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Monitoring movement, habitat use, and survival of endangered whooping cranes in the oil sands mining region

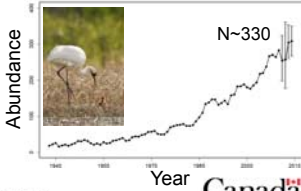


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¹Canadian Wildlife Service, ECCC


Whooping crane

- Species at Risk
 - IUCN, Canada (SARA), USA (ESA), AB/SK/MB (Wildlife Acts)
 - Assessed by COSEWIC as Endangered in 1978, 2010
 - (a) Small population size (b) Small distribution range
- Endangered: “faces imminent extirpation or extinction”
- Canadian population
 - Bottleneck (N=14 in 1938)
 - Rapid growth (~4%/year)
 - Current abundance (N~330, ≤ 82 pairs)
- Extinction risk
 - Single, small population




N~330



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Aransas-Wood Buffalo Population

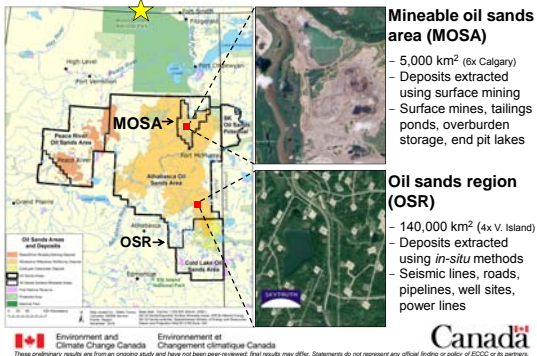
- Only natural, self-sustaining population
 - Wood Buffalo National Park (WBNP)
 - Aransas National Wildlife Refuge (ANWR)
- Migratory
 - May-Sept: Breeding (WBNP)
 - Sept-Oct: Fall migration
 - Nov-Mar: Wintering (ANWR)
 - Mar-Apr: Spring migration
- Migration assumed riskiest period
- “Loss, degradation of migratory habitat are limiting for recovery” (RS)
- Oil sands mining in migration corridor




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Oil Sands Developments



Risk to migratory birds

- Tailings ponds
 - Numerous: 64 process-affected waterbodies
 - Extensive: ~ 220 km²
 - Toxic: PAHs, metals
- Migratory birds
 - Est. 50,000 contacts/year
 - Mortalities (incidental, mass)
- Inclement spring weather



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- Tailings ponds
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 - Mortalities (incidental, mass)
- Inclement spring weather
- Whooping cranes
 - Oiled cranes, post-migration
 - Crude oil (USGS Patuxent WRC)
 - Speculation related to OSM



Baseline monitoring (2010-16)

- Investigate migration in OSR and MOSA
 - Migration corridor
 - Timing of migration
 - Occurrence, density, frequency of use
 - Stopover duration and proximity to industrial sites
 - Habitat use
- Evaluate risk
 - Do cranes land on tailings ponds?
 - Do they die?
- Mitigate risk
 - Inform EIA processes
 - Provide guidance to industry



Methods

- Cooperative study with US, Canadian partners
- Satellite telemetry
 - Data in remote areas
 - Unbiased
- 68 cranes banded w/ satellite transmitters
 - 31 juveniles at WBNP, 37 older birds in TX
 - 4-5 GPS locations per 24 h
- Monitored migration and survival, 2010-16
 - 231 individual migrations through the OSR
- Used surveys to estimate survival of juveniles accompanied by banded parents



Catch and release

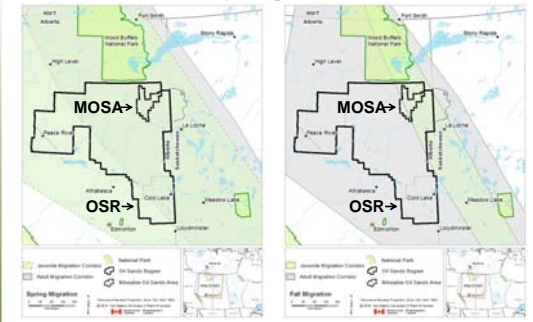


Catch and release



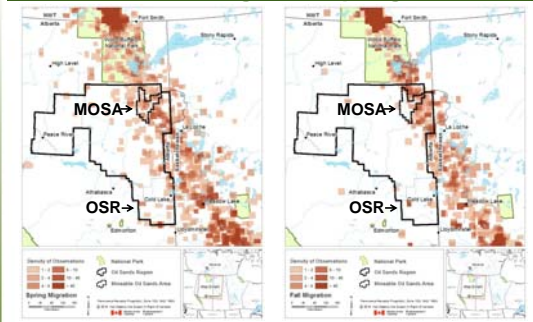
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The migration corridor included the entire OSR and MOSA in spring and fall



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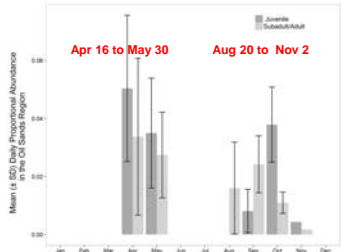
In the MOSA, cranes were more widespread and densities were higher in spring than fall



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In the MOSA and OSR, the period of migration was shorter in spring than fall

- Cranes can be in the OSR during periods of inclement weather, which could increase probability of landing



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Frequency of use & stopovers

- Almost all cranes migrate through the OSR
 - 96% in spring (88-100%) and 99% in fall (93-100%)
- Most cranes migrate through the MOSA
 - 76% in spring (50-90%) and 92% in fall (84-100%)
- Smaller numbers of cranes stop over in the MOSA
 - 16% in spring (11-25%) and 14% in fall (8-21%)
 - Cranes <3 years old ~4x more likely to stop over in the MOSA
- Stopovers are usually short and far from tailings ponds
 - 1-2 nights, 23.0 ± 15.7 km (mean ± SD)
- Some cranes land on or adjacent to tailings ponds, or other industrially modified sites

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Stopover in natural habitat, 11 Sept 2016 Athabasca River



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Stopover in natural habitat, 25-26 Sept 2016
Natural wetland



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Stopover in industrial area, 5-6 May 2014
Muskeg River Mine, Shell Canada (overview)



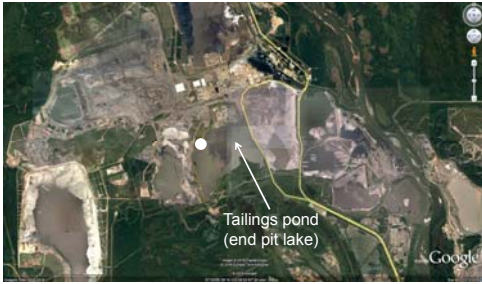
Source of site descriptions: Shell Canada, 2009, Tailings Management Plan for Muskeg River Mine.
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Stopover in industrial area, 5-6 May 2014
Muskeg River Mine, Shell Canada (detail)



Image Sept 2015
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**Stopover in industrial area, 14-16 May 2014
Mildred Lake Mine, Syncrude (overview)**



Source of site descriptions: Syncrude Canada, 2010. Annual Tailings Plan Submission for Mildred Lake Mine.

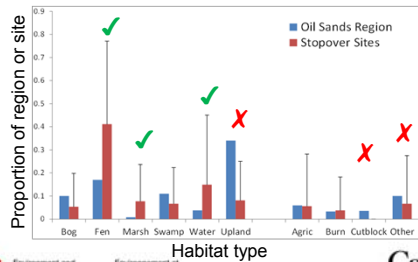
**Stopover in industrial area, 14-16 May 2014
Mildred Lake Mine, Syncrude (detail)**



Image Sept 2014

Habitat use during stopovers

- Tend to select fen, marsh, open water
- Tend to avoid upland habitats, anthropogenic areas



Survival

- Of 17 mortalities of marked cranes, 15% died in migration which makes up ~17% of year
- Monitored 231 migrations in OSR, 194 in MOSA
- No mortalities of banded cranes detected in the OSR
 - Majority of juveniles with banded parents also survived period including migration through OSR
- Survival seems high during migration through OSR
- Mortality of an individual of a very rare species would be rare and could be undetected
- Sub-lethal effects unknown



Conclusions

- Almost all cranes migrate through the OSR and most migrate through the MOSA
- Fewer cranes land in the MOSA, most stopovers are short and far from tailings ponds
- Some stopovers occur on or adjacent to tailings ponds
- Survival seems high, but detection rate unknown
- Sub-lethal effects unknown

Next steps:

- Proposed focused study, 2017-20
- Focus on cranes ≤ 3 years old (most at risk)
- Mechanisms, consequences of use of industrial areas
- Test hypotheses to quantify, mitigate risk

Acknowledgements

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Questions?