

# **Proposed Heartland Transmission Project**

## **Double Circuit 500 Kilovolt Line**

### **Direct Evidence – Environmental Impacts**

**by**

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**On behalf of RETA**

**Responsible Electricity Transmission for Albertans**

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## **General**

- This report refers primarily to the expert environmental impact evidence submitted by RETA (Exhibit #0647.05.RETA-457), plus to the applicants' reply evidence and responses to cross examination in this subject area.
- The Heartland Project Team's public consultation process was inadequate. Environmental information provided by public stakeholders appeared to play little role in the applicants' route selection and in the applicants' recommendation to build an above ground line in spite of the overwhelming data indicating the negative environmental impacts of an overhead line.
- The applicants' environmental assessment is deficient in many respects: poor baseline data, very limited literature review, misrepresentation of the data, and overt bias toward favouring the lattice tower option over the underground option within the preferred route.
- The environmental assessment deficiencies are particularly unfortunate considering this application is the first under the *Electric Statutes Amendment Act, 2009*, and the fact that the Heartland line is the largest line ever to be built in Alberta.

## **Baseline Biological Data**

- The applicants' environmental assessment is deficient in baseline biological data, particularly for wildlife. It is almost impossible to properly assess environmental impacts of a proposed project without adequate baseline data.
- Baseline data for wildlife found along the preferred route, and collected over a 32-year period (e.g., Exhibit #0038.02.KRISTENS-457), were submitted several times directly to the applicants. Unfortunately, the applicants chose not to reference this published information, and essentially completely ignored it.
- As a result, I have presented a summary of some of this published data in my expert evidence report filed by RETA (Exhibit #0647.05.RETA-457).
- My data indicate that some of the more important wetlands and natural areas along the preferred route include: North Saskatchewan River, Sturgeon River, Strathcona Science Provincial Park, Baseline Slough wetland complex, Bretona Pond Buck-for-Wildlife Area, Mill Creek, Fulton Creek Marshland, Fulton Pond, Fulton Creek, Crosswhite's Pond, Bretona ConservAction Area, Bretona Pond wetland complex, and many other smaller ponds, sloughs and wetlands.
- My data indicate a total of 182 bird species observed in and near the Sherwood Park Greenbelt (East TUC) from 1978 to the present.
- My data indicate that several thousand waterbirds overnight on each of the ponds in the preferred route landscape area during Spring and Fall migration, and that many bird species nest there.
- My data indicate 34 bird species on the preferred route are of provincial and/or federal concern, ranging from "Sensitive" to "Threatened".
- My data indicate a total of 26 mammal species observed in and near the Sherwood Park Greenbelt from 1978 to the present.
- My data indicate two mammal species on the preferred route are of provincial concern.
- My data indicate a total of 3 amphibian species observed in and near the Sherwood Park Greenbelt from 1978 to the present.

### **Applicants' Biophysical Data for Preferred Route**

- The preferred route crosses right over an Environmentally Significant Area (ESA), the North Saskatchewan River, where construction of the HTP may well increase slope instability and bank erosion. This is especially the case considering that 7 towers (tower nos. 79-85) will be constructed in the North Saskatchewan River valley.
- The construction footprint with respect to new disturbance to wildlife habitat is high on the preferred route.
- There are high risks of wind erosion and water erosion on the preferred route.
- High bird counts were recorded on the preferred route by the applicants at the North Saskatchewan River, Sturgeon River and Bretona Pond wetland complex. The preferred route crosses right over all three of these wetlands/riparian areas as well as right over Baseline Slough wetland complex.
- Bird counts by the applicants would have been significantly higher on the preferred route had wetland water levels been more typical. Water levels during the applicants' aerial and road-side surveys were atypically low (lowest in 32 years).
- The applicants counted relatively high numbers of historical and more recent raptor nests in the preferred route landscape area.

### **Impacts of Overhead Lines on Birds**

- Significant bird mortality caused by collision with overhead high voltage transmission lines has been reported in the literature. An estimated 174 million birds are killed annually in the U.S. from collisions with overhead transmission lines, which is greater than the total number of bird deaths from hunting in the same country.
- Based on estimates of bird mortality in the U.S. and the Netherlands, between 8,200 and 14,100 birds may be killed annually colliding with an overhead Heartland line along the preferred route. Undoubtedly, a number of variables would affect these calculations. If bird habitat along the Heartland preferred route was less ideal than in the U.S. and Netherland studies, bird mortality would be lower; on the other hand, the greater number of wires (20) spread over a longer vertical distance on the proposed Heartland double circuit 500kV line and the taller towers might well result in higher bird mortality. The use of bird deflector devices along specific segments of the Heartland line might reduce bird mortality to some extent; however, such deflectors would add to the negative visual impacts of these towers and lines on humans.
- The above-mentioned estimates are significantly higher than the estimate of 250 bird deaths per year for the Heartland overhead line provided by the applicants during cross examination.
- "Perfect Storm" scenarios for bird mortality along the preferred route due to collision with an overhead line the size of the Heartland line include: high numbers of poorly maneuverable bird species, extensive flights back and forth among many ponds and other wetland complexes located along the preferred route, poor visibility along segments of the preferred route due to frequent fog conditions, and gulls moving back and forth across the line at the North Saskatchewan River crossing between the Clover Bar landfill and overnight roosting locations.
- Overhead high voltage power line electromagnetic fields (EMFs) have been reported to negatively alter the behaviour, physiology, gland secretion, and the immune system of birds, which resulted in negative effects on their reproduction and

development. Studies have also reported that EMF exposure resulted in significantly reduced egg size, eggshell thinning, reduced egg laying and reduced hatching success. Based on EMF effects on reduced melatonin production, it has also been suggested that high voltage power lines can negatively affect the timing of bird reproduction, mate selection, several aspects of migration, feeding and sleeping patterns, and overall stress levels in birds.

### **Impacts of Overhead Lines on Mammals**

- Studies have reported a number of negative effects of overhead high voltage line EMFs on mammals including the following: reduced milk yield and milk fat in dairy cows, stillborn and deformed puppies and kittens, no reproductive cycling in cats, canine lymphoma, birth malformations among pig litters, and abnormal sexual organ development.

### **Underground Option and Lattice Tower Option Comparison**

- The underground option affects the smallest area of wetland communities; in fact, the lattice tower option affects close to five times more wetlands than the underground option. This is significant because wetland communities are generally the most sensitive and provide the highest quality of habitat to wildlife.
- The underground option is more suitable with respect to impacting potential rare plant occurrences because wetlands are far less impacted than for the lattice tower option.
- It is more important to control woody vegetation under overhead lattice towers than over a buried line. Therefore, the underground option is more suitable.
- The 77m-tall lattice tower option has significantly greater impact on bird collision mortality than the underground option. In fact the underground option will result in no bird deaths during the 50 to 60-year operation and maintenance phase.
- Because the bird collision mortality factor is perhaps the most important within the environmental impact context, this factor should have been statistically weighted when the underground and overhead options were compared. For example, without such weighting, the applicant considered temporary soil compaction during short-term construction of the underground option as important as bird mortality due to collision with the overhead lattice tower option during the 50 to 60-year life of the line.

### **Applicants' Reply Evidence and Cross Examination Responses**

- On pages 203-208 of their reply evidence, the applicants challenge many of the peer-reviewed studies I cite in my expert report on risks of EMFs to lab animals, wildlife, livestock and pets. The applicants suggest that because other studies they cite reveal lower risks, the studies I cite must be incorrect.
- On pages 203-208 of their reply evidence, the applicants refer to the health risks reported in some of the studies I cite as "not statistically significant associations" between EMFs and animal health. The fact is, there are many associations and correlations reported in the peer-reviewed literature between animal health and EMFs that may not be statistically significant, but statistical significance should not be used as the only criterion in determining the importance of a result. When health of animals or humans is considered, whether a correlation between EMFs and a

particular disease or health problem is statistically significant or not, a risk ratio of greater than 1.0 (the expected risk in the general population) is a real risk.

- On pages 203-208 of their reply evidence, the applicants state that strong correlations between EMFs and animal health are too imprecise, and they question the study methodologies, suggesting that the research I cite must somehow be flawed. The applicants consistently raise these concerns with studies that clearly indicate very real risks of EMFs to health, yet do not have similar concerns about precision and methodologies for studies that suggest lower or no risks.
- The applicants suggest, on page 207 of their reply evidence, that reindeer are not negatively impacted by overhead electricity transmission lines. In addition to the study I cited in my expert report, other studies support this negative impact. For example, Vistnes and Nellemann (2001)<sup>1</sup> report, “Our results suggest that power lines, even without human traffic, may result in substantial reductions in the use of foraging areas.”
- My expert report had pointed out that wind erosion, soil compaction and water erosion risk factors are markedly higher for the lattice tower option than for the underground option. On pages 226-227 of their reply evidence, the applicants state, “...wind erosion, compaction and water erosion risk were not markedly greater for the lattice tower design in comparison with the underground option.” The applicants consistently characterize any differences between the lattice tower and underground options as “minor” whenever the differences favour the underground option from an environmental perspective, but characterize the differences as “major” whenever they favour the lattice tower option.
- Generally, within their reply evidence, the applicants suggest that mitigation measures will be able to address all of the potential impacts raised by any of the interveners. We know this is not possible, and therefore there will be many environmental impacts that will be inadequately addressed or not addressed at all. An example is the applicants’ contention that use of bird deflectors will adequately mitigate against bird mortality through collision with the lattice tower option. The fact is, the proposed Heartland line would have 20 wires strung on towers up to 77m tall over a vertical distance greater than for any existing towers in Alberta in the preferred route where thousands of waterbirds migrate, breed, rear their young, feed and stage. This would create a “Perfect Storm” for significant bird mortality, and would essentially create an accident waiting to happen.
- The applicants suggest many times in their reply evidence (e.g., page 231) that PDAs (Pre-Disturbance Assessments) will be conducted to address many of the environmental concerns raised by interveners. The applicants refer to these PDAs so often within their facility application and reply evidence as the way to mitigate or avoid any impacts after the project is approved, whereas, these PDAs should be replaced by a proper Environmental Impact Assessment before the project is approved. This is the only way to ensure that the vast majority of the potential environmental impacts are not left to be identified or determined following project approval, when it will be too late to properly weigh the environmental evidence.
- On page 240 of their reply evidence, the applicants state, “The remaining locations listed (Strathcona Science Park [sic], Bretona Pond, Fulton Creek Marshland and Fulton Pond) are all at least 1 km from the preferred route and outside of the landscape area and well removed from the Project.” This is simply not true.

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<sup>1</sup> Vistnes, I and C. Nellemann. 2001. Avoidance of cabins, roads, and power lines by reindeer during calving. *Journal of Wildlife Management* 65(4):915-925.

Strathcona Science Provincial Park, Bretona Pond and Fulton Creek Marshland are within the applicants' 1.6 km landscape area. In fact, parts of the Bretona Pond wetland complex are within the Heartland power line ROW and will be crossed directly by the Heartland line.

- As a result of the applicants' above-mentioned error, the following statement by the applicant is also in error, "...the distance of these features from the preferred route footprint, suggests a very low probability and frequency of direct environmental effects on birds at these locations." In other words, the thousands of birds that utilize these areas will indeed be susceptible to mortality from collision with an overhead Heartland line. And, birds that utilize habitat even farther away than these identified areas will be susceptible to collision mortality because the overhead Heartland line would be so tall and the 20 wires would be strung over such a long vertical distance. (In part, this is a function of the angles of ascent and descent when waterbirds land on and take off from waterbodies near the preferred route.)
- On page 243 of their reply evidence, the applicants state, "Faanes (1987) did not estimate a rate of 124 deaths per kilometer of power line per year." The following is a quote from Manville (2005)<sup>2</sup>, "Faanes (1987) estimated 124 avian fatalities/km/yr near prairie wetlands and lakes in North Dakota. Koops (1987) examined 4,666 km of bulk transmission line in the Netherlands, estimating 0.75 – 1 million birds killed there per year (161 - 214 deaths/km/yr)."
- Cross examination by the Sherwood Park Fish and Game Association (SPFGA) revealed how inconsistently-conducted and inadequate the applicants' aerial and road-side wildlife and wildlife habitat surveys were. This, coupled with the fact that pond and marsh water levels were abnormally low when these surveys were conducted (lowest in 32 years), raise serious questions about the credibility and representativeness of the applicants' field surveys which served as a basis for subsequent biophysical evaluations.
- The SPFGA pointed out several examples of erroneously-labeled maps in the applicants' environmental assessment of their preferred route (e.g., labeling a large block of land as cultivated land when it should have been labeled as "wetland" and important habitat for waterbirds which could easily crash into power lines and towers if an overhead Heartland line was built there). The applicants responded that it was easy to make errors of this type, leading the SPFGA to ask how many additional errors of this type might there be in the applicants' environmental assessment.
- The SPFGA questioned the applicants' consistent and very subjective characterization of the wetlands and wetland complexes along their preferred route as "lower quality" and "not particularly important". As well, on page 239 of the applicants' reply evidence, the applicants state, "...most habitat within the TUC was assessed as being of relatively low value to wildlife..." The applicants have also consistently portrayed the wildlife habitat along the preferred route as "disturbed land" (e.g., pp. 6-1 and 6-2 in Appendix J1), and hence relegated it to inferior and lower quality. The fact is the many wetlands and other wildlife habitat within and adjacent to the preferred route are home to thousands of waterbirds and other wildlife. Just because these areas of high quality wildlife habitat are adjacent to urban areas and a roadway does not render them inferior, as the applicants repeatedly suggest in their facility application, reply evidence and during cross examination. For example, Figure 1 is a photo taken in October 2006 of a very small

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<sup>2</sup> Manville, A.M. 2005. Bird strikes and electrocutions at power lines, communication towers, and wind turbines: state of the art and science – next steps toward mitigation. Bird Conservation Implementation in the Americas: Proceedings 3<sup>rd</sup> International Partners in Flight Conference 2002:1054-64.

storm-water retention pond only a few acres in size adjacent to Fountain Creek Estates situated less than 80m from the initial preferred route ROW and less than 225m from the recently-revised preferred route ROW. Approximately 1,615 waterfowl (Canada geese and several species of ducks) were in this pond when the photo was taken (based on counts of birds in the photo and extrapolated to the edges of the pond not in the photo). This count is extremely high by anyone's standards, especially for such a small pond. How can a professional wildlife biologist, or anyone else for that matter, consider this pond, and many others like it in the preferred route, as "lower quality" or "of relatively low value to wildlife"?

- As well, Table 1 indicates the number of birds observed (by species) at Bretona Pond on May 6, 2011 (last Friday evening). Bretona Pond is part of the Bretona Pond wetland complex that the preferred route passes right over. (The pond itself is slightly over 1km from the preferred route ROW.) A total of 428 birds comprised of 25 species were observed over a 45-minute period from 19:00 to 19:45. Again, how can a professional wildlife biologist, or anyone else for that matter, consider this pond and wetland complex "of relatively low value to wildlife"?
- The applicant has suggested that disturbed land and land located adjacent to roadways or urban areas provides inferior wildlife habitat. Not only is this not true, as evidenced by my report (Exhibit #0647.05.RETA-457) and data in Figure 1 and Table 1 in this direct evidence, but the fact is that wildlife in such areas can be enjoyed by many more people due to their proximity to urban areas and easy access. From an aesthetic human appreciation and environmental education perspective, natural areas within urban settings are often considered more important than natural areas in pristine situations because they offer viewing opportunities to so many more people on a much more regular basis.



Figure 1. Unnamed pond near Fountain Creek Estates within the Sherwood Park Greenbelt. This pond, only a few acres in size, contained 1,615 birds (waterfowl). (Photo taken October 2006.)

Table 1. Birds observed on Bretona Pond, May 6, 2011. (Count took place over a 45-minute period from 19:00 to 19:45.)

<b>SPECIES</b>	<b>NUMBER OF BIRDS</b>
1. Red-necked grebe	3
2. Horned grebe	6
3. Eared grebe	52
4. Canada goose	7
5. Mallard	7
6. Northern pintail	2
7. Gadwall	2
8. American wigeon	4
9. Northern shoveler	6
10. Blue-winged teal	7
11. Green-winged teal	2
12. Canvasback	2
13. Ring-necked duck	5
14. Lesser scaup	39
15. Common goldeneye	48
16. Bufflehead	38
17. Ruddy duck	54
18. American coot	68
19. Killdeer	2
20. Common snipe	1
21. Ring-billed gull	27
22. Franklin's gull	14
23. American crow	1
24. Black-billed magpie	3
25. Red-winged blackbird	28
<b>TOTAL</b>	<b>428</b>

Note: Also, 2 muskrats were observed plus hundreds of wood frogs and striped chorus frogs were heard.