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Case study: Caribou Migration Routes

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Case (for presentation to students)

An environmental consulting firm in Alaska is hired by a natural gas utility to produce a map of a proposed pipeline through a portion of northeast Alaska in preparation for a public hearing (a hearing attended also by potential funders for the project). The company already has a pipeline route in mind but wants to assess this further within the context of the physical landscape, private land ownership, and public lands data. In the end they want to choose the shortest, most direct route to minimize capital expenditures for construction and pipeline efficiency. Geophysical, environmental, political, social, economic and regulatory factors often come into play when refining the best route.

A GIS analyst within the consulting firm is assigned to this project and proceeds to gather all pertinent data including existing topographic maps (DEMs), potential landslides, land use, land cover, geologic fault, soils, roads, railways, streams, station points, resident locations, administrative boundaries (including land ownership), vegetation, regulatory data, and subsurface seismic data.

The project involves consideration of the following variables:

- shortest distance from source to market;
- slope of terrain;
- number of stream, road, and railroad crossings;
- substrate (rocks, soils, etc., associated with burial);
- existing laws and regulations (e.g., proximity to wetlands, costs associated with right-of-way, etc.)
- proximity to population centers;
- use of existing utility corridors; and
- vegetation (removal of trees needed?)

DRAFT

The analyst plans to use these variables within a multi-step raster and network analysis involving the calculation of cost surfaces, distance surfaces, and direction surfaces in combination with source points, station points and destination points in defining an optimum pipeline route.

The analyst also has access to caribou migration routes throughout the region from the U.S. Fish and Wildlife Service (Figure 1). Although the proposed path of the pipeline itself will not fall within wildlife refuges, the migration corridors for this important species move beyond the reach of refuges. In fact the analyst's found these migration routes to intersect the proposed pipeline at several points.

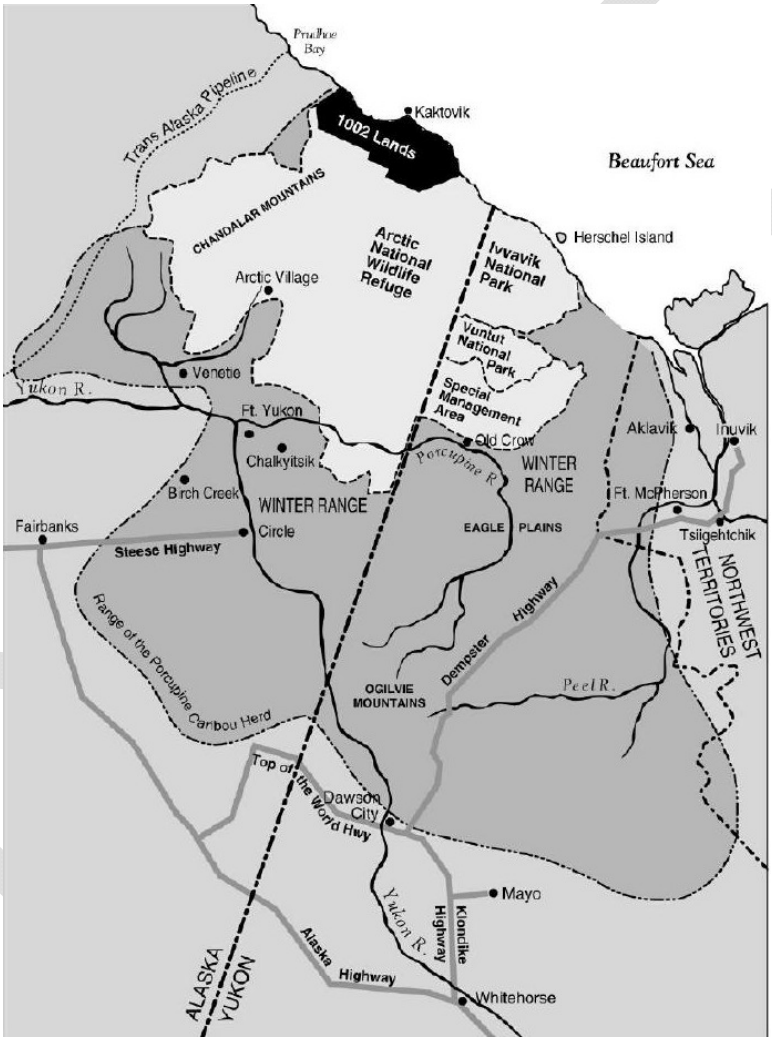

Fig. 1. Example of a winter range map for porcupine caribou in eastern Alaska and western Yukon Territory (Journey North Caribou, 2002, as obtained by the Porcupine Caribou Management Board of the Canadian Yukon). Note the location of the Trans Alaska Pipeline.

The analyst brings this finding to the attention of her supervisor. For reasons unknown to the GISP, the supervisor instructs her to remove the caribou migration routes from any maps prepared for the public hearing.

References

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Resources for teachers

Suggested discussion points

1. Which of the GISCI Rules of Conduct pertain to this case?
2. What obligations does the GIS analyst have to society, to employers and funders, to colleagues and the profession, and to individuals in society?
3. Even though the GIS analyst is not a designated decision maker, should she ask the supervisor why the caribou migration layer is to be omitted, and further, argue the case for why it should not?
4. What practical alternative solutions might the GIS analyst suggest? What should the GIS analyst say, and how should she say it in order to "survive" within the company, while still maintaining ethical principles?

Relevant GISCI Rule of Conduct

Section I, Number 12: "We, speaking in our professional capacity, shall not knowingly make false statements of material fact, nor shall we omit material facts."

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