



**Bureau of Land Management**

Anchorage Field Office  
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**Environmental Assessment**  
Campbell Creek Stream Restoration  
Bureau of Land Management  
Anchorage Field Office  
AK-040-06-EA-029

**Location:**

N $\frac{1}{2}$  NW $\frac{1}{4}$  Sec. 2 and the N $\frac{1}{2}$  NE $\frac{1}{4}$  Sec. 3, T. 12 S., R. 3 W., Seward Meridian

**Prepared By:**

Carl Persson  
Geologist  
August 29, 2006

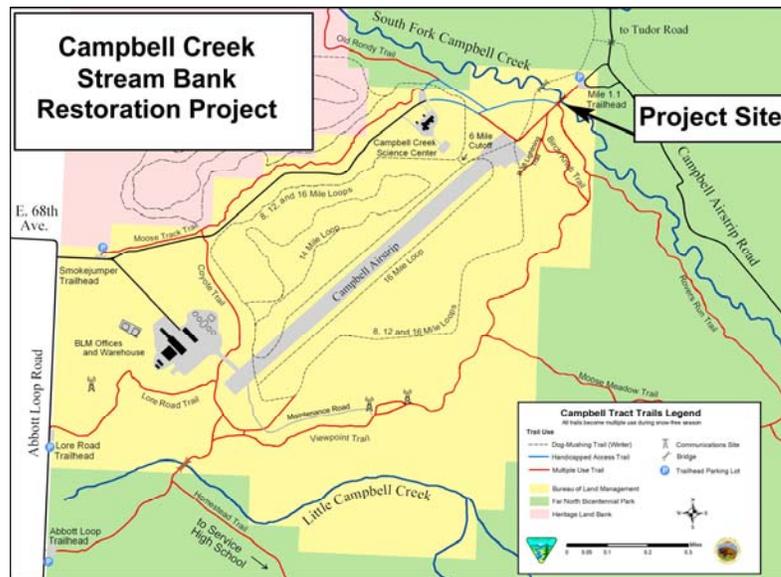
**I. INTRODUCTION**

The South Fork of Campbell Creek flows east to west on the northern boundary of the Campbell Tract, the Bureau of Land Management’s Administrative site in the City of Anchorage. The left bank of the creek is experiencing varying degrees of erosion on its course through the Tract. In an effort to reduce and control incidents of erosion, the Bureau of Land Management is proposing to reconstruct the bank in one area of erosion, vegetate another area of erosion and provide visitor access steps to the bank of the creek in two areas of potential erosion.

**A. Purpose and Need for the Proposed Action**

Campbell Creek is a short clear-water stream typical of Southcentral Alaska that drains from the Chugach Mountains through Anchorage to Cook Inlet. Approximately ¼ mile of this stream meanders through the northern portion of the 730 acre Campbell Tract (CT) which is administered by the Anchorage Field Office (AFO) of the Bureau of Land Management (BLM).

Like most streams in urban areas, Campbell Creek attracts intense human use. That use is predicted to increase steadily over time. There are two popular access points for the creek on CT. The Campbell Airstrip Parking lot is approximately ¼ mile upstream from the Campbell Creek Science Center (CCSC) parking lot. See Map 1, below. A web of trails between these two points was established over the years. Since completion of the CCSC, the trail system has seen as many as 25,000 visitors annually.



**Map 1**

In the summer of 2005 the various trails in the area were redesigned to include one main trail and controlled access points to the creek. The resulting main trail was formally named Salmon Run Trail. Approximately one-third of the 1,750-foot trail, which parallels Campbell

Creek, was re-routed away from the creek to avoid eroding sections of the creek bank. The trail was covered with E1 gravel and more than 100 spruce trees of varying sizes were planted along the trail to discourage spur trails to the creek bank. Two sites along the trail were identified for direct access to the creek bank and the creek. To enhance user trail experiences, two other sites along the creek were also identified for bank restoration and erosion control.

**B. Conformance With Land Use Plan**

The proposed action is in conformance with the Management Plan for Public Use and Resource Management on the Bureau of Land Management Campbell Tract Facility, signed June 1988, and the Campbell Creek Environmental Education Center Development Plan and Environmental Assessment, signed February 1993. Additionally, the Proposed Action has been reviewed and found to be in compliance with Recreation Objective (R-4) of the Southcentral Management Framework Plan (MFP), (March 1980):

“Provide for the needs of visitor’s seeking experience through sight seeing, photography, observation and/or interpretation.”

**C. Relationship to Statutes, Regulations, Policies, Plans or Other Environmental Analyses**

Environmental Assessment AK-040-04-EA-040 analyzed the environmental consequences of defining the trail system in the vicinity.

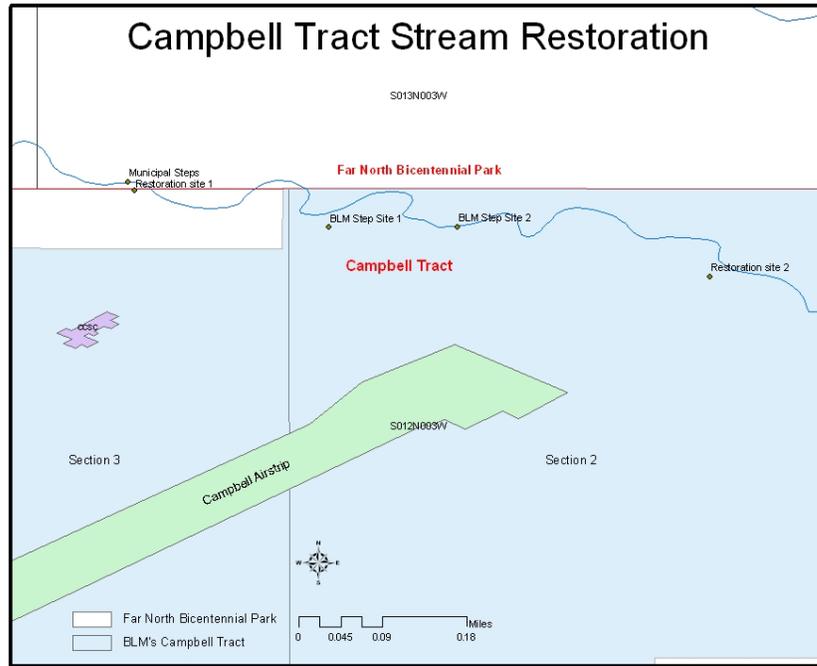
The in-stream structure proposed at stream restoration site #2 requires a fish habitat permit from the Alaska Department of Natural Resources, a determination from the Army Corps of Engineers that it qualifies under the national permit for placing fill within a stream, and a determination from the state that the project complies with the Alaska Coastal Zone Management Plan. Applications have been made to all three entities for approval of this project.

**II. PROPOSED ACTION AND ALTERNATIVES**

**A. Proposed Action**

To reduce and control the incidents of erosion along Campbell Creek the BLM proposes to:

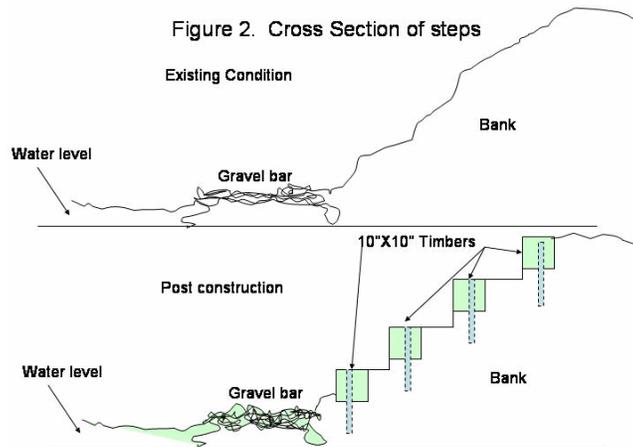
1. provide visitor access steps to the bank of the creek in two areas of potential erosion (BLM Step Sites 1 and 2);
2. restore a portion of the bank in one area of erosion (Restoration Site 2); and
3. vegetate another area of erosion (Restoration Site 1); *See* Map 2 below.



**Map 2**

**Access Steps**

Two sites (BLM Step Sites 1 and 2) have been selected for creek access from the cut banks to the waters’ edge. These were selected because they are already being used by the CCSC and local fishermen. They are located along safe reaches of the stream (shallow with few downstream hazards), and they are good locations for streamside educational programs. They will allow the public access to the water’s edge without trampling vegetation.



**Figure 2**

In order to provide access down to the creek from the elevated bank 4 foot 10" X 10" (BLM Step Site 2 – Photo 1 below) EPA approved landscape timbers will be set into the bank and anchored by 2 ft pieces of 3/8" steel rebar to form steps, *see* above. Wood chips will be placed on the steps to further reduce erosion. Steel cables may also be used to help anchor the timbers into place, *see* Photo 2 below for an example of cabling.



**Photo 1**



**Photo 2**

BLM Step Site 1 is in need of approximately two to three steps and BLM Step Site 2 is need of four or five steps.

## **Stream Bank Restoration**

### **Introduction**

There are two areas in the creek where human impact and a fallen tree have caused erosion deep into the cut bank (see Photos 3 & 4). For Restoration Site 2, the ford site, the creek bank cannot be restored without placing structures in the stream.



**Photo 3, Restoration Site 1**



**Photo 4, Restoration Site 2**

The use of coir logs with brush/hedge brush layering has been used with exceptional results on the Kenai Peninsula and Mat-Su region. The technique disperses energy acting upon stream-banks from currents, provides an aesthetically pleasing barrier to shore fill material, and provides fish habitat and protection. As a barrier to shore fill material, the slow decomposition rate (5 years) of the coir log provides support for erodible material sufficient to establish long-term cohesive properties, i.e. vegetative root mass and soil compaction.

Restoration Site 2 is located approximately 40 ft. upstream of the pedestrian bridge at the northern end of the Campbell Tract runway (Map 1). Restoration and rehabilitation efforts will be performed on approximately 30-35 ft of compacted and eroded stream bank at this site (Photo 5). Twenty feet of stream bank will be restored to resemble a reach of stream bank (reference reach) that more closely resembles natural conditions (Photo 5), while an additional 12 ft of stream bank will be rehabilitated to provide pedestrian access to the gravel bar and the water's edge. Providing an area of easy access to the water's edge will presumably reduce traffic across the restored section of stream bank to promote vegetative growth and overall stabilization.



**Photo 5, approximate fill area**

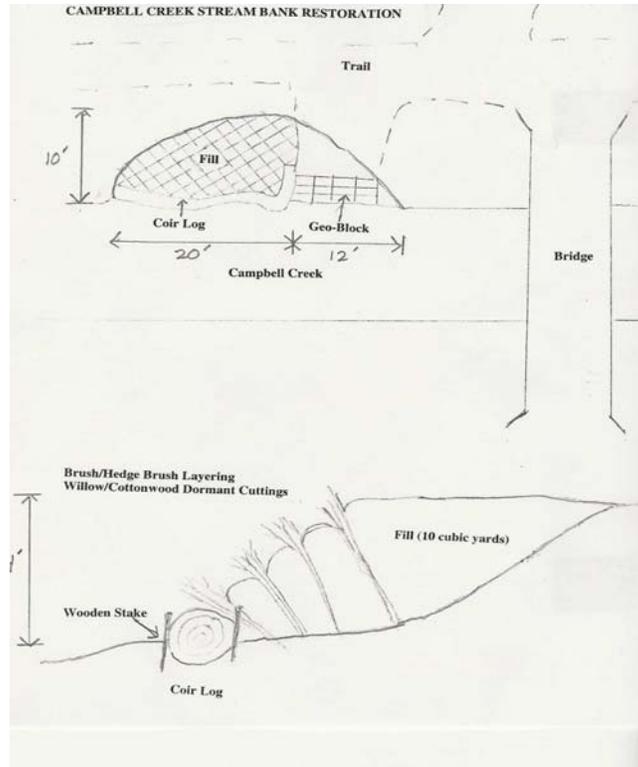


Figure 3, Plan and side view of proposed action at Restoration Site 2.

### Stream bank Design

The restoration reach will be made to mimic the physical and functional characteristics of the reference reach. This will be accomplished by building-up the stream bank to a height of approximately 5 feet. Initially silt fencing will be installed in the project area. A coir log, constructed of biodegradable rolled coconut fiber, will be used to shore fill material and prevent erosion during high water. This log will consist of a 20 ft section of 1 ft diameter log laid parallel to the stream channel at the trailing edge of the designed floodplain. This 20 ft piece of the coir log will be butted up against the stream bank at the upstream end of the project area, and then wrap approximately 5 feet around the downstream end.

A small percentage on the fill will be placed within the mean high water portion of the stream. The work will be timed to occur during a period of low water when none of the reconstructed bank structure will extend into the creek and spawning salmon will not be affected. The intention is that the coir log will decompose over time, allowing the root structure of the vegetation to establish itself anchoring the stream bank and helping to prevent erosion during high water events.

The in stream work is scheduled to occur June 21-22, 2006. Public access will be restricted to the restored riparian section using fencing until the development of mature riparian stands. A 6-foot fence with signage will

prevent the public from trampling the area and inhibit moose browsing for at least two years to give the vegetation a good chance to become established. An interpretive sign explaining the project and the importance of healthy riparian areas to the public may also be placed at the site.

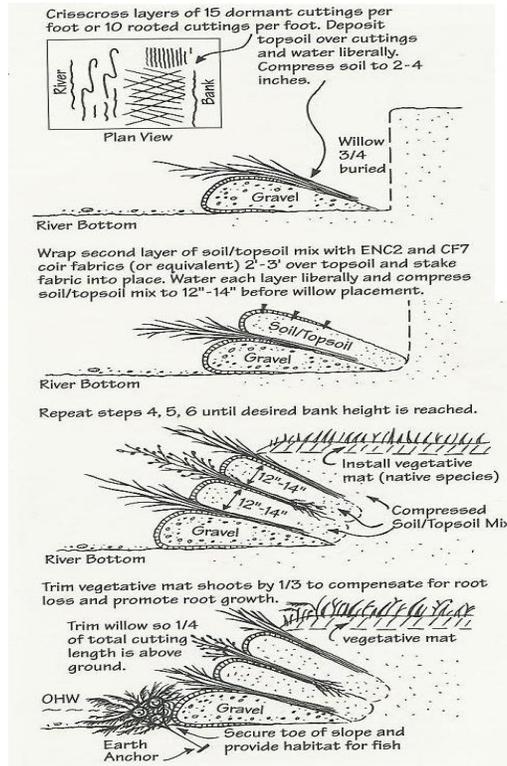


Figure 4, Technique to restore soil column. (State of Alaska, 1998)

## Soils

Material will be backfilled and layered to best represent the soil column of the reference reach. The soil profile of the restoration reach will consist of a six inch top layer of 70/30 percent topsoil/sand atop three 14 inch layers of 40/30/30 percent gravel/sand/topsoil with a six inch bottom layer of 100% gravel/cobbles. Each layer will be wrapped with biodegradable coir fabric (Figure 4) to stabilize the soil layers until natural soil cohesion properties take affect, primarily vegetation root growth and soil compaction.

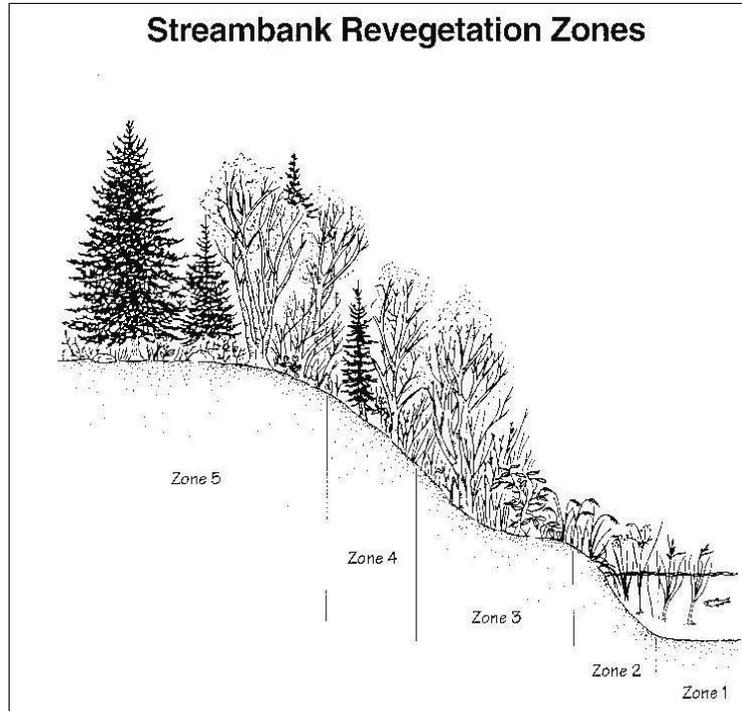


Figure 5, Moisture regime zones for re-vegetation of disturbed areas. (State of Alaska, 1998)

### Re-vegetation

Riparian vegetation native to Alaska will be planted/seeded throughout the project site. Re-vegetation techniques using moisture regime zones will assist in determining proper vegetation type and planting (Figure 5). The primary vegetation used will be dormant cuttings of willow and cottonwood. The result of planting/seeded operations is to closely reflect conditions at the reference site but immediate soil stabilization requirements may necessitate deviations, such as a greater concentration of annual grasses or other vegetation.

The coir log and fill placement will not occur within moisture regime zones 1 and 2 but will begin at the transition between zones 3 and 4. Sandbar willow (*Salix interior*) will be planted in zone 3 (across the coir log) to mimic the reference reach and reduce high water forces acting upon the restored stream bank.

Restoration of riparian vegetation is a key component of a successful restoration project. The root structures of riparian vegetation bind soil particles together, helping to minimize erosion and increase stream bank stability. Sandbar willow (*Salix interior*) will be planted in zone 3.

Within zone 4, cottonwood (*Populus sp.*), Dwarf Birch (*Betula nana*), prickly rose (*Rosa acicularis*) and species of tall grasses will be

planted/seeded. Zone 5 (optional) will be planted with paper birch (*Betula papyrifera*), black spruce (*P. mariana*), and/or quaking aspen (*Populus tremuloides*).

Restoration Site 1 would be restored by burying several approximately four-foot sections of willow bundles into the soil. The root structures of the resulting willow growth should anchor the bank and prevent future erosion.

### **Monitoring/Mitigation**

Four stream cross-sections (Figure 6) will be used to monitor affects from restoration efforts. Each cross-section will be surveyed once before restoration efforts begin and annually (mid-June) thereafter to identify stream channel fill/scour characteristics and excessive downstream stream bank erosion. Survey results will be inputted to WinXS-Pro, cross-section computer model, for trend analysis. Excess erosion trends will be determined using empirical knowledge of the fluvial geomorphic system. Mitigation measures to excess erosion may consist of stream bank reinforcement, in-stream structures to reduce flow velocities. Primary restoration objectives for this project include improving bank and floodplain stability by increasing riparian vegetation cover and root mass. A monitoring study should include objectives to measure the effectiveness of riparian vegetation restoration. A monitoring study should answer the following questions: (1) did planted vegetation survive at an acceptable rate? (2) did the restoration practice increase the cover of riparian vegetation?



Figure 6, Cross-sections (yellow) to be surveyed for monitoring of stream channel response to restoration action.

## Literature Cited

State of Alaska TR 98-3, 1998. Stream bank re-vegetation and protection, a guide for Alaska; revised 2005.

### **B. No Action Alternative**

The only alternative is the no action alternative. Under this alternative the Bureau would not do the proposed Campbell Creek restoration or hardened creek access points.

## **III. AFFECTED ENVIRONMENT**

### **A. Critical Elements**

There would be no impacts to the following critical elements; ACECs, environmental justice, farmlands, floodplains, Native American religious concerns, T & E species, air quality, wild & scenic rivers, subsistence, or wilderness.

#### **1. Cultural**

The Campbell Garrison (AHRS ANC-01384) is situated within the Campbell Tract. The garrison and airstrip were authorized in 1942 as one of four 5000 foot long satellite airfields associated with Fort Richardson. In 2004, the Campbell Garrison was determined eligible to be on the National Register of Historic Places.

The first soldiers to arrive at Campbell Garrison found that a scarcity of Quonset huts forced them to live initially in five man pyramantle tents. The soldiers soon built more permanent huts of sod in an area off the northeast end of the gravel airstrip. Today there are few visible signs of this camp. The area identified as its location shows some slight depressions that may be the remains of these sod huts. The area's surface has been disturbed by the building of the airstrip and taxiways. Some foxholes have been dug into the disturbed areas and a short ditch occurs in the general area but does not appear to lead to any structural remains.

Sometime after December 1942, a more permanent and comfortable Quonset hut camp was constructed along Campbell Creek. The Corps of Engineers as-built map (1944) of the garrison show Quonset huts used as barracks, an officers' quarters, a recreation hall, a mess, an aid station and several storage huts. The latrine and the power and pump house were the only structures that were not Quonset huts. At the close of the war, the Army removed all the Quonset huts at Campbell Garrison. The concrete

foundations of the latrine and the power and pump house are the only observable remains of that camp today.

The airstrip and taxiways are essentially the same as when they were constructed in 1942 despite over 60 years of use by the military, fire support, and more recently by BLM to support field operations for the Cadastral survey, the Anchorage Field Office, and the CCSC. The airstrip has received regular maintenance to keep it operable for aircraft over the years.

## 2. **Wetlands/Riparian Zones**

Campbell Creek has a relatively healthy and highly functioning wetlands/riparian zone. However, increasing use of the riparian zone by educational activities at the CCSC, fishermen and the general public, has created significant impacts. Extensive social trail development along the stream banks has damaged riparian plant species and created additional erosion into Campbell Creek.

Two sections of damaged stream-bank have been identified. The larger section of damaged stream-bank, Restoration Site 2, is a former creek ford originally used by the military to get tanks and other motorized equipment across the creek. A thirty-five foot section of stream-bank is collapsed and heavily eroded. Extensive traffic by recreational users of the CT has not allowed any vegetation to re-establish itself. A second section of collapsed stream-bank, Restoration Site 1, is located approximately ½ miles downstream where it appears that a large cottonwood tree once stood. A well trampled ramp approximately 5 feet wide leads down to the creek. The constant foot traffic again has not allowed vegetation to re-establish itself.

## 3. **Water Quality**

South Fork Campbell Creek is not an impaired water body (Clean Water Act Section 303(d)(1)(C) and the U.S. Environmental Protection Agency (EPA) implementing regulations (40 CFR Part 130)) though nearby stream (Little Campbell Creek and main stem Campbell Creek) are impaired for fecal coliform. Considering its location within urban Anchorage, Alaska, the water quality of South Fork Campbell Creek is considered good. Water quality sampling has been performed by the US Geological Survey (USGS) from 1948 to 2001.

## 4. **Invasive, Non-native Species**

There are 38 species of non-native plants known to exist in Anchorage that are listed in the Alaska Exotic Plants Information Clearing House list. Several of these species are likely to occur on the CT relocation areas. These include Buckhorn Plantain *Plantago sp.*, Yellow Toadflax *Linaria vulgaris*, Blue Burr

Stickweed *Lappula echinata*, Annual Bluegrass *Poa annua*, Leafy Spurge *Euphorbia esula*, Tufted Vetch *Vicia cracca* and possibly other species. These species are generally found in disturbed areas and often colonize areas around roads and trails.

The Amber-marked Birch Leaf Miner *Profenusa thomsoni*, a small insect introduced from Europe, in the Anchorage area since the mid 1990's, has infected many of the birch trees in the entire Anchorage Bowl, including the CT. It causes defoliation of some trees and can kill trees that are weak or otherwise stressed.

5. **Waste, Hazardous and Solid**

There are no known hazardous or solid wastes sites within the affected area.

**B. Land Status**

The proposed project site is located adjacent to Campbell Creek Science Center; on the 730 acre BLM administered Campbell Tract Facility, within Sec. 2, T.12 N., R.3 W., Seward Meridian. Located in east Anchorage, the general site area has road access via Abbott Loop Road. Some of the sites can only be accessed via foot or four-wheeler from the Salmon Loop foot-trail. The old stream ford, Restoration Site 2, site can be accessed by dirt/gravel road. The Campbell Tract is bordered by residential neighborhoods to the west and Municipality of Anchorage managed Bicentennial Park to the east south and north.

**C. Vegetation**

The vegetation in the area is typical of the coastal forest in south-central Alaska. The riparian zone is dominated by large cottonwood trees. The overstory is a mix of white spruce and deciduous trees. Deciduous trees include paper birch, black cottonwood, and aspen. In some areas there is a mid canopy of green alder. Blue joint grass, high bush cranberry, wild rose, and various species of forbs occur in the understory. The forest floor is carpeted with dwarf dogwood, and other dwarf shrubs common in south-central Alaska plant communities.

**D. Wildlife**

Most of the species of wildlife that occur in south-central Alaska can be found on the Campbell Tract. These include large mammals like moose, brown bears, black bears, coyotes, and lynx. The most common furbearers are mink and ermine, and beavers occur upstream and downstream of the site. There are many small mammals such as snowshoe hare, redback voles, other rodents, and shrews within the general project area.

The common nesting migrant birds are slate-colored junco, golden-crowned sparrows, Myrtle warbler, orange crowned warbler, Swainson's thrush, varied thrush, ruby-crowned kinglet, and robin. Resident song birds include boreal and blackcapped chickadees, brown creepers, red-breasted nuthatches, common raven, black-billed magpie, American dipper, and redpolls. The most common raptors are great horned owls, boreal owls, and goshawks.

**E. Recreation**

The Campbell Tract is designated for non-motorized recreational use. Recreation management for the Campbell Tract is directed by the June 1988 "A Management Plan for Public Use and Resource Management on the Bureau of Land Management Campbell Tract Facility. There are approximately 11 miles of developed recreation trails. Some of these trails link to an area wide trail system on adjoining municipal lands. The proximity of Campbell Tract to urban Anchorage places high demands on the site from a variety of users. Most recreation occurs on trails that were developed on old tank roads and airplane taxiways.

Access for recreation use on Campbell Tract is gained from two formal trailheads and five trails entering from surrounding parks and neighborhoods. Established trailheads with parking include the Smoke Jumper Trailhead located at the main Anchorage Field Office complex entrance and the Campbell Airstrip Trailhead located at mile 1.1 on Campbell Airstrip Road. Weekday daytime trail access is also available from the Campbell Creek Science Center (CCSC). Trail maintenance, signing, and event permitting is a cooperative effort between the BLM, MOA Parks and Recreation Division, and various volunteers and user groups.

Recreation users are primarily residents of Anchorage and surrounding communities. Estimated 2004 visitation was 69,000 user days. Users are typically found walking, running, biking, skiing, snowshoeing, dog-mushing and horseback riding. Many users live close to the Campbell Tract and use the area regularly for exercise, often with their family dogs. Regular competitive events, often starting on adjacent non-BLM lands traverse the Campbell Tract including the Nordic Ski Club's Tour of Anchorage, the start of the Iditarod Sled Dog Race and the World Sled Dog Championship Races.

The site of the proposed action is located adjacent to the Campbell Airstrip Trailhead which averages approximately 25,000 visits annually. This trailhead is the main entrance for users accessing the Salmon Run Trail, a streamside multi-use trail that follows the south side of Campbell Creek from the mushing bridge downstream to the terminus at Old Rondy Trail. Salmon Run trail is heavily used by CCSC educational groups and clients including the summer-use outdoor education special recreation permittee

Trailside Discovery Camp, for riparian and stream study activities. Other recreation users also utilize Salmon Run Trail including mountain bikers, walkers, fisherman and nature enthusiasts. Access to the actual stream can be gained from five informal trail spurs that depart from Salmon Run Trail. One element of the proposed action installs a short run of low profile wooden steps at the two most heavily used spurs to channel user traffic and reduce stream bank impacts.

The second element of the proposed action installs stream bank restoration materials at two streamside sites, one adjacent to the downstream end of Salmon Run Trail and the other immediately upstream of the Campbell Airstrip bridge, both on the south side of the creek.

**F. Fisheries**

Campbell Creek supports populations of Chinook and coho salmon, rainbow trout, Dolly Varden, and slimy sculpin. Chinook salmon migrate up the creek and spawn from late-June through July and coho salmon from late-August through October. The creek is stocked annually with rainbow trout by the Alaska Department of Fish & Game. This section of creek is open for catch-and-release only rainbow trout fishing and is a popular fishery during the summer months. The salmon are an important food source for the bears when they are present, particularly the brown bears.

**G. Soils**

Soil found at the project site is of the Kashwitna-Kichatna complex. This soil is coarse-silty loess over gravelly outwash material and is found on slope ranging from 0-3 percent. This soil is considered well drained with an available water capacity of 7.3 inches. Typical means of erosion is by wind or the creek.

**H. Visual Resources**

Campbell Tract is managed as an administrative site supporting various BLM Anchorage Field Office and State Office functions. The recreation program is secondary to the administrative function. The quality of visual resources on CT are important both to the operation of the administrative site and to the recreation and education programs conducted on the tract. Administratively, the quality of visual resources are appreciated by the many employees and civilians who work at, or visit CT, and send a greater message to the public about the quality of BLM's management of public lands statewide. Recreation-wise, CT's visual resources are appreciated by the many thousands of year-round trails and science center users who recognize the natural landscape as an integral part of the CT experience. The visual landscape of CT is highly visible to observers hiking and living in the mountains located east of the tract, as well as from the air as countless individuals fly in and out of Anchorage on commercial and private aircraft.

Although greatly impacted and modified from years of military and agency use, the visual resources on CT appear to the casual observer as relatively natural and wild looking from most observation points along the recreational trail system and near the Campbell Creek Science Center. Much of the tract is vegetated with a mix of second-growth species that have naturally developed on soils disturbed by the initial military airstrip and taxiway construction and subsequent administrative uses. Browsing of aspen, willow, birch, and cottonwood by moose have prevented these species from full development on disturbed sites, resulting in the dominance of alder and white spruce in these areas.

The area of the river access portions of the proposed action are surrounded by a closed canopy forest, so there are few scenic vistas. Heavy growth of alder, cottonwood, birch, and aspen dominate the canopy and common boreal forest riparian species dominate the forest floor and under story. The steps may be visible from points along Salmon Run Trail, and from low-use social trails on the north side of Campbell Creek. Fisherman traversing Campbell Creek will view these steps.

The stream restoration elements of the proposed action are located adjacent to the creek at the southern terminus of Salmon Run Trail and at the eroded “beach” site immediately above the Campbell Airstrip bridge. The restoration site adjacent to Salmon Run Trail is visible to users utilizing the spur trail at Pole Point, but cannot be seen from Salmon Run Trail proper. The restoration site near the Campbell Creek bridge is highly visible to users crossing the Campbell Creek bridge.

#### **IV. ENVIRONMENTAL CONSEQUENCES**

##### **A. Impacts of the Proposed Action**

##### **1. Vegetation**

Trees and brush in the immediate vicinity of the stream restoration would be re-established. The root structure for the resulting vegetation will help to anchor the stream bank and help to prevent future erosion. The vegetation will also eventually help provide additional riparian habitat for wildlife.

Focusing creek access to two areas (compared to uncontrolled access in many areas) and reducing social trailing is likely to decrease the amount of vegetation trampling that currently exists.

##### **2. Wildlife**

The efforts to decrease stream bank erosion would have positive impacts on salmon and other fish populations in Campbell Creek.

In 2005, the Alaska Department of Fish and Game (ADF&G) presented data showing that three radio-collared brown bears are regular residents along the South Fork of Campbell Creek, which runs through Campbell Tract. Data in 2006 shows that six brown bears, including 4 sows with cubs and two adult male bears, use the area of Campbell Creek within the proposed action. Use of the creek by brown bears is especially high during salmon runs, but telemetry data shows the degree of residency is higher than was previously thought.

Guided school groups have used social trails along the creek since 1996 along with anglers, mountain bikers, and other members of the public. The creation of Salmon Loop trail and the proposed access points will promote public use at the South Fork of Campbell Creek.

Initially, there was a network of social trailing leading into many parts of the riparian area, including tall grass habitat with limited visibility. Additionally, there was uncontrolled access along many points of the creek. This situation had demonstrated negative impacts to the vegetation and stream bank erosion, and was corrected for these reasons.

The potential for encounters between brown bears and users of the Salmon loop Trail and the proposed access points may be high. The creation of the trail and the access point along the creek may increase the potential for encounters between people and brown bears, and increase the potential for injury to people or the killing of bears for defense of life and property.

The stream bank restoration is not expected to significantly increase the numbers of fish present, so should not affect local bear populations.

The noise and activity associated with the construction of the stream restoration will tend to cause some wildlife species to temporarily avoid the site and relocate to other areas.

**3. Invasive, Non-Native Species:**

Invasive, non-native plant species are known to occur near the project site and throughout the Anchorage Bowl. As topsoil added and revegetation occurs there will be some potential to introduce invasive plant species. Invasive species would likely colonize areas along disturbed ground. Equipment brought on site would have a potential to bring in seeds from invasive or undesirable plant species.

**4. Wastes, Hazardous/Solid:**

Some heavy equipment use will be necessary to reconstruct the stream bank at the stream ford site, Restoration Site 2. There will be a small potential for oil spills into or near Campbell Creek from fuel spills, hydraulic line leaks/breaks, or other mechanical breakdown of the

machinery. Additionally, treated timbers will be used to construct the steps down to the creek. There is some potential for timbers to leach preservative chemicals into the surrounding soil and into the creek

5. **Water Quality**

Restoration efforts will do very little to improve the water quality of South Fork Campbell Creek. Failed restoration efforts have the potential to increase sedimentation and increase turbidity if fill material is released into the aquatic system. In the event restoration efforts fail, impacts may be substantial initially but will quickly dissipate depending on the amount of release and the timeliness of remediation efforts.

6. **Soils**

Increased sedimentation and turbidity may result from the loss of soil from the project site by erosional forces.

7. **Subsistence**

No change in Federal Subsistence Management Program authority or implementation would occur from the proposed action. The proposed action will not significantly restrict subsistence uses, decrease the abundance of subsistence resources, alter the distribution of resources, or limit subsistence user access from currently existing conditions.

8. **Recreation**

The hardened access points described in the proposed action will not result in significant impacts to the user recreation experience on Campbell Tract. The steps are low profile and will blend into the already busy woods environment. An increase in public use of the stream access points may result from the hardening of the sites as users recognize and are drawn to the more formal improvements along the Salmon Run Trail. Stream access patterns by CCSC and Trailside Discovery clients are not expected to change as the same existing non-hardened stream access points are currently being used.

The creek restoration site at the downstream end of Salmon Run Trail will have no significant effect on recreation. The restoration site immediately upstream from the Campbell Airstrip bridge may impact current use patterns by compressing the area available for stream access near the bridge. The restoration site is currently used by families and dog walkers for access to the water, a use that has necessitated this restoration project. These users will be more limited in their access ability to the creek at this location by the restoration work and protective fences. This may result in users seeking alternative access to the water.

A few recreational users to the area will be very temporarily exposed to noise and dust during the bank reconstruction at the bridge site. The

normally quiet streamside area would be noisier than usual due to equipment use. Recreation opportunities will be enhanced by these actions by providing a higher quality experience through a healthier stream system than presently exists.

**9. Fisheries**

Creek access point (BLM Step Site 1) is a long glide with optimal spawning depth and current speed that is heavily used by Chinook salmon for spawning and is an extremely unique spawning habitat feature located within CCSC managed-lands. The same qualities that make this spawning area attractive to salmon also make it appealing for an access point for students and recreationists. Creek side human activities could interrupt and displace actively spawning salmon.

Trampling of redds during fishing and recreational activities has a potential to cause high mortality of salmonids. A study of angler wading caused high mortality (43%-96%) of alevins (very young salmon that remain in the gravel) with only one or two passes per day. The extent or cumulative effects of this type of disturbance are not known (Roberts and White 1992). Conservation recommendations would include promoting student education and awareness of redd trampling during spawning and while eggs and alevins (July - April) are present in the stream substrate.

However, no students or instructors with CCSC or Trailside Discovery will be allowed to cross the creek during the period of time that salmon are spawning.

**10. Visual Resources**

Impacts to visual resources should be positive upon implementation of both elements of the proposed action. The hardened stream access points should result in less stream bank erosion as user traffic is funneled into a more defined and hardened traffic corridor. The wood steps are low profile and should blend in to the existing natural scenery.

The stream bank restoration actions will also provide a positive impact of visual resources by repairing the eroded stream sites to a more natural function and appearance. The site adjacent to the Campbell Airstrip bridge will result in the greatest improvement to the visual landscape due to the size of the currently eroded site and the proximity to a busy trail.

**B. Impacts of the No Action Alternative**

The principal impact of not authorizing the proposed stream restoration is there would be no stream restoration occurring. Vegetation along the stream banks would continue to be trampled and damaged. Collapsed stream banks would continue to erode sediment into Campbell Creek.

**C. Cumulative Impacts**

There would be no known negative cumulative impacts of the stream restoration to local resources. Ongoing stream restoration will have some positive cumulative impacts to the riparian environment by decreasing bank erosion of sediment into the creek.

**D. Mitigation Measures**

BLM will use EPA approved landscaping timbers; pressure treated Copper-Azole type B (CA-B) for example, to prevent the potential leaching of harmful chemicals into the creek.

Stipulations will require the crew to take pro-active measures to minimize impact to Campbell Creek from any accidental release of oil or hazardous substances from machinery operated at the creek. Measures will include having appropriate spill response materials on-site, establishing a containment perimeter around the work site, and/or placing sorbent boom immediately downstream/across the creek to prevent any spilled oil from spreading.

No students or instructors with CCSC or Trailside Discovery will be allowed to cross the creek during the period of time that salmon are spawning.

Changes in stream access recreation use patterns adjacent to the stream restoration sites should be monitored for any increase in social trail occurrence as users seek alternative routes to access the stream. Newly established social trails should be signed, closed and re-vegetated immediately upon discovery.

**V. CONSULTATION AND COORDINATION****List of Preparers**

Carl Persson- BLM Geologist, Lead Preparer

Jeff Denton- BLM Subsistence Coordinator

Bruce Seppi- BLM Threatened & Endangered Species Coordinator

Donna Redding- BLM Archeologist

Doug Ballou- BLM Recreation

Lee Koss- BLM Riparian Program Lead

Holly Kent- Director of the Anchorage Waterways Council

Larry Beck – BLM Environmental Protection Specialist