

**HARZA-EBASCO**

Susitna Joint Venture  
Document Number

2797

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## INTRA-OFFICE MEMORANDUM

2797

LOCATION Anchorage  
TO Files  
FROM R. Fairbanks  
SUBJECT Susitna Hydroelectric Project  
Meeting with Richard Bonar Regarding  
the Revelstoke, B.C. Hydro Project

DATE April 23, 1985

NUMBER 4.3.4.3

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During my attendance at the 21st North American Moose Conference in Jackson, Wyoming I met Richard L. Bonar of Revelstoke, British Columbia. Richard, who was a former employee of B.C. Hydro and Power Authority, presently is a biologist for the Wildlife Branch of the B.C. Ministry of Environment. He has conducted impact assessment studies on moose, black bear, and other species relative to the Revelstoke Dam on the Columbia River for about eight years. On April 18, 1985 I met with Richard and we discussed his observations and data that were relevant to the Susitna Project. Bill Steigers of LGL, who also participated in this meeting, tape-recorded most of it. A summary of our discussion is provided below. Also provided is Richard's address and phone number and the phone number of Keith Simpson, who was and still is the principal investigator for caribou and grizzly bear on the Revelstoke Project.

Addresses/Phone Numbers

Richard L. Bonar  
Box 2624  
Revelstoke, B.C. V0E 2S0

(604) 837-3285 in Revelstoke on weekends  
(604) 374-9717 in Kamloops during the week

Keith Simpson  
Revelstoke, B.C.

(604) 837-3723

Summary of MeetingRevelstoke Project and Study Area (partially from Bonar 1983)

B.C. Hydro began construction of the Revelstoke Project in southeastern B.C. in 1977. The 25 mi<sup>2</sup> reservoir is about 85 mi. in length and stretches between two other Columbia River reservoirs including the very large Mica Reservoir at the upstream end. Reservoir clearing took place

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between 1977 and 1983 and filling was completed in fall 1983. Water level fluctuations are slight because the project is operated as a run-of-the-river project (max. fluctuation equals 15 ft.). The reservoir is in mountainous terrain and is generally steep-sided. Terraces, alluvial fans, and riparian floodplains were present within the mainstem valley and larger tributaries, and represented the only areas of shallow slope. Annual snowfall is heavy with snow depths on moose winter range usually exceeding 40 in. and occasionally surpassing 75 in for short periods. Snow often develops a hard crust (since winter temperatures can vary widely) sufficient to support a moose. The average January temperature at Revelstoke at the downstream end of the reservoir is 21.4°F while at Mica Creek at the upstream end the average is 13.3°F. Most of the area is covered by mature coniferous forests with seral stages present on extensive logged and burned areas as well as avalanche paths and along watercourses in riparian associations. The moose population in the study area was about 250-300 animals with about two-thirds of those utilizing the impoundment zone during winter prior to impoundment.

to 30' below full - full by  
May 84

Reservoir Clearing

Clearing took place over a 6-7 year period. First, commercial harvest took place and then the remaining vegetation was cleared. Essentially all vegetation was removed including shrubs and herbs. Vegetation was piled and burned or buried. Some tracts of vegetation that would be well-submerged after filling were not totally cleared. Also, about a dozen tracts of high quality habitats, from a few to several hundred acres in size, were reserved from clearing until just prior to impoundment. Clearing had no measurable effect on the moose population largely because animals still utilized cleared areas, that rapidly regenerated browse, and the reserved tracts. Moose did not appear to be significantly disturbed by the clearing operation either. Radio-collared moose were often located within a few hundred yards of clearing operations. Debris did not become a problem after filling because of the degree of clearing and the efforts B.C. Hydro went to after filling to clean-up floating debris with booms and boom boats with metal rakes, which were used to clean up stranded debris.

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Open Water in Winter

Richard noted that moose showed no reluctance to cross the river in winter, prior to inundation, even though Mica Dam produced 4°C water all winter and kept the river open downstream. He noted that they crossed the open reservoir readily when it was cold, also. He said temperatures ranged down to -20°F in winter and even at these temperatures they would readily cross the river which had a winter flow of 25-30,000 cfs. Richard thought that aside from possible habitat changes resulting from flow regulation, open water in winter downstream from a dam would not be detrimental to moose. He said that in his study area when snows get very deep, moose will often concentrate along the river or reservoir shoreline which is often snow-free due to slight water level fluctuations, and will use this zone as a travel corridor, browsing on adjacent vegetation, and staying there for several days or more until travel becomes easier in adjacent forests. Richard also noted that open water in winter caused by upstream impoundment may increase river otter densities. Although he had no baseline data prior to filling Mica Dam, he felt that river otter densities were unusually high in the stretch downstream of the Dam because of the open water in winter.

Ice-related Problems

Richard said the reservoir often develops a complete ice cover in winter but that open water and partial ice covers occur as well, depending on the quite variable air temperature. Maximum ice thickness is about 1 ft. He said that moose readily and easily cross the reservoir on ice when it is stable and generally avoid crossing when it is not. Often the reservoir is mostly ice-covered except for along the shoreline. Moose avoid crossing at that time unless they can find an ice-bridge to the floating ice. As noted above, they also cross when the reservoir is mostly ice-free and they must swim. Richard noted that he has observed signs of about 20 instances where a moose had ventured onto the ice and fallen through, in the two winters since the reservoir was filled. He felt that these 20 instances represented the majority of these cases. He noted that only 2 mortalities occurred out of these 20 cases, and one was associated with the moose getting tangled in debris after breaking through. He said that, in most cases, as long as ice is strong enough,

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the moose can climb back out of the water onto the ice after he has broken through, even without any solid footing under the water. He said he's watched them do it and it's a slow process, but they manage. He stated that more deer mortalities have been noted (about 10 or so?) but that deer tend to venture out into thinner ice than moose and when they break through they can't get back out because the ice is too thin. He noted that the woodland caribou in the area readily cross the reservoir during the winter, when ice conditions permit, in groups of 1 to 20 animals. He said that no ice-related caribou mortalities have been noted. Richard noted that the fractured ice which settles in the large drawdown zone (on the order of 100 ft.) of the Mica Reservoir presents no problems, that he is aware of, to moose or other ungulates. The surface of the ice is generally rough and the cracks and fissures do not seem to cause these critters any problems. He also noted that he is not aware of any problems related to snowdrifting resulting from winds blowing snow along or from impoundment zone ice.

Summer Reservoir Crossings

Moose, bear (both species), and caribou readily cross the reservoir in summer. Moose crossings were noted in areas where the reservoir is anywhere from 300 yds. to 1 mi. wide. Although these species readily cross the reservoir, their crossing frequency appears to be less than prior to reservoir fillings. This is particularly the case for the bears. No problems have been noted relative to ungulates and mud-flats (although most soil materials in the area are coarse). Erosion and sluffing of areas along the steep-sided reservoir are common.

Population-level Effects

Two winters after reservoir filling, population-level effects have not been noted for moose or other large mammals. The 1983-84 winter was relatively mild and the 1984-85 winter was a little more severe than normal. Richard is somewhat puzzled that moose numbers have not yet declined. In addition, he has not seen a reduction in cow:calf ratios or any problems related to bull:cow ratios. He still expects to see a population-level effect, but wonders why it has not yet occurred.

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Miscellaneous

Richard noted that beavers seem to have increased along the shoreline since inundation, but he's not sure how long that will last. He also noted that transmission line corridors in the area are relatively heavily used by moose for foraging as are clearcuts. He noted that aside from the paper he presented at the 19th North American Moose Conference, no reports have been published in the last several years on his studies. He did note, however, that Keith Simpson had a few draft reports prepared on caribou and brown bear and that Simpson gave a paper at a Caribou Conference in Montreal last year regarding his studies.

cc: J. Thrall, HE  
C. Elliott, HE  
R. Lindsay, HE  
G. Gemperline, HE  
M. Bruin, HE  
R. Densmore, HE  
J. Durst, HE  
P. Ames, HE  
R. Bonar, B.C. Ministry of Environment, Wildlife Branch  
W. Steigers, LGL  
R. Sener, LGL