Alaska Canada Rail Link
Railroad Operating Cost Model

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Innovative Scheduling adapted our railroad operating cost model to evaluate the alternative Alaska-Canada routes.

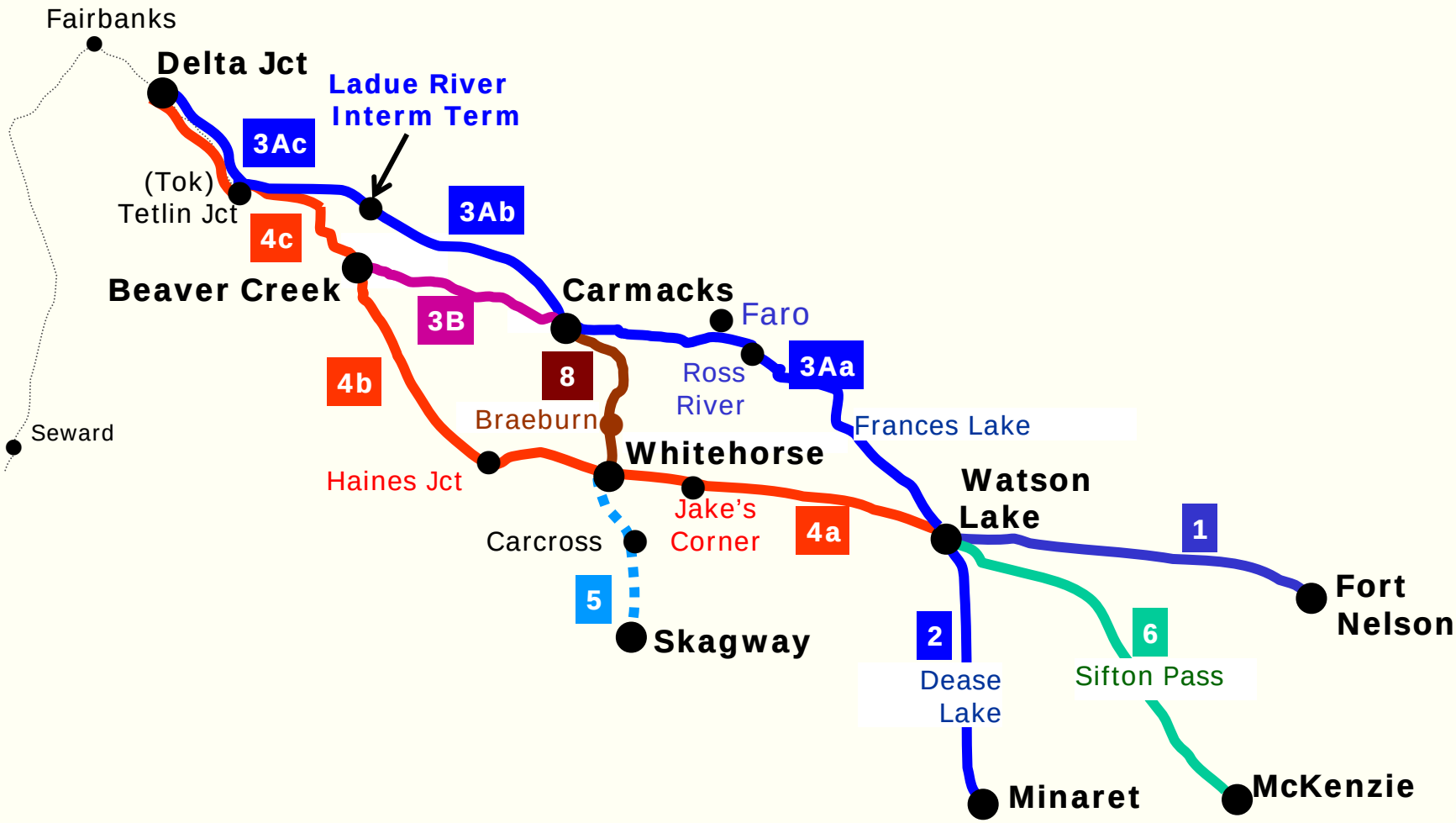
- But Anita got a new dog
- And he ate our homework

Any Questions ?

Innovative Scheduling adapted our railroad operating cost model to evaluate the alternative Alaska-Canada routes.

- "Above the Rail" Operating Costs
  - Equipment: Locomotives, Rail cars
  - Train Operations: Fuel, Crews, Dispatching, Field Management
- MOW "Below the Rail" Operating Costs
  - Somewhat variable with traffic, depending on cost item
  - Includes track, signal, bridges & buildings
- SG&A – Not variable with traffic volumes
- Initial investment treated as a capital cost spread evenly over the planning horizon
  - Assumed capital replacement is beyond planning horizon
  - User can select discount rate and payback period

Costs for each route segment are modeled independently and coded in the spreadsheet to match this map.



Users can evaluate many alternative routes by combining the various segments.

Four routes in BC, three routes in Yukon = 12 alternatives

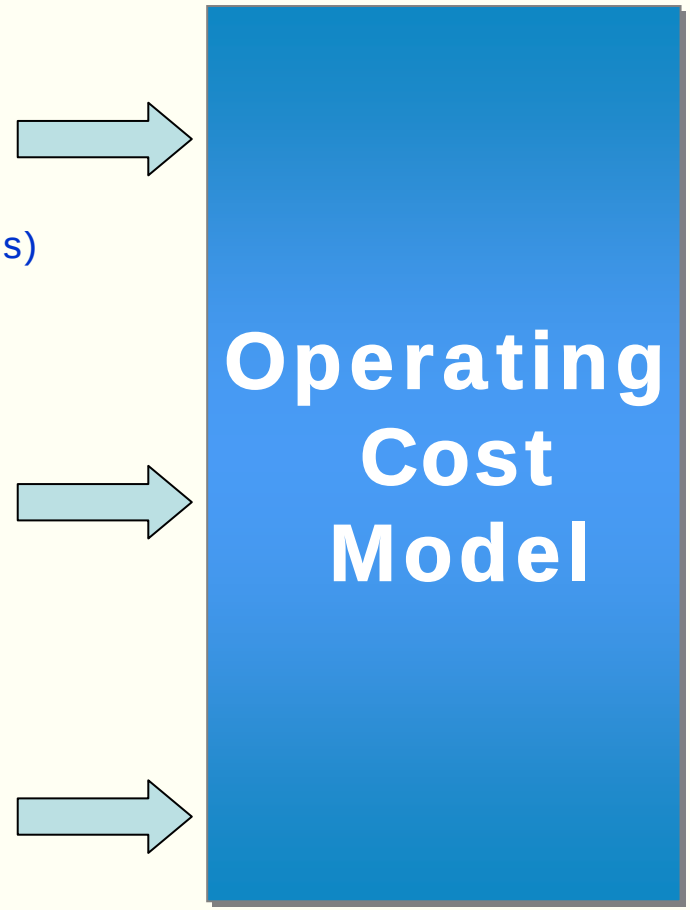
- WP&Y to Carmacks provides even more alternatives
- The total route inherits the attributes of each segment
  - The model rolls up the costs to an overall report for the network
- Capital costs were provided for each segment, represented in our model as average investment $/mile
- Traffic forecasts were not provided for the Rocky Mountain Trench segment or the Taylor Cutoff

Activity Based Costing attaches unit costs to operating parameters.

Traffic Forecast
- Intermodal (boxes)
- Minerals (tons)
- Coal (tons)
- Pipe (carloads)
- Industrial Equip (carloads)

Physical Factors
- Labor productivity
- Locomotive requirements
- Train running and dwell times
- Car dwell times

Unit Costs
- Wage & fringe rates
- Fuel, car hire, equipment and track maintenance unit costs



Costs
- Labor
- Maintenance
- Fuel
- Administrative

The model currently includes a traffic forecast for 3 routes.

Map courtesy of QGI Consulting

The traffic forecast includes sufficient detail to flow it on specific rail segments.

- Data Elements
  - Commodity
  - On-off junction
  - Annual volume
  - Duration of traffic (in years)
  - Starting year of traffic
  - Annual growth rate
- Low, medium and high traffic volumes
- Some traffic is exhausted after 1-3 years
  - Pipe flows
  - Equipment and supplies needed for construction
- Current traffic forecast includes coal and mineral shipments on the WP&Y

Internal model functions estimate the physical activities required to transport the forecasted traffic.

- Train starts
  - Cars per train, tons per car
  - Velocity, working times
- Crews
  - Crew districts, crew balance, crew rest
  - User can change crew size to evaluate cost tradeoffs for train control technology
- Rolling Stock
  - Locomotive requirements per train, servicing and fuel time
  - Railcars are foreign-owned or private
    - Car hire included, but no capital costs
    - Car repairs 100% rebillable
- Basic forces
  - MOW, mechanical personnel variable with traffic
  - Sufficient clerical forces for given traffic scenarios

We calibrated the model with unit costs and statistics from prior studies and current benchmarks.

- User can select High, Medium, or Low cost scenarios
  - Cost scenarios are a function of both the unit cost and the intensity of the functional relationship.
  - Example: "High Cost" = 3 AC locos per train, "Low Cost" = 3 DC locos per train
  - Users can also create an "Other" cost scenario to develop their own view of the world
- Confidential benchmark data processed to protect sources
- Parameters generally represent actual railroad trends
  - High Cost: AAR Analysis of U.S. Class I Railroads
  - Medium Cost: Regional railroad experience including ARR and BCR
  - Low Cost: Bare bones, best case

Users define a scenario by selecting a combination of routes, a volume of traffic, and a cost regime.

- Routes
  - Northern (Tintina Trench)
  - Southern (Alaska Highway)
  - Northern (Tintina Trench) Alternate 1
- Traffic
  - Low
  - Medium
  - High
- Costs
  - Low
  - Medium
  - High

Completing Model Delivery

- Continue to refine model inputs based on team members' review and feed-back
- Incorporate additional route and traffic information if required
- Document work with white paper for incorporation into larger project report
- Post final version of model to project website
- Work with Phase II Finance Team to develop views and reports that best meet their needs

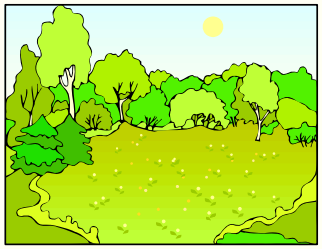
And the answer is . . .

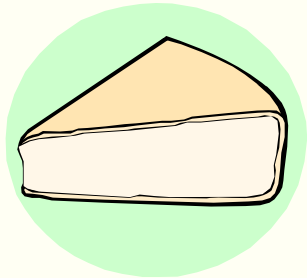
?

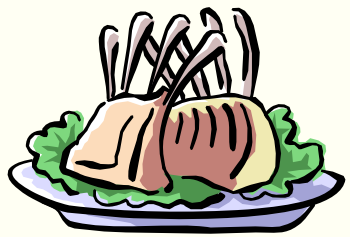
Time out for a short economics lesson

- Incremental costing is appropriate for contribution analyses
  - NOT average costs per carload
  - NOT average costs per car-mile
- Network Economics
  - Incremental cost/benefit analysis
  - The power of the O-D Matrix
  - The “last mile” problem
- Multi-product Firm Theory
  - System costs ARE appropriate for investment analyses
  - How is a Railroad like a Sheep Farm?

They are both baaaad at costing.







Preliminary Results Year 1: Operating Costs

Operating Costs Per Loaded Car-Mile				
	Low Cost Low Traffic	Low Cost High Traffic	High Cost Low Traffic	High Cost High Traffic
Watson Lake-Carmacks-Ladue River	**$0.509**	$0.535	$0.647	$0.675
Watson Lake-Whitehorse-Alaska Highway	$0.514	$0.540	$0.669	$0.697
Fort Nelson-Carmacks-Ladue River	$0.610	$0.637	$0.751	**$0.787**

Preliminary Results Year 4: Operating Costs

Operating Costs Per Loaded Car-Mile				
	Low Cost Low Traffic	Low Cost High Traffic	High Cost Low Traffic	High Cost High Traffic
Watson Lake-Carmacks-Ladue River	$0.457	$0.839	$0.619	$0.952
Watson Lake-Whitehorse-Alaska Highway	**$0.450**	$0.847	$0.624	$0.953
Fort Nelson-Carmacks-Ladue River	$0.549	$1.106	$0.719	**$1.200**

The discount rate and planning horizon have a huge impact on total costs.

Effect of Discount Rate and Planning Horizon on total costs (Year 1) for Watson Lake-Carmacks-Ladue River			
	Low Cost High Traffic	**Medium Cost Medium Traffic**	**High Cost High Traffic**
Discount Rate	5%	10%	15%
Planning Horizon	30 yrs	25 yrs	20 yrs
Total $/Load	$5,328	$8,722	$12,350

Preliminary Results Year 1: *Total* Costs

Total Costs Per Revenue Load				
	Low Cost Low Traffic	Low Cost High Traffic	High Cost Low Traffic	High Cost High Traffic
Watson Lake-Carmacks-Ladue River	$5,614	$5,328	$13,091	$12,350
Watson Lake-Whitehorse-Alaska Highway	$5,733	$5,435	**$13,368**	$12,609
Fort Nelson-Carmacks-Ladue River	$4,186	**$3,975**	$9,710	$9,165

Preliminary Results Year 4: *Total* Costs

Total Costs Per Revenue Load				
	Low Cost Low Traffic	Low Cost High Traffic	High Cost Low Traffic	High Cost High Traffic
Watson Lake-Carmacks-Ladue River	$5,849	$5,147	$13,774	$11,466
Watson Lake-Whitehorse-Alaska Highway	$6,200	$5,405	**$14,632**	$12,047
Fort Nelson-Carmacks-Ladue River	$4,324	**$3,917**	$10,154	$8,560

Model Demonstration

- Example Factors: Cars
- Example Functions:
  - Scenarios
  - Calculations Routes
- Traffic Forecast
- Example Resources: Crews, Manpower
- Start-Up Expenses
- Summary Report

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