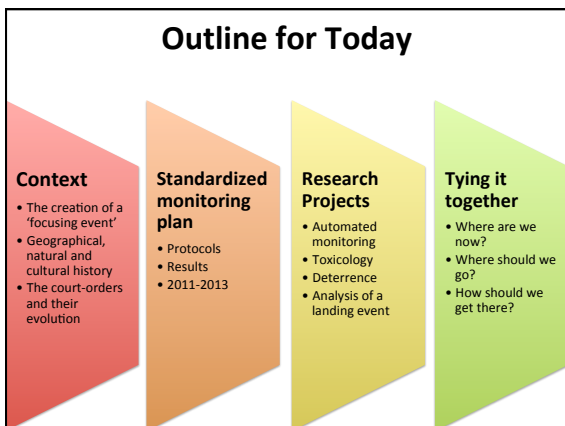


First, thanks to these CORE people...	For....
Sarina Loots, Cindy McCallum, Rob Ronconi	Monitoring program management
Elizabeth Beck, Ffion Cassidy, Sarina Loots	M.Sc. Students and RAPP research leadership
Jeff Ball, Trish Fontaine, Aditya Gangadharan, Patrick Gilhooly, Tom Habib, Julia Jackson	Data management and analysis
Audubon, CBC, Edmonton Journal, Peter Essick, Dave Fairless, Globe and Mail, Greenpeace, Huffington Post, Pembina Institute, NY Times, Northern Journal, Todd Powell, RAPP team, Science Contours, USFW Service, Wikipedia Commons	Photos



When and why did tailings ponds and birds become such a big deal?

1960	1970	1980	1990	2000	2010
		Boag, DA and Lewin, V (1980) Effectiveness of three waterfowl deterrents on natural and polluted ponds. <i>J Wildlife Manag</i> 44: 145-154.		Ronconi RA, St. Clair CC (2006) Efficacy of a radar-activated on-demand system for deterring waterfowl from oil sands tailings ponds. <i>J Appl Ecol</i> 43: 111-119.	Dead ducks debacle



2008 2009 2010 2011 2012 2013

April 28, 2008: 1600 birds die at an oil sands tailings pond

500 ducks suffer a crude death in Alberta

Just five mallard ducks have been rescued from an oily tailings pond, while up to 500 birds have sunk to their deaths in the toxic byproduct of Synthetic Canada Ltd.'s oil-sands operation in northern Alberta.

An estimated 400 to 500 ducks landed on the hydrocarbon-contaminated lake, which is usually surrounded by noise-making cannons to deter migrating waterfowl, but a late weather storm that dumped 50 centimetres of snow in the area obliterated the equipment of the devices this spring, the company said.

"It's definitely unusual circumstances, but they're really sad circumstances and we want to do everything we can to help ensure it doesn't happen again," Synthetic spokesman Alan Moore said Wednesday.

Presentation on the Research on Avian Protection Project, 2010 - 2014

2008 2009 2010 2011 2012 2013

**Mar 1 – 28 April 2010:
A 9-week trial**

Syncrude duck death trial underway
Case could set precedent for tailings-pond operations

Oil sands giant Syncrude returned to court Monday for its trial in the deaths of 1,600 ducks in a northern Alberta tailings pond in April 2008.

Dozens of birds full of blackground materials were stacked on tables and cabinets in the St. Albert, Alta., courtroom. Prosecutors say it could take months to get through the evidence. Two months have been set aside for the trial.

Syncrude is facing charges under federal and provincial laws. The Crown alleges the oil sands operator was negligent and failed in its duty to protect migratory birds.

However, Syncrude lawyer Robert White said the incident was just a mistake.

"There's no question that the settling basin and its contents were the reason that these birds died and there is no question at all but that the settling basin is Syncrude's responsibility and is morally culpable, but they are not guilty of criminal offences," he said.

One of the birds released from an oil sands tailings pond near the Millinery, Alta., was taken to a wildlife rehabilitation center outside Edmonton by rescuers.

Related Stories

- Syncrude trial to start Monday
- Syncrude pleads not

2008 2009 2010 2011 2012 2013

**June 25, 2010:
Conviction on both counts**

Oilsands giant Syncrude found guilty in deaths of 1,600 ducks

Darcy Henton, Edmonton Journal
Published: Friday, June 25, 2010

ST. ALBERT, Alta. — Politicians and environmental activists are applauding a judge's decision Friday to find oilsands giant Syncrude Canada guilty of charges stemming from the deaths of more than 1,600 ducks at a toxic waste pond in northern Alberta.

However, while such critics were accusing government of failing to adequately oversee this country's controversial oilsands operations, a Syncrude lawyer said he was planning to recommend that the company appeal the verdict.

Syncrude was charged with failing to prevent the deaths of 1,600 ducks that landed on the company's 12-square-kilometre tailings, or waste, pond near the Aurora mine north of Fort McMurray, on April 28, 2008.

The incidents was one of the biggest public humiliations Canada's oilsands have suffered: the now infamous "duck incident."

"Syncrude" could have set up its system to place statements sooner and more quickly regardless of the weather that arrived in April of 2008," provincial court Judge Ken Tysvold said Friday as he announced his verdict inside a courtroom outside Edmonton.

"It was reasonable to take those precautions and Syncrude did not."

Syncrude was charged under the Alberta Environmental Protection and Enhancement Act for failing to prevent hazardous substances from coming into contact with wildlife. It was also charged under the federal Migratory Birds Convention Act for depositing a harmful substance in waters or an area frequented by migratory birds.

An oil-soaked American Coot is cleaned by workers from Focus Wildlife Canada at the Wildlife Rehabilitation Society of Edmonton in May 2008.

File photo.
Larry Wang

Email to a friend
Printer friendly

2008 2009 2010 2011 2012 2013

**October 22, 2010:
Sentence announced**

Syncrude to pay \$3M for duck deaths

2010 WINDHOPE
Edmonton—Globe and Mail Update
Published Friday, Oct. 22, 2010 1:03PM EDT
Last updated Wednesday, Oct. 15, 2010 4:57AM EST

An Alberta judge has accepted a bargain struck by prosecutors and oil sands producer Syncrude Canada Ltd. that will see the company pay a \$3-million fine — the largest environmental penalty in Alberta history — after being found guilty of the deaths of 1,600 birds on its tailings ponds two years ago.

Including creation of a research project to advance bird protection

2008 2009 2010 2011 2012 2013

**October 25, 2010:
Another 500 birds die on a tailings pond**

Toxic Syncrude tailings pond kills hundreds more ducks

PATRICK WHITE
From Wednesday's Globe and Mail
Published Tuesday, Oct. 26, 2010 2:43PM EDT
Last updated Monday, Nov. 29, 2010 6:37PM EST

Hundreds of ducks are dead after landing in a toxic Syncrude tailings pond on Monday, igniting yet another public relations disaster for a company and an industry that was slapped with the largest environmental penalty in Alberta court history just three days ago.

An Environmental Focusing Event

1960 1970 1980 1990 2000 2010

Photo by SRD biologist Todd Powell following a tip from a still-anonymous whistle blower

"...focusing events change the dominant issues on the agenda in a policy domain...."

Birkland 1998

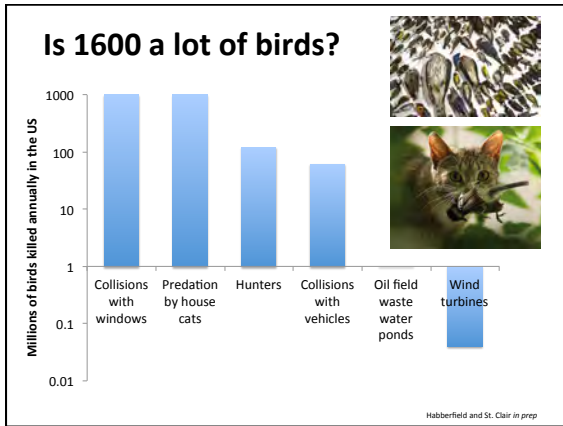
**Dead ducks and dirty oil:
Media representations and environmental solutions**

Timeline of Events with Frequency of Articles by Date

Print Media: 96 articles 1978-2008
747 articles 2008-2011

P. Nelson, N. Krogman, L. Johnston & C. C. St. Clair
In Press: *Society and Natural Resources*

Presentation on the *Research on Avian Protection Project, 2010 - 2014*



The problem with secrecy

The Wilson Journal of Ornithology 122(3):569-576, 2010

ANNUAL BIRD MORTALITY IN THE BITUMEN TAILINGS PONDS IN NORTHEASTERN ALBERTA, CANADA

KEVIN P. TIMONEY^{1,3} AND ROBERT A. RONCONI¹

ABSTRACT—Open pit bitumen extraction is capable of causing mass mortality events of resident and migratory birds. We investigated annual avian mortality in the tailings ponds of the Athabasca tar sands region, in northeastern Alberta, Canada. We analyzed three types of data: government/industry reported mortalities; empirical studies of bird deaths at tailings ponds; and rates of landing, eiling, and mortality to quantify annual bird mortality due to exposure to tailings ponds. All low self-reported data from industry indicate an annual mortality due to tailings pond exposure in northeastern Alberta of 65 birds. The self-reported data were internally inconsistent and appeared to underestimate actual mortality. Scientific data indicate an annual mortality in the range of 458 to 5,029 birds, which represents an unknown fraction of true mortality. (Government/industry monitoring without a statistically valid design, standardized across all facilities, is needed. Systematic monitoring and accurate, timely reporting would provide data useful to all concerned with bird conservation and management in the tar sands region. Received 17 November 2009; Accepted 5 May 2010)

DISCUSSION

Uncertainties in Mortality Estimates.—Bird oilings may peak in August and September rather than in spring (Van Meer and Arner 1985), and it is reasonable to double the spring mortality to derive an annual mortality of ~458 to 1,630 birds.

The problem with a lack of credible monitoring

Colleen's memory of a graph:

There were no standards for monitoring birds; live or dead

Synchrude to ask judge to dismiss all charges
 Hazardous substance stored properly, lawyer
 Darryl Henton, *Edmonton Journal*
 Published: Tuesday, April 27 2010

Synchrude has claimed the snowstorm prevented it from getting bird dissections on its Aurora tailing pond, which is the size of 640 football fields. But employee statements entered into evidence last week suggest the company started deploying the cannons and effluents late in the season and its bird and ecology team was ill-equipped and understaffed and stymied by a series of glitches.

Staff members said they had no boats to deploy rafts with cannons and effluents and only one truck among seven employees to deploy shore cannons and effluents.

While confirmed the company deployed significantly fewer deterrents in 2007 than it had in 2006, but produced substantial statistics showing the incidence of oiled birds also dropped during the spring months of those years.

He said over those eight years only 25 ducks died at Aurora during the spring migration — a ratio of about one duck each month.

But St. Clair questioned the number of dead ducks the company reported and pointed out that Synchrude has no standardized monitoring program in place, despite a recommendation from its own biologists.

She said she thinks the numbers of oiled ducks found on the Synchrude site have been "under-estimated for many years — perhaps dramatically."

St. Clair said in her own review of the data she noticed about half the ducks were found near buildings rather than along the shores of the 12-square-kilometre basin, making it unlikely they were the only birds to die from contact with toxic tailings.

"We cannot necessarily be sure that these numbers represent a comprehensive one around that point or any other," she said under re-examination by the *Edmonton Journal*.

© Edmonton Journal 2010

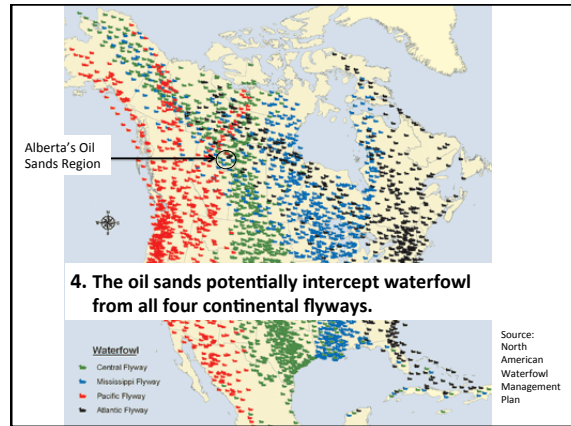
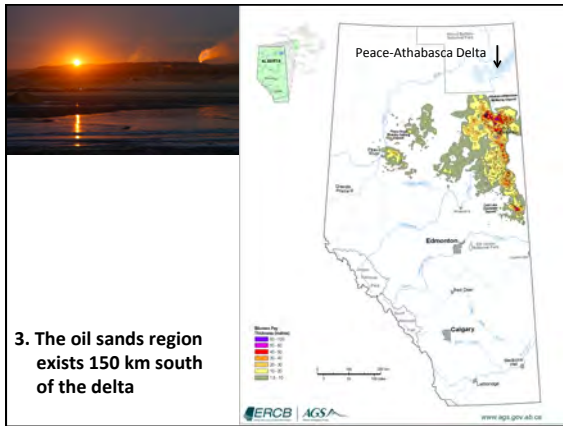
Why does it matter?

Ten facts set this stage; only one of them is a big problem

1. The Peace-Athabasca Delta is an important bird area; the 2nd largest FW delta in the world

2. The delta stages over a million birds annually

Gary Kramer, USFWS



8. But birds habituate to deterrents readily, which means that...

9. ...it is likely impossible to prevent landings completely on large ponds.

10. We pretend it isn't so

Creation of a 'creative sentence'

March April May June **Summer** October

David G. Myral & Ronald M. Kruhlak
Chairs of the Occupational Health & Safety and Energy, Environmental & Regulatory Practice Groups.

Federal Crown prosecutor Kent Brown and provincial Crown prosecutor Susan Mallory speak with reporters outside the St. Albert, Alta., courthouse. (CBC)

RAPP
 Research on Avian Protection Project





RAPP Advisory Committee

Darrell Martindale (Shell Canada); Joel Ingram (Environment Canada)
 John Guley (Golder Associates); Dave Fairless (Alberta Env & SRD)

RAPP's Court Orders:
Increase Bird Protection in the Oil Sands Region

- Review the literature
- Support standardized monitoring program
- Conduct field experiments
- Recommend best practices

RAPP's Court Orders:
Increase Bird Protection in the Oil Sands Region

-  Review the literature
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-  Conduct field experiments
-  Recommend best practices

Historical and industry-based literature
Originally compiled by Rob Ronconi and refined by Julia Jackson

Blokpoel H, Burton J (1973) Weather and height of nocturnal migration in east central Alberta: a radar study. *Bird Banding* 46: 311-328.





Many bird species preferentially migrate at night. Determined the range in altitude of migrating birds using radar at Cold Lake, Alberta. Weather was found to drastically affect the altitude that birds fly at. Birds usually flew low if clouds were present. If no clouds were present, then birds flew at altitudes that offered ideal wind conditions.

Boag DA, Lewin V (1980) Effectiveness of three waterfowl deterrents on natural and polluted ponds. *J Wildlife Manag* 44: 145-154.

Tested the effectiveness of three visual floating deterrent types for deterring birds from landing on small natural ponds. Out of the three deterrents tested, the human effigy was found to be the most effective.

Butterworth E, Leach A, Gendron M, Pollard B, and Stewart GR (2002) Peace-Athabasca Delta waterbird inventory program: 1998–2001 final report. *Ducks Unlimited Canada*. Edmonton, Alberta, Canada.

RAPP's Court Orders

-  Review the literature
-  Support standardized monitoring program
-  Conduct field experiments
-  Recommend best practices

Government of Alberta
 Environment

Office of Trade Matters
 50 Place du Commerce
 2nd Floor
 Edmonton, Alberta T6C 2G8
 Telephone: (780) 427-9878
 Fax: (780) 427-9881
 env@alberta.ca

448 42270

November 5, 2010

See Attached Distribution List


Further to meetings held in September 2010 between oil sands mining operators and staff from Alberta Environment and Sustainable Resource Development, I am writing you regarding the effectiveness of bird deterrent systems deployed in the oil sands area.

These meetings clearly identified that there is a significant disparity in the bird deterrent and monitoring methods currently being employed by industry. As such, there is a clear need to assess the adequacy of bird deterrent and monitoring systems currently being used. This need is accentuated by recent avian mortality incidents at oil sands operations.

It is critical that the actions discussed at these meetings be implemented as soon as possible in advance of the 2011 bird migration season. We will therefore be holding follow-up meetings with the intent of finalizing all plans as soon as possible.

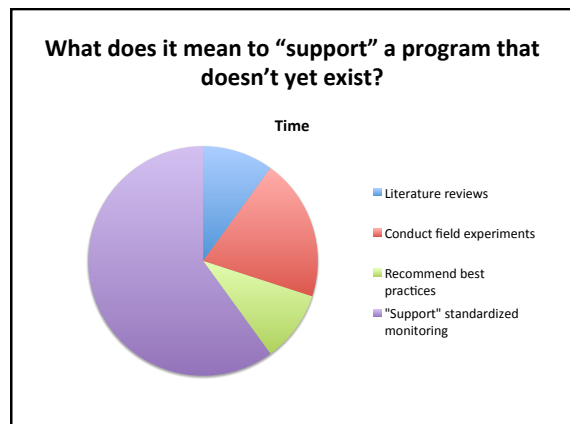
As with other safety-related technology, it is clear that collaboration between industry in consultation with the Government of Alberta, can result in workable systems to deal with this crucial issue.

Should you have any questions please contact me directly.

Sincerely,

 Amy Ellis
 Deputy Minister

Highlights added by Colleen

Why hasn't the government taken a more active role in bird (and other environmental) protection in Canada's largest industry?

**Review of Alberta Environment
2009 Compliance Inspection Reports and
Avian Deterrence in the Oil Sands Region**

Prepared for:
Alberta Environment
Environmental Management/Northern
Compliance
9915 Franklin Ave., Box 21
6th Floor Provincial Building
Fort McMurray, AB
T9H 2K4

October 2009


Prepared by:
Colleen Cassidy St. Clair
Department of Biological Sciences
University of Alberta
Edmonton, AB, T6G 2E9

&

Robert A. Ronconi
Life Science Centre
Dalhousie University
Halifax, NS, B3H 4J1


**The origins of a
pond inventory
and a standardized
monitoring
program**

2011: Facilitate Dialogue



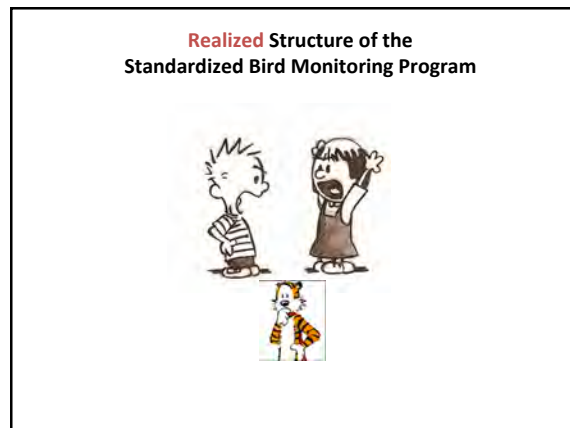
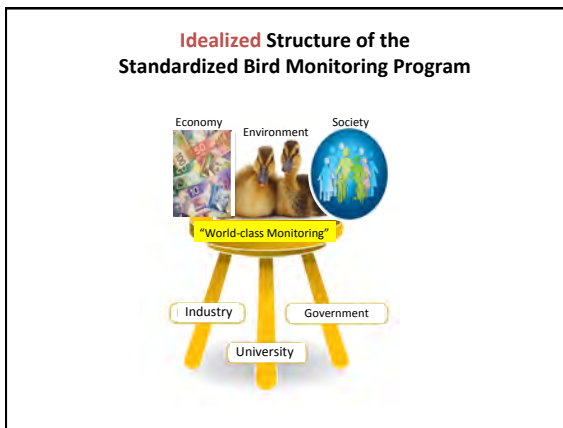
Oil Sands Bird Contact Monitoring Plan for 2011

Prepared for:
Albian Sands Energy Ltd., Calgary, AB
Canadian Natural Resources Limited, Calgary, AB
Imperial Oil, Calgary, AB
Suncor Energy Inc., Calgary, AB
Synchrude Canada Ltd., Fort McMurray, AB



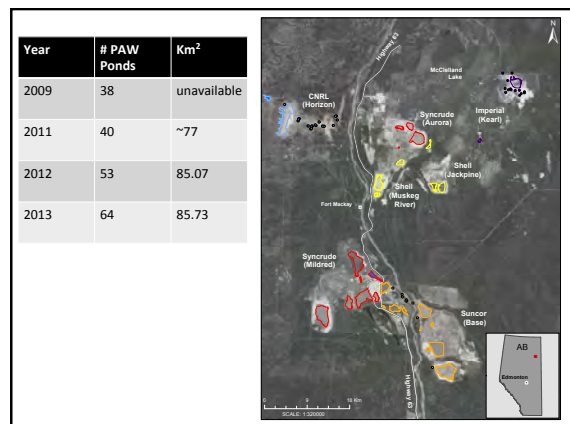
FINAL REPORT: 16 March 2011

Prepared by:
Robert A. Ronconi
Department of Biology
Acadia University
Wolfville, NS B4P 2R6




Monitoring Plan Objectives

1. Provide an estimate of bird contacts and mortalities on ponds containing process-affected waters;
2. Provide an estimate of bird contacts on ponds containing fresh water;
3. Develop a standardized monitoring program for all oil sands mine operations to provide comparable data across ponds, sites, seasons, and years;
4. Identify species at risk that have been affected through contact on ponds containing process-affected waters, and
5. Provide direction on adaptive management for long-term monitoring and bird deterrent programs.



Presentation on the Research on Avian Protection Project, 2010 - 2014

Industry	Government	U of A
<p>CNRL: Cal Duane, Joanne Hogg, and Sarah Robertson</p> <p>Imperial: Hanna Janzen, Rachel Nobel-Pattison, and Sherry Nugent (Imperial);</p> <p>Shell: Chelsea Hoff, Paul Knaga, Fred Kuzmic, and Darrell Martindale (Shell);</p> <p>Suncor: Bruce Anderson, Christine Lambert, and Josh Martin (Suncor);</p> <p>Synchrude: Courtney Drover, Steve Gaudet, and Jamie Sullivan</p> <p>Dozens of employees and contractors</p>	<p>Alberta: Michael Aiton, Randall Barrett, Pat Marriott, Andrea McGregor, Sarah McLean, Tanya Richens, Joann Skilnick, Kelly Williams</p> <p>Canada: Joel Ingram and Richard Wlaciec</p> 	<p>Graduate students: Elizabeth Beck, Ffion Cassidy, and Sarina Loots</p> <p>Technicians: Jeff Ball, Aditya Gangadharan, Chris Godwin-Sheppard, John Brzustowski, Trish Fontaine, Patrick Gilhooly, Tom Habib, Cindy McCallum, Bryan Shore, and Donnette Thayer.</p> <p>UG Students: James Koether, Victoria Lemmons, Stephan Pacholok,</p> <p>Research Assistants: Fauve Blanchard, Amanda Brown, Katrina Burrows, Alicia Cappello, Allison Dunlop, Amy Field, Neil Foley, Michelle Fornier, Lindsay Howes, Julia Jackson, Steven Pasichnuk, Tobias Tan, Nicole Woodman, and Sarah Yuckin Tyana Rudolfsen, Sierra Sullivan and Carissa Wasyliv</p>

It took a lot of people to get this done!						
	CNRL	Imperial	Shell	Suncor	Synchrude	
Bird Monitors	Ken Foster Christie Godwin-Sheppard Gabrielle Coulombe Lucie Parker Priscilla Lai Emily B Jenny A Jillian Johnston	Simon Hall, Leslie Hunt Crystal Adamek, Alex Dings Adria Snowdon, Ben Thivierge Hatem Hamdi, Ian Savoy, Jon Beresford, Maya Krohman, Allison Barron Amanda Geiger Abdi Nur Craig Ibbotson Danielle Byrtus Eden Harris Ian Buchwald Kayla Willis Olga Palomino Rezeena Khan Serafina Dalla-Longa	Felicia Jauffé Marika van der Pol Alysha Hile Michelle Brake Tim Rowe Scott Moffat William Van Der Weide Alexa McShail Serafina Dalla-Longa	Maya Cronner Penny Denehaveous Mike McNeil Michelle Brake Amanda Geiger Rezeena Khan Janna Lutz Erin MacDonnell Fiona Tse Jessica Cogswell Jonathan Brenner Mohamed Mohamed Maria Siruno Ola Oluwatoshin Kayla Willis	Kyle Lawson Jim Smith Liz Blum Natasha Robinson Jay Pandoz Eric Eustergerling Mayja Walsh Jonathan Donahue Taro Iwuru Uche Okoronkwo Carla Webb Addie Green Devon Lane	
Mortality Searches	BL, CR CT, DA DL, IS JH, LB	Not available	Brett McComber Troy McComber Matthew Courtenay John H, Ed G Teaira Y, Brad M	Dana Sharp Nicole Woloszyn Jonathan Brenner Steve Benoit Jay Mallard Billy Ayeres, and 15 other individuals	47 individuals	
Management	Calvin Duane Joanne Hogg Richard Kavanagh Peter Streight Sarah Robertson	Sherry Nugent Rachel Noble-Pattinson Justin Krisko Kavanaugh Harold Funk Jim Cifrusz Chad Colish Kelly Group Dean Starblanket	Fred Kuzmic Paul Knaga Chebbie Hoff Nikki Colton	Calvin Duane Joanne Hogg Richard Kavanagh Peter Streight Sarah Robertson	Steve Gaudett Jamie Sullivan Tonya White	

Monitoring Protocol Components



Bird Surveys




Mortality Searches



Incidental observations

Live Observation Protocol

- Where?
- How long?
- How often?
- What to record?
- How much detail?
- How is data entered?
- How trained?
- How is data quality-checked, standardized, analyzed, reported?



Mortality Search Protocol

- Where?
- What transportation method?
- How is effort measured?
- What is recorded?
- How is search effort standardized?
- How is detectability estimated?


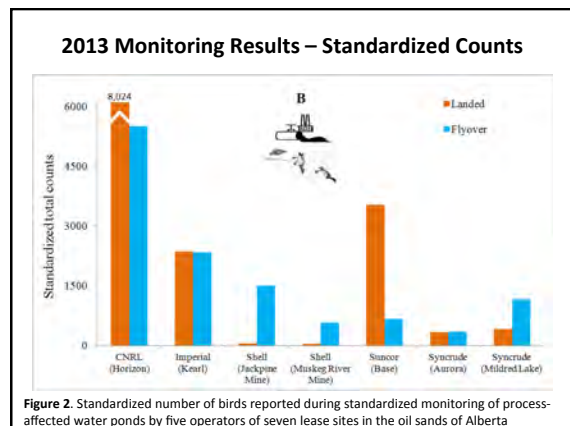
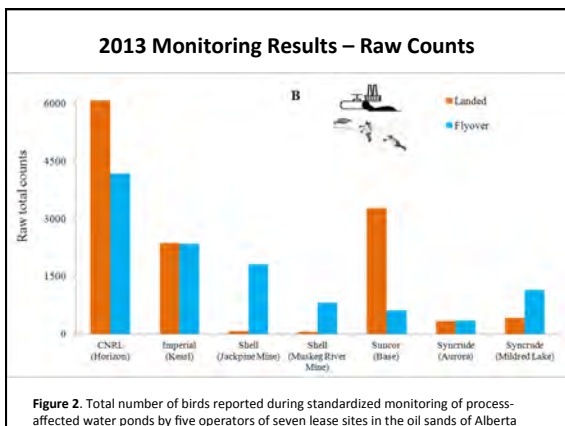
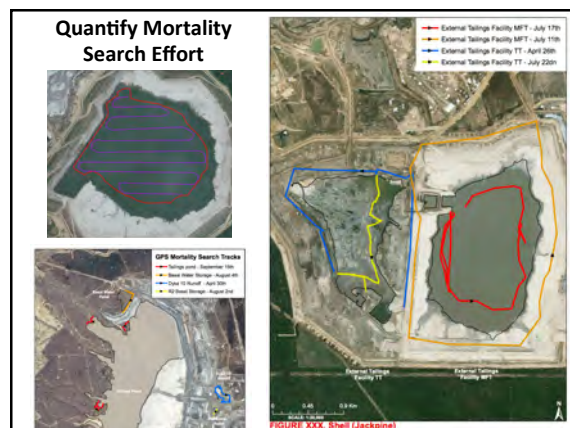
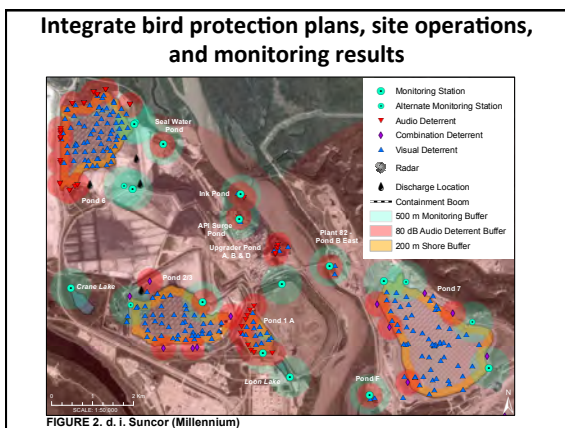
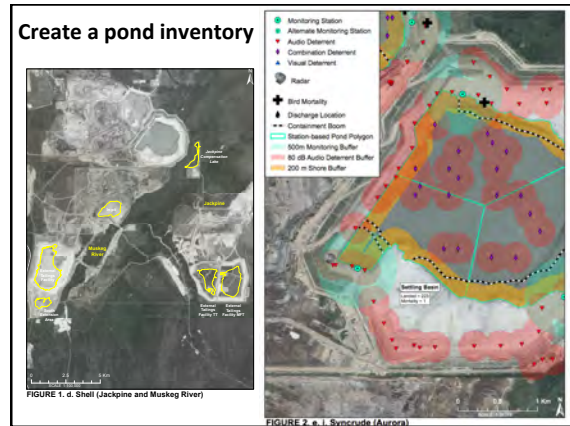


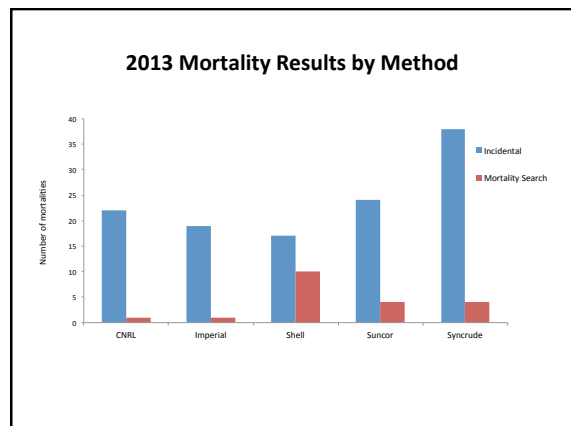
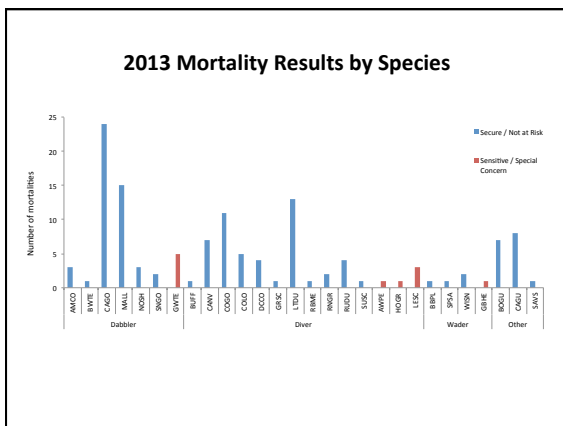
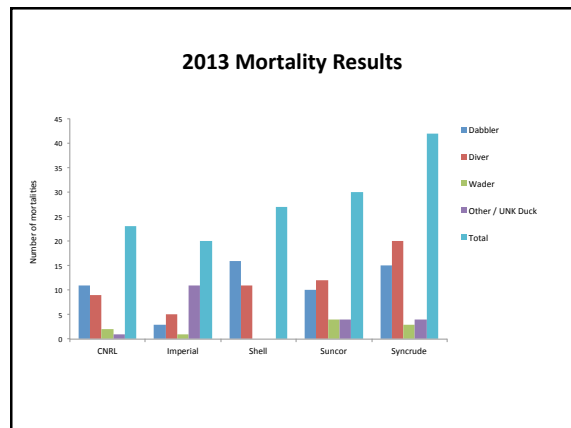
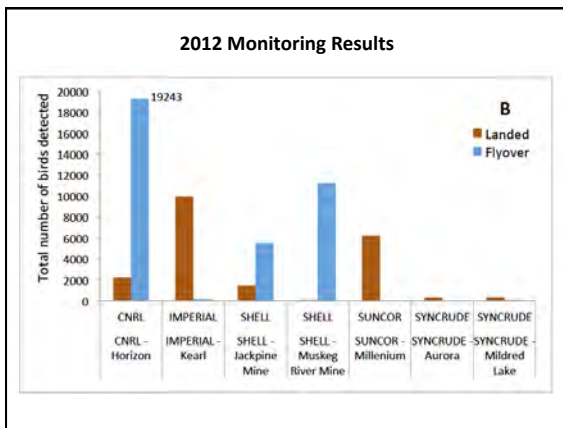
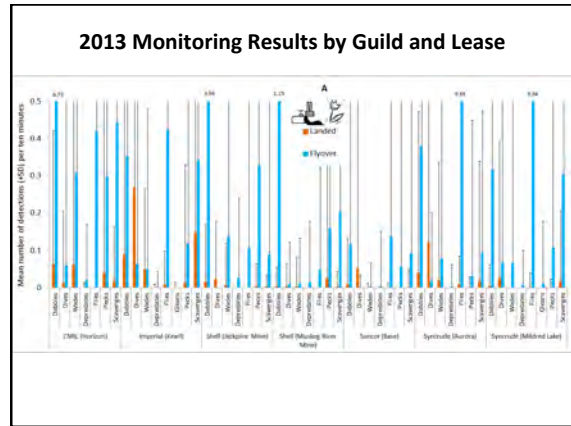
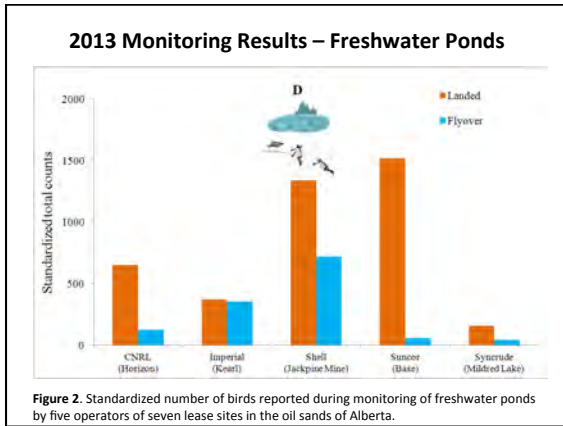
Table 4.1. Summary of changes to the Oil Sands Bird Contact Monitoring Program between 2011 and 2014.

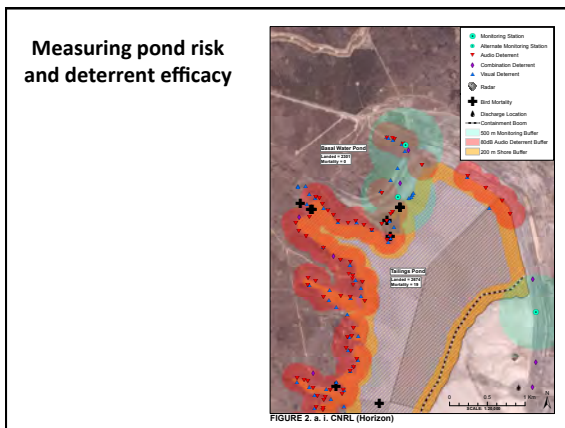
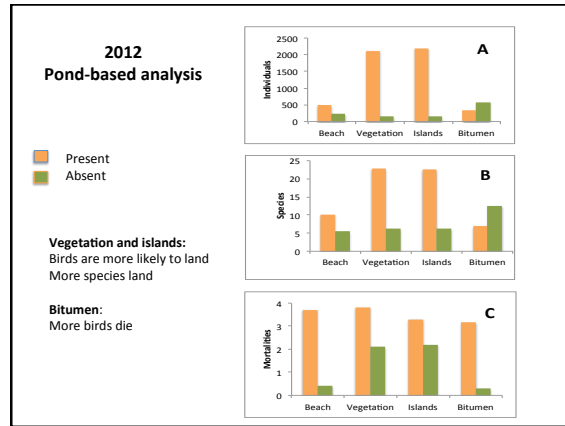
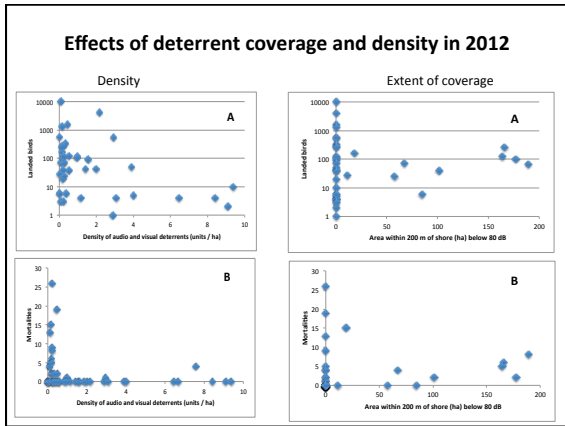
Topic	2011 Protocol	2012 Protocol	2013 Protocol	2014 Protocol
Survey stations	Allocate survey stations in relation to pond size and place them, when possible, at equidistant intervals on pond perimeters.	Increase the standardization of survey stations, last year's stations sometimes floated around the pond.	Designate permanent survey stations and mark them with barcodes; designate alternate stations when access is prevented.	Increase the permanence of survey markers where necessary and continue to use barcodes which have standardized station positions.
Training	Companies undertook all training of observers; at some lease sites, personnel were responsible for both training and observation.	Require that observers are trained in bird identification and do not have simultaneous responsibilities to lease holders.	Optional attendance at a webinar of ~ 3 h offered by U of A; in April, the number of observers in attendance differed by operator.	U of A made the 2013 webinar available for use by all operators.
Measurement of inter-observer variation	Incidental assessment of inter-observer variation occurred at Shell's site owing to simultaneous work there by U of A and industry observers. Enormous differences also occurred among operators that could not be explained by geography alone (e.g., species that were highly abundant at one site and	U of A initiated a study of inter-observer variation by visiting lease sites, traveling with industry observers, and conducting simultaneous, but independent surveys. U of A and Shell participated in the study in Spring and Fall, CNRL joined in Fall. Such visits were not conducted at Suncor.	U of A observers visited the lease sites of all five oil sands companies multiple times in each of the spring and fall migration seasons. These data will be examined in detail to provide guidance on minimizing variation among observers and to estimate detectability functions.	In 2014, one day a week may be devoted to "Comparison Days" for the purposes of training new observers, standardizing performance among observers, collecting information about protocol standardization, or compensating for missed monitoring days. Details are provided under bird surveys.

Visits by U of A observers 2011 (Shell), 2012, 2013 (all)

- Experience with protocol on site
- Separate observer from site effects
- Share knowledge
- Build effective, collaborative program

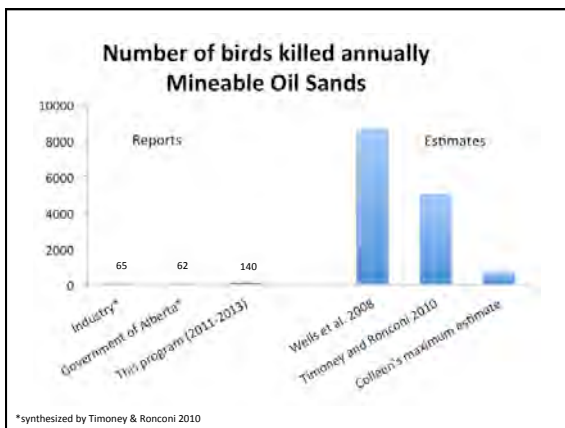






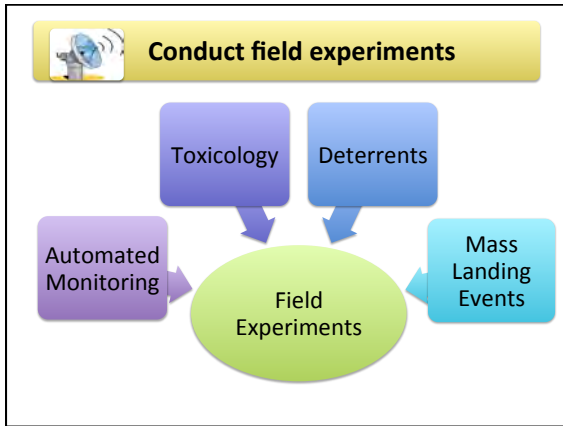
Compare pond attributes, deterrent effort and landing / mortality results

Operator and pond name	Pond characteristics			Number and area of survey stations						Distance (m) from river to pond		
	Origin	Bitumen	Type	Area	Primary	Secondary	Water	Shore	Total	Per_June	Control	Edge
CNRL West Water Pond	2011	NO	PA	10.2	1	0	115	0	115	0.12	14121.0	14121.0
CNRL East Water Pond	2008	NO	PA	11.0	1	0	115	0	115	0.10	3006.0	3006.0
CNRL West Oil Refinery	2009	NO	PA	4.0	1	0	73	0	73	0.1	1025.0	1025.0
CNRL Emergency Dump 1	2009	YES	PA	0.2	1	0	0	0	0	0.1	1201.0	7827.2
CNRL Emergency Dump 2	2009	YES	PA	0.2	1	0	0	0	0	0.1	1201.0	7730.6
CNRL Emergency Dump 3	2011	YES	PA	0.2	1	0	0	0	0	0.1	1201.0	7811.2
CNRL Ammonia Dump	2008	NO	PA	1.0	1	0	11	0	11	0.1	5424.0	5424.0
CNRL Mine Dump	2008	NO	PA	1.0	1	0	11	0	11	0.1	3080.0	4984.0
CNRL Mine Dump	2008	YES	PA	1.0	1	0	11	0	11	0.1	3017.0	7961.0
CNRL Mine Dump	2009	YES	PA	0.2	1	0	11	0	11	0.1	8910.0	8420.0
CNRL S1 Emergency Dump	2008	YES	PA	0.2	1	0	0	0	0	0.1	1401.0	6774.0
CNRL S2 Sulfur Dump	2009	NO	PA	1.0	1	0	11	0	11	0.1	1001.0	1001.0
CNRL S3 Emergency Dump	2008	NO	PA	0.2	1	0	0	0	0	0.1	1201.0	10641.0
CNRL S4 Sulfur Dump	2008	YES	PA	0.2	1	0	0	0	0	0.1	1201.0	6947.0
CNRL S5 Sulfur Dump	2008	YES	PA	0.2	1	0	0	0	0	0.1	1201.0	5250.0
CNRL Steam Water	2008	NO	PA	1.0	1	0	0	0	0	0.1	1101.0	1043.0
CNRL Sulfur Refinery	2008	NO	PA	10.0	1	0	73	0	73	0.1	2410.0	2410.0
CNRL Sulfur Refinery	2008	YES	PA	10.0	1	0	94	0	94	0.1	1451.0	1451.0
Imperial Ammonia Refining Plant	2011	NO	PA	10.0	1	0	105	0	105	0.1	2824.0	2824.0
Imperial West Water Treatment	2011	NO	PA	0.4	1	0	0	0	0	0.1	1001.0	1001.0
Imperial Ammonia Refining Refinery	2011	YES	PA	0.4	1	0	0	0	0	0.1	1001.0	3021.0
Imperial North Refinery	2011	NO	PA	1.0	1	0	11	0	11	0.1	2970.0	2970.0
Imperial Ammonia Transport 1	2011	YES	PA	0.1	1	0	0	0	0	0.1	2701.0	2701.0
Imperial Ammonia Transport 2	2011	YES	PA	0.1	1	0	0	0	0	0.1	2601.0	2601.0
Imperial H2S Refinery	2011	NO	PA	1.0	1	0	11	0	11	0.1	1001.0	1001.0
Imperial SPS Refinery	2011	NO	PA	0.1	1	0	0	0	0	0.1	2711.0	2711.0
Imperial H2S Refinery	2011	YES	PA	1.0	1	0	11	0	11	0.1	1001.0	1001.0



RAPP's Court Orders

- Review the literature
- Support standardized monitoring program
- Conduct field experiments
- Recommend best practices



Field experiments: Automated Monitoring

Sarina Loots

- Cameras can detect birds comparably to industry observers to 500 m; automated analysis can halve analysis time
- Marine radar detects only 2/3 of the birds detected by people; accuracy is affected by antenna type, installation height, substrate, and bird behavior

Field experiments: Toxicology

Elizabeth Beck

- Literature identifies many potential effects of PA water, virtually no tests of ecologically-realistic exposure
- Domestic ducks exposed to PAW show few health effects; vanadium was higher in treated birds

Field experiments: Deterrence

Ffion Cassidy (M.Sc.)

- Visual deterrents may provide effective supplements to audio; multi-modal, ecological relevance and motion are assets
- Effect of lasers appears to vary by laser colour, season, foraging guild, and bird sex-age class

Field experiments: mass landings

- October 2010 Landing Event
- 6 / 21 dangerous ponds with dead birds
- "Natural experiment"
- GofA asked:**
- Could increased deterrents have prevented it?

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Toxic Syncrude tailings pond kills hundreds more ducks

PATRICIA WRIGHT
From Wednesday's Globe and Mail
Published Tuesday, Oct. 26, 2010 2:43PM EST
Last updated Monday, Nov. 26, 2010 4:37PM EST

468 comments 125 tweets 1 recommendation

Hundreds of ducks are dead after landing in a toxic Syncrude tailings pond on Monday, giving yet another public-relations disaster for a company and an industry that was slapped with the largest environmental penalty in Alberta court history just three days ago.

How do you compare deterrent effort when acoustic intensity varies?

- Acoustic cannons
- Phoenix wailers
- Hyperspikes
- LRADs

120 dB

156 dB

LRAD Noise Device
They say it will blow out your ear drums.

A standard for comparing range of acoustic deterrents

120 dB

156 dB

With recommended spacing of 400 m (Golder 2000), cannons provide an 80 dB stimulus; The sound law predicts LRAD's maintain > 80 dB for 6.5 km

80 dB sound intensity provides a reasonable benchmark for acoustic deterrent coverage

LRAD stimulus reaches several km into adjacent forest at 80 dB

Many dead best predicted by shoreline below 80 dB combined with distance to river

But then, why these?

Analysis: Logistic regression comparing 3 ponds with many dead birds to 18 dangerous ponds without mortalities

Some correlated facts: Mortalities within ponds were

- Usually < 100 m from shore
- Downwind sides
- near anthropogenic lights (6/21; 15 unknown)

Mortalities

Deterrents

Suncor base operations

Light stations

Some facts about anthropogenic light

- Attracts most vertebrates
- Appears to interfere with UV cones and magnetic navigation
- Appears to disorient and trap nocturnal migrants

Directional orientation of birds is compromised by yellow and red light, which all white light contains
Wiltshcko et al. 2010

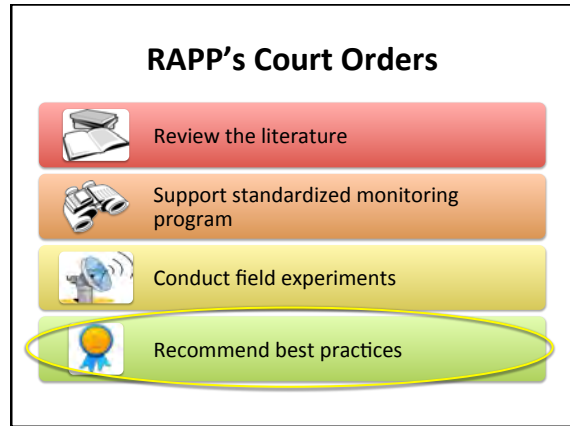
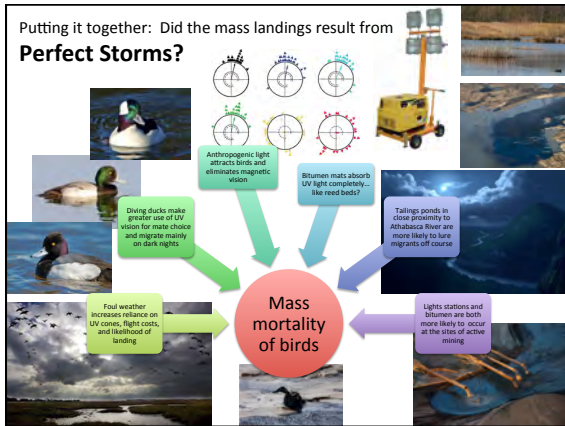
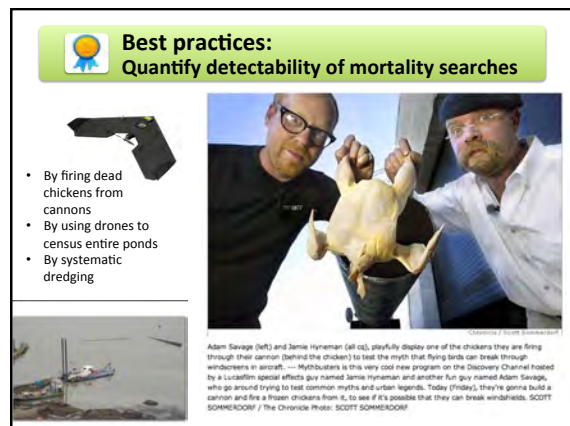
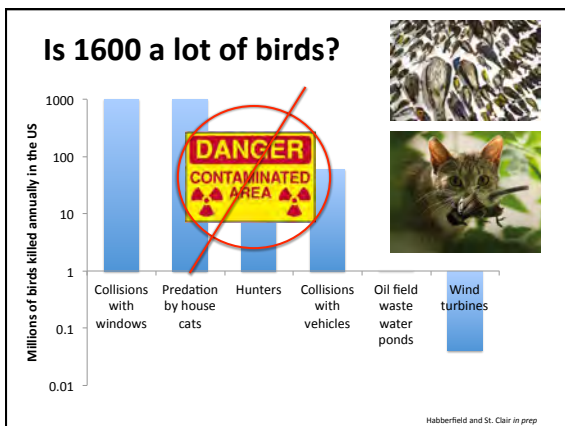


Table 12.1. Perceptions expressed at the outset of RAPP, information collected by RAPP that bears on those perceptions, and recommendations stemming from that information for future operational changes by the mineable oil sands industry.

Perceptions	RAPP Information	Developmental Recommendations
1. Mass landings happen rarely and cannot be predicted.	The three known landing events suggest that foul weather, darkness, proximity to a migratory corridor and the presence of anthropogenic light in the vicinity of bitumen can increase the likelihood of mass mortality events (Chapter 2).	a. Continue to combine information from the literature, media reports of mass landings by birds elsewhere, and data from the standardized monitoring program to refine and test the hypotheses in the report on the Oct 2010 landing event. b. If they are supported, develop procedures specific to storm events during migratory seasons. Adjustments could include: <ul style="list-style-type: none"> Attraction to safer areas within ponds via decoys, Heightened deterrence in the vicinity of bitumen, Turning off, shielding or colour manipulation of lights in the vicinity of bitumen.
2. The news media provides diverse and balanced information about tailings ponds.	News reports associated with the mass landing and mortality events in the oil sands emphasized technological solutions and the dichotomous views of government, industry, and one environmental group. Little voice was given to members of a wider public (Chapter 3).	a. Ensure monitoring is rigorous, comparable, and spatially explicit and that its results are transparent and publicly accessible. b. Use that information to improve and defend deterrent practices. c. Share both kinds of information to inform a diverse public about bird protection in the oil sands and its complexity.
3. No one is accurately counting the birds that land or die.	Development of a standardized monitoring program over the past three years provides rigorous, transparent, and defensible information about the rates of	a. Continue to support the standardized monitoring program with a goal of increasing its efficiency to minimize costs while maintaining the quality and comparability of information over time.



Best practices: Ask tough questions

How the gun feels
This danger to the animals. The more powerful the sound!

Should LRADs be used in the midst of the boreal forest?

Should corporations alone determine methods of 'bird protection'? Should they be obliged to provide peer-reviewed tests?

Should LRADs be used in the midst of the boreal forest?

What are the net ecological effects of bird deterrent systems?

Best practices: Curb noise pollution

NEWS SCIENCE & ENVIRONMENT

Traffic noise driving songbirds to the limit in cities

By Mark Kelner

17 March 2013 10:00 AM GMT+01:00

The rising level of noise in urban areas may be preventing some species of songbirds from nesting in houses in developed areas, a study has concluded.

Canadian researchers found that noisy neighbourhoods reduced the nest temperatures of all bird species, affecting the way some species communicated.

Unable to hear all elements of a song, females could perceive singing males as if they were nearby, they added.

The findings were first published in the *Journal of Great Lakes Research*.

"These birds seem to be growing stressed in attempting to overcome the loudness of songbirds in other areas," explained Dr. Jeffrey D. Fisher.

"In the future, we hope that these areas have better high levels of anthropogenic noise, other areas, such as finding the noise in urban areas."

Proppé, St. Clair, Sturdy (2013) *Global Change Biology*

Best practices: Supplement Sound with Sight

Best practices: Segregate bitumen

Best practices: Tailor deterrence effort to bird risk

Best practices: Manipulate attraction

Best practices: Achieve "3D" by Integrating detection, deterrence, and deflection

Best practices: Support the right principles

Summary of Today

Context

- This has gone on for a long time and lots of people knew, even if they didn't talk about it

Supporting a standardized monitoring plan

- The data are clear: A lot of birds land, which is inconsistent with existing law, but not many die

Related research

- We know enough already to try new things and improve the situation with win-win-win solutions

Tying it all together

- It'll take engagement by society, transparency by government, collaboration by industry to make that happen

For Thank you	
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Collaboration	Academics: Erin Bayne, Naomi Krogman, Rob Ronconi, Judit Smits, Phil Taylor, Keith Tierney, Hong Zhang Industry: CNRL, Imperial Oil, Shell Canada, Suncor, Syncrude
Co-Investigation	M.Sc. Students: Elizabeth Beck, Ffion Cassidy, Sarina Loots UG Project Students: Jolyn Kozar, Seann Murdock, Steve Pasichnuk, Stephan Paxon, Sierra Sullivan, Patrick Walsh Associates: Jeff Ball, John Bruztowski, Trish Fontaine, Aditya Gangadharan, Patrick Gilhooly, Thomas Habib, Cindy McCallum, Donnette Thayer
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Support	Regulatory: Michael Atton, Randall Barrett, Pat Marriott, Andrea McGregor, Sarah McLean, Tanya Richens, Joann Skilnick, Kelly Williams (all Govt of Alberta); Joel Ingram, Bill McMurty, Samantha Song, Richard Wiacek (all Govt of Canada) Logistical: Lewyk Camp provided free camping, power, and water 2011-2013 RAPP Advisory Committee: Dave Fairless, John Gulley, Joel Ingram, Darrell Martindale,