

Report to the
Northwest Pipeline Corporation
Salt Lake City, Utah

A PRELIMINARY ENVIRONMENTAL ASSESSMENT
OF THE TAYLOR HIGHWAY, ALASKA,
WITH REFERENCE TO A NATURAL GAS PIPELINE

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INTRODUCTION

The Canadian National Energy Board proposed in early July 1977 that the Alcan natural gas line route paralleling the Alaska Highway be modified to swing north to Dawson City, Yukon Territory, where it would be available to transport gas reserves from the Mackenzie River Delta via a future spur line along the Demster Highway.

Such a reroute would depart from the Alaska Highway at Tetlin Junction, approximately 80 miles from the U.S. - Canadian border, and would proceed north along the Taylor Highway for 109 miles to the border near Boundary and then 68 additional miles to Dawson City before turning southeast along the Klondike Highway to again join the Alaska Highway near Whitehorse. While such an alternative route had been previously suggested, it had not been formally proposed and there was little definition of possible environmental impacts. Considerable information does exist on the environment and natural resources adjacent to the Taylor Highway, but the material had not been brought together in a format applicable to pipeline construction and maintenance.

The purpose of this preliminary investigation is to summarize the available literature, interview agency personnel familiar with the Taylor Highway and the Fortymile River basin through which it passes and to conduct a brief field survey to become personally familiar with the area and to define possible environmental problems and subject areas that may require further detailed study. Emphasis has been placed on fish and wildlife and aquatic ecosystems, the writer's field of expertise, but notes have been included as to other possible environmental

and engineering aspects, subject to further consideration by experts in other disciplines.

The field reconnaissance was conducted by vehicle along the Taylor Highway during the period 3 - 5 August 1977. Time preceding and following that period was devoted to gathering information, data synthesis and writing. Observations were made of: the general terrain; stream characteristics including productivity, turbidity, water temperature in degrees Fahrenheit, flow as a cubic feet per second (cfs) order of magnitude "guesstimate" to give some impression of size; recreational and commercial utilization; and potential pipeline construction environmental problems. Photographs of the major stream crossings were taken. No observations were made at this time of conditions any distance from the highway or of water bodies which would not appear to be directly impacted by the proposed pipeline, which is assumed would closely follow the road. Distances refer to miles from Tetlin Junction as given by Alaska State Department of Highways (DOH), 1977. The weather had been unseasonably hot and dry prior to and during the survey and the streams were probably below their usual late summer low levels. Undoubtedly a number of smaller tributaries that might ordinarily contain flowing water were dry or reduced to seepage.

DESCRIPTION OF THE ENVIRONMENT

General Topography, Climate and Vegetation

The Taylor Highway lies approximately 180 miles east of Fairbanks in the area referred to as Interior Alaska, a region characterized by alternating rounded even-topped ridges with gentle side slopes interspersed with wide flat river valleys. This area of rolling hills and valleys, with the occasional mountain that may range up to 6,000 feet in elevation, has been termed the Northern Plateau or Yukon-Tanana Upland Physiographic Province. Along the Taylor Highway elevations range from 1,540 feet at the South Fork to over 3,500 feet near Mount Fairplay and 4,150 feet at the Canadian border. Bedrock is exposed in some river canyons and ridges, but most of the terrain is mantled with vegetation or surface rubble. The area is heavily mineralized. The Tintina Fault or Trench lies near the Yukon River some 45 miles north of the proposed alternate pipeline route. No glacial activity exists in the region at the present time and the streams do not present the silty, braided condition typical of glacial rivers. The Fortymile River and its major tributaries flow in broad, alluvial "U-shaped" basins with narrow flood plains. Marshes and bogs are numerous, but few lakes occur in the drainage.

Predominant soils consist of glacial till and outwash sands and gravels with wet loams and thick organic mats often underlying lowland areas. Well drained, brown, loamy soils overlay gravel and sand in terraces and low hills; loess deposits on high hills may be extensive. Moderate to high potential for erosion is common in all soil types in the region. Discontinuous permafrost is widespread throughout the area

along with ice wedges. Combined with soils of high erosion capability, the discontinuous permafrost at a temperature of 30 - 32°F results in very unstable earth material subject to thermal degradation and erosion when the insulating vegetation mat is disturbed. In most areas a dense ground cover of grasses, mosses and shrubs retards run-off. Ground water supplies appear limited in availability. DOH (1977) contains considerable detailed information on the geology and soils of the area in reference to road upgrading much of which would also be applicable to pipeline construction.

The region experiences a typical, subarctic continental climate -- long, cold winters and short, warm summers. Freeze-up of the rivers occurs in October and they become ice-free in early to mid-May in most years. Most of the annual precipitation occurs as summer thunderstorms, and averages only 11 inches per year. Snowfall averages 45 inches and snow is generally present from October to April.

Most of the Taylor Highway traverses upland spruce-hardwood forests, but with considerable areas of high brush thickets and some low brush muskeg-bog and alpine tundra. Large forest fires have changed the vegetation in many areas and the landscape shows various stages of succession. Quacking aspen, paper birch and white spruce forests with an understory of willows, rose, alders, buffaloberry and cranberry cover most of the upland areas. Black spruce predominates in the poorly drained lowlands associated with tamarack, various hardwoods, mosses, sedges and grasses. Muskey bogs are found where conditions are too wet for tree growth. High brush thickets of birch, alder and willow cover extensive areas below the tundra. Alpine tundra occurs above the 2,500 foot level and consists of bare rock and rubble interspersed

with herbacious plants including willow, dwarf birch, bearberry, mountain-avens, blueberry and cranberry as well as sedges and grasses. Some sagebrush grows on the dry slopes. No threatened or endangered plant species are known to inhabit the area.

Population and Economy

The only communities on the Taylor Highway between Tetlin Junction and the border are Chicken and Boundary. Census data are conflicting, but the summer population of Chicken may be 100-150, while less than 10 spend the winter there and could thus be termed permanent residents. Boundary also has a population of about 10. A number of people also summer at Jack Wade, Highway Department camps and at mining operations, but the permanent population is probably less than 20, (U. S. Department of the Interior (DOI), 1973). The fact that the road is not kept open in winter probably accounts in large part for the sparse population. There are no public utilities, no schools, and no churches.

The Taylor Highway was built in the early 1950's to aid the mining industry, but tourism has overtaken mining as the main user group. Considerable mining activity still exists in the Fortymile Country, and it may well expand in the future, but much of the present-day placer gold mining appears to be of a semi-recreational or hobby nature, (Schetzle, 1976). To date gold has been the only mineral of economic significance. There is much interest in developing a latent asbestos resource, as well as copper and other minerals, but production awaits further assessment, improved economic conditions and settlement of the complex land ownership issues. Timber is not presently utilized commercially, but in the early mining days great quantities were used for construction, thawing gravel beds in the gold fields and as fuel

for dredges and steam boats. One gold dredge used 12 cords of wood per day or 1,500 cords annually.

Tourist interest is directed in large part towards history, mining and the gold rush rather than the more usual fishing, hunting and scenic attractions so the two industries, in this instance, seem compatible. Fishing, by most Alaskan standards, could only be classed as mediocre; hunting along the Taylor Highway has become minimal, due to the decline in big game populations; and the scenery, while pleasant, is not spectacular. Due to the lack of accommodations, nearly all the tourists are campers, and thus contribute relatively little to the economy of the area. A few tour buses take the Klondike Loop, viewing the attractions of Dawson City and the Taylor Highway. About 125 vehicles per day used the road in 1975. The term "highway" is somewhat a misnomer as the road surface is in rather poor condition; alternately dusty or muddy; narrow - average width of 21 feet with no shoulders; and with sharp horizontal and vertical curves. While adequate for slow moving, light tourist traffic, it would barely suffice as a haul road for heavy equipment although at times the road has served as a haul route for asbestos ore trucked from the mine at Clinton Creek in the Yukon Territory to the railhead at Fairbanks. The state has plans for upgrading the highway and is presently replacing most of the single-lane bridges, (DOH, 1977). With both American and Canadian upgrading and tourist promotion, the Taylor could become a primary Alaska entry route with greatly increased traffic and tourist-related activities. The proposed Wild and Scenic River status for the Fortymile will also increase tourist interest. The DOI (1973) estimates that the annual rate of recreation use will increase from the present 36,000 visitor days per season to 119,000 with implementation of the proposal. The Fortymile

River area is becoming increasingly popular for recreational pursuits and future development must maintain a compatibility with these values. In a DOH (1977) survey, 66% of the respondents said that they had camped, 42% panned for gold, 37% engaged in photography, 29% fished, 21% hiked with lesser percentages in various other outdoor activities. Thus there is a matrix of rounded outdoor utilization, with no one outstanding value for most of the visitors.

The Fortymile River

Except for the first nine miles north of Tetlin Junction, the Taylor Highway lies entirely within the drainage of the Fortymile River. This is a very complex river system, (Figure 1, from DOI, 1973), a network of 1,000 miles of named tributaries and countless unnamed creeks and rivulets forming an arterial spiderweb draining 6,562 square miles, (4.2 million acres), before joining the Yukon River in Canada, 15 miles east of the border. The system can be divided into three distinctive subsystems: (A) Dennison and Mosquito Forks; (B) Middle and North Forks; and (C) The South Fork and Main River. The Middle and North Forks, (B), can be omitted from this assessment and only subsystem A and the lower part of C need be considered. For simplification, the Dennison and Mosquito Forks combine to form the South Fork which flows north to be joined by the North Fork forming the main stem Fortymile River which then flows east to join the Yukon River. The average gradient of 10 to 20 feet per mile produces stream velocities exceeding 5 miles per hour -- ideal conditions for float trips; some white water rapids are scattered along the route to add variety. Flood plains tend to be narrow with none of the braided pattern characteristic of glacial rivers. Streambeds generally are composed of bedrock, boulders and gravel with some sand and mud in pools. The beds and channels appear

fairly stable as well as the bank vegetation. Except where mining has disturbed the substrate, notably in the Chicken and Wade Creek areas, there is little surface evidence of extensive gravel deposits although muskeg covered terraces - remnants of ancient drainages - occur in many places and generally consist of coarse gravel overlying bed rock.

There is little information on stream flow in the Fortymile Basin. Maximum flow occurs in late May or early June following snow melt and spring breakup. Rain induced high water can be expected at any time during the summer. Low flows start in August and flow continues to drop throughout the fall months and into winter when surface water becomes locked up as ice. Some water data were collected during the summer months of 1910-12 by the U. S. Geological Survey, (USGS, 1957), for determination of availability for mining. The Mosquito Fork had a maximum flow of 4,030 cfs on June 16, 1912 and a minimum of 34 cfs on September 30, 1910. Monthly mean discharges in cfs were:

	<u>June</u>	<u>July</u>	<u>August</u>	<u>September</u>
1910		190	95	60
1911				172
1912	1,673	210	292	459

The Dennison Fork during June and July of 1912 had a maximum discharge of 6,500 cfs and a minimum of 105 cfs. The Walker Fork in July and August of 1910 had a maximum discharge of 242 cfs and a minimum of 9. For the South Fork mean discharges in cfs were:

	<u>May</u>	<u>June</u>	<u>July</u>	<u>August</u>	<u>September</u>
1910			889	911	485
1911		970	932	336	345
1912	2,280	5,340	635	1,380	1,140

Maximum discharge during this period was 12,600 cfs on June 17, 1912 and the minimum was 134 on August 6, 1910.

During July of 1954 and 1955 the USGS made a few spot checks, (USGS, 1958): Mosquito Fork ranged from 260 to 1,070 cfs; the West Fork of Dennison Fork from 114 to 395 cfs and the South Fork from 621 to 1,600 cfs. In more recent times the USGS has operated a gaging station near Steele Creek on the main Fortymile River, (Mr. Robert Borrows, USGS, Fairbanks, pers. comm., 1977). For the 1976 water year, maximum flow was on May 3-4 at 23,000 cfs, average discharges were 0 in March; 38 cfs in April; 10,139 in May; 4,000 cfs in June; 1,800 in July; 1,700 in August; 940 cfs in September; 588 cfs in October, declining to 1 cfs in November and to 0 flow in December. There is little mention of serious floods in the Fortymile drainage; Selkregg, (1977), lists a flood stage at Steele Creek of 42,800 cfs on July 11, 1963.

There are no USGS water quality monitoring stations on the Fortymile River, but occasional spot samples have been taken and published in USGS Water Supply Papers. The streams receive natural sediment principally during snow melt and rainstorm runoff; about 50% of the annual sediment load is transported during the period of spring runoff. Except for seasonal sedimentation from the spring snow melt, some placer mining activity, and varying degrees of brownish discoloration from organic material picked up from the muskeg bogs which they drain, the water is clear and quality is considered good. The Bureau of Land Management, (BLM, 1976), notes that siltation in the South Fork has increased during recent years and is beyond limits set by the Environmental Protection Agency, (EPA). Also, new mining roads and heavy use by all-terrain vehicles are causing damage to fragile soils and erosion.

The U. S. Department of the Interior, (DOI, 1973), has recommended

Figure 1. Map of the Fortymile River drainage, (from DOI, 1973).

that 375 miles of the Fortymile River and 320,000 acres of adjacent land be included in the National Wild and Scenic Rivers System under the Alaska Native Claims Settlement Act, PL 92-203, Section 17 (d) (2). This action would preserve existing scenic, recreational, historic, and water quality values of the river. For the "Wild River" designation, 161 miles of the Middle and North Forks and the upper portion of Mosquito Fork have been selected; the nine mile Wade Creek has been selected as a "Recreational River"; the remaining 205 miles including portions of Dennison Fork and its West Fork, lower Mosquito Fork, Walker Fork, Logging Cabin Creek and the South Fork have been proposed as "Scenic Rivers".

For the Wild Rivers, existing valid mining rights will be honored, but further mineral appropriation will be terminated. Mining will be permitted in the Scenic and Recreational Rivers under regulation to provide safeguards against pollution and impairment of scenery. In all cases, provision will be made for reasonable access to mineral deposits outside the river area and carefully routed and designed highways, (and presumably pipelines), may cross wild and scenic rivers.

BLM, (undated), promotes the Fortymile River.
Wilderness Canoe Trail:

"The canoeist has an excellent opportunity to follow Alaska's history with a trip down the Fortymile River. Names like Nugget Gulch, Discovery Creek and Deadman Riffle illustrate the joys and danger the prospectors of the past encountered. The abandoned mining communities of Franklin, Steele Creek, and Fortymile can be seen from the river."

Perhaps the trail should be termed the Fortymile River Historical Canoe Trail since little of the river has not been impacted to some degree by early mining, and gold rush history seems to be the main attraction,

(Johannsen, 1976; BLM, 1976). As much as 60% of the streambank in the South Fork and Main Fortymile River shows effects of past mining activities. The Middle and North Fork float trip starts high on the Middle Fork and ends at the Yukon River with access at the O'Brien Creek bridge on the road to Eagle. This trip would not be impinged upon at all by the proposed pipeline. The South Fork trip can start at the West Fork bridge, (mile 49), or at the Mosquito Fork bridge and Chicken area, (mile 64-66), at high water, but probably during most of the season the water is too low at these access points for enjoyable boating. Generally, access would be preferable at the South Fork bridge, (mile 75), and floating down the South Fork to the Main River with take out at the O'Brien Creek bridge or at the mouth. The highway and proposed pipeline corridor would cross the West and Mosquito Forks and, from approximately mile 67 at Chicken to mile 75 at the South Fork bridge, would parallel the South Fork canoe trail. However, almost this entire area has been heavily disturbed by mining and the addition of a buried pipeline, if screened and revegetated, would cause little impairment of scenic and historical values. The proposed classification for this section of river is "Scenic" and the DOI has determined that mining, under regulation, is a consistent resource use for this segment. A pipeline would also appear to be a valid use since the corridor already exists. The most used access is probably at the South Fork bridge and from this point downstream the river would not be impacted at all by the proposed pipeline which crosses over to Walker Fork and up Wade Creek. Wade Creek, proposed as a Recreational River, is too small for boating and has been heavily impacted by mines and roads; other compatible uses would add only incrementally to its present condition. Long-term impacts from pipeline construction on Wade Creek would be far less than

those created by past, present, and future mining. Thus the proposed pipeline would have a negligible effect on the Wild and Scenic River concept or the canoe trails.

Except for the Chicken area and Wade Creek there is little surface evidence of alluvial gravel. Extensive gravel mining for pipeline construction requirements in the river beds would likely be considered incompatible with scenic river values. A study should, therefore, be made of the amount of gravel needed, its availability, and the ramifications of gravel removal on the aquatic systems and recreation. It may be necessary to develop some of the numerous upland quarry sites with the use of rock crushing plants if there is a shortage of available gravel deposits. The extensive gold dredge tailing may also provide a source of rock and gravel.

Whether hillside or stream bed, due to the high aesthetic values the material sites will need to be screened, revegetated or otherwise rehabilitated. The BLM has environmental studies completed for 27 material sites between mile 15 and 82.

Since the Fortymile River is a clear water, scenic system with extremely high recreational values, adverse impacts from erosion, siltation, camp pollution, and material source development must be carefully monitored and minimized. The development of material sites necessarily involves removal of vegetation and the soil layer leaving a piece of land bare and unsightly and subject to erosion. Mitigative measures include limiting the number of sites, locating them where they can be screened from view, recontouring surfaces, and replacing the organic soil layer and revegetation. Erosion and sedimentation may also be a problem with material sites. These problems may be especially

severe near streams, where the "riverscape" would be impacted, and in the alpine areas where the paucity of vegetation makes the scar particularly noticeable and where reseeding has been generally ineffective.

Fish

Fisheries investigations on the Fortymile River by the Department of Fish & Game, (ADFG), and other agencies have been minimal; no reports have been published and information is of a very general nature.

Grayling is the ubiquitous species occurring throughout the system. Characteristically grayling winter in the larger rivers and migrate upstream into the tributaries in the spring, primarily May, for spawning and feeding. In the fall, before freeze up, they migrate back downstream to overwintering areas. The USGS reports no flow in the lower Fortymile in winter causing one to wonder of the grayling overwintering habits and habitats. No reference has been found to springs or upwelling areas that are used in other rivers by overwintering fish. Likely, they concentrate in deep holes in the larger tributaries, even without inflowing water, or drop down to the Yukon River, although the latter would entail a very long migration from the upstream areas. Mr. Tom Trent, of BLM, and Mr. Richard Peckham, of ADFG, conducted a fishery survey during the summer of 1975, (Peckham and Mr. Joe Webb, BLM, pers. comm., 1977). Using a helicopter and spot checking with nets and electrofishing gear at locations away from the road they found grayling to be widely distributed, but not particularly abundant, along with small numbers of round whitefish and sculpin. No fingerling salmon were found. A few locations contained no fish and the impression was that the Fortymile River was not a fertile system and that there was little variety in the aquatic community. This contrasts with the

visual impression that the streams would be productive having clear water, good pool-riffle ratios, extensive shallow gravel areas and good streamside cover. A study of possible limiting factors would be interesting - limited overwintering areas might be suggested.

Grayling is the principal recreational species of the Fortymile River and the fishing is considered good to excellent by ADFG, (undated). The streams rated excellent are north of Eagle Junction and would not be affected by the proposed pipeline. During the course of this survey, little fishing activity or interest was noted, perhaps partly because of the hot weather. Grayling fishing is generally best during early and late summer. Burbot and round whitefish are found in the system although they are of little interest to anglers.

The sheefish or inconnu is found in the lower Fortymile, frequently as far upstream as the O'Brien Creek bridge, with lesser numbers at the South Fork bridge and they have been reported as far as the Mosquito Fork. There is some directed fishing in the lower Fortymile, but most sheefish are caught incidentally to grayling fishing. There is apparently a spawning migration as well as a feeding migration, (Mr. Ken Alt, ADFG, pers. comm., 1977).

The DOI, (1973), mentions chinook and chum salmon in the lower segment, but there seems no documentation of this observation. Mr. Fred Andersen, (ADFG, Commercial Fisheries Biologist, Fairbanks, pers. comm., 1977), is unaware of any salmon spawning in the Fortymile River. ADFG captured fingerling chinook at the mouth and on this basis have categorized the stream as an "Anadromous Fish Stream". However, fingerling salmon on their downstream migration are known to frequently enter

adjacent rivers and sloughs and their capture does not necessarily indicate they originated in the Fortymile River. Northern pike and several other species of whitefish also occur in the lower river. There is little subsistence fishing and no commercial fishing in the Fortymile River and the harvest of fish in other areas that are produced by the Fortymile would be significant.

With essentially a single-species fishery, the problems of pipeline construction scheduling to avoid sensitive times are greatly simplified. There should, however, be baseline, site-specific studies done at each crossing before construction to determine when grayling are present, their general life history and if other species may be present. In particular, some of the mountain meadow-type streams appear productive, but may be above the migratory capability of the grayling. Studies of potential overwintering pools and spawning sites will be required. Scheduling of instream work to avoid sensitive and critical periods such as migration, spawning and overwintering will be necessary to minimize undesirable environmental impacts. Mitigative measures to avoid siltation such as sedimentation pools, riprap, re-seeding, limitations on exposed land surfaces and soil stabilization will be required.

Wildlife

The dominant element in the Taylor Highway animal community has been the Fortymile caribou herd. This was formerly one of the largest herds in Alaska, numbering perhaps one-half million in the 1920's with its range extending from west of Fairbanks to Whitehorse, (Hemming, 1971). Vast numbers migrated through the Chicken valley each year providing food for the early-day miners. Presently there are about

5,000 animals in the herd. The causes for the decline are speculative, but large numbers are known to have joined the Porcupine and possibly other herds; overgrazing and fires could have lowered range productivity and started a downward trend which was compounded by continued predation and increased hunting pressure. The harvest in 1971 was 2,360 animals, but has since been reduced to less than 100 per year, (Gasaway, 1975). Only 200-300 caribou hunters traveled the highway in 1976 and the present limited open season effectively eliminates "road hunting".

The herd's calving area in recent years has been the Tanana Hills at the headwaters of the Chena, Salcha, Charley and North Fork Fortymile Rivers and Birch Creek -- generally some hundred miles west of the Taylor Highway. Calving occurs between mid-May and mid-June. The herd roams the Tanana Hills during the summer and in September begins the drift toward winter ranges. Movement is southeast toward the Taylor Highway which they cross in October and well into November. Winter ranges have been varied and seemingly unpredictable, but are generally in the taiga east of the Taylor and into the Yukon Territory with the Ladue River valley having fairly consistent use. In March and April the caribou begin to move toward the calving grounds, moving generally northwest along the summits of the Tanana Hills, (Hemming, 1971).

Mr. Larry Jennings, (ADFG game biologist at Tok, pers. comm., 1977), states that generally in recent years the biggest fall migration occurs between mile 85 and 105, (anything beyond mile 95 is actually on the road to Eagle; it is assumed that the caribou also crossed the road to Boundary at a similar mileage, but this needs further clarif-

ication). The secondary crossing area has been 40-65 mile. The crossing areas tend to become more southerly later in the season and caribou have crossed at mile 9 as late as December. The migration and wintering pattern is rather erratic and in some years numbers of caribou have wintered near the highway. The size of the population may have reached its low point and is beginning to show some signs of increase. Mr. Jennings envisions no major conflict between caribou migration and a buried pipeline along the Taylor Highway as long as there are no stretches of open ditches, high steep embankments or major construction activities at the time and place they are migrating. Compressor stations and work camps should be sited to avoid caribou migratory routes. Further documentation of migratory behavior is recommended, including the section of highway from Eagle Junction to the border and on the Canadian side, as well as a better understanding of spring migration paths. While caribou are notoriously unpredictable, and the Fortymile herd has been called the most unpredictable herd in Alaska, (ADFG, 1973), a compilation of past records, combined with current observations, would give guidelines for planning work schedules to minimize contact.

Preliminary locations for compressor station sites have been chosen at approximately mile 20 and mile 102. The mile 20 location appears well placed in the rolling forested hills, (Figures 2 and 3), but mile 102, in the alpine terrain about 6 miles east of the Eagle junction may require further investigation before determination of exact siting to avoid wildlife conflict. Because of the emphasis on summer construction by the Alcan Pipeline Company, impacts to caribou while on their sensitive wintering grounds will be minimal.

Moose have declined over all interior Alaska due to severe winters, predation and probably overharvest and the Taylor Highway area is no exception. Densities are low overall, but ADFG, (1973), indicates some important fall-winter concentration areas near Mount Fairplay, Chicken, Denison and Mosquito Forks and Wade Creek. Moose do not migrate in the classical sense, but make periodic seasonal movements between mountains and adjoining lowlands. Movements from the highlands to lower wintering areas normally occur during November. Moose have been found to be reasonably adaptable to roads, pipelines and other developments and no serious problem is contemplated. Only 400-500 moose hunters traveled the Taylor Highway in 1976, and there is no open season proposed for 1977. No Dall sheep or bison populations are found near the Taylor Highway.

Both black and brown (grizzly) bears are widely distributed throughout the area, but there appear no areas of concentration as occur along salmon streams in the coastal areas, (ADFG, 1973 and 1977). The main problem will be, as with the Alyeska pipeline, of feeding by workers and the raiding of garbage dumps. The nuisance bears then become threats to human safety and property and must be destroyed. Proper garbage disposal and strict regulations against feeding are essential to avoid confrontations.

Wolves are considered numerous in the Tanana Hills, (ADFG, 1977), but except for some adverse wolf-human interaction as with bears would be little impacted. Furbearers such as lynx, wolverine, beaver, otter, mink, martin, weasel, muskrat and red fox as well as hares, marmot and squirrels are found throughout the area and would be little affected by pipeline construction. Better access through winter highway maintenance might increase the harvest of furbearers.

No particularly rare or unusual birds frequent the vicinity of the Taylor Highway. Peregrine falcons are reported by DOI, (1973), to nest on cliffs along the North and Middle Forks of the Fortymile, far removed from the highway. BLM personnel have observed an occasional peregrine at Chicken; they do not nest there but are believed to nest along the South Fork. Ospreys also are reported as nesting along the river. During certain weather conditions numbers of sandhill cranes may move south through the Fortymile valley, but the lack of their preferred habitat of marshes and fields along the highway probably precludes intensive utilization or serious interference with their feeding or resting. The sandhill crane is not a rare, threatened or endangered species. Little waterfowl production occurs in the Fortymile basin although ducks are numerous along the Dennison and Mosquito Forks. Grouse and ptarmigan of several species are found along the Taylor Highway and present hunting opportunities varying with their cyclical trends in abundance. The Mount Fairplay area is especially popular for ptarmigan hunting. Chicken obtained its name from the miners' term for ptarmigan, suggesting their abundance in the area at that time. During the course of the field trip, the only game species noted were five sharp-tailed grouse at mile 19, a pair of mallard ducks and one snowshoe hare near Chicken. The unusually hot and dry weather might have inhibited wildlife movements.



Figure 2. Mile 20 on the Taylor Highway, looking south.

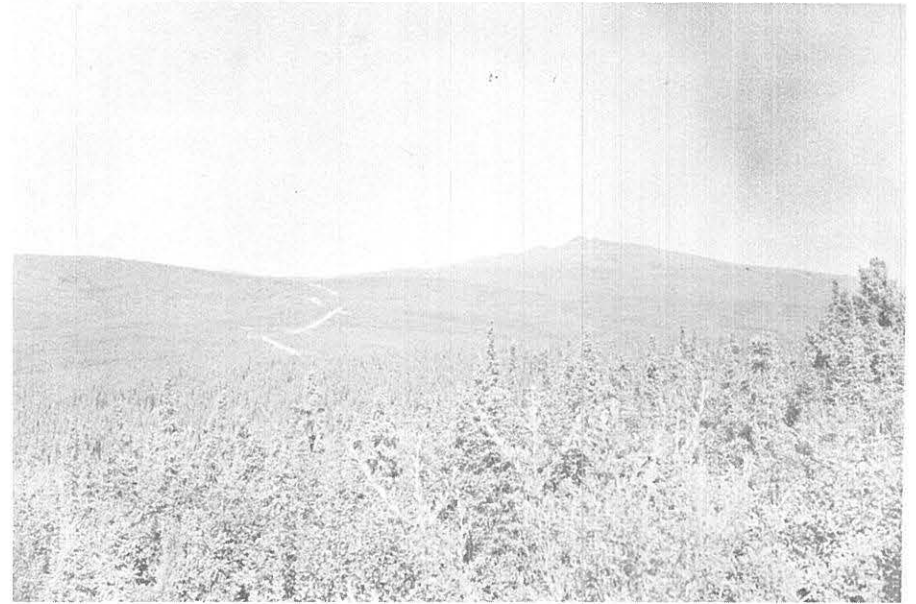


Figure 3. Mile 20 on the Taylor Highway, looking north towards Mount Fairplay.



Figure 4. West Fork of the Dennison River, mile 49.

LOG OF THE TAYLOR HIGHWAY

Mile 0.0 Tetlin Junction.

- 2.5 Leaving Tetlin Indian Reservation.
- 4.0 Fourmile Lake one-half mile to the east. Stocked with sheefish and coho salmon by ADFG and reported to provide good fishing.
- 6.3 Porcupine Creek - a tributary of the Tanana River. About 1 cfs, temperature 48, moderately silty, of low fishery value but provides grayling fishing according to DOH, (1977). Three 36-inch culverts present - one plugged with silt.
- 11.3 Unnamed very small stream of less than 0.1 cfs, clear, a headwater tributary of the Dennison Fork.
- 18.6 Small roadside pond. Five sharp-tailed grouse and a pair of yellowlegs, (Totanus, sp.), observed.
- 22.0 From mile 0 the road has largely traversed the rolling hills of the Yukon-Tanana uplands through a typical taiga forest of spruce, birch, aspen and alder, (Figures 1 and 2). The road is largely ridge top with the Dennison Fork to the east and the West Fork to the west.
- 26.8 Unnamed small marshy stream of about 0.1 cfs; clear and probably productive; a tributary of the West Fork.
- 28.0 Highway ascends into alpine terrain.
- 28.5 Dry creek bed.
- 29.8 Spring flows from the hillside, about 0.1 cfs, 40°. Steep terrain would prevent fish access to this point.
- 31.7 Dry creek bed.
- 32.3 Creek bed with slight seepage.
- 32.5 Highway elevation 3,190 feet; opposite Mount Fairplay, elevation 5,541 feet.
- 33.2 Small, clear tundra stream of about 0.5 cfs. An unnamed tributary of the West Fork.
- 35.0 Road descends down into the valley of Logging Cabin Creek; parallels the stream for seven miles, which is about 1/4 mile away and not visible.
- 35.8 Culvert over dry stream bed.
- 40.5 Small unnamed tributary of Logging Cabin Creek drains a swampy area, less than 0.1 cfs. Culvert present.

- 41.3 Dry stream bed with culvert.
- 43.3 Crossing Logging Cabin Creek. Stream is about 8 feet in average width, 6 inches deep, flow calculated by floating chip method at 3.7 cfs, temperature 50°, gravel bottom, clear water, and would appear to be productive. Grayling present according to ADFG, (undated). New highway bridge under construction.
- 43.5 Unnamed small stream of less than 0.1 cfs, 2 culverts. A large old fire burn covers area.
- 44.2 Stream bed and culvert with a trickle of water.
- 49.5 Crossing West Fork, also called West Fork of the Dennison River. A moderate-sized stream of 40 - 50 cfs occupying a very broad valley. Water clear with slight tannic coloration, temperature 61°. Productive appearing stream; grayling present according to ADFG. Campground and access point to the South Fork Fortymile River Wilderness Canoe Trail, however, except in early spring the water is usually too low to provide an enjoyable trip, (BLM, undated). New highway bridge under construction. Figure 4.
- 50.0 The West Fork fire burned 203,000 acres in 1966.
- 50.6 Taylor Creek. Flow about 5 cfs, temperature 49°, water clear but discolored by dissolved organic acids. Stream meanders through meadows and appears productive; grayling present according ADFG.
- 52.6 Marshy seepage ares, culvert present.
- 53.9 Unnamed tributary of Dennison Fork; about 1 cfs; slight tannic coloration; probably contains grayling and appears productive.
- 55.5 Unnamed tributary of Dennison Fork. A typical brushy, meadow-type stream; humic discoloration; about 1-2 cfs; temperature 50°. It would be important to determine if fish utilize these high meadow streams and, if so, their seasonal abundance. Figure 5.
- 60.0 An extensive burn area on east side of road.
- 64.2 Cross Mosquito Fork. The Mosquito and Dennison Forks combine about 3 miles below the crossing to form the South Fork. The Mosquito Fork is a fairly large stream of perhaps 100 cfs; clear but with a slight brownish stain; temperature 62°; shallow with mostly gravel bottom. ADFG reports grayling present, but an hours fly fishing in the evening produced no evidence; two other fishermen reported similar results. A SCUBA gold sluicing operation in operation just above the bridge. An access point for the South Fork Canoe Trail, but, except for spring, water usually is too low. New bridge and highway relocation underway. Figure 6.

Figure 5. Typical meadow stream, mile 55.

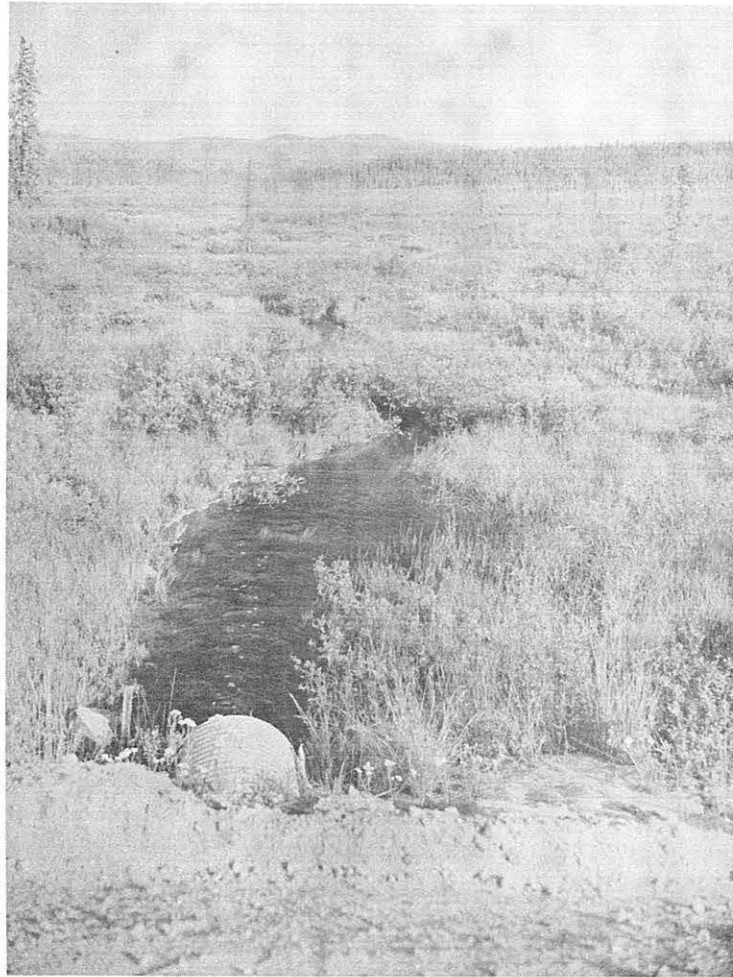
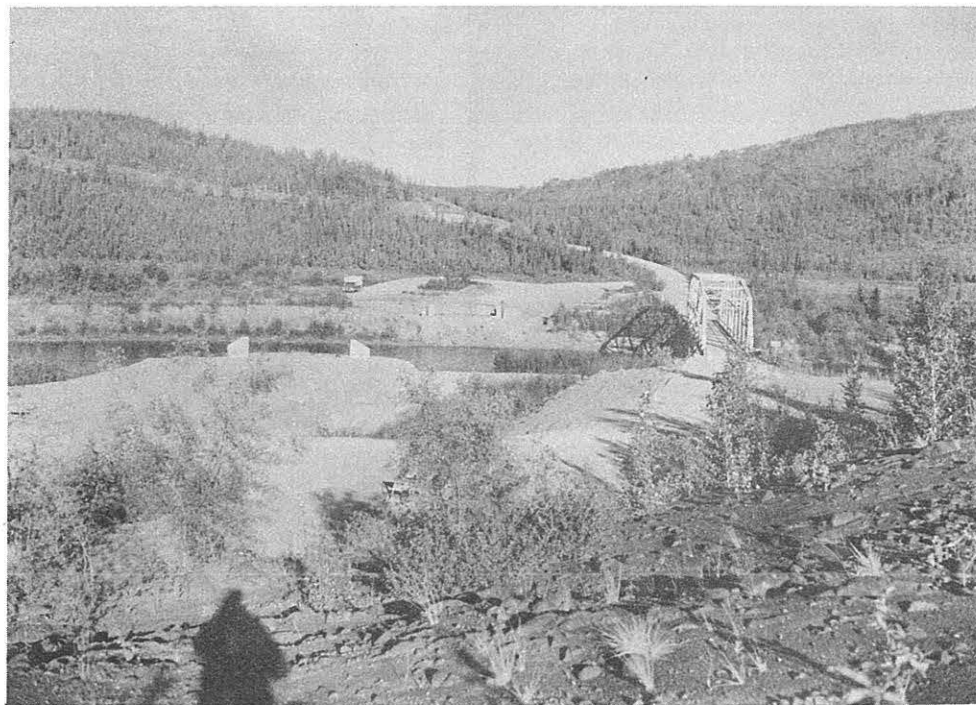


Figure 6. Mosquito Fork, mile 64.



- 66.8 Community of Chicken and Chicken Creek. The creek is an inconsequential, muddy stream of about 0.5 cfs; no apparent fishery value. The valley floor is covered with old dredge spoils. The Highway Department plans extensive road relocation in the Chicken area to take out the curves. Any pipeline alignment should consider these plans. Figure 7.
- 69.1 Lost Chicken Creek. A trickle at this season.
- 70.0 Culvert with seepage.
- 72.9 Canyon, no water flow.
- 73.5 Road approaches the north bank of the South Fork and closely follows the river for about three miles along the side of a fairly steep, narrow canyon wall, (Figure 8). The pipeline would appear to be better located on the south side of the river where there is a flat, wide bench. Consideration might be given in planning to not cross Mosquito Fork, instead, cross Dennison Fork and keep south of the South Fork until mile 76 where the road crosses over to the Walker Fork drainage. This would avoid crossing Mosquito Fork and the South Fork and the rough terrain around Chicken and the north side of the South Fork, but might conflict with scenic river values.
- 74.5 A snowshoe hare along the road.
- 75.7 Cross South Fork. A large stream at this point of several hundred cfs. ADFG reports grayling and sheefish present. The first major access point to the South Fork Canoe Trail. A new bridge under construction, (Figure 9). Wall Street Creek comes in from the south-east, about 1cfs. The Taylor Highway leaves the South Fork at this point climbing a ridge over into the Walker Fork watershed.
- 77.5 A very small stream tributary to an oxbow lake to the west.
- 78.0 - 80.0 An area of steep rocky canyons and sharp curves for several miles; might present some difficulties for pipeline construction and the road would need improvement. No water flowing in the canyons at this time.
- 81.9 Crossing Walker Fork. Medium-sized clear stream of about 20 cfs, temperature 51°. Appears productive and contains grayling according to ADFG. A large BLM campground present and new bridge under construction. Figure 10.
- 82.0 Road turns up Wade Creek and closely parallels it to near its source. The creek is divided, one branch on each side of the road. The south side stream runs about 2 cfs and is very muddy; the north side creek is moderately clear, slightly tannic stained and flowing about 0.5 cfs. Wade Creek is shallow, silty and appears of little or no fishery value. Seemingly almost the entire valley floor has been disturbed by past gold mining activities.



Figure 7. Chicken, Alaska, mile 67.



Figure 8. South Fork, Fortymile River Valley, looking east, downstream, from mile 71.

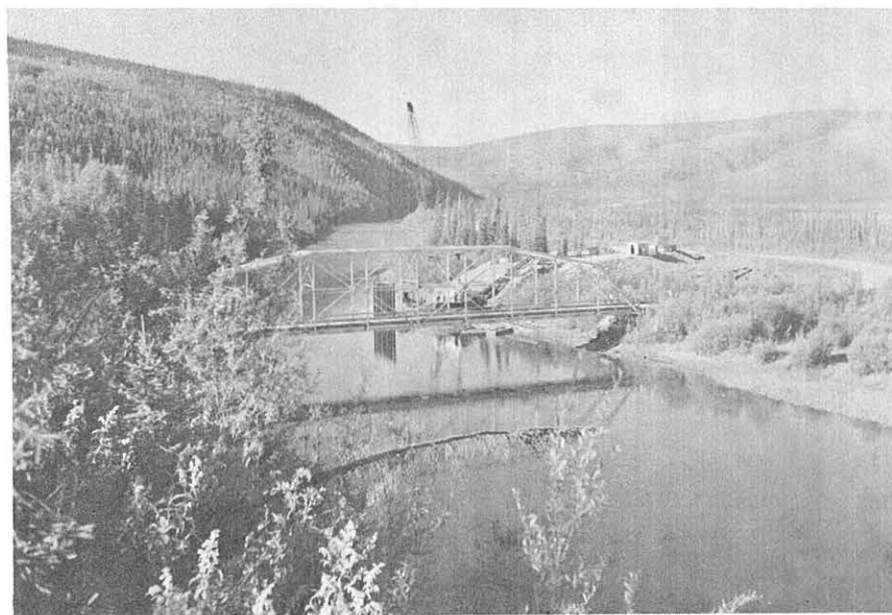


Figure 9. South Fork bridge, mile 76.

- 84.0 An active placer gold mining operation on Wade Creek. The operator uses a cat with front-end loader to move rocks, gravel and dirt to the top of the sluice box where the material is washed down into the stream. The operator also runs the cat directly through the stream; no settling pond was evident. The deterioration in water quality above and below the site is plainly evident in figure 11.
- 86.0 Abandoned Jack Wade gold dredge. Rock tailing deposits are evident all along the road and the creek has been severely impacted by early mining activities.
- 90.0 Jack Wade - an old mining camp.
- 92.0 Warner Creek and Grace Creek combine to form Wade Creek. Highway parallels the north side of Warner Creek, which here is a small, brushy stream of steep gradient, nearly to its head at mile 95.
- 95.7 Junction, the road to Eagle takes off to the north. From this point to the Canadian border for 13 miles the road runs along the ridge tops in alpine terrain in excess of 3,000 feet elevation. A mile to the south in a deep valley lies the upper reaches of Walker Fork with several tributaries and to the north lies Squaw Gulch, with Woods Creek and Kal Creek draining north into Canyon Creek and into the main Fortymile River. No streams are crossed in this section. Some of the steep, rocky alpine areas might present difficulties for pipeline construction.
- 104.7 Boundary, a gas station, restaurant and landing strip.
- 108.7 U. S. - Canada border. Customs station is located on a high ridge at 3,700 feet.

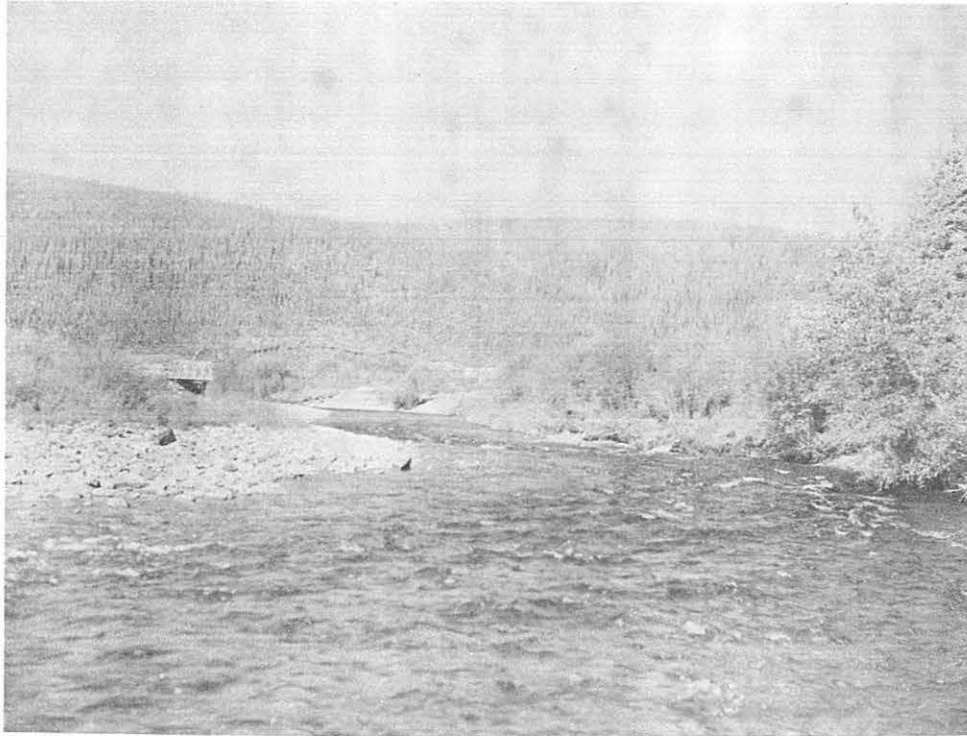


Figure 10. Walker Fork, looking downstream towards the Highway bridge, mile 82.



Figure 11. Placer gold mining, Wade Creek, mile 84.

SUMMARY AND CONCLUSIONS

The Canadian National Energy Board proposed that the Alcan natural gas pipeline swing north to Dawson City, Yukon Territory, via the Taylor Highway. A preliminary environmental assessment of the Alaska segment of this alternative route was conducted in August 1977 for the Northwest Pipeline Corporation. The Taylor Highway lies in the Northern Plateau or Yukon-Tanana Uplands Physiographic Province consisting of broad, undulating divides with rounded, even-topped ridges separated by flat, alluvial valleys. Spruce-hardwood forests are interspersed with high brush thickets, musket-bog, and alpine tundra. There is no glacial or fault activity along the route. Discontinuous permafrost is widespread and, combined with soils of high erosion capability results in unstable earth material subject to thermal degradation and erosion.

Two settlements along the Taylor Highway and scattered miners comprise a summer population of about 200, which declines to 20 in the winter. Gold mining is the principal commercial activity. Gold rush history appears to be the main tourist attraction, with scenic qualities, fishing, boating, hiking and hunting of lesser importance. The road is in poor condition and the state is presently replacing most of the bridges and has plans to upgrade the road.

The Taylor Highway is mostly within the drainage of the Fortymile River, a large, complex system with generally clear, good quality water. The Department of Interior has proposed that much of the Fortymile be included in the National Wild and Scenic Rivers System. The wild river portion is far upstream from proposed pipeline; the scenic river sections

would be crossed at several points and impinged upon for a short distance, but the "riverscape" in this section has already been severely impacted by previous mining and road activity. The overall, long term impact of pipeline construction on the wild and scenic river values would be negligible. Gravel required for pipeline construction may be in limited supply and its removal may be incompatible with scenic and recreational river values. The development and mitigation of material sites may be one of the major environmental impacts. The control of erosion and prevention of siltation in the clear streams must also be recognized.

The Fortymile River has essentially a single-species fishery. Grayling are ubiquitous, but not generally abundant and aquatic productivity is low. Several other fish species occur in the lower river below the Taylor Highway. The Fortymile caribou herd is the dominant element in the animal community although greatly reduced from its former abundance. The herd's calving grounds and summer range are far west of the Taylor Highway and they winter generally east of the highway. No serious conflict with a buried pipeline is anticipated if compressor stations, work camps and construction activities are integrated with the herd's migratory patterns. No rare, threatened or endangered species are recorded for the highway area and the only other wildlife problem envisioned is one of bear-human confrontation.

This preliminary assessment revealed no major, long term environmental impacts affecting the productivity of the Fortymile area, if construction is scheduled to consider the migration of fish and wildlife and high standards in erosion control and compatibility with aesthetic values are maintained. Before final alignments and construction schedules

are programmed, however, several studies need to be completed to provide data for planning and design to minimize environmental concerns: (1) site-specified, baseline fishery studies to determine seasonal species abundance at each crossing and spawning and overwintering areas; (2) documentation of past and present fall and spring caribou migrations along the Taylor Highway in terms of spatial and temporal distribution; and (3) rock and gravel requirements for the work pad and pipeline, resources available, and the environmental ramifications of removal.

Although, the Alaska Taylor Highway segment of the Dawson alternative presents no major environmental problems, it appears to be less attractive than the prime route down the Alaska Highway from a number of standpoints. The two routes might be compared thusly:

	<u>Alaska Highway</u>	<u>Taylor Highway</u>
Length (Tetlin Jct. to border)	80 miles	109 miles
Road Condition	Good, paved, heavy duty, all weather.	Poor, gravel, summer use only at present.
Terrain	Mostly forested, low elevation, river level, moderate slope.	Mostly forested, rolling hills, some canyons and steep, rocky alpine.
Right-of-Way	Cleared, old Haines to Fairbanks Military Pipeline ROW presumably available for most part.	Not cleared; complex land ownership.
Stream Crossings (greater than 1 cfs)	4 (all small)	10 (several large)
Gravel	Apparent good supply in glacial river beds.	May be limited.
Fish	A few salmon; minor recreation and subsistence fisheries for grayling, pike, whitefish and burbot.	No salmon; significant recreational fishery for grayling; no subsistence.

	<u>Alaska Highway</u>	<u>Taylor Highway</u>
Wildlife	Waterfowl production area near Northway.	The Fortymile caribou herd.
Aesthetics	Nothing outstanding; area receives heavy use and is developed.	Proposed Wild & Scenic River; high quality scenic, recreational and historical value; undeveloped.

In conclusion, by comparing the Alaska segments of the two proposed routes, the Alaska Highway prime route clearly presents both environmental and engineering advantages over the Taylor Highway alternative.

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