# *Russian River Landscape Assessment*

***Brown Bear, Lower Russian River***

***Prepared by the***
***U.S. Department of Agriculture***
***Chugach National Forest***
**Seward Ranger District**

August 2004

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**Prepared by:**

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# RUSSIAN RIVER LANDSCAPE ASSESSMENT

## 1.0 INTRODUCTION

The Russian River watershed lies on the Kenai Peninsula, about 50 miles due south of Anchorage, Alaska, and just southwest of Cooper Landing, Alaska (figure 1.1). The watershed lies within the Kenai Mountains and is bounded by the Kenai River to the north. The western boundary of the Seward Ranger District of the Chugach National Forest bisects the watershed, running along the Russian River, and the western half of the watershed lies on the Kenai National Wildlife Refuge. The Sterling Highway and the Russian River Campground provide access at the mouth of the Russian River. The watershed is also accessed by foot on the Russian Lakes Trail or by aircraft.

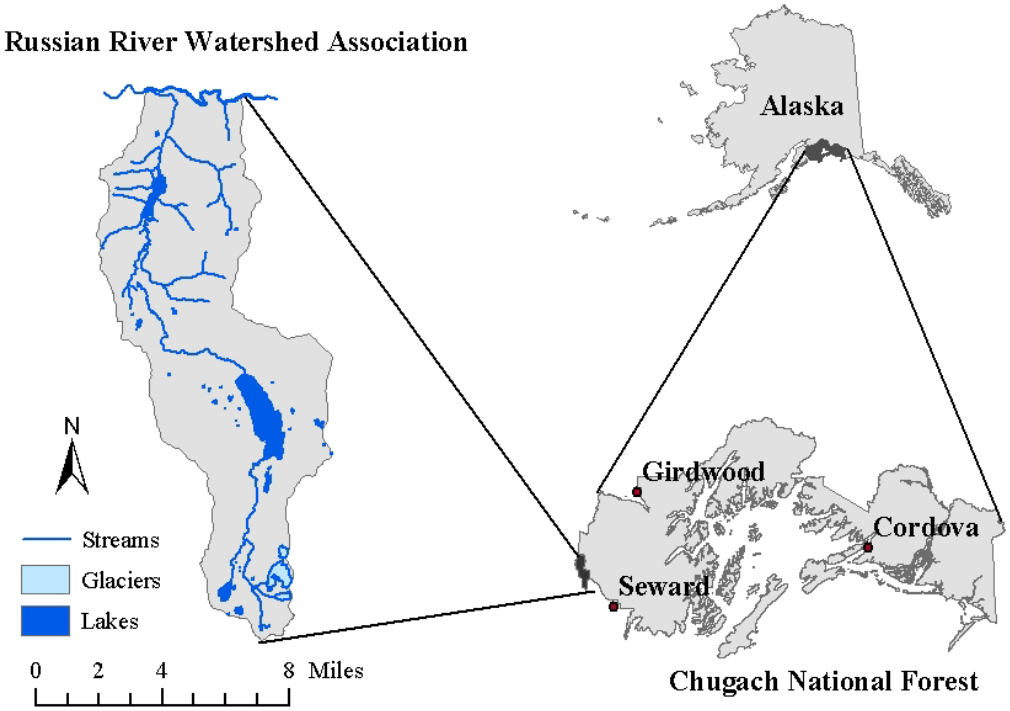


**Figure 1.1: Location of the Russian River watershed.**

The Russian River watershed association covers approximately 42,939 acres (67 square miles). Approximately 20,738 acres (48%) of the watershed lie on the Chugach National Forest, with most of the remainder managed by the US Fish and Wildlife Service as part of the Kenai National Wildlife Refuge. The watershed is characterized by a glacially sculpted valley flowing north into the Kenai River. The majority of the watershed is undeveloped backcountry, although the area around Russian River Campground and the lower portion of the Russian River receive heavy recreational use as a result of the high fishery values. Fishing, camping, hiking, and mountain biking are some of the activities that take place in the watershed.

**Figure 1.2: Lower Russian Lake.**

**Figure 1.3: Russian River anglers.**

## 2.0 WATERSHED CHARACTERIZATION

### 2.1 Lands

The Russian River is located west of the community of Cooper Landing. The Russian River Watershed includes Upper and Lower Russian Lakes, which are situated in a low, U-shaped valley that runs between steep-sided mountains. Over its twelve mile length, the Russian River drops from an elevation of about 700 feet at Upper Russian Lake to 350 feet at the confluence of the Russian and Kenai Rivers. The maximum elevation within the analysis area is Cooper Mountain at 5270 feet. The ridge that forms the eastern boundary of the river corridor maintains an elevation of approximately 4000 feet.

The main activity that draws people to the Russian River corridor is sport salmon fishing, although other types of recreation carried out in the area include hiking, camping, mountain biking, hunting, backcountry cabin use, nature photography, wildlife viewing, outfitter and guide use, berry picking, and relaxation with families and friends. A majority of the recreational use in the Russian River Watershed occurs during the summer months (June – August) coinciding with the sockeye salmon runs. Much of the sockeye salmon sport fishery occurs in the lower two miles of the Russian River near the Russian River Campground. This segment of the Russian River is currently the second largest sockeye salmon sport fishery in the state of Alaska, after the Kenai River sockeye salmon sport fishery. The upper watershed towards Upper Russian Lake receives much lower visitor use.

The northern end of the watershed towards the Sterling Highway has most of the lands issues. This is due to the Russian River Campground recreation complex and associated special use permits, the Russian River Settlement Agreement of July 26, 2001 and the Russian River Land Act (PL 107-362), and the existing Chugach Electric powerline/utility corridor located about 1.2 miles upstream from the Russian River and Kenai River confluence.

## 2.2 Geology, Minerals, and Soils

### 2.2.1 Geology

The bedrock geology of the study area is dominated by undifferentiated sedimentary rocks consisting of primarily shale, graywacke, and small deposits of travertine bedrock (Huber, 2002). They are part of the Valdez Group, which together with the McHugh Complex make up the Chugach Terrane. This terrane is part of an assemblage of arcing terranes that were thrust onto the North American Continent late in the Cretaceous Period resulting in uplifting and consequently the formation of the Chugach-Kenai Mountains. (Kelly, 1985).

### 2.2.2 Minerals

The U. S. Forest Service has withdrawn from mineral entry 2,998 acres of National Forest system lands in the Russian River drainage. This means that no mining claims can be located, and further mineral development and mining cannot occur within the withdrawn area. In addition, all mining claims that existed prior to the withdrawal are now abandoned and void.

Mineral resource values within the Russian River corridor and the entire Russian River valley are low to non-existent. There are no known metallic mineral occurrences, no known occurrences of leasable minerals, and no valuable common variety mineral deposits. The only known mineral occurrences within the Russian River valley are several small, common variety travertine deposits.

### 2.2.3 Soils

The Landtype Association (LTA) is part of the National Hierarchal Framework that is used to delineate landscapes on Chugach National Forest. Ecological units at this level are defined by the “geomorphic process and how it affects the topography, surficial geology, local climate, soils, and potential natural plants community patterns” (Davidson, 1997). Soils in the study area can be described in terms of where they lie on the landscape. This is because the geomorphic processes that formed the different landtypes are intricately related to the pedogenic processes that formed the soil on those sites (Soil Survey Division Staff, 1993). Soil mapping units and their descriptions will be provided if they have been developed for particular landtypes in the study area. The mapping units represent the major types of soils typically found on those sites based on survey work done throughout the Chugach National Forest by D.F. Davidson (1989, 1999) and A.M Davis (1979,1980), however, the units may also include minor soil components that will not be described here.

## 2.3 Hydrology

### 2.3.1 Climate

The climate of the Russian River watershed is cool and moist. The average daily temperature at Cooper Landing and the mouth of the Russian River is about 36 degrees

F, decreasing dramatically with elevation. The average maximum July temperature at the mouth of the Russian River is about 68 degrees F, and the average minimum January temperature is about 11 degrees F (table 2.1) (Western Regional Climate Center, 2004).

Because the watershed lies in a rain shadow created by the eastern Kenai Mountains, which capture much of the moisture in storms that circulate over Prince William Sound, it receives considerably less precipitation than the coastal areas to the east and south. Average annual precipitation ranges from about 20 inches at the mouth of the Russian River to over 60 inches at the high elevations at the head of the watershed. Rainfall is the heaviest in the fall months, and winter months receive more precipitation than summer months.

**Table 2.1: Climate statistics for weather stations near the Russian River watershed.**

| Station | Location | | | | Temperature | | |
|---|---|---|---|---|---|---|---|
| | Elevation (ft) | Latitude (ddmm) | Longitude (ddmm) | # of years of data | Average Daily Temp (F) | Average Max July Temp (F) | Average Min Jan Temp (F) |
| Cooper Landing [1] | 380 | 6029 | 14958 | 29 | 35.9 | 68.2 | 10.7 |
| Cooper Lake Project [1] | 440 | 6023 | 14940 | 45 | 37.4 | 65.4 | 13.5 |
| Cooper Lake [3] | 1200 | 6023 | 14941 | 23 | - | - | - |
| Snug Harbor Road [2] | 500 | 6024 | 14921 | 23 | - | - | - |
| Upper Russian Lake [2] | 700 | 6020 | 14953 | 5 | - | - | - |

| Station | Precipitation | | | | | | |
|---|---|---|---|---|---|---|---|
| | Annual Precip (inches) | Average March 1 Snowpack Depth | | Average May 1 Snowpack Depth | | Peak snowpack of record (by SWE) | |
| | | inches | SWE* | inches | SWE | inches | SWE |
| Cooper Landing [1] | 21.8 | 9 + | - | 0 + | - | - | - |
| Cooper Lake Project [1] | 30.8 | 13 + | - | 0 + | - | - | - |
| Cooper Lake [3] | 38.4 | 47 | 13.2 | 34 | 12.3 | 71 | 29.3 |
| Snug Harbor Road [2] | - | 20 | 5.1 | 12 | 2.5 | 40 | 13.6 |
| Upper Russian Lake [2] | - | 49 | 15.7 | - | - | 73 | 24.5 |

[1] Weather station data (WRCC, 2004); [2] Snow course data (USDA NRCS, 2004)

[3] SNOTEL Site (USDA NRCS, 2004); * SWE=Snow water equivalent; + Monthly average

Snowpack and snowfall in the Russian River watershed increase dramatically with elevation. The mouth of the watershed receives about 46 inches of snow annually, with a maximum annual snowpack of about 10 to 20 inches. Snowfall at the mouth of the watershed accounts for less than 25% of the total annual precipitation. Upper Russian Lake receives an average annual maximum snowpack of about 50 inches. The head of the watershed receives considerably more snow, with average maximum annual snowpacks of about 80 inches and snowfall accounting for over 60% of the total annual precipitation. Snowfall increases dramatically just to the south of the watershed, where average annual maximum snowpacks of over 300 inches contribute to the Harding Icefield and its associated glaciers.

### 2.3.2 Watershed Morphometry

The Russian River watershed association is about 17 miles long and 2 to 4 miles wide, with a drainage area of 42,939 acres (67 square miles). The watershed association lies within the Upper Russian Lake, Russian River, and Kenai River-Round Mountain subwatersheds ($6^{th}$-level) within the Kenai River-Russian River watershed ($5^{th}$-level). The watershed association drains north into the Kenai River. Elevations range from 340 feet at the mouth of the Russian River to over 5200 feet at the southern end of the watershed.

Lakes cover 1553 acres, or 3.6% of the watershed. Upper and Lower Russian Lakes are natural lakes along the Russian River, covering 1137 and 173 acres, respectively. Upper Russian Lake has a maximum depth of 260 feet and a mean depth of 88 feet, whereas Lower Russian Lake has a maximum depth of only 26 feet and a mean depth of 12 feet (Spafard and Edmundson, 2000). Several large alluvial fans exist along tributary streams at the bases of the steep valley sides. Winter avalanches commonly occur on the steep sideslopes of the valley and in the headwaters of the Russian River.

### 2.3.3 Glaciers

The Russian River valley was sculpted by several major glacial episodes in the Pleistocene. During this time, glaciers extended from the Harding Icefield to fill the Russian River valley. As a result of the extensive past glaciation, the valley has a relatively flat bottom and the valley sides are oversteepened. Glacial moraines are located in the low passes leading to Resurrection River and Skilak River. A moraine at the north end of Upper Russian Lake helps create the deep lake that lies in a basin scooped out during a Holocene glacial advance. A large terminal moraine also lies near the mouth of the river. The Russian River gorge, downstream of Lower Russian Lake, is the result of post-glacial fluvial erosion during periods of higher flows during glacial recession. Russian River falls represents a knickpoint in this gorge, where resistant bedrock is exposed as a result of upstream propagation of the incision into this gorge. Downstream of the gorge, the river opens into a wider valley at the confluence with the Kenai River, and the river valley is incised into the coarse glacial moraine deposits at the mouth of the Russian River.

Currently, only 371 acres, or 0.9% of the Russian River watershed is covered by glaciers. These small remnant glaciers lie in the headwaters at the southern end of the watershed. Although the extensively glaciated Harding Icefield is located directly south of the Russian River watershed, glaciers from the Icefield do not currently extend into the watershed. The eastern branch of the Skilak Glacier, originating at the Harding Icefield, lies only about 100 vertical feet below and within a half mile south of the 1900-foot pass south of Goat Lake. This glacier once extended over this pass into the Russian River watershed. Without this linkage to the Harding Icefield, the Russian River watershed has limited high elevation source areas for glaciers.

### 2.3.4 Streams

A total of about 70 miles of mapped streams lie in the Russian River watershed association. Channel types were assigned based on the Tongass National Forest Channel Type User Guide (USDA Forest Service, Alaska Region, 1992), with the

exception of the 18 miles of stream in the Kenai National Wildlife Refuge. Most of the length of the Russian River is a Floodplain (FP) channel, with gradients less than 1% and little lateral containment. The 2-mile gorge downstream of Lower Russian Lake and a 1-mile reach between Upper and Lower Russian Lakes are Large Contained (LC) channels, with slightly higher gradients and moderate incision into shallow gorges. The tributaries to the Russian River, including most of the unclassified streams west of the Russian River, are predominantly High Gradient Contained (HC) channels, draining the steep valley sides and mountain slopes of the headwaters. Several of these streams are Alluvial Fan (AF) channels at these bases of the valley sides. Two Moderate Gradient Contained (MC) channels drain the low pass between the Russian River and Resurrection River into Upper Russian Lake. No glacial dominated streams exist in the watershed.

### 2.3.5 Wetlands

Wetlands cover only 3500 acres, or 8.1 % of the Russian River watershed. About 55% of these wetlands are palustrine wetlands, or areas associated with swamps, bogs, ponds, beaver ponds, and floodplains. Palustrine wetlands are particularly prominent along the Russian River in the 2-mile reach upstream of Lower Russian Lake and are also scattered throughout the valley floor along the length of the valley. Lacustrine wetlands, or wetlands associated with lakes, cover 1500 acres and include Lower Russian Lake, Upper Russian Lake and Goat Lake. About 67 acres of Riverine wetlands exist along the Kenai River at the north end of the watershed association. Wetlands are mostly absent in the uplands of the watershed, although scattered palustrine wetlands exist in the broad passes that lead to Skilak River to the west and Resurrection River to the southeast.

### 2.3.6 Streamflows

Streamflow data are based on historical data from 1947 to 1954, at a gauge shortly downstream of Lower Russian Lake with a 61.8 square mile drainage area (US Geological Survey, 2004) (figure 2.1). No gauging stations are currently in operation in the watershed. The flow regime in the Russian River is largely unaffected by glaciers. Streamflows are controlled primarily by snowmelt in the early summer and rainfall runoff in the late summer and fall. Spring runoff generally begins in mid to late-April, with flows rising rapidly to a summer snowmelt peak averaging about 300 cfs in mid to late-June. Flows gradually decrease throughout the remainder of the summer as the snowpack is depleted. Late summer and fall rainstorms are capable of producing large peak flows that can exceed the summer snowmelt peak flows. These high magnitude events are generally short in duration, although continuous rain storms can elevate flows for longer periods of time. The peak flow of record of 1280 cfs occurred during a fall rain event on November 24, 1952. Flows remain low, generally between 25 and 60 cfs from January to mid-April.

Although the period of record is insufficient for statistical analysis, the 2-year flow is expected to be about 500 to 600 cfs, and the 10-year flow is expected to be about 1000 to 1200 cfs. Unit discharges are about 8-10 cfs per square mile for the 2-year flood, and 16-20 cfs per square mile for the 10-year flood. These values are slightly lower than the unit discharges for Crescent Creek (10 and 22 cfs per square mile for the 2 and 10-year floods, respectively), about 12 miles to the east. Because of the rain shadow effect

created by the Kenai Mountains, floods on the Russian River are relatively low volume compared to drainages on the eastern side of the Kenai Peninsula, which can exceed 300 cfs per square mile for the 10-year flood.

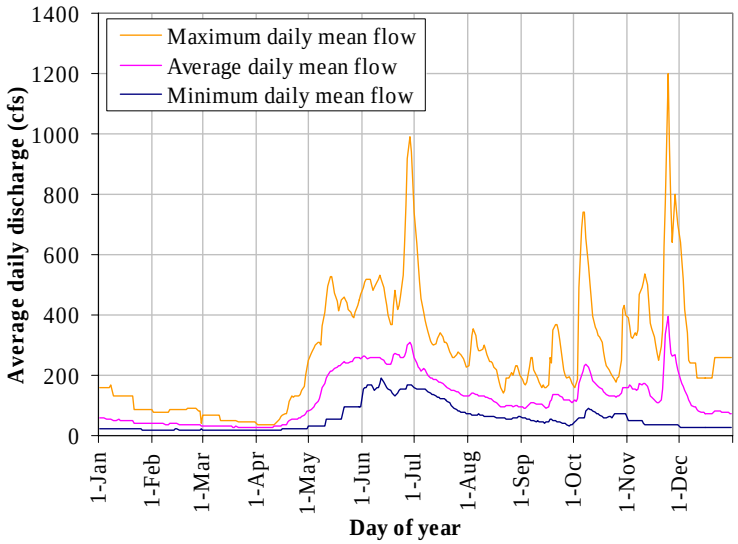


**Figure 2.1: Average daily streamflows for the Russian River. Period of record 5/1/47 to 9/30/54 (US Geological Survey, 2004).**

### 2.3.7 Water Quality

Because of the scarcity of development and human activities in the analysis area, water quality is generally pristine, and as a result of the low percentage of glaciers in the watershed, the water in the Russian River is very clear. Sediment that does enter the Russian River settles out in Upper and Lower Russian Lakes, or is readily transported downstream. Sources of water quality impairment are limited in the watershed, and human activities are most likely to affect water quality in the lower 2 miles of the river. All available water quality data meet State standards (Alaska Department of Environmental Conservation, 2003).

## 2.4 Vegetation and Ecology

A variety of plant community types occur throughout the assessment area, influenced by human and natural disturbances. Plant communities encompass a wide range of habitats, including coniferous forest, deciduous forest, mixed conifer/deciduous forest, forest edges, tall shrublands, low shrublands, seeps and wet areas, riparian areas, streambanks, waterfalls, lake margins, ponds, sphagnum bogs, subalpine meadows, alpine tundra areas, and grasslands. Coniferous forested habitats are generally white spruce (*Picea glauca*), mountain hemlock (*Tsuga mertensiana*), or mixed spruce-hemlock stands. Hardwood forests include stands of cottonwood (*Populus trichocarpa*), birch (*Betula papyrifera*), and small stands of aspen (*Populus tremuloides*). Other stands are mixed hardwood and softwood, generally birch with white spruce. Non-forested communities include grasslands (including *Calamagrostis canadensis* monocultures, but also including sedge meadows [*Carex* spp.] and other mixed graminoid patches), alder (*Alnus* spp.), other brush, including willow (*Salix* spp.) and other low shrubs, and alpine tundra (including a variety of low forbs, lichens, and

subshrubs). Some areas in the most southern section of the landscape are rock or ice cover.

Vegetation is more of a boreal transition forest nature than the coastal forests, although the Russian River landscape area is close to the transition zone and contains unique species assemblages around the Cooper Landing area. This area is sometimes referred to as the “banana belt” of the west side of the Kenai because of the often sunnier and drier weather.

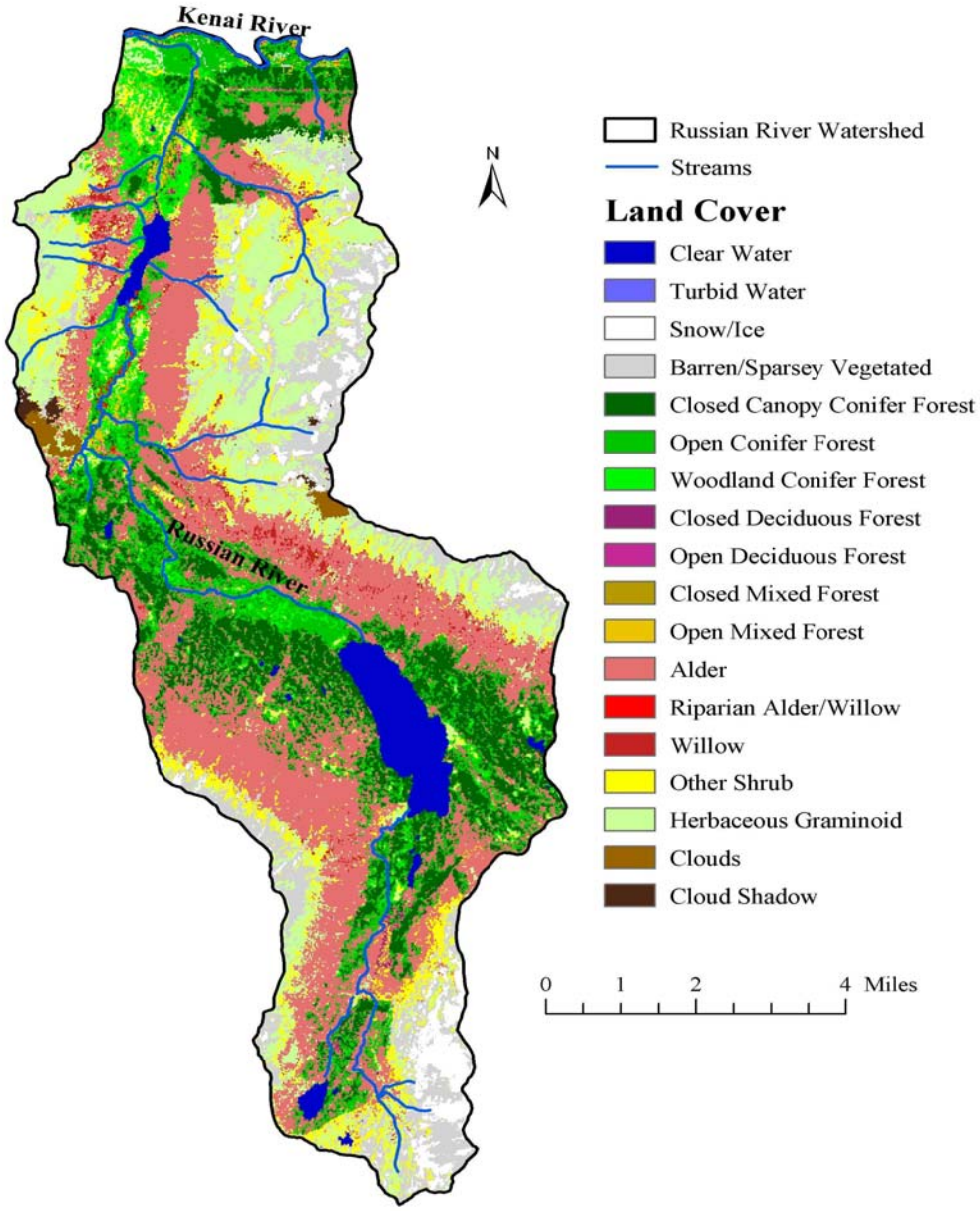


**Figure 2.2: Russian River Watershed Landcover Types.**

## 2.5 Fire

Wildfire (Potkin 1997), past and present, has had a prominent influence on the composition and structure of the forested landscape of the Kenai Peninsula. Both are natural disturbance processes of the Russian River watershed. Wildfire frequency and existing vegetation structure have clearly been altered since European settlement. In addition, prescribed burns have been used to manage health and safety risks and promote higher quality wildlife habitat, particularly for moose.

## 2.6 Aquatic Species and Habitats

The Russian River occupies a channel created from past glacial activity. Banks are made of large rocks and boulders, and have good vegetative cover. Streamflows generally peak in mid to late June as snowmelt in the upper valley reaches its maximum. Flows begin to fall rapidly in July and August as the snow pack disappears. This period coincides with the upstream migration of the majority of the Russian's Sockeye salmon.

Anadromous species known to use creeks within the watershed include Coho, Pink, Chinook, Sockeye, and Chum salmon. Resident fish include Dolly Varden, whitefish, sculpin, stickleback, and rainbow trout. Sockeye are the most abundant species. The Russian River has two distinct Sockeye runs, the first occurring from early June to mid-July, and the second occurring in mid to late July and continuing into late August and early September. Invertebrates found in the Russian River watershed include caddis flies, dragonflies, black flies, midges, mayflies, stoneflies, aquatic earthworms, gilled snails, and aquatic mites to name a few.

The habitat in the Russian river watershed is in pristine condition from Russian River Falls upstream to the headwaters. There has been no logging or mining in the watershed. The absence of resource extraction has preserved the high quality of the salmon habitat in the upper watershed.

Aquatic habitat along the angler's trail has been impacted by the rapid growth in the use of Russian River as a high-use fishing destination. Hardening of sites and redirecting use and users has mitigated some impacts to the habitat. The increase in use of the fishery has precipitated anglers to move into the gorge between the powerline crossing and the falls. The gorge is showing evidence of bank damage especially along the toe of the talus slopes. There is no developed trail in the gorge. Anglers are forming their own trail within the confining walls of the gorge. Trampled vegetation, litter, and human waste are present along the river in the gorge near the falls. Since this area is not on the official trail system, there is limited law enforcement. In 2001, Forest Service personnel observed numerous violations of snagging and catch limits. The gorge appears to offer a "lawless wild-west" fishing experience in contrast to the "combat fishing" that takes place along the anglers trail section of the river.

Sockeye salmon is the most important species to the Russian River, and Rainbow trout and Coho salmon are secondary. Sockeye escapement has been monitored since 1960 at the Russian River weir downstream of Lower Russian Lake. Data show that escapement numbers have steadily increased since 1960 (table 2.2). In 2004, 110,244 Sockeye salmon made it through the weir (ADF&G, 2004).

**Table 2.2: Sockeye escapement numbers at the Russian River weir.**

| Dates | Total Sockeye Escapement | Escapement during record high year | Escapement during record low year |
|---|---|---|---|
| 1960 – 1969 | 302,952 | 43,816 (in 1963) | 14,544 (in 1962) |
| 1970 – 1979 | 409,133 | 87,852 (in 1979) | 13,926 (in 1977) |
| 1980 – 1989 | 697,735 | 138,377 (in 1989) | 30,800 (in 1982) |
| 1990 --1999 | 861,650 | 139,863 (in 1999) | 34,691 (in 1996) |
| Sept 30, 2000 – Sept 30, 2004 | 461,371 | 157,469 (in 2003) | - |

Decadal escapement numbers with high and low years

## 2.7 Terrestrial Species and Habitats

Terrestrial habitats in the watershed association are typical of those provided by the plant community types in this transitional zone between boreal forests or more northerly latitudes and the northernmost coastal temperate forests that are generally found farther to the south. The mosaic of wetland and upland habitats provides a diverse array of high quality habitat. Nearly 200 species of wildlife commonly found on the Kenai Peninsula.

Habitats range from barren snow and ice, steep rocky slopes, and alpine tundra and meadow that provide summer range for mountain goat and other species, to a variety of forested upland habitats and wetlands on the side slopes and alluvial valley bottoms. These habitats support the diverse array of animal populations of large and small mammals, migratory and resident birds, small mammals, and other species. Early seral or stand initiation type habitats (Oliver 1981) provide feeding habitat for moose and snowshoe hare, and nesting habitat for neotropical migrants, such as sparrows and warblers. Old growth forest habitats provide nesting habitat for goshawks and woodpeckers, thermal, hiding cover or denning areas for large mammals, and travel corridors for moose, bear, wolverine, and wolves. Broadleaf forest types, such as mature birch in the stem exclusion phase, support populations of other species of migratory songbirds, including several species of thrushes and warblers. Salmon runs in the Russian River and associated lakes and tributaries are an important seasonal source of food and support populations of many terrestrial species of wildlife, including brown and black bear, bald eagles, wolves, and a host of others.

Wildfire, spruce bark beetle (*Dendrocthonus rufipennis*) infestations, other natural processes such as avalanches and flooding, and human activities affect wildlife habitat. Wildfires and spruce bark beetle infestations appear to have been and continue to be the factors that influence the structure, distribution, and functions of wildlife habitat throughout the watershed, although to a lesser extent than other watersheds on the Seward Ranger District. Red-backed vole populations appear to be increasing in beetle-infested spruce stands as a result of changes in feeding and hiding cover. These changes in red-backed vole populations, which is a keystone prey species for a number of predators, is likely to contribute to increases in the populations of coyote, lynx, hawk, owl, and mustelids that prey on them.

Human activities and development, particularly recreation have also affected wildlife habitat. Although recreational fishing has substantially altered habitat in some areas, cumulatively habitat alterations caused by human activities are relatively minor (about 1 percent of the total area within the watershed association), and these are primarily limited to areas in and around the confluence of the Russian and Kenai Rivers. The watershed does experience high recreational fishing use near the confluence of the Kenai and Russian Rivers, an area also frequented by brown bears for foraging. The high number of people in close proximity to bears has also led to numerous bear/human encounters, many of which have been negative for people or bears or both.

### 2.7.1 Sensitive Species, Management Indicator Species and Species of Special Interest

There are no federally-listed threatened or endangered species that occur in the watershed, as all listed species within the forest boundaries are associated with marine environments. One sensitive species, the Trumpeter swan, was found to be breeding in the watershed in 2004. Within the Russian River watershed association there are three management indicator species (brown bear, moose and mountain goat) and eight species of special interest (gray wolf, wolverine, lynx, river otter, bald eagle, northern goshawk, marbled murrelet and Townsend's warbler. There are few available data for management indicator and other species of concern in the watershed association. The Alaska Department of Fish and Game (ADFG) conduct annual fall counts for moose and periodic surveys for mountain goats and caribou. Seward Ranger District biologists conduct annual surveys of northern goshawk, bald eagle, owl and neotropical migratory bird surveys. Habitat models have been developed to characterize brown bear, moose, mountain goat and Dall sheep habitat (figure 2.3).

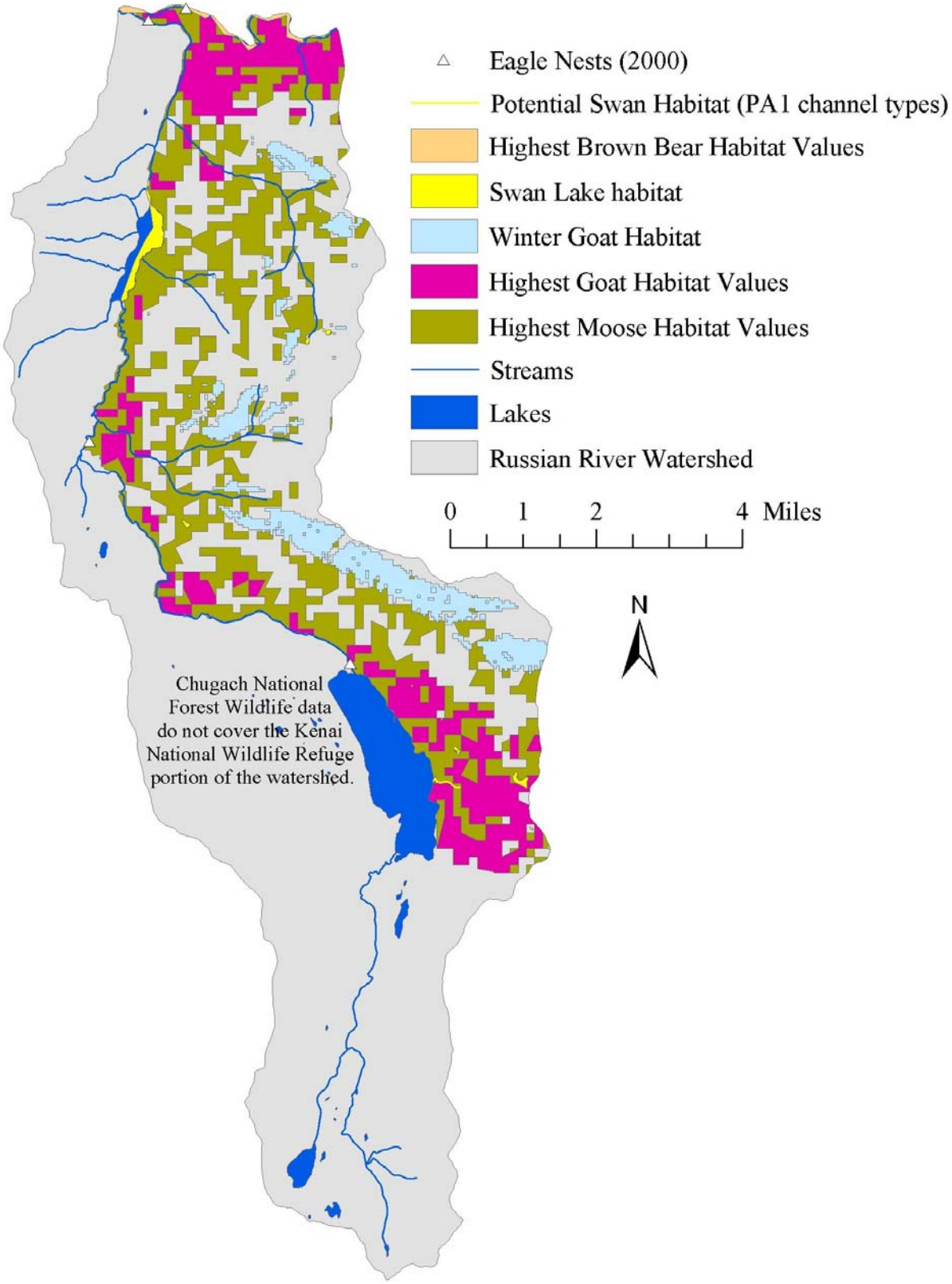


**Figure 2.3: Russian River Watershed Potential Wildlife Habitat.**

## 2.8 Human Uses: Past and Present

### 2.8.1 Human Uses: Past

Speaking in terms of the defined European contact reference period, the two main catalysts for human exploration and utilization of the Russian River Watershed include mining and recreation. Until the gold rushes of the early nineteenth century, contact between Native and Non-Native Alaskans was primarily related to the fur trade. Mining in the area began in 1834 but quickly subsided due to a lack of prospects. However, Russian exploitation of the area continued though the years by way of hunting and trapping. Eventually, resources began to take over the drive for the population in and near the watershed, much like prehistoric use.

When the Chugach National Forest was created it marked the beginning of growth and exploitation of the Russian River watershed for the sole purpose of recreation. The community of Cooper Landing, as it is known today, was established in 1910. The theme of tourism and recreation grew in this area throughout the early part of the twentieth century largely due to two factors. First, during this time accounts of hunting and fishing availability were being published internationally, drawing adventurers from distant places who wanted to experience this Alaskan wildlife and activity. In 1911 there were 24 registered guides on the Peninsula that generally catered to wealthy gentlemen from Europe and North America (Barry 1997). With the increased number of visitors, the need for recreational lodging and other accommodations increased as well.

Second, the watershed became more accessible for Alaskans and out of state tourists due to the maintenance and construction of transportation methods. Along with improvements to the original trails accessing the area, the road from Cooper Landing to Seward was finished in 1937 and was passable by automobile (Barry 1997). These transportation corridors expanded the opportunity for related settlements and added to the flow of travelers along the previous natural traveling paths, waterways. As accessibility increased, businesses grew, and the diversity of services and recreation in both Cooper Landing and the Russian River watershed followed along. Settlement and development continued with the construction of the, a lodge run by Luke and Mabell Elwell on Upper Russian Lake. That lodge along with the Russian River Rendezvous and the Russian Lakes Trail cabins all improved accessibility and duration of stay in the watershed recreation areas.

Through this time of development, numerous cultural resources have been documented in the watershed. The area contains 15 known pre-historic and historic Seward Alaska Heritage Resource Survey sites. All sites that are managed by the Chugach National Forest are subject to the provisions of the “Programmatic Agreement”. Included additionally to these 15 sites, the Sqilantnu Archaeological District, which includes significant information to the pre-historic and historic settlement and subsistence of the area, is located at the confluence of the rivers. This extensive district, so far, covers an area of at least four thousand acres, containing over three thousand cultural features and is located in both FS and KNWR lands.

Only a small portion of the area has been archaeologically surveyed, so it is likely that other unknown historic and prehistoric sites exist in the area. All the known prehistoric sites are currently one site, the Sqilantnu district and it has been nominated for the

National Register of Historic Places. Currently, no Forest Service managed sites in the area are interpreted and a vast amount of information for these sites could be created.

**Table 2.3: Location of Sqilantnu Archaeological District.**

| AHRS # | Site Name | Period | Description |
|---|---|---|---|
| SEW-00282 | Sqilantnu Archaeological District (east) | Prehistoric/ Historic | Include numerous prehistoric and historic features through the confluence area |
| SEW-00433 | SEW-00433 | Prehistoric | Surface depressions possible house and cache pits |
| SEW-00432 | SEW-00432 | Prehistoric | 43 surface features including a possible house pit |
| SEW-00646 | Gwin's Lodge/Roadhouse | Historic | Associated with growth and tourism built in 1949 |
| SEW-00166 | SEW-00166 | Prehistoric | Two house depressions |
| SEW-00167 | Hubbard Cabin | Historic | Small one room cabin built in 1930's |
| SEW-00189 | SEW-00189 | Prehistoric | 5 surface features including a possible house pit |
| SEW-00221 | Upper Russian Lake Lodge Site | Prehistoric/ Historic | Structure built in 1920's which encountered both Russian and prehistoric artifacts during building |
| SEW-00193 | Russian River Rendezvous | Historic | Structure remains that burned down in 1951 or 1952. |
| SEW-00157* | Russian River Falls | Prehistoric | Numerous prehistoric cache pits |
| SEW-00170 | Schooner Bend Bridge | Historic | Covered bridge built in 1929, has since been torn down |
| SEW-00042 | Russian Mine Site | Historic | Mining remains found near the confluence of the rivers |
| SEW-00201* | Russian River Village East (Winter Village) | Prehistoric/ Historic | Area included house and cache pits along with other cultural remains |
| SEW-00202 | Russian Lakes Trail Site | Prehistoric | Numerous cache pits form the remains of a seasonal fish camp |
| SEW-00610 | Henton's Lodge/Sportsman's Lodge | Historic | Historic meeting facility from 1946-1980's. Has since been torn down |
| SEW-00975 | Upper Russian Lakes Cabin | Historic | Historic Forest Service Cabin built in 1951 |

### 2.8.2 Human Uses: Present

A majority of the recreational use in the Russian River Watershed occurs primarily during the summer months (June – August) coinciding with the sockeye salmon runs. Much of the sockeye salmon sport fishery occurs in the lower two miles of the Russian River, and its confluence with the Kenai River. This segment of the Russian River is currently the second largest sockeye salmon sport fishery in the state of Alaska behind the Kenai River sockeye salmon sport fishery. The upper watershed towards Upper Russian Lake receives much lower visitor use.

Although the main activity that draws people to the Russian River corridor is salmon fishing, other types of recreation carried out in the area include hiking, camping, mountain biking, hunting, backcountry cabin use, nature photography, wildlife viewing, outfitter and guide use, berry picking, and relaxation with families and friends. Existing recreational facilities in the Russian River Watershed include the following: Russian River Campground and Day-Use Areas; Russian River Angler Trail; Russian Lakes Trail; Russian River Falls Trail; three backcountry cabins; and eight designated dispersed camping sites.

Cooper Landing, the nearest community, is approximately three miles to the east of the Russian River/Kenai River confluence. Anchorage, Alaska's largest population center is approximately 100 miles to the northeast via the Seward and Sterling Highways. Kenai and Soldotna, the largest population areas in the Kenai Peninsula, are approximately 40 miles to the west of the confluence.

# 3.0 KEY ISSUES AND QUESTIONS

Watershed analysis is a broad level ecosystem analytical tool intended to provide context and information regarding the effects and impacts that management decisions may have on the ecosystem. Its purpose is to guide land management decisions and to facilitate the implementation of the management objectives of the Chugach National Forest Plan. Watershed analysis also serves as a basis for developing project-specific recommendations and determining restoration and monitoring needs within the analysis area. During the initial stages of this analysis, the analysis team developed a set of "key issues and questions" from existing basic background information to help define the analysis.

## 3.1 Lands

**Issue:** The Alaska Department of Transportation's Sterling Highway reroute proposal may have some impacts to land status/ownership in the northern part of the Russian River watershed.
**Issue:** Development outside of National Forest System (NFS) lands (e.g., CIRI, state, private) and the potential impacts to NFS lands.
**Issue:** Cook Inlet Region, Inc. (CIRI), in cooperation with the USDA Forest Service and US Fish and Wildlife Service, may build a visitor center, archaeological research center, and visitor-oriented services (e.g., lodge, restaurant, etc.) on an 42-acre parcel north of the Sterling Highway that settles, in part, CIRI's ANCSA Selection 14(h)(1) selections at Russian River. While this possible development is just north of the Russian River watershed, the potential exists of drawing more people to the Russian River/Kenai River confluence area.

## 3.2 Geology, Minerals and Soils

**Erosion Processes**
**Issue**: Stream bank erosion seems to be the most significant erosion process in the study area. It is primarily the result of disturbance by anglers and the majority occurs downstream of Lower Russian Lake. Bank erosion can occur directly by destroying the stream bank itself and dislodging soil into the stream or indirectly by trampling the vegetation along the banks, which through their roots aid in retaining the soil in place. Degradation of the stream bank can increase sediments into the river, widen the river channel, and remove the most productive soil horizons, which are critical in re-vegetation. Recent restoration work by the Forest Service and the Youth Restoration Corp has been concentrated north of the power line, downstream to the confluence with the Kenai River.

***Question**: Are current restoration activities and projects adequately addressing the accelerated erosion brought about by the intense usage the area receives every year?*

**Issue**: A major part of controlling stream bank erosion is the restoration of the bank itself through a variety of methods. This usually includes bringing in top-soil from an outside source to use as fill behind some of the restoration structures. In the past, the focus has been in assessing the possibility that the restoration material, such as coirlogs and erosion mats, would be introducing exotic plants and seed into the area. A recent informal assessment of restoration work done on the Russian River last year suggests

that the top soil brought in from Soldotna may have contained non-native species that are now growing in these restored sites.

***Question**: Is the practice of bringing in soil from an outside source contributing to the introduction of non-native plant species into the area? If so, then what are the alternatives that will ensure stream bank rehabilitation and protection, and yet minimize or eliminate the introduction of non-native species? If not, then what are the other likely sources?*

## 3.3 Hydrology

***Question:** How has climate change influenced the hydrologic regime of the watershed?*
***Question:** How do fire and insect damage to forests in the watershed affect runoff processes and water quality?*
**Issue:** Hydrologic processes in the watershed affect a variety of recreational uses. Floods and avalanches can present safety hazards and maintenance issues for trails and facilities.
***Question:** What is the flood history for the Russian River watershed?*
***Question:** How do floods and subsequent channel changes affect hiking and angler trails in the watershed?*
***Question:** What dangers do avalanches pose to winter backcountry users?*

**Stream channel**
**Issue:** Heavy recreational use from anglers has caused loss of riparian vegetation and subsequent bank erosion on both banks along parts of the Russian River. These changes result in channel widening, a decrease in the size of the substrate, and a decrease in water depth.
***Question:** What are the natural geomorphic processes occurring on the Russian River, to what extent does the river naturally migrate, and what is the role of large woody debris in the channel?*
***Question:** How has recreational use along the lower portion of the Russian River changed channel morphology and the sediment transport regime?*
***Question:** Which areas in the watershed are the most sensitive to stream bank erosion and where would recreational uses have the most impact?*

**Water Quality**
***Question:** What are the current water quality conditions in the watershed?*
***Question:** How do floods and mass wasting events affect turbidity and sediment loads in the Russian River?*
***Question:** How does bank erosion from angler use along the lower Russian River affect turbidity and sediment loads in the Russian River?*

## 3.4 Vegetation/Ecology

***Question:** What are the major vegetation successional processes at work on the landscape and how, if in any way, have these changed since European settlement?*
***Question:** What changes in vegetation have taken place since the major change in recreational fishing?*
***Question:** Will current recreational use increase the population and spread of non-native species?*

***Question:*** *How are current recreational uses affecting the ecology of the Russian River watershed? This includes introduction of non-native species, trampling of native species, reduction in quality of riparian vegetation, and reduction in quality and cover of vegetation at cabin sites and along trails.*
***Question:*** *How have land management activities and human use influenced the existing vegetation community structure and distribution?*
***Question:*** *How has the spruce bark beetle infestation affected the plant community composition, structure, and function, and how will it continue to affect the landscape over time?*
***Question:*** *What is the role of fire in the landscape historically and currently?*
***Question:*** *What is the amount and distribution of stand structure types as they relate to wildlife habitat and landscape level plant community function?*
***Question:*** *How will the current use and process in the landscape affect sensitive plant populations?*

## 3.5 Fire

***Question:*** *What is the role of fire on the landscape historically and currently?*
***Question:*** *How has the increase in public use of the area affected the amount of human starts during the fire season?*

## 3.6 Aquatic Species and Habitats

***Question:*** *What impacts will land management and the increased, or displaced, use by anglers have on the refuge side of the river?*
***Question:*** *Will we need to reduce fish limits and access to the river?*
***Question:*** *Do we need a comprehensive approach to stream restoration rather than a band-aid approach?*
***Question:*** *Do angler's walking in the stream-bed have an impact on rainbow and salmon redds on the stream reach below the power line?*

## 3.7 Terrestrial Species and Habitats

**Issue:** Trumpeter swans are a sensitive species, previously unknown to breed on the district, although they are known to stage here during spring and fall. Two pairs were documented during the breeding season in the watershed in Lower Russian Lake, and east of Upper Russian Lake. On the KNWR, float planes have been documented to disturb nesting birds.
***Question:*** *How many trumpeter swans breed in the watershed? Where do they nest? Are they being impacted by float planes or other recreational activities?*
**Issue:** Russian River provides important fishing area for both humans and bears (brown and black). Bear/human interactions are documented to occur in the area. Some, such as the bear mauling in 2003 are extremely serious. Many encounters are detrimental to humans, bears, or both. Defense of Life and Property mortalities (DLP) are an issue.
***Question:*** *How many bears inhabit the watershed? How are fishing and other recreation activities affecting brown bears, and how are these potential effects impacting the population over time?*
***Question:*** *What is the distribution and abundance of threatened, endangered, or sensitive wildlife species, management indicator species, and species of special interest?*

***Question:*** *What are the current habitat conditions (existing and potential habitat), and trends for these species? What is the distribution and abundance of key habitat components such as old growth, thermal and hiding cover, snags, downed logs, and travel corridors?*
***Question:*** *What was the likely historical (pre-European settlement) relative abundance and distribution of these species?*
***Question:*** *How has spruce bark beetle infestation affected the watershed, and the abundance and distribution of these species?*
***Question:*** *How much recreation currently occurs in the watershed, and how are recreation activities affecting these species?*

## 3.8 Human Uses

### 3.8.1 Human Uses: Past

***Question:*** *What heritage resources are present in the watershed, and where are they?*
***Question:*** *How have heritage resources been affected by mining?*
***Question:*** *How have past management efforts affected heritage resources?*
***Question:*** *What subsistence uses are there in the watershed?*
***Question:*** *How have past management efforts affected subsistence use?*
***Question:*** *What cultural landscapes are present in the watershed?*
**Issue:** Vandalism - Damage to sites located near high recreational activity.
**Issue:** Erosion – destruction of sites located near the Russian River that endure changing water levels. With the implementation of the Forest Plan, destruction of cultural sites in the watershed is a great concern. Expanding and improving campsites and trails in the watershed could cause a major impact to heritage resources. Toleration of intentional vandalism/looting damage to sites will not be endured and ideally, would initiate some form of corrective action. This action would take place by way of rerouting of activities, erecting of barriers around the sites, fines and/or mitigation.
**Issue:** Lack of cultural information within the landscape. Areas of un-surveyed land have a high potential to yield additional sites and information. A lack of archaeological inventory in the Russian River Landscape causes concern as recreational use continues, increases and expands. Presently, archaeological surveys of the area are limited, in general, to the confluence of the Russian and Kenai Rivers

### 3.8.2 Human Uses: Present

**Issue:** Timing of other resource activities such as using prescribed fire while people are recreating in the area.
**Issue:** Development outside of National Forest System (NFS) lands (e.g., CIRI, state, private) and the potential impacts to NFS lands.
***Question:*** *Should the capacity of the Russian River Campground and associated river access be increased by adding another campground loop and expanding parking areas? Will this negatively impact the resources people are coming to enjoy?*
***Question:*** *Will further recreation development and bear viewing opportunities in the upper drainage increase negative bear-human encounters?*
***Question:*** *Will further recreation development in the upper drainage cause or increase user conflicts between hikers, bikers, and other visitors?*
***Question:*** *Will further recreation development in the upper drainage cause or increase perceived visitor crowding or safety issues?*

***Question:*** *Should the Forest Service prepare a formal Recreation Management Plan for the lower Russian River Watershed? Along with this, should a carrying capacity analysis be implemented for recreational use in the watershed?*
***Question:*** *Should there be more or less commercially guided fishing opportunities (including float planes) in Upper Russian Lake? Will this conflict with non-guided hike-in and fly-in fishing?*
***Question:*** *In general, should there be an increase in commercially guided opportunities in the Russian River watershed?*
***Question:*** *What should the extent of trail improvement be along the Russian River Angler Trail? Continue trail upgrades to the powerline and determine what type of access is needed above the powerline. Any change in the trail condition class could change the visitor experience and the number of people using the trails.*
***Question:*** *Is stream bank restoration on the lower Russian River due to fishing pressure working? Is monitoring effective?*

# 4.0 CURRENT CONDITIONS

**This portion of the landscape analysis assesses the current state of resources within the watershed and provides a summary of all that is known to date about the core watershed analysis topics.**

## 4.1 Lands

### Russian River Campground

The Russian River Campground is located just south of the Sterling Highway at Milepost 53. Alaska Recreation Management, the campground concessionaire, is permitted by the Forest Service to operate the campground through the summer months. Alaska Recreation Management, which operates under a Granger-Thye authority special use permit, has overseen the day-to-day operations of the Russian River Campground since 1994. The campground was operated by a different concessionaire from 1992 to 1994 and before 1992 was operated by the Forest Service.

The occupancy rates at the campground are approximately 51% annually which equates to an average of 45,000 people each year. This use has been steady since the early 1990's.

In the campground, there are 83 campsites, two day-use parking areas that accommodate a total of 100 vehicles, and the trailhead access points for the Russian Lakes Trail and the Russian River Angler Trail. There is also electricity and telephone service provided at the campground.

Campground improvements in FY2004 include the conversion of some campsites to comply with federal accessibility guidelines and the replacement of two flush toilets with vault toilets. The campground and Russian River Angler Trail are expected to receive upgrades over the next 5-10 years including the improvement of some facilities to comply with federal accessibility guidelines.

### Chugach Electric Association Powerline

The Chugach Electric powerline in the Russian River watershed runs approximately 3 miles east to west about 1.2 miles upstream (south) of the Russian River and Kenai River confluence. This powerline supplies electricity for much of the Kenai Peninsula and has been under permit to Chugach Electric since the 1960's. The powerline and surrounding vegetation is periodically maintained by Chugach Electric and is accessed through National Forest by four-wheel drive vehicles and ATV's.

### Outfitter and Guide Use

There are 31 outfitter/guides that are permitted to use the Russian River Valley for a variety of activities including fishing, hiking, mountain biking, llama trips, and float plane fishing trips to Upper Russian Lake.

**Cook Inlet Region, Inc. (CIRI) and Russian River**

CIRI is one of thirteen Regional Corporations established by Congress under the terms of the Alaska Native Claims Settlement Act of 1971 (ANCSA). ANCSA provided land and a series of cash payments as compensation to Alaska Natives for their aboriginal land rights. As a privately-held business, CIRI is owned by approximately 6,500 Athabascan, Eskimo, and Aleut shareholders. CIRI is a private landowner on the Kenai Peninsula.

A provision of ANCSA known as Section 14(h) (1) enabled Regional Corporations to specifically apply for and receive ownership of important cultural sites. Prior to the deadline on December 31, 1976, CIRI filed four separate 14(h)(1) applications in the area of the Russian River due to abundant archaeological evidence and oral tradition that indicate habitation of the area some 8,000 to 10,000 years ago primarily because of the rich salmon resources.

Concern by the United States over the validity of the CIRI selections was complicated by the recreational use of the Russian River area by the public. Each year nearly 50,000 anglers fish the confluence area, primarily for sockeye salmon, and additionally for rainbow trout and silver (Coho) salmon. The economic value to Kenai Peninsula alone is estimated at $5.8 million annually, directly attributed to the Russian River fishery. It has been a high priority goal to preserve the public's access to these fertile fishing grounds.

The issues at Russian River between CIRI and the United States have been ongoing for nearly 20 years. Three years ago the parties decided that rather than engage in lengthy, expensive litigation, they would negotiate a settlement agreement that provided each party the interest it deemed necessary. The Russian River Section 14(h) (1) Selection Agreement was signed by CIRI, the Forest Service (FS), and the US Fish and Wildlife Service (FWS) in July 2001. The Agreement provides consensus on the following points:

- The Russian River Campground and the ferry crossing, owned by the Kenai National Wildlife Refuge, as well as most of the land at the Russian River, will remain in federal ownership and control. Public fishing will remain unchanged.
- FWS will convey to CIRI all archaeological and cultural resources from 502 acres of Refuge lands certified by the Bureau of Indian Affairs.
- From the Chugach National Forest, CIRI will be conveyed a 42-acre parcel on the bluff overlooking the confluence of the Kenai and Russian Rivers and a 20-acre parcel near where the Sterling Highway crossed the Kenai River. The 20-acre parcel is subject to Section 14(h) (1) provisions which require protection of the cultural resources. In addition, a public easement managed by the Forest Service along the banks of the Kenai River is reserved on the 20-acre parcel to allow continued public fishing.
- CIRI will relinquish its ANCSA Section 14(h) (1) selections in the area, now totaling 2010 acres.
- CIRI, FWS and FS agree to pursue a public visitor's interpretive center for the shared use of all three parties to be built on the 42-acre parcel to be conveyed to CIRI.
- In conjunction with the visitor's interpretive center, the parties will pursue establishment of an archaeological research center that will facilitate the management of the cultural resources in the area.

- The parties agree that certain visitor-oriented facilities may be developed by CIRI on the 42-acre parcel. These facilities may include a lodge, dormitory housing for staff and agency people, and a restaurant. CIRI agrees to seek input from the federal agencies as to their needs and desires for the area.
- The parties commit to enter into a Memorandum of Understanding for the purpose of ensuring the significant activities at Russian River are carried out in a cooperative and coordinated manner.
- The agreement also authorizes, but does not require, the exchange of land lying adjacent to the Sterling Highway at Russian River for important brown bear habitat near the Killey River in the Kenai Peninsula owned by CIRI.

The Russian River Land Act (PL 107-362) ratified the Russian River Section 14(h) (1) Selection Agreement of July 26, 2001. The Act also authorized FS appropriations in the amount of $13.8 million for CIRI for:

- Planning and design of Joint Visitor's Interpretive Center.
- Planning and design of Archaeological Research Center.
- Construction of these facilities per agreement.
- Up to $138,000 total for reimbursement of FS, FWS, and Kenaitze tribe for assistance in planning and design.

## 4.2 Geology, Minerals and Soils

### 4.2.1 Geology

**Quaternary Geology**

The Russian River valley is a broad U-shaped valley originally shaped by glaciation and surrounded by steep mountains. Soils on the steep slopes consist mainly of sands and gravel derived from glacial till and eroded local material transported down the slope. The soil ranges from 2 to 5 feet deep, and overlies shale, greywacke, and travertine bedrock. All of these soils may be overlain with avalanche debris in many locations.

The valley bottom consists primarily of accumulations of glacial till and alluvial outwash made up of sands, silts and rounded gravel deposited in between low bedrock hills. The Russian River and its small tributary streams have deeply incised channels through the till and outwash to more resistant rocks or bedrock. Some low lying areas have 1 to 2 feet of muskeg type organic cover and ponded water over the soil.

**Bedrock Geology**

Bedrock consists mostly of slate and greywacke belonging to the Late Cretaceous Valdez Group (Tysdal, 1979). The Valdez Group is dominated by rhythmically interbedded greywacke, siltstone, and mudstone with rare pebble conglomerate. Fossil evidence has established a Maestrichtian age (Jones and Clark, 1973) for deposition of the sediments by turbidity currents in a trench-fill environment (Budnik, 1974). The Valdez Group is a marine turbidite sequence.

Four small, thin, surficial travertine (a form of limestone) deposits of postglacial age and possible hot springs origin are known to exist along the eastern side of the Russian River drainage. Air photos of the Russian River valley show a strong north/south

lineament, which is suggestive of a fault. It trends along the east side and parallel to the Russian River for approximately six miles. All four known travertine occurrences occur along this lineament. Therefore, the four deposits appear to be fault-related. Additional travertine occurrences may occur within this 6-mile area. The occurrence of scattered travertine boulders (outside of the known deposits) along the east side of the Russian River valley suggest that other travertine deposits may exist, but are covered by talus and avalanche debris.

On the largest of the four deposits, the bedrock is moderately east-dipping interbedded slate and greywacke overlain in places, unconformably, by a west-dipping, thin, sheet-like surficial travertine deposit approximately parallel with the present hill slope.

### 4.2.2 Minerals

#### Travertine

The four known travertine deposits are: Herreid's (1967) northern (formerly covered by the REC #1 placer mining claim) and southern (formerly covered by the RS & S #2 placer mining claim, Figure 4.1) deposits and two previously unknown deposits located approximately two and three miles south of the RS & S #2.

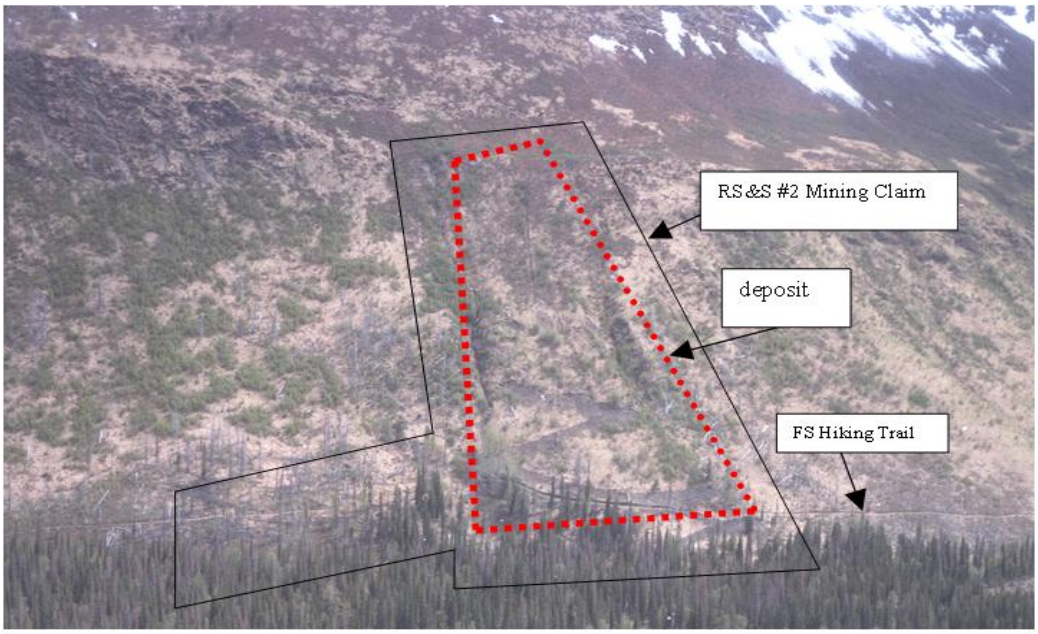


**Figure 4.1: The RS&S #2 mining claim is located on a steep hill slope in the Russian River valley, just below the outlet of lower Russian Lake. Travertine outcrops are not visible from this distance. A few travertine boulders, cobbles and pebbles can be seen from the hiking trail.**

The third and fourth travertine deposits mentioned above are currently of unknown extent, but appear similar in character to the other two travertine deposits. No travertine outcrop has been identified on either of these; only scattered travertine boulders/cobbles/pebbles (Figure 4.2).

**Figure 4.2: Travertine boulders on the RS&S #2 mining claim**

**Leasable Minerals**

Leasable minerals include coal, gas, phosphate, sodium, potassium, oil shale and geothermal steam. There are no known occurrences of leasable minerals within the Russian River valley. Further, the area has no known potential for oil and gas resources. Turbidite facies rocks such as the Valdez Group, lack organic content, as is typical of a flysch sequences.

**Locatable Minerals - Metallic Minerals**

Locatable minerals are those mineral occurrences upon which mining claims can be located under the General Mining law of 1872, as amended. In general, the locatable minerals are those that are mined and processed for the recovery of metals. This category may also include certain nonmetallic minerals and uncommon varieties of mineral materials. Although the Valdez Group rock has hosted the metallic deposits elsewhere, there are no known metallic mineral occurrences, such as gold, silver or copper, within the Russian River valley (Jansons and others, 1984). This area is easily accessible and has been well explored for metallic minerals. There have been no known mining claims staked for these minerals, nor have any plans of operations been submitted to the Forest for the development of metallic minerals in this area.

**Common Variety Minerals**

Sand and gravel is commonly occurring along the Sterling highway corridor, in the vicinity. There is a sand and gravel pit adjacent to the Russian River campground that has been used locally. It is generally low quality material, and suitable only as fill.
A Forest Service mineral validity report has concluded that the travertine occurrences are actually a common variety mineral. The Forest Service does not consider the travertine deposit to be valuable because a validity report has determined that the travertine does not meet the criteria of a locatable deposit; additionally, it is not marketable, and cannot be mined at a profit (Huber and Day, 2002).

**Erosion Processes**

Erosion can occur in the form of landslides, surface erosion, and streambank erosion. Landslides on forested land are dependent on several factors. Douglas N. Swanston (1997) developed a rating system for slope stability on the Tongass NF, which factored in topographic attributes, soil properties, geology, and hydrologic conditions. This system was later modified for use on the Chugach NF by Dean Davidson (Appendix A). Of these factors, slope gradient is the most critical. Landslides most frequently occur on slopes greater than 72% (Swanston, 1997) and between 72% and 56%, stability depends on other factors such as topographic position and restrictive layers. Slopes less than 56% are less likely to fail unless there are other critical limitations. The Mountain Sideslopes unit is particularly susceptible to landslides based on these criteria. Many of the soils in these units are underlain by compact glacial till that can serve as a slippery surface if water is restricted and starts to flow just above it.

A second landform/soil condition that is commonly associated with landslides are the depositional glacial outwash deposits and glacial lake deposits containing high amounts of silts that are now exposed in steep slopes located in the valley bottoms. An area representative of these soils, where previous landslides have occurred, is on the east side of the road access to the Russian River Campground at Scooner Bend on the Kenai River. On site appraisal of these criteria are essential for most types of site-specific activities. Figure 4.3 illustrates the critical slope classes for the study area.

Surface erosion is minimal in the study area because of the heavy vegetative cover found throughout. Areas that have been recently deglaciated or areas that are high in the mountain summits and covered with frost-churned rocks are an exception. These areas may have not developed enough of a soil stratum to support vegetation and keep sediments intact and protected from wind and water. Also, areas that have recently been disturbed due to mass wasting, avalanches, or down cut by streams will be more susceptible to surface erosion for the same reasons. An area that is particularly susceptible to surface erosion and to some extent landslides is the east slope above Lower Russian Lake. There is evidence of avalanche paths that have limited vegetative cover. The southern end of Upper Russian Lake also shows bare areas probably attributable to avalanches that could contribute to surface erosion.

Stream bank erosion is a natural process that occurs throughout the study area as the Russian River migrates along the valley floor. However, accelerated erosion is a significant problem downstream of Lower Russian Lake where thousands of anglers recreate every year and have an impact on the banks of the river. The riparian vegetation that occurs along streams stabilizes the bank by reinforcing the soil with its root system. The soils that support this vegetation along all the major streams in the study area are formed on deep alluvial deposits of silt, sand and gravel, but it is the very thin top layer that has the organic materials essential for growth. Damaging riparian vegetation will leave the bank susceptible to increased rates of erosion until the vegetation recovers. Disturbing the riparian soils will leave the stream banks vulnerable for a considerably longer time.

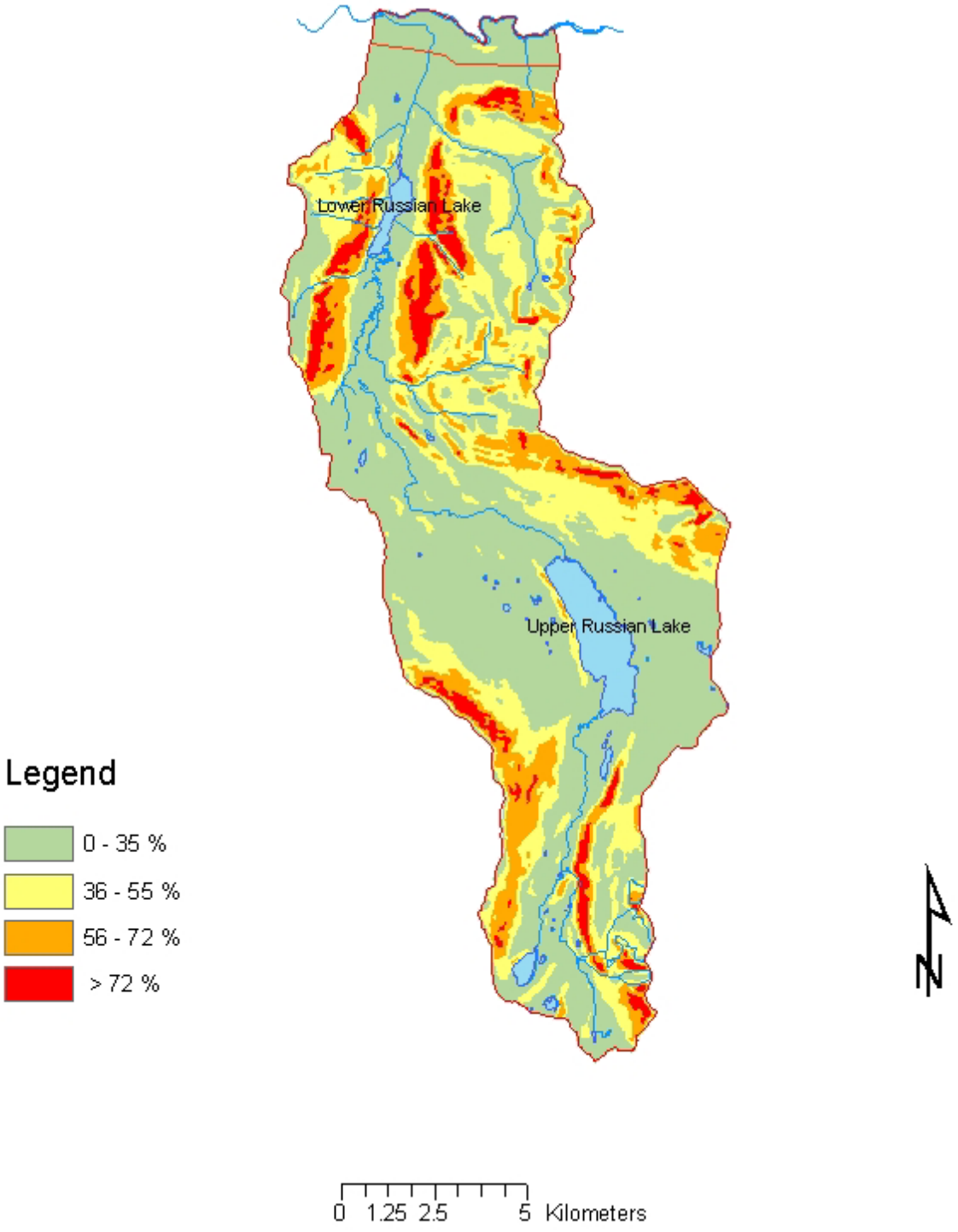


**Figure 4.3: Critical slope classes for land stability ratings.**

### 4.2.3 Soils

The most intensive soil survey of the study area was conducted on the Russian River campground (Davis, 1979). The survey covered an area of approximately 406 acres on the north end of the study area. This work was incorporated into a more extensive collection of soil mapping done in 1989 on the Kenai road corridor by Davidson (Figure 4.4). The soil mapping in this area was initially based on details observable from aerial photographs such as geomorphic landforms and changes in vegetative cover and slope. Further work was done on the ground to fine tune map lines and describe the soil components and associated soil properties. The soil characteristics found in the campground area are highly dependent on the alluvial and morainal materials on which they were formed. Although the survey did not extend beyond the powerline, inferences can be made about soil composition in similar areas.

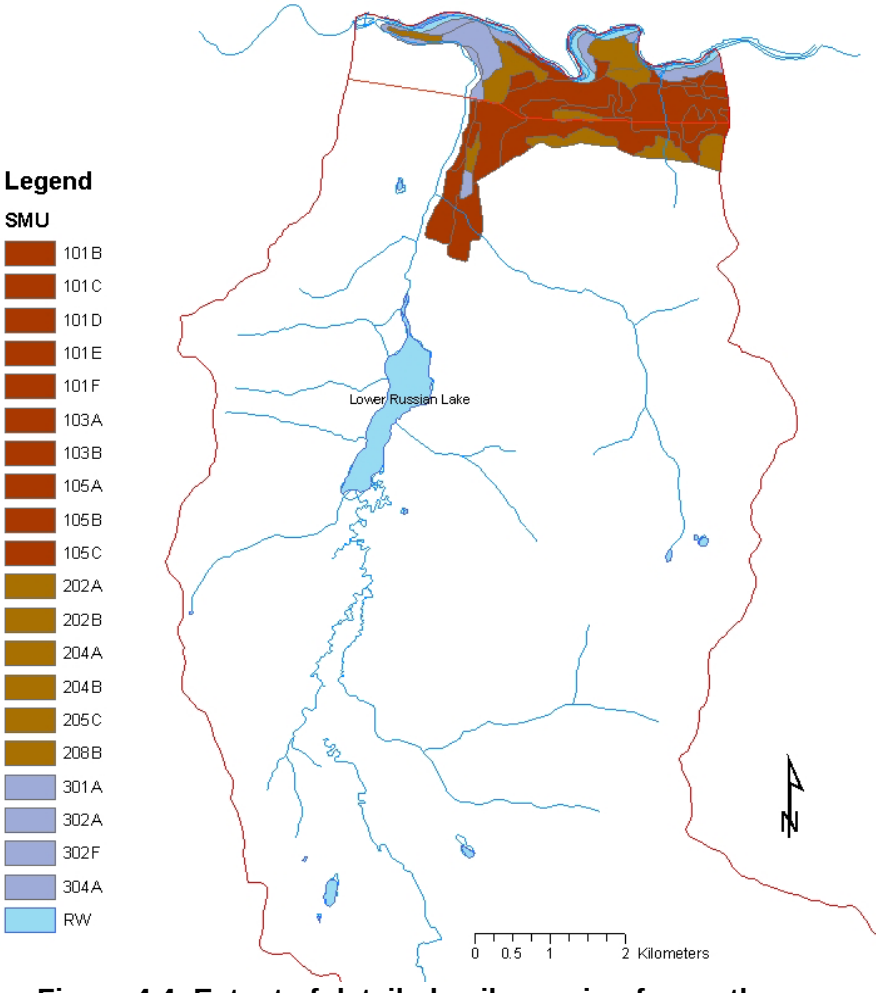


**Figure 4.4: Extent of detailed soil mapping for northern extent of landscape assessment area.**

The valleys in which the Russian and Kenai Rivers occupy were carved out by glaciers. The rivers have further incised the valleys and created a series of terraces throughout the study area. Morainal terraces such as the one on which the Russian River campground sits are composed of unstratified silt, sand, gravel, cobbles, and boulders. The soils that form on this material will have limitations due to the excessive number of

large rocks in the subsoil and surface. These soil properties change in areas where stream flows have removed or overlain morainal deposits with alluvial deposits. Soils forming on alluvium tend to be stratified with different layers of sediments. Layer composition will differ in the amount of fine sediments and rock size depending on the energy of the stream flows that laid them down. Limitations for these soils are usually due to drainage or permeability problems associated with one or more restrictive layers in the soil profile or a high water table. This is particularly evident upstream of Lower Russian Lake where hydric soils are found in conjunction with palustrine wetlands. Another area of interest lies south of the Russian River Campground along the Russian River Campground Road. Lake deposits occur throughout the area which can become highly unstable when saturated (Davis, 1979).

The soils occurring on the mountain sideslopes and summits in the study area have only been mapped to the Landtype Association (LTA) level. These are generalizations about soil patterns that are likely to occur on particular landtypes. The following LTA units have been mapped on the Chugach National Forest portion of the Russian River landscape assessment (Figure 2). Similar landtype associations occur on the Kenai National Wildlife, which has similar geomorphology and vegetation patterns on the opposite side of the Russian River.

**Glaciers LTA**: The unit consists primarily of glaciers and rock inclusions. Soils development is minimal on these units because of the relatively young age of any exposed surface. These landtypes are found on the southern end of the study area above Summit Creek.

**Mountain Summits LTA**: These areas are characterized by rocky terrain with intermittent ice and snow. The soil that does occur tends to be stony, weakly developed and shallow. Subtle changes in the soil profile and depth will occur as you move from concave to convex positions on the landscape. These landtypes are found at higher elevations on Cooper, Russian, and Bear Mountain.

**Mountain Sideslopes LTA**: These areas are characterized by disturbance in the form of mass wasting and slope erosion. These soils may be forming on top of compact glacial till. The extent of pedogenesis is typically determined by where along the sideslope it occurs. The soils get deeper and more developed as you move from the higher, steeper, convex positions to the lower, gentler, concave positions down slope. Soils are typically medium textured and well drained. Areas that are not subject to continual erosion or deposition from material above will usually exhibit greater soil development and will support mature conifer forests.

**Hills LTA**: Soils are formed from glacial till or ice-scoured bedrock knobs. Soil type is highly dependent on landscape position. Soils on knobs and shoulder slopes will be shallower and less developed than those on sideslopes. Those in toe slope positions and basins that receive and pond water will tend to develop organic soils and may support wetland vegetation.

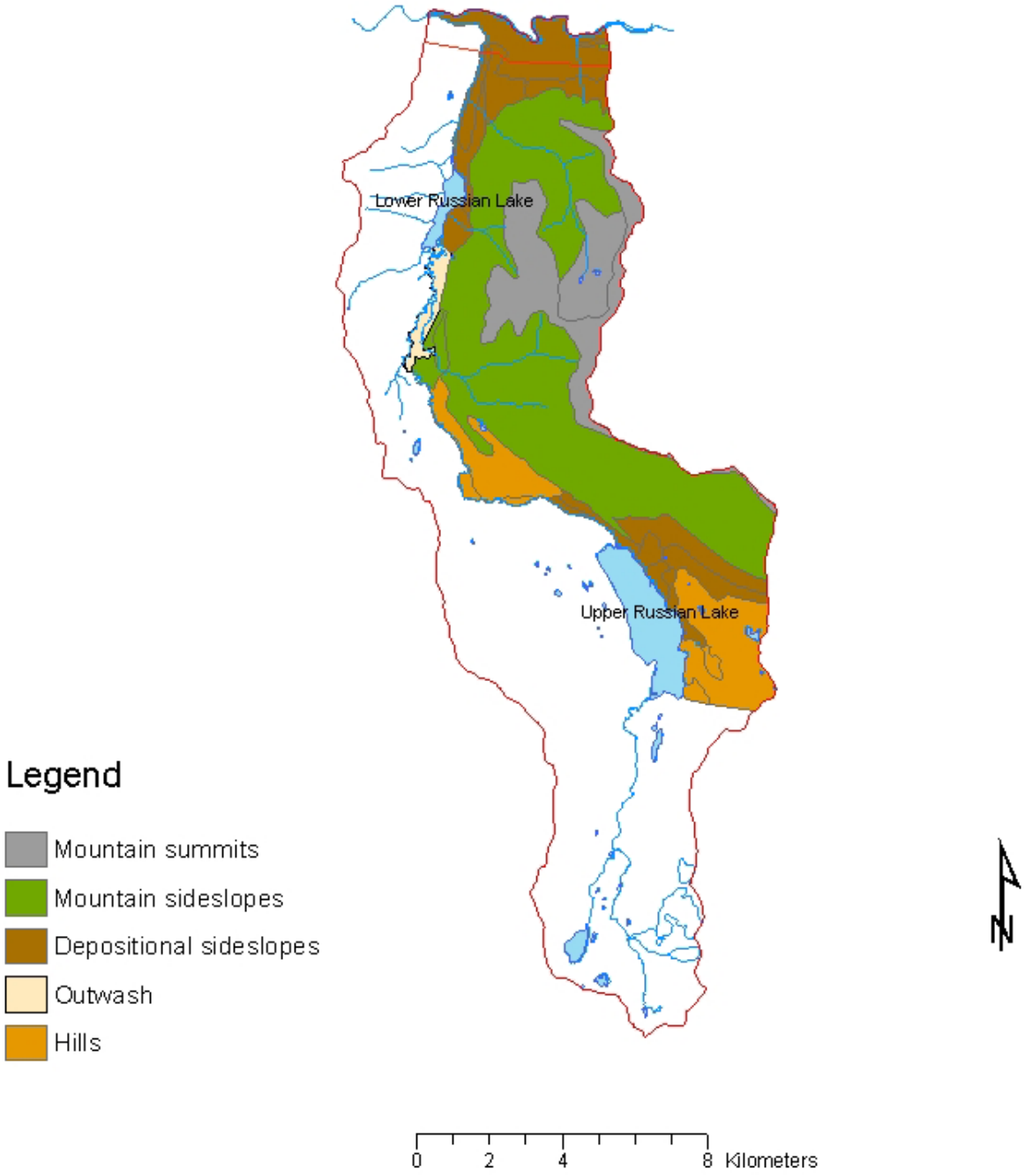


**Figure 4.5: Landtype Associations mapped on the Chugach National Forest portion of the landscape assessment.**

**Depositional Slopes LTA**: These soils are forming at the base of long sideslopes where sediments from higher slopes are accumulating such as alluvial fans and forested footslopes. Soils are usually, deep, coarse textured, and well drained, except where there is accumulation of subsurface runoff. This association also includes stream terraces and floodplains such as those found downstream of Lower Russian Lake and throughout the Russian River Campground.

**Outwash LTA**: These soils are forming on active floodplains and on glacial outwash sediments that were laid down under high water energy. This association can be found throughout the valley bottom but particularly between the Lower and Upper Russian Lakes. These soils are typically somewhat well drained to excessively drained. In some areas, especially above Lower Russian

## 4.3 Hydrology

### Climate

The climate throughout Alaska has gradually become warmer over the past century. Temperature data from the Cooper Landing area for the last 50 years show natural climatic oscillations, but overall trends are not evident. Recent winter temperatures at Cooper Landing and Cooper Lake have been warmer than those of the last 15 years (WRCC, 2004), and Kenai Lake remained unfrozen for most of the winters of 2001-2002 and 2002-2003. However, similar warm winter temperatures also occurred in the 1980's. The influence of the warming climate on hydrologic processes is discussed in the following sections.

### Glaciers

Glaciers currently have little effect on geomorphologic and hydrologic processes in the Russian River watershed. As a result of the warming climate and the current patterns of precipitation, the small remnant glaciers in the headwaters of the watershed are slowly decreasing in size. Throughout the Kenai Peninsula, glaciers are generally receding and thinning, including the nearby Skilak Glacier and the East Branch of Skilak Glacier just south of the Russian River watershed. Because of the close proximity of the East branch of Skilak Glacier to the Russian River watershed, a moderate glacial advance could cause this glacier to advance into the watershed. Such an event would re-connect the watershed with glaciers from the Harding Icefield and alter the hydrologic and geomorphologic characteristics of the watershed. Under the current climatic trends, this is not likely to happen.

### Streamflows

Streamflows in the Russian River are most affected by summer snowmelt and fall rainstorms. Because the Russian River watershed lacks glaciers and lies in the rain shadow of the Kenai Mountains, it generally does not experience dramatic flow fluctuations or flashy flows. However, fall rainstorms can increase flows to levels higher than those from summer snowmelt runoff. Floods that originate from the upper watershed are somewhat attenuated by Upper and Lower Russian Lakes, decreasing the magnitude of peak flows in the lower Russian River. River ice builds in the channel between October and early May, and in some situations can temporarily dam the river, subsequently sending a short-duration outburst flood downstream.

As glaciers continue to decrease in size as a result of the warming climate, streamflows will also decrease slightly. However, changes in vegetative abundance and distribution as a result of climate change, insect infestation, and fire can also have an effect on the quantity and timing of streamflows, generally causing streamflows to increase. Heavy vegetative cover in the Russian River watershed results in uptake of water by

evapotranspiration and high infiltration rates of water into the soils. The current spruce bark beetle infestation in the Russian River watershed is not severe and likely has little effect on streamflows in the Russian River, as the gradual die-off of trees allows rapid replacement by understory vegetation. This understory vegetation compensates for any changes in evapotranspiration resulting from die-off of spruce trees. Large forest fires have occurred in the watershed and can have a larger effect on streamflows, as they can temporarily eliminate losses from evapotranspiration and decrease soil infiltration rates, causing increased runoff and higher peak flows into the Russian River during the period immediately following the fire.

**Alluvial Fans**

Because of the steep valley sides in the glacially sculpted Russian River valley, several steep headwater streams create large alluvial fans along the valley floor. Lower Russian Lake is constricted by a large fan in the east side and three small fans on the west side (figure 4.6). A large alluvial fan from the east side of the valley upstream of Lower Russian Lake has pushed the meandering Russian River to the west side of the valley. Alluvial fan channels on these fans are very dynamic, frequently shifting their position on the fan as sediment is deposited, and these fans continue to aggrade very slowly. The large alluvial fans on the east side of the valley cause problems with trail crossings because of high flows, sediment deposition, and periodic channel avulsion. This occasionally requires bridges to be replaced or maintained.

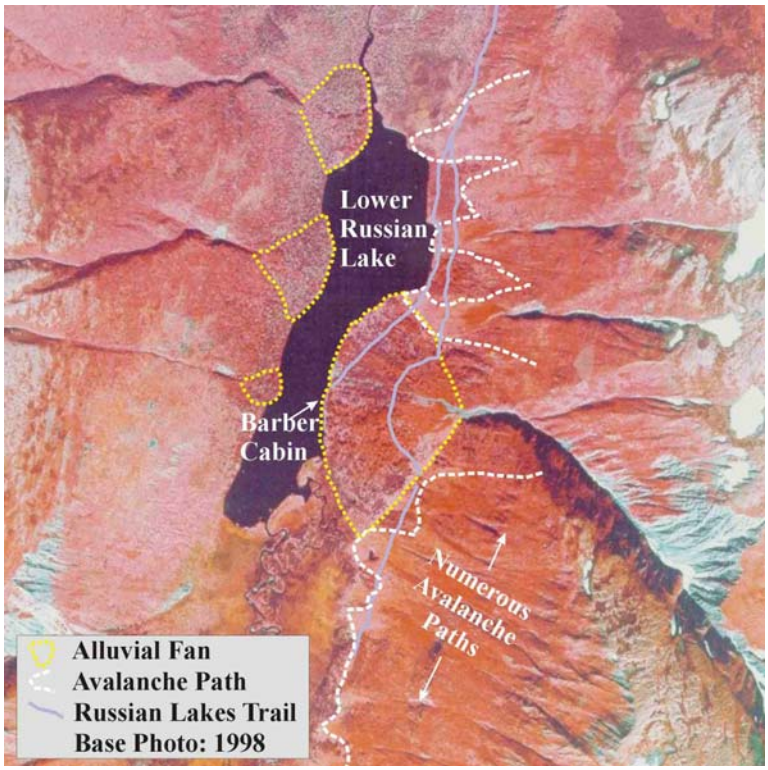


**Figure 4.6: Alluvial fans, avalanche paths, and trails at Lower Russian Lake.**

### Avalanches

Winter and spring avalanches commonly occur in portions of the Russian River valley as a result of abundant snowfall and steep valley walls. Avalanches are the largest concern on steep slopes that receive wind loading, or slopes below large cornices on the ridge tops. These avalanches can be a concern where they present dangers to trail users on the Russian Lakes Trail (figure 4.6). Although this trail is not heavily used in the winter and spring, considerable danger exists where the trail crosses directly below several large avalanche paths along east side of Lower Russian Lake. Access to the Barber Cabin crosses some of these areas. Avalanches also occur in the headwaters of the Russian River.

## 4.3.1 Stream Channel

### Lower Russian River

The lower Russian River downstream of Lower Russian Lake has a predominantly gravel and cobble substrate. Boulders are present as a result of the terminal moraine deposit at the mouth of the river, and bedrock is exposed at the falls just downstream of Lower Russian Lake. The river is confined in a bedrock gorge in the 2 miles downstream of the lake, with an average gradient of about 1% (figure 4.7). Downstream of the gorge, the Russian River has a lower gradient and moderate floodplain development, although the floodplain is confined within the high bluffs of the terminal moraine deposits. Lower Russian Lake captures bedload sediment from upstream, and because of the moderate gradient, the lower Russian River has the capacity to flush fine sediments downstream, leaving a predominantly coarse substrate and low sediment loads. Large woody debris is generally flushed downstream, although log jams and large trees with root wads, particularly large cottonwood trees, can remain in the channel. River ice sometimes results in localized bank scour, and ice jam breakout floods can cause channel scour and bank erosion. The lower Russian River channel is naturally dynamic, and high flows continuously cause some degree of scour and deposition, as well as localized bank erosion during channel migration.

The Russian River began to experience a considerable increase in angler use in the second half of the 20th Century, and particularly after the construction of the Russian River Campground in 1969. As a result of increased use along the lower Russian River, the channel experienced increased rates of bank erosion and channel widening. Angler trampling on the banks causes soil compaction and loss of riparian vegetation, which in turn decreases the strength of the banks, exposes bare soil to erosive flows, and causes bank erosion and subsequent channel widening (figure 4.8). As the channel width increases, the depth decreases, and the ability for the channel to transport sediment decreases. In the lower Russian River, these changes also caused the substrate to shift from more of a cobble substrate to more of a gravel substrate, and the reduction of pool depths and the loss of riparian vegetation decreased the amount of cover for fish. However, spawning habitat likely became more abundant with the increased amount of gravel in the substrate.

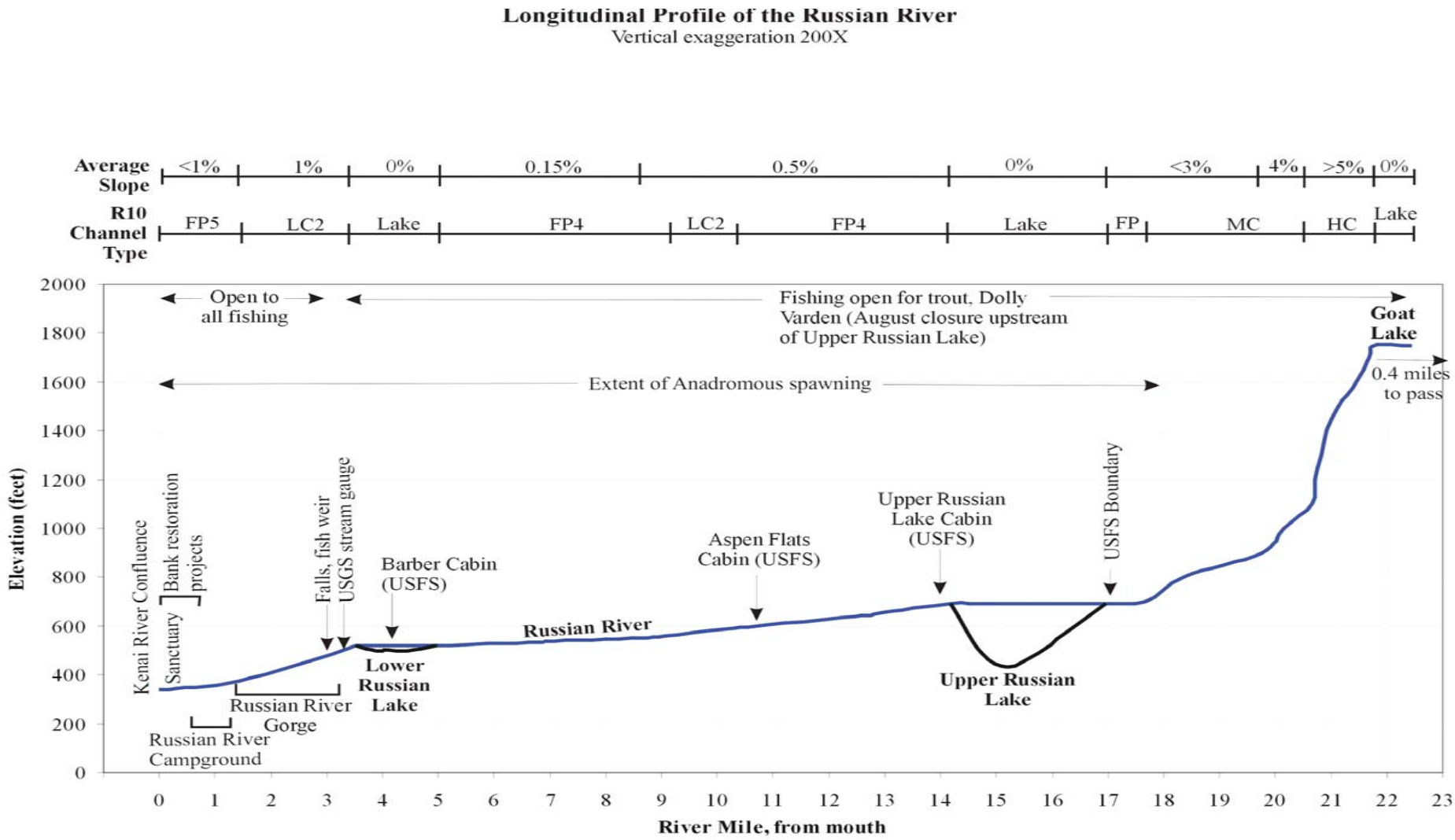


**Figure 4.7: Generalized longitudinal profile of the Russian River, by river mile.**

**Figure 4.8: Trampled, compacted, and eroding streambank near the mouth of the Russian River (*photo by Dean Davidson, Chugach National Forest*).**

In 1950, the channel width along the lower 0.6 miles of the Russian River ranged from about 40 to 100 feet. Channel width changed little between 1950 and 1962, and only a small amount of channel widening occurred by 1974. Between 1974 and 1990, increased angler use of the lower Russian River downstream of Russian River Campground resulted in considerable channel widening (figure 4.9). By 1990, the channel width ranged from about 60 feet to 140 feet. Between 1990 and 2003, little additional channel widening occurred, likely the result of management efforts to control bank degradation.

Most of the bank erosion has occurred on the east side of the river because of the concentrated use from Russian River Campground and the presence of a high bluff along much of the west bank of the lower Russian River. Bank erosion along the east bank has resulted in development of a much more irregular shoreline, with large sections eroded out of the bank where angler trampling has damaged the floodplain and riparian vegetation.

The largest channel changes have occurred at the mouth, where the island separating the Russian and Kenai Rivers has been decreasing in size, with a new channel developing into the Kenai River to the east of the island. Two areas of concern for bank erosion and its effects on the angler trail are about 500 feet upstream of the mouth and about a half mile upstream of the mouth at “Cottonwood Corner.” At both of these locations, the channel is currently migrating into the floodplain area on the east side of the river.

Construction of elevated, light-penetrating boardwalks along the lower Russian River in the last 10 years to control the effects of angler use on bank erosion has substantially improved the condition of the banks and riparian areas. Along with access stairways into the river and seasonal fences that restrict angler trampling on the banks, the riparian vegetation has recovered, the banks have become more stable, and the rate of channel widening has decreased. Ongoing bank restoration projects on the east bank by the US Forest Service and the Youth Restoration Corps (YRC) have helped stabilize problem areas of the channel. Continued monitoring of channel morphology will quantify changes and trends in channel width, depth, and bank structure. Future restoration work will deal with channel migration where it threatens the angler trail.

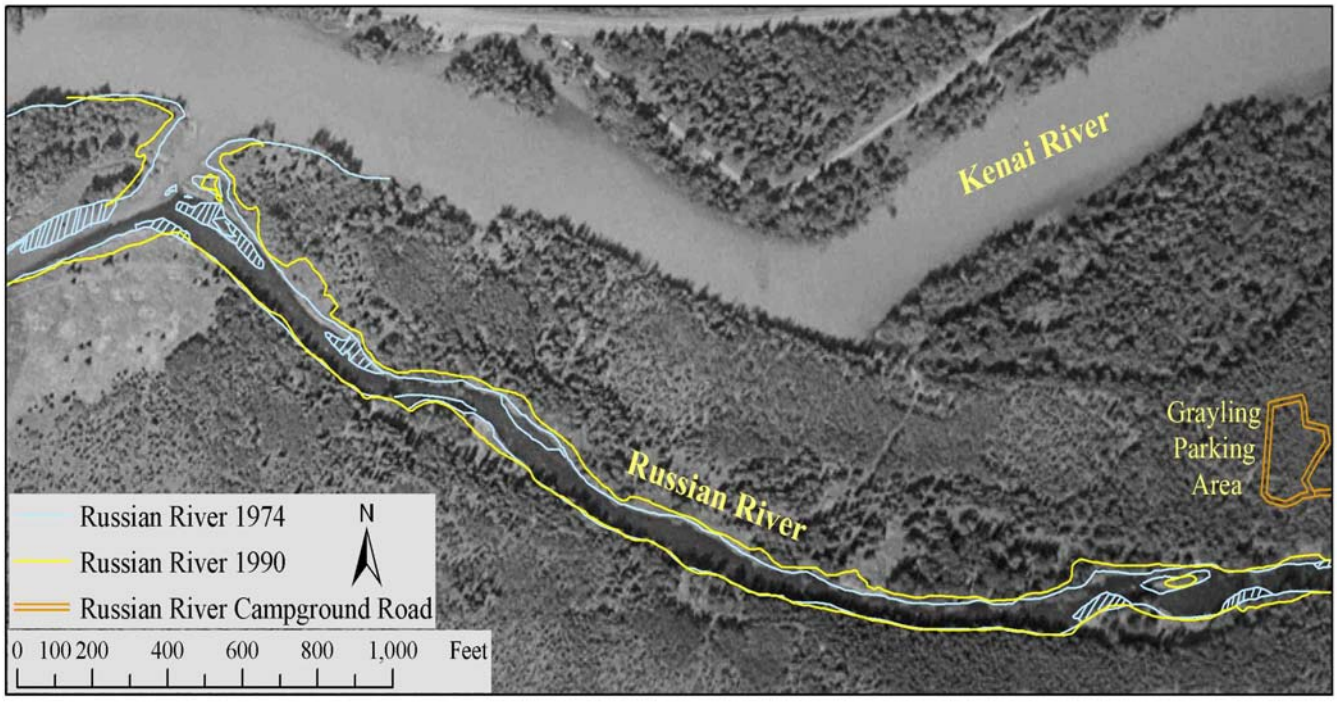


**Figure 4.9: Channel changes on the lower Russian River from 1974 to 1990, with 1962 base photo. Cross-hatched areas are gravel bars. Adapted from lines drawn from aerial photography by Dave Blanchet, Chugach National Forest.**

No efforts have been made to protect or restore the banks on the west side of the lower Russian River. Because access to the river is primarily from the Russian River Campground to the east, most of the angler impacts occur on the east side of the river. However, the ferry from the Sterling Highway over the Kenai River provides substantial access to the west bank at the mouth of the Russian River, where considerable bank erosion also occurs. Although the west bank is not as heavily impacted upstream of the mouth, bank trampling occurs, increasing the rate of bank erosion and channel widening. Also, increased angler use in the gorge downstream of Lower Russian Lake is causing increased bank erosion along the primitive angler trail that follows the east side of the river. Riparian vegetation in the gorge is less abundant because of the lack of floodplains. Erosion in this area will not substantially increase channel width, but it does affect vegetative cover for fish, overhanging banks, and sedimentation. Because current trends suggest that more people are using this area, future monitoring and restoration efforts may need to focus on this area.

**Upper Russian River**

In the 3 miles upstream of Lower Russian Lake, the Russian River has fine substrates, a low gradient averaging about 0.15%, and a meandering channel pattern with extensive floodplains. This highly sinuous channel actively migrates, and oxbows and meander cutoffs are common. Although the channel is naturally dynamic in this location, the fine grained soils that comprise the banks make this area highly susceptible to accelerated bank erosion from angler trampling. Damage to riparian vegetation from angler trampling could result in decreased bank integrity, channel widening, loss of deep pools, and increased sedimentation into the channel. This is not currently occurring in this

area. Although the area is closed to salmon fishing, increased use of the Russian River watershed may lead to increased angler use in this area for other species. In the 5 miles downstream of Upper Russian Lake, the gradient increases to about 0.5%. Upstream of Upper Russian Lake, the gradient increases dramatically to the headwaters near Goat Lake (figure 4.7).

**Summit Creek**

Summit Creek drains a 6.5 square mile watershed southeast of Upper Russian Lake and currently flows into the Resurrection River watershed. This small, moderately glaciated watershed creates an alluvial fan on the broad pass separating the Russian River and Resurrection River. Because of its high flows and high sediment loads, the Summit Creek channel has shifted between the Russian River and Resurrection River in the past century (figure 4.10).

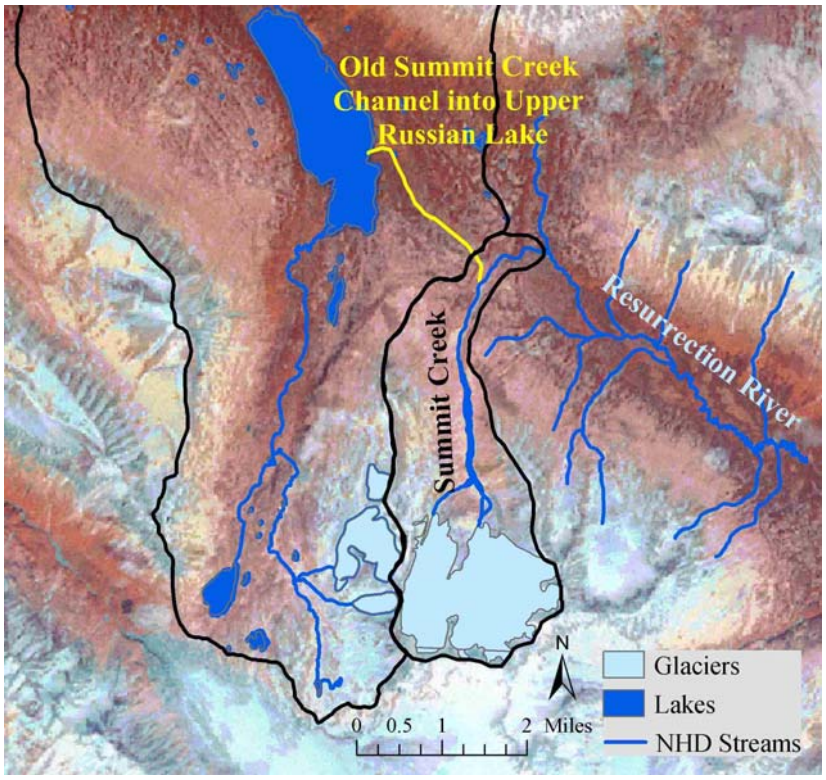


**Figure 4.10: Summit Creek watershed and the old channel into Upper Russian Lake.**

In the late 1950's, the Summit Creek alluvial fan channel migrated and began to drain into the Russian River watershed, and glacial silt from Summit Creek began discharging into Upper Russian Lake. Fearing that the increased turbidity and sediment loads would decrease ecosystem productivity on the popular Russian River, a levee was constructed in 1958 to force the flow of Summit Creek back into Resurrection River (Troyer and Medred, 1999). This levee, as well as a bulldozer, remain in place. The potential exists for a large flood to cause the channel to break through the levee, but as the glaciers continue to recede, sediment loads are decreasing.

The addition of Summit Creek to the Russian River watershed would increase the size of the Russian River watershed by about 10% and would cause noticeable changes in streamflows, water quality, and ecosystems in the Russian River. This would increase the flow in the Russian River by about 10 to 20% because of the increased runoff from heavier precipitation and glacial melting in the Summit Creek watershed. The addition of Summit Creek to the Russian River watershed would increase the percentage of glaciated area in the watershed from 0.9% to 3.6%. This would likely be enough to increase the turbidity in Upper Russian Lake, affecting plankton productivity and those fish that feed on plankton. The effect would diminish downstream as suspended sediment would settle in the lakes and channel of the Russian River.

### 4.3.2 Water Quality

Because of the scarcity of development and human activities in the watershed, water quality is generally pristine. With only small remnant glaciers in the watershed, the water in the Russian River is very clear, with turbidities generally less than 1 NTU. The pH of the Russian River is neutral, the water is well oxygenated, metal concentrations are generally very low, and water temperatures have been measured as high as 12 degrees C in July (Litchfield and Kyle, 1991; Litchfield and Kyle, 1992; US Geological Survey, 2004; Ruffner, 2004). All measured parameters were below the Alaska state standards for drinking water (Alaska Department of Environmental Conservation, 2003). No hydrocarbons have been detected in the Russian River during the Kenai Watershed Forum baseline water quality monitoring program that began in 2000 (Ruffner, 2004). Nutrients in the Russian River are greatly affected by the large number of returning salmon, which are likely to cause seasonal variations in nutrient levels. High levels of nitrates have been measured in the Russian River (Litchfield and Kyle, 1991; Litchfield and Kyle, 1992; Ruffner, 2004), likely because of the presence of fish carcasses. Studies in 1994 by the US Forest Service and between 2000 and 2003 by the Kenai Watershed Forum (Ruffner, 2004) showed low levels of fecal coliform in the Russian River.

The water in the Russian River is generally clear. Bank erosion from angler trampling has the potential to increase sediment loads and turbidity in the lower Russian River, when high flows encounter raw, eroding banks. Currently, the Russian River has the capacity to transport most fine sediment downstream. However, increasing bank erosion along the angler trail in the lower gorge can cause additional sediment deposition. Fine sediments in the channel can fill the interstitial space in the gravel substrate, decreasing the quality of spawning habitat.

Along the east side of the lower Russian River, light penetrating walkways, fences restricting river access to certain points, and continued bank restoration efforts are helping to maintain good water quality by improving riparian areas and decreasing rates of bank erosion. Also, the presence of toilets at the Russian River campground helps control levels of fecal coliform in the river. Although most of the access to the lower Russian river is from the campground on the east side of the river, the west bank remains a potential source of sedimentation from bank erosion resulting from angler trampling.

Floatplane use on Upper Russian Lake has increased in recent years, increasing the potential for impairment of water quality from oil and gas spills. An apparent oil slick was

observed on Upper Russian Lake during August 2003, possibly the result of floatplane use (personal communication, Benoit, 2003).

Forest fires and the subsequent loss of vegetative cover and decreased infiltration rates can potentially cause increased sediment loads in the Russian River through increased surface runoff and erosion. Much of the sedimentation that would result from a fire in the upper watershed would settle in Lower Russian Lake, although suspended sediment can continue into the Lower Russian River. Forest damage from spruce bark beetle infestation also has the potential to cause increased sedimentation from increased runoff and erosion. However, this is not likely to make a large effect on water quality in the Russian River watershed because of the rapid replacement of dead trees with understory vegetation, which protects the soil and maintains high infiltration rates, as well as the presence of a diverse mix of birch, cottonwood, aspen, hemlock, and spruce in the watershed. The small remnant glaciers that exist in the headwaters of the watershed are an additional source of sediment and turbidity to the tributary streams that they feed, but water quality effects from these sources are generally not visible downstream of Upper Russian Lake.

## 4.4 Vegetation

The assessment area includes fifteen consolidated cover types in the Chugach National Forest GIS database (table 4.1). These types, by smallest acreage to largest acreage, include all types from snow and ice to white spruce. Acreages for the Kenai National Wildlife Refuge portion of the landscape are not available, but are expected to cover a similar percentage of the landscape. Percentage is presented in the third column. The cover type layer in the GIS database was derived from a more detailed Timber Type layer, and several cover types reflect consolidations of these types according to the Chugach National Forest Resource Information Management Data Dictionary (2004). White spruce and Sitka spruce were combined to form the hemlock-spruce type, although in this landscape there is no Sitka spruce. Mixed hardwood-softwood type includes aspen-white spruce, birch-white spruce, cottonwood-Sitka spruce, cottonwood-white spruce, cottonwood-birch-white spruce, aspen-hemlock, birch-Sitka spruce, and birch-hemlock. Cottonwood-balsam poplar (which are taxonomically similar) was combined with cottonwood-birch to form cottonwood, aspen-birch and aspen were called aspen, and natural grass and alpine high meadow were combined to form grass and alpine. The original Timber Type layer was derived from aerial photo interpretation in the late 1960's and early 1970's. Additions and changes have been made to this layer as changes are noted on the ground, but the cover types listed polygon by polygon do not necessarily have complete accuracy.

**Table 4.1: Acres and Percentages of Landscape per Cover Type.**

| Cover Type | Acres | Percent of Landscape |
|---|---|---|
| SNOW AND ICE | 20 | 0.1 |
| MUSKEG MEADOW | 42 | 0.2 |
| ASPEN | 100 | 0.5 |
| OTHER NONFORESTED | 106 | 0.5 |
| OTHER BRUSH | 150 | 0.7 |
| COTTONWOOD | 267 | 1.3 |
| BIRCH | 401 | 1.9 |
| MIXED HARDWOOD - SOFTWOOD | 608 | 2.9 |
| ROCK | 643 | 3.1 |
| WATER | 658 | 3.2 |
| HEMLOCK-SPRUCE | 850 | 4.1 |
| HEMLOCK | 1424 | 6.9 |
| ALDER | 3700 | 17.8 |
| WHITE SPRUCE | 3784 | 18.3 |
| GRASS AND ALPINE | 7984 | 38.5 |
| Total | 20,738 | 100.0 |

When considering the landscape as a whole, broad categories of cover type can be important in gaining a clear picture of forested cover as compared to non-forested cover. Table 4.2 presents the combined totals of acres and percentages for major categories of land cover, including forested, non-forested vegetation, non forested (such as rock, ice and snow, human-constructed features), and water. The majority of this landscape falls into a non-forested vegetation category, including grasslands, alpine meadows, and shrub or brushlands. Much of this landscape is steep side slopes to the south of the assessment area, away from the areas of heavy recreational use along the highway corridor.

One of the unique features of this assessment is the influence of elevation gradients on the distribution and type of vegetation. Vegetation above 1500 feet elevation is generally shrub and alder-dominated communities, including areas of dwarf birch, salmonberry, willow, various ericaceous shrubs and heath, mountain-ash, and others. Forested areas are generally confined to below 1500 feet. Within the forested types, the system of lakes and streams which flow into the Russian River, and in turn, into the Kenai River, create a number of unique riparian vegetation types including some non forested vegetative types at lower elevations. Figure 4.11 presents the cover types and other features of the National Forests lands.

**Table 4.2: Summary of Major Cover Type Categories.**

| Summary by Major Type | Acres | Percent of Landscape |
|---|---|---|
| Forested | 7434 | 35.9 |
| Non Forested Vegetation | 11,877 | 57.3 |
| Non Forested | 769 | 3.7 |
| Water | 658 | 3.2 |
| Total | 20,738 | 100.0 |

The highest elevations support little or no vegetation and are covered with ice and snow, interspersed with bare rock and talus. In some areas in the higher elevation soils are more developed, supporting plant communities ranging from scrub heath and shrub to alpine grasslands and the colorful and unusual muskegs meadows, with acidic soil features and an unusual complement of ericaceous vegetation. Side-slopes at lower elevations support forested stands and wetlands spreading down to the alluvial valley bottoms of different watersheds. On steeper slopes and drainages, avalanches are a predominant force in vegetation dynamics.

On the Refuge section of the landscape, there was a study conducted in the upper drainage. Figure 4.11 shows the points of the data collection. Plot data reconstructed the historical composition of the forests, and included information on soil, existing vegetation, and stand age. There was no correlation between tree size and tree age.

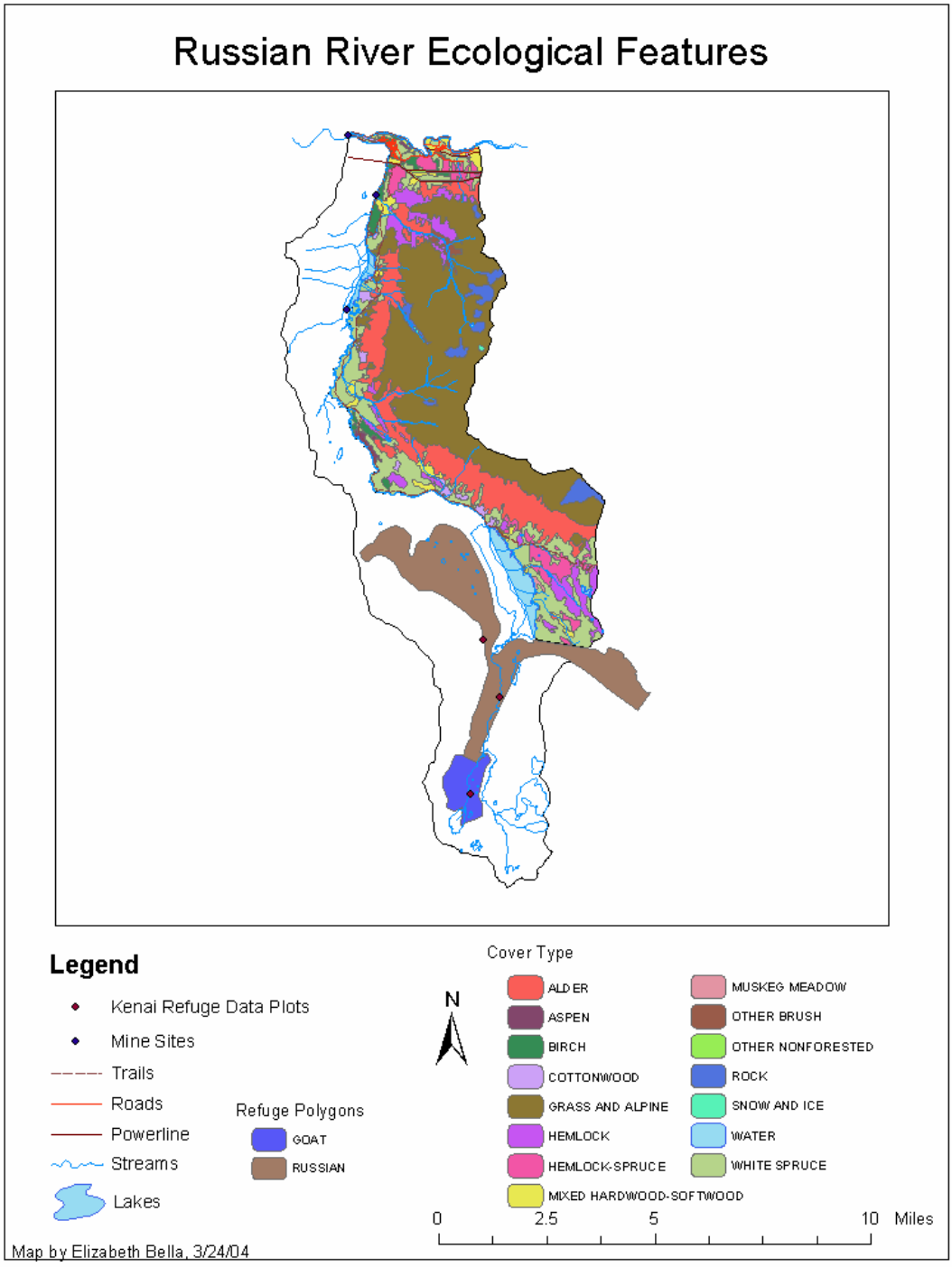


**Figure 4.11: Ecological Features**

The Russian River landscape can also be considered in sections based on proximity to the areas of heavy use and the areas away from trails and roads. The section closest to the highway is most heavily used and is most exposed to the influences of recreational use, including trampling, non native species introduction and spread, bare ground areas and exposed roots, and shifts in composition as more fragile species are reduced in population size. Figure 2 shows the location of non-native species (weeds) found during surveys in the summer of 2003. Surveys were conducted by Rob DeVelice (Forest Ecologist) assisted by Elizabeth Bella, Betty Charnon, Michael Shephard, and others. Results from this survey are presented in a Forest report from 2003, and data is on file at the Supervisor's Office in Anchorage for this weed study.

Areas away from the trail system, campground and cabins (include the Russian Lakes trail and the trails leading around and from the campground) and road system (including the highway, the campground loops, and Snug Harbor Road) offer a more pristine representation of vegetation typical of this landscape.

Extensive vegetation data collection has taken place along the developed areas of the landscape. There is a series of paired fisheries and ecology plots aimed at studying bank degradation along the Russian River's lower section along the angler trail, near the confluence with the Kenai River. In addition, there is a series of permanent ecology plots under the boardwalks aimed at studying the effects of light penetrating boardwalk as compared to old wooden boardwalks in terms of vegetation recovery. Several biological evaluations for plants have taken place along the trails, cabins, and around the campground within the past 15 years.

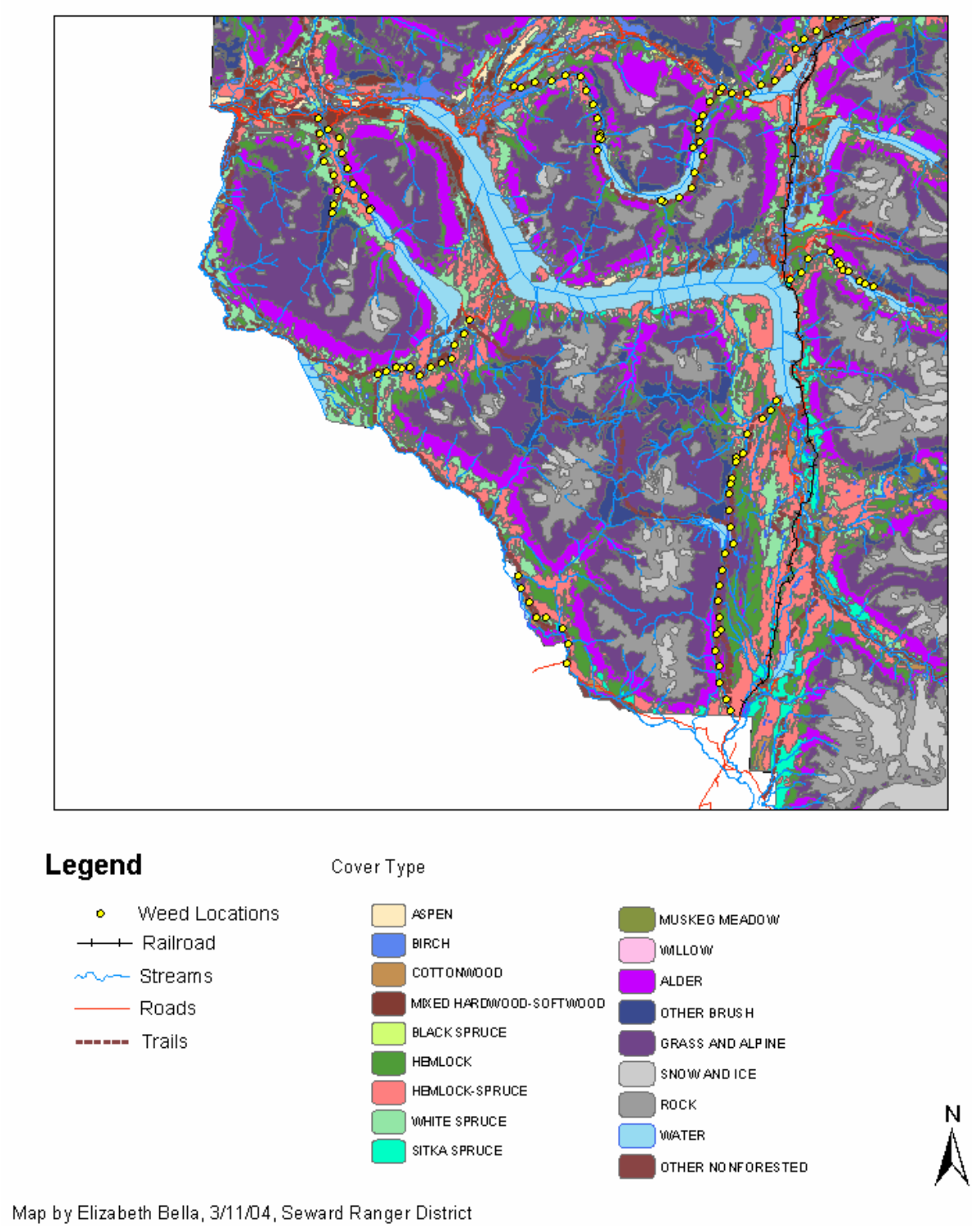


**Figure 4.12: Weed Locations on National Forest Lands in the Russian River Landscape.**

## 4.5 Fire

Current fire conditions in the Russian River and surrounding area have stayed fairly constant over the past few years. There has been an average of 3-4 fires in the area over the past two years. These fires have been easily extinguished but all have been human caused. The current outbreak of spruce bark beetle has been documented in the area but has not drastically affected the fuel loadings but could have significant effects in the future. There is also a notable increase in recreation use in the area and also new structures being built in the vicinity. This coupled with the dead spruce issue could pose a serious fire suppression problem in upcoming years.

Fuels and fire data is not up to date for this area or most of the Kenai Peninsula but efforts are in place to gather the needed information and come up with strategic plans to adjust to the growing population and suppression problems. Major fires that have occurred in the watershed since 1947 are shown in Figure 4.13.

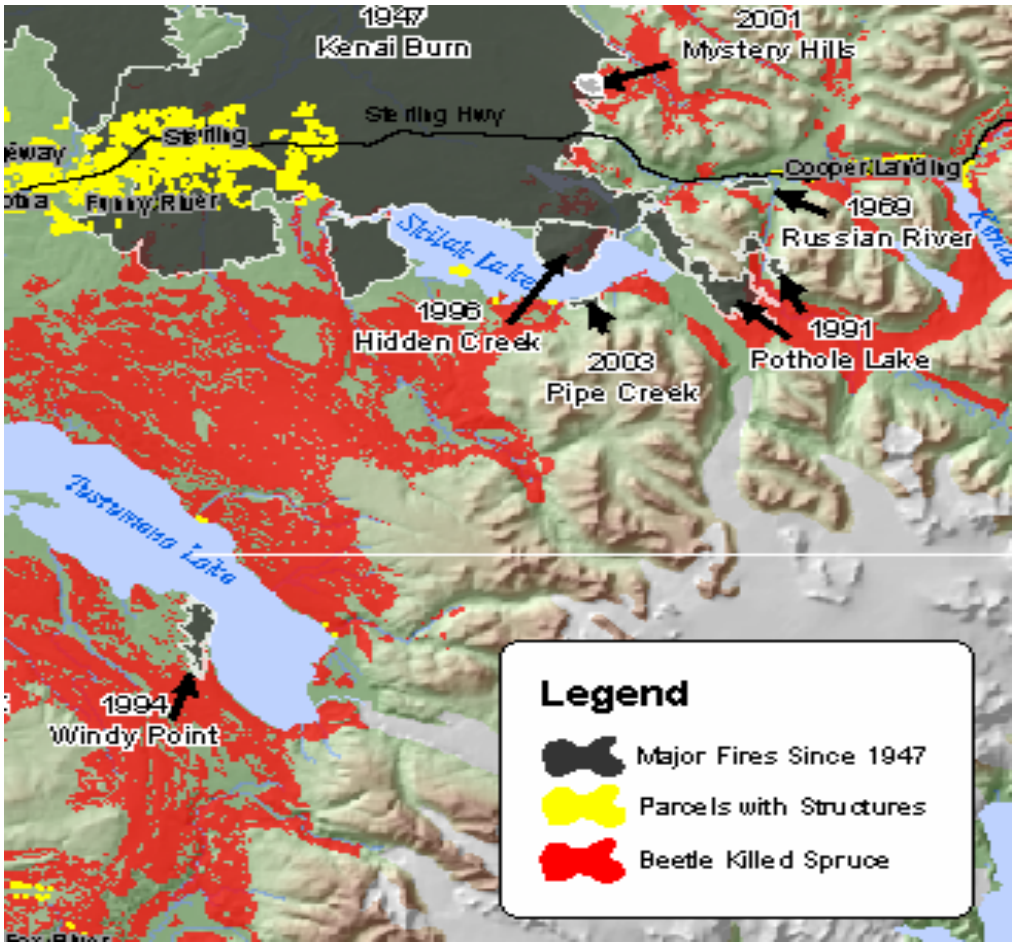


**Figure 4.13: Fire occurrence in the Russian River watershed.**

## 4.6 Aquatic Species and Habitats

The Russian River is a world famous Sockeye fishery that typically sees 70,000 anglers in a single 4-month season. The river also has a very competitive rainbow fishery, which is catch and release only. The increase in visitation impacts the river and its riparian area. These increases in visitation also impact water quality, including increased runoff of fecal coliform/fecal streptococcus from human waste, increased sedimentation caused by increased bank erosion, and an increase in water temperature due to stream widening and loss of canopy cover. Seasonally the riverbanks are fenced to help protect the restored areas as well as riparian vegetation holding the banks in place. Boardwalks with light penetrating decking have been constructed on Russian River angler trail, with areas of packed gravel and also areas with matting along the river. The boardwalk also has river access points with walkways and stairs leading into the river. Ongoing restoration projects still occur on the river by USFS personnel and the Youth Restoration Corps. During the past few years further erosion and trail degradation has become more noticeable on the angler trail between the power line and the falls. However, it appears the construction of trails, boardwalks and river access has helped to slow if not stall the erosion process along the USFS side of the river. The Refuge side is showing signs of increased pressure and further erosion.

In 1968 the Forest Service constructed the Russian River campground. This was the starting point for Russian River getting *"loved to death".* With increases in facilities the numbers of anglers increased on the river. The streamside riparian vegetation was trampled and soil was exposed. The river washed away bare soil and unstable denuded banks slumped into the stream. The riparian showed erosion patterns similar to cattle damage on western streams in cow country. This led to channel widening which generates lower quality habitat for rearing salmon and rainbows. Wide shallow channels lack pools and are more susceptible to warming, and the water can reach lethal temperatures more quickly than in deeper narrower channels.

In the mid 1990s the Seward Ranger District began building elevated boardwalks and access stairs to manage the 40,000 visitors that came to the Russian river. Fragile riparian areas were fenced off and allowed to recover. Bank fishing was discouraged and anglers were directed to fish in the river to return their fish carcasses to the river for bear safety and nutrient cycling.

Monitoring efforts on the Russian River have been ongoing since 1996 with fifty-one permanent plots being laid out along the banks for vegetation surveys as well as bank condition surveys. These plots are re-monitored every 3 to 4 years. Data from 2004 was compared with the data from 1996 and it shows for Segment 1 (Grayling downstream to the Confluence) that 11 units are showing improvements, 8 units have had no change and only 2 units show more disturbance. The disturbance rating is a number system from 1 to 5, with 1 being relatively undisturbed (0-5%), 2 being light disturbance (6-25%), 3 being moderate disturbance (26-50%), 4 being moderate to heavy disturbance (51-75%), and 5 being heavy disturbance (76-100%). Figures 4.13, 4.14, and 4.15 show the differences from 1996 to 2004 in disturbance along the river. We have also seen an improvement in the amount of overhanging vegetation along the riverbank, which supplies insects to the river.

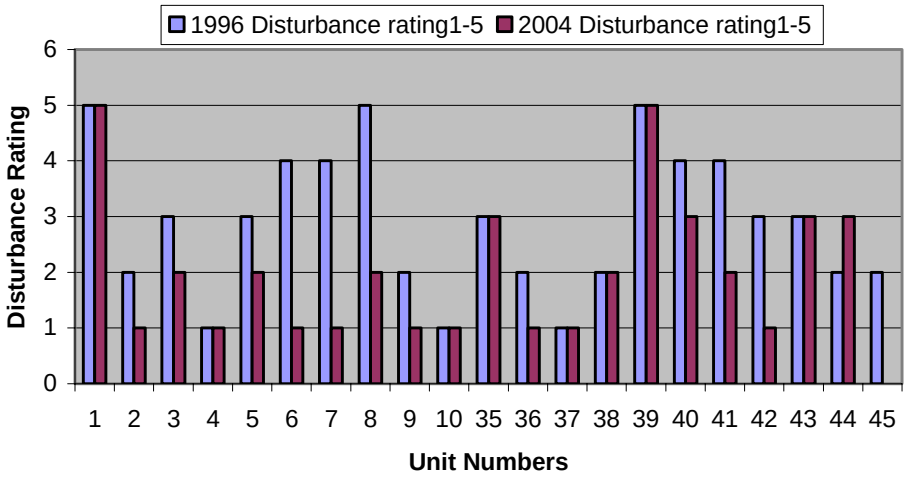


**Figure 4.14: Bank Disturbance Rating 1996 & 2004 for units in Segment 1 (Confluence to Grayling).**

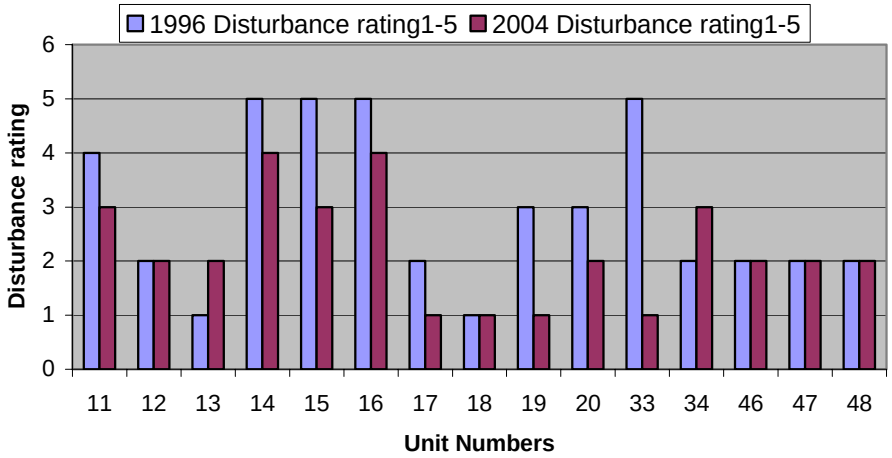


**Figure 4.15: Bank Disturbance Rating 1996 & 2004 for units in Segment 2 (Grayling to Pink Salmon).**

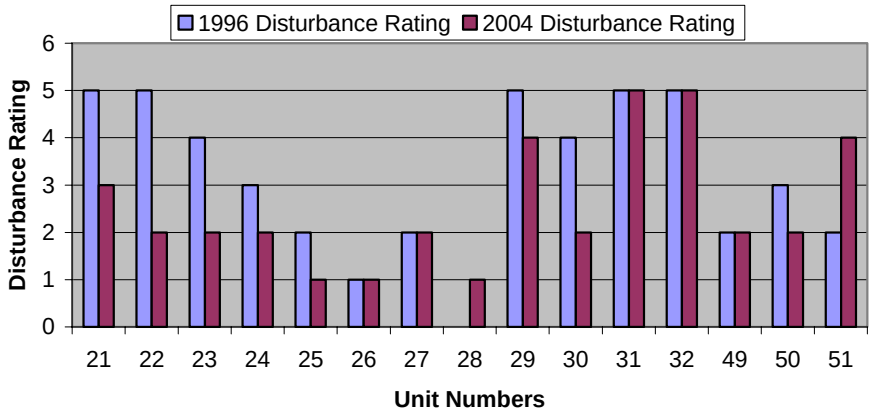


**Figure 4.16: Bank Disturbance Rating 1996 & 2004 for units in Segment 3 (Pink Salmon to Power Lines).**

## 4.7 Terrestrial Species and Habitats

The diverse mosaic of habitat types within the watershed association supports populations of an array of large game and other nongame animals. Management has focused on management indicator species and species of concern to characterize existing conditions. In addition, while there are no threatened or endangered species or potential habitat in the watershed, several sensitive species have existing or potential habitat.

**Table 4.4: TES, MIS, and SSI habitat of the Russian River Watershed.**

| SPECIES | MIS | TES | SSI | EXISTING HABITAT | POTENTIAL HABITAT |
|---|---|---|---|---|---|
| Humpbacked Whale (Endangered) | | X | | No | No |
| Steller"s Eider (Threatened) | | X | | No | No |
| Montague Island Tundra Vole (Sensitive) | | X | | No | No |
| Osprey (Sensitive) | | X | | No | Yes |
| Peale's Peregrine Falcon (Sensitive) | | X | | No | No |
| Steller Sea Lion (Endangered) | | X | | No | No |
| *Dusky Canada Goose (Sensitive) | X | X | | No | No |
| Kittlitz Murrelet (Candidate) | | X | | No | No |
| Trumpeter Swan (Sensitive) | | X | | Yes | Yes |
| Brown Bear | X | | | Yes | Yes |
| *Black Oystercatcher | X | | | No | No |
| Moose | X | | | Yes | Yes |
| Mountain Goat | X | | | Yes | Yes |
| Gray Wolf | | | X | Yes | Yes |
| Lynx | | | X | Yes | Yes |
| Marbled Murrelet | | | X | Unknown | Unlikely |
| *Montague Island Hoary Marmot | | | X | No | No |
| River Otter | | | X | Unknown | yes |
| Sitka Black-tailed Deer | | | X | Unknown | Yes |
| Townsend's Warbler | | | X | Unknown | Yes |
| Wolverine | | | X | Yes | Yes |
| Bald Eagle | | | X | Yes | Yes |
| Northern Goshawk | | | X | Unknown | Yes |

***The Montague Island Tundra Vole and Montague Island Hoary Marmot are endemic to Montague Island, and are not known to occur on the Kenai Peninsula. Black Oystercatchers do not occur on the Seward Ranger District.***

## 4.7.1 Sensitive Species

### Trumpeter Swans

Trumpeter swans were observed in the watershed during the breeding season in 2003 and 2004. One pair of swans with cygnets was documented, just south of Lower Russian Lake. Another pair with cygnets was observed just northwest of Placer Creek (just south of the watershed). Swans are known to breed west of the watershed, on the KNWR; however, this is the first observation of breeding swans this far east. In 2004,

the Lower Russian Lake pair, and Placer Creek pair were observed again in the same locations, without cygnets. A pair of swans is also known to nest near Exit Glacier, southeast of the watershed (cygnets in 2003). The Exit Glacier pair was observed to forage far to the northeast, close to the Placer Creek nesting area, within the watershed. The Placer Creek birds may use the Russian River watershed for foraging.

Approximately 145 acres potential swan lake habitat occurs in the watershed on national forest land.

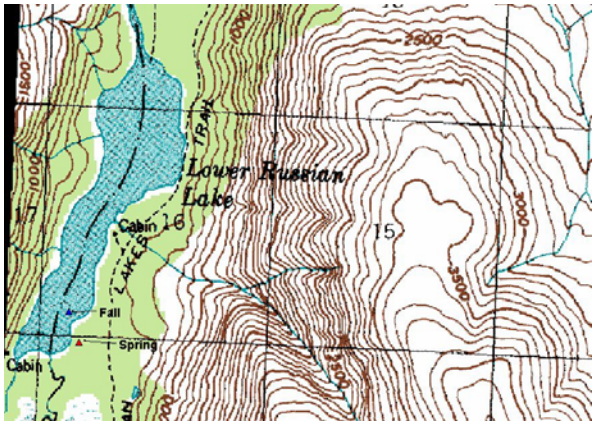


**Figure 4.17: Lower Russian Lake Swan Locations.**

**Figure 4.18: Photo of pair taken in the spring on 5-28-04.**

### Osprey

The Osprey (***Pandion haliaeetus***) is a Region 10 sensitive species. It is considered an uncommon to rare throughout Alaska (Palmer 1988). The osprey is widely distributed across much of Alaska south of the Brooks Range, but localized in the vicinity of lakes, large rivers, and coastal bays (Gabrielson and Lincoln 1995). They nest near water, atop trees, posts, rock pinnacles, or even the ground. Ospreys are not known to use the watershed, bur potential nesting and foraging habitat does not occur near the Upper and Lower Russian Lakes. Ospreys may travel through the area during spring and fall migrations, but they are not considered to be winter residents.

## 4.7.2 Management Indicator Species

### Moose

Moose are primarily associated with early to mid succession habitat and riparian areas (USDA Forest Service 2002) and are dependent on early seral vegetation types including young hardwoods (willow, birch, aspen and to a smaller extent, cottonwoods). The availability of winter range is considered to be the major limiting factor of moose population size. On the Kenai Peninsula other limiting factors include predation, hunting, and mortality from vehicular collisions (Lottsfeldt-Frost 2000). Renecker and Schwartz (1998) found that the nearness of feeding and hiding/thermal cover also can be a limiting factor, especially in areas of large-scale disturbance.

Moose winter range is primarily located north of Lower Russian Lake in the 1969 burn area, and around Upper Russian Lake (personal communication with Ted Spraker, AKFG). CNF GIS data layers indicate that high value moose habitat is estimated be just over 10,000 acres on the eastern side of the watershed. KNWR acreages are not included in these values. The largest amount of high quality moose habitat is found in riparian areas along the Russian River, however high quality habitat is distributed throughout the CNF portion of the watershed on all but the highest elevations. Current cover-type mapping in the GIS database must be updated to more accurately reflect the existing distribution of hardwood habitat types used and favored by moose. Existing GIS vegetation-type mapping does not accurately identify early seral vegetation. For example, birch stands mapped in the seedling/sapling size class are typically 80 years old and no longer provide forage. An updated analysis of existing habitat composition, including age and size classes, is needed to estimate the acreage and quality of moose habitat and to identify the location and extent of potential habitat enhancement opportunities (e.g., prescribed burning or silvicultural treatments). ADFG considers the overall habitat on the SRD to be of low quality and capable of supporting only 2 to 5 moose per square mile.

The continuing spruce bark beetle infestation has altered the habitat structure and function across the watershed association area. Dead or dying spruce forest types are likely to be replaced by early seral phase vegetation communities favorable to moose. In addition, dead and dying spruce have contributed to increased fuel loading that provides opportunities for using prescribed burns to promote early seral vegetation type habitat favored by moose. Potential prescribed burning across the landscape should include an evaluation on potential long-term impacts on late seral vegetation types and habitat dependent species.

**Mountain Goat**

Mountain goats use cliffs, alpine, and sub-alpine habitats and are generally found near steep cliffs with slopes over 50 degrees. In South-central Alaska, winter habitat may be a limiting factor for mountain goat populations (USDA Forest Service 2002).

Mountain goat winter range occurs primarily on south facing alpine slopes on approximately 1600 acres of the eastern side of the watershed (value does not include habitat on the KNWR). Mountain goats are known to occur on Cooper Mountain and on the north side of the Russian River (personal communication with Ted Spraker, AKFG 2002), and west of Lower Russian Lake on the Kenai National Wildlife Refuge (personal communication with Pat O'Leary, Seward Recreation Program).

**Brown Bear**

Brown bears have large home range requirements and are generally intolerant of human activities and development. Suring et al. (1998) estimated the Kenai Peninsula population at 280 bears or about 12 bears per 386 square miles. On the Kenai Peninsula, the primary factor limiting is spring and summer feeding habitat. Spring and summer habitat includes south-facing hillsides and avalanche chutes, big game winter ranges, and salmon streams that provide the high quality foods that bears need to develop fat reserves before denning and to replenish fat stores depleted after denning. Carrion, berries, and fish sources in the watershed association provide a diversity of food sources for bears.

Some high value brown bear habitat occurs within the watershed, mainly near the Kenai River on the north portion of the watershed. Chugach National Forest GIS layers indicate that the eastern side of the watershed contains 657 acres of low value brown bear habitat, 18,700 acres of moderate value habitat and 77 acres of high value habitat. The high value habitat occurs on the northern portion of the watershed, near the Kenai River. This area also receives some of the highest density of human use. Acreage of suitable habitat from the western side of the watershed (Kenai National Wildlife Refuge) is unavailable. Upper Russian Lake area has high use by bears when the salmon are present.

The majority of the watershed is considered a “brown bear core” management area, listed in the forest plan as management emphasis to meet population objectives for brown bears and to reduce dangerous encounters between humans and brown bears.

Roads and trails, other existing development, and increasing levels of recreational activities in the watershed may reduce the quality of available habitat and increase the number of negative bear-human encounters. Habitat modification and human activities have resulted in an increase in the number of brown bears killed in defense of life or property (DLP; Suring and Del Frate 2002). During the summer, bears concentrate along low-elevation valley bottoms and coastal salmon streams in areas that are heavily used by humans. Several encounters have occurred at salmon streams resulting in injury to humans and injury or death to brown bears.

### 4.7.3 Species of Special Interest

#### Bald Eagle

Bald eagles in south central Alaska generally nest in old cottonwood trees near water and use the same nest each year (Daum 1994). The nearness of large nest trees to food sources is the primary limiting factor for the bald eagle population. Eighty-two percent of all bald eagle nests on the Seward Ranger District are in mature cottonwood trees with an average diameter of 31 inches and within one-quarter mile of an anadromous-fish-bearing stream.

Bald eagles are known to nest along the Kenai River and Russian River near Upper Russian Lake. Information on historic populations of bald eagles is not available. Habitat impacts if they exist in the watershed are likely related to natural disturbances such as flooding and human disturbance from recreation and aircraft.

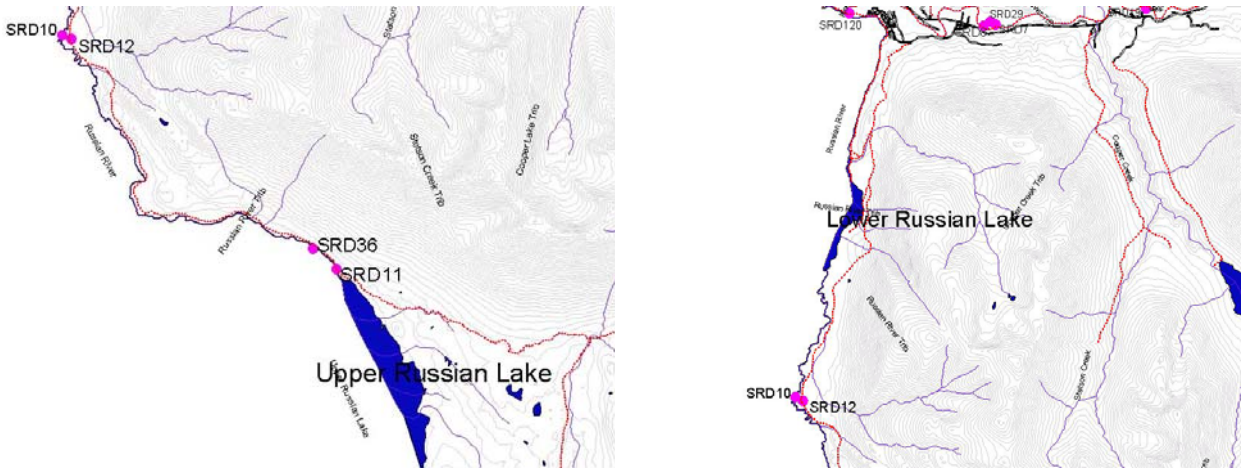


**Figure 4.19: Bald Eagle Nests in the Russian River Watershed.**

**Wolverine**

The wolverine is a scavenger and opportunistic forager with a low biotic potential and large home range requirement. Similar to the brown bear, it is sensitive to human activities and development. Recreational uses and hunting may be population-limiting factors.

Little is known about wolverine populations in and their use of the watershed. Wolverines kill sites or tracks were documented in 2 locations in or near the watershed in 1992 (near the confluence of the Kenai and Russian Rivers, and south of Upper Russian Lake). Wolverines travel over a wide range of habitats in search of food such as big game carrion (moose and goats) that occur within the watershed.

**Northern Goshawk**

The northern goshawk is an uncommon forest raptor that feeds on small and medium sized mammals and birds (Iverson et. al. 1996). They are year-round residents of the CNF (USDA Forest Service. 1984). The amount and juxtaposition of feeding and nesting habitat appears to limit population viability in Southeast Alaska (Iverson et. al. 1996). The nesting-breeding season is March –July. The majority of goshawk nests on the SRD are in old growth hemlock-spruce stands characterized by a closed canopy, large average diameter, gap regeneration, and an open understory (SRD goshawk nest files).

There are no known northern goshawk nests located within the Russian River watershed, although potential habitat exists in older hemlock and hemlock- spruce forests. No surveys have been conducted, and surveys in potential habitat in order to determine if goshawks are present and breeding here. Most of the mature or old growth habitat occurs near Upper Russian Lake, and has been impacted by the spruce bark beetle. Habitat for the goshawk and other old growth species is likely very limited.

**River Otter**

River otters are associated with coastal and fresh water environments and the immediately adjacent (within 100-500 feet) upland habitats (Toweill and Tabor 1982;

USDA Forest Service 2002). Beach characteristics affect the availability of food and cover, and adjacent upland vegetation also provides cover (USDA Forest Service 2002). Otters travel several miles overland between bodies of water and develop well-defined trails that are used year after year (USDA Forest Service 2002). River otters breed in late winter or early spring. Young are born from November to May with a peak in March and April (Toweill and Tabor 1982). The family unit usually travels over an area of only a few square miles (USDA Forest Service 2002).

Habitat for river otter is likely along the Russian River and some of its tributaries. Rivers otter sign has been noted near Lower Russian Lake, and it appears the area is being trapped for otters (personal communication with Pat O'Leary, Seward Recreation Program).

**Lynx**

Lynx use a variety of habitats, including spruce and hardwood forests, in early successional communities. They require a mosaic of conditions, including early successional forests for hunting and mature forests for denning (Koehler and Brittell 1990). Lynx habitat in Alaska occurs where fires or other factors create and maintain a mixture of vegetation types with an abundance of early successional growth (Berrie 1973; Berrie et al. 1994). In Alaska, lynx tend to use elevations ranging from 300-1075 meters, and seldom use unforested alpine slopes (Berrie 1973). Mating occurs in March and early April and kittens are born 63 days later under a natural shelter such as a wind fallen spruce or rock ledge (Berrie et al. 1994). The production and survival of lynx kittens is influenced dramatically by cyclic changes in snowshoe hare and other small mammal populations (Poole 1994). The populations of lynx on the Forest are thought to be stable and within the range of historic viability (USDA Forest Service 2002).

Lynx probably occur throughout forested sections of the watershed. CNF GIS data is lacking. A lynx was seen in the Grayling parking area of the Russian River campground in 2003, much to the delight of all the campers (personal communication with Pat O'Leary, Seward Recreation Program).

**Marbled Murrelet**

Marbled murrelets are medium sized seabirds that inhabit near-shore coastal waters, inland freshwater lakes, and nest in inland areas of old-growth conifer forest or on the ground (Carter and Sealy 1986, Marshall 1988). Except for the fall period when they are molting, flightless, and stay on the ocean, murrelets are known to fly to tree stands.

The Seward Ranger District has performed murrelet surveys in the past, but none have been done in the Russian River Watershed. Mature hemlock and spruce hemlock forests in this watershed may provide suitable nesting habitat, although we currently have no evidence indicating murrelets use this area. Proximity to coastal water is an important factor in nest site location.

The watershed overall appears warmer and drier than other watersheds on the Seward District, and site quality tends to be lower. For this reason, and due to extensive fires about 100 years ago, and spruce bark beetle impacts, very large trees appear to be limited. This may limit habitat quality for species such as marbled murrelets in the watershed.

**Townsend's Warbler**

Townsend's warblers are found throughout forested locations in the Russian River watershed. They are associated with older, mature spruce and hemlock forests and are not found as often in young coniferous or hardwood forests. The spruce bark beetle infestation has probably negatively affected Townsend's warblers due to their preference for older coniferous forests.

The Seward Ranger District does not have any point count routes in the Russian River watershed, but results from surveys taken at other locations on the District indicate that Townsend's warblers are found in higher numbers in older spruce and hemlock forests and that they have declined in numbers between 1994 and 2000 (Prosser 2002, unpublished).

There are not any GIS layers of Townsend's warbler habitat, but it can be assumed that they occur throughout forested sections of this watershed, most abundantly in hemlock and spruce-hemlock forests.

**Gray Wolf**

Wolves are habitat generalists. During winter wolves are found at lower elevations in forested or woodland areas (Stephenson 1994). Wolves are highly social animals and usually live in packs that include parents and pups of the year. Pack size usually ranges from 2 to 12 animals. In Alaska the territory of a pack often includes from 300 to 1,000 square miles of habitat with the average being about 600 square miles (Stephenson 1994). Wolves normally breed in February and March and pups are born in May or early June (Stephenson 1994)). There are approximately 10-11 packs occur on the Seward Ranger District, and the Skilak Lake/Russian Lakes pack inhabits the watershed (Ted Spraker, personal communication, 2002). A pack of wolves was seen taking down a moose on Lower Russian Lake several years ago (personal communication, Pat O'Leary).

## 4.8 Human Uses

### 4.8.1 Human Uses: Past

The Russian River Landscape Assessment area encompasses the entire drainage of the Russian River, which includes Upper and Lower Russian Lakes. It is bounded on the north and south by the Kenai Mountains. Ownership of lands within the area includes the USFS, State of Alaska, CIRI, the Kenai National Wildlife Refuge (KNWR) and private landowners. The Landscape Assessment Area includes approximately 42,997 acres. As outlined in the Programmatic Agreement between the USDA Forest Service, the Advisory Council on Historic Preservation and the Alaska State Historic Preservation Officer (hereafter referred to as the PA), the Forest Service has established management policies, standards, manuals, and guidelines designed for the management and treatment of heritage resources consistent with the spirit and intent of the National Historic Preservation Act of 1966, as amended (16 USC 470f) (NHPA). Please see Appendix A. Summary of Laws and Presidential Executive Orders that Pertain to Heritage/Cultural Resources.

Federal management of cultural resources is legislated by Acts of Congress and Presidential Executive Orders, which mandate conducting inventories of cultural resources, also known as historic properties, and the preservation and interpretation of all types of cultural resources for the benefit of the public.

This management includes Executive Order 13287, which pertains to use of historic buildings and sites as historic assets, and the NHPA, which requires identification of, and consideration of the effect of undertakings on, historic properties eligible for the National Register of Historic Places. Consultation with Native tribes is required by both Section 106 of NHPA, the PA and by Executive Order 13287. Consultation with the State Historic Preservation Officer (SHPO) and the National Advisory Council on Historic Preservation (ACHP) is also required by law and regulated by 35 CFR 800 and the PA.

Public involvement regarding the management of historic properties is also a requirement and includes local interested parties that may be consulted. These include, but are not limited to, groups such as the Alaska Historic Society, the Cooper Landing Historical Society, and the Alaska Association for Historic Preservation.

Cultural resources in project areas proposed by the Forest Service are inventoried under section 106 of the NHPA. Other inventories of cultural resources on National Forest lands outside identified project areas fall under Section 110 of the NHPA.
Currently 16 historic and archaeological sites are known within the boundaries of the Russian River Landscape Area. It is the goal of both the Chugach National Forest's Heritage Program and the Region 10 Heritage Program to complete an inventory of the cultural resources of this area to develop a database and accurate GIS layer of the known archeological sites.

### 4.8.2 Human Uses: Present

Existing recreational facilities in the Russian River Watershed include the following: Russian River Campground and Day-Use Areas; Russian River Angler Trail; Russian Lakes Trail; Russian River Falls Trail; three backcountry cabins; and eight designated dispersed camping sites. The main activity that draws people to the Russian River corridor is salmon fishing, although other types of recreation carried out in the area include hiking, camping, mountain biking, hunting, backcountry cabin use, nature photography, wildlife viewing, outfitter and guide use, berry picking, and relaxation with families and friends.

**Sport Fisheries on the Russian River**

Salmon species present in the Russian River drainage include chinook, coho, and sockeye salmon. The Russian River is most renowned for its consistent return of sockeye salmon. Prior to 1987, the Russian River supported the largest sockeye salmon sport fishery in Alaska. Currently it is the second largest in the state behind the Kenai River sockeye salmon sport fishery.

The sockeye salmon sport fishery is concentrated in the lower 2 miles of the Russian River, and at its confluence with the Kenai River. Angler effort during the sockeye salmon runs has increased dramatically over the years. A record of 154,200 early run

salmon were caught in 1987 and the record late run harvest was 58,410 salmon in 1985. The record for total angler effort for one season was 194,780 angler days in 1987 (Hammarstrom and Athons, 1989). An angler day is one person fishing for any length of time during one day. This intense angler use over the years has caused considerable degradation to riparian vegetation and acceleration of streambank erosion along the angler trail.

Returns and harvests of chinook and coho salmon numbers are considerably lower. The Russian River is closed to harvest of chinook salmon but is open for harvest of coho salmon with an average of 1,843 coho caught annually since 1977 (Nelson, 1990).

The lower Russian River supports the largest spawning population of trophy rainbow trout in the Kenai River system. Rainbow trout counts since 1991 have shown increasing spawning activity. This increase can be attributed to the catch and release regulation on the Russian River, fishing closure on the upper Kenai River while rainbows are spawning, and imposing a more restrictive catch and release fishery on the upper Kenai River for all rainbow trout less than 30 inches.

Combined effects of intense recreational use by anglers and spruce bark beetles killing many of the large spruce trees have stressed the riparian area and stream-banks of the lower Russian River. As more anglers use the bank area along the river, the riparian vegetation and undercut banks are damaged leaving reduced quality habitat for fish. As a result of the spruce bark beetles killing the large spruce trees, there is less live root mass along the banks to hold the soil in place.

The Russian River Angler Trail is currently being extensively reconstructed to protect and rehabilitate streamside vegetation (see summary of Angler Trail below).

**Russian River Campground**

The campground is located just south of the Sterling Highway at Milepost 53. There are 83 campsites, and two day-use parking areas that accommodate a total of 100 vehicles. The roads, spurs, and parking areas are paved. Facilities within the campground include a pavilion, vault toilets, a dump station, four stairways from the campground to the Angler Trail, and a contact station.

Campground improvements in FY2004 include the conversion of campsites to comply with federal accessibility guidelines and the replacement of two flush toilets with vault toilets. The campground is expected to receive upgrades over the next 5-10 years including the conversion of some facilities to comply with federal accessibility guidelines.

The occupancy rates at the campground are approximately 51% annually which equates to an average of 45,000 people each year. Alaska Recreation Management is permitted by the Forest Service to operate the campground through the summer months.

**Russian River Angler Trail**

The Russian River Angler Trail is located along the river and extends from Lower Russian Lake to the confluence of the Russian River and the Kenai River. This trail is approximately 3.5 miles long. Its primary use is for the recreational salmon fishery which is one of the few rivers in Alaska that has two runs of sockeye (red) salmon between

mid-June through mid-August. A good late run of coho (silver) salmon from late August through September extends the fishing season and the popularity of the Angler Trail. The lower 1.5 miles of trail is managed as a Class 5 Trail (high degree of user comfort). This trail segment is currently being extensively reconstructed to protect the fishery and cultural resources adjacent to the river by the installation of 3,000 feet of new boardwalk, controlled river access points, and the fencing and closure of 91% of the streambank to foot traffic. Due to the river's close proximity to the campground and highway system, an average of 45,000 visitors enter the campground and recreate along the Russian River from the beginning of June through September each summer.

**Russian River Falls Trail**

Russian River Falls Trail is located off of the Russian River Angler Trail a half mile below Lower Russian Lake. A viewing platform was constructed overlooking the falls in 1995. This four-mile round trip hike from the trailhead in the Russian River Campground has become a favorite day-use destination point for many non-fishing recreation visitors.

**Russian Lakes Trail**

The Russian Lakes Trail traverses the entire length of the Russian River Valley before leaving the Russian River Watershed to connect with the Resurrection River Trail and the eastern segment of the Russian Lakes Trail leading to Snug Harbor Road near Cooper Lake. The Russian River valley is located on the western side of the Kenai Mountains known for their ruggedness and scenic beauty. The trail is accessed by two trailheads: one is located within the Russian River Campground and can accommodate eight vehicles with an additional six vehicles in a nearby overflow parking area; the second trailhead is located at Mile 9 of the Snug Harbor Road near Cooper Lake and has parking capacity for 10 vehicles.

The Russian Lakes Trail is approximately 21.5 miles long. Most of the trail is managed as a Trail Management Class 3 providing a moderate degree of user comfort. There are numerous spectacular vistas along the trail, easy access to alpine country, and a large variety of plant and animal life. The trail provides access to salmon and trout fishing and is used year-round by hikers, horseback riders, mountain bikers, cross-country skiers, and snowmachiners. Summer use of the trail is estimated at 7,000 users. Winter use is low to moderate with users primarily accessing the backcountry cabins.

**Public Use Cabins**

Three public use cabins are located along the Russian Lakes Trail. The Barber Cabin, located on Lower Russian Lake, was constructed in 1986. This cabin is the most utilized cabin in the Forest Service's Region 10 Public Use Cabin System. The Barber Cabin meets federal accessibility guidelines and is occupied 88% of the time during a 153-day summer season. The trail leading to Barber Cabin will need to be reconstructed to the Class 4 Trail Standard to meet federal accessibility guidelines. Aspen Flats Cabin is located on the river between Upper and Lower Russian Lakes at Mile 9 of the trail. Aspen Flats Cabin, constructed in 1977, is occupied 40% of the time during the 134-day summer season. Upper Russian Lake Cabin is located on the northeast shore of Upper Russian Lake at Mile 12 of the trail. Upper Russian Lake Cabin is one of the oldest cabins in the Cabin System (built in the 1950's) and the occupancy rate for this cabin is 82% during the 134-day summer season. Upper Russian Lake Cabin is scheduled to be

replaced in FY2005 because of structural concerns and a portion of the Russian Lakes will have to be rerouted. The cabin replacement will eliminate an existing dispersed campsite but the old cabin at Upper Russian Lake will likely remain in place, as it may be a historic structure.

**Dispersed Campsites**

There are eight designated dispersed campsites along the Russian Lakes Trail. These sites are located near the upper and lower lakes and at favorable locations along the trail. The sites are identified by a camping sign. Maintenance crews have developed tent pads, fire rings and remove hazard trees at these sites.

**Outfitter and Guide Use**

There are 31 outfitter/guides that are permitted to use the Russian River Valley for a variety of activities including fishing, hiking, mountain biking, llama trips, and float plane fishing trips to Upper Russian Lake.

### 4.8.3 Subsistence

Subsistence has a long tradition in settled Alaska. The USFWS defines subsistence as the gathering of special forest products (SFP) for customary and traditional uses by rural residents, for direct personal or family use for consumption, barter, sharing, or customary trade (cash sale), that does not constitute a significant commercial enterprise. SFP are non-timber biological resources such as mushrooms, boughs, burls bark, ferns, moss, berries, roots, and flowers. Though they are not governed under SFP regulations, firewood and house logs are also gathered for subsistence use. The USFS has set aside areas for this purpose. Residents also fish, hunt game, and trap fur-bearing animals for subsistence. Although some hunting and trapping is not officially sanctioned, it is largely tolerated by enforcement agencies. Cooper Landing, adjacent to the watershed, is considered a rural community, and may use the watershed for subsistence purposes, as well as other rural residents (Hope).

### 4.8.4 Forest Management

The USFS manages the watershed for brown bear core (the majority of the watershed), wild rivers (adjacent to Russian River), and wildlife, fish, and recreation (primarily the northern portion of the watershed near the Kenai and Russian River confluence). Forest Plan Management Areas located in the watershed are:

**242 - Brown Bear Core Area Management Area – Category 2**
**Theme** – Brown Bear Core Area Management Areas are designed to manage selected landscapes and their associated habitats to meet population objectives for brown bears and to reduce dangerous encounters between humans and brown bears. This management area prescription was developed to address the “Habitat for Sustainable Populations of Brown Bears” Interest.

**132 - Wild River Management Area – Category 1**
**Theme -** Wild Rivers or segments of rivers, with their immediate environments are managed to maintain, enhance and protect the free-flowing character and outstandingly

remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar river related values for the benefit and enjoyment of present and future generations. Wild River Management Areas are characterized as having watersheds or shorelines that are essentially primitive. This management area prescription was developed to address the “Wild and Scenic Rivers” Interest. Wild River segments recommended for designation will be managed to maintain their outstandingly remarkable values, free-flow, water quality, and classification eligibility.

**312 - Fish, Wildlife and Recreation Management Area – Category 3**
**Theme –** Fish, Wildlife and Recreation Management Areas are managed to provide a variety of habitats for fish and wildlife species and year-round recreational opportunities in both developed and dispersed settings. This management area prescription was developed to address the “Management of Fish and Wildlife Habitat” and “Recreation Opportunities” Interests and the “Habitat for Fish and Wildlife” Situation Statement.

# 5.0 REFERENCE CONDITIONS

**This section documents the knowledge of past conditions in the watershed association.** In order to understanding the condition of the watershed, it is important to establish a frame of reference. For this analysis, the **reference conditions vary based on times of important changes for particular resources.** For some resource areas, little is known about changes over time; proxy indicators are sought to help simulate what are thought to be reference conditions. In other cases, there are no good proxies for past conditions. In these cases, reference conditions may be based on knowledge of reference conditions of other watersheds, or knowledge of processes known to have taken place.

## 5.1 Lands

**The reference condition is 1895**, **when people were utilizing the area for mining, hunting, fishing, and activities associated with subsistence use. Gold prospectors originally established the foot trail know today as the Russian Lakes Trail in the early 1800's.**

Following the purchase of Alaska from Russia in 1867, the lands surrounding Prince William Sound became the focus of mineral exploitation (Alaskan.com, 2000). An impending private monopoly on the reserves and transportation of its coal and copper motivated President Theodore Roosevelt to designate the lands of the Chugach National Forest in 1907, originally some 23 million acres in size (Alaskan.com, 2000).

**During the 1960's and 1970's, outdoor recreation expanded exponentially nationwide**. South-central Alaska's population rose from 50,000 in 1950 to 110,000 is 1970, to 300,000 in 1985. Alaska residents continually seek recreation activities in a natural setting, while expanding tourism continues to attract many more visitors to Alaska. The Forest Service expanded and improved campgrounds, trails, and trailheads on the Seward Ranger District during the 1960's and 1970's in response to the increased public demand.

**During the last 40-50 years, various human developments in the area have greatly increased the number of people utilizing the Russian River watershed.** These developments include the Sterling Highway construction in the mid-1950's, the construction of the Cooper Lake Dam, Snug Harbor Road, and the Chugach Electric power-line in the 1960's, and the construction of the Russian River Campground in the late 1960's. The Russian River for salmon sport fishing became popular starting in the 1960's and has ballooned to current use levels.

## 5.2 Soils and Erosion Processes

Soil development in the Russian River valley is relatively new. The valley was occupied by glaciers anywhere from 10,000 to 12,000 years ago. Soil development started as glaciers retreated and left behind fresh parent material in the form of exposed bedrock, glacial till, and outwash plains. The soil composition of the area will change gradually as soil development continues, particularly in those areas that remain stable. The morainal and alluvial terraces at the confluence are examples of comparatively stable landscapes. Soil development on these terraces is typically characterized by the movement of fine

sediments vertically along the soil profile creating distinct layers, and a general increase in soil depth. Another example is the outwash plains located immediately upstream of Lower Russian Lake and Upper Russian Lake. These areas are consistently receiving sediments, which are accumulating and creating a hydric soil substrate that supports wetland vegetation. Soil development is continuous throughout the study area but at times it can be impeded or reinitiated by erosion. This is particularly true of stream banks near the more popular fishing areas along the Russian and Kenai Rivers.

**The establishment of the Russian River Campground will serve as the reference point for accelerated stream bank erosion in the study area**. The campground facilitated access to areas downstream of the Lower Russian Lake, which receives the greatest impact from anglers. Trampling destroys the riparian vegetation, which then weakens the stream bank by the loss of the root structure. The banks then become vulnerable to subsequent trampling and by the force of stream flows. The loss of even the surface layer is critical because of its productivity. The nutrients from decomposing organic material enrich the topsoil and provide a fertile bed for re-vegetation. Losing this layer requires that topsoil be brought in from elsewhere in order to reestablish the riparian vegetation and reinforce the stream banks.

## 5.3 Geomorphology

Episodes of extensive glaciation and recession have occurred in south-central Alaska in the past 2 million years, with the last peak of glaciation occurring in the late Pleistocene (20,000 to 25,000 years ago), when glaciers filled the entire Russian River valley. At this time, a branch of the Skilak Glacier, about 5 miles east of the Skilak Glacier, extended from the Harding Icefield into the Russian River watershed from the south (figure 5.1). The Skilak Glacier itself extended north from the Harding Icefield toward Skilak Lake, and a portion of the glacier branched over a low pass into the Russian River watershed from the west. These glaciers joined to form a large valley glacier that extended down the length of the Russian River valley. The Lowell Glacier flowed from the Harding Icefield into the Resurrection River watershed.

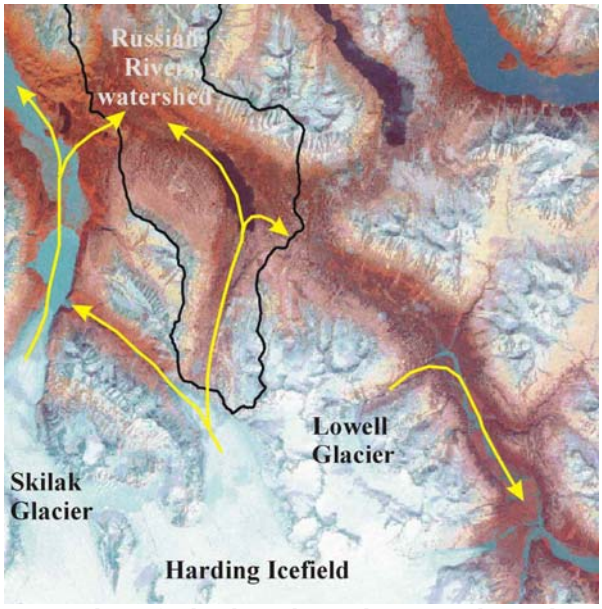


**Figure 5.1: Past flow paths of glaciers into the Russian River watershed.**

Rapid melting occurred in the Holocene, beginning about 12,000 years ago, accompanied by numerous episodes of small advances and retreats. The Skilak and Lowell Glaciers receded out of the Russian River watershed, exposing 2 low passes. At that time, the Lowell Glacier likely acted as a glacial dam where it intersected the Resurrection River valley, creating a lake extending to the top of the low pass into the Russian River watershed. Water from this lake likely spilled into the Russian River (Blanchet, 1994).

The final remaining glacier in the Russian River watershed was the branch of the Skilak Glacier that extended into the head of the watershed from the south. Repeated episodes of glacial advance and retreat during the Little Ice Age likely created the deep basins occupied by Upper Russian Lake and the lake at the terminus of Skilak Glacier. The moraine at the end of the lake at Skilak Glacier corresponds to a maximum advance during the Little Ice Age (Wiles, 1992). It is unknown when glaciers last reached as far as Upper Russian Lake, but the outwash characteristics downstream of the lake suggest that this probably occurred during the Little Ice Age. A moraine likely from a Little Ice Age glacial advance lies at the outlet of Upper Russian Lake, helping to form the lake.

During the Little Ice Age glacial maxima, the upper Russian River occupied a wide outwash plain with multiple channels and high sediment loads. As a result of further recession, Upper Russian Lake appeared and began to capture much of the glacial sediments. As the glaciers continued to recede, sediment loads decreased further and the channel downstream of Upper Russian Lake began to stabilize into the single channel pattern that is now present. Continued glacial recession and thinning after the Little Ice Age exposed the pass at the head of the Russian River watershed, cutting off the east branch of the Skilak Glacier from the watershed. Because the Russian River watershed has limited high elevation source areas for glaciers, the glaciers remaining in the Russian River watershed then receded quickly. Remnant glaciers in the southern end of the Russian River watershed have continued to recede in the past century.

Although glaciers sculpted the Russian River valley, subsequent fluvial erosion shaped portions of the valley, particularly along the lower Russian River. Post-glacial streamflows during glacial recession were larger than current flows, resulting in the down-cutting of the gorge downstream of Lower Russian Lake. Russian River falls represents a knickpoint in this gorge, where resistant bedrock is preventing further upstream migration of the gorge. Downstream of the gorge, the river opens into a wider valley at the confluence with the Kenai River, and much of the river is incised into the coarse glacial moraine deposits at the mouth of the Russian River. These coarse sediments prevent large-scale channel migration.

### 5.3.1 Hydrology

During the glacial recession following the Little Ice Age glacial advance, streamflows were considerably larger than present conditions as a result of melting glacial ice. These high flows helped create the lower Russian River gorge. As recently as about 60 to 100 years ago, it is likely that streamflows were somewhat elevated over current conditions as the remnant glaciers in the headwaters of the watershed were larger and melting rapidly. In the 1960's, prior to the development of the Russian River campground

and the sharp increase in angler use, streamflows were likely similar to current conditions, but streamflow data are very limited.

### 5.3.2 Stream Channel

During the Little Ice Age glacial advance, much of the Russian River between Upper and Lower Russian Lakes was a wide, braided channel on a glacial outwash plain. This channel has since stabilized into a single channel as the glaciers receded and Upper Russian Lake began to capture almost all of the glacial sediment. In the early 20th Century, it is likely that the Upper Russian River channel was less stable than it currently is, as the outwash plain was less developed. In the 1960's, prior to development of the lower Russian River area, the upper Russian River channel was likely very similar to its current condition.

Because the lower Russian River is incised into coarse morainal deposits, its course has changed relatively little in the past 100 years. Prior to the 1970's, the channel was narrow and the riparian areas were healthy. Aerial photography from 1962, 1950, and land survey data from 1929 indicate that the channel ranged from about 40 to 100 feet wide. Between 1962 and 1974, only a small amount of channel widening occurred (figure 5.2). Some degree of bank erosion occurred naturally along the lower Russian River during this time period as the river continually adjusted to dissipate flow energy, but healthy riparian vegetation prevented large sediment inputs into the river and roots held the banks together. Overhanging root masses resulting from natural bank erosion provided good fish habitat.

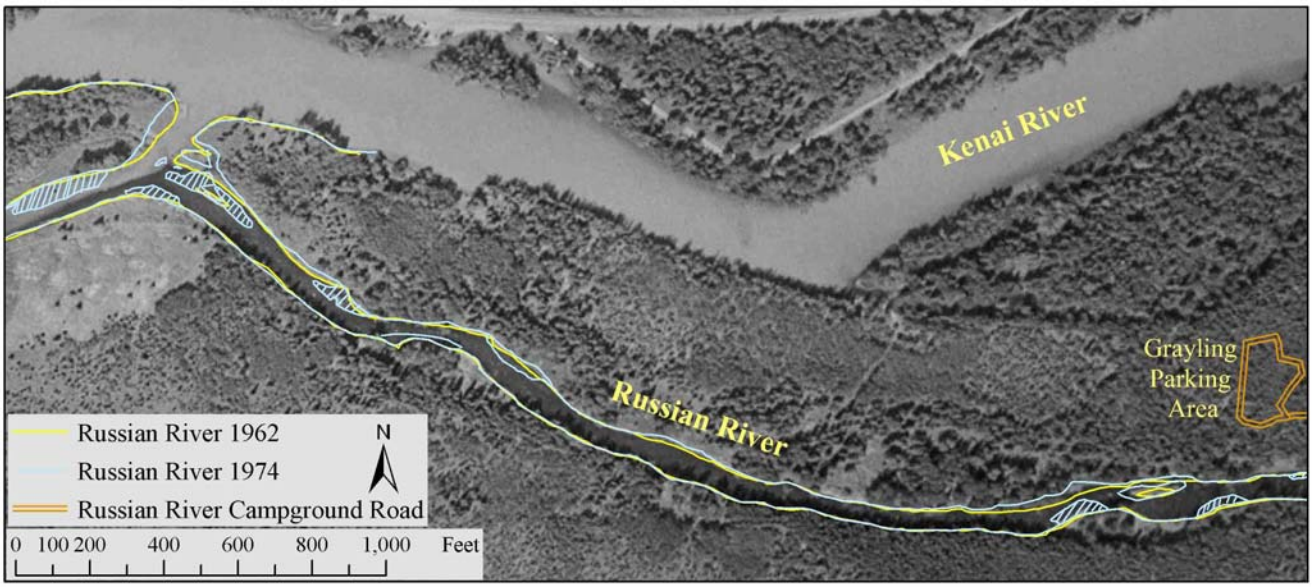


**Figure 5.2: Channel changes on the lower Russian River from 1962 to 1974, with 1962 base photo. Cross-hatched areas are gravel bars. Adapted from lines drawn from aerial photography by Dave Blanchet, Chugach National Forest.**

### 5.3.3 Water Quality

No water quality data are available prior to **1950**, but some generalizations can be made. During the period of rapid glacial recession, sediment loads and turbidity of the Russian

River were higher than current conditions. Although bedload glacial sediment settled out in Upper and Lower Russian Lakes, suspended sediment remained in the water. Turbidity decreased after glaciers were cut off from the Russian River watershed and the glacial outwash plain stabilized. The Russian River may have had higher turbidity as recently as 100 years ago. In the 1950's and 1960's, it is likely that sediment loads and turbidity were similar to current conditions. The general chemical water quality of the Russian River prior to the 1970's was very pristine, as the watershed had minimal human development and little use. Nutrient levels in the river were likely similar to current conditions, as the river maintained healthy salmon runs in the past.

## 5.4 Vegetation

When considering historical conditions, anthropomorphic changes to vegetation are generally limited to the period **after 1860**, when Russian fur trappers followed by miners came through the area. Various fires in the drainage have altered the current vegetation composition. Fires have been sporadically and partially recorded since around 1913. According to reports, miners in the area set large scale fires around 1913 to 1915, which burned most of what is referred to as the Juneau Valley. Juneau Creek drainage is across the Kenai River to the North from this landscape, but the simple maps provided in early mining reports seem to indicate that fire covered the lower drainage on the south side, into the Russian River drainage. The soil surveys in the upper data collection plots on the Refuge indicated there was no charcoal in the soil layers and no evidence on the tree growth rings of fire of large scale that far up into the drainage. Most of the fires were concentrated in the lower part of the landscape nearest the road. Because of the presence of older trees in the upper drainage, up to 330 years, the fires were likely spotty or of mixed intensity. Many of the trees cored on the sample plots were also older than 1880. Tree size has historically been smaller in the upper landscape because of elevation and edaphic factors.

Historical disturbances other than fire were mainly limited to landslides and avalanches, particularly in the upper drainage, and along the side slopes above what is now the Russian Lakes Trail. Lightning strikes, causing natural fires, were possible but unlikely. Frequency of lightning strike is currently low. Ecological changes in the landscape include the jumping of creeks into the Russian Lakes system. In the 1950's, Summit Creek jumped into a new channel and began dumping its sediment load into Upper Russian Lake, which had the potential to considerably alter the ecology of the entire lower end of the drainage, and the Russian River, which currently flows clear. Human intervention with a bulldozer altered the creek channel back to its previous channel by constructing a berm, which today is covered with aspen and young spruce. There is potential within this landscape for similar events in the future.

Generally the landscape was historically in the same proportion of non-vegetated versus vegetated. Forest development centuries ago, when the drainage hydrology and glaciology was more active, was most likely lower. The past several centuries have allowed the current forest cover to develop. It is unlikely there have been big changes in the percent of forest cover in the last several centuries, except for spruce bark beetle outbreaks at intervals prior to recording and the known outbreak in the early 1970s. Fires during the early 1900s also reduced forested cover in spots and provided for the current mosaic of uneven-aged stands of mountain hemlock and spruce-hemlock mixed

forest, along with mixed hardwood-softwood stands. The elevation, disturbance regime, edaphic conditions, and climate preclude full sized forests on much of this landscape.

Pre-1970s conditions included some alteration of the vegetation in the lower landscape with the construction of the highway, the campground, and other structures. The severe trampling problems found today were minimal prior to **1970**. In the upper drainage, there is evidence of a spruce bark beetle outbreak in the early 1970's from the Refuge data points. Mountain hemlock cohorts from this time period form an uneven-aged stand with the remaining trees at the Refuge's sample sites. A fire in 1969 near the campground and along the Russian Lakes Trails created hardwood patch forests.

## 5.5 Fire

Prior to European settlement (circa **1740**), fire frequency was likely lower than it is now, ranging from return intervals of somewhere between 100 and more than 600 years. Large stand-replacing fires occurred at long intervals usually ranging between 250 and 500 years. These occur under extreme events follow fuel moisture, high temperature, low relative humidity, and high winds. It is possible that spruce bark beetle infestations were instrumental in predisposing forest landscapes to large fires. Historically, most ignitions in the region resulted in fires of small area and ecological impact because fuel moisture limited the intensity, size, and severity of burns (Agee 1993). In an interview with the Kenaitze tribe, the use of fire was discussed to reduce travel barriers between the Kenai area and to the Russian River (personal communication, Bill Shuster, 1997). Since European settlement, wildfire frequency has increased, particularly around developed areas. Up until the elimination of the steam engine in 1954, many relatively small fires were common. Since that time, almost all fires have been initiated by other human sources of ignition. Potkin (1997) reported that 99 percent of all fires on the Chugach National Forest are caused by humans. Beginning in the late 19$^{th}$ century and continuing through the early 20$^{th}$ century, this period shows high fire frequencies on the Kenai Peninsula. The forests of the Kenai Peninsula represent a nearly natural situation. Before settlement there was virtually no utilization or disturbance of the resource except by the aboriginal people. According to Potkin (1997), the majority of wildfires are human-caused as lightning occurs very infrequently; 5 known occurrences were reported in the last century. From the early 20th century until the 1950s there was a period of high wildfire frequency from railroad activity on the Kenai Peninsula portion of the Chugach National Forest. These wildfires have decreased in acreages burned as fire prevention techniques improved following the end of the steam engine era around 1953. The number of fire occurrences is still significant on the forest. Since the 1960's the greatest cause of fires on the Kenai Peninsula portion of the Chugach National Forest has been campfire starts by recreationists. Due to the increase in local population and tourism, the number of fire occurrences appears to be increasing in recent decades. Location of fire starts on the peninsula portion of the Chugach National Forest between 1960 and 1997 concentrate almost exclusively along the road corridor (Blanchet, 1987; USDA 2004). The Russian Lakes Trails shows a considerable fire start history, particularly in the vicinity of Lower Russian Lake. This high concentration of fire starts is likely due to both the high use of this trail (especially up to Lower Russian Lake) and the relatively low precipitation received by this area.

## 5.6 Aquatic Species and Habitats

Prior to 1895 Russian River fisheries are thought to be in a relatively healthy state with an abundance of salmon available for local harvest. The length of occupation by the Kenaitze and the size of the settlement indicate a robust and reliable salmon run at Russian River. Perturbations in stock size would due to changing ocean survival limited and winter survival on spawning streams. Too many spawners could also negatively impact run size.

The Russian River was a destination for local anglers seeking fish since the peninsula was populated. The construction of the Alaska Central railroad in the early 1900s opened up the first gateway to the Russian River. Ferry service was available from Lawing on the East end of Kenai Lake to Cooper Landing and down the Kenai River (Wilson 1977). The Sterling Highway improved access in the late 1930s to the Russian River and the Rainbow Trout and salmon. Much anecdotal evidence exists for the Russian River being home to numerous large rainbows in the early days of the 20th Century.

From the 1920s through the 1950s, variations in salmon escapements could be impacted by commercial over-fishing and fish traps, *along with* natural perturbations.

## 5.7 Terrestrial Species and Habitats

Although the existing array and distribution of habitats appears to be within the range of normal variation for the region, there is no quantitative data on pre-European settlement conditions. There apparently has been a shift in the populations of some large game animals in response to natural shifts in habitat patterns that have occurred since European settlement. It is appears that these shifts are part of natural successional changes in habitat that occur in cycles as well as human influences. Although little information is available, some inferences can be made regarding reference or pre-European settlement conditions.

Past populations of wildlife are unknown, except that we have moose now and there is no evidence of moose in the past. This is likely due to extensive expansion of hardwoods due to human caused fires at the turn of the century. It is likely other species that use hardwoods such as lynx and birds have increased, and potentially species such as brown and black bear that prey on moose may have increased as well. Hunting and trapping pressure has likely influenced populations locally in the past by native people and the Russians. Impacts to wildlife are unknown, but may have been heavy at times. With greater numbers of people inhabiting the watershed now, we can assume there is greater hunting and trapping pressure overall, but this may be in a more sustained but regulated fashion due to fish and game management. How this has changed animal numbers or species composition from the past is unknown. Current management focuses on increasing moose numbers, and will continue to do so.

Reference conditions specific to Sensitive, Management Indicator, and Species of Special Interest are as follows:

### 5.7.1 Sensitive Species

#### Trumpeter Swans

Little to no data exists on reference conditions. It is likely that if natural conditions for swan nesting habitat have remained stable, human disturbance, especially from float planes has increased and may have affected swan numbers over time. It is possible that swans are expanding their range from the wildlife refuge to the east.

#### Osprey

Little to no data exists on reference conditions for Osprey.

### 5.7.2 Management Indicator Species

#### Moose

Very limited information is available to indicate reference conditions for moose in the Russian River watershed. No evidence exists suggesting that moose were present on the Kenai Peninsula until 150 years ago (personal communication with Tony Largaespada, district archaeologist). Some sources indicate that prior to the turn of the century caribou were the more abundant ungulate species on the peninsula. It is unknown if caribou used to occur in the watershed, but they are not present now (only to the north). Habitat alteration following increased European contact (burning, land clearing) altered the vegetation and increased the amount of early successional forests, which led to an increase in the moose population (Davis and Franzmann 1979, Klein 1965; Spencer and Hakala 1964). Since then land managers have used prescribed burns and mechanical treatments to support high moose populations by providing favorable habitat. In the past, the Forest Service has used prescribed fire twice in this watershed in order to improve moose habitat. The Russian River burn in 1969 was considered a very successful burn; however browse in this area is probably getting too high. Another prescribed fire was set in 1998 but according to moose browse utilization surveys, this burn was unsuccessful in creating moose habitat, as the area is covered in *Calamagrostis canadensis*.

#### Mountain Goat

No quantitative data exists to indicate what reference conditions were for mountain goats in this watershed. Increased hunting pressure after initial European contact may have reduced mountain goat populations; however mountain goat habitat has probably remained relatively unchanged.

#### Brown Bear

Data on reference conditions of brown bear is very limited to nonexistent. It is assumed that historic populations of brown bear were higher and that European contact decreased brown bear populations through habitat loss, hunting and DLPs, although potential increases in fisheries, moose populations could have increased bear populations?

The more recent increase in fishing and recreation in the watershed probably has resulted in some habitat encroachment, and increased DLP mortalities.

### 5.7.3 Species of Special Interest

**Wolverine**

Little to no data exists on reference conditions for wolverine.

**Northern Goshawk**

No quantitative information exists on reference conditions for goshawks. Undoubtedly, goshawks have been impacted by the spruce bark beetle infestation, causing reduction in potential nesting habitat

**River Otter**

No quantitative data exist for river otter reference conditions. Reports from the 1920s indicate Peninsula-wide scarcities, more than likely a result of increased trapping pressure after European contact. It is unclear how recreation and increased human use along the Russian River may affect river otter populations.

**Lynx**

Once again, quantitative data regarding reference conditions for lynx are nonexistent. Reports from the 1920s (Culver 1923) indicate lynx were widespread on the Kenai Peninsula. As with all fur-bearers, populations are thought to have decreased after European contact due to the increase in hunting and trapping.

**Marbled Murrelet**

Quantitative data regarding reference conditions for marbled murrelet are nonexistent. The watershed overall appears warmer and drier than other watersheds on the Seward District, and site quality tends to be lower. If conditions over time have remained fairly stable, conditions were never likely to have provided high quality nesting habitat for murrelets.

**Townsend's Warblers**

Data on reference conditions is unavailable. The Forest Service performed surveys in the late 1970s, these indicate Townsend's warblers were the most abundant species in older forests and were not abundant in recently burned forests. European contact may have decreased Townsend's populations if older forests were altered, but overall impacts on the population were probably minimal. Forest fires and the spruce bark beetle over the last 100 years may have also reduced available habitat over time.

**Gray Wolf**

Reference conditions are absent. The wolf population more than likely suffered declines after the influx of European settlers, as hunting pressure of all fur bearers increased at

this time. However, wolf populations may have increase with the increase in the moose population 150 years ago.

Historically, the caribou population was much larger and more widely distributed. Moose were likely less abundant and restricted to riparian and subalpine areas as documented by Lutz (1960). Brown bear, wolf, black bear, wolverine, marten and other carnivore populations were likely larger due to less human-induced mortality and disturbance. Northern goshawk density would have been lower due to less diversity in feeding habitat.

## 5.8 Human Uses

### 5.8.1 Human Uses: Past

This provides reference conditions for many of the other resources, and is listed under watershed characterization and existing conditions.

### 5.8.2 Human Uses: Present

The time period associated with this Reference Conditions category is 1895. At that time there was no “recreation” use, as we know it today, occurring within the analysis area. However, people were utilizing the area for mining, hunting, fishing, and activities associated with subsistence use. Gold prospectors originally established the foot trail know as Russian Lakes Trail today in the early 1800’s.

Recreation, in the form of leisure time off work, really did not occur until after World War II. Generally, nationwide and to some extent within the watershed analysis area, the thought of camping, hiking and fishing for fun, instead of for subsistence, became more and more popular after 1942.

During the 1960’s and 1970’s, outdoor recreation expanded exponentially nationwide. South-central Alaska’s population rose from 50,000 in 1950 to 110,000 is 1970, to 300,000 in 1985. Alaska residents continually seek recreation activities in a natural setting, while expanding tourism continues to attract many more visitors to Alaska. The Forest Service expanded and improved campgrounds, trails, and trailheads on the Seward Ranger District during the 1960’s and 1970’s in response to the increased public demand.

During the last 40 years, various human developments in the area have greatly increased the number of people utilizing the Russian River watershed. These developments include the Sterling Highway construction in the mid-1950’s, Upper Russian Lake Cabin, and the construction of the Russian River Campground in the late 1960’s. Forest Service trail maintenance records for the Russian Lakes Trail date back to the 1950’s. Two additional public use cabins along the Russian River were built in the 1970’s and 1980’s. The Russian River for salmon sport fishing became popular starting in the 1960’s and has ballooned to current use levels.

# 6.0 SYNTHESIS AND INTERPRETATION

## 6.1 Lands

Various human developments including the Sterling Highway construction in the mid-1950's and the construction of the Russian River Campground in the late 1960's have greatly increased the number of people using the Russian River corridor.

Increased human uses in the area have led to increased attention to the lands in and near the vicinity of the analysis area. The lands near the northern boundary of the Russian River watershed are a mixture of NFS lands, FWS lands, CIRI lands, State lands, private lands, and Cooper Landing borough lands. Several FS special use permits have been issued to private entities carrying out business in the vicinity of the Russian River watershed including Chugach Electric Association, Alaska Recreation Management, and several outfitters and guides.

The potential development of CIRI-selected lands near the Russian River and Kenai River confluence and the possible reroute of the Sterling Highway could result in an increase in requested special use permits, land exchanges and conveyances, right-of-ways, etc. The increase in visitors that may result from increased development near the Russian River could result in increased requests for outfitter/guide permits as has been the trend over the last 40 years. The existing Chugach Electric powerline location would also be utilized for any new future utility corridor requests such as the installation of fiber-optic lines for example.

## 6.2 Geology, Minerals, Soils

### 6.2.1 Geology

Mineral resource values within the Russian River corridor and the entire Russian River valley are low to non-existent. There are no known metallic mineral occurrences, no known occurrences of leasable minerals, and no valuable common variety mineral deposits. The only known mineral occurrences within the Russian River valley are several small, common variety travertine deposits.

### 6.2.2 Minerals

Land management activities and human use will not affect mineral development since there are no known valuable mineral deposits within the area. Therefore, recreational use will not have a negative effect on minerals development.

There are no long-term and/or short-term environmental consequences of land management activities and human use on geology and mineral resources.

### 6.2.3 Soils and Erosion Processes

The accelerated soil erosion on stream banks due to overuse from anglers along the Russian and Kenai Rivers has far-reaching implications within the study area that affect

soil productivity, riparian vegetation, water quality, fish habitat, and recreation. Recent work has been aimed at problem areas that take the brunt of the impact from anglers. That is, areas that have proven to be successful or convenient fishing spots in the past are visited more often than others are and therefore impacted to a greater degree. Other areas are being degraded quicker because of the river's natural tendency to migrate along the valley.

Efforts by the Forest Service to minimize bank erosion have been concentrated along the Russian River, downstream of Lower Russian Lake, to the confluence with the Kenai River. Some of the more extensive projects have involved the construction of elevated walkways with access points into the Russian River bypassing the stream banks. The Youth Restoration Corps, a non-profit youth group, has also done restoration work in cooperation with the Forest Service in areas such as Cottonwood Point and at the confluence with the Kenai River. Some of these projects have included stream-bank restoration and protection using root wads, coirlogs, and terraces backfield with soil; and stream bank re-vegetation using willow cuttings, rooted alder and willow transplants.

The introduction of non-native species is an important consideration when planning and implementing restoration projects. Some of the steps taken have included the use of erosion control products that have been sterilized and wrapped in plastic until they are on site. However, availability sometimes requires the acquisition of products that are imported from overseas vendors where control varies from place to place. Another possible source of contamination is the soil used to reinforce structures or that which as a bed for the re-vegetation. Soil brought in from outside the immediate restoration area could contain non-native seed. Moreover, these restored areas are usually fenced, fertilized, and watered regularly to insure adequate re-vegetation success, which can also be providing a productive setting for non-native seeds.

## 6.3 Hydrology

Climate change has caused gradual changes in the hydrologic regime of the watershed. The gradually warming climate has resulted in continued glacial recession, and as a result, the Russian River exhibits few characteristics of glacial runoff. Hydrologic conditions have changed very little since conditions prior to the development of the Russian River Campground. Warmer temperatures may lead to increased risk from beetle infestations and forest fires, which can potentially result in increased runoff and sedimentation. The potential for the highly glacial Summit Creek to break through the levee constructed in 1958 currently exists, as the fan is continuing to slowly expand and thicken.

**Recreational uses have had a large effect on channel morphology of the lower Russian River.**
As a result of angler trampling of banks and riparian areas, the lower 0.6 miles of the Russian River experienced considerable channel widening, with the largest impacts occurring in the 1970's and 1980's. This also resulted in the reduction of pool depths and the reduction of substrate size. In the past 10 years, construction of elevated walkways, fences, and access stairways into the channel have helped improve the conditions of the banks and riparian areas, thereby minimizing the channel widening process. Bank restoration activities have also helped restore the banks in some areas to allow new riparian vegetation to become established. As a result of the large number of

anglers that visit the Russian River, bank erosion continues to increase in the Russian River gorge and along the west side of the lower Russian River, where angler trails are not developed. The low gradient meandering channel of the Russian River upstream of Lower Russian Lake is very sensitive to streambank erosion, but currently does not receive heavy use.

**Recreational uses in the watershed have slight effects on water quality in the Russian River system.**
Water quality in the Russian River is mostly pristine, as little development exists in the watershed. Although heavy use of the lower Russian River has the potential to degrade water quality, current water quality conditions are likely similar to those of conditions prior to development of the Russian River Campground. Water quality can potentially be impaired by sediment from bank erosion along the lower Russian River and the Russian River gorge. Revegetation of the riparian areas along the Lower Russian River has helped to control the issue of sedimentation into the river, but the problem is also increasing in other areas along the river. Also, increased floatplane use on Upper Russian Lake is increasing the potential for water quality degradation from oil and gasoline spills.

## 6.4 Vegetation/Ecology

Changes in the structure of the vegetation communities are part of the natural progression in stand composition, structure, and function for this landscape. Current hardwood and mixed softwood-hardwood stands have resulted from past spot fires, management activities, or some kind of disturbance. Natural disturbance processes will continue to allow hardwood regeneration in places resulting in new stand development classes for species such as birch and aspen. Cottonwood will continue to have a dynamic stand size presence along the riparian corridors and lake margins. However, the aspen stands and many of the birch stands are decadent, and some have a spruce understory present. Many of the current hardwood stands or mixed stands are being replaced successionally by spruce or spruce mixes because of fire suppression efforts.

Changes in vegetation around the developed parts of the Russian River have resulted in loss of vegetation along the banks, although current restoration and educational efforts have improved the vegetation on the Forest Service side. Future recreation use increases will likely cause more degradation without careful monitoring, continued restoration efforts, and cooperative work between the Forest Service and the Refuge. Likewise, the spread of nonnative species throughout the landscape can be controlled by monitoring, education, and direct control efforts such as mechanical removal.

## 6.5 Fire

Spruce bark beetle infestation has led to increased risk of fire and a short-term increase in LWD recruitment potential. The beetle infestation has not affected recreation significantly, though it has raised the risk of wildfire in areas which are frequented by humans. Although the increased risk of wildfire is not quantified, it may still be a concern in the community of Cooper Landing and surrounding area. Efforts are currently underway to reduce the risk of wildfire. However, because there is no identified feasible way to rid the beetle from the watershed, the need for additional treatment appears to be unwarranted.

With the increased recreational usage this could lead to increased risk of wildfire. This high risk of fire starts is likely due to both the high use of this trail (especially up to Lower Russian Lake) and the relatively low precipitation received by this area. The lower Russian River and highway corridor gets an extremely large amount of use during the summer months especially during the months of June through August due to the salmon fishing. With campgrounds being full and limited areas to camp people are more apt to camp anywhere they can and put in a campfire or leave them unattended. This is where the potential for wildfire is the greatest.

## 6.6 Aquatic Species and Habitats

Anadromous and resident fish are present in the watershed association. Five species of salmonids are present within the watershed. Sockeye salmon is the most important to the Russian River. Rainbow trout and Coho salmon being secondary. Sockeye escapement has been monitored since 1960 on the Russian River.

From 1960 through the present time, fish numbers appear to be within the natural range of variability, and there is nothing to suggest there is a linkage between management activities on Forest Service lands and salmon ability to return to the Russian River to spawn. Yet, angler trampling of the banks has the potential to cause channel widening and shallowing, which could limit escapement on the lower river along the anglers trail. Since the late 1980's, monitoring has shown that stream bank restoration activities have reduced these impacts. Although potential exists for future limited stream-bank degradation in the upper gorge, this is unlikely to affect fish escapement or spawning habitat, as higher water flows and bedrock substrate help route sediment through this area.

## 6.7 Terrestrial Species and Habitats

Primary factors affecting wildlife and habitat in the past and present are:

- Changes in vegetation and structure (habitat) due to climate change, natural disturbance (such as flooding, avalanches, fire, and the spruce bark beetle), and human caused fire suppression and wildfires.
- Human use of the watershed for recreation, hunting, and trapping.

Previous fires (wildfire and prescribed fire), and site quality, have limited the available mature and old growth conifer forest in the watershed. The spruce bark beetle has impacted much of the existing mature forest near Upper Russian Lake. Due to a gradual warming climate, this trend is likely to continue, increasing the risk of additional wildfire and beetle infestations. This affects the watershed by limiting the amount of mature forested habitat available for species such as northern goshawks and marbled murrelets. Site quality also appears to limit the growth of large trees. In some areas, hardwood stands or mixed stands are being replaced successionally by spruce or spruce mixes because of fire suppression efforts, limiting early seral hardwood browse for moose.

Past populations of wildlife are generally unknown, except that we have moose now and there is no evidence of moose in the past. This is likely due to extensive expansion of hardwoods due to human caused fires at the turn of the century. It is likely other species that use hardwoods such as lynx and birds have increased, and potentially species such

as brown and black bear that prey on moose may have increased as well. As hardwoods grow out of the reach of moose, throughout the district and in the watershed, habitat for moose is declining.

Human use of the watershed in the past affected wildlife primarily through hunting and trapping pressure by native people and the Russians. Impacts to wildlife are unknown, but may have been heavy at times. With greater numbers of people inhabiting the watershed now, we can assume there is greater hunting and trapping pressure overall, but this may be in a more sustained but regulated fashion due to fish and game management. Greater potential impacts to wildlife come from disturbance to animals due to increasing recreation pressure from anglers, hikers, campers, and aircraft. Some of these activities also damage habitat, such as riparian vegetation along well-used fishing areas. Symptoms of this are increasing negative bear/human encounters due to habituated black and brown bears near fishing, camping, and float plane landing areas, and defensive behavior by bears with young.
Aircraft, unregulated by forest service permits, provide increasing access for recreation and wildlife viewing, particularly around Upper Russian Lake. Aircraft has the potential to cause disturbance to a wide variety of wildlife (depending on the altitude and frequency of use) such as Trumpeter swans, mountain goats, Dall sheep, and bald eagles.

As human use increases, negative bear/human interactions and other impacts to wildlife and habitat will likely increase as well. In addition, the risk of wildfire and associated effects on habitat will increase.

## 6.8 Human Uses

### 6.8.1 Human Uses : Past

The known resources in the Russian River Watershed represent a small variety of historic and prehistoric themes that have arisen in the Kenai Peninsula's history. The majority of known sites are from the prehistoric period and are located within the large Sqilantnu Archaeological District. However, it is likely that more sites from the prehistoric and early historic periods exist, but have not yet been found due to the small amount of archaeological survey in the area. The richness of the known cultural resources in the Russian River Watershed Area, along with the ease of access to the area, makes pro-active documentation and public interpretation desirable.

### 6.8.2 Human Uses: Present

Outdoor recreation is the fastest growing use on the national forests and grasslands across the United States, continuing a steady trend since before the 1950s (Cordell, 2004). Population has been, is, and will be the major driver of outdoor recreation participation growth in this country (Cordell, 2004). By 2100, the U.S. population is expected to almost double from 288 million to 571 million, and the phenomenal rate of recreational growth on the National Forest System is likely to disproportionately increase the number of recreational users (Cordell and Overdevest, 2001). Currently, well over 90% of Americans participate in at least one outdoor recreation activity (Cordell, 2004). Estimates of recreation days occurring in forest settings show (in order) walking for pleasure; viewing/photographing natural scenery, birds, flowers, and wildlife; day hiking;

sightseeing; driving for pleasure; mountain biking; and visiting a wilderness or primitive area as the most actively engaged activities in 2000-2001 (Cordell, 2004).

Following suit with national recreation trends, recreation use in the Russian River watershed has increased dramatically over the past 40 years. Various human developments including the Sterling Highway construction in the mid-1950's and the construction of the Russian River Campground in the late 1960's have greatly increased the number of people using the Russian River corridor. Due to the close proximity of the campground and highway system to the Russian and Kenai Rivers and the popularity of the salmon sport fishery, an average of 45,000 visitors enter the campground and recreate along the lower Russian River from the beginning of June through September each summer. The Russian Lakes Trail, which includes the upper Russian River corridor receives approximately 7,000 annual visitors primarily during the summer season.

Within the past 40 years, the concept of recreation itself has changed with the advancement of technology to include a wider range of recreation experiences. The development of new technology which is lighter in weight and more durable such as full-suspension mountain bikes, waterproof hiking boots and rain gear, synthetic clothing and sleeping bags, powerful snowmobiles, four-season camping tents, backcountry telemark gear, and more versatile float planes have allowed recreationists to pursue new activities in the backcountry which are longer in duration and can be carried out year-round. New technology in the form of sport-utility vehicles, larger Recreation Vehicles (RV's) and 45-60 foot motorhomes has also surpassed the original concept of frontcountry recreation that was envisioned for the recreationists of the 1960's and 70's.

Many of the Forest Service campgrounds, day-use areas, trailheads and hiking trails built in the 1960's and 70's are no longer adequate for today's recreationists and have been or will eventually need to be upgraded, replaced or rebuilt to conform with the needs and desires of today's recreationists and to comply with current federal, state, and local laws, regulations and guidelines. Many new facilities such as backcountry cabins, yurts, huts, campgrounds, and campground expansions are also being built, planned or proposed on National Forest System lands in general to meet the demand for recreation.

The overall result of new or modified recreational activities and the explosive increase in the number of recreation visitors to the Kenai Peninsula and specifically, the Russian River Watershed during the last 40 years, has led to many new opportunities and challenges. The large number of visitors using the lower Russian River area has contributed to and changed the economy of many Kenai communities but has also led to the deterioration and loss of natural and cultural resources and facilities. Foot traffic along the riverbanks is damaging fish rearing habitat, killing vegetation, compacting and eroding soil, and damaging tree roots. Portions of the lower river have gotten wider and shallower over the last 20-40 years due to accelerated bank erosion. This could eventually lead to adverse impacts on the migration patterns of sockeye salmon, which are currently the main attraction to this area. Loss of cultural resources along the lower Russian River and near the confluence is also occurring where foot traffic has accelerated river bank erosion causing river water to erode nearby cultural features.

Increased foot traffic along the lower river has also exposed tree roots which have become tripping hazards on the Angler Trail, as well as weakening trees and other vegetation. Facilities such as boardwalks, trails and fish cleaning stations are also in

need of repair or replacement. In 1996, a Decision Notice was signed by the Seward District Ranger to protect riparian areas, cultural resources and the scenic quality of the lower Russian River by building 3,000' of new boardwalk and fencing off 91% of the streambank to foot traffic among other measures.

Increased visitor use along the upper Russian River corridor has also led to many management challenges such as increased human-wildlife encounters, visitor conflicts, trail and facilities deterioration, and increased requests for new outfitter/guide opportunities.

## 6.9 Synthesis and Interpretation Summary

**Increasing recreation use in the last 40 years is the most important change and management issue in the Russian River Watershed**. Recreation use has increased dramatically due to human developments such as construction of the Sterling Highway in the mid-1950',s and the Russian River Campground in the late 1960's providing easy access to the Russian River fishery. Recreation use is expected to continue to increase in the future. This increasing use has had negative impacts, directly or indirectly on a variety of natural resources. Direct impacts include loss of vegetation and destruction or degradation of fish and wildlife habitat, stream bank erosion, disturbance to and habituation of wildlife, destruction or degradation of cultural sites, impacts to visual quality, destruction or degradation of facilities, and introduction of non-native plant species. Indirect effects include erosion, changes in channel morphology, introduction of non-native species as a result of restoration efforts, and increasing risk of human caused wildfire. The Russian River (particularly the lower section) receives the highest use in the summer months from anglers due to the salmon fishery along the Kenai and Russian Rivers. Restoration efforts aimed at restoring vegetation and reducing erosion have been very successful, but have resulted in the introduction of nonnative plant species. Restoration efforts have not addressed increasing use and degradation that is starting to occur in the gorge, nor does it affect impacts on wildlife, cultural resources, facilities, spread of non-native species, or potential increased risk of wildfire.

# 7.0 DESIRED CONDITION , OPPORTUNITES, AND MANAGEMENT STRATEGIES

## 7.1 Lands

**Desired Condition:** Highway traffic along the Sterling Highway will have been improved in the Cooper Landing area with minimal impact on the resources of the Forest or the riparian areas along the Kenai River.

**Management Strategies:**

- Remain involved in Sterling Highway reroute project being proposed by Alaska Department of Transportation.

**Desired Condition**: Private land in-holdings will have development consistent with their economic potential and minimal impact on the surrounding Forest. Private landowners with in-holdings and holders of valid mining claims will have reasonable access to their

lands. The means of access will be consistent with management area direction and emphasis.

**Management Strategies:**

- Work with permittees during application process, conduct site-specific NEPA as needed.

**Desired Condition:** Scenery along the Seward Highway All-American Road and other major travel corridors will be managed to maintain the natural appearance of the landscape.

**Management Strategies:**

- Roads, structures, utilities, and other facilities will repeat naturally occurring line, form, color, and texture to the extent it is safe and practical.

**Desired Condition:** Commercial recreation developments will occur on other land ownerships. A variety of businesses that provide or support recreational opportunities on the Forest will operate under special use permit.

**Management Strategies:**

- The Forest Service, FWS, and CIRI will enter into a Memorandum of Understanding for the purpose of insuring the significant activities at Russian River (e.g., visitor's center, archaeological research center and visitor-oriented facilities) are carried out in a cooperative and coordinated manner.

## 7.2 Geology, Minerals, Soils

### 7.2.1 Geology

There are no desired conditions, opportunities, or management strategies for geology.

### 7.2.2 Minerals

The 1872 Mining Law confers a statutory right for a person or persons to enter upon public lands to prospect, develop and mine valuable minerals. However, it has been determined that other values of the Russian River area exceed any potential minerals values, and mining is not appropriate; thus a mineral withdrawal is in place. This withdrawal expires on Feb. 13, 2023, but it may be renewed.

**Desired Condition:** Continued renewal of mineral withdrawal for the Russian River area in 2023 until such time as the known fishery, wildlife, and recreational values diminish or until valuable minerals deposits are identified. Outside the withdrawn area, the land is open to mineral entry. This area should remain open to mineral entry unless some compelling reason to close it is identified in the future.

### 7.2.3 Soils

Anglers are the primary reason accelerated erosion occurs on the Russian River. Efforts should be focused on diverting some of the use away from impacted areas and those areas that are susceptible to damage from foot traffic. Those areas that are being deteriorated by the river's normal migration pattern could be protected by redirecting the force of the water away from those particular banks using bio-restoration techniques or structures that are more permanent.

Careful selection of restoration materials needs to continue in order to minimize the introduction of non-native species into the area. An effort should be made to use local soils, which support similar plant communities, when needed as backfill or as top soil. Monitoring of restored sites should continue in order to evaluate the success of re-vegetation practices and to determine if any exotic plants have been introduced unintentionally.

**Desired Condition:** Healthy stream banks with riparian vegetation and erosion within natural range.

**Opportunity:** Reduce bank erosion.

**Management Strategies:**

- Develop a management strategy for bank erosion for the area above the powerline.
- Develop a strategy for introduction of native vegetation on disturbed sites and reduce potential for introduction of non-native species?

## 7.3 Hydrology

**Desired Condition:** For the Lower Russian River Bank Stabilization downstream of the powerline will be a stable, self-maintaining channel with a healthy riparian area. Such a stable channel will naturally migrate to some degree, but should maintain its pattern, profile, and dimensions. No additional channel widening will occur as a result of bank erosion from angler trampling. Ideally, the channel will contain good spawning habitat as well as deep pools that provide cover for fish.

**Opportunity:** Continue efforts to minimize additional channel widening by controlling the effects of angler use on bank erosion and riparian vegetation.

**Management strategies:**

- Continue ongoing bank restoration efforts on the lower Russian River, repairing banks that have been heavily damaged by angler use. The placement of rock or log structures and large woody debris in the channel can also help direct flows away from sensitive bank areas. The objectives are to prevent further channel widening, protect the angler trail, and allow the river to establish a natural channel, especially where the channel has become excessively wide. Bank restoration of heavily degraded areas allows for the establishment of riparian vegetation, which improves the strength of the banks.
- Place interpretive signs for anglers along the lower Russian River. These measures will help educate recreational users about the effects of angler

trampling on channel morphology, riparian vegetation, water quality, fish habitat, and the fish themselves.

**Desired Condition: Water Quality**. In its desired future condition, water quality in the Russian River watershed will be within the State Standards (Alaska Department of Environmental Conservation, 2003).

**Opportunity:** Existing conditions are likely within state standards, but water quality data should be collected where problem areas exist that could potentially degrade water quality.

**Management Strategies:**

- Monitoring and preventative measures can be taken in the Russian River watershed to identify sources and prevent increased uses from degrading water quality. Known problem areas are Upper Russian Lake (oil and gas pollution from floatplanes) and the lower Russian River (increased turbidity from bank erosion).
- Continue ongoing bank restoration efforts and management of angler trampling on the banks of the lower Russian River, as stated above, to minimize sediment input and turbidity increases in the river.

## 7.4 Vegetation /Ecology

**Desired Conditions:** The watershed will be free of non native species. The vegetation will contain a mosaic of different stand development classes. The ecology of the watershed will exist in a proper functioning condition in terms of vegetation cover and hydrology. Degraded conditions around the developed sections, including the angler trail, the other trails, the cabins, and the campground will be improved, and future degradation prevented.

**Opportunity:** Restoration efforts and monitoring of the streambanks in the developed recreation areas should be a joint effort between the USFS and the Refuge. Current management by the Forest Service is direct restoration, education, and maintenance of the trail system along the Russian River. The Refuge side needs restoration work, cleanup, maintenance, and some construction to return it to an ecologically functioning state on par with the Forest Service side. Future and further collaborative efforts will be the key to maintaining the Russian River banks and hydrology over the long term

**Management Strategies:**

- The Chugach National Forest has drafted an Exotic Species Management Plan. The provisions in this plan call for the control and eradication of known populations of exotic species, and the use of weed-free materials in construction activities, including restoration work. This Plan should be applied to any construction, improvement, or ground-disturbing work, including restoration work, on the Russian River developed areas. Re-seeding efforts have introduced a number of weed species to this landscape, and future introduction of undesirable exotics should be avoided.
- Prescribed burns may be a tool applied to create and maintain a desired mosaic of stand composition and structure, which would help meet the desired future

condition of a mosaic of different stand development classes (Oliver and Larsen 1996).
- Disturbance to the upper landscape watersheds should be kept at a minimum to continue the meet the goal of a proper functioning condition for vegetation cover and hydrology.
- Monitoring of water quality, fish presence, and streambanks will also help plan efforts to keep the greater landscape in a proper ecologically functioning condition.
- Alteration of streams, including bulldozer work or other larger-scale projects, may sometimes be necessary to maintain the hydrology of the stream system and support the current fish and wildlife population of the landscape.
- Develop an integrated interagency management plan to address restoration, and management with KNWR, USFS, and AKFG.
- Conduct an interagency restoration project along both sides of river, 3 miles from the confluence of the Kenai and Russian Rivers to gorge.

## 7.5 Fire

**Desired Condition:** The predominant conditions on the Chugach National Forest will be those that result from natural processes. Conditions that result from active management or restoration will be present in selected locations. (From the CLRM, pg. 3-13).

**Opportunity:** Apply FRCC (Fire Regime Condition Class) or other models to determine fire risk, fire return intervals, potential fire spread, and strategies to deal with fire in the watershed.

**Management Strategies:**
- Restoration activities, such as prescribed fire and mechanical treatments, in these areas and small-scale forest management activities along the road corridors will create opportunities for the utilization of forest products.
- Prescribed fires will occur on a limited basis each year for fuel reduction, improvement of wildlife habitat and restoration to desired vegetative conditions. Catastrophic wildland fires are projected to be infrequent and, when they occur, will most likely be distant from major highway corridors and other centers of human activity. Smoke levels will be within state standards for particulate material, except when catastrophic fires occur. (CLRMP, pg. 3-15)

## 7.6 Aquatic Species and Habitats

**Desired Condition**: Maintain or increase fish numbers and habitat quality, especially coho. Improve access for anglers and reduce erosion.

**Opportunity:** Improve fish habitat and fishing opportunities.

**Management Strategies:**
- We need to continue with the boardwalks, fencing, and bank restoration and protection.
- The fisherman's trail between the power line and just below the falls needs to be upgraded.

- Continue with the bank restoration efforts along the existing angler's trail below the power line.

**Opportunity:** Develop fishing opportunities for Dolly Varden in the Russian Lakes.

Management Strategies**:**
- Inventory existing habitat and develop a management strategy.
- Identify good fishing spots and techniques, and provide public information.

## 7.7 Terrestrial Species and Habitats

**Desired Condition:** Bear human interactions are minimal and there is a cohesive and consistent message regarding managing bear human interactions between all land and resource management agencies (USFS, USFWS, AKFG (Game and Sport Fish), State Parks.

**Opportunity:** Decrease negative bear/human interactions

**Management Strategies:**
- Temporal or spatial zoning regarding fishing restriction (such as no fishing zones or time periods).
- Vegetation Management: reduction along banks to improve visibility.
- Two graduate masters projects on public use and bear movements.
- Continue working with and developing plan with Interagency Brown Bear Team.
- Increase awareness with interpretation and education.
- Additional bear proof food lockers in backcountry areas.

**Desired Condition:** There is diversity of vegetation types and structure, providing a wide range of habitats for wildlife.

**Opportunity:** Identify current vegetation and structure, and identify projects to promote structural diversity.

**Management Strategies:**
- Get and interpret Ikonos imagery to determine existing vegetation type and structure, and input into GIS.
- Burn to improve browse conditions: Revisit Russian River 1969 and 1990 prescribed burns or fires. The 1969 burn is now out of reach of moose. The 1990 fire burned too cool, now has *Calamogrostis canadensis*. Collect data and consider prescribed burning in Upper Russian and Upper Russian South Burn Units. Consider visual quality for 1969 burn.

**Desired Condition**: Recreation opportunities include responsible consumptive and non-consumptive uses within an acceptable range of impacts.

**Management Strategies**:
- Identify important habitat areas and determine if they are being impacted by current recreation use.
- Develop a wildlife interpretive/education plan to promote responsible consumptive and non-consumptive use.

- Bear and fish viewing at falls.
- Inventory and monitoring of existing MIS, TES, SSI species and habitats and potential impacts from recreation activities.
- Conduct Trumpeter Swan nest habitat surveys and develop management plan if necessary.

## 7.8 Human Uses

### 7.8.1 Human Uses: Past

**Desired Condition:** There are no negative impacts to cultural resources**.**

**Opportunity:** Increase education and awareness about cultural resources.

**Management Strategies:**

- A proactive management plan for the watershed would completely archaeologically survey areas in the watershed that continually have either large numbers of projects conducted, or have a high degree of public use, raising issues of both direct and indirect use. Project specific partial surveys of these areas have been done over the years, however with the continuous and/or increased use of this area by both visitors and the Forest Service, complete archaeological surveys, resulting in more complete knowledge of both the location and significance of cultural resources, will make future planning and management activities more efficient. Such information will allow sites to be avoided, interpreted, rehabilitated, and if necessary, nominated for the National Register of Historic Places. Partnerships for such surveys could include Alaska Native organizations or interested public groups such as the Cooper Landing Historical Society.
- Documentation and interpretation of individual sites.
- In cooperation efforts with CIRI, the State, and Wildlife Refuge, we can work to protect and interpret cultural resources. Opportunities can stem from both prehistoric and historic sites such as the Sqilantnu Archaeological District and the Russian River Rendezvous. Ultimately, by way of interpretation and signage of sites, districts, and cultural landscapes, the history within the sites may be preserved for the future. Given the trend of visitors to the Russian River area and a general public interest in history, including Native history, there is great potential for interpretation and education of the many cultural resources in this area.
- The Heritage Program should begin to encourage Stewardship Agreements with Outfitter/Guides to interpret historic sites for clients and monitor sites for the Forest. This results in a win-win situation, as the Forest provides historical as well as archaeological ethics information on the sites to the Outfitter/Guides which they may present to their clients, and in return, the Outfitter/Guides provide the Forest with photographs and information of the condition of the sites monitored, helping the Forest better manage valuable public resources. An increase in the number of Stewardship Agreements, and heritage resource interaction with Outfitter/Guides is desirable for future management of the Russian River Watershed area.

### 7.8.2 Human Uses: Present

**Desired Condition:** There is a balance between human uses for recreation and resource use and the degradation of or acceptable change in natural resources.

**Opportunity:** Determine an acceptable level of human use and resource degradation.

**Management Strategies:**

- Public survey on acceptable changes in fishing experiences; will they accept night closures?
- Temporal or spatial closures and long-term monitoring?
- Integrated multi-resource, multi-agency management plan for recreation in the watershed.
- Rehabilitation and expansion of existing facilities (ongoing). Potential projects for Revised Forest Plan Implementation include the following:
- Russian Lakes Trail Reconstruction
- Russian River Angler Trail Reconstruction
- Upper Russian Lake Cabin Reconstruction
- Russian River Campground Toilet Replacement
- Russian and Kenai Riverbank Restoration and Revegetation
- Develop a management plan showing acceptable use for different areas and plan facilities in these areas.
- Continue the Stream Watch program along the lower Russian River.

**Desired Condition:** Human uses and impacts are concentrated in certain areas rather than spread out, and impacts are within an acceptable range.

**Opportunity:** Determine appropriate locations for recreational development where impacts have no adverse effects and/or can be easily mitigated.

**Management strategies**:

- Develop a plan to determine human use throughout the watershed, an acceptable range of use, and identify sufficient management actions when an unacceptable range is reached.
- Develop bear viewing opportunities at Russian River Falls.
- Develop a bear – human interaction management strategy.
- A collaborative effort was started in 2004 between the USDA Forest Service, USFWS, State of Alaska Department of Fish and Game (Sportfish and Game Biologists), and Alaska Recreation Management to better understand bear – human interactions that occur along Russian River and work together to minimize the chance of encounters that end in injury to human or bear. The components of this effort are coordination with the Interagency Brown Bear Team, interpretive efforts with the anglers, research dealing with bears' use of drainage, and law enforcement issues.
- Rehabilitation and expansion of existing facilities (ongoing). Potential projects for Revised Forest Plan Implementation include the following:
- Russian Lakes Trail Reconstruction
- Russian River Angler Trail Reconstruction
- Upper Russian Lake Cabin Reconstruction
- Russian River Campground Toilet Replacement

- Russian and Kenai Riverbank Restoration and Revegetation
- Develop a management plan showing acceptable use for different areas and plan facilities in these areas.
- Continue the Stream Watch program along the lower Russian River.

**Desired Condition:** Human uses and impacts are concentrated in certain areas rather than spread out, and impacts are within an acceptable range.

**Opportunity**: Determine appropriate locations for recreational development where impacts have no adverse effects and/or can be easily mitigated.

**Management Strategies**:

- Develop a plan to determine human use throughout the watershed, an acceptable range of use, and identify sufficient management actions when an unacceptable range is reached.
- Develop bear viewing opportunities at Russian River Falls.
- Develop a bear – human interaction management strategy.

# 8.0 DATA GAPS AND RECOMMENDED SURVEYS

## 8.1 Lands

**Data Gaps:** None Identified.

**Monitoring and Research Needed:**
- Continual monitoring of lands special use permits in the area.
- Stay abreast of issues dealing with future development in Cooper Landing, CIRI-selected land, and state and private lands in the vicinity.

## 8.2 Geology, Minerals, and Soils

### 8.2.1 Geology

**Data Gaps:** None Identified.

**Monitoring and Research Needed:** No

### 8.2.2 Minerals

**Data Gaps**: None Identified.

**Monitoring and Research Needed**: No

### 8.2.3 Soils

**Data Gaps:**
- Detailed soil mapping that covers the alpine landscape.

**Monitoring and Research Needed:**
- Monitoring bank erosion of gorge area and continue to monitor cross sections.
- Monitor streambank restoration sites for non-native species that may have been introduced during the restoration process by way of imported soil, seeding, or any other materials.

## 8.3 Hydrology

**Data Gaps:**
- Channel morphology and water quality.

**Monitoring and Research Needed:**
- Continue to monitor cross sections along the Lower Russian River to determine trends in channel change. Such data can help determine which parameters are changing, why, and what can be done to best maintain healthy, natural banks.

- Monitor bank erosion in the Russian River gorge. Increased use in this area is causing degradation of the banks and increased sedimentation into the river. Monitoring can be used to best determine the course of action for restoring these banks or improving the angler trail.
- Monitor rates of human-induced bank erosion on the Russian River upstream of Lower Russian Lake. Although it currently receives little use, the channel in this area is very susceptible to bank erosion from angler trampling, as the banks are composed of fine sediments.
- Monitor water quality degradation from oil and gasoline spills in Upper Russian Lake to help determine the effects of these pollutants on fish and wildlife, if any, and develop recommendations to minimize the water quality degradation. No such data currently exist.
- Monitor bank erosion along the angler trail in the Russian River gorge as stated above, determine the amount of sedimentation occurring as a result of bank erosion, and develop strategies for minimizing future bank erosion.

## 8.4 Vegetation/Ecology

**Data Gaps:**
- No current information on vegetation composition and structure for the Upper Russian River.

**Monitoring and Research Needed:**
- Monitor new population of non natives and monitor changes in bank conditions.

## 8.5 Fire

**Data Gaps**: None Identified

**Monitoring and Research Needed**:
- Pre and post burn monitoring information.

## 8.6 Aquatic Species and Habitats

**Data Gaps:**
- Effects of high levels of angler use.
- What are the effects of use levels increasing into the Gorge area?
- What is the status of the resident fish population in Upper and Lower Russian Lakes?

**Monitoring and Research Needed**:
- Need a rainbow trout survey, research on angler trampling effects on redds.
- Where is potential spawning habitat along anglers trail?
- What are the effects of use levels increasing into the Gorge area

## 8.7 Terrestrial Species and Habitats

**Data Gaps**:

- Existing and potential habitat for all sensitive species, management indicator species, and species of special interest, and other species of interest such as Dall sheep.
- Existing populations and population trends for all sensitive species, management indicator species, and species of special interest, and other species of interest such as Dall sheep.
- Population size and structure and maps of core spring and summer feeding habitat, and winter denning habitat of brown bears, and assessment of the effects of existing human activities on these areas
- Assessment of the effects of human activities on all sensitive species, management indicator species, and species of special interest, and other species of interest such as Dall sheep. Are there adverse impacts to wildlife or habitat, and if so, what is acceptable?
- Identify Trumpeter swan nesting and rearing habitat, identify what if any impacts float planes and other activities are having.
- What is the current vegetation composition and structure, and potential habitat for all species?
- What impacts is the spruce bark beetle having on habitat and wildlife such as goshawks.

**Monitoring and Research Needed**:
- Effects of recreation activities on wildlife in the watershed.

## 8.8 Human Uses

### 8.8.1 Human Uses: Past

**Data Gaps:**
- Limited information on cultural resource sites.

**Monitoring and Research Needed?**
- Further investigation of watershed to identify all cultural resource sites.

### 8.8.2 Human Uses: Present

**Data Gaps**:
- No consistent recreation use numbers for the watershed
- What are the appropriate amounts and kinds of recreational use compatible with the area and when do negative results start to occur to the physical, biological and social resources of the area? In other words, what is the appropriate threshold or carrying capacity of the area?
- What are the projected recreation demands for the area and are the current recreational facilities in place adequate for projected growth and/or demand?

**Monitoring and Research Needed**:
- Consistent effort to capture recreation use numbers by using trailhead devices such as laser trail counters, vehicle counts at trailheads, and other orchestrated “random sampling” techniques employed throughout the year.

- Employ a recreational carrying capacity study for the area similar to the effort being made at Six Mile – take carrying capacity a step further and utilize the data to come up with key management standards, indicators and monitoring protocol for this specific area utilizing the Limits of Acceptable Change (LAC) methodology (which was developed by the Forest Service).

# 9.0 RECOMMENDATIONS

## 9.1 Recommended Actions

1. **Develop an integrated, multi-agency, Resource and Recreation Management Plan** for the watershed that includes coordination with the Alaska Department of Fish and Game, US Forest Service, and the Kenai National Wildlife Refuge, CIRI, Alaska Recreation Management, and outfitter/guides. The plan should address the following items:

   - Strategy to determine and quantify existing and acceptable levels of human use for different portions of the watershed and sufficient management actions when an unacceptable range is reached. What is the carrying capacity? Employ a recreational carrying capacity study for the area similar to the effort being made at Sixmile Creek – take carrying capacity a step further and utilize the data to come up with key management standards, indicators and monitoring protocol for this specific area utilizing the Limits of Acceptable Change (LAC) methodology.
   - Identified appropriate locations for recreational development where impacts have no adverse effects and/or can be easily mitigated.
   - Strategy for rehabilitation and expansion of existing facilities (ongoing) such as Russian Lakes Trail Reconstruction, Russian River Angler Trail Reconstruction, Upper Russian Lake Cabin Reconstruction, Russian River Campground Toilet Replacement
   - Recommendations for facilities to maintain the natural appearance of the landscape along the Seward Highway All-American Road.
   - A management strategy for dealing with future bank erosion in new areas, such as above the power line.
   - Strategy for conducting an interagency restoration project along both sides of river, 3 miles from the confluence of the Kenai and Russian Rivers to gorge.
   - Strategy for dealing with wildfire in the watershed. Apply FRCC (Fire Regime Condition Class) or other models to determine fire risk, fire return intervals, potential fire spread.
   - Prescribed burn plan to create and maintain a desired mosaic of stand composition and structure, which would help meet the desired future condition of a mosaic of different stand development classes and improvement of wildlife habitat.
   - Guidelines from the Chugach Exotic Species Management Plan for reducing or eliminating the spread of non-native plant species during restoration activities.
   - A cohesive and consistent message regarding managing bear human interactions between all land and resource management agencies (USFS,

USFWS, AKFG (Game and Sport Fish), State Parks. Work with Brown Bear Study Team and Bear Working Group.

- Identified areas for additional bear proof food storage boxes.
- Strategy for reducing vegetation and improving visibility to reduce human/bear encounters along stream bank and trails.
- Guidelines if necessary for reducing recreation impacts to trumpeter Swan nesting areas.
- Management plan for identifying, protecting, and interpreting cultural resource sites in cooperation with CIRI, the State, and Wildlife Refuge, and outfitter guides. Plan should incorporate Stewardship agreements with outfitter/guides.
- Interpretive plan that includes:
    i. Interpretive signs for anglers along the lower Russian River to educate recreational users about the effects of angler trampling on channel morphology, riparian vegetation, water quality, fish habitat, and the fish themselves.
    ii. Interpretive signs or materials for good fishing areas and techniques for Dolly Varden in Russian Lakes.
    iii. Interpretive signs and materials on reducing negative bear human encounters.
    iv. Interpretive signs on fish and wildlife viewing opportunities and viewing ethics, especially at the falls.
    v. Interpretive signs and information on prehistoric and historic sites such as the Sqilantnu Archaeological District and the Russian River Rendezvous

2. **Continue ongoing bank restoration efforts on the lower Russian River,** repairing banks that have been heavily damaged by angler use, and consider channel restoration in areas in which channel migration is threatening the angler trail. Appropriate restoration methods include bio-engineering techniques to restore streambanks, and the placement of rock or log structures and large woody debris in the channel to help direct flows away from sensitive bank

3. **Continue current Stream Watch Program.**

4. **Develop a Memorandum of Understanding** with The Forest Service, FWS, and CIRI for the purpose of insuring the significant activities at Russian River (e.g., visitor's center, archaeological research center and visitor-oriented facilities) are carried out in a cooperative and coordinated manner.

5. **Continued renewal of mineral withdrawal** for the Russian River watershed.

6. **Conduct the following inventory, monitoring, and research to support these recommendations:**

## 9.2 Inventory

- Employ a consistent inventory to capture recreation use numbers by using trailhead devices such as laser trail counters, vehicle counts at trailheads, and other orchestrated "random sampling" techniques employed throughout the year.

- Conduct inventory of Dolly Varden and other resident fish in Upper and Lower Russian Lake.
- Identify potential salmon spawning habitat near the angler trail.
- Inventory and monitoring of existing and potential habitat for MIS, TES, SSI species, identify important habitat areas and areas where potential impacts from recreation activities may be occurring. Conduct Trumpeter Swan nest habitat surveys and areas of potential impacts from recreation use.
- Inventory and documentation of important cultural resource sites (historic and pre-historic) within the watershed.
- Identify current vegetation and structure through IKONUS imagery, aerial photos, land sat imagery or other methods.

## 9.3 Monitoring

- Continue monitoring of restored sites in order to evaluate the success of re-vegetation practices and to determine if any exotic plants have been introduced unintentionally.

- Initiate monitoring and preventative measures if needed for:
  - Water quality at Upper Russian Lake and lower Russian River.
  - New areas of stream and stream bank degradation due to angler traffic. Consider the effects on fish of increasing angler use in the gorge area.

## 9.4 Research

- Identify brown bear numbers, movements, and important habitat areas in the watershed in relation to human use, and areas of concern where recreation impacts may be occurring.

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