

23 January 2006

Ms. Caryn Rea
ConocoPhillips Alaska, Inc.
P.O. Box 100360
Anchorage, AK 99503

Subject: **Data report for Alpine Pipeline Caribou Surveys, 2004–2005**

Dear Ms. Rea:

This letter report constitutes our deliverable for the 2005 project titled “Caribou Along The Alpine Pipeline.” It summarizes data on caribou distribution and movements in 2004 and 2005 in the area surrounding the Alpine Pipeline, extending from the Alpine project facilities on the central Colville River Delta east to the processing facilities at Kuparuk CPF-1.

Please contact us with any questions or requests for further information.

Thank you,

Brian Lawhead & Alex Prichard
ABR, Inc.

Introduction

U.S. Department of Transportation (USDOT) stipulation 2.6.1 states that the pipeline carrying processed, sales-quality crude oil from the Alpine Development Project to the Kuparuk Oilfield “...shall be maintained to avoid significant alteration of caribou and other ungulate movement patterns. The Commissioner may require additional measures to mitigate impacts to ungulate movements.”

This letter report address the stipulation by summarizing data from 2004 and 2005 on caribou distribution and movements in the area surrounding the Alpine Pipeline. The data were derived from surveys conducted for two larger projects carried out under contract to ConocoPhillips Alaska, Inc. (CPAI): the Greater Kuparuk Area (GKA) mammal study (Lawhead and Prichard 2005) and the Alpine Satellite Development Program (ASDP) caribou monitoring study (draft report in preparation).



Study Area

The Alpine Pipeline extends ~55 km (34 mi) from the processing facilities at the Alpine CD-1 pad to those at Kuparuk CPF-1. The Colville East aerial survey area encompasses most of the length of this pipeline (between the Colville River delta and the Kuparuk CPF-2 area) and extends from the Beaufort sea coast inland 48–56 km (30–35 mi) (Lawhead and Prichard 2006).

The Alpine pipeline was constructed in the winter of 1998–1999. ABR conducted aerial surveys of caribou in the area of the pipeline corridor both before (1992–1998) and after construction (1999–2005) (Lawhead and Prichard 2006).

Methods

Two methods were used to examine caribou distribution and movements. Transect survey data provided information on caribou distribution and telemetry data provided information on movements by individual caribou. The main focus of this letter report is on 2005, but data from 2004 are included also.

A fixed-wing airplane (Cessna 185 or 206) was used to survey systematically spaced strip transects (50% sampling coverage) twice in the calving season, during an early survey (5–6 June 2005 and 5 June 2004) near the peak of calving and a later survey (10–11 June 2005 and 16 June 2004) near the end of calving. The early survey was timed to coincide with the approximate peak of calving and the late survey was near the end of calving. Detailed descriptions of methods used for transect surveys were presented by Lawhead and Prichard (2005, 2006).

Telemetry data from caribou collared with standard (VHF), satellite, and Global Positioning System (GPS) transmitters in the Central Arctic Herd (CAH) and Teshekpuk Herd (TCH) by the Alaska Department of Fish and Game (ADFG) and North Slope Borough (NSB) Department of Wildlife Management were provided by those agencies under data-sharing agreements for the ASDP/CD-4 monitoring study (draft report in preparation). Telemetry data allowed examination of movements by specific collared individuals in relation to the Alpine Pipeline. GPS collars provide the finest scale of resolution of caribou movements, with the highest degree of accuracy and precision and the most frequent position fixes (5-h intervals). Satellite collars provide locations accurate to within 1 km and 1–2 fixes daily. VHF collars were the least frequently collected but can provide higher accuracy than satellite telemetry, depending on the survey conditions.

Results

Transect Surveys during Calving

Systematic surveys of strip transects provided a good picture of caribou distribution during the calving season. In 2005, caribou were distributed farther west during calving than was expected based on the calving distributions in previous years (Lawhead and Prichard 2006). In the Colville East survey area, the greatest density of calving activity tends to occur inland away from the coast, south of the Alpine Pipeline (Lawhead and Prichard 2005, 2006). This inland/coastal gradient is reflected in the density data below (Table 1), which showed greater densities south of the Alpine Pipeline on both calving surveys in June 2005. About 35% of the survey area was

located north of the Alpine Pipeline and 24 and 25% of the number of groups and total caribou, respectively, were found there in early June, compared with 20% and 16% in mid-June. The numbers in the southern part of the survey area increased in mid-June as more caribou continued to move into the area from the south, in advance of mosquito harassment.

Table 1. Number of groups and estimated density of all caribou and calf caribou in the Colville East survey area during early (5–6 June) and late calving (10–11 June) surveys in 2005.

| Survey | Location | Area (km ²) | No. of Groups | Total No. of Caribou | No. of Calves | Total Density | Calf Density |
|--------|----------|-------------------------|---------------|----------------------|---------------|---------------|--------------|
| Early* | North | 514 | 41 | 91 | 13 | 0.65 | 0.09 |
| | South | 946 | 128 | 278 | 66 | 1.08 | 0.26 |
| Late | North | 514 | 54 | 215 | 73 | 0.84 | 0.28 |
| | South | 946 | 214 | 1,128 | 290 | 2.38 | 0.61 |

*Applied Sightability Correction Factor to density estimates due to patchy snow cover (Lawhead and Prichard 2005).

By 21 June 2005, shortly before mosquito harassment began, over 6,000 caribou were estimated in the survey area (Lawhead and Prichard 2006). By 29 June, the day after mosquito harassment began, nearly all of the 1,400 caribou estimated in the survey area were located north of the pipeline, and the others presumably had moved out to the north and east toward mosquito-relief habitat at and near the sea coast.

GPS Telemetry

CAH GPS collars, 2005 — Of the GPS-collared sample of 33 CAH caribou, 14 collared caribou crossed the Alpine Pipeline at various times during spring, summer, and fall 2005; the other collars were distributed elsewhere in the CAH range.

Caribou GPS102 moved from south of the Meltwater pad (DS-2P) and crossed the Alpine Pipeline north of DS-2L on 2 August, after spending about 5 days east of DS-2P. The caribou moved at an average rate of 2.8 km/h during the 10-h period in which it crossed the pipeline.

Caribou GPS104 moved steadily northeast on the west side of the Meltwater road in late May at a rate of 0.3 km/h. It crossed the Alpine Pipeline north of DS-2L on 1 June and remained within ~5 km of the pipeline until 10 June, moving at an average rate of 0.13 km/h.

Caribou GPS405 moved northeast along the Meltwater road in late June 2005 at an average rate of 0.26 km/h. The caribou crossed the Alpine pipeline east of DS-2L on 27 June (the onset of mosquito harassment) and then moved northeast the Kuparuk Oilfield at a rate of 2.33 km/h, generally in a northeast direction.

Caribou GPS406 spent late May and most of June in the area around the Meltwater pad and road. On 26 June it began moving north rapidly, crossing the Tarn road and Alpine pipeline on 27 June and continuing northeast into the Kuparuk Oilfield. It returned to the area again on 29 July, when it moved west from the Tarn Road along the Alpine Pipeline for about 5 km before moving

northwest onto the eastern Colville River delta. On 6 August, this caribou moved south rapidly across the Alpine Pipeline east of the Colville River and moved southward out of the study area.

In late July, Caribou GPS412 moved southwest from the Oliktok Point Road and across the Alpine Pipeline on 26 July to the area west of the Tarn road. It crossed the Alpine Pipeline again northbound on 27–28 July.

Caribou GPS416 moved slowly northward in the area west of the Meltwater road between mid-May and early June. At about 3.5 km from the Alpine Pipeline it started veering east. On 2 June it was within 1.5 km of the Alpine Pipeline but turned and moved south until it was southwest of the Meltwater road, then moved east of the Meltwater pad by mid-June. It slowly moved northward and then crossed the Alpine Pipeline just west of the Tarn road on 27 June, while moving rapidly to the northeast (presumably under mosquito harassment). It crossed the Alpine Pipeline again in the same general location on 21 July while moving rapidly northward.

Caribou GPS417 moved northward rapidly from the Meltwater road and crossed the Alpine Pipeline on 20–21 June. It returned to the area in September, when it spent ~3 weeks in the vicinity of the Tarn road (between DS-2M and DS-2N). This animal crossed the pipeline to the north ~6 km west of the Tarn road on 4 October and remained within 6 km on the north side of the pipeline until 13 October, when it crossed the pipeline again and moved away southwest. No obvious delay in crossing the pipeline was noted.

Caribou GPS418 moved north rapidly and crossed the Alpine Pipeline ~10 km west of the Tarn road on 27 June.

Caribou GPS421 moved north and crossed the Alpine Pipeline just west of the Tarn road on 26 June.

Caribou GPS423 moved north rapidly and crossed the Alpine Pipeline just west of the Tarn road on 27 June. It appeared to slow down somewhat before crossing the pipeline.

Caribou GPS9807 was in the vicinity of the Alpine Pipeline northwest of the Tarn road from ~7 June to 22 June and crossed the pipeline at least 4 times during this period. It crossed the Alpine Pipeline in the same area northbound on 2 August and then southbound again on 3 August, then moved rapidly northeast and crossed the Alpine Pipeline on 5 August. This caribou moved north to the coast and then headed rapidly south, crossing the pipeline ~10 km east of Nuiqsut on 7 August.

Caribou GPS9814 moved rapidly northward in early August and crossed the Tarn road, but stopped within 1 km of the Alpine Pipeline on 2 August before heading back to the south. It moved west and then north again, crossing the Alpine Pipeline ~10 km east of Nuiqsut on 5 August before moving south again, rapidly crossing the Alpine Pipeline in the same area on 6 August.

Caribou GPS9819 moved southwest from the Oliktok Point Road and crossed the Alpine Pipeline just west of the Tarn road on 26 August, then moved north and recrossed the pipeline

north of DS-2L (northern Tarn pad) on 27 August. This caribou again crossed the Alpine Pipeline northbound ~10 km east of Nuiqsut on 8 August and subsequently crossed the pipeline southbound near DS-2L on 16 August.

Caribou GPS9911 moved north rapidly on 2 August, crossing the Alpine Pipeline northeast of DS-2L. After crossing the pipeline, it turned around and recrossed to the south on the same day.

CAH GPS collars, 2004 — Caribou GPS104 was located near the Tarn road between 29 April and 16 May 2004 and within 10 km of the Alpine pipeline during 16–22 May 2004. On 22 May it crossed the Alpine Pipeline northward, 10 km west of the Tarn road, and remained north of the pipeline until 14 June 2004, subsequently crossing the pipeline at least 5 times between 14 and 18 June.

Caribou 9819 was 40 km south of the Alpine Pipeline on 23 May 2004. It moved steadily north-northeast at a mean rate of 0.2 km/h. At ~1 km south of the Alpine Pipeline the caribou stopped moving north and remained just south of the pipeline until 20 June 2004, when it crossed and moved north to the Palm (DS-3S) road area at a mean rate of 1.1 km/h.

Caribou GPS9916 was located in the Meltwater (DS-2P) project area in mid-June 2004. On 20 June 2004 it crossed the Alpine Pipeline north of the Tarn road, traveling at a rate of 2.8 km/h, and moved rapidly to the Palm road. It slowed down in the Palm area and then moved slowly to the northeast.

Caribou GPS403 was located north of the Alpine pipeline and ~4 km east of the Alpine CD-1 pad on 8 September 2004. It remained north of the pipeline until 27 September, when it moved south rapidly, presumably toward winter range. The mean rate of movement was 0.3 km/h as it moved south toward the pipeline and 1.6 km/h after it crossed.

TCH GPS collars, 2004–2005 — One of 10 GPS-collared caribou from the TCH crossed the Alpine Pipeline during this period. Caribou 0406 crossed in two locations in early June 2005 while moving northwest toward Teshekpuk Lake. Between 28 May and 1 June, this caribou moved steadily north on the east side of the Colville River at a mean rate of 0.4 km/h. Within ~6 km of the pipeline, its path became more erratic and it took ~82 h to move the last 8.1 km to the pipeline (mean rate 0.1 km/h). The caribou crossed the pipeline on 6 June after spending 9–12 h within 1 km of the pipeline, then headed north at 1.6 km/h and west at 2.1 km/h before approaching the pipeline again and slowing down. The animal again spent 9–12 h within 2 km of the pipeline before crossing westward ~2.5 km south of the Alpine facilities, still on 6 June, and then moved northwest toward Teshekpuk Lake at a mean rate of 1.3 km/h over the next 2 days.

Satellite Telemetry

A total of 5 caribou with the CAH (3 of which were captured with the TCH) were collared for all or part of 2004, but only one collared animal was available in 2005. In contrast, 17 and 20 collared caribou from the TCH were transmitting for all or part of 2004 and 2005, respectively.

No satellite-collared caribou from either herd crossed the Alpine Pipeline in 2005. Two CAH caribou crossed the pipeline in 2004.

Caribou 0208 – In late May 2004, Caribou 0208 headed toward the Kuparuk Oilfield from the east. On 29 May it was ~8 km southeast of the Tarn road and on 31 May (the next position fix) was ~10 km north of the Alpine Pipeline. A straight line between the two points crossed both the Tarn road and the Alpine pipeline but, given the long time period between the two position fixes, it is impossible to know where the caribou crossed oil field structures. The caribou was ~3 km south of the Alpine Pipeline on 6 June and was on the north side on 8 June, remaining north of the pipeline until it moved east through the oilfields on 22 June. This caribou had been captured with the TCH in fall 2002 but spent the winter of 2003–2004 with the CAH.

Caribou C0104 – During 2–20 June 2004, Caribou C0104 was in the area between the Tarn road and the Alpine Pipeline. It was within 2 km on the north side of the pipeline during 6–8 June and just south of the pipeline the rest of the time. The caribou crossed the pipeline again and moved northeast into the Kuparuk Oilfield between 20 and 22 June.

VHF Telemetry

No VHF-collared caribou were recorded in the vicinity of the Alpine Pipeline in March (CAH), April (TCH), or May (CAH) 2005. In early June, one CAH caribou and one TCH caribou were within 5 km of the pipeline. The CAH caribou was south of the pipeline on 1 June 2005 and had crossed northward by 6 June 2005. In late June, one collared CAH caribou was within 5 km and a total of 6 CAH collared caribou were within 10 km of the pipeline; all were located south of the pipeline in the vicinity of the Tarn road on 24 June 2005.

During VHF tracking of CAH and TCH caribou by ADFG during July and August 2005, no caribou were found within 5 km of the Alpine Pipeline. One collared CAH animal was found in a group of ~200 caribou on the Colville River delta on 2 August 2005 and groups of 1,200 and 700 caribou were found south of the Tarn and Meltwater roads, 10–15 km from the Alpine Pipeline. One collared CAH caribou was located in the Meltwater area on 31 July and 10 August 2005. All other collared caribou located by ADFG on those dates were either in the Kuparuk or Prudhoe Bay oilfields or west of the Colville River.

In May 2004, 2 VHF-collared CAH caribou were located within 5 km of the Alpine Pipeline and 6 caribou were within 10 km. By early June, 4 CAH and 1 TCH caribou were present within 5 km of the pipeline and 8 CAH and 1 TCH collars were within 10 km. A VHF-collared TCH caribou was within 10 km of the Alpine Pipeline in November 2004; no VHF-collared caribou were recorded within 10 km of that pipeline in any other month.

Conclusions

The combined results of systematic transect surveys and telemetry data from GPS-, satellite-, and VHF-collared caribou provided indirect and direct evidence, respectively, of crossings of the Alpine Pipeline in 2004 and 2005. The densities of caribou north of the pipeline during the calving season were lower than they were south of it, consistent with the expected gradient of higher density inland during calving. Northward crossings of the pipeline occurred during May and June as caribou moved toward the coast during the calving and postcalving periods, especially as mosquito harassment began. Some southward crossings occurred during those seasons as well as in fall.

The limited data available from GPS-collared caribou suggest a possible difference between herds in pipeline-crossing behavior. The movement data from the single GPS-collared TCH caribou that encountered the Alpine Pipeline suggest that the pipeline may have contributed to minor delay in that caribou's movement toward the Teshekpuk Lake area during spring 2005. On the other hand, most movements by collared CAH caribou, which have more experience negotiating oilfield infrastructure, did not suggest delays in crossing. It must be borne in mind that the telemetry data are merely suggestive rather than conclusive in interpreting pipeline crossing behavior, because no one witnessed the encounters and other factors potentially affecting pipeline crossings (such as snow cover, weather conditions, insect activity, intraspecific behavioral interactions) were undocumented.

References Cited

- Lawhead, B. E., and A. K. Prichard. 2005. Mammal surveys in the Greater Kuparuk Area, northern Alaska, 2004. Report to ConocoPhillips Alaska, Inc. and the Greater Kuparuk Area, Anchorage, by ABR, Inc., Fairbanks. 39 pp.
- Lawhead, B. E., and A. K. Prichard. 2006. Mammal surveys in the Greater Kuparuk Area, northern Alaska, 2005. Report to ConocoPhillips Alaska, Inc. and the Greater Kuparuk Area, Anchorage, by ABR, Inc., Fairbanks.