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High Peaks to Headwaters Watershed and Fisheries Restoration Environmental Assessment

Clear Creek Ranger District, Arapaho-Roosevelt National Forests
Clear Creek County, Colorado

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1.0 PURPOSE OF AND NEED FOR ACTION

In the US Department of Agriculture *Strategic Plan for FY 2010-2015*, watershed restoration is targeted as a core management objective of the National Forests and Grasslands. In order to achieve this goal, the Forest Service has been directed to restore degraded watersheds by strategically focusing watershed improvement projects and conservation practices at the landscape and watershed scales. In response to this direction, the Forest Service developed the Watershed Condition Framework (WCF). The purpose of the framework was to provide a comprehensive approach for classifying watershed condition. The framework uses a set of 12 indicators that are surrogate variables representing ecological, hydrological, and geomorphic functions and processes that affect watershed condition (USDA Forest Service 2011). The results of the WCF for the Clear Creek Ranger District indicate that out of 16 sixth level watersheds three are impaired, nine are functioning at risk, and four are properly functioning. Four sixth-level watersheds were chosen for watershed and aquatic habitat improvement based on condition classification and fisheries quality.

For the proposed project, the Forest Service identified 3 indicators from the WCF to try and improve: aquatic habitat, road/trail density, and water quality. The purpose of this project is to improve and/or maintain watershed conditions by implementing a variety of restoration based activities that address impacts to aquatic and riparian area habitats. Action is needed to bring select watersheds towards desired conditions outlined in the Forest Plan and to comply with Forest Service watershed condition policy (FSM 2520) and National Best Management Practices (BMP's) for Water Quality Management on National Forest System lands (USDA Forest Service 2012) that directs us to "protect National Forest System watersheds by implementing practices designed to maintain or improve watershed condition…"

The selected sixth-level watersheds for this proposed project are: South Clear Creek, Headwaters West Chicago Creek, West Fork Clear Creek, and Headwaters Clear Creek (Appendix A, Map 1). The purpose of this project is addressed below with a description of the needs.

Improve impaired instream aquatic habitat and associated riparian habitats in those streams identified as having high fishery value

Aquatic habitats in the Upper Clear Creek watersheds were identified as being functioning at risk due to mining impacts, proximity of roads to aquatic or wetland habitats, and other management activities. Inventories of dispersed camping activities along the South Chicago Creek and West Chicago Creek drainages found that the use has resulted in streamside vegetation removal, bank degradation, and human sanitation issues. These uses have resulted in the reduction of aquatic habitat quality and quantity (e.g. reduced deep pools, spawning areas, etc.), and increased bank instabilities. Reductions in aquatic habitat quality and quantity do not provide the necessary habitats to support aquatic species' life histories.

Improve water quality and instream habitats by improving road/stream crossings

Road/stream crossings have been identified as preventing the migration of aquatic species up and down a stream corridor. Poorly designed structures, undersized structures, and in some cases, low water crossings, can create barriers preventing aquatic species from migrating. In addition, road/stream crossings can also be sources of erosion and sedimentation, impacting water quality, and degrading instream habitats.

Reduce impacts to water quality and aquatic habitats by decommissioning roads identified as having undesirable impacts on watershed condition

The proximity of roads to aquatic habitats results in increased sediment delivery to those systems. Increased sediment delivery may degrade physical instream habitat by causing reductions in the quality and quantity of aquatic habitats (e.g. reductions in pool volume, elimination of complex side channel habitats, etc.). Specific roads in the project area were identified as being in poor condition and as having potentially negative impacts on wetland and riparian habitats.

Restore and enhance floodplain and off-channel wetland habitats altered by land use

Floodplain and wetland habitats in the project area have been impacted by various land management activities (e.g. highway operations, mining, road locations). Riparian and wetland conditions were identified as functioning at risk resulting from poor water quality, lack of connectivity between stream habitats and floodplains, and sedimentation of riparian and floodplain habitats. Important functions, such as sediment transport, energy dissipation, nutrient exchange, and the creation and maintenance of complex habitats, can be limited in altered systems.

PROPOSED ACTION

In response to the needs for action discussed above, the Forest Service is proposing to conduct a suite of aquatic and riparian restoration work in four sixth-level watersheds (Appendix A Map 1), encompassing 105,573 acres. Proposed activities have been broken into three categories:

- Stream restoration
- Riparian/wetland/floodplain connectivity enhancement
- Road maintenance and decommissioning

Specific details of the proposed action are identified in Section 2.0.

1.1 PUBLIC INVOLVEMENT

This project proposal was first listed in the Arapaho-Roosevelt National Forest Schedule of Proposed Actions in April 2012. The proposal was provided to the public and other agencies for comment during formal public scoping from August 3, 2012 to September 10, 2012. Using comments from the public, other agencies, state and local governments, and other organizations, the project interdisciplinary team developed a list of potential issues to address. All the comments were reviewed and analyzed by key interdisciplinary team members and the District Ranger. We received a total of 89 specific comments from 16 individuals or groups. Commenters expressed concern with the proposal as described:

- restricted access to private property from proposed road closures,
- reductions in recreation opportunities with road closures, and
- identifying water quality impacts to proposed road closures

These issues were tracked through the analysis and considered in the design of the Proposed Action activities.

2.0. ALTERNATIVES

This section describes the proposed action alternative. When there are no unresolved conflicts concerning alternative uses of available resources (NEPA, section 102(22) (E)), the EA need only analyze the proposed action and proceed without consideration of additional alternatives (36 CFR 220.7(b) (i)).

PROPOSED ACTION ALTERNATIVE

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- Stream restoration
- Riparian/wetland/floodplain connectivity enhancement
- Road maintenance and decommissioning

The specific activities including design features and any required monitoring, as they relate to stream restoration, riparian/wetland/floodplain connectivity enhancement, and road maintenance/decommissioning are described in detail in this section. Post implementation monitoring, when identified as part of the proposed activities, will be completed by forest resource specialists on an annual basis for up to three years, to ensure effectiveness of activities.

STREAM RESTORATION ACTIONS

The Forest Service is proposing various stream restoration actions on approximately 25 miles of stream within the project area (Appendix A, Maps 2-5). Aquatic habitats have been identified as impaired

within the project area due to various management activities. Stream restoration actions have been designed to improve water quality, aquatic habitat conditions, and channel morphology. These projects are intended to address the Watershed Condition Framework (2011) Indicator for Aquatic Habitat (3.0), more specifically, 3.1 Habitat Fragmentation, 3.2 Large Woody Debris, and 3.3 Channel Stability. Treatment methods will vary based on site-specific inventories and conditions. Heavy equipment may be used in waterways, riparian zones, and adjacent to wetland habitats.

INSTREAM FISH HABITAT ENHANCEMENT –

Instream habitat enhancement generally refers to structures/features intentionally placed in the stream or floodplain for habitat restoration. Use of these features can improve a stream's access to its floodplain through stabilization of channel profile, control or limit additional erosion by offering bank protection, and creating habitat complexity by redirecting water. In this description, the placement of large wood and creation of large woody debris jams is also included.

Large wood placement can provide a variety of benefits to streams and aquatic habitat by creating habitat complexity, habitat cover, and promoting natural stream bank stability. Indirectly, large wood placement can have influences on sediment trapping, pool scour, hydraulic roughness, and channel stability. Locations of large wood placement will be identified based on site-specific needs for habitat complexity, vertical stability, and sediment storage.

Large woody debris (LWD) replenishment entails adding unanchored wood directly to the channel or to adjacent floodplains, side channels, or banks where it can be recruited and/or redistributed by the stream. Wood species will generally consist of local native species in riparian corridor.

Table 1. Proposed Stream Restoration Actions

Proposed Action	Description of Work
Anticipated Areas of Implementation for the stream restoration activities:	*See Appendix A, maps 2-5 for specific reach locations. (Boulder placement, placement of large woody material activities could be combined during implementation)*
Instream placement of large boulders *Anticipated Work:* *Approximately 24 miles of improvement over the entire project area* *Anticipated Project Implementation:* *1 to 2 instream projects per year in one watershed*	Locations of boulder placement for pool creation, stream stabilization, etc. would focus primarily on the drainages seen in Maps 2-5. Boulders would be staged on or adjacent to roads and placed instream either by heavy equipment or manually. Restoration methods of disturbed areas during implementation could include: de-compacting to a specified depth, re-contouring, creating surface roughness, implementing erosion control measures, and re-vegetating with native grasses, shrubs and/or forbs. Site-specific measures will be determined by USFS Restoration Representative.
Acquisition of large woody material *Anticipated Work:* *Large woody debris acquisition will not*	The large wood used in restoration activities would be acquired either on-site, purchased, or from timber operations. Wood may include bucked up logs, cut trees, and whole trees including root wads.

exceed 10 trees (16"-36" DBH) per site *<u>Anticipated Project Implementation:</u>* *Up to 3 projects per year as described below for large woody debris projects.* *Where habitat complexity is the primary objective, surveys will be done prior to log placement to determine appropriate number of logs per mile.* *General "rule of thumb" spacing for instream structure installation is 2- 4 channel widths per pool in areas of high wood loading; 5-7 channel widths for unobstructed channels.*	Generally trees felled or pulled for stream restoration work would be between 16"- 36" DBH (or whatever DBH is readily available on-site or for purchase and appropriate for stream size) Trees will be brought to stream with heavy equipment. If necessary, cable yarding equipment may be used to drag logs to site. Restoration methods of disturbed areas during implementation could include: de-compacting to a specified depth, re-contouring, creating surface roughness, implementing erosion control measures, and re-vegetating with native grasses, shrubs and/or forbs. Site-specific measures will be determined by USFS Restoration Representative.
Large woody debris (LWD) placement/replenishment *<u>Anticipated Work:</u>* *Approximately 25 miles of placement or replenishment throughout the project area* *<u>Anticipated Project Implementation:</u>* *1 to 2 instream projects per year in one watershed*	Large wood (acquired per direction above) would be staged on or adjacent to roads and placed in the stream using a tracked excavator or backhoe. The machinery would access stream channels and riparian areas through use of temporary access trails as it exits the project area. Restoration methods of disturbed areas during implementation could include: de-compacting to a specified depth, re-contouring, creating surface roughness, implementing erosion control measures, and re-vegetating with native grasses, shrubs and/or forbs. Site-specific measures will be determined by USFS Restoration Representative.

<u>BANK STABILIZATION –</u>

Bank damage or bank instability resulting from a variety of land use impacts can result in changes to water quality. Bank stabilization activities would tie closely with the instream habitat enhancement features by re-directing flow to prevent further bank erosion. In locations, where an absence of vegetation is observed or where instream structures are not needed, bank stabilization techniques would include, but not be limited to placing rock or planting vegetation. The techniques would vary depending on site and degree of erosion. Depending on method of treatment and size of material needed, equipment such as excavators or backhoes could be needed.

Table 2. Proposed Bank Stabilization Activities	
Proposed Action	**Description of Work**
Anticipated Areas of Implementation:	*See Appendix A, Maps 2-5 for areas of proposed implementation*
Manual installation of stream bank stabilization structures *Anticipated Work:* *Approximately 20 miles of bank stabilization* *Anticipated Project Implementation:* *Bank stabilization projects could occur simultaneously with other instream projects such as boulder placement, etc.*	These activities would include the installation of structures that would encourage or promote re-vegetation and bank stabilization (e.g. seeding, live willow staking, willow fascine bundles, and "bio-logs"). It is anticipated that much of the bank stabilization work will occur by hand.
Installation of stream bank stabilization structures with equipment *Anticipated Work:* *Approximately 20 miles of bank stabilization* *Anticipated Project Implementation:* *Bank stabilization projects will occur simultaneously with other instream projects*	This aspect of the proposed action, like above, involves the installation of structures promoting bank stabilization and aiding riparian vegetation recovery; however, this method proposes the use of equipment to complete these activities. Heavy equipment, like such as excavators, backhoes, etc. may be in the stream channel, on banks, or on the road. Restoration methods of disturbed areas during implementation could include: de-compacting to a specified depth, re-contouring, creating surface roughness, implementing erosion control measures, and re-vegetating with native grasses, shrubs and/or forbs. Site-specific measures will be determined by USFS Restoration Representative.

RIPARIAN/WETLAND FLOODPLAIN HABITAT IMPROVEMENT ACTIVITIES

Riparian/floodplain area actions will be designed to improve stream adjacent riparian and wetland areas. , Objectives of this action are to improve water quality, aquatic habitat complexity, and overall riverine connectivity between floodplains/riparian zones, or off-channel wetlands. One focus will be in minimizing the impacts of dispersed camping in riparian areas and streamside zones. These projects are intended to address the following Watershed Condition Framework (2011) Indicators: (3.0) Aquatic Habitat – 3.2 Large Woody Debris and 3.3 Channel Stability; (5.0) Riparian/Wetland Vegetation Condition.

Treatment options and methods used will vary based on site-specific conditions. Heavy equipment may be used in waterways, riparian areas, or near wetland habitats for tree felling, bank stabilization, construction of off-channel habitats, etc.

DISPERSED CAMP SITE RECLAMATION AND DESIGNATION –

Dispersed camping sites adjacent to riparian or wetland areas will be restored to natural conditions by ripping, seeding, and mulching impacted areas. The two areas proposed for campsite management are the West Chicago Creek and South Chicago Creek drainages.

Table 3. Proposed Dispersed Site Reclamation and Designation	
Proposed Action	**Description of Work**
Anticipated Areas of Implementation:	*West Chicago Creek and South Chicago Creek, see Appendix A, Map 6*
Dispersed Camp Site Reclamation *Anticipated Work:* *Approximately 22 sites proposed for reclamation in West Chicago Creek.* *Approximately 12 sites proposed for reclamation in South Chicago Creek/ Hefferman Gulch Road.* *Anticipated Project Implementation:* *2 different locations in one watershed; 1 area treated each year to total 2 year project implementation.*	This aspect of the proposed action will eliminate dispersed camping sites adjacent to riparian or wetland areas in the West Chicago Creek and South Chicago Creek drainages. Restoration will be achieved by de-compacting, seeding, and mulching impacted areas. For sites that are immediately adjacent to streams, bank stabilization work is anticipated (see Bank Stabilization Description of Work above). Much of the reclamation work is anticipated to occur by hand with the exception of de-compaction, which is anticipated to be done with heavy equipment. Restoration methods of disturbed areas during implementation could include: de-compacting to a specified depth, re-contouring, creating surface roughness, implementing erosion control measures, and re-vegetating with native grasses, shrubs and/or forbs. Site-specific measures will be determined by USFS Restoration Representative.
	In addition to the elimination of sites adjacent to streamside or wetland areas, this aspect of the proposed action will also restrict camping in the West Chicago Creek drainage to the developed campground, and camping in South Chicago Creek to the designated dispersed area. All other areas outside of the campground will be closed to camping and signed.
Dispersed Camp Site Designation *Anticipated Work:* *Approximately 4-6 sites proposed for designation* *Anticipated Project Implementation:* *2 different locations in one watershed; 1 area treated each year to total 2 year project implementation.*	This action is proposing to designate dispersed camping sites outside of riparian and streamside zones. This action will involve the construction of fence, signing, and installation of a fire ring. It is anticipated this work will be completed primarily by hand and the help of volunteers. Heavy equipment is not anticipated. Restoration methods of disturbed areas during implementation could include: de-compacting to a specified depth, re-contouring, creating surface roughness, implementing erosion control measures, and re-vegetating with native grasses, shrubs and/or forbs. Site-specific measures will be determined by USFS Restoration Representative.

Given that areas in West Chicago Creek were identified as unsuitable for camping management, camping will be restricted to the West Chicago Creek Campground and all other areas outside of the campground would be closed to camping. As mitigation to the dispersed camping closure in West Chicago Creek, the district is proposing to move forward with converting the West Chicago Creek picnic site to tent campsites that will become part of the campground (recommendation from the Arapaho-Roosevelt National Forests and Pawnee National Grassland Recreation Site Facility Master Planning Process (USDA Forest Service 2007). Five to seven additional campsites would be created with the conversion and sanitation concerns would be addressed with a nearby existing toilet facility.

FLOODPLAIN AND OFF-CHANNEL WETLAND ENHANCEMENT/RESTORATION –

Connectivity of stream channels with floodplains provide important functions including flood energy dissipation, flood water storage, natural sediment transport conditions, nutrient exchange, and the creation and maintenance of complex habitats. Techniques employed as part of this project would enhance, create, or reconnect floodplain habitats for the purposes of improving aquatic habitat, water quality, and riparian condition.

Table 4. Proposed Floodplain/Off-Channel Wetland Enhancement

Proposed Action	Description of Work
Anticipated Areas of Implementation:	*See Appendix A, Maps 7-9 for areas of implementation*
Floodplain and Off-Channel Wetland Enhancement/Restoration *Anticipated Work:* *Approximately 500 acres of enhancement or restoration are proposed in the project area, but work is not anticipated to occur in the entire 500 acre area.* *Anticipated Project Implementation:* *1-2 projects per year up to 100 acres each*	This proposed action involves the enhancement and/or restoration of off-channel wetland and floodplain habitats. Existing habitats would be excavated if pond habitat is desired. The use of heavy equipment is anticipated in pond excavation, floodplain restoration, and habitat maintenance or creation. Limited tree felling is anticipated as part of this project and would be achieved either manually or with equipment onsite. Appropriate BMP's would be applied for equipment work within sensitive areas. Anticipated work is approximate and may vary during implementation based on site-specific ground conditions. Restoration methods of disturbed areas during implementation could include: de-compacting to a specified depth, re-contouring, creating surface roughness, implementing erosion control measures, and re-vegetating with native grasses, shrubs and/or forbs. Site-specific measures will be determined by USFS Restoration Representative.

ROAD ACTIONS

These projects would include road maintenance, closure, decommissioning, and the replacement or installation of road/stream crossing structures designed for aquatic organism passage. These projects are intended to address the following Watershed Condition Framework (2011) Indicators: (3.0) Aquatic Habitat – 3.1 Habitat Fragmentation and 3.3 Channel Stability, (6.0) Roads and Trails – 6.1 Open Road Density, 6.2 Road Maintenance, and 6.3 Proximity to Water.

AQUATIC ORGANISM PASSAGE –

Stream crossings such as culverts and fords that have been identified as barriers to fish passage or contributors to aquatic habitat quality degradation would be replaced with structures designed for organism passage.

Table 5. Proposed Aquatic Organism Passage Actions

Proposed Action	Description of Work
Anticipated Areas of Implementation:	*See Appendix A, Maps 10-13 for site specific proposals*
Stream Crossing Replacement or Installation *Anticipated Work:* *15 structure installations or replacements* *Anticipated Project Implementation:* *Given cost of design and planning, it is anticipated no more than 2 structures will be replaced each year.* *Structure prioritization will be determined prior to implementation.*	This proposed action involves: 1) replacing culverts that are undersized or blocking/limiting passage of aquatic species with appropriate sized structures designed for aquatic passage, or 2) installing new structures in locations where drainage associated with roads impacts water quality. Existing structures would be excavated and a new stream channel would be constructed for installation of the new crossing structure. Stability structures upstream and downstream of the new crossing may be constructed to control potential channel incision. Heavy equipment, such as tracked excavators and backhoes, would be used to complete the activities. Dewatering of the stream channel would occur before excavation begins. For the purpose of this analysis, stream crossing "structures" (those existing or those that may be installed) include open-bottom arches, multi-plate or squashed pipe arches, embedded pipes, low-water crossings, prefabricated concrete or modular bridges, or ATV/OHV trail bridges.

ROAD MAINTENANCE –

Road maintenance on Forest Service roads is an ongoing activity. Road maintenance is generally designed to reduce erosion of road surfaces and cut and fill slopes and the production of sediment by primarily correcting road surface deficiencies and improving drainage problems. As a part of this proposed action, road maintenance activities would be prioritized and conducted as funding allows and would occur on sections of roads that have been identified through monitoring, within the project area, as having impacts to wetlands or aquatic habitats. Generally, road maintenance when implemented as a part of this project would primarily consist of the installation or construction of drainage features, such as culverts, ditches, water bars, rolling dips, etc.

ROAD DECOMMISSIONING/CLOSURE –

The objectives of decommissioning would be to reduce soil erosion, decrease road density, reduce impacts to fish and aquatic habitat associated with sedimentation and stream crossings, and restore natural infiltration rates. All Forest Service system roads within the project area were included in the initial project development. Each road was analyzed using mapping and on the ground knowledge, based on monitoring, on its effects to riparian, wetland, or aquatic systems. During initial scoping, there were road segments considered for decommissioning that were later excluded due to: little to no impacts to riparian, aquatic, or wetland habitats, and private land access. Acreages, miles and locations are approximate and may vary during implementation due to site-specific conditions on the ground.

The method needed for road decommissioning projects would vary based on site-specific conditions. Each road has a different history, challenges, and natural resource features.

Road decommissioning methods include the use of heavy equipment, or explosives, and would be used on those roads identified as needing culvert removal, stream crossing stabilization or slope stabilization. Any drainage structures to be removed or treated, such as culverts, bridges, or fords, would be accomplished in such a way that restores natural drainage. This usually involves the excavation of road fill and removal of culverts for drainages and streams, thereby restoring natural contours of stream channels. In addition, road prisms would be restored to natural hillslope contours on portions of the roads where it was needed to achieve restoration objectives. This can include de-compacting to a specified depth, creating surface roughness, and re-vegetating with native plant communities.

Roads may also be closed for administrative reasons which would include the erection of a gate, or other barrier to restrict or eliminate motorized access, except administratively. Several roads were identified as causing impacts to Grizzly Gulch; however, those roads are necessary for private access. These roads, as seen below in Table 6 and in Appendix A, Map 10, would be administratively closed, gated, and a special use authorization would be issued to the landowner.

Roads proposed for closure or decommissioning are shown in Table 6 and can be seen on maps in Appendix A, Maps 10-13.

Table 6. Proposed Road Actions by Watershed				
Watershed	**Road Number**	**Rationale for Inclusion**	**Proposed Action**	**Miles**
South Clear Creek (1019000040101)	248.1J[1]	Segment of road crosses Leavenworth Creek and is located in willow riparian area with isolated wetlands	Decommission currently closed segment beyond dispersed site	0.76
	248.2B	Segment of road is located in large wetland and riparian area. It also crosses a tributary to Leavenworth Creek.	Decommission	0.93
	248.2C	This segment of road has become braided and is resulting in hillslope erosion and impacts to downslope wetland habitats	Decommission southern road segment	0.23
	248.2L	This road segment is connected to 248.2B, and without decommissioning it the closure on 248.2B would be ineffective.	Decommission	0.05
	Total miles proposed for decommissioning: 1.97			
Headwaters Clear Creek (1019000040102)	189.1G	A gate is proposed because the private landowner needs access to their property. In order to easily restrict access to 189.1H, a gate at the junction of 189.1G and 189.1I is needed	Close with gate at junction of 189.1G and 189.1I; Issue Special Use Authorization to landowner	0.70
	189.1I			0.36
	189.1H	Given road drainage issues and mine proximity with waste rock tailings to the creek, the road, while needed for private landowner access, is having impacts to Grizzly Gulch.		0.14
	3W189.1	This unauthorized route crosses through several seasonal wet areas and small tributaries to Grizzly Gulch	Decommission unauthorized route	0.07
	15W189.1	This unauthorized route crosses through several seasonal wet areas and small tributaries to Grizzly Gulch	Decommission unauthorized route	0.21
	Total miles proposed for decommissioning: 1.48			
West Fork Clear Creek (1019000040103)	146.1	This road segment is having negative impacts on the riparian and instream quality of Woods Creek.	Decommission	0.46
	1W146.2	This unauthorized route is located within riparian habitats along Woods Creek, and its tributaries are resulting in negative impacts.	Decommission unauthorized route	0.41
	180.1A	This road segment crosses and parallels	Decommission	0.51

[1] Road currently closed to public just beyond dispersed camping area. The section currently closed is proposed for decommissioning and is not currently on the Motor Vehicle Use Map.

Table 6. Proposed Road Actions by Watershed				
Watershed	**Road Number**	**Rationale for Inclusion**	**Proposed Action**	**Miles**
		West Fork Clear Creek for its length. The road is resulting in impacts to West Fork Clear Creek.		
	261.1[2]	This road segment, while closed to the public, has been identified as having causing impacts to riparian systems and forested wetlands.	Decommission	0.91
	261.3C[2]	This road segment, closed to the public, crosses Mad Creek. Although much of this road has been naturally re-vegetated, work is needed at the crossing location.	Decommission	0.90
	1W261.3	This unauthorized route parallels a tributary to Mad Creek	Decommission unauthorized route	0.16
	Total miles proposed for decommissioning: 3.35			
Headwaters West Chicago Creek (1019000040203)	247.1D	The road parallels West Chicago Creek and is located in close proximity to wetland and riparian habitats.	Decommission	0.48
	769.1[2]	This road parallels Chicago Creek for much of its length, and is located no more than 50-100' away from stream.	Decommission	0.82
	Total miles proposed for decommissioning: 1.3			
Total Miles Proposed for Decommissioning in Proposed Action: 8.1				

[2] Road currently closed to public and not on the Motor Vehicle Use Map.

3.0. ENVIRONMENTAL CONSEQUENCES

FISHERIES

FEDERALLY THREATENED, ENDANGERED AND PROPOSED SPECIES

The only threatened, endangered, or sensitive fish species potentially impacted by the proposed action are greenback cutthroat trout. A separate Biological Assessment was prepared to document the effects of the proposed action on populations of native cutthroat within the project area (Carroll 2013). Findings are summarized in the effects section, below. No depletions are associated with this project; therefore, the federally listed species downstream of the project in the South Platte River basin do not need to be addressed.

FOREST SERVICE SENSITIVE SPECIES

Of the five aquatic sensitive species found on the Arapaho-Roosevelt National Forest, only two have habitat found within the project area and carried forward in the analysis. Lake chub and the Rocky Mountain capshell snail are the two Forest Service sensitive species carried forward in the analysis. Suitable habitat is found within the project area, although neither species has been observed. A separate Biological Evaluation was prepared to document the potential impacts of the proposed action on sensitive species within the project area (Larkin-McKim 2012). Findings are summarized in the effects section below.

MANAGEMENT INDICATOR SPECIES

Brook trout, brown trout, and greenback cutthroat trout were included in Management Indicator Species (MIS) analysis found in the High Peaks to Headwaters Biological Evaluation (Larkin-McKim 2012). Brook trout are the most common trout species found within the project area. While brown trout are less common in Forest streams, they can be found downstream of project area streams.

AQUATIC HABITAT WITHIN THE PROJECT AREA

Aquatic habitats within the project area vary from impacted to virtually pristine. Stream impacts vary between locations, but within the project area, aquatic habitats have generally been affected by recreation, historic mining, and the location of roads and/or highways. Streams like South Chicago Creek and West Chicago Creek have been channelized and simplified due to the roads that parallel to the streams for much of their distance. In addition, those streams have also been adversely impacted by dispersed camping. Dispersed camping has resulted in increased erosion and instability in the stream, loss of riparian vegetation, and simplified aquatic habitats. Historic mining impacts on aquatic habitats within the project area (e.g. Grizzly Gulch, Stevens Gulch, Quayle Creek, etc.) vary from physical alteration of stream channels (e.g. reduced habitat quality and quantity, simplified stream channels, etc.) to the direct discharge of acid mine drainage into waterways.

EFFECTS OF THE PROPOSED ACTION FOR FISHERIES RESOURCES AND AQUATIC HABITATS

The proposed action has been designed to improve fisheries, riparian, and wetland habitats. While the implementation of the proposed activities may result in short-term ground disturbance, vegetation removal, and increases in sedimentation and turbidity of aquatic habitats, the effects are expected to be short-term in duration with benefits lasting long-term. The implementation of project design criteria developed for this project will further minimize any potential effects of short-term sedimentation and turbidity. Dispersed camping designation and remediation may result in short-term disturbance as well, but will be beneficial in the long term for stream condition and fish habitat complexity. The application of project design criteria meant to protect soil, water, and fisheries resources will limit the potential for adverse effects to resident fish and their habitats (see section 4.0). Effectiveness monitoring of activities designed to improve stream stability, fish habitat complexity, and water quality will be conducted on an annual basis for up to 3 years after project implementation.

For Threatened or Endangered Species – Given that the proposed action proposes to improve aquatic habitats for resident aquatic species, and is expected to improve aquatic passage for streams containing native cutthroat trout, the implementation of this alternative ***may affect but will not adversely affect*** greenback cutthroat trout populations found within the project area.

For Sensitive Species – Given that the proposed action proposes to improve aquatic habitats for all resident aquatic species, the selection of this alternative is anticipated to have a ***beneficial impact*** on sensitive species if present within the project area.

For Management Indicator Species – Given that the proposed action proposes to improve aquatic habitats for all resident aquatic species, ***no change*** in the current trend of management indicator species is anticipated on the Planning area scale.

HYDROLOGY

Development in the upper Clear Creek basin since the 1850's has led to historic and continuing watershed impacts. Historic mining resulted in both direct and indirect impacts to stream and riparian systems. Placer mining disturbed many streams and adjacent riparian areas. Streams were often straightened and entrenched and aquatic habitat was simplified, with increased riffles and decreased pools. Lode mining has left some streams with continuing water quality problems from adit drainage of acidic, metals laden water and from mill tailings and spoil piles.

There are numerous County, Forest Service, and private roads within the watersheds. Many roads are located adjacent to drainages, and erosion from cut and fill slopes and road surfaces is a source of sediment to streams. Two of the watersheds have major highways paralleling streams. I-70 parallels Clear Creek in the Headwaters Clear Creek watershed, and US 40 parallels West Fork Clear Creek in the West Fork Clear Creek watershed. Both roads are heavily sanded in the winter, and traction sand has provided a major source of stream sedimentation. Several stream segments within the analysis area are

listed either on the Colorado State 303(d) list as impaired streams under the Clean Water Act (CWA), or on the Monitoring and Evaluation (M&E) list, where there is reason to suspect water quality problems, but there is also uncertainty regarding one or more factors, such as the representative nature of the data (Table 7) (State of Colorado, 2012).

Table 7: 2012 Colorado 303(d) and Monitoring and Evaluation List Streams

ID Number	Stream Segment	Portion	CO M&E Parameter	CWA 303(d) impairment
COSPCL01 Aquatic Life	Mainstem of Clear Creek, including all tributaries and wetlands, from the source to the I-70 bridge above Silver Plume.	Kearney Gulch, Grizzly Gulch	Aquatic Life	
COSPCL02a	Mainstem of Clear Creek from Silver Plume to West Fork Clear Creek.	All		Cd
COSPCL03a	Mainstem of S. Clear Creek	All		Cu
COSPCL03b	Leavenworth Creek	All		Cu
COSPCL06	West Clear Creek tributaries	Mad Creek	pH	Zn
COSPCL06	All tributaries to West Clear Creek.	Hoop Creek	Cd, Pb, Zn	

Note: Cd-Cadmium, Cu-Copper, pH-acidity, Pb-Lead, Zn-Zinc

In the table above, stream segments where parameters are listed in the fourth column, (CO M&E Parameter) are on the monitoring and evaluation list. Those where parameters are listed in the fifth column (CWA 303(d) impairment) are on the 303(d) list of impaired streams. As can be seen from the table, metals pollution is a primary concern for upper Clear Creek and its tributary streams.

For more complete analysis, see the Hydrology Specialist Report (Chambers 2013).

Effects of Proposed Action on Hydrology

The proposed activities would have long term beneficial effects to watershed resources. Installing stream crossings that would provide for aquatic organism passage (AOP) would also provide for less restricted flow of water and sediment. Undersized culverts have increased the risk that flood flows could flood the roads, eroding road materials, and putting the crossing at risk of failure. Replacing culverts with AOP crossings would allow for more stable transport of flood flows and sediment.

Stream restoration would provide for more diverse aquatic habitat, stabilize streambanks, reduce erosion, and provide for more natural and stable pool and riffle sequences. Riparian and floodplain restoration would promote riparian vegetation and reconnect streams to floodplains. Improved riparian vegetation would provide improved habitat and travel corridors for wildlife and would trap and store sediment from upland sources. During flood events, functional riparian areas would reduce flood

velocities and trap and store flood sediments. Reconnecting floodplains to streams would allow the floodplains to more effectively attenuate flood peaks and reduce downstream flood damage.

Road maintenance, closure, and decommissioning would reduce or remove a major source of sedimentation, would reduce impervious areas, and would permit re-vegetation of currently bare areas.

While the proposed activities are all beneficial to watershed condition in the mid to long term, activities that require ground disturbance could increase erosion and sedimentation in the short term, until vegetation has recovered or has been reestablished. These short-term impacts are anticipated to be minimized or eliminated through the application of project design criteria (see section 4.0). Effectiveness monitoring of activities designed to improve riparian/floodplain connectivity, water quality, and instream stability will be conducted on an annual basis for up to 3 years after project implementation.

RECREATION

The High Peaks to Headwaters project area provides a varied recreational setting for multiple user groups. The project area includes 5 campgrounds, 6 picnic sites, 54 miles of hiking trails, and parts of 2 wilderness areas. In addition, the project area includes a popular area for ATV/OHV enthusiasts in the Leavenworth Creek basin. There are a number of permit holders that operate within the project area boundary, including Loveland Ski Area, and outfitter/guides.

There are three designated wilderness areas adjacent to or in proximity to the project area. The Vasquez Peak Wilderness area is located to the north of the West Fork Clear Creek Watershed. The James Peak Wilderness area is to the north and lies within the West Fork Clear Creek Watershed (see Map 9). The Mount Evans Wilderness encompasses the southern half of the Headwaters West Chicago Creek Watershed and the southeast portion of South Clear Creek Watershed (Map 11).

There are six Colorado Roadless Areas (CRA) within the project area; however, only four have the potential to be affected by the proposed action. Vasquez Adjacent roadless area is located north of Interstate 70 and in the headwaters of West Fork Clear Creek. Mount Sniktau roadless area is located south of Interstate 70 within the headwaters of Clear Creek watershed. The Bard Creek roadless area is located north of Interstate70 and is bordered by mainstem Clear Creek and West Fork Clear Creek drainages. Square Top Mountain roadless area is located within the South Clear Creek watershed.

There are nine roadless area characteristics that are considered if proposing to implement projects within roadless area boundaries. These characteristics were addressed during the planning of the project, and documentation is available in District Files.

- High quality or undisturbed soil, water, air
- Sources of public drinking water
- Diversity of plant and animal communities

- Habitat for T&E, Proposed, Candidate and Sensitive species for those species dependent on large, undisturbed areas of land
- Primitive, semi-primitive, non-motorized and semi-primitive motorized classes of dispersed recreation
- Reference landscapes
- Natural-appearing landscapes with high scenic quality
- Traditional cultural properties
- Other locally identified unique characteristics

Dispersed Camping

Dispersed camping occurs throughout the High Peaks to Headwaters project area. Two specific locations would be rehabilitated and/or relocated for dispersed camping management, along portions of West Chicago Creek and South Chicago Creek. In 2012, a dispersed camping site inventory was completed in the West Chicago and South Chicago Creek areas and found that those dispersed camping sites located in close proximity to water with little to no ground cover were rated as having adverse impacts to watershed and aquatic resources. The ARNF/PNG Forest Plan (USDA Forest Service 1997) provides direction on dispersed camping sites to close, rehabilitate, or otherwise mitigate sites when unacceptable resource damage is occurring. Under the proposed action, camping in West Chicago Creek and South Chicago Creek drainages would be restricted to developed campgrounds and designated campsites, respectively. Suitable campsites would be identified and located outside streamside management zones. Sites would be signed, with fire ring construction and fencing to restrict vehicle access. Current dispersed sites adjacent to riparian or wetland areas would be closed, restored and reclaimed by de-compacting/ripping soils, seeding, and mulching. In addition, bank stabilization work may be required in areas immediately adjacent to streams.

Effects of the Proposed Action on Recreation Resources

Roadless and Wilderness

No tree cutting or road building activities would take place within CRAs. Activities proposed within or adjacent to roadless include the decommissioning of authorized roads, instream habitat improvements, and wetland/floodplain connectivity enhancements. Although some instream habitat improvements would require the acquisition of large woody debris, felling would not occur within roadless area boundaries. Implementation of the proposed action would result in improved aquatic habitat, watershed condition, and more managed camping along two drainages. No adverse effects to the nine roadless area characteristics are anticipated with the implementation of the proposed action. No activities being proposed would occur within designated wilderness; therefore, the proposed action would result in no effects to wilderness areas or wilderness character.

DISPERSED CAMPING

This action would result in restricting camping opportunities along West Chicago Creek and South Chicago Creek. Dispersed camping would be designated to sites in one area along South Chicago Creek near Lower Hefferman Gulch Road (FSR#247.1). The Proposed Action would restrict recreational opportunities by reducing campsite locations. Educational signing would be placed in conspicuous locations near dispersed camping areas. It is anticipated that during construction of dispersed sites, there may be short-term displacement and competition for available campsites, but this is expected to end once construction is complete. Since camping in these two drainages will be limited to the designated dispersed sites in South Chicago Creek and the developed campground in West Chicago Creek, impacts and competition for sites in adjacent areas outside of the project area may increase. Reduction in the number of campsites adjacent to wetland and/or riparian areas will improve resource conditions for soil, water, and fisheries. It is anticipated that restricting camping to the developed campground and designated dispersed sites will have effects to recreationists, but camping opportunities still exist in these two areas, albeit in a more managed fashion.

For more detailed analysis on recreation within the project area, see the Recreation Specialist Report (Bradt and Wobig 2013).

ROAD ACTIONS

The proposed decommissioning of roads is anticipated to affect recreational opportunities in the reduction of available routes. Closing these roads is not expected to greatly displace motorized use into other areas. In addition to open roads, approximately 4.4 miles of administratively closed or unauthorized roads are proposed for decommissioning. These roads may provide access to dispersed camping opportunities, and closing them would affect this use. However, these campsites could still be accessed by foot, and the overall experience for non-motorized campers, seeking this type of experience, would be improved.

Proposed road maintenance (predominantly anticipated on main access routes) actions could include road drainage improvements, surfacing, etc. These actions could have an effect on motorized recreationists seeking out ruts, mud, boulders, and other obstacles; however, maintenance actions are anticipated primarily on main access routes which aren't expected to greatly impact motorized recreation enthusiasts. Stream crossing improvements (installation of stream crossing structures such as bridges, culverts, etc. or hardening of stream/road crossings) implemented as part of the proposed action could have an effect on those recreationists looking for water challenges; however, those improvements are limited in scope on roads used by motorized recreationists.

HERITAGE RESOURCES

The project analysis area is centered on the Georgetown/Silver Plume Historic District (5CC3), which served as a hub for the outlying smaller mining districts such as Waldorf (the Argentine District), the Grizzly and Stevens Mines, Empire, and the Minnesota Mines. Although many mining features and

complexes have the potential to be affected by the proposed action given lack of specific survey information within the project area, no known significant mining sites are within the Area of Potential Effect (APE). Roads of historic importance are present within the project area as well as eligible recreation residence cabins.

EFFECTS OF THE PROPOSED ACTION ON HERITAGE RESOURCES

Several activities of the proposed action have the potential to impact cultural resources within the project area. The use of heavy equipment and hand-tools has the potential to disrupt or destroy prehistoric or historic artifacts. As site-specific actions are developed, a cultural resource evaluation will be required prior to the implementation of any action. This is anticipated to limit the effects to historic artifacts found within the disturbance areas. Additionally, the application of project design criteria developed for cultural resources found in Section 4.0 of this document is expected to limit potential adverse effects of the project.

For more detailed analysis of the heritage resources found in the project area, see the Heritage Specialist Report (Alford 2012).

WILDLIFE RESOURCES

ENDANGERED, THREATENED, AND PROPOSED SPECIES FOR THE ARAPAHO AND ROOSEVELT NATIONAL FORESTS

The Canada lynx is the only federally listed wildlife species within the project area. The project area includes suitable lynx habitat and overlaps four lynx linkage areas (Berthoud Pass, Loveland Pass, Guanella Pass and Herman Gulch). The proposed actions all occur in the Clear Creek and Mt. Evans Lynx Analysis Units (LAU). The Clear Creek LAU is 106,223 acres with 41,747 acres of lynx habitat with 39% being mapped as unsuitable. The Mount Evans LAU is 67,736 acres with 49,256 acres of lynx habitat with only 8% being mapped as unsuitable. Unsuitable habitat does not contain enough hiding cover for available forage to support lynx prey year round.

EFFECTS OF THE PROPOSED ACTION ON CANADA LYNX

Some of the activities being proposed would take place within lynx linkage areas (e.g. riparian/floodplain enhancement, road decommissioning, and stream restoration actions). Activities that will require the incidental removal or felling of trees (stream and riparian/floodplain actions) will be designed to mimic natural conditions, but may result in negligible alteration of suitable lynx habitat. However, design criteria would limit any anticipated effects to lynx. Road closures are expected to benefit lynx by increasing refuge habitats and improving habitat effectiveness.[3]

[3] Habitat effectiveness, as defined by the Forest Plan is mostly undisturbed habitat which is buffered from regularly used roads and trails (FEIS Appendix B, page 12)

Although parts of the proposed action have the potential to negligibly alter suitable lynx habitat, and other proposed activities are anticipated to benefit lynx, implementation of the proposed action ***may affect, but is not likely to adversely affect*** the Canada lynx. Design criteria developed for wildlife resources (see Section 4.0 in this document) implemented as part of this project are anticipated to limit potential effects to the species. The proposed action is consistent with the 2008 Southern Rockies Lynx Amendment and the June 2010 lynx screens were used to supplement analysis (see McCormick 2012 High Peaks to Headwaters Biological Assessment and Evaluation for more details). The project decision screens as governed by the 2010 Southern Rockies Lynx Consultation Agreement provide US Fish and Wildlife Service concurrence for (ESA) Section 7 consultation on simple and direct projects that are not likely to adversely affect lynx.

Forest Service Region 2 Sensitive Species

The following table shows Forest Service sensitive species that are found within the project area or have habitat present within the project area. They are separated by habitat type.

Table 8. Forest Service Sensitive Species by Habitat Type

Habitat Type	Species
Forest	Northern goshawk
	Boreal owl
	Olive-sided flycatcher
	Flammulated owl
	American marten
	Hoary bat
Alpine/Sub-alpine	White-tailed ptarmigan
	North American wolverine
	Rocky Mountain bighorn sheep
Waterfall/Cave/Cliff/Riparian	Black swift
	Townsend's big-eared bat
	Bald eagle
	Peregrine falcon
Wetland	Boreal toad
	Northern leopard frog
	Hudsonian emerald dragonfly

Effects of the Proposed Action on Forest Service Sensitive Species

The species listed above in Table 8 were considered in the analysis of the proposed action. The High Peaks to Headwaters Biological Assessment and Biological Evaluation (McCormick 2012) describes in detail the anticipated impacts to the species. Anticipated impacts to terrestrial species are expected to be minimal. Road closures will slightly increase refuge habitat and improve habitat effectiveness within the project area. Incidental tree removal associated with stream and/or riparian actions are expected to be minor and sporadic, and will be designed to mimic natural occurrences, which should result in

negligible changes to forested habitat. Some forest or riparian species may receive indirect benefits from riparian actions as habitat is improved for their prey resulting in increased foraging opportunities. Alpine or subalpine species are not expected to be impacted as proposed activities do not overlap in their habitats. Species present in uncommon habitats, like waterfalls, cliffs, or caves, may indirectly benefit from riparian actions as prey habitat is improved resulting in increased foraging opportunities.

Because the likelihood of this project having impacts on terrestrial sensitive species is anticipated to be minimal, the implementation of this project and its associated activities are anticipated to have ***no impact*** on the terrestrial sensitive species listed above.

The proposed action is expected to increase aquatic habitat complexity, reduce erosion and sedimentation, restore habitat connectivity and expand riparian vegetation resulting in increased habitat abundance and quality for Forest Service wetland sensitive species. A short-term disturbance to wetland species should be expected during project implementation, which may result in temporary habitat loss and displacement. However, the long-term benefits of habitat improvements outweigh any short-term impacts. In addition, wetland actions will likely be implemented at low-flow (late summer/fall - after the breeding season of most species) and activities will be distributed both spatially and temporally throughout the project area, minimizing negative impacts. Design criteria to prevent the spread of amphibian disease and to protect functional breeding sites would be applied when working in boreal toad and leopard frog habitat (see Section 4.0).

The implementation of this project, with the application of specific design criteria found in Section 4.0 of this document, is anticipated to have a ***beneficial impact*** on the boreal toad, northern leopard frog, and Hudsonian emerald dragonfly.

MANAGEMENT INDICATOR SPECIES

Based on the overall habitat present within the project area, the following management indicator species (MIS) and their specific habitats were analyzed as a part of this project.

Table 9. Arapaho-Roosevelt Management Indicator Species

Management Indicator Species (MIS)	Management Indicator Community (MIC)
Pygmy nuthatch	Old Growth
Mountain bluebird	Forest Openings
Bighorn sheep*	Forest Openings
Elk	Forest Openings and Young to Mature Forest
Mule deer	Forest Openings and Young to Mature Forest
Golden-crowned kinglet	Interior Forest
Warbling vireo	Aspen Forest
Wilson's warbler	Wetland
Boreal toad*	Wetland

*Boreal toad and bighorn sheep were also analyzed as Forest Service sensitive species above

EFFECTS OF THE PROPOSED ACTION ON MANAGEMENT INDICATOR SPECIES

Although the proposed project is anticipated to result in slight increases in refuge habitats and habitat effectiveness, **no change** to current population trends of these species is anticipated at the planning level.

For more detailed analysis on wildlife within the project area, see the High Peaks to Headwaters Biological Assessment/Biological Evaluation (McCormick 2012).

BOTANICAL RESOURCES

THREATENED AND ENDANGERED PLANTS

No TE plant species are known or suspected to occur in the project area. Three threatened riparian species are known to occur downstream of the project area. Colorado butterfly plant occurs along riparian zones in the greater Denver and surrounding areas, Western prairie fringed orchid occurs on the main stem of the Platter River in Nebraska, and Ute ladies'-tresses orchid occurs in along riparian corridors of Clear Creek downstream of the town of Idaho Springs. Water depletions to the South Platte River watershed are not anticipated as part of this project.

EFFECTS OF PROPOSED ACTION ON THREATENED AND ENDANGERED PLANT SPECIES

Because there are no water depletions associated with this project, the implementation of this project should have ***no effect*** to listed plants occurring downstream of the project area.

FOREST SERVICE SENSITIVE PLANTS

Eight sensitive species are known to occur within or near the project area: spathulate moonwort, narrowleaf moonwort, Rocky Mountain monkeyflower, Kotzebue's grass of Parnassus, Rocky Mountain cinquefoil, clawless draba and Gray's Peak draba, and simple kobresia.

EFFECTS OF PROPOSED ACTION ON FOREST SERVICE SENSITIVE SPECIES

Much of the site-specific areas proposed for project activities do not contain suitable habitat for sensitive plants, and none of the known sensitive plant sites within the project area occur in areas influenced by the proposed project. It is possible, but unlikely, that undetected plants could exist in the riparian areas, adjacent uplands used for staging areas, or roads designated for decommissioning, that could be impacted by project activities. If plants occur in disturbance footprints, they could be adversely impacted by crushing, burying, or removal. If they are present in areas that may be indirectly enhanced by project activities, such as restoring wetlands, it is possible that they could be benefitted by project implementation. It is unlikely that fens would be disturbed. To help ensure that no sensitive plants would be adversely impacted by project activities, surveys would be conducted as part of the proposed action in areas containing suitable habitat to determine plant presence. If plants were encountered, proposed activities would be revised to avoid adverse impacts to sensitive plants.

Therefore, based on the low likelihood of occurrence of sensitive plants, and implementation of design criteria if sensitive plants are found during surveys, an effects determination of ***no impact*** is warranted for sensitive plants.

Other Plant Communities of Concern

About 400 linear meters of a noteworthy plant community, the bristlecone pine/common juniper woodland community, may be bisected by road 769.1. The community is ranked "B3" (high biological value) by the Colorado Natural Heritage Program. The proposed decommissioning of all or portions of that road could impact portions of the community, possibly resulting in limited felling of bristlecone pines.

Effects of Proposed Action on Other Plant Communities of Concern

As part of the proposed action, a specific design criterion was developed that prohibits disturbance of bristlecone pine trees unless necessary to accomplish decommissioning objectives.

Soils and Geology

The geology of the analysis area consists primarily of granite or rocks formed from granite. On upper hill-slopes and ridgelines, soils are formed from bedrock. On lower hill-slopes and valley bottoms, soils are formed in parent materials that were deposited by gravity, moving water or glaciers. These rocks typically weather slowly so analysis area soils are generally sandy, and have high rock content.

In the absence of natural or human caused disturbance, natural rates of erosion are typically low in forested environments with high levels of ground cover within the analysis area. Natural physical processes, such as soil erosion may be accelerated by ground disturbing activities that remove protective ground cover or alter runoff rates. Other infrequent and episodic natural physical processes include landslides and debris flows. Hill-slopes in the area are not generally highly susceptible to mass wasting, so landslides are not common. Debris flows and rock falls are more common, particularly following wildfire. Following soil disturbance, natural re-vegetation and recovery is generally a slow process in uplands soils within the project area.

Effects of Proposed Action on Soils and Geology

Ground disturbance associated with heavy equipment and/or other restoration methods may result in the increased potential for soil erosion, compaction or displacement. These effects are anticipated to be short-term and minor due to the application of project design criteria. In the long-term, all proposed restoration activities within the riparian zones, floodplains and uplands are expected to have direct beneficial effects to soil resources as the rehabilitation, erosion control, and re-vegetation of these would improve soil stability, soil hydrologic function, and the soils ability to support native vegetation.

For more complete analysis information, see the Soils and Geology Specialist Report (Schroder 2013).

OTHER RESOURCE AREAS

Other resource areas, such as lands, minerals, and invasive plants were not included in the Environmental Assessment, although analysis of those areas was completed. During the course of analysis, it was determined that these resource areas had the potential for negligible or discountable effects with the implementation of the proposed action. Complete analysis documents can be found in the project record.

CUMULATIVE EFFECTS OF THE PROPOSED ACTION

Other past, present and reasonably foreseeable actions occurring on Federal and non-Federal lands, with similar effects that overlap in time and space include Colorado Department of Transportation highway maintenance (predominantly winter) on Interstate 70 and US 40, Colorado Department of Transportation widening and improvements on Interstate 70, mine reclamation projects in West Fork Clear Creek watershed (specifically West Fork Clear Creek, Lion Creek, North Empire Creek), and hazard tree treatments along power lines, roads, and trails. These actions would likely contribute cumulatively to sedimentation in area streams, contribute to increases in short term displacement, compaction, and erosion of soil; however, there would also likely be a cumulative beneficial effect resulting in long-term improved water quality (mine reclamation efforts/CDOT sediment basin improvements) and improved instream habitat quality and quantity and bank stability (mine reclamation projects with associated instream improvements). Therefore, the direct and indirect effects of the various elements of the proposed action, when added to the effects of similar effects from past, present, and reasonably foreseeable future actions would not result in permanent adverse cumulative effects. Over the long-term, the effects associated with the proposed action are expected to result in benefits to watershed and aquatic resources, thereby off-setting short-term cumulative effects described in the analysis.

4.0 PROJECT DESIGN CRITERIA

HERITAGE RESOURCES

1. All areas of proposed ground disturbance in terrain of high probability of archaeological sites would be intensively surveyed for cultural resources prior to implementation. Consultation with the State Historic Preservation Office (SHPO) as well as the appropriate tribes and local governments must be completed to allow for concurrence on determinations of eligibility and effect for the proposed undertakings before the proposed activities could proceed.
2. Should significant archaeological sites or areas of cultural importance to a tribe occur within a proposed rehabilitation areas, the sites would be protected from ground disturbing activities by a 50 foot buffer, thus removing them from the area of potential effect (APE). No heavy equipment access or rehabilitation work would be allowed with the buffered areas unless they are specifically cleared in consultation with the aforementioned parties and concurrence has been received for a determination of *no adverse effect.*
3. In the case of significant linear resources (i.e. roads), project work must be designed in a manner that protects the historic integrity of the feature. Consultation with SHPO and the local government must be completed before any work could proceed.
4. All NRHP eligible or unevaluated sites within the APE would be flagged on the ground for avoidance, or monitored by an archaeologist during implementation.
5. If affected properties are discovered after project activities are completed, the Forest would document any damage and consult with SHPO and Council pursuant to 800.13(b).
6. Consultation with Native American tribes must be completed prior to the closure of roads to ensure that access to areas of cultural importance is not inadvertently removed.

RECREATION

7. Any projects that would be implemented in areas where permit holders operate will be coordinated with the special use permit holders.
8. Dispersed campsites to be closed will be raked and re-vegetated with native seed mix. Where feasible, barriers and/or “area closed for rehab” signs will be posted to keep users out of these areas.
9. Heavily compacted soil should be tilled to develop an acceptable seedbed for vegetation in areas determined unnecessary for use.
10. Excessive erosion will be stabilized. Such techniques (water bars, rip rap, etc.) will use native materials and be visually unobtrusive.
11. All designated campsites will be signed and located a minimum of 100 feet from the stream bank and a 50 feet spacing between campsites would be preferable. Each site will consist of a parking area for 1-2 vehicles, site marker, and fire ring. A Forest Service hydrologist will review final campsite locations.

WILDLIFE RESOURCES

12. Do not fell trees or use existing downed woody debris for aquatic/riparian restoration within the Herman Gulch lynx linkage area. As an alternative import material from outside the linkage area.
13. Decontaminate all tools and equipment including boots and waders with a quaternary compound disinfectant (such as Super HDQ Neutral by Spartan Chemicals) when working in or near amphibian habitat (historically or currently occupied). Follow manufacturer recommendations for concentrations and applications.
14. Ensure proposed actions do not reduce hydrologic functioning and water quality of known and historic boreal toad and leopard frog breeding sites to maintain habitat effectiveness and prevent reproductive losses to the species.
15. To prevent trampling and maintain water quality for successful reproduction, do not implement projects within 100 feet of known, active, boreal toad or leopard frog breeding sites from May 15 to September 30. Dates may be modified by USFS Wildlife Biologist based on site-specific surveys.

BOTANICAL RESOURCES

16. Prior to ground-disturbing activities, conduct surveys for sensitive plant species in potentially-impacted areas that contain suitable habitat. Conduct surveys at times when plants are identifiable.
17. If sensitive plants are encountered prior to or during project implementation, adjust project activities to avoid adverse impacts in consultation with Forest Service Botanist or botany representative.
18. Avoid disturbance of old-age or noteworthy “bonsai” bristlecone pine trees in the recognized noteworthy community unless critical to accomplishing project objectives.
19. Seed mix will be government furnished.
20. Planting species/cultivars and genetic sources will be approved in advance by a Forest Service Botanist or restoration representative.
21. Seeding/planting timing, rates, and methods will be derived in consultation with a Forest Service Botanist or restoration representative, and will be developed in accordance with the ARP re-vegetation policy.

NOXIOUS WEEDS

22. To minimize risk of noxious weed introduction and spread, require all equipment to be used for ground-disturbing activities (not including service trucks or other vehicles that remain on roadways) to be clean, i.e. free of mud, dirt, and plant parts, or other debris that could contain or hold seeds, prior to entering the project area. Equipment will be considered free of soil and other debris when a visual inspection does not disclose such material. Disassembly of equipment components or specialized tools is not required.

23. Use wood straw for mulch where feasible. If forage straw is used for re-vegetation or erosion control, it must be certified weed-free per the Forest Service Weed Free Forage Products Order Number: R2-2005-01.
24. If imported fill material is required, use weed-free sources where possible.
25. Re-vegetate sites with certified weed-free seed. Seed mixes will be developed in accordance with the ARP re-vegetation policy and consultation with the Forest Service botanist or botanical representative, and independent testing of seed may be needed.
26. Prior to implementation, conduct an inventory for noxious weeds in areas planned for ground-disturbing activities. Treat and/or avoid noxious weeds that are found, depending on the species, location, and extent of infestations. Appropriate actions will be determined by the CCRD Invasive Plants Coordinator.

HYDROLOGY/FISH/SOILS

27. Construct stream crossings during low flow periods of late summer or early fall.
28. Divert streamflow around construction zone to minimize sediment transport and turbidity.
29. Design stream crossings to sustain bankfull dimensions of width, depth, and slope. Construct stream beds to be stable for expected flows.
30. Design road drainage to drain onto stable upland slopes.
31. When decommissioning roads, de-compact road surface to promote re-vegetation, remove cross drain culverts, and reestablish drainage patterns across road.
32. For decommissioned roads, reestablish natural contours for sight distance from open roads, within 100 feet of perennial and intermittent streams, and on slopes greater than 35%, at the minimum.
33. For ground disturbance near or adjacent to perennial or intermittent streams, provide sedimentation barriers to trap sediment. Note: Sediment barriers may not be required if low terrain slope and vegetation are sufficient to provide natural sediment traps.
34. In the water influence zone next to perennial and intermittent streams, lakes, and wetlands, allow only those land treatments that maintain or improve long-term stream health. In areas disturbed by implementation, a USFS Restoration Specialist will determine the appropriate BMP's on a site-specific basis.
35. Conduct actions so that stream pattern, geometry, and habitats are maintained or improved toward robust stream health.
36. Stabilize and maintain roads and other disturbed sites during and after construction to control erosion.
37. Where feasible and beneficial, scrape, stockpile and re-spread topsoil.

5.0 PROPOSED MITIGATION

The picnic site at West Chicago Creek will be converted from a day use picnic site to primitive overnight camping. Approximately 5-7 campsites will be created using existing site amenities such as road, parking area, table, fire grate and restroom. Little to no site disturbance will be necessary to convert the sites to overnight use. Over time these sites may be included as an extension of the West Chicago Creek Campground and require a fee for camping.

6.0 AGENCIES AND PERSONS CONSULTED

Paul Winkle – Colorado Parks and Wildlife, Northeast Region Aquatic Biologist, Denver Colorado

Leslie Ellwood – US Fish and Wildlife Service, Ecological Services Division, Lakewood Colorado

Ty Petersburg – Colorado Parks and Wildlife, District Wildlife Manager, Denver Colorado

F. Boyd Wright – Colorado Parks and Wildlife, Native Aquatic Species Biologist, Fort Collins Colorado

7.0 REFERENCES

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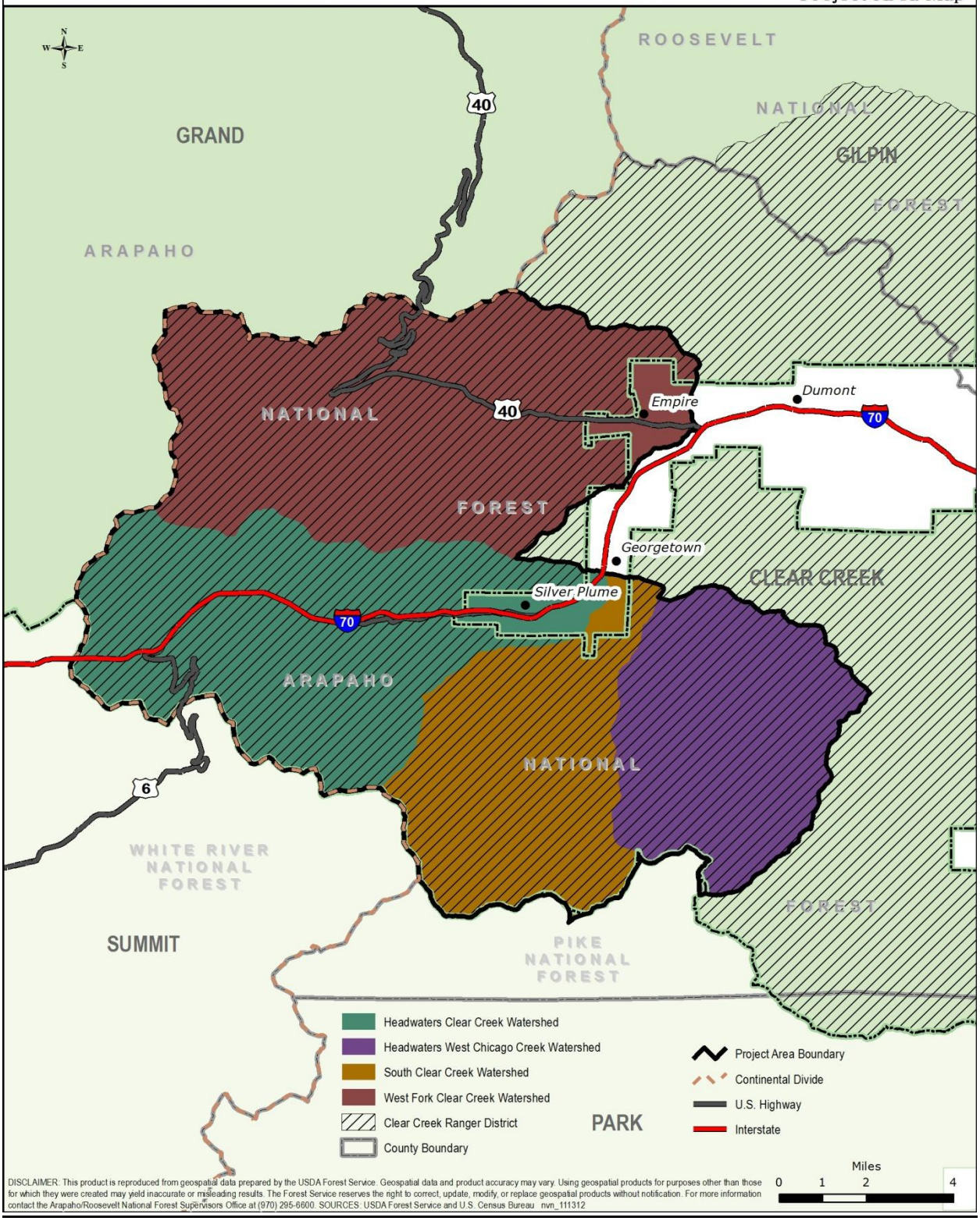
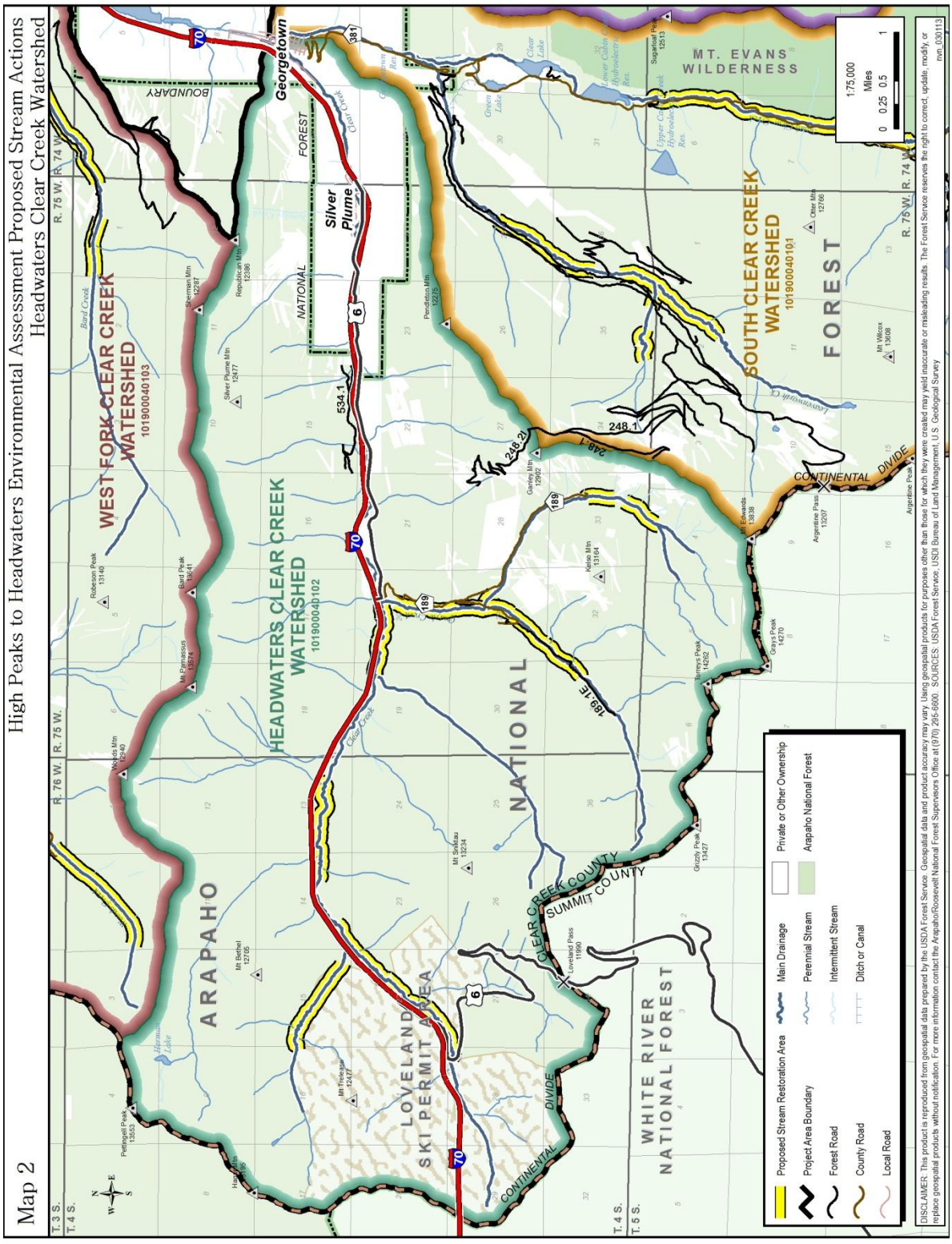
APPENDIX A

Map 1

High Peaks to Headwaters Environmental Assessment
Project Area Map




Map 2
High Peaks to Headwaters Environmental Assessment Proposed Stream Actions
Headwaters Clear Creek Watershed
WEST FORK CLEAR CREEK WATERSHED
10190004010 3
HEADWATERS CLEAR CREEK WATERSHED
10190004010 2
SOUTH CLEAR CREEK WATERSHED
10190004010 1
ARAPAHO
NATIONAL
FOREST
MT. EVANS WILDERNESS
LOVELAND SKI PERMIT AREA
WHITE RIVER NATIONAL FOREST
Georgetown
Silver Plume
CLEAR CREEK COUNTY
SUMMIT COUNTY
CONTINENTAL DIVIDE
BOUNDARY
534.1
248.1
248.2
189.1E
Proposed Stream Restoration Area
Project Area Boundary
Forest Road
County Road
Local Road
Main Drainage
Perennial Stream
Intermittent Stream
Ditch or Canal
Private or Other Ownership
Arapaho National Forest
175,000
Miles
0 0.25 0.5 1
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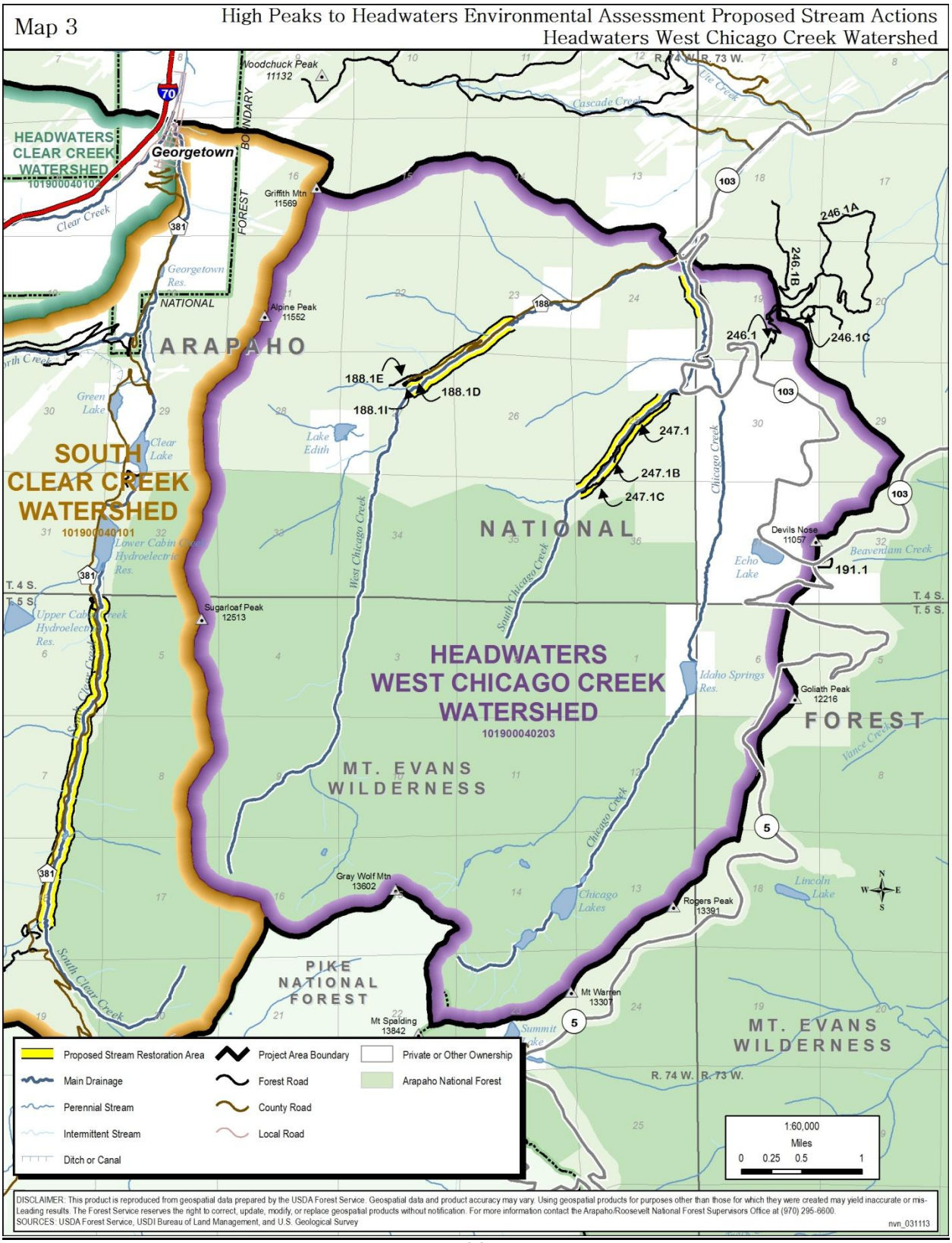
mvn_030113


Map 3
High Peaks to Headwaters Environmental Assessment Proposed Stream Actions
Headwaters West Chicago Creek Watershed
HEADWATERS CLEAR CREEK WATERSHED
101900040102
SOUTH CLEAR CREEK WATERSHED
101900040101
HEADWATERS WEST CHICAGO CREEK WATERSHED
101900040203
ARAPAHO NATIONAL FOREST
NATIONAL FOREST
MT. EVANS WILDERNESS
PIKE NATIONAL FOREST
Georgetown
Woodchuck Peak 11132
Griffith Mtn 11569
Alpine Peak 11552
Sugarloaf Peak 12513
Gray Wolf Mtn 13602
Mt Spalding 13842
Mt Warren 13307
Rogers Peak 13391
Goliath Peak 12216
Devils Nose 11057
188.1E
188.1D
188.1I
247.1
247.1B
247.1C
246.1A
246.1B
246.1C
191.1
Proposed Stream Restoration Area
Main Drainage
Perennial Stream
Intermittent Stream
Ditch or Canal
Project Area Boundary
Forest Road
County Road
Local Road
Private or Other Ownership
Arapaho National Forest
1:60,000
Miles
0 0.25 0.5 1
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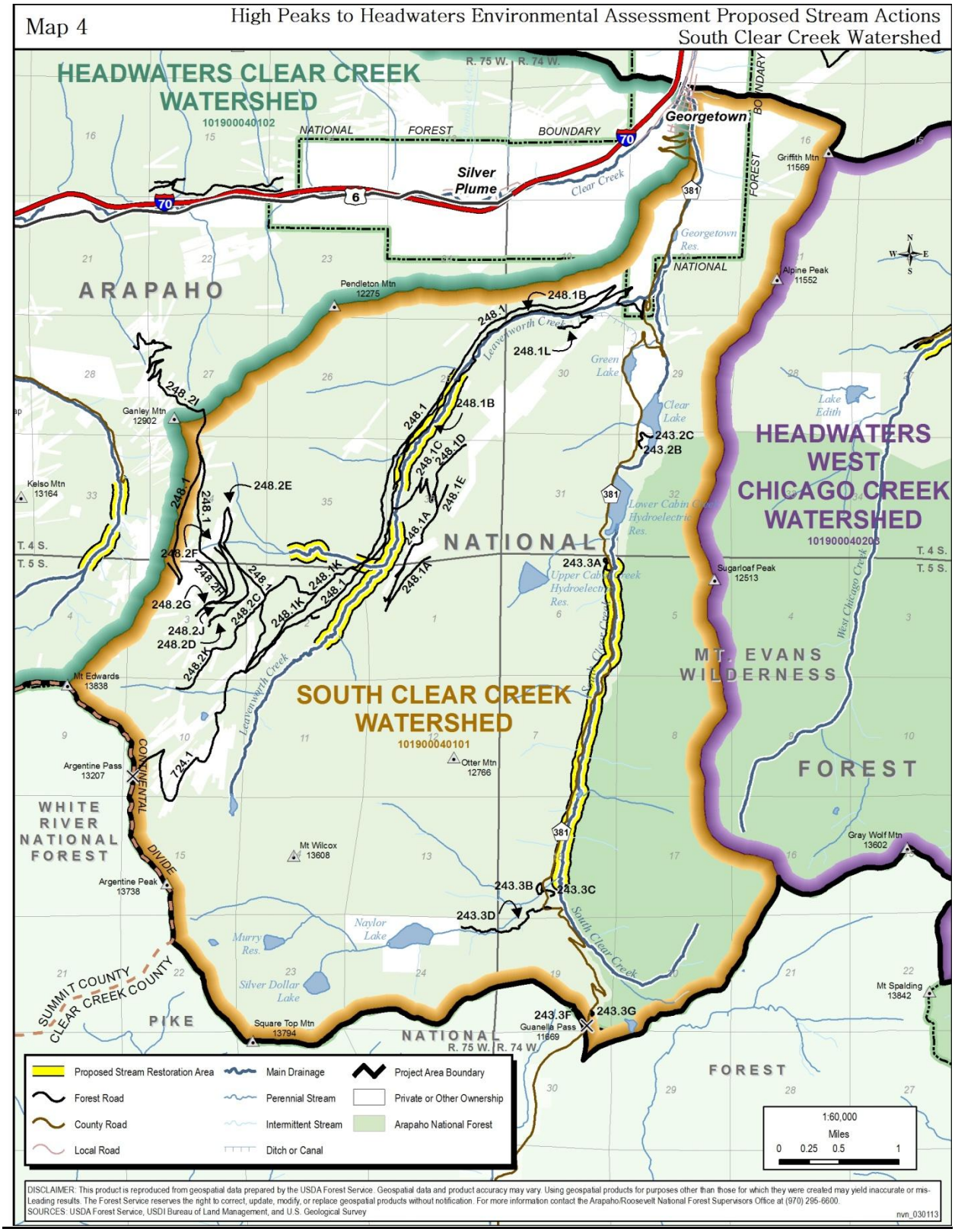
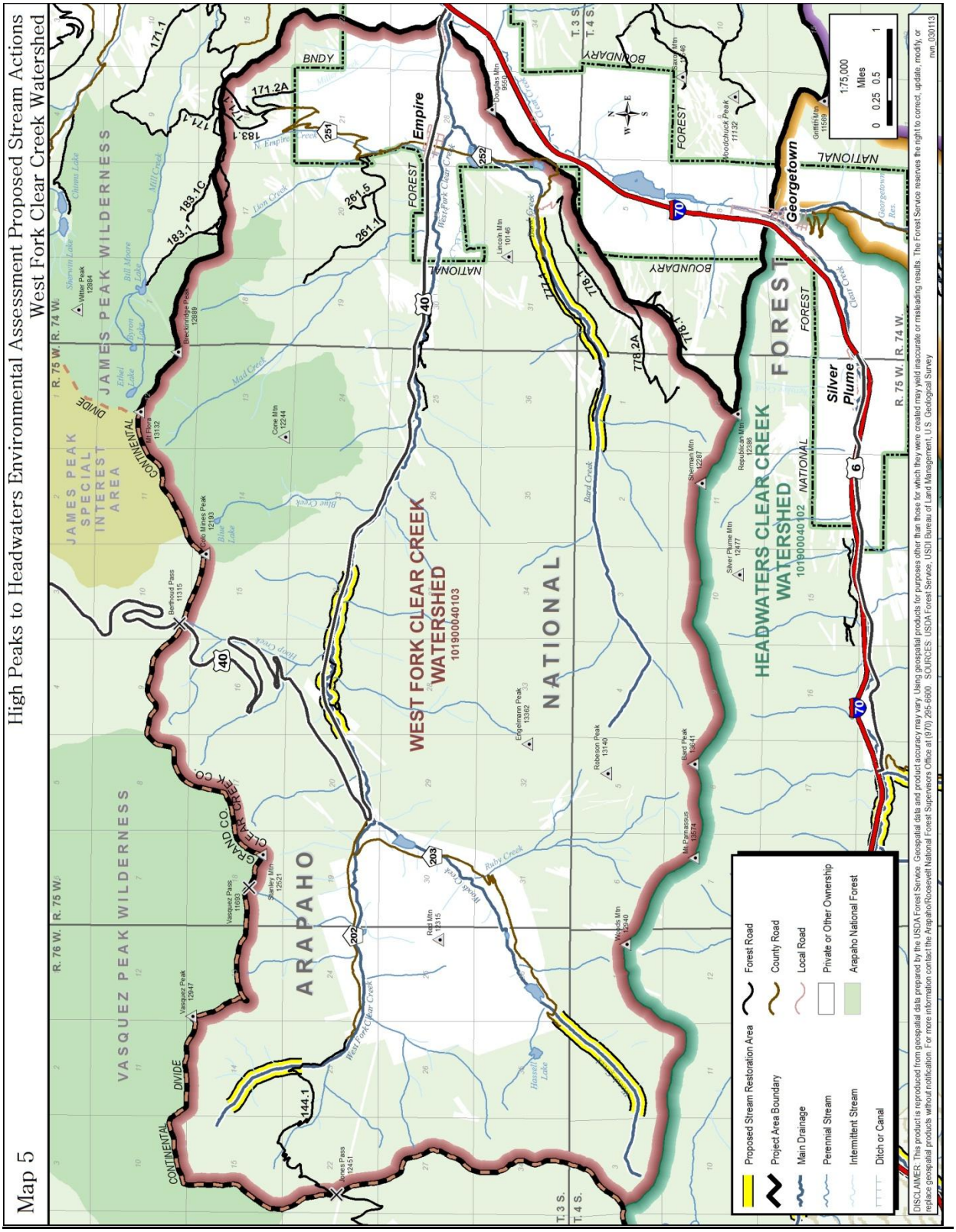
SOURCES: USDA Forest Service, USDI Bureau of Land Management, and U.S. Geological Survey
nvn_031113

Map 4 High Peaks to Headwaters Environmental Assessment Proposed Stream Actions South Clear Creek Watershed




Map 5
High Peaks to Headwaters Environmental Assessment Proposed Stream Actions
West Fork Clear Creek Watershed
WEST FORK CLEAR CREEK WATERSHED
10190004010 3
HEADWATERS CLEAR CREEK WATERSHED
10190004010 2
ARAPAHO NATIONAL FOREST
VASQUEZ PEAK WILDERNESS
JAMES PEAK WILDERNESS
JAMES PEAK SPECIAL INTEREST AREA
Georgetown
Silver Plume
Empire
Proposed Stream Restoration Area
Project Area Boundary
Main Drainage
Perennial Stream
Intermittent Stream
Ditch or Canal
Forest Road
County Road
Local Road
Private or Other Ownership
Arapaho National Forest
1:75,000
Miles
0 0.25 0.5 1
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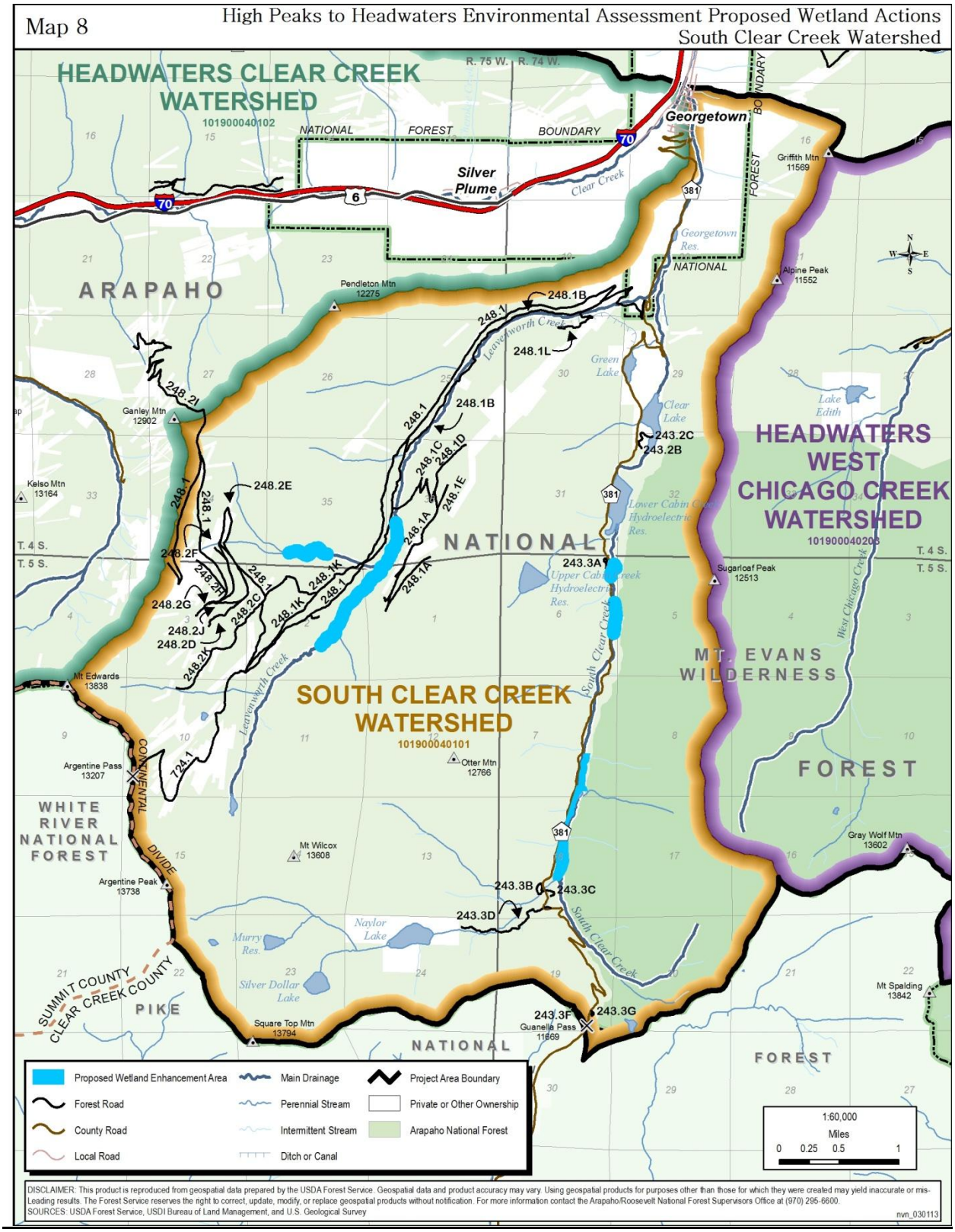
nvn_030113

Map 6 High Peaks to Headwaters Environmental Assessment Proposed Dispersed Camping Actions
Headwaters West Chicago Creek Watershed


Map 8
High Peaks to Headwaters Environmental Assessment Proposed Wetland Actions
South Clear Creek Watershed
HEADWATERS CLEAR CREEK WATERSHED
101900040102
HEADWATERS WEST CHICAGO CREEK WATERSHED
101900040203
SOUTH CLEAR CREEK WATERSHED
101900040101
ARAPAHO NATIONAL FOREST
MT. EVANS WILDERNESS
WHITE RIVER NATIONAL FOREST
PIKE NATIONAL FOREST
Georgetown
Silver Plume
Pendleton Mtn 12275
Ganley Mtn 12902
Kelso Mtn 13164
Mt Edwards 13838
Argentine Pass 13207
Argentine Peak 13738
Mt Wilcox 13608
Otter Mtn 12766
Square Top Mtn 13794
Guanella Pass 11669
Mt Spalding 13842
Gray Wolf Mtn 13602
Sugarloaf Peak 12513
Alpine Peak 11552
Griffith Mtn 11569
248.1B
248.1L
248.2I
248.1C
248.1D
248.1E
248.2E
248.2F
248.2G
248.2J
248.2D
248.2K
248.1K
248.1A
243.2C
243.2B
243.3A
243.3B
243.3C
243.3D
243.3F
243.3G
724.1
Proposed Wetland Enhancement Area
Forest Road
County Road
Local Road
Main Drainage
Perennial Stream
Intermittent Stream
Ditch or Canal
Project Area Boundary
Private or Other Ownership
Arapaho National Forest
1:60,000
Miles
0 0.25 0.5 1
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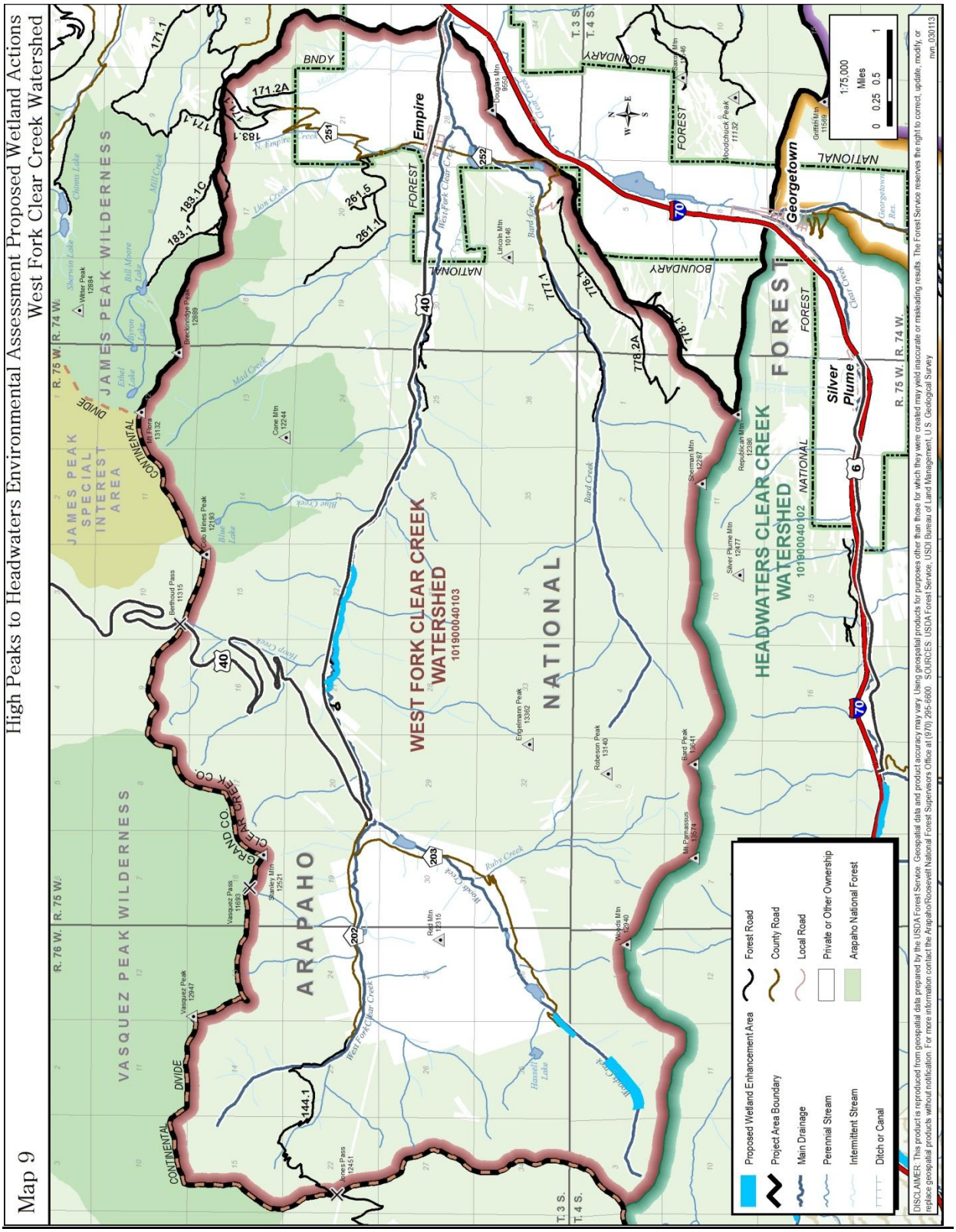
SOURCES: USDA Forest Service, USDI Bureau of Land Management, and U.S. Geological Survey
nvn_030113


High Peaks to Headwaters Environmental Assessment Proposed Wetland Actions
West Fork Clear Creek Watershed
Map 9
WEST FORK CLEAR CREEK WATERSHED
10190004010 3
HEADWATERS CLEAR CREEK WATERSHED
10190004010 2
ARAPAHO NATIONAL FOREST
JAMES PEAK WILDERNESS
VASQUEZ PEAK WILDERNESS
JAMES PEAK SPECIAL INTEREST AREA
Georgetown
Silver Plume
Empire
BNDY
CONTINENTAL DIVIDE
GRAND CO.
CLEAR CREEK CO.
Proposed Wetland Enhancement Area
Project Area Boundary
Main Drainage
Perennial Stream
Intermittent Stream
Ditch or Canal
Forest Road
County Road
Local Road
Private or Other Ownership
Arapaho National Forest
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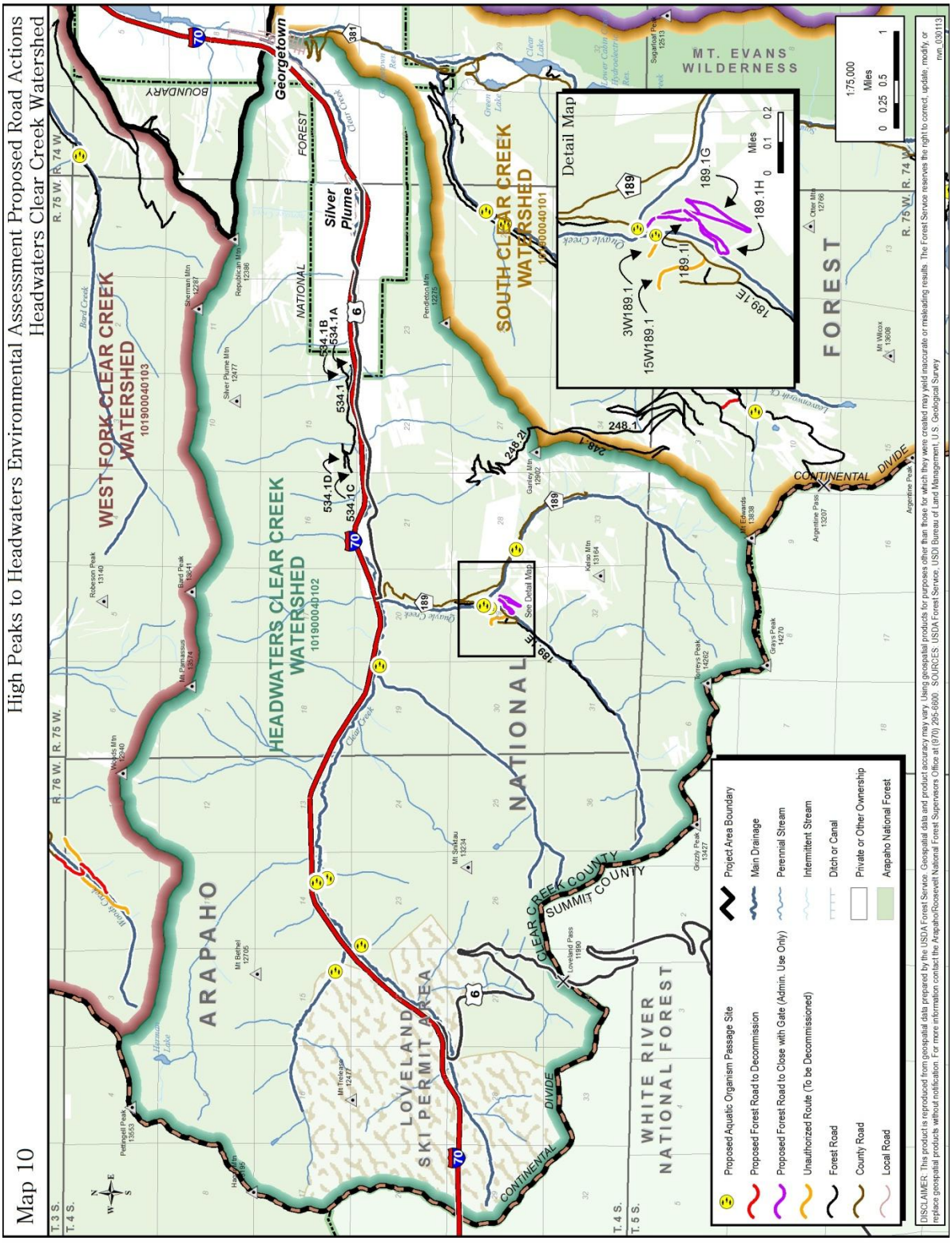
1:75,000
Miles
0 0.25 0.5 1
nvn_030113


Map 10
High Peaks to Headwaters Environmental Assessment Proposed Road Actions
Headwaters Clear Creek Watershed
WEST FORK CLEAR CREEK WATERSHED
10190040103
HEADWATERS CLEAR CREEK WATERSHED
10190004D102
SOUTH CLEAR CREEK WATERSHED
10190040101
ARAPAHO
LOVELAND SKI PERMIT AREA
ARAPAHO NATIONAL FOREST
WHITE RIVER NATIONAL FOREST
MT. EVANS WILDERNESS
CLEAR CREEK COUNTY
SUMMIT COUNTY
CONTINENTAL DIVIDE
Georgetown
Silver Plume
Detail Map
534.1
534.1A
534.1B
534.1C
534.1D
248.1
248.2
189
189.1
189.1E
189.1F
189.1G
189.1H
3W189.1
15W189.1
Proposed Aquatic Organism Passage Site
Proposed Forest Road to Decommission
Proposed Forest Road to Close with Gate (Admin. Use Only)
Unauthorized Route (To be Decommissioned)
Forest Road
County Road
Local Road
Project Area Boundary
Main Drainage
Perennial Stream
Intermittent Stream
Ditch or Canal
Private or Other Ownership
Arapaho National Forest
1:75,000
Miles
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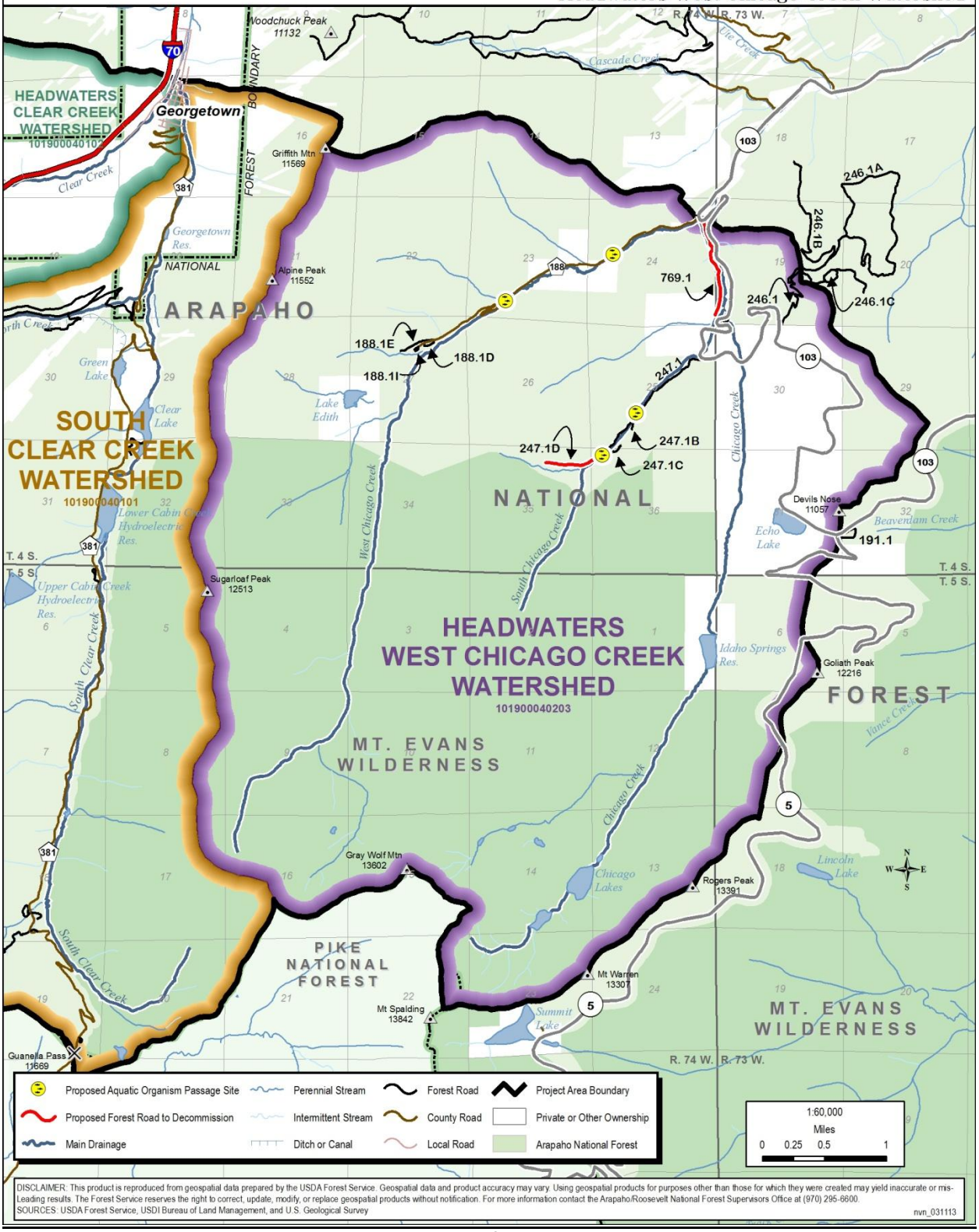
rvn 030113

Map 11 High Peaks to Headwaters Environmental Assessment Proposed Road Actions
Headwaters West Chicago Creek Watershed



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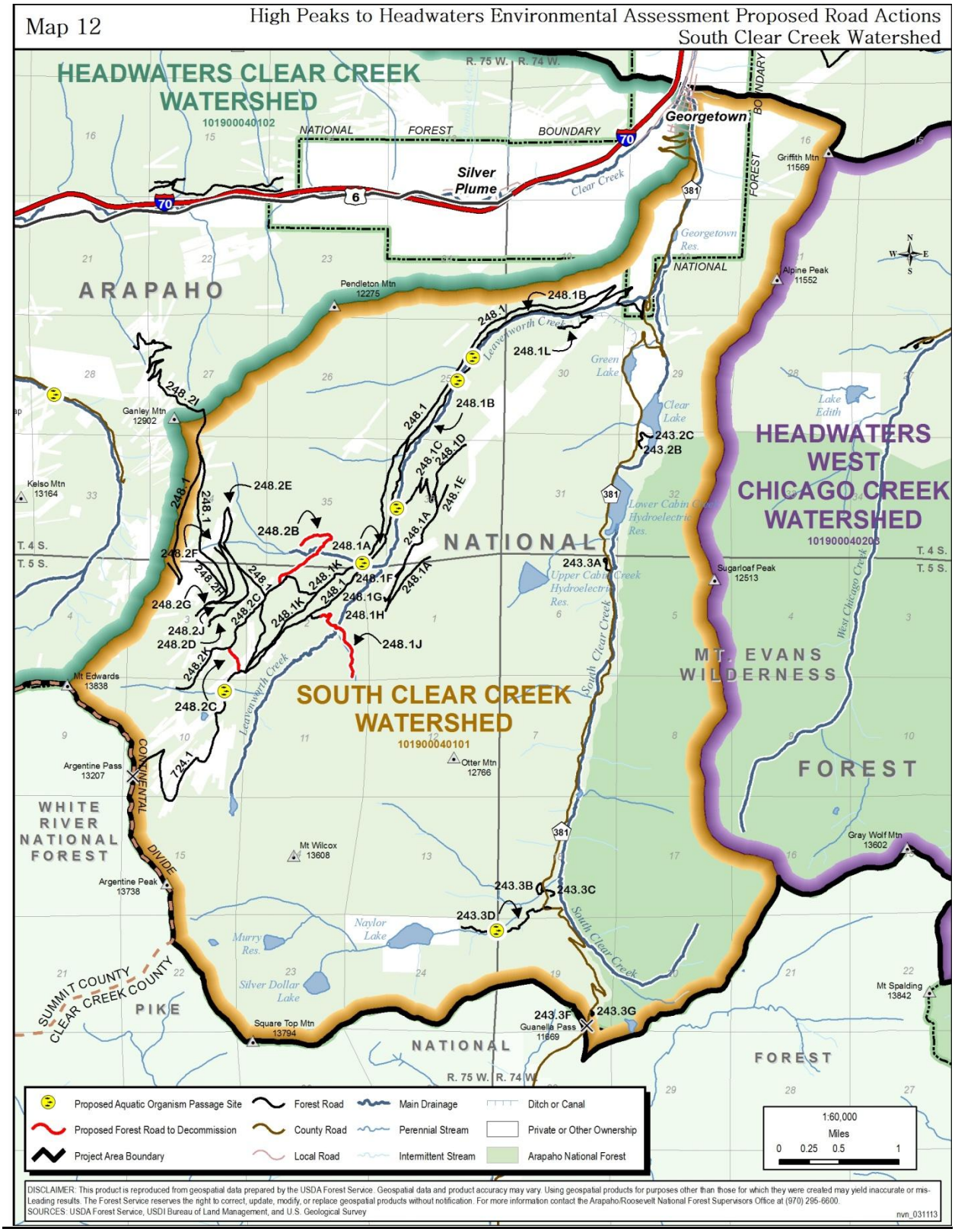
SOURCES: USDA Forest Service, USDI Bureau of Land Management, and U.S. Geological Survey
nvn_031113


Map 12
High Peaks to Headwaters Environmental Assessment Proposed Road Actions
South Clear Creek Watershed
HEADWATERS CLEAR CREEK WATERSHED
101900040102
HEADWATERS WEST CHICAGO CREEK WATERSHED
101900040203
SOUTH CLEAR CREEK WATERSHED
101900040101
ARAPAHO NATIONAL FOREST
MT. EVANS WILDERNESS
WHITE RIVER NATIONAL FOREST
Georgetown
Silver Plume
Pendleton Mtn 12275
Ganley Mtn 12902
Kelso Mtn 13164
Mt Edwards 13838
Argentine Pass 13207
Argentine Peak 13738
Mt Wilcox 13608
Otter Mtn 12766
Square Top Mtn 13794
Guanella Pass 11669
Griffith Mtn 11569
Alpine Peak 11552
Sugarloaf Peak 12513
Gray Wolf Mtn 13602
Mt Spalding 13842
248.1B
248.1L
248.2I
248.1
248.1C
248.1D
248.1E
248.2E
248.2B
248.1A
248.2F
248.1K
248.1F
248.1G
248.1H
248.1J
248.2G
248.2J
248.2D
248.2K
248.2C
724.1
243.2C
243.2B
243.3A
243.3B
243.3C
243.3D
243.3F
243.3G
Georgetown Res.
Lower Cabin Creek Hydroelectric Res.
Upper Cabin Creek Hydroelectric Res.
Clear Lake
Green Lake
Lake Edith
Naylor Lake
Murry Res.
Silver Dollar Lake
Leavenworth Creek
South Clear Creek
West Chicago Creek
Clear Creek
SUMMIT COUNTY
CLEAR CREEK COUNTY
PIKE
CONTINENTAL DIVIDE
NATIONAL FOREST BOUNDARY
T. 4 S.
T. 5 S.
R. 75 W.
R. 74 W.
Proposed Aquatic Organism Passage Site
Proposed Forest Road to Decommission
Project Area Boundary
Forest Road
County Road
Local Road
Main Drainage
Perennial Stream
Intermittent Stream
Ditch or Canal
Private or Other Ownership
Arapaho National Forest
1:60,000
Miles
0 0.25 0.5 1
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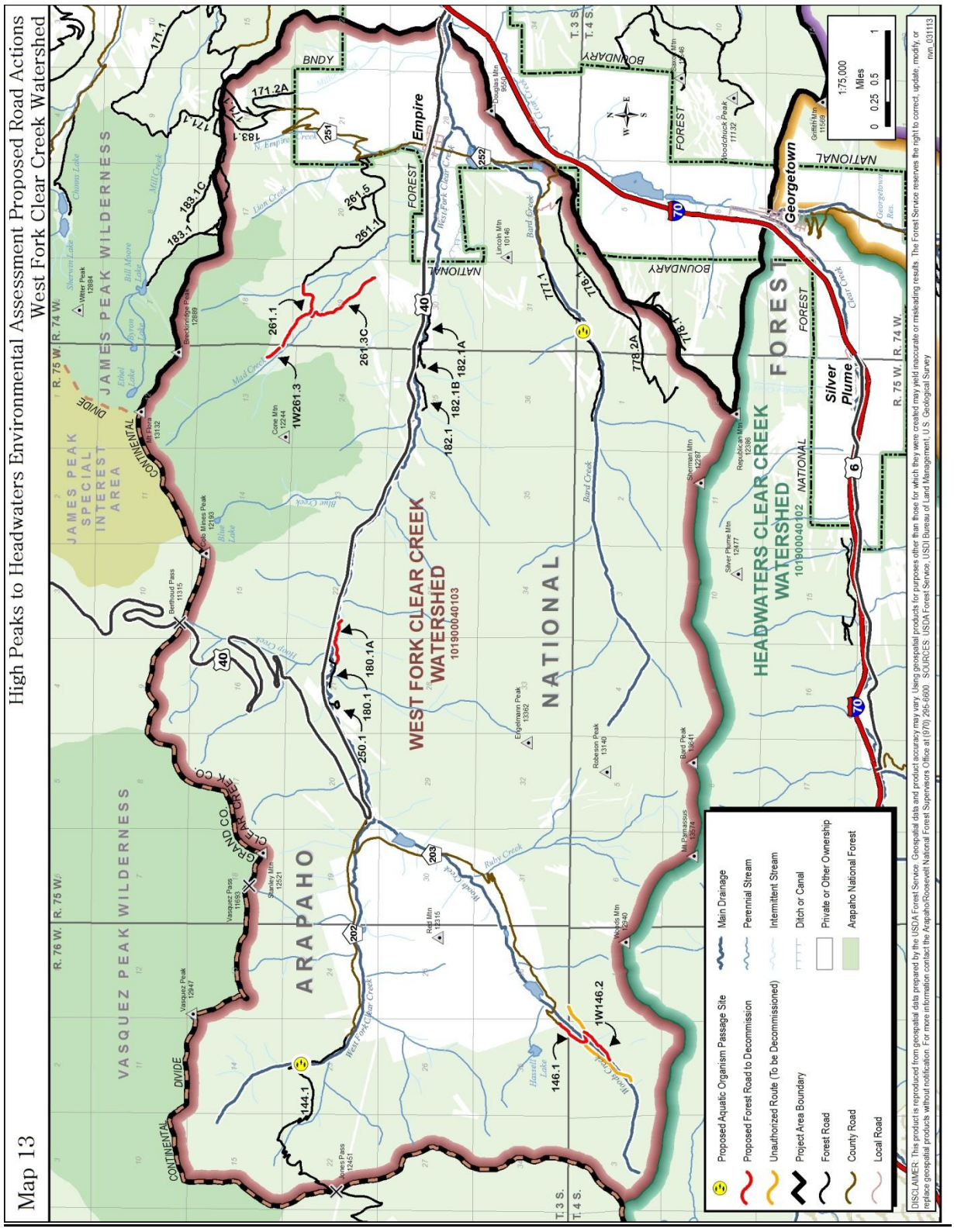
Map 13
High Peaks to Headwaters Environmental Assessment Proposed Road Actions
West Fork Clear Creek Watershed
WEST FORK CLEAR CREEK WATERSHED
1019000040103
HEADWATERS CLEAR CREEK WATERSHED
1019000040102
ARAPAHO NATIONAL FOREST
JAMES PEAK WILDERNESS
VASQUEZ PEAK WILDERNESS
JAMES PEAK SPECIAL INTEREST AREA
Georgetown
Silver Plume
Empire
Proposed Aquatic Organism Passage Site
Proposed Forest Road to Decommission
Unauthorized Route (To be Decommissioned)
Project Area Boundary
Forest Road
County Road
Local Road
Main Drainage
Perennial Stream
Intermittent Stream
Ditch or Canal
Private or Other Ownership
Arapaho National Forest
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