A Case Study of Human Use in the Gulkana River Watershed

A report prepared by:

The Copper River Watershed Project
PO Box 1560
Cordova, AK 99574
www.copperriver.org

June, 2007

Funded by the State of Alaska Department of Environmental Conservation
with Alaska Clean Water Action funds

Contents

I. Introduction.....5

II. Purpose and Scope of Work.....6

III. Results 7

Sportfishing Effort.....7

River Traffic.....9

Hiking, Camping, and Visitor Use.....13

Off Road Vehicle Use.....16

Land Status.....24

Culverts.....27

Large Scale Infrastructure.....29

Mining and the Trans-Alaska Pipeline.....31

IV. Analysis.....33

V. Recommendations.....35

VI. Bibliography.....37

VII. Appendix.....40

List of Maps, Tables, and Photos

Gulkana River Angler Days, 1982-2003 7
Gulkana River Bank Fishermen, 2005 8
Gulkana River Bank Fishermen, 2006 8
Gulkana River Commercial Permits, 1995-2006 10
Gulkana River Motorized vs. Nonmotorized Visitors, 2006 10
Gulkana River Traffic at Peak Use, 2006 11
Gulkana River Traffic by Aerial Observation, 2005 12
Gulkana River Traffic by Aerial Observation, 2006 12
Gulkana Visitors, 1963-2006 13
Visitor Use Near Stream-side Trails/Camp, 2002-2006 14
Campsite Impact in Upper Gulkana River, 2005 14
Campsite Impact in Upper Gulkana River, 2006 14
Campsite Impact in Sourdough Segment, Gulkana River, 2005 14
Campsite Impact in Sourdough Segment, Gulkana River, 2006 14
New Rules for Activity Along the Gulkana River 15
Off Road Vehicle (ORV) Trails Within the Gulkana National Wild River Corridor (Map #1) 17
Legal and Illegal OHV Trails in the Gulkana Watershed (Map #2) 18
Trails Within the Gulkana Wild and Scenic River Corridor (Map #3) 19
Number of Users per Year of Multi-Use Trails Accessing the Gulkana River, 2002-2006 20
State Permitted Stream Crossings, Gulkana River, Crossings #1-4 21
Private Land Ownership Along the Gulkana River 26
Copper River Knowledge System, Culvert Analysis 27
Culverts in the Gulkana River Watershed 28
The Trans-Alaska Pipeline Crossing the Gulkana River 32
Pipeline Leaking Oil 32
Seasonality of Use on the Gulkana River, BLM Floater's Guide 34

List of Acronyms

ADF&G	Alaska Department of Fish and Game
BLM	Bureau of Land Management (Under the US Department of the Interior)
CRWP	Copper River Watershed Project
DEC	Alaska Department of Environmental Conservation
DNR	Department of Natural Resources (State of Alaska)
DOT	Department of Transportation (State of Alaska)
ISER	Institute for Social and Economic Research, University of Alaska
USFS	US Forest Service
OHV/ORV/ATV	Off Highway Vehicles/Off Road Vehicles/All Terrain Vehicle

I. Introduction

This is a case study of human use on the Gulkana River examining the extent, geographic scope, and seasonality of human impacts on fish habitat. The Gulkana River provides critical habitat for an impressive array of wildlife including Caribou, Grizzly Bears, and Trumpeter Swans, as well as numerous species of fish. In fact, the Gulkana River and its tributaries provide spawning ground for approximately 20% of the King Salmon population in the Copper River drainage.[1]

The Gulkana River originates in the Alaska Range, flowing south through Summit Lake and Paxson Lake, past Sourdough, to its confluence with the Copper River. In 1980, several segments of the Gulkana River were designated as part of the National Wild and Scenic River System. These segments include the Mainstem from the headwaters down to Sourdough, the Middle Fork and the West Fork.

The Gulkana River lies between the Glenn Highway and the Richardson Highway. The Richardson Highway follows the river corridor, running just east of the Mainstem. This makes the Gulkana River easily accessible to people from both Anchorage and Fairbanks. There are two campgrounds along the river, nine permitted commercial guiding outfits, and even a spot with wheelchair accessible fishing in addition to all the unofficial recreation areas along the river. Anecdotal evidence from a wide range of sources suggests that human use of the river has increased in recent years and may be changing the character of the river to the detriment of salmon and salmon habitat.

Most of the land alongside the river is managed by the BLM. The shoreland itself, up to the ordinary high water line, is owned by the State of Alaska, administered through the DNR. ADF&G manages all the wildlife within the watershed. The DOT, the Gulkana Village Corporation, Ahtna Inc., and a few private individuals also own part of the uplands along the Gulkana River. These agencies have noted the potential impact of increased human use and are trying to take a proactive approach to the issue. The BLM revised the Gulkana River Management Plan for the first time since 1983 and it was published in August of 2006, in cooperation with the DNR. Campsites, commercial licenses, OHV trails, and the number of people using the river are all being carefully monitored. The Revised River Management Plan includes protocols for all of the issues being monitored such that if use should exceed allowable thresholds for a quality wilderness experience, steps will be taken to mitigate the situation. User groups on the Gulkana River include:

- independent sportfishermen, subsistence users, hunters, and recreational users
- commercial guides and their clients
- local residents, residents from other parts of Alaska, and tourists from out of state
- motorized users in power boats, jet boats, and ORV's, as well as
- non-motorized users in rafts and kayaks, as well as hikers and campers

This study aims to synthesize quantitative information from a wide variety of sources and will be shared with all agencies. The goal is to apply these data specifically to assessing human use impact on salmon and salmon habitat.

---

[1] Graham, Marnie, BLM, *Alaska Frontier*, "Growing Pains", Summer, 2005, p. 5

II. Purpose and Scope of Work

The purpose of this study is to compile a quantitative analysis of human use on the Gulkana River so that verifiable data rather than anecdotal incidents can be incorporated into regional planning and discussion forums. This study synthesizes data from a wide variety of sources including state, federal, native, and independent sources, and will be shared with all area agencies.

This case study aims to create a model by which we can analyze human use of a river. It characterizes and documents the types of human use in the Gulkana River. The purpose of documenting these uses is to assess the potential for salmon habitat impairment as a result of human activity. The following types of human use were estimated using the best available data:

- Sportfishing Effort
- River Traffic
- Camping, Hiking, and Visitor Use
- Off Road Vehicle Use
- Land Status
- Large Scale Infrastructure: Roads Construction, Culverts, and Aerial Photography
- Mining and the Trans-Alaska Pipeline

This study focuses on these selected types of human use due to the potential habitat impacts they may inflict on salmon rearing, spawning, or migration. If human use exceeds certain thresholds, sedimentation, pollution, nutrification, disruption, and/or barriers to fish passage may result. This study approaches these potential habitat impairments with two goals. First, we hope to provide baseline data of human use before habitat degradation becomes a problem. Proactive assessment can result in more efficient and effective planning strategies versus continuous restoration efforts. Second, the synthesis of field surveys from various agencies may help identify areas that have become overused and help assemble resources for restoration.

In February, 2007, the Institute for Social and Economic Research at the University of Alaska, Anchorage, published a study in which 20 habitat managers around the Copper River watershed were interviewed about salmon habitat. In it, the authors state that, "The most important and noticeable trend to many managers is the increasing amount of users of Copper River natural resources."[2] The study contains the views of 20 professionals in the field and there were a number of important themes that emerged from the interviews. We recommend that anyone interested in the human use case study also read the ISER report in order to better understand the policy side of habitat issues.

Likewise, water quality, and spawning, rearing and migration locations and their seasonal use all are relevant to the question of impact. However, these things fall outside the scope of this study and will have to be addressed in a subsequent analysis. Analyzing locations of concentrated human use is especially important if, as demonstrated for the Tonsina River sub-watershed, salmonid spawning habitat is limited to as little as ten percent of a drainage's total stream channel network.[3]

---

[2] Lowe, Marie, "Copper River Salmon Habitat Management Study," ISER, February 2007, p. 6

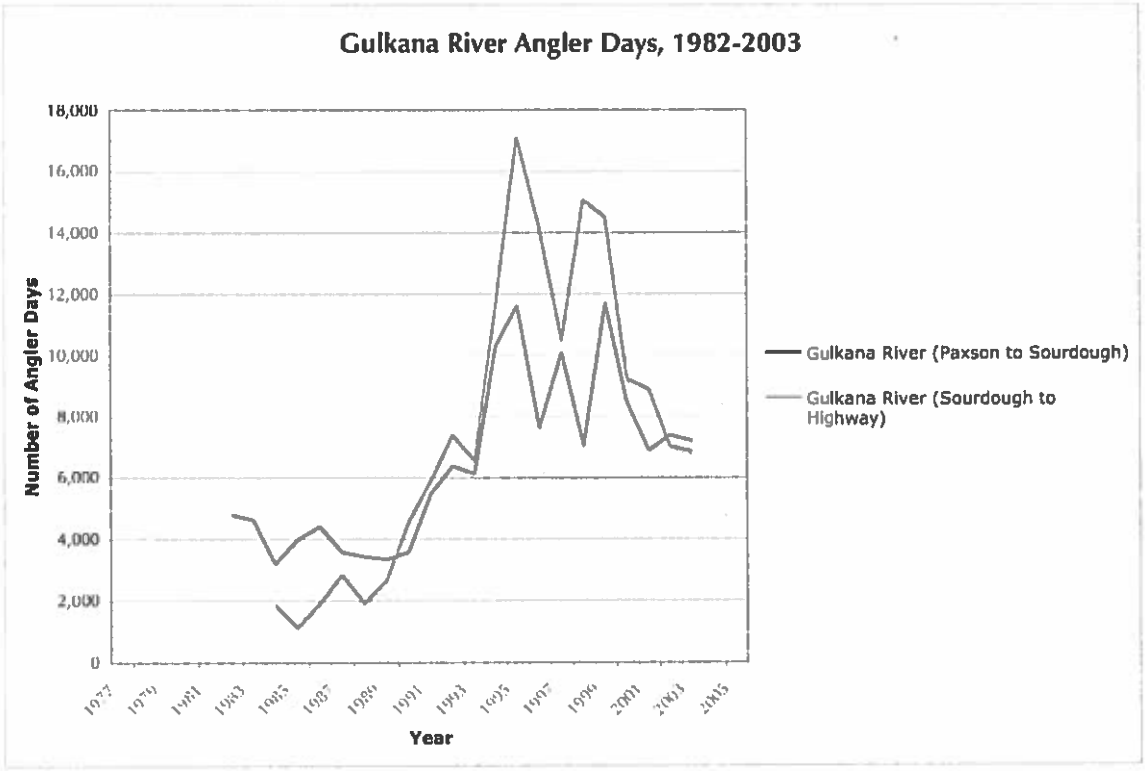
[3] Stillwater Sciences, "Copper River Watershed Salmon Habitat Monitoring Plan Development: Results from Tonsina River Basin Field Reconnaissance," May, 2007, p. 27

IV. Results

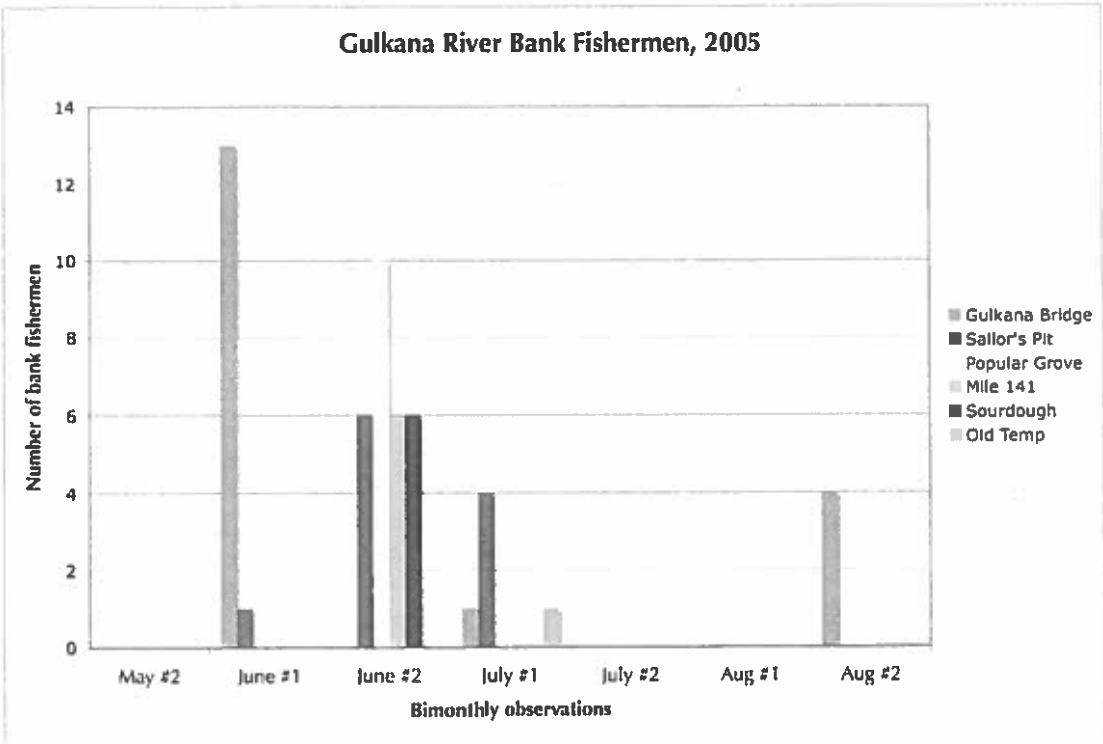
Sport Fishing Effort

Two sources of data have been compiled to represent the trend in sportfishing effort on the Gulkana River. The Alaska Department of Fish and Game has conducted mail-in surveys to estimate the number of angler days on specific stretches of the Gulkana River. The most complete data sets are on the stream reaches from Paxson Lake to Sourdough, and from Sourdough to the Highway. These data span approximately 20 years, and are represented in graph form below.

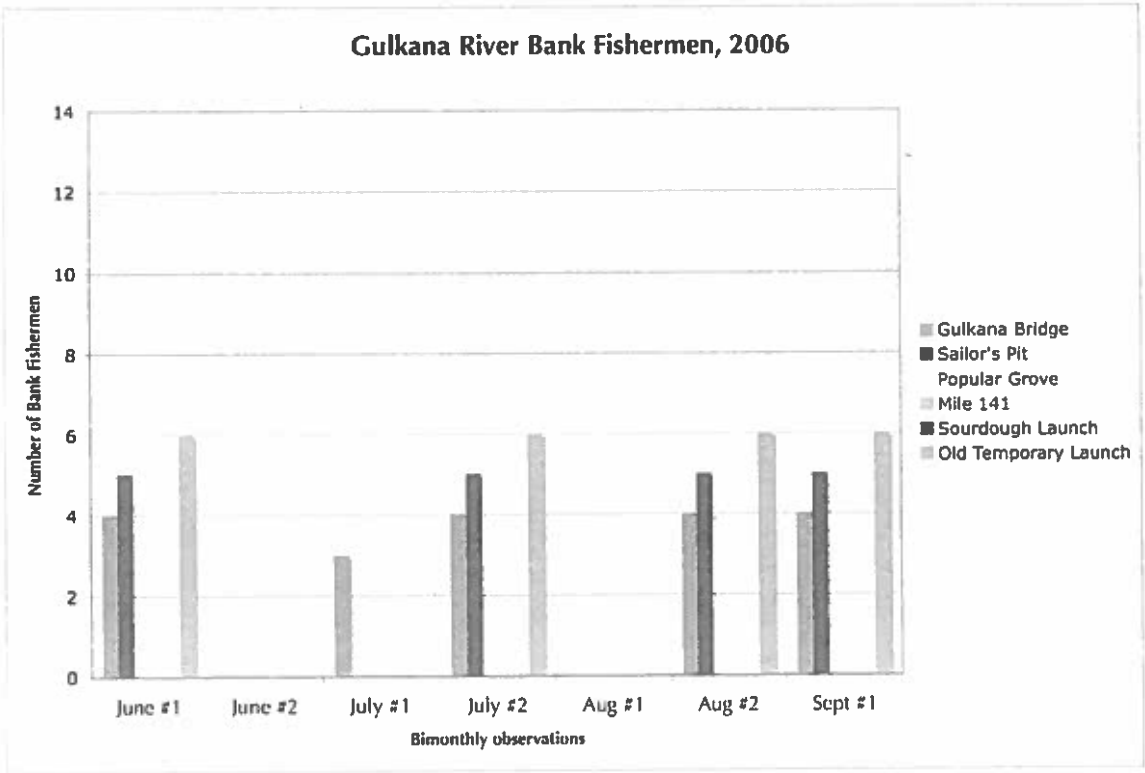
The BLM (Glennallen Field Office) has conducted aerial flight observations in 2005-2006, providing more accurate and complete information on the number of people fishing at peak time intervals. Bimonthly observations were recorded from May-September. In 2005, the BLM recorded 51 bank fishermen over the course of seven flights. In 2006, the BLM counted 63 bank fishermen from the same number of aerial flights.



Data Courtesy of ADF&G



Data Courtesy of BLM



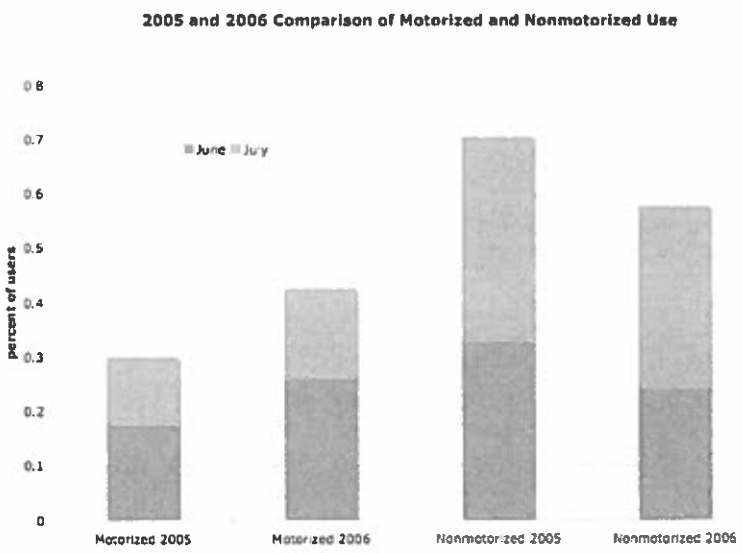
Data Courtesy of BLM

River Traffic

Sportfishing and recreational boating in the Gulkana River watershed supports local businesses and impresses visitors from around the world. In addition, fisheries biologists have documented that a significant percentage of the Copper River salmon fishery relies on the spawning and rearing habitat provided by the Gulkana River and its tributaries. These ecological and social services provided by the Gulkana sub-basin can coexist as long as proactive measures are taken to ensure stream habitat quality and wilderness opportunities. Crucial for this vision is knowing the extent of river traffic during peak time periods when salmon are returning to the rivers, as well as the potential impact of motorized pollution (hydrocarbons) to juvenile salmon.

A summary of the trends in river traffic according to the BLM is as follows: "Rafters generally use the Upper Gulkana starting in late May through July for both fishing and floating. Motorized users tend to congregate from Sourdough Campground upstream to the West Fork confluence and downstream to the Richardson Highway bridge for salmon fishing. During August, water levels generally drop and river use subsides. However, water levels tend to rise once again with increasing rainfall in autumn making it navigable when subsistence hunting season begins and river users focus on opportunities to supply their families with food for the winter."[4]

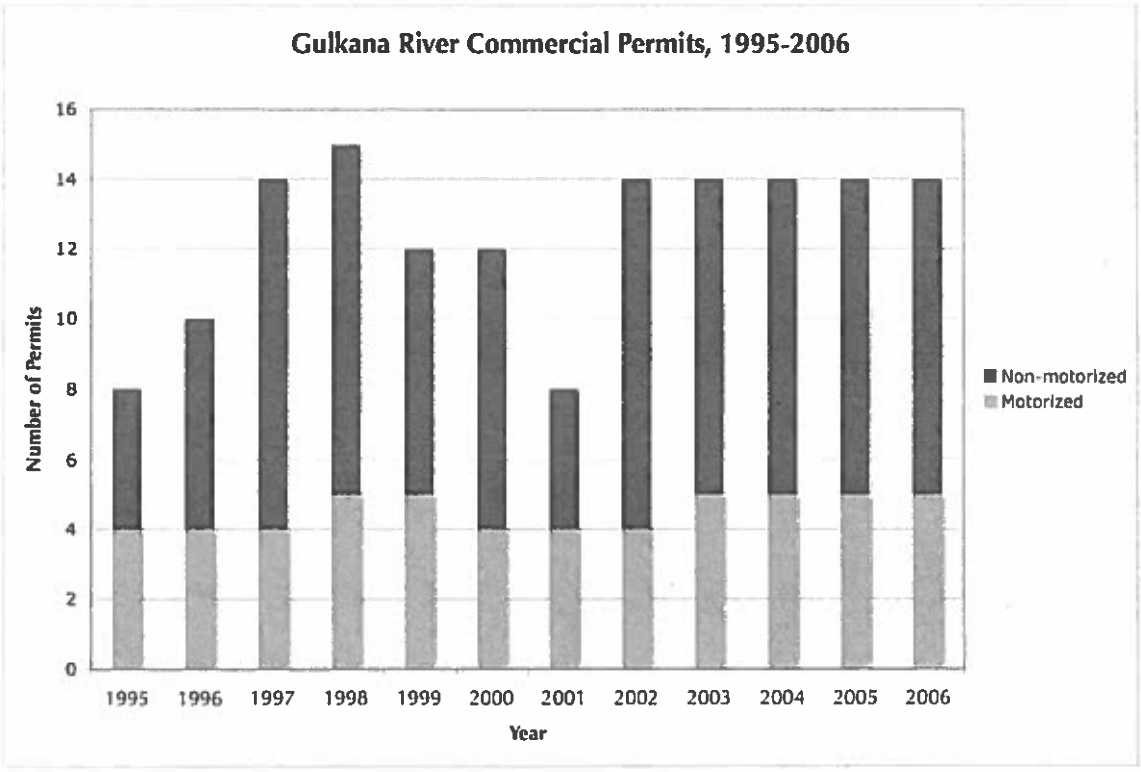
Type of use on the river varies distinctly by river segment and by time of year. Very few motorized boats go upriver of the fish tower, which is approximately 1.5 miles upriver of the confluence with the West Fork. Powerboat use is mainly on the lower river and Sourdough segments of the river. Also, since the lower segment of the river does not have special designation as Wild and Scenic, it is not regulated as carefully. Nevertheless, salmon have to swim through both segments. Watercraft observation data provided by the ADF&G's fish counters (shown at left) show that motorized traffic past the fish counting tower is heavier in June than July (for the two years for which we have data).



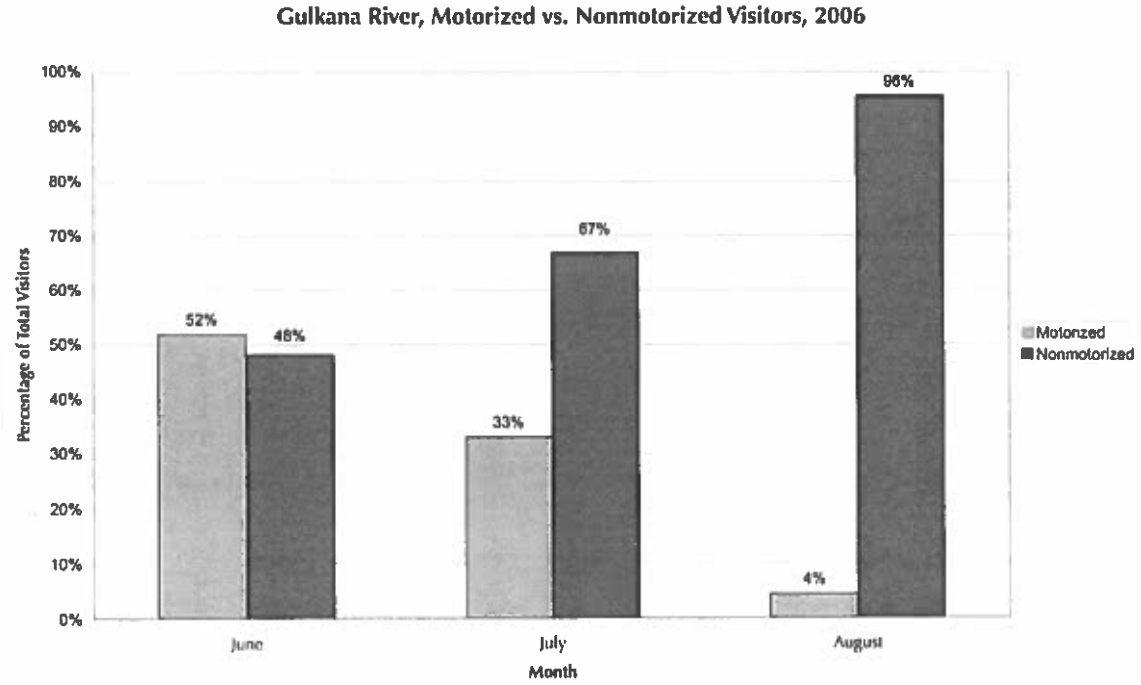
The BLM Glennallen Field Office provides historical trends and current observations of various indicators of river traffic. The pertinent information for salmon habitat is the amount of activity and fishing during migration windows, as well as the extent of motorized boats with hydrocarbon inputs. The graphs below show the commercial permits issued to river guides over the past twelve years for historic context. The 2005-2006 data from aerial observation characterize types of river traffic, extent of motorized use, and seasonality of river traffic during peak use periods.

---

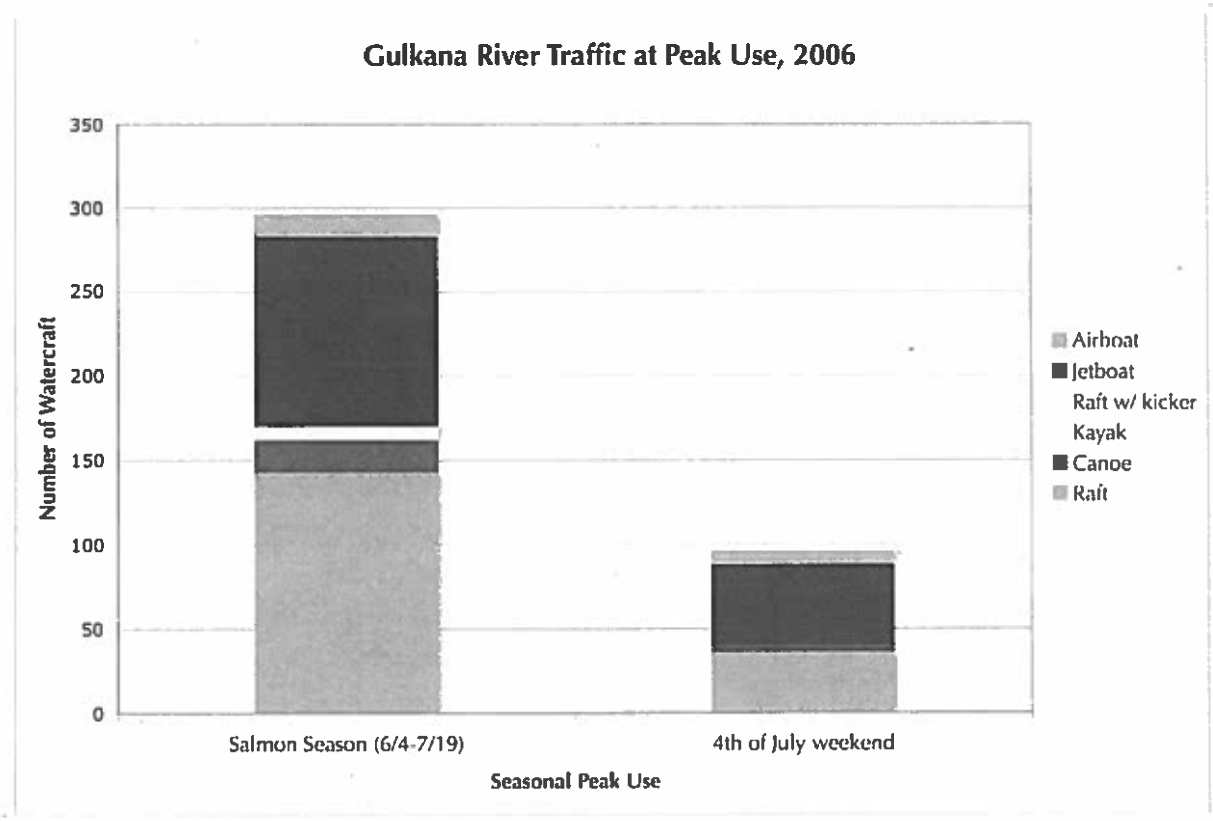
[4] Graham, Marnie. "Growing Pains," p. 6.



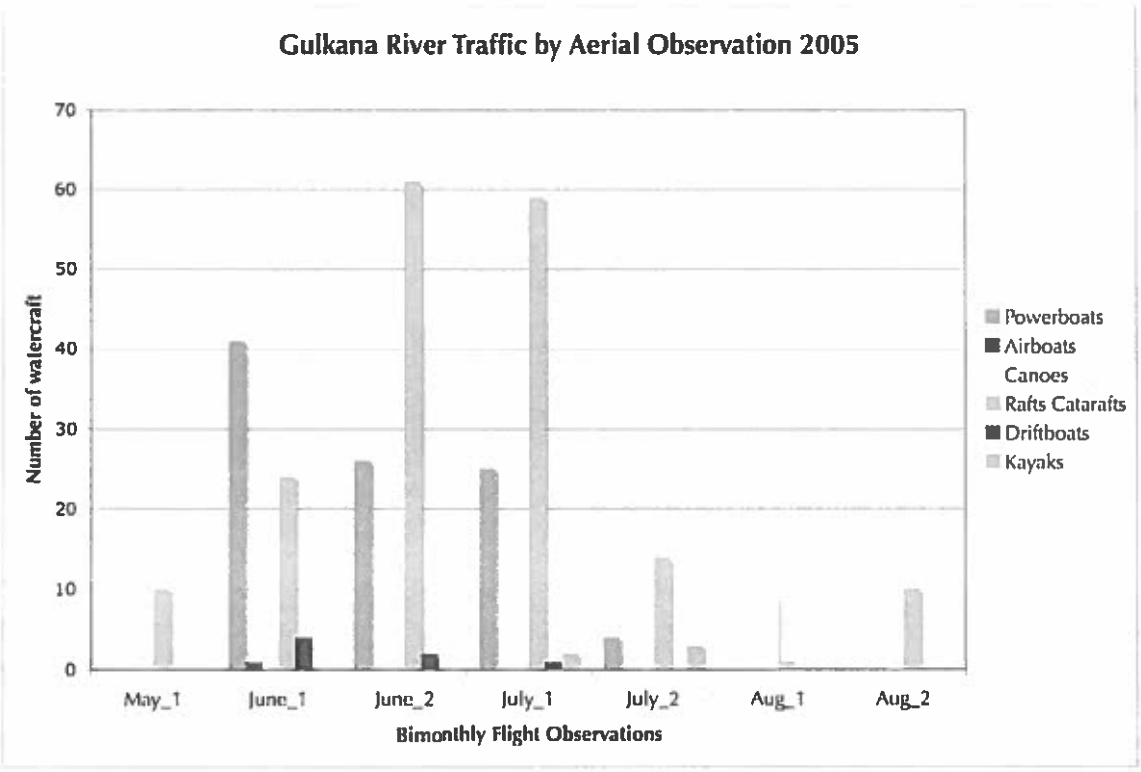
Data Courtesy of BLM



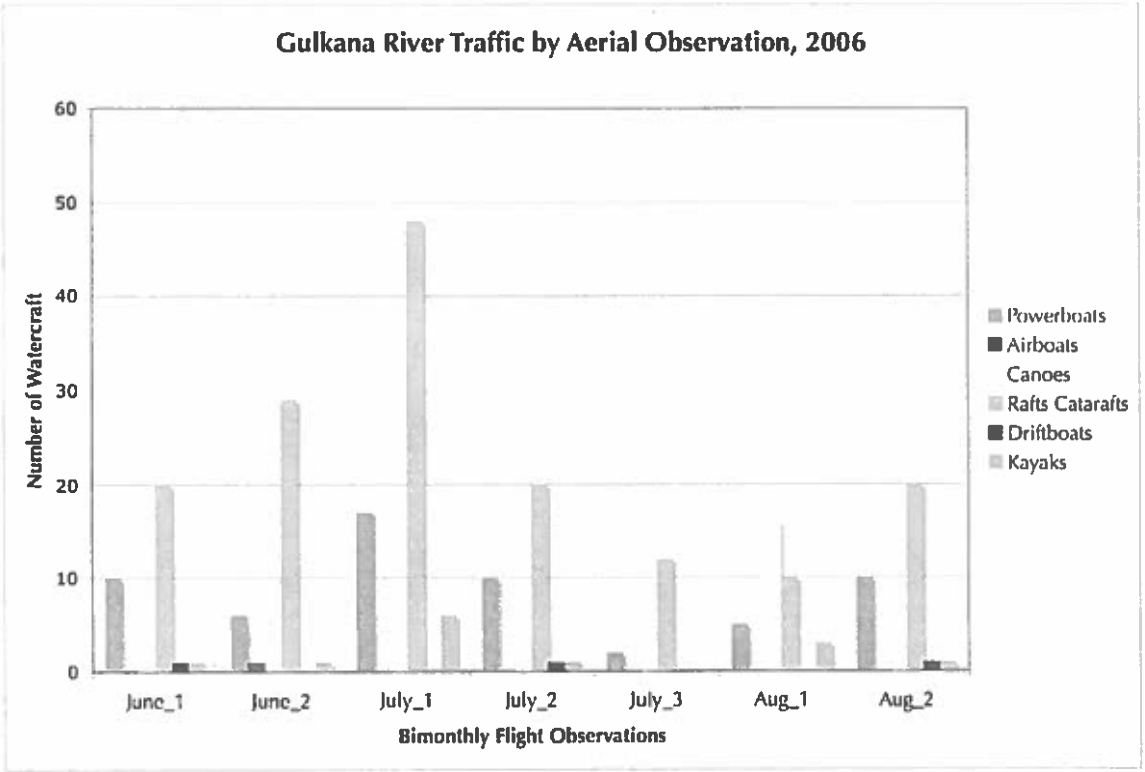
Data Courtesy of BLM



Data Courtesy of BLM



Data Courtesy of BLM



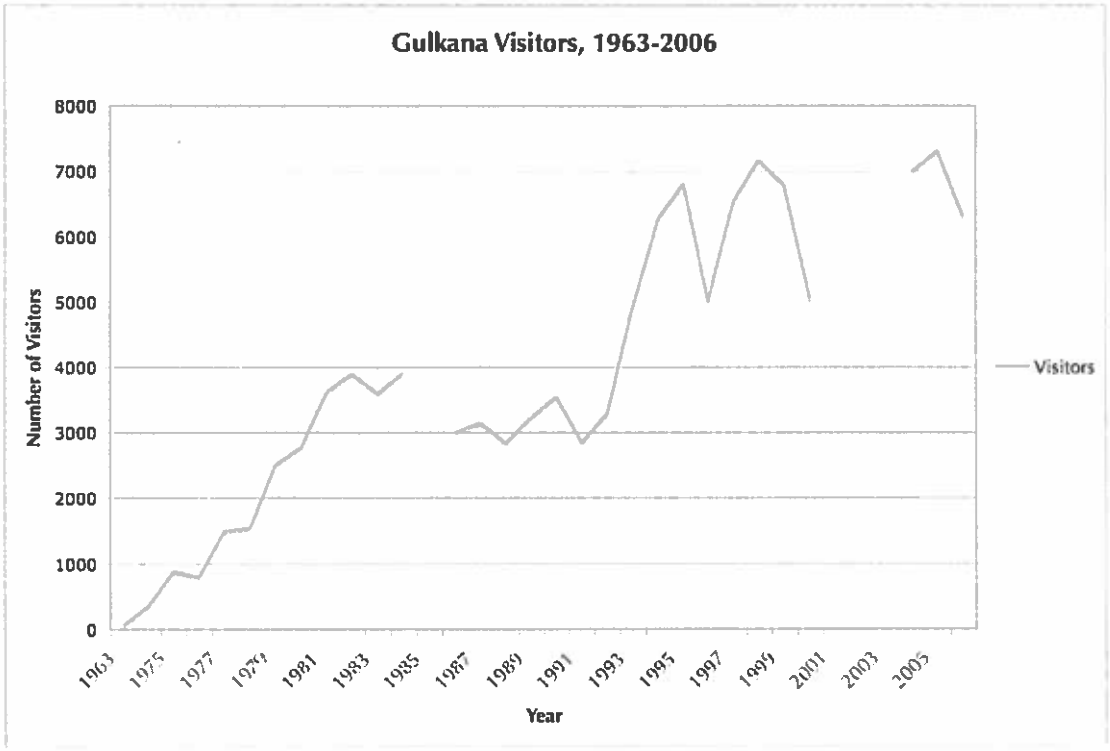
Data Courtesy of BLM

Hiking, Camping, and Visitor Use

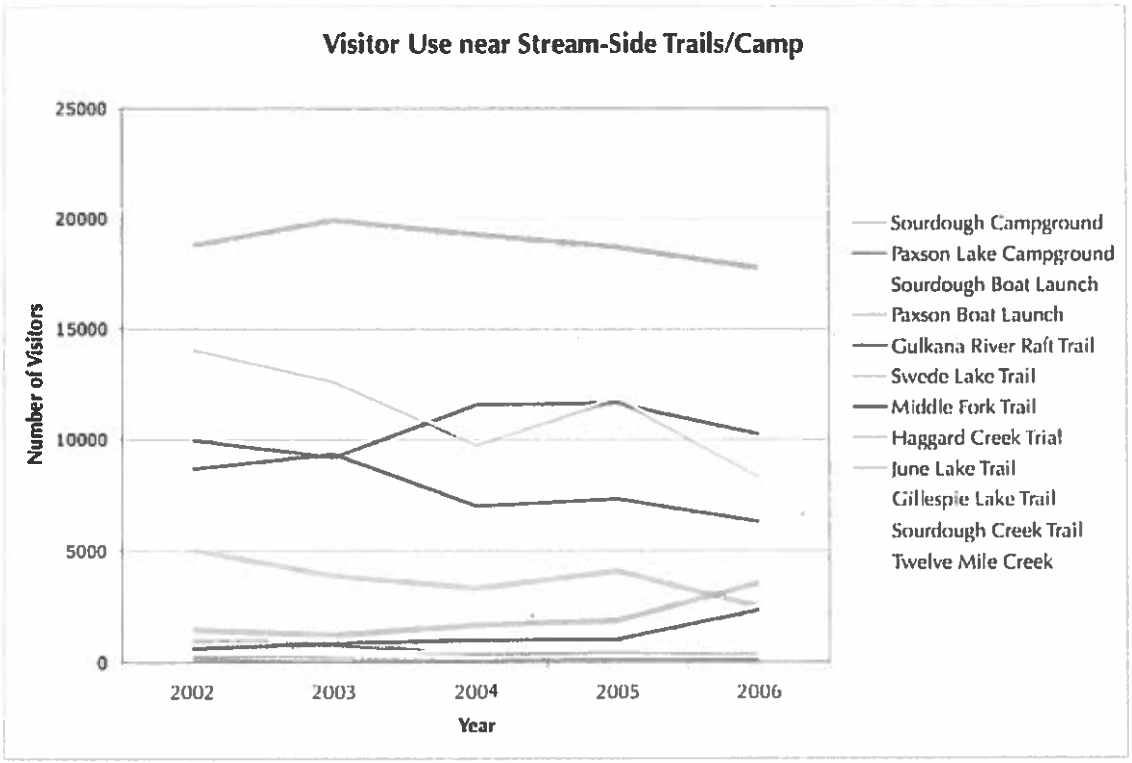
Experiencing Alaska's Wild and Scenic rivers builds ecological understanding and stewardship among local residents and visitors alike. Given this study's focus on aquatic habitat, it may seem insignificant to monitor human use on (dry) hiking trails and campsites. Recreational managers know, however, that the beauty of Alaska's rivers lure many visitors to admire the free flowing waters from stream banks and riverside access points, leading to the intersection of nature-lovers and salmon habitat.

Left undocumented, the cumulative impacts of litter, human waste deposition, and compacted riparian vegetation may slowly but surely have negative implications for the specific habitat characteristics needed for juvenile salmon rearing. For instance, compacted stream-side trails or campsites can lead to loss of native vegetation important for stream bank stability and clean, cold, oxygenated water. In addition, human waste can add excessive nutrients into subsurface flows that enter rivers, disrupting the balance of metabolic needs and algae concentrations.

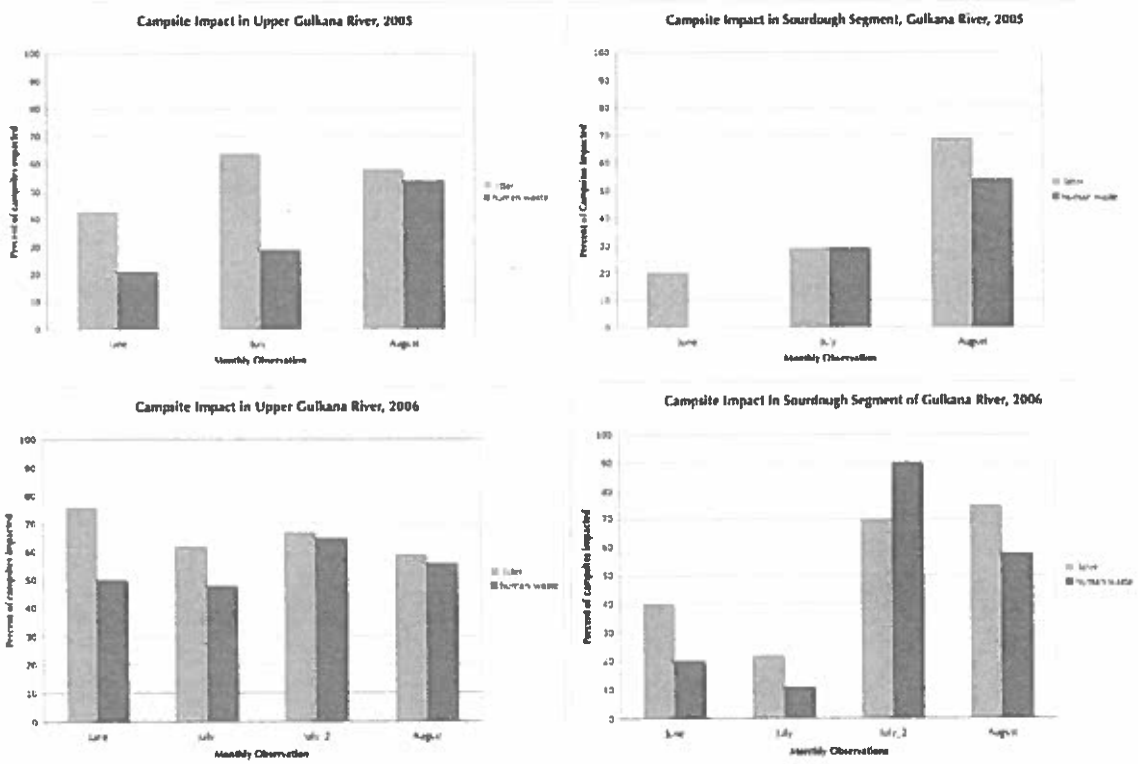
For historical context, the first graph shows Visitor Use from 1963-2006 (data courtesy of the BLM). The following graphs, also from the BLM, present the number of people visiting streamside campgrounds and trails (2002-2006), followed by 2005-2006 data on campsite impact from litter and human waste.



Data Courtesy of BLM



Data Courtesy of BLM



Data Courtesy of BLM

The BLM is undertaking proactive steps to mitigate the impacts of human use. These include:

- A new set of rules for river users as of 2007 "…to address human impacts that exceed 'limits of acceptable change' identified in the public participation portion of the revision of the Gulkana River Management Plan."[5]
- A floater's guide (previously there was no guide) featuring 60 recommended campsites, which are monitored by the BLM. This is intended to reduce the number of campsites along the river, which had risen to over 110 in recent years.[6]
- Monitoring of all campsites for human waste, expansion, litter, and number of fire rings. If human use exceeds acceptable levels as outlined in the Revised River Management Plan, steps will be taken to correct the situation. For example, should human waste exceed acceptable limits, outhouses will be installed.
- Monitoring of fecal coliform in the river. The study is not yet complete, however, preliminary evidence suggests that levels may be higher than regulation allows.

New Rules for Activity Along the Gulkana River

1. When camping with or traveling in a groups larger than 12, the group needs to appoint an organizer and obtain a letter or agreement from the Glennallen Field Office Manager, well in advance of the trip.
2. During peak season, camping limitations will be imposed on certain segments of the river requiring campers to move after three days at the same campsite, in order to share the river's resources. Camping within the river corridor for longer than 14 consecutive days is prohibited.
3. Failure to properly dispose of all burned and unburned trash including toilet paper is also prohibited, as is the failure to properly dispose of human waste. Human waste must be buried in at least six inches of soil and at least 100 feet away from campsites, gravel bars, and water bodies. Carrying portable toilets and hauling all waste out is strongly encouraged.
4. Chainsaw use is now banned completely within the river corridor. All users should plan to utilize dead and down debris for campfires or carry a camp stove.
5. Off-road vehicles traveling through the river corridor must stay on designated sites. All other trails within the river corridor including spur trails off the designated trails are closed completely. ORV riders are encouraged to park their vehicles out of site from the river users when possible.
6. The use of firearms for recreational purposes or the use of fireworks is strictly prohibited within the corridor. Firearms may be used for hunting and in emergency situations.
7. A complete list of rules will be posted at boat launch sites, trailheads and river crossings within the Gulkana National Wild River segments. They may also be obtained from the BLM. [7]

[5] Jenkins, Joseph, "BLM Announces Rule Changes for the Gulkana River," *Delta Wind*, June 7, 2007, p. 1.

[6] Emmons, Heath. Personal interview. 15 June 2007.

[7] Jenkins, Joseph, p. 1.

Off Road Vehicles

The use of off road vehicles in the Gulkana River watershed provides access to subsistence hunting areas and remote cabins. When used appropriately, off road vehicles (ORV), also called off highway vehicles (OHV) and all terrain vehicles (ATV), can offer necessary transportation for rural, remote communities.

ORV use can have detrimental impacts to wetland and stream ecosystems if riders are not responsible about trail maintenance and permitted crossings. According to the Copper River Salmon Habitat Management Study, which interviewed 20 habitat managers in the Copper River watershed, including at least 8 who work in the Gulkana River watershed specifically, "Most identified ORV use as the most important threat in the Copper River watershed today."[8] Tom Taube, Regional Management Coordinator for the ADF&G Sport Fish Division and a former a long-time resident of the Gulkana area agrees: "They are also one of the top threats overall impacting fish habitat on the river."[9] ORV's affect fish habitat the most at stream crossings.

ORV's have the potential to:

- produce sediment that can smother salmon eggs downstream
- destroy salmon redds
- destroy stream bank vegetation
- add non-point source pollution to the water
- widen stream beds, making them shallower, and lead to an increase in water temperature at crossings
- introduce invasive plant and animal species into vulnerable areas
- increase human access where previously there was none

CRWP originally proposed to conduct low elevation digital aerial photography to document non-permitted stream crossings in the sub-basin. Poor weather conditions, late spring snowmelt, and scheduling conflicts prevented the aerial photographs from being taken. However, BLM data can document existing trails and provide the description and ground photos of current ORV stream crossings. As with river traffic, the Wild & Scenic section of the river has posted signs to clearly designate the legal trails from the illegal ones, however, there are not signs on the lower portion of the river. [10] It is less regulated.

BLM Maps of Existing Trails

The BLM has recently done extensive field research to document the existing trails. They have mapped both the legal and illegal trails, posting signs on the legal trails to designate them for riders. They also performed restoration work on many of the illegal trails that impact the riparian zone in an effort to close illegal trails. This restoration work consisted of blocking the trail with logs and planting willows to encourage its return to natural vegetation. The following BLM maps show the trail networks in the Gulkana River watershed.

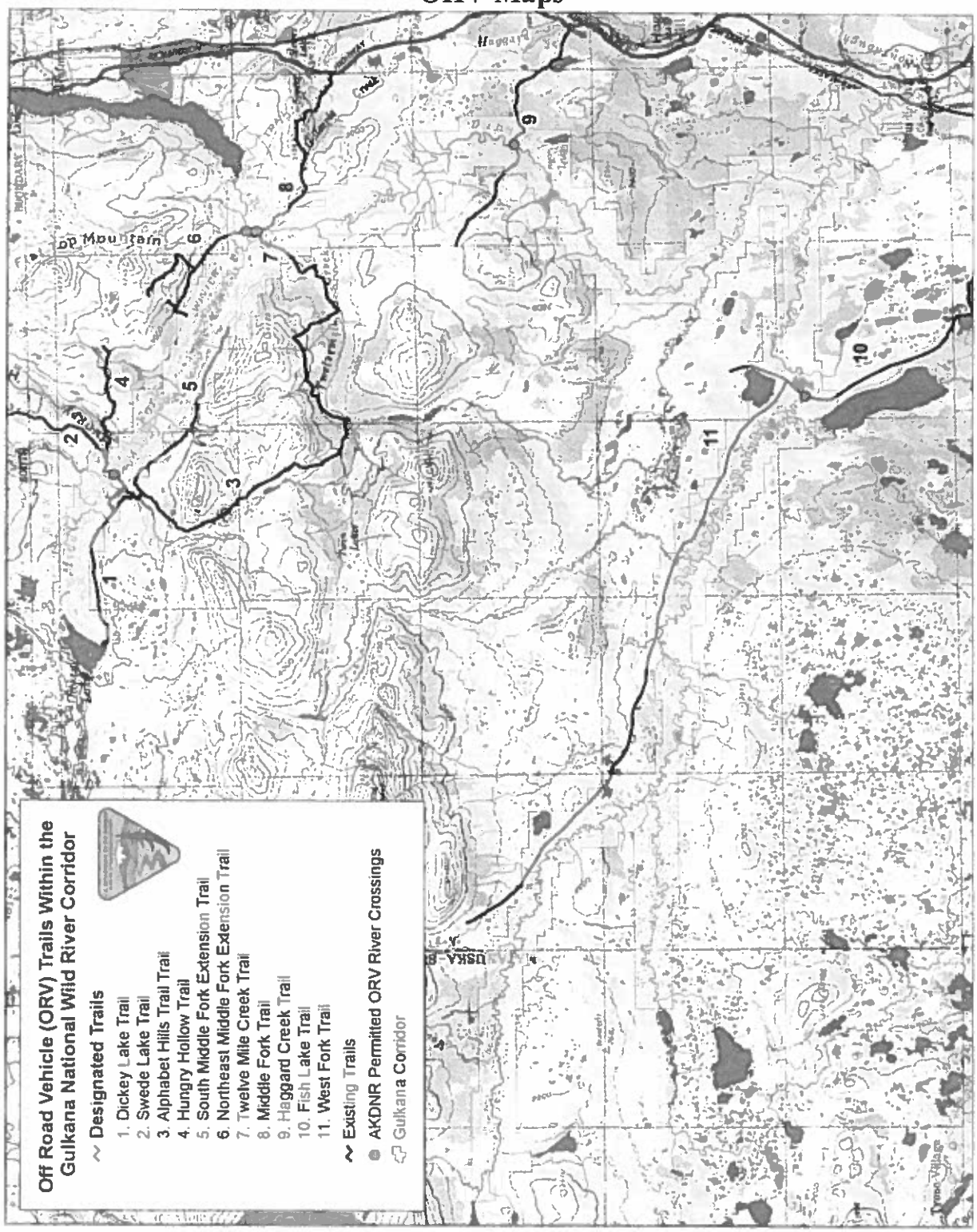
---

[8] Lowe, Marie E, p. 19

[9] Taube, Tom. Personal communication via email, 10 July 2007.

[10] Jacobs, Laura. Telephone interview. 11 July 2007.

OHV Maps

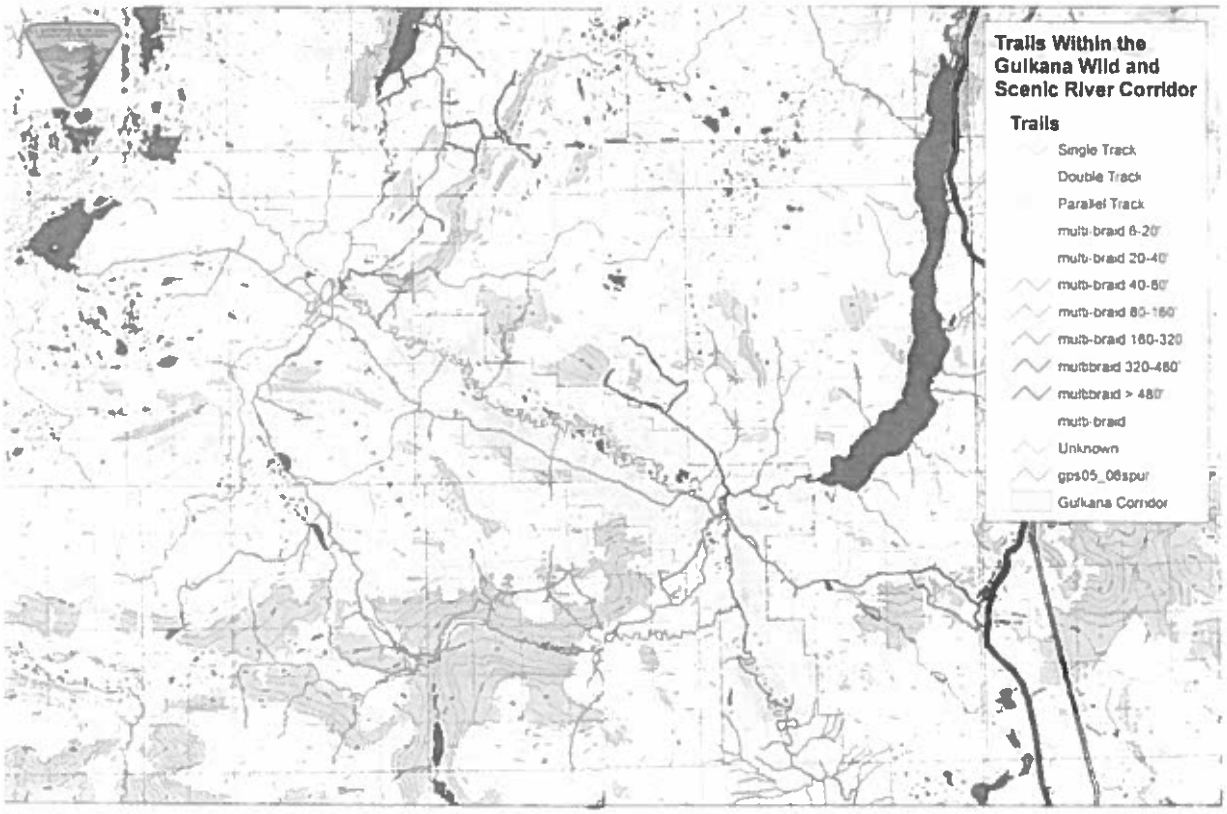


OHV Trails Map #1

This map shows the ORV trails in the Gulkana River watershed.

OHV Trails Map #2

Map #2 Proliferation of Trails
This map shows the proliferation of trails as riders make new paths. Note that some of these existing trails have already had restoration work done on them. Both maps #1 and #2 show that the majority of the trails are along the Middle Fork, from which riders can access the north side of the Alphabet Hills, a popular area for hunting. Even though the Mainstem of the Gulkana is easier to access from the highway, the ground is much too wet to make it practical or popular for ORV use.



OHV Trails Map #3

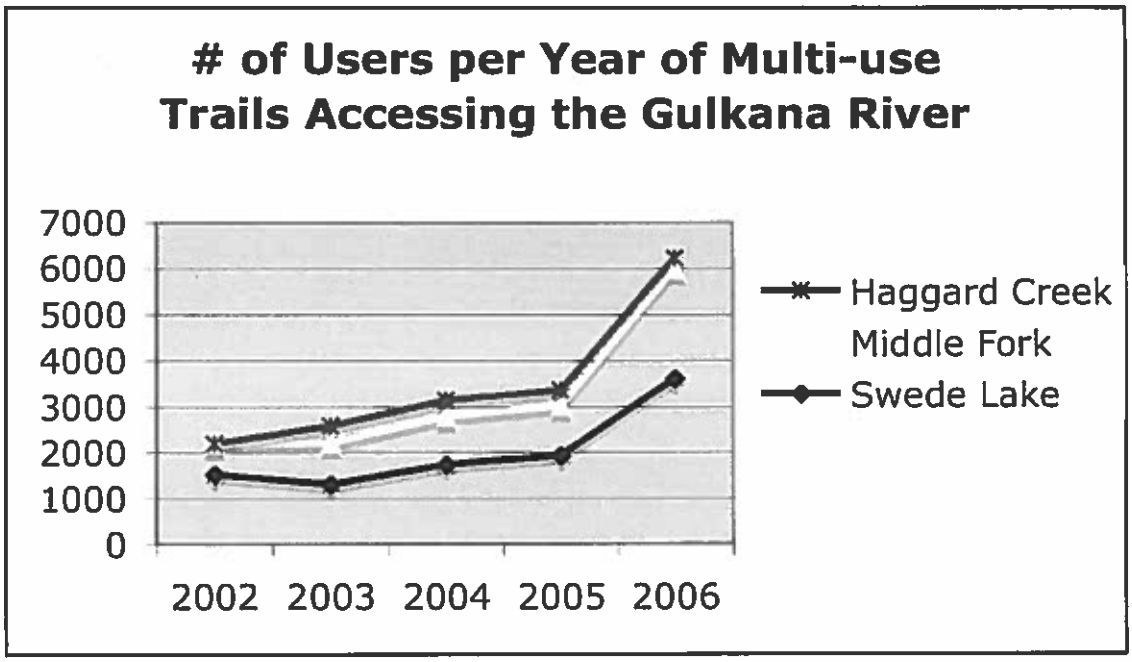
MAP #3 Braided Trails

This map shows detail of the Middle Fork, at the most concentrated area of trails. It depicts the conditions of the trails, whether they are single or multiple track, and how wide they are. Notice that there are numerous places where the **trails are over 480' wide**.

Number of OHV Users

This graph shows the number of users per year on 3 of the main trails in the Gulkana River watershed. These data include winter use, though the majority of the use occurs during the king season and hunting season.

The number of users doubled from 2005-2006. This is due to the fact that the State of Alaska increased the number of Tier II hunting tags, which brought more people out on the land.[11]



Data courtesy of BLM

[11] Larson, Cory, BLM/Glennallen Field Office, Personal email. 3 July 2007.

State Permitted Stream Crossings on the Gulkana River

Even though the BLM manages land along the upper portion of the river, stream crossing permits are issued by the state. These are the four main crossings. Others exist and are permitted, but are rarely used. They are mostly on the West Fork.[12]

River Crossings:

Crossing #1: Meirs Lake/Middle Fork Trail crossing

- This is the higher green dot between trails 6 and 8 on the BLM Trails Map #1. Accesses the Northeast Middle Fork Extension trail
- There are actually two crossings at this location. Crossing #1 is used by smaller OHV's due to a shallower water depth

Section 6, T12N, R2W, CRM
Latitude 62.51.05.46991 N
Longitude 145.40.00.53227 W

Recommended width: 50 foot from centerline, 100 foot total width

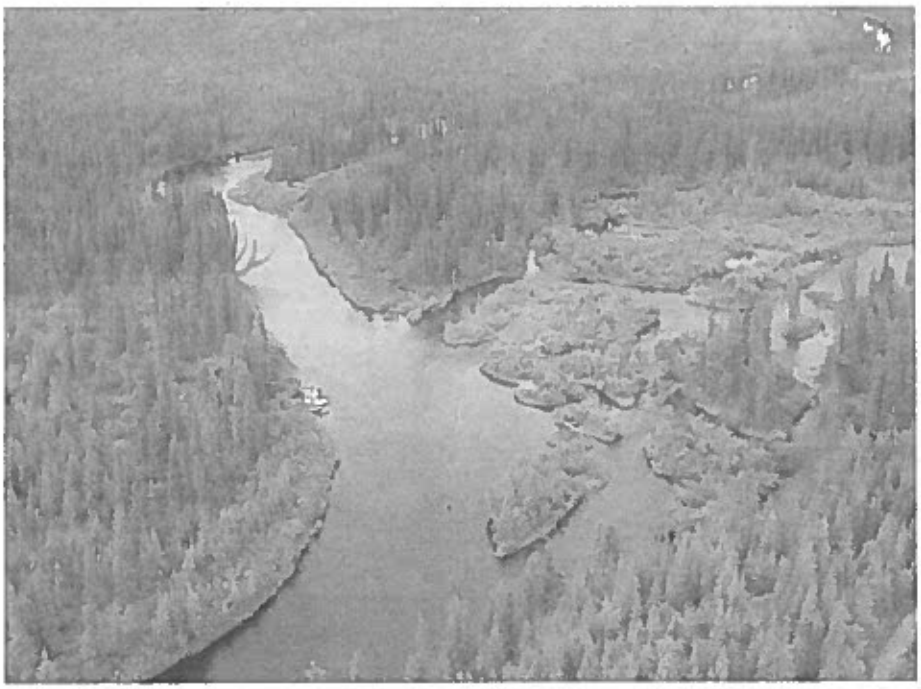
[12] Larson, Cory. Personal communication via email. 3 July 2007.

Crossing #2: Middle Fork/Meiers Lake Trail

- This is the lower green dot on the BLM Trails map between trails 7 and 8
- Accesses the 12 Mile Creek trail. This crossing is primarily used by larger track vehicles due to water depth. Vehicles ford the river by crossing from island to island, emerging on the south side of the river in the vicinity of the rafts in this picture.

  Section 6, T12N, R2W, CRM
  Latitude 62.50.47.95569 N
  Longitude 145.40.00.25547 W

Recommended width: 50 foot from centerline, 100 foot total width



Crossing #3: Swede Lake Trail crossing at the Middle Fork Gulkana River

- This is the green dot on trail #2 BLM Trails map #1.
- Accesses the Dickey Lake Trail and Alphabet Hills trails.

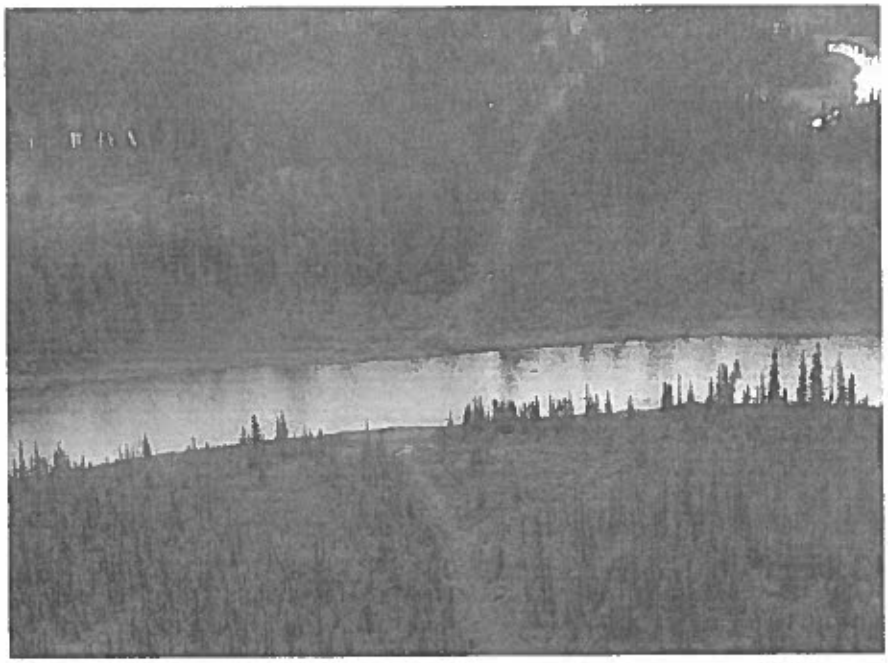
  Section 6, T12N, R2W, CRM
  Latitude 62.55.00.34387 N
  Longitude 145.55.31.02039 W

Recommended width: 50 foot from centerline, 100 foot total width
Usable by large and small OHV's.
(See photo next page)

Crossing #4: Haggard Creek Trail crossing

- This is the green dot on trail 9 on the BLM Trails Map #1.
  Section 22, T11N, R2W, CRM
  Latitude 62.43.19.31153 N
  Longitude 145.34.40.76306 W

Recommended width: 50 foot from centerline, 100 foot total width
Permitted Vehicles: Track Master, Track T-600, Nodwell RN110, and a Max



Land Status

The ownership of a piece of land is very significant in terms of the management of salmon habitat. The priority level of maintaining salmon habitat varies with every owner. Likewise, each public agency has its own organizational values that its employees have to follow. As a salmon swims upriver, it may see a wide range of habitat conditions. "Manager interviews suggested that control over land/and or land ownership (land tenure) is a key element in determining how salmon habitat is protected in the watershed."[13]

The status of land ownership is a pertinent issue along the Gulkana. Not only are there a number of different landowners, the land status is also changing. Current land owners/managers include the federal government, administered through the BLM; the State of Alaska, administered through the DNR Office of Habitat Management and Permitting; the Gulkana Village Corporation, Ahtna Inc.; as well as a few private individuals, which includes both native allotments and non-Native individuals.

The State of Alaska used to administer its lands through the ADF&G. Governor Murkowski moved the Division of Habitat from ADF&G to the DNR Office of Habitat Management and Permitting (OHMP). Although ADF&G doesn't own or manage any of the land now, it is still responsible for overseeing the fish, game, and aquatic plant resources on the Gulkana, as it does throughout the state. ADF&G operated a fish counting tower just upstream of the confluence with the West Fork in partnership with the BLM from 2002-2006.

To make matters more complicated, Alaska has an extremely complex system of land transfer that reflects not only the variety of stakeholders vying for Alaska's lands but also the debate between industrial development and ecological preservation. It began in 1906 when the Native Allotment Act was passed, which allowed native people to apply for land in 160-acre parcels. When statehood was granted in 1959, the vast majority of land was federally owned, so the Statehood Act was passed for the purpose of transferring 104.5 million acres into state hands for use as a revenue base. Inevitably, the state selected lands with which the native populations did not agree. The federal government then put a freeze on the state's selection of lands in 1964. This was 1967. The selection of land stopped, but the question was not addressed again until after oil was discovered in Prudhoe Bay in 1968. Development was unable to proceed as a result of these land distribution laws. So in 1971, the Alaska Native Claims Settlement Act (ANCSA) was passed, designed to settle the aboriginal claims of the Alaska natives. ANCSA resulted in the transfer of 45 million acres of land to native populations and led to the formation of Alaska's Native Corporations and Villages, which were given $962 million as part of the deal.

ANCSA included a section that called for 80 million acres of particularly sensitive federal lands to be kept from development, with a deadline for Congress to resolve the matter. Six years after ANCSA was passed, it began to be discussed. This debate eventually resulted in Alaska National Interests Land Conservation Act (ANILCA), passed in 1980. By the time ANILCA was passed, technology and shifting demographics had brought many changes to question of what constituted traditional, subsistence lifestyle. Finally, by 2003 Congress passed the Alaska Land Transfer

[13] Lowe, Marie E, p. 28

Acceleration Act in hopes of resolving land transfers by 2009, the 50th anniversary of Alaska's statehood.

This may not seem relevant to a quantitative study of human use impact on salmon habitat, but land ownership is absolutely crucial in how that land is managed. By the time the Congressional Research Service examined the issue in January of 2005:[14]

- Neither the Statehood Act conveyance process nor the ANCSA conveyance process had been completed.
- The state was entitled to 104.5 million acres. Only 43 million acres had been successfully surveyed, transferred, and the patent processed. 47 million acres had been transferred but are awaiting patent. The process had not even begun for 15 million acres.
- Under ANCSA the Native Corporations were entitled to 45.6 million acres. Only 18 million acres had gotten final patents. Many of the applications could not be processed because the Native Corporations were encouraged to over select land.
- There were also still thousands of acres of land pending under Native Allotment claims.

Data from the Congressional Research Service[15]

The net result is that there are ***millions of acres*** of land whose ownership is in limbo, both in the short term and the long term, and they are hotly contested by conservation groups and pro-development groups. Moreover, there are parcels of federal land trapped as islands within large holdings that make management extremely challenging. Even in areas where ownership is clear, the exact intentions of what is allowed under the laws, especially in conservation areas, continues to be debated.

This issue is pertinent to the Gulkana River watershed because so much of it is currently under the jurisdiction of the Federal government, managed by the BLM. The land around the Gulkana has been and is currently going through the conveyance process. The deadline for applications for selected lands is December 10, 2008. What follows are the standings at present.

Gulkana Village

Gulkana Village is on the east side of the Gulkana River, at the confluence of the Gulkana River and the Copper River. It encompasses approximately 640 acres. Gulkana Village is at milepost 127.5 on the Richardson Highway, 20 miles south of Sourdough and 14 miles north of Glennallen.

Gulkana Village is inhabited by Ahtna people. They are a federally recognized tribe. The population of the village averages 80 people, increasing to approximately 120 people in the summer months. They use the river for both domestic and subsistence purposes. They draw an average of 6,400 gallons of water per day from their well, which is shallow at only 15 feet deep, and directly influenced by the river.

---

[14] Brooks, Nathan. p. 2

[15] Ibid, p. 2.

Private Land Ownership

Private land ownership can have an enormous impact on habitat and water quality of a river. The vast majority of the land along the Gulkana River is owned and managed by the state, the federal government, or native groups. Small, private parcels do exist though. Parcels on the river are defined as being within one half mile of the river bank.

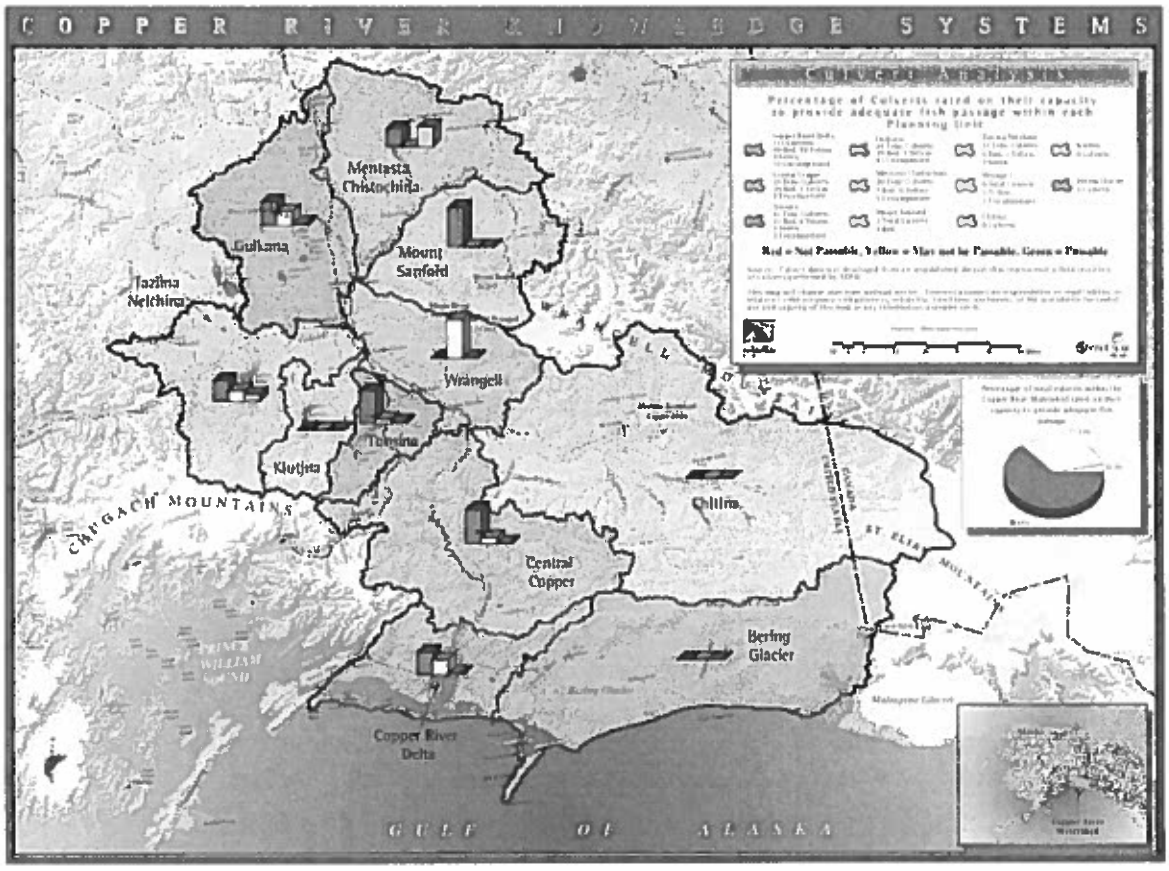
Private Land Ownership Along the Gulkana River

River Segment	# of Privately Owned Lots Along River
Mainstem, upstream of Sourdough (Wild & Scenic segment)	2
Mainstem, downstream of Sourdough	11 * 1 subdivision, # of houses undetermined.
Middle Fork	1 next to Dickey Lake
West Fork	2 at North end of Fish Lake (also some illegal trespasses)

Information from BLM Realty Department

Culverts

Culverts can instantly prevent an entire salmon run from spawning by blocking migration. This map produced by Ecotrust Copper River project gives an overview of the culvert situation in the Copper River watershed. **Only 4% of the culverts in the whole Copper River watershed are evaluated as passable for salmon. 64% are not passable. Within the Gulkana River basin, there are 24 total culverts and 19 of them are impassable.**



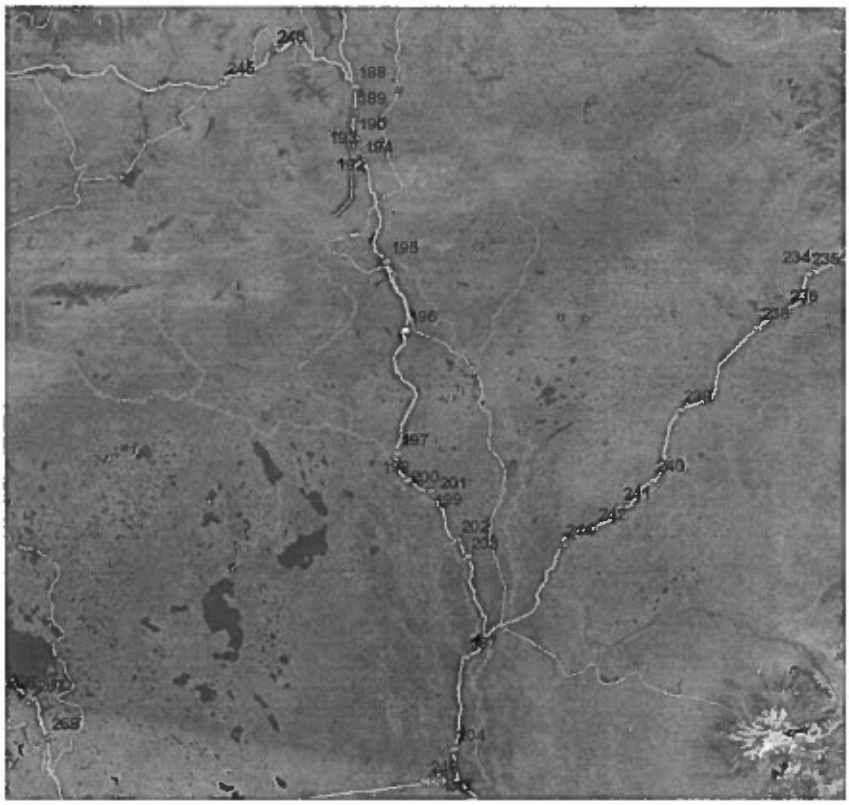
Culvert Prioritization

ADF&G has an excellent cost-benefit analysis system that allows them to prioritize which culverts it would be most productive to improve. Unfortunately, within the Gulkana watershed, the necessary data to perform a cost-benefit analysis are not available. There are neither cost estimates available for the projects, nor fisheries habitat data to describe the benefits. Of the culverts for which ADF&G does have some field data, two sites were recommended on a preliminary basis for improvement, pending further data (See Appendix for site details).

Both culverts:

- are on the Richardson Highway
- are small streams which drain into Paxson Lake
- are perched approximately 1 foot
- constrict the channel
- have gradients that preclude upstream migration.

This map shows the culverts in the Gulkana River Watershed:



Map courtesy of ADF&G

Large-Scale Infrastructure

Road Construction

In the Copper River Salmon Habitat Management Study (ISER, 2007) most habitat managers "cited road access as the greatest danger to salmon habitat in any of the regions identified as threatened"[16] (emphasis in original study). "On average, managers correlate road access with threatened areas."[17]

The DOT plans for 2006-2008 call for no construction of new roads along the Gulkana River. There are plans to do maintenance work on the existing roads. Also, the airport in Gulkana was damaged 3 years ago in earthquake and is currently being fixed, however, it is not expected to have any impact on the river.

Aerial Photographs: (See Hard Copy Appendix)

Documenting visible increase in development over time and present development:
Sourdough Campground
June 9,1962 (black and white photocopy)
1 highway with 2 small areas of offshoots, one being Sourdough Campground.
(Photocopy courtesy of BLM Glennallen field office)

August 14, 1998 (black and white photocopy)
The more recent photo shows a clear increase in human use. It features 2 highways, one of which has a large parallel braid in it. There is also another new road with its own braid and offshoots that runs perpendicular between the two highways. The previously developed areas are larger and more developed in the second photograph. Sourdough is one of the busiest points along the Gulkana River at present. (photocopy courtesy of BLM Glennallen field office)

Crosswind Lake Landing Strip (private) north shore
July 27, 1965 (black and white photocopy)
The unpaved airstrip is already present, though smaller, with three buildings and a small dock. There are 2 small roads going west and 2 small roads going east of the airstrip. This photo is much lower elevation than the more recent photos and does not show beyond that. (Photocopy courtesy of BLM Glennallen field office)

August 1984 (high elevation infra-red photograph)
This photo was taken at the highest elevation. Mining survey transects are visible in the southwest and southeast corners. There is a road looping around the airstrip to the north. The airstrip is longer. There is 1 main road with 1 parallel loop heading to the southwest side of the lake that appears to have some residential development along it (ie: cutting of trees), between 8 and 20 possible residential sites are distinguishable. Especially between the large loop on the west side and the airstrip at the north there appears to be a great deal of small trails forming,

[16] Lowe, Marie E, p. 23

[17] Ibid, p. 5

possibly OHV trails. On the southeast side, there is at least 1 main road as well as a network of roads beginning to extend straight east.
(photo purchased from Aeromap)

June 19, 2004 (2 color photographs)
The 2004 photos are very clear. The landing strip is well developed, though still dirt. There is a residential development with 1-2 homes and several outbuildings. On the west side there are approximately 40 sites that look residential in nature but which are without buildings. There is extensive spider webbing of trails, most of which are parallel, heading to the smaller lake nearby. To the north, there are several trails running parallel to the road that loops around above the airstrip. There are 25 more potential residential sites. Moving to the east the roads are clear and well defined and there is evidence of spider-webbing OHV trails over there as well, though these trails are more spread out from each other, not so tightly bunched together.
(photos purchased from Aeromap)

Mining Transects
Seismic mining surveys are common in photos of this area and can be noted in the 1984 photo of Crosswind Lake. They are the straight lines cutting the landscape into squares. These surveys cut a long swath through the vegetation allowing their equipment to take seismic readings of what is under the surface. They do not spend extensive time in the area if nothing is found and the vegetation is allowed to grow back after they have cut through. The amount of impact caused by these surveys, erosion, sedimentation, use and creation of new roads, stream crossings, is not known. The transects make good moose habitat but impact to streams is detrimental. It is worth noting here that many of the photographs taken in the last fifty years were for the purpose of development and resource extraction. Many of the photos in the BLM archives are labeled "BLM Department of Engineering," which no longer exists.

Paxson Lake (2 high elevation infrared photos)
2 main roads running parallel north south along the lake. 3 roads and 2 trails connect the two. There is 1 large offshoot leading to the Paxson Lake Campground, 1 long loop with an offshoot in the center, and 15 small offshoots along the road. It is not clear if these are residential clearings, recreational, or other types of development. The road keeps farther away from the shore of the lake than it does around other lakes we have examined, which bodes well for minimal impact on water quality.
(NASA photo, purchased from Aeromap)

Summit Lake (1 infrared photo)
July 1980
There are 3 main roads, 2 of which run parallel to each other along the east side of the lake and river. There are 5 roads that connect the two running parallel.
(photo purchased from Aeromap)

Dickey Lake (1 infrared photos)
Aug 1980
No evidence of human use or development.
(NASA photo purchased from Aeromap)

Mining and the Trans-Alaska Pipeline

Mining

Mining is a potential threat to salmon and salmon habitat because, depending on the technique used, it often results in erosion and sedimentation. Mining can add very harsh pollutants to runoff and groundwater. Not only is the actual mining itself hazardous, but all the human activity that it brings with it results in an increase in other types of human use that have already been discussed, for example, road construction, trampled riparian vegetation, human waste.

There is no significant mining occurring in the Gulkana River watershed at present. This is true for minerals and for oil and gas. There is low mineral potential in the area and the remoteness and lack of access make it less desirable. What mining and exploration has been done was not very successful. Prospects in the near future are minimal. According to the DNR's Copper River Area Plan, the Gulkana River itself falls under a special land use designation, in keeping with its Wild and Scenic designation. Therefore, subsurface mining is no longer allowed, though gas and oil are technically outside of those restrictions.

Trans-Alaska Pipeline

The Trans-Alaska Pipeline moves oil from Prudhoe Bay on the North Slope of Alaska to the port of Valdez on Prince William Sound. Construction on it began in 1975 and the first oil rain through it in June 1977. It is 800 miles long, crosses three mountain ranges, active fault lines, permafrost, and over 800 rivers and streams. The structure is truly an engineering marvel, but a single event such as a valve failure, or another earthquake, could have a far-reaching, devastating impact.

As a form of human use, the Trans-Alaska Pipeline doesn't involve a lot of direct human activity on a daily basis. However, it has the potential to be catastrophic for salmon and salmon habitat should a major break in the pipeline ever occur. Engineering marvel or not, the Trans-Alaska Pipeline is now over 30 years old. There are a variety of maintenance issues including corrosion problems, pipeline shutdowns and restarts, neglected maintenance, and inadequate leak detection systems that increase the possibility of a major spill. The pipeline is also vulnerable to external damage, such as the leak that was caused when it was shot by a drunken man in October 2001.

Drills are performed every year to prepare for the possibility of another large oil spill in Prince William Sound, however contingency plans for inland oil spills within the Copper River Watershed are minimal. No surprise drills are held either, so real-life conditions are not replicated in Alyeska's drills. Local managers on every level express distinct lack of confidence in the ability to deal with a break in the pipeline, one of the few things that state, fed, native, non-profit, fishermen and citizens all agreed on in the Copper River Salmon Habitat Management Study. As of October 2006, "If a spill occurred in the Gulkana at the Sourdough crossing…it would take roughly 23 hours for oil to reach Containment Site 10-16 at the Richardson Highway Bridge. In good weather, Alyeska could respond and intercept the leading edge of the spill before it enters the Copper River in 23 hours, at the expense of oiling 29 miles of the Gulkana

River…"[18] Since then, Alyeska, the company responsible for the pipeline has had to renew its permits with the Alaska Department of Environmental Conservation. The DEC stipulated that their permit would only be renewed with further attention to these matters and the deadline for their full response is still pending.

http://tapseis.anl.gov/guide/photo/Gulkana_Bridge.html
The pipeline crosses 800 rivers and streams, etc.

Photo courtesy of Ecotrust
Damage from a drunken gunman in 2001 caused a spill of 285,000 gallons of oil.

[18] Copper River Watershed Project, p. 4.

IV. Analysis

The Trends in Extent, Geographic Scope, and Seasonality

Extent

- The trend most consistently expressed in the data is that human use of the Gulkana River is increasing over time.

- There was a peak of use between 1996 and 1999. Since then numbers have gone back down to the level of the early 1990's. The spike is attributed to changes on the Kenai Peninsula that reduced the number of people that could fish there those years. The Gulkana River is known as an "overflow area" and this should be taken into consideration as other parts of the state are experiencing increasing use as well.

- Commercial permits: In the Revised River Management Plan published in 2006 it says that, "Guided fishermen may be more successful at catching fish, but they still make up less than ten percent of the total use on the Gulkana National Wild River portion of the river based on 2001 actual use numbers for permitted guides utilizing the river upstream from Sourdough"(p. 63). However, in 2001 there were only 8 permitted guides. By 2002, the very next year, the number of guides had jumped back up to 14 (see chart on p. 10) where it has been holding steady ever since. This would suggest that guided fishermen have more of an impact than the numbers in the River Management Plan represent. The increase from 8 to 14 permits represents a 75% increase in the number of permitted guides over the last 11 years. An increase in the number of permits can look small but it represents an exponential increase the number of visitors.

- Most of the people using the river are coming from outside the watershed, either from within Alaska, driving from Anchorage and Fairbanks, or from other parts of the United States and the world, coming as tourists. The population of the entire Copper River valley is 3,200 and clearly the number of visitors is higher than the total number of local residents (see graph of Gulkana visitors since 1963).

Geographic Scope

- The location that receives by far the greatest use is Sourdough Campground and Boat Launch. Paxson Lake Campground and Paxson Lake Boat Launch are the second most popular points on the river system.

- In terms of sportfishing effort, the data shows that the largest numbers of anglers are concentrated at the Gulkana Bridge and Sailor's Pit, with Poplar Grove and the Old Temporary Launch receiving significant use as well.

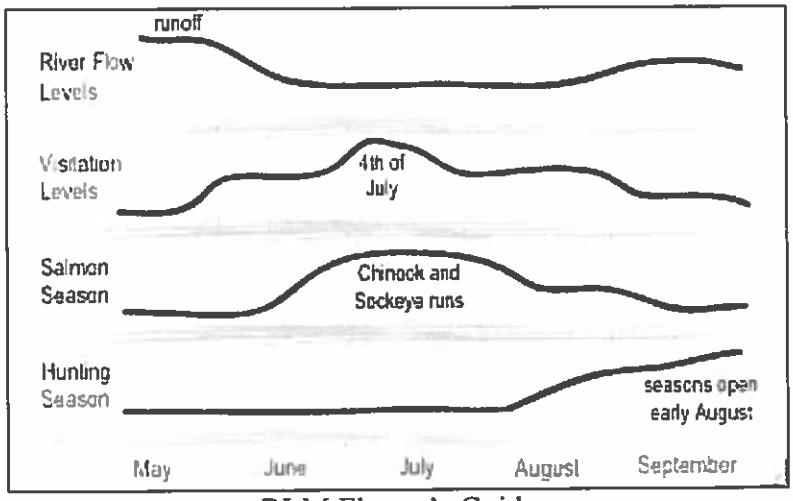
- OHV trails overlap geographically with other uses primarily near the confluence of the Middle Fork and the Main stem, just downstream from Paxson Lake. The majority of OHV use occurs around the Middle Fork.

- There is a significant distinction between the upper segment of the river and the lower segment. There is very little motorized traffic upriver of the fish tower, but it is very common in the lower segment.

Seasonality

- The highest overall use of the river coincides with the Fourth of July. However, each type of use peaks at a different time. Fishing and floating occur mostly between June and the end of July. Hunting happens primarily in August and September. This graph on the next page from the BLM Floater's Guide graphically illustrates the seasonal functions of the river.

Seasonality of Use on the Gulkana River



BLM Floater's Guide

We see the strongest threats to fish habitat in the Gulkana River basin as:

- Culverts: culverts at road and driveway crossings have the potential to block fish passage and obstruct miles of upstream spawning habitat. An analysis of culverts in the Gulkana River sub-watershed would be a useful next step in determining what type of fish habitat by species and by use at life stage (spawning, rearing, migration?) is blocked by failed culverts.
- The Trans-Alaska Pipeline: with the TAPS crossing tributaries to the Copper River so close to the confluence with the Copper River, residents' concern is for how quickly Alyeska Pipeline Service Company could effectively respond to a potential breach in the line and prevent oil from reaching the main stem of the Copper River.
- OHV crossings: the next step in determining OHV crossings' effect on fish habitat will be to determine which segments of the river are used by salmon for spawning, rearing and migration and how these overlap with heavy OHV use areas.
- Hydrocarbons from motorized boat traffic: CRWP and Gulkana Village Council hydrocarbon sampling for boat exhaust pollutants shows that hydrocarbons are present in

the river in early July due to peak human use times. CRWP will continue testing to monitor whether these levels increase.

- Fecal coliform

V. Recommendations

1. **Complete the human use data protocols that we were unable to complete with this study and continue to monitor human use.**
    - Culverts: More research needs to be put into the culverts in the Gulkana watershed. The numbers on the Ecotrust map regarding culverts do not add up to 100% and need to be re-examined, however, if they are even close to true then culverts could be having a detrimental effect on salmon populations in the Gulkana River sub-watershed. Likewise, the ADF&G has an excellent cost-benefit analysis system that allows them to prioritize which culverts it would be most productive to improve. CRWP originally planned to obtain a list, prioritizing the culverts in the Gulkana River watershed, to include in this study. Unfortunately, within the Gulkana watershed, the necessary data to perform a cost-benefit analysis are not available. There are neither cost estimates available for the projects, nor fisheries habitat data to describe the benefits. Collecting those data is an essential next step in determining these culverts' effects on fish passage.
    - Use of GIS technology: CRWP had planned to make a map showing the locations of each type of human use. This map could then be overlaid with a map of critical salmon habitat areas to see where these two systems intersect. Unfortunately, while we now have access to a GIS specialist, the GIS software we had hoped to use was not up and running in time to use it for this study. This would help to make the conclusions of this study much clearer.
    - Low-elevation aerial photography: CRWP had planned to perform low-elevation aerial photography in order to assess the extent of OHV trails. Unfortunately, we were unable to coordinate all the necessary people and circumstances to make it happen this year.
    - Obtain more recent data on the percentage of fishermen with commercial guides.
    - The numbers for campsite impact, river bank fishermen, and OHV users showed significant increases between 2005 and 2006. These issues in particular should be monitored to see if these increases continue and at the same rate of increase.
    - Digitize our aerial photography collection.

2. **Compare human use data to salmon habitat data**
    - Develop physical characteristics habitat model (using Tonsina River drainage geo-spatial approach by Stillwater Sciences) to map actual locations for salmon spawning, rearing, and migration (resting pools, eddies, etc.) habitat within the stream channel network and compare to geographic scope of human use.
    - Identify when those locations are most sensitive and compare to seasonality of highest human use.
    - Continue the hydrocarbon testing that CRWP is doing in cooperation with the Gulkana Village. According to this chart found in the BLM Floater's guide, visitor levels are highest when river volumes are the lowest. Hydrocarbon

discharges then, are occurring when river volumes are down, and hence are concentrated at those times. Examine the effects of hydrocarbons on salmon and salmon habitat and cross reference the times and locations of highest hydrocarbon concentrations with times and locations of salmon activity.

- Analyze water quality data collected by CRWP and Gulkana Village to see if water quality if being negatively impacted by human use. Also consider fecal coliform results from current BLM study once the information is available.
- Obtain data on the effects of multiple catches and releases on salmon. Angler days of effort data: the number of angler days on the lower section tripled in the late 80's/early 90's, then nearly tripled again in the next ten years before coming back down to the same level as the early 90's. Angler days of effort for the upper river increased by about 50% for late 80's/early 90's, then nearly doubled for ten years before falling back down to the same level as the early 90's. It is likely that many salmon are being caught multiple times in this process.

3. **Compare human use data and salmon habitat data to the results of the Copper River Salmon Habitat Management Study to see where issues overlap.**

4. **Distribute this information. CRWP would like to:**
   - Share this information with local agencies so that it can be used in planning.
   - Facilitate local participation in addressing the important planning that should take place to ensure quality river recreation and thriving salmon habitat.
   - Potentially partner up with the BLM and other agencies to promote a more widespread understanding of these issues, reinforcing the tremendous work that has been done by all concerned on this issue.
   - Share this information with the permitted guides working on the river in hopes that they will share it with their guests as well.
   - Develop public education materials for river users that take into account an audience of users from outside the region.
   - Evaluate this case study for level of usefulness, accuracy, and accessibility.
   - Adapt this case study to other subwatersheds throughout the Copper River region.

VI. Bibliography

ADF&G

Albert, Steve. Personal communication via email <steve.albert@alaska.gov> 16 July, 2007.

Taube, Tom. 2 personal communications via email, <tom.taube@alaska.gov> 10 and 12 July, 2007.

BLM

Becker, Brenda, Realty Specialist Lead. Telephone interview. 10 July, 2007.

Bureau of Land Management, "Gulkana National Wild River Floater's Guide." <http://www.blm.gov/ak/st/en/fo/gdo/gulkana_national_wild.html> 24 July 2007

Bureau of Land Management, "Gulkana National Wild River Record of Decision, Final Environmental Assessment, and Revised River Management Plan," August 2006.

Bureau of Land Management, Gulkana National Wild River Recreation guide, 2006.

Bureau of Land Management, Aerial Photos Archives. Personal viewing of collection. 15 June, 2007.

Emmons, Heath, Outdoor Recreation Planner. Personal interview. 15 June, 2007.

Graham, Marnie, Public Affairs Specialist. Telephone interview. 10 July, 2007.

Graham, Marnie, Public Affairs Specialist. Bureau of Land Management, "Growing Pains," Alaska Frontiers, Summer 2005. p. 5-7.

Hamby, Denton, BLM Outdoor Recreation Planner. Personal interview. 15 June, 2007.

"Heads up for Gulkana Wild River Travelers," Copper River Record, 6 June, 2007.

Jones, Laurie, GIS Specialist. Personal interview. 15 June, 2007.

Larson, Cory, Outdoor Recreation Planner. Personal interview. 15 June, 2007.

Larson, Cory, Outdoor Recreation Planner. Personal Communication via email. <Cory_Larson@ak.blm.gov> 3 July, 2007.

Townsend, Debbie, Executive Secretary. Telephone interview. 10 July, 2007.

CRWP

Copper River Watershed Project. "A Call for Citizen's Oversight For the Trans-Alaska

Pipeline," Oct. 2006, p. 4.

DEC

"Alaska Department of Environmental Conservation Division of Spill Prevention and Response Industry Preparedness Program" Trans Alaska Pipelines System (TAPS) Pipelines Oil Discharge Prevention and Contingency Plan Renewal Application Final Findings Document, November 30, 2006

"Oil Discharge Prevention and Contingency Plan Amendment Approval," State of Alaska DEC/Governor Murkowski's Office Nov 30 2006

DOT

Hoffman, John. Personal communication via email. <john.hoffman@alaska.gov> 23 July, 2007.

Krol, Lon. DOT Engineer/Architect V. Telephone interview. 11 July, 2007

DNR

DNR Division of Mining, Land & Water. "Gulkana River Planning Update," May 25, 2006.

DNR Division of Mining, Land And Water, "Special Use Land Designation for Gulkana River Shorelands and Waters (ADL 229819)". 2006.

DNR Division of Oil and Gas/Tony Knowles, Governor, "Notice of Copper Basin Oil & Gas Exploration License."25 July 2000.

Jacobs, Laura. Telephone interview. 11 July, 2007.

Other Sources:

Aeromap
Aerial photos

Alaska Humanities Forum, "Alaska History and Cultural Studies" <http://www.akhistorycourse.org/articles/article.php?artID=256> Last updated 2007. 20 July 2007.

Alyeska Pipeline Service Company website, "Pipeline Facts." <http://www.alyeska-pipe.com/pipelinefacts.html> Last updated 7 May 2004. Visited 18 July, 2007.

Bartlett, Larry. "Fish Like There's No Tomorrow," Fish Alaska Magazine, July 2002.

Brooks, Nathan. "The Alaska Land Transfer Acceleration Act: Background and Summary." Congressional Research Service, Library of Congress.14 January, 2005.

Ecotrust, "Culvert Analysis," [Map] Copper River Knowledge System. January 2005.

"Gulkana Bridge." [Photo] <http://tapseis.anl.gov/guide/photo/Gulkana_Bridge.html> Visited 20 July, 2007

Jenkins, Joseph. "BLM Announces rule changes for the Gulkana River" Delta Wind. 7 June, 2007.

Lowe, Marie E., "Copper River Salmon Habitat Management Study." Institute of Social And Economic Research, University of Alaska, Anchorage. Feb 2007.

National Parks Conservation Association, "What is ANILCA?" <http://www.npca.org/media_center/fact_sheets/anilca.html> Last Updated: March 4, 2007. Visited 18 July, 2007.

U.S. Department of the Interior Bureau of Land Management (BLM) and Argonne National Laboratory (Argonne). "Trans-Alaska Pipeline System Renewal Environmental Impact Statement (TAPS Renewal EIS) Process." <http://tapseis.anl.gov/> Last updated 2002. Visited 19 July 2007.

Young, Rick. Gulkana Village Council. "Water Resources Management Planning and Development: Gulkana River Impact Assessment Project Technical Report." 2004.

VII. Appendix

Culverts Recommended for Replacement

Project Code: CRB02 Station ID: RI159 VISIT: 1

Date: 9/4/2002 Time: Observers: Dean Beers, James Lawrence

Site Information:

GPS Location: Lat. (dec. deg): 62.9865755003 Long. (dec. deg): -145.503284734

Road Name: Richardson HWY Region:

Quad Name: GULKANA D-4 ITM: D-4 Stream #:

Legal Desc: F022S012E29 Data Offloc: ASC Stream Name:

Field Notes:

Road Prism Type: Spec. Site Cond.:

Culvert Measurements:

Culvert ID: A Cross Structure Type: Corrugated Metal Pipe

			Inlet	Outlet
Category:	Classification:	Length: 41	Width (ft): 3.00	
Corrugation Depth (in.):	Entrance Type: N/A	Tidal Influence: No	Height (ft): 3.00	
Corrugation Width (in.):	Baffles Present: No	Culvert Gradient: 4.7300	Manuf. Diameter:	
		Perch Ht. (Flow - Ind): 0.62	Water Depth (ft):	0.30
		Perch Ht. (Flow - Dep):	Substr. Dep (ft):	
			Struc. Damage (%):	
			Culv. Blockage (%):	

	Inlet	Outlet
Substrate Type:	N/A	N/A
Erosion:	N/A	N/A

Stream-Related	Upstream	Downstream
Dominant Substrate Type:		
Sub Dominant Substrate Type:		
Bank Comp:	N/A	N/A
Suitability:	N/A	N/A
Type:	N/A	N/A

	Mean Up-Stream Width	Constriction Ratio
Bank Full Width:	N/A (ft)	N/A
Ordinary High Water:	10.13 (ft)	0.29
Stream Bed Width:	N/A (ft)	N/A

	Width (ft)	Dist. (ft)
Tallcrest Width at OHW:		
Outlet Pool OHW Line (Max Width.):		

	Width (ft)	Dist. (ft)
Upstream OHW Width (125-150 ft.):		
Upstream OHW Width (100-125 ft.):	7	7
Upstream OHW Width (50-100 ft.):	13	75
Upstream OHW Width (5-50 ft.):	11	50
Upstream OHW Width (5 ft.):		
Upstream BF Width (125-150 ft.):		
Upstream BF Width (100-125 ft.):		
Upstream BF Width (50-100 ft.):		
Upstream BF Width (5-50 ft.):		
Upstream BF Width (125-150 ft.):		
Upstream BF Width (100-125 ft.):		
Upstream BF Width (50-100 ft.):		
Upstream BF Width (5-50 ft.):		
Downstream OHW Width (125-150 ft.):		
Downstream OHW Width (100-125 ft.):		
Downstream OHW Width (50-100 ft.):		
Downstream OHW Width (0-50 ft.):		

Longitudinal Section Elevation Common Station ID		Dist. from Xing	Inst. No.	HS	HI	Elevation	Field Comments
Downstream station, thalweg 1 (deepest)			1	11.1	100	88.95	
Longitudinal Section Elevation Specific Station ID	**Seq**	**Dist. from Xing**	**Inst. No.**	**HS**	**HI**	**Elevation**	**Field Comments**
Inlet, culvert invert	A		1	8.49	100	91.51	
Inlet, culvert thalweg	A		1	8.49	100	91.51	
Outlet, culvert invert	A		1	10.4	100	89.57	
Outlet, thalweg	A		1	11.3	100	88.69	

Culvert Site 189

Project Code CRB02 **Station ID** R194 **VISIT** 1

Date: 8/4/2002 **Time:** **Observers:** , Dean Beers, James Laurence

Site Information:

GPS Location: **Lat. (dec. deg):** 62.92204 **Long. (dec. deg):** -145.5013793 26

Road Name: Richardson HWY **Region:**

Quad Name: GULKANA D-3 **ITM:** D-3 **Stream #:**

Legal Desc: C013N001W07 **Data Office:** ANC **Stream Name:**

Field Notes:

Road Prism Type: **Spec. Site Cond.:**

Culvert Measurements:

Culvert ID: A **Cross. Structure Type:** Corrugated Metal Pipe

					Inlet	Outlet
Category:	**Classification:**		**Length:**	**Width (ft):**	6.00	
Corrugation Depth (in.):	**Entrance Type:** N/A		**Tidal Influence:** No	**Height (ft):**	6.00	
Corrugation Width (in.):	**Baffles Present:** No		**Culvert Gradient:**	**Manuf. Diameter:**		
			Perch Ht. (Flow - Ind): 1.32	**Water Depth (ft):**		0.40
	Inlet	**Outlet**	**Perch Ht. (Flow -Dep):**	**Substr. Dep (ft):**		
Substrate Type:	N/A	N/A		**Struc. Damage (%):**		
Erosion:	N/A	N/A		**Culv. Blockage (%):**		

Stream-Related	**Upstream**	**Downstream**
Dominant Substrate Type:		
Sub Dominant Substrate Type:		
Bank Comp:	N/A	N/A
Suitability:	N/A	N/A
Type:	N/A	N/A

	Mean Up-Stream Width	**Constriction Ratio**
Bank Full Width:	N/A (ft)	N/A
Ordinary High Water:	7.33 (ft)	0.82
Stream Bed Width:	N/A (ft)	N/A

	Width (ft)	**Dist. (ft)**
Tallcrest Width at OHW:		
Outlet Pool OHW Line (Max Width.):		

	Width (ft)	**Dist. (ft)**
Upstream OHW Width (125-150 ft.):		
Upstream OHW Width (100-125 ft.):	8	8
Upstream OHW Width (50-100 ft.):	9	75
Upstream OHW Width (5-50 ft.):	5	50
Upstream OHW Width (5 ft.):		
Upstream BF Width (125-150 ft.):		
Upstream BF Width (100-125 ft.):		
Upstream BF Width (50-100 ft.):		
Upstream BF Width (5-50 ft.):		
Upstream BF Width (125-150 ft.):		
Upstream BF Width (100-125 ft.):		
Upstream BF Width (50-100 ft.):		
Upstream BF Width (5-50 ft.):		
Downstream OHW Width (125-150 ft.):		
Downstream OHW Width (100-125 ft.):		
Downstream OHW Width (50-100 ft.):		
Downstream OHW Width (0-50 ft.):		

Longitudinal Section Elevation Common Station ID		**Dist. from Xing**	**Inst. No.**	**FS**	**HI**	**Elevation**	**Field Comments**
Downstream station, thalweg 1 (tallcrest)			1	16.6	100	83.42	
Longitudinal Section Elevation Specific Station ID	**Seq**	**Dist. from Xing**	**Inst. No.**	**FS**	**HI**	**Elevation**	**Field Comments**
Inlet, culvert invert	A		1	13.1	100	86.88	
Inlet, culvert thalweg	A		1	13.2	100	86.85	
Outlet, culvert invert	A		1	15.3	100	84.74	
Outlet, thalweg	A		1	17.2	100	82.79	

Culvert Site 194