest Orders to protect resources would likely be issued or no additional personal use permits would be issued for this area. Such orders could prohibit collection or specify how collection could occur.

Cumulative Effects of No Action on Identification of a need for commercial and personal forest product harvest opportunities
None identified.

Irreversible/Irretrievable Commitments of No Action to Identification of a need for commercial and personal forest product harvest opportunities
No irreversible or irretrievable commitments of resources were identified.

Unavoidable Adverse Effects of No Action on Identification of a need for commercial and personal forest product harvest opportunities
None identified.

Forest Plan Consistency of No Action on Identification of a need for commercial and personal forest product harvest opportunities
The no-action alternative would be consistent with Forest Plan standards that apply to forest product harvest opportunities, as some personal use post and pole and firewood harvest would continue under the no-action.

Other Required Disclosures under No Action on Identification of a need for commercial and personal forest product harvest opportunities
None identified.

Conclusions for Environmental Consequences of No Action on Identification of a need for commercial and personal forest product harvest opportunities
No additional opportunities for commercial and personal forest product harvest would be made available. Ongoing collection of firewood, Christmas trees, and posts and poles would continue to be harvested under personal use permits in the West Fork project area under existing rules, regulations, and orders.

EFFECTS OF PROPOSED ACTION ALTERNATIVE

Mitigations Included in Proposed Action on Identification of a need for commercial and personal forest product harvest opportunities
Log decks of non-commercial products would be made available to firewood and post and pole removal.
Some additional post and pole harvest areas would be designated for personal use.
Opportunities for commercial firewood harvest would be made available.
To prevent resource damage and meet Forest Plan standards for firewood harvest, personal use firewood cutting in the Cascade fire area would occur in designated units with application of specific design features. If trees in specific commercial units in the Cascade fire area are not sold under contract, other units burned by the fire would be

opened to personal use firewood harvest with specific design features. These same design features would apply to personal use firewood collection in all non-commercial units burned by the fire. Design features for personal use firewood harvest would be:

- Personal use firewood cutting would occur only in designated units during designated times of year. Once cutting is completed in the designated unit(s), an additional unit would be designated.
- Designation would occur through marking personal use firewood areas with tree-marking paint, flagging, and/or signs. Additional signs indicating all other burned areas are off-limits to firewood harvest would be placed along West Fork Road #2071.
- No personal use firewood cutting would occur within 100 feet of streams.
- No personal use firewood cutting would occur on steep slopes (>35%) between West Fork Road #2071 and the West Fork Rock Creek.
- Off-road vehicle/ATV travel for firewood retrieval in burned areas would occur only on identified routes within personal use firewood cutting units. Forest Service personnel would identify and mark such routes prior to designating areas for cutting. Designated retrieval routes would be either existing system and non-system roads.
- Firewood cutters would be required to lop and scatter slash so that it is not placed in roads, road cutslopes and ditches, and streams.
- Stumps would be cut low to limit visibility.
- To protect wet meadows and drainages, no personal use firewood or post/pole cutting would occur in unit 9.
- Visual management and snag retention standards would be met through design and layout of firewood harvest areas.

Additional Mitigations for Consideration for Identification of a need for commercial and personal forest product harvest opportunities

Consider making some post and pole areas available for tribal teepee pole collection.

Direct and Indirect Effects of Proposed Action on Identification of a need for commercial and personal forest product harvest opportunities

Mitigations included in the Proposed Action (see above) would result in additional opportunities for forest product harvest, particularly commercial harvest opportunities for firewood and posts and poles. Proposed thinning and removal of ladder fuels would likely reduce the overall area near West Fork Road #2071 where Christmas trees are currently available. Additional firewood and bough material would be made available as live trees are cut and log decks of non-merchantable material are provided for collection.

Cumulative Effects of Proposed Action on Identification of a need for commercial and personal forest product harvest opportunities

There is potential that some personal use firewood harvesters may choose to harvest firewood in other areas where restrictive mitigations are not in place, thereby resulting in increased removal of firewood and related resource impacts in these areas.

Short-term Uses vs. Long-term Productivity of Proposed Action on Identification of a need for commercial and personal forest product harvest opportunities
None identified.

Irreversible/Irretrievable Commitments of Proposed Action on Identification of a need for commercial and personal forest product harvest opportunities
Removal of Christmas trees during thinning would irretrievably reduce opportunities for Christmas tree harvest in treated areas until tree regeneration becomes large enough for future harvest (approximately 10-15 years). Once piles made available for firewood salvage are burned (1 to 5 years), the lack of live and dead trees in treatment units would irretrievably reduce opportunities for firewood harvest in the West Fork until tree regeneration becomes large enough for future harvest (50 to 100 years) or until remaining live trees begin to die (20 to 50 years).
No irreversible commitments of resources were identified.

Unavoidable Adverse Effects of Proposed Action on Identification of a need for commercial and personal forest product harvest opportunities
None identified.

Forest Plan Consistency of Proposed Action on Identification of a need for commercial and personal forest product harvest opportunities
A non-significant Forest Plan amendment for visual quality objectives would be required (see project Visuals Resource report). With application of mitigations, commercial and personal forest product harvest would comply with all other applicable Forest Plan standards and would address Forest Plan standards to encourage utilization of small diameter material and sawlog byproducts. The proposed action would also address the Forest Plan standard to use commercial harvest for firewood and other small products to accomplish timber stand improvement.

Other Required Disclosures under Proposed Action on Identification of a need for commercial and personal forest product harvest opportunities
None identified.

Conclusions for Environmental Consequences of Proposed Action on Identification of a need for commercial and personal forest product harvest opportunities
The proposed action would make additional areas and products available for commercial and personal use forest product harvest.

<u>Analysis Issue: Concern about use of heavy equipment and suggestion for use of smaller equipment, such as horse logging</u>

Introduction
During public comment, a concern about use of heavy equipment and suggestion for use of smaller equipment, such as horse logging, was identified as an analysis issue.

Regulatory Framework for Concern about use of smaller equipment
No regulations, policy, or guidance requiring or precluding use of smaller equipment were identified. Regulation, policy, and guidance focus instead on compliance with various resource management and environmental protection measures during implementation. Such measures are detailed and evaluated in various resource specialist reports for this project (see project record).

Assumptions, Methodology & Scientific Accuracy, and Information Used for Concern about use of smaller equipment
A qualitative description of how such equipment could be utilized under the alternatives is provided.

Description of Spatial Bounds used for effects analysis
Proposed treatment units spatially bound the area considered for this analysis.

Description of Temporal Bounds used for effects analysis
A maximum temporal bound of 10 years was utilized because proposed activities could occur over a 5-10 year period.

Past, Present, & Reasonably Foreseeable Future Actions considered for cumulative effects analysis
Past and ongoing personal use post and pole harvest. Past timber harvest. Ongoing West Fork Road reconstruction and bridge replacements.

Affected Environment of Concern about use of smaller equipment
The affected environment is areas near and adjacent to West Fork Road #2071 where forest products are available proximal to the road.

Mitigations Included under Action Alternatives for Concern about use of smaller equipment
Potential areas for commercial and personal use post and pole harvest opportunities are included in the proposed action.

Additional Mitigations for Consideration for Concern about use of smaller equipment
Consider utilizing small timber sales or fuels contracts to implement this project, as this may encourage local or regional operators with smaller equipment to bid on project activities.
Where resource conditions require it, all mitigations included in the proposal for commercial operations should also be applied to operators using small equipment.

EFFECTS OF NO ACTION ALTERNATIVE for concern about use of smaller equipment -

Mitigations Included in No Action Alternative for Concern about use of smaller equipment
None identified.

Direct and Indirect Effects of No Action Alternative to Concern about use of smaller equipment
Existing personal use post and pole harvest areas would remain available for harvest using small equipment. The No Action alternative would not provide additional potential areas for use of smaller equipment to harvest forest products.

Cumulative Effects of No Action Alternative to Concern about use of smaller equipment
The No Action alternative would not provide additional potential areas for use of smaller equipment to harvest forest products. Existing personal use post and pole harvest areas would remain available for harvest.

Short-term Uses vs. Long-term Productivity of No Action Alternative for Concern about use of smaller equipment
None identified.

Irreversible/Irretrievable Commitments of No Action Alternative to Concern about use of smaller equipment
None identified.

Unavoidable Adverse Effects of No Action Alternative on Concern about use of smaller equipment
None identified.

Forest Plan Consistency of No Action Alternative for Concern about use of smaller equipment
There are no identified Forest Plan standards requiring or prohibiting use of smaller equipment.

Other Required Disclosures under No Action Alternative for Concern about use of smaller equipment
None identified.

Conclusions for Environmental Consequences of No Action Alternative on Concern about use of smaller equipment
Existing personal use post and pole harvest areas would remain available for harvest using small equipment.

Concern about use of smaller equipment- EFFECTS OF PROPOSED ACTION

Mitigations Included in Proposed action for Concern about use of smaller equipment

None specifically identified.

Direct and Indirect Effects of Proposed action to Concern about use of smaller equipment
The proposed action would not preclude use of smaller equipment to meet the purpose and need. Under the proposed action, treatment areas could be made available to potential treatment using smaller equipment if such equipment could meet the contractual terms and conditions and applicable environmental protection measures.

Cumulative Effects of Proposed Action to Concern about use of smaller equipment
Existing personal use post and pole harvest areas would remain available for harvest.

Short-term Uses vs. Long-term Productivity of Proposed Action for Concern about use of smaller equipment
None identified.

Irreversible/Irretrievable Commitments of Proposed Action to Concern about use of smaller equipment
None identified.

Unavoidable Adverse Effects of Proposed Action on Concern about use of smaller equipment
None identified.

Forest Plan Consistency of Proposed Action for Concern about use of smaller equipment
There are no identified Forest Plan standards requiring or prohibiting use of smaller equipment.

Other Required Disclosures under Proposed Action for Concern about use of smaller equipment
None identified.

Conclusions for Environmental Consequences of Proposed Action on Concern about use of smaller equipment
Under the proposed action, treatment areas could be made available to potential treatment using smaller equipment if such equipment could meet the contractual terms and conditions and applicable environmental protection measures.

<u>Analysis Issue: Effects of project implementation to the West Fork Road.</u>

Introduction:
Effects of project implementation to the West Fork Road was identified as an analysis issue from public comment.

Regulatory Framework for Effects to West Fork Road:
Applicable Forest Plan standards (USDA 1986, page 37) include:
"3) Transportation System Operation and Maintenance
a) The Forest Transportation System shall be managed to provide for administration and protection of the resources and the needs, health, and safety of the public.
b) Road management programs will include maintenance, signing, and traffic control. Traffic control includes the issuing of orders which close or restrict the use of any Forest development road or trail. Reasons for closures include, but are not limited to, game management, fire danger, public health or safety, and resource damage.
d) Adequate signing will be provided on all roads for the safety and convenience of the Forest user…."

Assumptions, Methodology & Scientific Accuracy, and Information Used for Effects to West Fork Road:
A qualitative discussion discloses potential effects of project implementation to West Fork Road to address this analysis issue. Effects to recreational users of the road are disclosed in the Recreation Specialist Report (see project record). Effects to various other resources associated with or near the road are considered in various project specialist reports (see project record).

Description of Spatial Bounds used for effects analysis
West Fork Road #2071 is the analysis area.

Description of Temporal Bounds used for effects analysis
A maximum temporal bound of 10 years was utilized because proposed activities could occur over a 5-10 year period.

Past, Present, & Reasonably Foreseeable Future Actions considered for cumulative effects analysis
Ongoing reconstruction of West Fork Road (USDA 2002).
Beartooth Travel Management Plan (USDA 2008).
Proposed replacement of West Fork Road bridges (USDA 2009).

Affected Environment of West Fork Road
The only road leading into and out of the West Fork of Rock Creek is Forest Road # 2071. Road #2071 is a paved road up to Basin campground. From Basin campground, the road is narrow and unpaved, west to West Fork trailhead, which is the end of the road. Road improvements have occurred, and are ongoing in the West Fork of Rock Creek. Replacement of two bridges is also proposed. Road improvements within the project area may increase accessibility to the areas by forest visitors, and thus, increase the number of visitors using the road. Average daily traffic on West Fork Road #2071, Memorial Day through Labor Day, was 115 vehicles, with peak days of 260 (Krogstad 2008). Under the Beartooth Travel Management Plan (USDA 2008), West Fork Road #2071 is open to motorized use April 15 to December 1 to allow for non-motorized winter recreation opportunities.

Effects to West Fork Road – Environmental Consequences:

Additional Mitigations for consideration for Effects to West Fork Road
If the no-action is decided upon, potential hazard trees would remain along West Fork Road in the Cascade fire area and may create a need for a special road closure order to prevent Forest road user injury or death.

EFFECTS OF NO ACTION ALTERNATIVE TO WEST FORK ROAD
Mitigations Included in No Action Alternative for Effects to West Fork Road
None identified.

Direct and Indirect Effects of No Action Alternative to West Fork Road
Dead trees, dying trees, and burned hazard trees would remain immediately adjacent to the road. As these trees deteriorate or if future wind events occur in the drainage, they could fall onto the road, blocking access or egress, damaging road infrastructure (culverts, ditches, bridges, the road surface, etc.), and potentially injuring or killing forest visitors (Photo 1). Potential for future wind damage under the No Action alternative is disclosed in the project Forest Vegetation report (see project record). Costs for repair of damaged road-related infrastructure would be paid out as damages occur and as funding is available.

There would be no potential damages from project implementation equipment (see effects discussion for Proposed Action alternative below).

Photo 1. Vehicle damaged by 11/2007 wind event on West Fork Road #2071. No injuries occurred.

Cumulative Effects of No Action Alternative to West Fork Road
The West Fork road improvement project (USDA 2002) would remove hazard trees in the cutslope of the road, reducing some immediate potential for impacts to the road and road-related infrastructure. Other potentially hazardous trees would remain near the road and could impact road-related infrastructure if and when they fall. If culverts and ditches are destroyed or plugged by falling trees, stormwater or snowmelt runoff could potentially further damage the road surface and deposit road sediment into streams.

Irreversible/Irretrievable Commitments of No Action Alternative to West Fork Road
No irreversible commitments were identified.
Damage caused by trees blocking or falling on the road would have the irretrievable impact of potentially precluding road access/egress and preventing infrastructure from properly functioning (such as culverts and ditches being plugged and runoff being diverted elsewhere).

Unavoidable Adverse Effects of No Action Alternative to West Fork Road
Damage caused by trees blocking or falling on the road could potentially prevent infrastructure from properly functioning (such as culverts and ditches being plugged and runoff being diverted elsewhere, potentially to a location that results in adverse water quality effects).

Forest Plan Consistency of No Action Alternative to West Fork Road
Because of future potential for burned hazard trees to fall on vehicles or preclude access/egress, unless a special order is issued for closure of this road to public vehicle use, the No Action would not comply with Forest Plan standards for managing the Forest Transportation System to provide for administration and protection of the resources and the needs, health, and safety of the public (USDA 1986, page 37).

Other Required Disclosures under No Action Alternative to West Fork Road
None identified.

Conclusions for Environmental Consequences of No Action Alternative to West Fork Road
Dead trees, dying trees, and burned hazard trees would remain immediately adjacent to the road. As these trees deteriorate or if future wind events occur in the drainage, they could fall onto the road, blocking access or egress, damaging road infrastructure (culverts, ditches, bridges, the road surface, etc.), and potentially injuring or killing forest visitors. The No Action would not comply with Forest Plan Forest Transportation System management standards.

Effects to West Fork Road- EFFECTS OF PROPOSED ACTION ALTERNATIVE TO WEST FORK ROAD

Mitigations Included in Proposed Action Alternative for Effects to West Fork Road

To prevent impacts to roads, firewood cutters would be required to lop and scatter slash so that it is not placed in roads, road cutslopes and ditches, and streams.
The operator would be required to reclaim or repair impacts to roads, trails, or routes.
Project area access would be allowed to recreation residences and the public access in the to the extent possible while not compromising safety of the public or workers.
Operations would be limited to weekdays to minimize impacts and avoid higher use of the area by recreation users on the weekends unless the work could occur without risk to the public. Limiting operations and log hauling to week days whenever possible would reduce impacts to adjacent land owners during evening hours and weekends. Special orders closing operating areas to the public Monday – Friday during project activities would be implemented for public safety when necessary.

Direct and Indirect Effects of Proposed Action Alternative to West Fork Road
Dead, dying, and burned hazard trees would be removed from areas adjacent to and near West Fork Road, thereby reducing the potential for such trees to fall onto the road, blocking access or egress, damaging road infrastructure (culverts, ditches, bridges, the road surface, etc.), and potentially injuring or killing forest visitors. Potential for future wind damage under the Proposed Action is disclosed in the project Forest Vegetation report (see project record).

Project implementation traffic on the road would impact the road surface and infrastructure due to potential transport of implementation personnel, wood products, transport of heavy machinery, and winter snowplowing. Impacts to the road could include rutting, damage to asphalt on paved portions of the road, dust generation, washboards, and plugged or damaged ditches and culverts. Contractors would be responsible for repair of any wear and tear or damages they cause. Such costs are accounted for in the project timber sale appraisal (Clark 2008).

Cumulative Effects of Proposed Action Alternative to West Fork Road
The West Fork road improvement project would remove hazard trees in the cutslope of the road, reducing some immediate potential for impacts to the road and road-related infrastructure. This work, combined with proposed activities, would greatly reduce potential impacts of trees falling on the road.

If culverts and ditches are destroyed or plugged by project implementation equipment, stormwater or snowmelt runoff could potentially further damage the road surface and deposit road sediment into streams until such impacts are repaired. Forest Service contract requirements generally require immediate mitigation of such impacts.

Short-term Uses vs. Long-term Productivity of Proposed Action Alternative for Effects to West Fork Road
Short term impacts of project implementation to West Fork Road #2017 would occur (see above), but would result in long-term benefits of better maintaining the road and maintaining safe vehicle access/egress on the road.

Irreversible/Irretrievable Commitments of Proposed Action Alternative for Effects to West Fork Road
No irreversible commitments identified.
Short term irretrievable impacts of project implementation to West Fork Road would occur (see above), but would likely be repaired or mitigated by contract workers so as to prevent resource damage or unsafe conditions.

Unavoidable Adverse Effects of Proposed Action Alternative for Effects to West Fork Road
Short term adverse impacts of project implementation would occur (see above). Such impacts would be localized and not significant.

Forest Plan Consistency of Proposed Action Alternative for Effects to West Fork Road
The Proposed Action would comply with Forest Plan standards for managing the Forest Transportation System to provide for administration and protection of the resources and the needs, health, and safety of the public (USDA 1986, page 37).

Other Required Disclosures under Proposed Action Alternative for Effects to West Fork Road
None identified.

Conclusions for Environmental Consequences of Proposed Action Alternative on Effects to West Fork Road
Dead, dying, and burned hazard trees would be removed from areas adjacent to and near West Fork Road, thereby reducing the potential for such trees to fall onto the road, blocking access or egress, damaging road infrastructure (culverts, ditches, bridges, the road surface, etc.), and potentially injuring or killing forest visitors. The Proposed Action would comply with Forest Plan Forest Transportation System management standards.

<u>Analysis Issue: Effects to local economy, with consideration of viability of forest products and costs/benefits of mitigations.</u>

Introduction

Effects to the local economy, with consideration of viability of forest products and costs/benefits of mitigations was identified as an analysis issue from public comment. This analysis offers a qualitative discussion of potential project economic effects.

Regulatory Framework for Effects to local economy:
The preparation of NEPA documents is guided by CEQ regulations for implementing NEPA (40 CFR 1500-1508). NEPA requires that consequences to the human environment be analyzed and disclosed. The extent to which these environmental factors are analyzed and discussed is related to the nature of public comments received during scoping. NEPA does not require a monetary benefit-cost analysis.

Forest Service Handbook (FSH) 2409.18 guides the financial and, if applicable economic efficiency analysis for timber sales. Forest Service policy in Forest Service Manual (FSM) 2430 specifics that the Forest Service will "Complete a financial and, if necessary, economic analysis, as guided by FSH 2409.18, for each timber sale in the project proposal expected to exceed $100,000 in advertised value, and evaluate unusual requirements on sales of lesser value."

Assumptions, Methodology & Scientific Accuracy, and Information Used for Effects to local economy:
A timber sale appraisal specific to potential timber harvest associated with the proposal was completed (Clark 2008) to assess project feasibility. Project feasibility is used to determine if an offered commercial timber sale will sell given current market conditions. Although this project has both a commercial and non-commercial component, project feasibility is only relevant to the commercial component. Therefore, project feasibility was only analyzed for those units that had a commercial component.

Per FSM 2430, because a timber sale associated with this proposal is not expected to exceed $100,000 in advertised value (Clark 2008), a formal financial and economic analysis was not completed. Assumptions utilized in the appraisal, including potential consideration of viability of forest products and costs of mitigations, are detailed in the appraisal spreadsheet (Clark 2008). Benefits of mitigations, such as protection of water quality or soil productivity, are not quantified monetarily for this analysis. Such mitigations are considered in various resource-specific specialist reports in the context of compliance with applicable law, policy, and regulation.

Recent fuels projects on the Beartooth District have had costs of approximately $900 per acre to complete thinning, slash disposal, and pile burning.

Based on the results of the timber sale appraisal and recent costs for fuel reduction projects on the Beartooth District, a qualitative discussion of effects to the local economy is provided.

Description of Spatial Bounds used for effects analysis
For the appraisal, proposed treatment units where timber harvest equipment is operable and merchantable products are available were identified through on-the-ground reconnaissance and use of existing timber stand data. This area totaled 238 acres and is the spatial area for economic timber sale feasibility analysis. It was assumed that treatment costs for the remaining acreage (697 acres) would be similar to recent fuels treatment costs of $900 per acre.

The qualitative discussion of environmental effects is placed in the context of local and regional spatial scales. The local scale is Carbon County, Montana. The regional scale utilized is the Montana counties that surround the Beartooth District, which are Big Horn, Carbon, Park, Stillwater, Sweet Grass, and Yellowstone counties. These counties, which are all in the Billings, MT economic area, are included because they share a labor market,

commuters, and could be collectively affected by Custer National Forest management activities and outputs.

Description of Temporal Bounds used for effects analysis
Timber sale appraisal was based on a bid date of 12/2008. Once a bid is awarded, implementation could take from 1 to 5 years. Discussion of economic effects is placed in the context of State of Montana employment data from the first 3 quarters of 2008.

Past, Present, & Reasonably Foreseeable Future Actions considered for cumulative effects analysis
Continued decline in timber markets (Morgan and Keegan 2009) was considered.
2008 employment history was considered.

Affected Environment of local economy
Forestry and fuels reduction employment plays a small role in the local and regional economy, as demonstrated by State of Montana employment data (MTDLI 2009). For the first 3 quarters of 2008, less than 1% of employment was in Forestry and Logging and the Agriculture & Forestry Support Industry in all the Montana counties surrounding the Beartooth District. There is no local or regional industry or employer that depends upon fuels reduction or wood product removal on the Beartooth Ranger District. Similar Beartooth District projects implemented in the past relied on contract workers from other parts of Montana or Wyoming.

Any jobs generated by this project would be short-term (1 to 5 years in duration) employment in timber extraction or fuels reduction activities, primarily heavy equipment or chainsaw operation, and would most likely rely on workers from outside Carbon County. The nearest operating sawlog mill to the West Fork Rock Creek in the counties that surround the Beartooth District is RY Timber in Livingston, Montana.

Effects to local economy – Environmental Consequences:

Additional Mitigations for consideration for Effects to local economy
None identified.

Effects to local economy- EFFECTS OF NO ACTION ALTERNATIVE
Mitigations Included in No Action Alternative for Effects to local economy
None identified.

Direct and Indirect Effects of No Action Alternative to local economy
The No Action alternative would not affect the local economy.

Cumulative Effects of No Action Alternative to local economy
Because less than 1% of employees in the local and regional economy are in the Forestry and Logging and the Agriculture & Forestry Support industries, not supporting existing jobs or temporary jobs through the proposed action would not noticeably affect the local or regional economy.

Irreversible/Irretrievable Commitments of No Action Alternative to local economy
None identified.

Unavoidable Adverse Effects of No Action Alternative to local economy
None identified.

Forest Plan Consistency of No Action Alternative to local economy
No Forest Plan goals, objectives or standards specific to economic effects were identified.

Other Required Disclosures under No Action Alternative for Effects to local economy
None identified.

Conclusions for Environmental Consequences of No Action Alternative on Effects to local economy
The No Action Alternative would not have measurable effects to the local economy. Market benefits such as increases in forest productivity and value for the remaining trees by eliminating competitive stress would not occur. Other non-quantified benefits of treatments such as improved safety for the public and firefighters and improved fire suppression capability would not occur.

Effects to local economy- EFFECTS OF PROPOSED ACTION ALTERNATIVE
Mitigations Included in Proposed Action Alternative for Effects to local economy
None identified.

Direct and Indirect Effects of Proposed Action Alternative on Effects to local economy
Results of the economic analysis completed for the project indicate that this project is not economically feasible. The timber sale appraisal shows a negative value for the proposed harvest of timber (Clark 2008). At an estimated cost of $900 per acre for non-commercial fuels treatments, this project becomes less economically feasible. Treatments would be prioritized and accomplished as appropriated funding is made available. Additional funds for project activities may also be obtained from cooperators, other agencies, and local donations. In the event that funding becomes available for the Proposed Action, project implementation would temporarily create some new jobs and/or support existing jobs. It is also possible that some areas may be sold as personal use firewood or post and pole areas for a nominal fee. Because the amount of appropriated funding available and the demand for personal use forest products is unknown, it is not possible to estimate the total jobs and the amount of direct, indirect, and induced labor income resulting from the activities. Market benefits that could occur as a result of the proposed activities include increases in forest productivity and value for the remaining trees by eliminating competitive stress. Other non-quantified benefits of treatments include improved safety for the public and firefighters and improved fire suppression capability.

Cumulative Effects of Proposed Action Alternative on Effects to local economy
Because less than 1% of employees in the local and regional economy are in the Forestry and Logging and the Agriculture & Forestry Support industries, any support of existing jobs or temporary jobs generated by the proposed action would not noticeably affect the local or regional economy.

Short-term Uses vs. Long-term Productivity of Proposed Action Alternative for Effects to local economy
None identified.

Irreversible/Irretrievable Commitments of Proposed Action Alternative to Effects to local economy
None identified.

Unavoidable Adverse Effects of Proposed Action Alternative on Effects to local economy
None identified.

Forest Plan Consistency of Proposed Action Alternative for Effects to local economy
Other Required Disclosures under Proposed Action Alternative for Effects to local economy
No Forest Plan goals, objectives or standards specific to economic effects were identified.

Conclusions for Environmental Consequences of Proposed Action Alternative on Effects to local economy
In the event that funding becomes available for the Proposed Action, project implementation would temporarily create some new jobs and/or support existing jobs. It is also possible that some areas may be sold as personal use firewood or post and pole areas for a nominal fee. Because the amount of appropriated funding available and the demand for personal use forest products is unknown, it is not possible to accurately estimate the total jobs and the amount of direct, indirect, and induced labor income resulting from the activities.

<u>Analysis Issue: Effects of project on climate change (carbon flux):</u>

Carbon Flux Executive Summary:
Public comments received during scoping asked that the Forest Service "examine the effect of this project on global warming". Given the local context and the narrow and limited scope of Beartooth Front Storm Damage Clean-up and Fuels Reduction Healthy Forests Restoration Act Project – West Fork Rock Creek Project, this analysis focuses on the effect of this project on local carbon storage and release (carbon flux).

Forests of the United States store approximately 66,600 Mt (million metric tons) of carbon (Birdsey et al 2007). Forest carbon stocks of the entire Custer National Forest are estimated from forest inventory plots to be 33.6 Mt (COLE 2009), or less than five one

hundredths of a percent (0.0005) of total U.S. forest carbon stocks. The West Fork Rock Creek Project will affect only a tiny percentage of the forest carbon stocks of the Custer National Forest, and an infinitesimal amount of the total forest carbon stocks of the United States.

Because of the extensive tree mortality from the 2007 storm event and the 2008 Cascade fire, approximately two-thirds of the proposed treatment area is estimated to currently be a net carbon source. That is, the tree mortality from these events have changed forest conditions from a situation where more carbon was being removed from the atmosphere then was being emitted (sink) to forest conditions that are emitting more atmospheric carbon through decay than is being absorbed through tree growth (source). As forests regenerate in areas disturbed by the 2007 storm event and the 2008 Cascade fire, additional carbon will be sequestered in newly grown biomass. Under the No Action alternative, these areas would remain a net source of carbon to the atmosphere until carbon uptake by new trees exceeds the emissions from decomposing dead organic material, likely within several years to several decades. Rates of sequestration would gradually increase then eventually taper off (although likely remain net positive) as stands age and growth slows (Pregitzer and Euskirchen 2004). Carbon sequestered in these regenerated forests would eventually be released when a new disturbance (fire, wind, insect infestations, etc.) occurs and the forest stands revert to net sources of atmospheric carbon.

Those forest stands not affected by these recent disturbance events are likely net carbon sinks at this point in their development. Under the No Action alternative, they would continue as sinks until the next disturbance event (fire, wind, insect infestation, etc.) occurs. Over the long-term (centuries) net carbon storage is often zero, if stands regenerate, because re-growth of trees recovers the carbon lost in the disturbance and in decomposition of trees killed by the disturbance (Kashian et al. 2006).

The proposed action would remove some carbon stored within treatment area biomass through harvest of live and dead timber and other fuel reduction activities, including prescribed burning. A portion of the carbon removed would remain stored for a period of time in wood products (US EPA 2009, Depro et al 2008), and removed firewood would partially offset fossil fuels that would otherwise be used for home heating.

The harvest of live trees in unburned areas and areas with little or no wind damage could temporarily convert some live stands (approximately 1/3 of the treatment area) from a carbon sink that currently removes more carbon from the atmosphere than it emits to a carbon source that emits more carbon through biomass decomposition than it absorbs through tree growth. These stands would remain a source of carbon to the atmosphere (or weakened sink) until carbon uptake by new and remaining trees again exceeds the emissions from decomposing dead organic material. As stands continue to develop, the strength of the carbon sink would increase until peaking at an intermediate age and then gradually decline but remain positive. Carbon stocks would continue to accumulate, although at a declining rate, until impacted by future disturbances.

Removal of dead wood such as the fire or wind damaged trees would reduce onsite carbon stores. The portion removed as products may partially delay carbon release relative to on-site decay rates. The portion burned in piles would hasten release of that carbon to the atmosphere compared to on-site decay rates. Treated burned and wind-damaged stands would continue to emit more carbon than they absorb (but to a lesser extent than under the no-action alternative) and would remain net carbon sources until new trees that sequester additional carbon are well established. As the stands continue to develop, the strength of the carbon sink would increase until peaking at an intermediate age and then gradually decline but remain positive (Pregitzer and Euskirchen 2004). Carbon stocks would continue to accumulate, although at a declining rate, until impacted by future disturbances.

The impacts of the proposed action on global carbon sequestration and atmospheric concentrations of CO_2 would be miniscule, particularly in the context of the 66,600 Mt of carbon currently contained in U.S. Forests. Management actions - such as those proposed – that improve the ability to safely control and/or suppress fire and utilize harvested trees for long-lived forest products may help sustain the current strength of the carbon sink in U.S. forests (Birdsey et al. 2007). The short-term change in carbon stocks and sequestration rates resulting from the proposed action are infinitesimal on global and national scales, as are the potential long-term benefits.

In conclusion, the project would have no discernable impact on atmospheric concentrations of greenhouse gases, or global warming.

Carbon Flux analysis Changes between Draft and Final:
Not applicable.

CARBON FLUX AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Introduction

Public comments received during scoping asked that the Forest Service "examine the effect of this project on global warming" (comments submitted 12/2008 by Michael Garrity for the Alliance for the Wild Rockies (AWR) and Native Ecosystems Council (NEC)). Effects of this project on climate change was identified as an analysis issue and are analyzed in terms of carbon storage and release, hereafter referred to as carbon flux.

Regulatory Framework –Carbon Flux

None - There are no applicable federal, state, or local statutes or regulatory standards or Custer Forest Plan goals, standards, or objectives specific to fuels reduction or silvicultural activities and their relationship to global warming or carbon flux.

Assumptions, Methodology, Scientific Accuracy, and Information Used for Carbon Flux Analysis

Given the local context and the narrow and limited scope of Beartooth Front Storm Damage Clean-up and Fuels Reduction Healthy Forests Restoration Act Project – West Fork Rock Creek Project, this analysis focuses on the effect of this project on local

carbon storage and release (carbon flux). This methodology was selected based on the following considerations:

Forests of the United States store approximately 66,600 Mt (million metric tons) of carbon (Birdsey et al 2007). Forest carbon stocks of the entire Custer National Forest are estimated from forest inventory plots to be 33.6 Mt (COLE 2009), or less than five one hundredth of a percent (0.0005) of total U.S. forest carbon stocks. The West Fork Rock Creek Project will affect only a tiny percentage of the forest carbon stocks of the Custer National Forest, and an infinitesimal amount of the total forest carbon stocks of the United States.

While the effects of the West Fork Rock Creek Project on atmospheric concentrations of CO_2 are imperceptible in the short-term and the long-term, it is recognized that the forests of the United States reduce the global warming potential of fossil fuel emissions by removing a measurable portion of CO_2 from the atmosphere. The most recent estimates indicate that U.S. forests and wood products sequester approximately 910 teragrams of CO_2 eq. in 2007, and the net annual sequestration has increased by 50 percent since 1990 (US EPA 2009, page 7-15). According to the U.S. EPA, this represents about 15 percent of total U.S. greenhouse gas emissions in 2007 (US EPA 2009, page ES-4). Another recent analysis estimates that U.S. forests and wood products offset nearly 20 percent of U.S. fossil fuel emissions (Pacala et al. 2007).

These nation-wide estimates are produced as part of a the U.S. Climate Change Science Program and the U.S. contribution to the United Nations Framework Convention on Climate Change program to develop and periodically update national inventories of greenhouse gas emission sources and sinks. In addition, to the U.S. Forest Services contributions to these national efforts, the Forest Service also conducts national assessments of its activities on global warming (Joyce et al. 2008; Ryan et al. 2008; USDA 2007; Joyce et al. 2000). Given the global scale of global warming, national and international inventories, syntheses, and assessments, are a much more effective method of evaluating cumulative effects of land management and other human activities on atmospheric concentrations of CO_2 and other greenhouse gases than analyses of individual, small-scale vegetation management projects, such as the West Fork Rock Creek Project.

Comments submitted by AWR/NEC attached two papers regarding carbon sequestration and forest management (Depro 2006, Smith undated). Both papers are very general evaluations of the potential nation-wide role of public lands forests as carbon sinks. The article by Depro et al. uses simulation modeling to evaluate the forest carbon implications of three broad scenarios of management of U.S. public forests. Their analysis concludes that a “no timber harvest” scenario results in more carbon stored in public forests over coming decades nationwide than a “business-as-usual” scenario of 15 to 20 million cubic feet of timber harvest volume per decade. This conclusion, and their entire model, is based on the assumption that fire, insects, disease, and other natural mortality would remove timber volume on 140,000 acres annually on all public forests in the contiguous

48 States, a small fraction of actual recent forest disturbance rates (Westerling et al 2006).

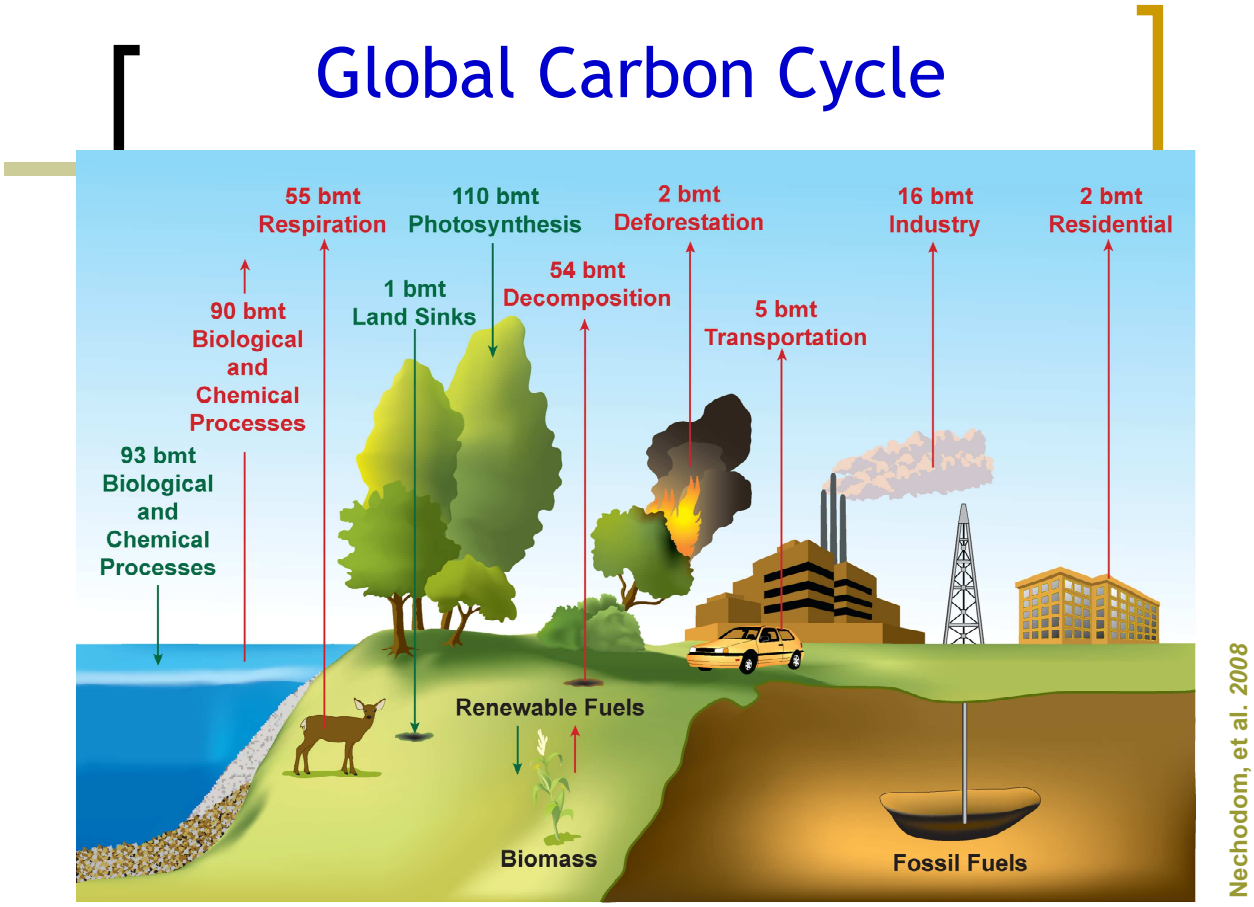
Neither paper specifically addresses the forest types, current conditions, or natural disturbance regimes of the project area. Most significantly, the papers submitted by AWR/NEC (Depro et al. 2008, Smith undated) grossly underestimate or ignore the role of fire, forest insects, and forest pathogens in the forest carbon cycle. Throughout the Northern Rockies, and including the Beartooth Ranger District, these natural disturbance processes have much greater impacts on carbon stocks and rates of carbon sequestration by forests than timber harvesting and fuels management. The unpublished paper by Rebecca Smith submitted by AWR, argues that national forests should be "allowed to convert to eventual old-growth condition" and thus maximize forest carbon stocks. Attempting to maximize forest carbon storage in these disturbance prone forests may be counter productive because increasing tree density often increases drought stress, vulnerability to mortality from bark beetles, and probability of crown fire. This is evidenced by the affects of recent wind and wildfire to the primarily climax-stage lodgepole forests in the project area. Indeed, in some forest types, increasing tree density may lead to the loss of old trees and substantial loss of carbon stocks (Fellows and Goulden 2008).

More fundamentally, both papers ignore the likelihood that elimination of timber harvest on public forests will result in increasing harvest elsewhere to meet continuing public demand for wood products. If this occurred, there would be no net carbon benefit. In other words, there is no net impact on atmospheric CO_2 concentrations. Moreover, if the elimination of timber harvest on public lands resulted in increased prices for wood products, it could result in increased use of more energy intensive materials, such as steel and cement. This would produce an increase in fossil fuel emissions, and atmospheric concentrations of CO_2. Thus, elimination of timber harvest on public forests is unlikely to produce any net decrease in the growth of atmospheric greenhouse gas concentrations, and may exacerbate current trends.

Description of Spatial Bounds used for Carbon Flux effects analysis
Effects analysis of project-related carbon sequestration or release focuses on the proposed project activity areas, which is where project activities have the greatest potential to affect forest carbon storage or release rates.

Description of Temporal Bounds used for Carbon Flux effects analysis
Temporal bounds used for effects analysis are one rotation age of lodgepole pine stands in the West Fork project area, up to approximately 120 years except where forest disturbances such as wind, fire, or insect outbreaks intervene sooner.

Past, Present, & Reasonably Foreseeable Future Actions considered for Carbon Flux cumulative effects analysis
Firewood collection.
Post-fire natural tree regeneration.
Post-wind event natural tree regeneration.



bmt = Billion Metric Tons

Figure 1. Carbon cycle diagram. *From Nechodom et al 2008*.

Affected Environment - Effects on Carbon Flux

Carbon is continuously cycled among aboveground and belowground biomass, dead wood, forest litter, and soil organic matter and between forest ecosystems and the atmosphere as a result of biological processes in forests (e.g., photosynthesis, respiration, growth, mortality, decomposition, and disturbances such as fires or pest outbreaks) and anthropogenic activities (e.g., harvesting, thinning, clearing, and replanting). Figure 1 provides a simplified model of carbon cycling. As trees photosynthesize and grow, carbon is removed from the atmosphere and stored in living tree biomass. As trees die and otherwise deposit litter and debris on the forest floor, carbon is released to the atmosphere or transferred to the soil by organisms that facilitate decomposition. (US EPA 2009).

Because of the extensive tree mortality from the recent wind and fire events, approximately two-thirds of the proposed treatment area is estimated to currently be a net carbon source. That is, the tree mortality from these events have changed forest conditions from a situation where more carbon was being removed from the atmosphere

then was being emitted (sink) to forest conditions that are emitting more atmospheric carbon through decay than is being absorbed through tree growth (source). Those forest stands not affected by these recent disturbance events are likely net carbon sinks at this point in their development.

Forests of the United States store approximately 66,600 Mt (million metric tons) of carbon (Birdsey et al 2007). Forest carbon stocks of the entire Custer National Forest are estimated from forest inventory plots to be 33.6 Mt (COLE 2009), or less than five one hundredth of a percent (0.0005) of total U.S. forest carbon stocks. The West Fork Rock Creek Project will affect only a tiny percentage of the forest carbon stocks of the Custer National Forest, and an infinitesimal amount of the total forest carbon stocks of the United States.

Effects on Carbon Flux – Environmental Consequences:

Effects on Carbon Flux - EFFECTS OF NO-ACTION ALTERNATIVE

Mitigations Included in No-Action Alternative for Effects on Carbon Flux
None identified or required.

Direct and Indirect Effects of No-Action Alternative on Carbon Flux
Ongoing decay of dead wood and litter from the 2007 storm event and the 2008 Cascade fire has likely converted most of the areas affected by these events from a carbon sink to a carbon source (approximately 2/3 of the proposed treatment areas). That is, the tree mortality from these events have changed forest conditions from a situation where more carbon was removed from the atmosphere then was being emitted (sink) to forest conditions that are emitting more carbon through decay than is being absorbed through tree growth (source). As forests naturally regenerate in areas disturbed by the 2007 storm event and the 2008 Cascade fire, additional carbon will be sequestered in newly grown biomass. These areas will remain a net source of carbon to the atmosphere until carbon uptake by new trees exceeds the emissions from decomposing dead organic material, likely within several years to several decades. Rates of sequestration will gradually increase then eventually taper off (although likely remain net positive) as stands age and growth slows (Pregitzer and Euskirchen 2004). Carbon sequestered in these regenerated forests will eventually be released when a new disturbance (fire, wind, insect infestations, etc.) subsequent decay occurs. Forest stands not affected by these two recent events are likely carbon sinks and will continue as sinks until the next disturbance event (fire, wind, insect infestation, etc.) occurs.

Over the long-term (centuries) net carbon storage is often zero, if stands regenerate, because re-growth of trees recovers the carbon lost in the disturbance and in decomposition of trees killed by the disturbance (Kashian et al. 2006).

Cumulative Effects of No-Action Alternative, Forest Carbon Flux
The recent wind and fire events have reset the affected forest stands' position in the carbon cycle. Considerable carbon was released into the atmosphere during the fire event

and most of these stands are now net carbon sources with biomass decay exceeding vegetation growth.

Firewood collection would continue to occur in the project area where allowed. Because material would not be cut, decked, and made available for collection, firewood collection under the No Action would likely occur at lesser levels than under the proposed action, thereby resulting in an immeasurable increase in consumption of fossil fuels by the public for heating local homes unless other firewood sources are substituted.

As stated in the project fuels report (see project record), under the No-action alternative, there is a higher probability that a fire start could not be suppressed and would grow larger than a fire would under the Action Alternative. This could potentially lead to earlier release of sequestered carbon under the no-action alternative.

Irreversible/Irretrievable Commitments of No-Action Alternative – Carbon Flux
None identified.

Unavoidable Adverse Effects of No-Action Alternative – Carbon Flux
As disclosed in the project fuels report (see project record), there is increased potential for a large wildfire under the no-action alternative. Such a disturbance event could potentially lead to earlier atmospheric release of carbon stored in the project area.

Forest Plan Consistency of No-Action Alternative – Carbon Flux
There are no Custer Forest Plan objectives, goals, or standards specific to carbon balance or climate change.

Other Required Disclosures under No-Action Alternative – Carbon Flux
None identified.

Effects on Carbon Flux - PROPOSED ACTION ALTERNATIVE
Mitigations Included in Proposed Action Alternative
None identified or required.

Direct and Indirect Effects of Proposed Action Alternative on Carbon Flux
The proposed action would remove some carbon stored within treatment area biomass through harvest of live and dead timber and other fuel reduction activities, including prescribed burning. A portion of the carbon removed would remain stored for a period of time in wood products (US EPA 2009, Depro et al 2007), and removed firewood would partially offset fossil fuels that would otherwise be used for home heating.

The harvest of live trees in unburned areas could temporarily convert some live stands (approximately 1/3 of the treatment area) from a carbon sink that currently removes more carbon from the atmosphere than it emits to a carbon source that emits more carbon through biomass decomposition than it absorbs through tree growth. Units where clearcut, aspen treatment, conifer colonization removal, or infrastructure protection

treatments are applied would experience the greatest change. Units where trees are thinned but still leave a stocked, live forest stand (e.g. thinning and liberation cuts) would experience a lesser degree of change (it is not clear whether these thinned areas would remain a net carbon sink or become carbon source areas in the near-term). These stands would remain a source of carbon to the atmosphere (or weakened sink) until carbon uptake by new and remaining trees again exceeds the emissions from decomposing dead organic material. As stands continue to develop, the strength of the carbon sink would increase until peaking at an intermediate age and then gradually decline but remain positive. Carbon stocks would continue to accumulate, although at a declining rate, until impacted by future disturbances.

Removal of dead wood such as the fire or wind damaged trees would reduce onsite carbon stores. The portion removed as wood products may partially delay carbon release relative to on-site decay rates. The portion burned in piles would hasten release of that carbon to the atmosphere compared to on-site decay rates. These stands would continue to emit more carbon than they absorb, but to a lesser extent than under the no-action alternative. These stands would remain net carbon sources until trees that sequester additional carbon are well established. As the stands continue to develop, the strength of the carbon sink would increase until peaking at an intermediate age and then gradually decline but remain positive (Pregitzer and Euskirchen 2004). Carbon stocks would continue to accumulate, although at a declining rate, until impacted by future disturbances.

Although thinning and pile burning under the proposed action would reduce standing carbon stocks and result in atmospheric emission of carbon, compared to the no action alternative, these treatments would reduce the amount of carbon likely to be released to the atmosphere due to future fire disturbance (Finkral and Evans 2008). The proposed action is consistent with research recommendations (Krankina and Harmon 2007) for protecting carbon gains against the potential impacts of future climate change by reducing fuel loads through thinning.

Over the long-term (centuries) net carbon storage is often zero, if stands regenerate, because re-growth of trees recovers the carbon lost in the disturbance and in decomposition of trees killed by the disturbance (Kashian et al. 2006).

Cumulative Effects of Proposed Action Alternative – Carbon Flux

The recent wind and fire events have reset the affected forest stands' position in the carbon cycle. Considerable carbon was released into the atmosphere during the fire event and most of these stands are now net carbon sources with biomass decay exceeding vegetation growth (carbon storage).

Firewood collection would continue to occur in the project area where allowed. Because material would be cut, decked, and made available for collection, firewood collection would likely occur at greater levels than under the no-action action alternative, thereby potentially resulting in an immeasurable decrease in consumption of fossil fuels by the public for heating local homes unless other firewood sources are substituted.

The impacts of the proposed action on global carbon sequestration and atmospheric concentrations of CO_2 are miniscule, particularly in the context of the 66,600 teragrams of carbon currently contained in U.S. Forests. Management actions - such as those proposed – that improve the ability to safely control and/or suppress fire and utilize harvested trees for long-lived forest products may help sustain the current strength of the carbon sink in U.S. forests (Birdsey et al. 2007). The short-term change in carbon stocks and sequestration rates resulting from the proposed action are imperceptibly small on global and national scales, as are the potential long-term benefits.

Short-term Uses vs. Long-term Productivity of Proposed Action Alternative for Effects to Carbon Flux

Short-term uses would be the removal of carbon stored in the project area. Some of this carbon would be released into the atmosphere during pile burning. The remaining carbon would be stored as wood products. Long-term productivity would not be changed because planned natural regeneration (see Forest Vegetation specialist report in project record) would result in new trees sequestering carbon as discussed above.

Irreversible/Irretrievable Commitments of the Proposed Action Alternative on Carbon Flux.

No irreversible commitments have been identified. Irretrievable commitments would be a temporary change, or rate of change, to carbon stored and released in the project area as discussed above.

Unavoidable Adverse Effects of Proposed Action Alternative – Effects on Carbon Flux

As discussed above, proposed treatments would reduce the amount of carbon stored in live, dead, and burned trees in the treated stands until treated stands regenerate with trees that sequester additional carbon and prematurely release part of that into the atmosphere. In context, these effects are for practical purposes similar to those that occur during natural forest mortality events caused by fire, wind, or insects.

Forest Plan Consistency of Proposed Action Alternative – Carbon Flux

There are no Custer Forest Plan objectives, goals, or standards specific to carbon balance or climate change.

Other Required Disclosures under Proposed Action Alternative for Effects to Carbon Flux

None identified or needed.

Conclusions for Environmental Consequences of Proposed Action Alternative – Carbon Flux

Proposed treatments would temporarily alter carbon stores and carbon flux rates within treatment units. These local changes are similar to those that occur under natural forest disturbance events such as fire, wind, or insect epidemics. The resulting effects on

atmospheric CO_2 concentrations would be imperceptible in the short-term and the long-term.

Dan Seifert

_____ 4/17/2009_
SPECIALIST SIGNATURE DATE

Additional specialist input and review relative to climate change and carbon flux was provided by Pete Zimmerman and Jim Morrison with the USFS Region 1 Regional Office.

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