

# **2014 Protocol**

## **Oil Sands Bird Contact Monitoring Program**

### **(OSBCMP)**

**Colleen Cassady St. Clair, Sarina Loots, and Robert A. Ronconi**



Department of Biological Sciences  
University of Alberta

Prepared for use by :

Shell Canada Energy Ltd., Calgary, AB  
Canadian Natural Resources Ltd, Calgary, AB  
Imperial Oil Ltd, Calgary, AB  
Suncor Energy Inc., Calgary, AB  
Syncrude Canada Ltd., Fort McMurray, AB

Under the regulatory requirements of  
Alberta Environment and Sustainable Resource Development

**1 April 2014**

## Table of Contents

Preface.....	4
Summary of Changes to the 2014 OSBCMP Plan.....	5
Introduction.....	9
Origin of the Oil Sands Bird Contact Monitoring Program.....	9
Purpose.....	10
Objectives.....	10
Scope.....	10
Regulatory Framework.....	11
Responsibilities.....	12
Reporting Requirements.....	14
Operational Constraints.....	15
Materials and Methods.....	15
Bird Survey.....	15
Mortality Search.....	16
Related Documents.....	16
Monitoring Protocols.....	18
Setup.....	18
Bird Surveys (2014 Bird Survey Form).....	24
Mortality Searches (2014 Mortality Search Form).....	29
Incidental Observations (2014 Incidental Observation Form).....	33
Species At Risk.....	35

Procedural Standards .....	36
Recommendations for future adjustments to the OSBCMP .....	39
Protect past investment in the OSBCMP .....	39
Determine detectability of live bird surveys for each pond and station .....	40
Determine the detectability and representativeness of mortality searches .....	40
Address the standardization of bird protection via deterrence .....	41
Engage the Public .....	41
Bibliography .....	43
Additional Resources .....	46
Tablet Forms .....	46
Training seminar .....	46
Appendix A. Attributes of species detected in the 2013 OSBCMP .....	46
Appendix B. Summary of listings for species at risk.....	46

## Preface

The Oil Sands Bird Contact Monitoring Program has evolved rapidly between 2011 and 2013 to provide a rigorous measure of bird contact with process-affected water ponds in the minable oil sands. The program makes it possible to compare, for the first time, data among ponds, seasons and lease sites. These data have revealed that tens of thousands of birds land on process-affected ponds annually, but very few (< 1%) appear to die as a result.

The data on landings have been quantified with extensive measurement of inter-observer variability and will be defensible in scientific and public arenas. The data on mortalities are considerably less standardized to date, owing mainly to the challenging operational constraints involved in collecting these data. Standardizing these data to ensure that they are both representative and comparable among sites and years should be a priority for the program and suggestions for achieving that are contained at the end of this document along with a few other recommendations.

The program will enter a new era in 2014 with the end of the involvement by U of A researchers that was mandated by a court order emanating from *R. vs. Syncrude*. Although we have played a leading role in the development and refinement of this monitoring plan, many others provided ideas and reviews. We are especially grateful to the following individuals:

*Government of Alberta:* Michael Aiton, Randall Barrett, Pat Marriott, Andrea McGregor, Sarah McLean, Tanya Richens, Joann Skilnick, Kelly Williams;

*Government of Canada:* Joel Ingram, Richard Wiacek

*Industry:* Calvin Duane, Joanne Hogg, Sarah Robertson (CNRL); Hannah Janzen, Rachel Nobel-Patterson, Sherry Nugent (Imperial); Chelsie Hoff, Paul Knaga, Fred Kuzmic (Shell); Bruce Anderson, Christine Lambert, Josh Martin (Suncor); Courtney Drover, Steve Gaudet (Syncrude)

*University of Alberta:* Neil Foley, Julia Jackson, Cindy McCallum

As plan authors, we are happy to offer this final protocol to support a new era of bird monitoring in the oil sands region, one in which the industry is poised to become globally recognized for its innovative, collaborative, and comprehensive approach to bird monitoring and protection in the context of industrial activity.

## Summary of Changes to the 2014 OSBCMP Plan

Topic	2013 Protocol	2014 Protocol
Survey stations	Designate permanent survey stations and mark them with barcodes	Increase the permanence of survey markers where necessary and continue to use barcodes
Training	Optional attendance at a webinar offered by U of A in April; amount of attendance differed by operator	U of A is to provide a condensed webinar similar to last year, but with a shorter section on bird ID; details are contained under responsibilities.
Measurement of inter-observer variation	U of A observers visited all sites several times during each of spring and fall	In 2014, one day a week may be devoted to 'Comparison Days' for the purposes of training new observers, standardizing performance among observers, collating information about protocol standardization, or compensating for missed monitoring days. Details are provided under bird surveys.
Equipment	Ensure quality equipment is available: spotting scope, binoculars, range finder, tripod, tablet	Operators are to ensure that spotting scopes are used and mounted appropriately on tripods or window mounts at stations monitoring to 500 m
Pond inclusion	Monitor all ponds that were included in previous protocols	Operators have the option of dropping from the daily monitoring program small ponds (< 1.5 ha) that recorded no landings or mortalities; detailed criteria are contained under procedural standards.
Recording of pond	Provide a description of pond characteristics for each of	Operators are to use the maps produced by U of A in 2013 to record

characteristics	vegetation, islands, beach, and bitumen as an estimate to the nearest quartile	the same pond characteristics, but in association with each survey station (i.e., up to four times per pond). Information for the recording of anthropogenic light may follow in 2013 or beyond.
Beach areas	Survey area includes the water, shore that could be reached at any time of the year by changing water levels and air below 100 m within a 500 m radius of the survey station.	Measure the distance between the survey station and (a) the current waterline and (b) the high-water mark for each of 3 directions on approximately May 1 and September 1 each year.
Bird inclusion	Include birds that contact the shore area	Distinguish the landing location of birds as being (a) on water or (b) between the current waterline and the high-water mark and whether that area is wet or dry at the time of detection. The high water mark includes any area with visible bitumen or water residue.
Requirements for single observers	If there is a single observer who is also recording data, there <b>must</b> be a system to ensure standardization of observation time at either 10 or 30 minutes. Compensation systems could include use of a voice recorder or stopping the observation clock whenever data recording is occurring.	Use a new function on the tablet forms that stops the scan clock when single observers are looking at their tablets. Recording on tablets in real time is needed to support this function and a field for total elapsed scan times has been added to tablet forms.
Species at risk	Do not report birds that are only heard as part of the bird	Continue to emphasize species at risk in training and incidental recording

	surveys. Report species at risk that are heard in any location as an incidental observation.	and use all available cues (i.e. including sound) to identify species at risk.
Fly-overs	Report only those flyovers that occur within 100 m immediately above survey stations.	Continue use of this threshold, but provide height references during training. Operators may provide additional information about flight patterns if desired as part of their comparison day work.
Mortality searches	Conduct mortality searches at each process-affected pond once every 2 weeks. Plan a survey route and record the route that was completed.	Standardize the three forms of mortality searches now taking place and conduct each type of search at least every two weeks. Detailed information is contained under mortality searches.
Mortality reports	Record mortalities in a separate database via computer following collection of field notes	Require use of standardized forms for each search type; homogenize the provincial and protocol requirements as per protocol refinements below.
Data submission	Submit data only via tablets or web-based forms; use paper data forms <b>only</b> on an interim or emergency basis.	Enter data in real time to support measurement of survey time (above); entered data can be transmitted to the data manager in a separate step.
Data checking	Have U of A error-check data weekly and send requests to operators	Designate an entity to ensure data checking occurs frequently (ideally weekly) to protect the value of the entire program.
Reporting	Operators write reports for lease sites; U of A writes a synthetic report for	Continue to compare data among operators with synthetic figures and analyses. Ensure that both individual

	comparisons across industry	and combined reports are produced with the same set of data.
Bird hazing	Between 2011-2013, bird hazing was not discussed as part of the OSBM Program.	Suggestions for standardization are contained under recommendations at the end of this document.
Public involvement	Between 2011-2013, no public involvement in the OSBM occurred.	A suggestion to consider adding a component in 2014 or beyond is contained under recommendations at the end of this document.



### ORIGIN OF THE OIL SANDS BIRD CONTACT MONITORING PROGRAM

In 2010, a bird mortality event occurred in the oil sands region that resulted in considerable and sustained public interest (Nelson et al. *in press*). In response to these circumstances, the Government of Alberta commissioned a standardized protocol with which to monitor bird contacts and mortalities in association with process-affected water (hereafter PAW) ponds in the region (Ronconi 2011). Industry and government representatives invited the senior author (Colleen Cassady St. Clair) to advise on refinements to the program in that year and to receive, store and report on the data produced by it (St. Clair et al. 2012). Dr. St. Clair and her group at the University of Alberta met with industry and government representatives several times per year in 2011, 2012, 2013 and 2014 and lead collaborative refinements to the program plan (St. Clair and Loots 2012; St. Clair, Loots, McCallum, and Ronconi 2013) and a second annual report (St. Clair et al. 2013). As part of this work, the U of A team has developed tools and procedures to enter data electronically in the field, standardize the training of observers, assure the quality and standardization of data, and identify remaining challenges.

A third annual report on the OSBCMP will coincide with final reporting on the related *Research on Avian Protection Project (RAPP)*. That project, and all of the work done by U of A in association with the OSBCMP was made possible through funding of a creative sentence that followed the conviction in *R. vs. Syncrude (2010)*. The end date of RAPP is 30 April 2014, and a new arrangement will be needed to support the continuation of the Oil Sands Bird Monitoring Program. The 2014 protocol will be submitted as a peer-reviewed publication for potential use by other industries.

The OSBCMP has had several names in its short history. In 2011, it was known in 2011 as the Regional Bird Monitoring Program (RBMP); in 2012, it was usually called the Oil Sands Bird Monitoring Program (OSBMP); and in 2013 it was called the Oil Sands Bird Contact Monitoring Program (OSBCMP). We have retained that final name in 2014.

By any name, the program is a collaborative one and uses the principles of adaptive management, several in-person meetings annually, and ongoing correspondence by email and telephone to produce a refined protocol each March or April for use in the subsequent monitoring seasons. To date, a series of university-based authors have written and revised the plan with feedback from mine operators and government

agencies including Alberta Environment and Sustainable Resource Development (AESRD) and Environment Canada.

## **PURPOSE**

The purpose of the program is to document bird interactions with liquid storage facilities at oil sands mining facilities with methods that are robust and systematic. This program provides ongoing and site-specific guidance on bird deterrent strategies aimed at reducing bird contacts and mortalities.

## **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; and
4. Identify species at risk that have been affected through contact on ponds containing process-affected waters;
5. Provide direction on adaptive management for long-term monitoring and bird deterrent programs.

## **SCOPE**

The ultimate purpose of the monitoring program is to support adaptive management of bird protection in the oil sands region. Doing so will require ongoing integration of monitoring results with deterrent practice, a process that began in the annual report for 2012. The protocols contained in this document refer to the monitoring of birds only and do not address the details of deterrent practice, which are contained in the Wildlife Protection Plans that are submitted to government by individual operators. Some comments on the potential to monitor responses to deterrents are contained under best practices as the end of this plan.

The monitoring program described by this protocol is designed to detect avian landings, injuries and mortalities, related to oil sands process-affected ponds and to do so in a standardized and rigorous way. This protocol does not address wildlife other than birds and even within birds, the plan is designed primarily for those species that that are more

likely to come in contact with process-affected water or the shore areas it contacts. That focus was formalized in the 2013 plan by designating *target birds* as those that dabble, dive, or wade as a primary means of foraging. In contrast, *non-target birds* include those that forage primarily by pecking at the ground, gleaning fruit or insects from vegetation, or by flying (i.e., aerial insectivores), depredating (raptors), and scavenging. The same distinction will be used in 2014.

All operators and government personnel associated with the Oil Sands Bird Contact Monitoring Program were provided with an opportunity to review a draft plan that was submitted by plan authors on March 7, 2014 and discussed at a meeting on March 17, 2014. Additional discussion occurred by email.

This final 2014 version of the OSBCMP Plan is but another step on an ongoing path for achieving best practices in bird protection in the oil sands region. We hope that a tradition will continue to refine the plan both within and among years to achieve this goal while integrating social and economic dimensions in the region and beyond.

## Regulatory Framework

Oil sands operations are required to operate facilities in a manner that minimizes the possibility of birds coming into contact with harmful or hazardous substances. This requirement is formalized in three pieces of legislation:

Section 5.1 (1) of the Migratory Birds Convention Act, 1994, *No person or vessel shall deposit a substance that is harmful to migratory birds, or permit such a substance to be deposited, in waters or an area frequented by migratory birds or in a place from which the substance may enter such waters or such an area.*

Section 155 of the Alberta Environmental Protection and Enhancement Act, 2010, *A person who keeps, stores or transports a hazardous substance or pesticide shall do so in a manner that ensures that the hazardous substance or pesticide does not directly or indirectly come into contact with or contaminate any animals, plants, food or drink.*

Section 32 (1) of the Species at Risk Act (2002), *No person, shall kill, harm, harass, capture or take an individual of a wildlife species that is listed as an extirpated species, an endangered species or a threatened species.*

Although all three Acts are relevant to this program, the monitoring plan is primarily regulated under the provincial Environmental Protection and Enhancement Act (EPEA) (2010). The following conditions appear, with minor variations, in each of the oil sands mines EPEA approval:

*The approval holder shall submit a Waterfowl Protection Plan to the Director by Month, Date, Year, unless otherwise authorized in writing by the Director.*

*The Waterfowl Protection Plan shall include:*

*(a) techniques and procedures for a comprehensive bird deterrent program for all tailings, consolidated tailings and waste ponds which minimizes avian mortality from the ponds;*

*(b) a comprehensive program for monitoring and documenting avian mortality, timing of incidents, and bird species affected; and any other information as required in writing by the Director.*

*The approval holder shall implement the Waterfowl Protection Plan as authorized in writing by the Director.*

Each operator implements their own deterrent programs as described in their unique Waterfowl Protection Plan (a). The monitoring component of these plans (b) however is to be conducted in coordination with all other oil sands mine operators. This regional approach was confirmed in a letter from the designated Director of EPEA approvals to operators in the spring of 2011. It stated that:

*We find that this plan [the Oil Sands Bird Contact Monitoring Plan] meets the requirements of Subsection X.X.XX (b) of your EPEA Approval. Please proceed with the implementation of the Oil Sands Bird Contact Monitoring Plan for 2011 in accordance with subsection X.X.XX of your EPEA Approval.*

The regional Oil Sands Bird Contact Monitoring Program is now entering its fourth year of implementation. The data it produces are standardized among seven lease sites operated by five multi-national companies in the minable oil sands, making it among the largest and most collaborative monitoring programs of its kind.

## **RESPONSIBILITIES**

For 2014, Regulators are responsible for:

- Inspecting sites for compliance with plan

- Coordinating the relationship between operators and collaborating individuals for the collection of mortalities for use in toxicological and related analyses
- Reviewing reports for compliance with legislations and regulations
- Providing guidance to operators for adaptive management

The University of Alberta is responsible for:

- Updating the 2013 OSBCMP Protocol for 2014 following discussions with GoA and operators
- Provide updated versions of the electronic forms named in this protocol for use at the start of the 2014 monitoring season. Subsequent changes to forms will be made by industry.
- In 2013, the U of A also performed the following tasks, but a new entity will be identified by operators to perform these tasks in 2014:
  - Receiving, error-checking and standardizing data records
  - Developing and leading the training of bird monitors via seminar or webinar
  - Synthesizing and reporting on the data from all operators
  - Conducting a study of inter-observer variation
  - Participating in several workshops with Regulators and Operators to discuss past data and future plans

Operators are responsible for:

- Implementing the Oil Sands Bird Monitoring Plan and adhering to its protocols
- Hiring and training Observers
- Obtaining Annual Research Permits and Collection Licenses;
- Entering data precisely to ensure data is of a suitable quality for analysis
- Identifying an entity to receive, error check, standardize, and store data as outlined in an email from GoA on 4 March 2014
- Reporting observations as per the Reporting Requirements
- Submitting an annual report of their monitoring results

## REPORTING REQUIREMENTS

Operators are responsible for reporting wildlife occurrences detected through this program as described below. JSG = Alberta Justice and Solicitor General; F & W = Fish and Wildlife; ESRD = Alberta Environment and Sustainable Resource Development.

Receiving Agency	Content	Deadline	Regulatory Tool
JSG – F&W Officer; & ESRD - Area Biologist	Species-at-risk mortalities	Immediately	Research Permit and Collection License
JSG – F&W Officer; & ESRD - Area Biologist	Injured wildlife	Immediately	Research Permit and Collection License
JSG – F&W Officer; & ESRD - Area Biologist	Wildlife mortalities	Monthly	Research Permit and Collection License
ESRD – Area Biologist	Wildlife observations, including mortalities in FWMIS loadforms	Annually – March 31	Research Permit and Collection License
Project Manager	Digital maps of survey and deterrent locations	Annually - April 15	Oil Sands Bird Monitoring Plan
Project Manager	Bird observations, including mortalities at ponds <sup>2</sup>	Monthly	Oil Sands Bird Monitoring Plan
ESRD - EPEA Director	Results of Monitoring Program	Annually – March 15	Oil Sands Bird Monitoring Plan: Annual Report
ESRD - EPEA Director	Wildlife Incidents & Mortalities on site	Annually - April 15	EPEA Approval: C&R Report

## OPERATIONAL CONSTRAINTS

Oil sands process-affected ponds occur on large industrial sites that impose significant constraints on workers that are not typically encountered when monitoring wildlife in other contexts. It is important to recognize these constraints and how they will impact the implementation of monitoring activities related to bird contacts and mortalities. Most of the constraints are related to human health and safety concerns, which must not be compromised. Such issues include both chronic risks (e.g., hearing damage from deterrents) and acute risks (e.g., accidents related to working at night, over water, or on unstable pond shores). Whenever possible, operators are to overcome operational constraints that would otherwise negatively impact the quality of the data collected under the monitoring plan. To support this requirement, protocols include several specific suggestions for the oil sands context on the training of personnel, placement of survey stations, timing of observations, and recording of data.

## Materials and Methods

Each simultaneous crew will require the following equipment.

### BIRD SURVEY

- Electronic device (i.e., a tablet computer) for recording data, determining GPS position, automating a date and time stamp, and providing a timer
- Bird identification tools, e.g. field guides (see section 8.2)
- Binoculars (10x42 magnification or greater)
- Range finder (range of at least 500 m; may be integrated with binoculars)
- Handheld GPS
- Tripod with panning head (minimum height of 170 cm or greater)
- Spotting scope (60x or greater magnification)
- Clip board with datasheets (as backup to electronic data collection device)
- Digital camera (to photo document where necessary)
- A timer with an audible alarm

- Compass with clinometer and declination settings (set to +14° or 14° East)
- Miscellaneous additional equipment such as portable waterproof casings for cameras, extra batteries or battery banks, extra memory cards for cameras
- Hearing protection for surveys conducted near audible deterrents

### **MORTALITY SEARCH**

- Boats, where necessary
- Binoculars (10x42 magnification or greater)
- Range finder (range of at least 500 m; may be integrated with binoculars)
- Clip board with datasheets (as backup to electronic data collection device)
- Digital camera (to photo document where necessary)
- Gloves, bags, and labels for collection of dead birds
- Handheld GPS
- Miscellaneous additional equipment such as portable waterproof casings for cameras, extra batteries or battery banks, extra memory cards for cameras

### **RELATED DOCUMENTS**

Electronic forms and backup datasheets that accompany survey protocols include the following.

- Avian Monitoring Program – 2014 Bird Survey Form
- Avian Monitoring Program – 2014 Mortality Search Form
- Avian Monitoring Program – 2014 Incidental Observation Form
- Alberta Environment form for reporting “Avian Incidents”



**Table 1. Definitions of terms**

Beach	The area between the edge of the water and the surrounding landscape that potentially comes in contact with pond products through the action of wind or waves AND occurs on a slope that is gradual enough to permit walking or perching by birds.
Contact	The presence of a bird on a pond. Including birds landed on the pond, diving under the water surface, foraging in the water, mating on the water, and birds touching vegetation on the pond.
Deterrent	Instruments stationed beside or on a tailings pond to deter birds. Includes both audio (e.g. propane cannons, phoenix wailers, speaker systems, long range acoustic devices) and visual deterrents (e.g. human effigies, peregrine effigies, lasers).
Flyover	One or more birds flying over a pond during an observation period. The term may apply to migrating flocks or individuals and can include migratory flights, foraging flights, and predator evasion.
Freshwater pond	Ponds not involved in the waste of the bitumen mining process and used in the standardized monitoring of birds in the area to survey species that may be found on ponds during migration periods.
Incident	Observations of birds where harm or danger to a bird has occurred or had the potential to occur.
Incidental Observation	Any detection of a bird that occurred randomly without following any particular survey methodology.
Landing	A bird coming into contact with the pond, the shore, or the inside of the dyke.
Non-target bird	Birds that scavenge, fly, glean, depredate, and peck for food as their primary means of foraging .

Process-affected water	Water that has come in contact with the processes associated with the extraction of bitumen and plant operations.
Species at Risk	Species listed as threatened, endangered, or of special concern under the Alberta Endangered Species Conservation Committee, Alberta Wildlife Act or the federal Committee on the Status of Endangered Wildlife in Canada.
Target bird	Birds that dabble, dive, or wade for food as their primary means of foraging. These birds are targeted by the program because they have a greater likelihood of contacting process-affected water or its residue.

## Monitoring Protocols

### SETUP

1. **Identify the ponds that must be monitored.** Discussion in 2013 and 2014 identified several small ponds on the lease sites of CNRL and Imperial that appeared to pose little danger to birds and had not exhibited previous mortalities or landings. For ponds on these and other lease sites that meet the following criteria, monitoring may be reduced to one survey of live birds per week, but these ponds should continue to be surveyed for mortalities every two weeks. Existing deterrent requirements are unaffected by this change in monitoring frequency.
  - a. Zero birds *of the target guilds* reported as landed in the past year;
  - b. Zero mortalities for the past three years;
  - c. Bitumen is present < 10% of the time *or* on < 10% of the pond surface;
  - d. Vegetation, shallow beach, and islands have been removed or fitted with exclusion material (this is already true for most of the qualifying ponds); and
  - e. The pond is < 1.5 ha in area.

All other ponds containing process-affected water are to be monitored 6 days / week in accordance with the monitoring protocol and EPEA

regulations. The 7<sup>th</sup> day is to be dedicated to complementary activities including training, monitoring and analyses as described below.

2. **Designate survey stations for monitoring of live birds (April 1 - April 15 and July 1 - July 25).** Identify appropriate survey stations according to criteria listed below for each pond. The number of stations is dependent on pond size (Table 2). Stations should exhibit the following characteristics.
  - a. Provide the best vantage for observation, ideally in an elevated area on a peninsula (Figure 1);
  - b. Positioned as close to shore as can be achieved safely that maximize visibility when the sun is close to the horizon (i.e., on north and south ends);
  - c. Spaced with as much distance between stations as possible;
  - d. Oriented so that observations can be conducted from within a vehicle or by using the vehicle as a wind break where wind inhibits observations;
  - e. Located the same locations that were used in previous years to support inter-annual comparisons;
  - f. Designated with a visible, semi-permanent marker that provides the name of the station in text, bar code, and flag with robust marker and a bar code (the U of A provided information for operators to order bar codes directly in March 2014); and
  - g. If the designated survey station is made unavailable by mine activity, choose an alternate site. Be **sure** to record the location of this site with a GPS and indicate by email to the data manager the need to add it to subsequent location options on the tablet. Operators that know a survey station will become unavailable part way through the season should designate an alternative survey site in advance.

**Table 2. Criteria for identifying the number and locations of survey stations**

Pond Size (km <sup>2</sup> )	Number of stations	Criteria for station locations
< 1.5	1	Best location for viewing entire surface area

1.5 - 5	2	Placed on opposite ends of the pond (e.g., north and south ends)
5 – 10	3	Divide the perimeter into thirds and place one station in each ensuring they are at least 2 km apart
> 10	4	Divide the perimeter into quarters and place one station in each ensuring they are at least 2 km apart

**3. Designate routes and location for mortality searches** (April 1 - April 15 and July 1 - July 25).

- a. Identify planned transect routes at each pond for mortality searches (above) **and** record the actual transects with GPS. Retain the ability to adjust these routes to the areas with the highest likelihood of containing dead birds..
- b. Small ponds and their shores are to be scanned completely with binoculars and all mortalities reported. If possible, walk the perimeter of the pond.
- c. For larger ponds, designate routes for both belt transects and focused searches, and measure detection limits. Additional details are provided under the mortality search protocol below.
- d. Position searches in the areas that are most likely to accumulate mortalities. Typically, these areas will be wherever bitumen accumulates: on the downwind sides of ponds, in bays, near shore-based or floating vegetation, and near outflow pipes.

**4. Initiate the monitoring program**

- a. Visit all process-affected ponds every 3 days until tailings ponds are > 25% thawed or first birds are detected on ponds, whichever occurs first.
- b. Once each pond is >25% thawed or birds have been observed, initiate daily bird observations (2014 Bird Observation Form) and mortality searches once every two weeks (2014 Mortality Search Form).
- c. Provide the following information to the designated data manager for each pond as soon as possible after the start of the spring monitoring season (and

by April 15)

- i. Pond identification
- ii. Station identification
- iii. GPS location of each survey station.



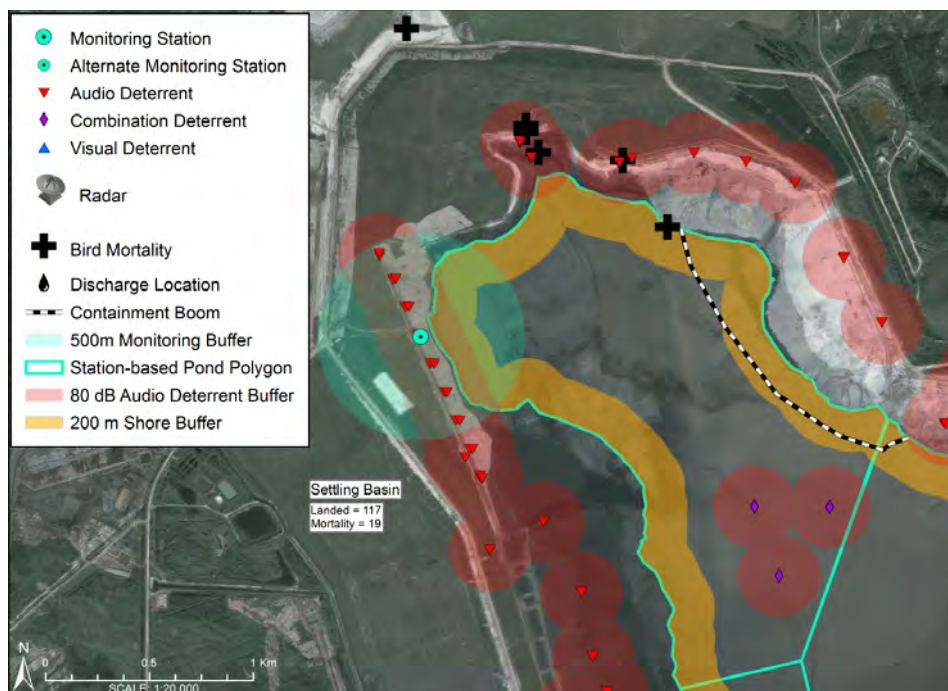
**Figure 1. Positioning of survey stations.**

Example of optimal positioning of survey stations at Suncor's pond 2/3. Pond surface area is approximately 2.7 km<sup>2</sup> and circles illustrate a 500 m radius from each survey station, which is depicted with a green dot. Approximate pond area is given by the purple line and shows how pond surface area changes over time.

**5. Record pond deterrent configuration (April 1 - April 15 and July 1 - July 25)**

- a. Record the configuration of the deterrents set up at each pond prior to the first round of pond inventories.
- b. Provide to the data manager spatial data that depicts the:
  - i. Pond identification;
  - ii. Date when deterrent was set up;

- iii. Type of deterrent device;
  - iv. Specifications of acoustic and visual deterrent
  - v. GPS location of each deterrent device
- c. Record and report to the data manager the configuration of the deterrents set up at each pond prior to the second period of survey inventories, if changes to the configuration have been made.
- d. Provide the information described above as shape files (Figure 2) that can be compared among operators.



**Figure 2. Example of pond information**

Example of the information on deterrent configuration and pond characteristics that is to be provided for each pond to the data manager as GIS shape files. Additional examples of these maps are contained in the 2014 Final Report of the Research on Avian Protection Project.

**6. Record pond characteristics (April 1 - April 15 and July 1 - July 25)**

- a. Measure characteristics of each pond prior to the first round of pond inventories.

- b. Provide to the data manager the following information for each pond and survey station:
- i. Purpose of the pond (e.g., emergency dump pond, tailings pond)
  - ii. Estimation of the surface area of water associated with the pond;
  - iii. Shore-based distance (m) between each survey station and the waterline measured at three radians. One should point directly from the survey station to the centroid of the pond (as derived from the GIS layer); one should point to the right and one 45° to the left of the centroid. Observers are to record these values on approximately May 1 and September 1 for all ponds. The purpose of these measurements is to estimate the shore area and the distance between the observers and the water.
  - iv. Estimation of the shore area with a slope gentle enough to permit walking by wading birds (as for people, a slope of < 45° from the horizontal can be walked on)
  - v. Estimated proportion of surface of both shore and pond that contains vegetation, both rooted and floating in bins of
    1. 0;
    2. 1-25%;
    3. 26-50%;
    4. 51-75%;
    5. 76-100%
  - vi. GPS location of discharges into the pond, separated by type;
  - vii. GPS location of booms or other bitumen containment devices; and
  - viii. Provide information about the anthropogenic light associated with the pond with a method and frequency to be determined later for use across the region.
- c. Measure and report to the data manager the characteristics of each pond prior to the second round of pond inventories, if changes have occurred.

## BIRD SURVEYS (2014 BIRD SURVEY FORM)

### Schedule

The purpose of bird surveys is to generate a reliable estimate of bird contacts and flyovers on ponds containing processed-affected or fresh water. Reliable estimates can only be generated if there is a strict adherence to these protocols.

1. Conduct bird surveys during spring and fall migration periods (April 16 – July 6 and July 25-October 31).
3. If it is not possible to concentrate surveys in the morning, it is imperative that their timing be altered so that all ponds are sometimes surveyed in the morning.
4. Visit each survey station in accordance with inventory frequency and timing requirements:
  - a. Visit each survey station at process-affected ponds 6 days / week.
  - b. Visit each survey station at freshwater ponds twice weekly.
  - c. Aim to begin daily monitoring within approximately one hour of sunrise (Table 3). Observers should anticipate and overcome predictable delays in start time owing to access permissions, organizational meetings, etc. If possible, observations on process-affected ponds should occur in the morning.
  - d. Conduct observation sessions at each survey station for 10 minutes at ponds smaller than 1.5 km<sup>2</sup>; 30 minutes for all others

**Table 3. Suggested start times for bird surveys**

<b>Inventory Period</b>	<b>Recommended Start Time</b>
April/May	06:00
June – Early July	05:00
Late July – September	06:00
October	07:00



5. Beginning in 2014, operators are to devote one day a week to training, calibration, and compensatory monitoring. Such *Comparison Days* are to be scheduled in advance, operators are to avoid simultaneous use of the same days across the entire industry and to avoid days with severe storm events. At their discretion, operators may use the flex day to conduct any one of the four activities below. A new option on the survey forms can be used to designate the use of a comparison day and the particular purposes below.
  - a. Quantify inter-observer variation (as performed by U of A in 2013) by designating two observers who complete separate, but simultaneous, surveys. Have each observer perform at least four such surveys each year at all ponds of sizes 2-4.
  - b. Conduct a training session with comparison of survey results between observers during and immediately after observations. Training sessions should review all protocol components and bird ID comparable to the training webinar offered by U of A in 2013. Each observer should participate in at least two such training sessions each year.
  - c. Conduct a regular monitoring day to compensate for restricted site access on other days of the week
  - d. Collate, standardize, and analyze data generated by the *Comparison Days* for use in annual reports.

### Staffing Requirements

1. Surveys may be conducted in teams of one, two, or more individuals. In the past, bird observers were sometimes also responsible for hazing birds off of process-affected ponds. To protect the comparability of monitoring data, bird observers must not be responsible for bird deterrence while conducting monitoring sessions.
2. Duties while conducting bird surveys may be divided as follows depending on the number of observers available as long as the number of minutes spent watching for birds is standardized at either 10 minutes (small ponds) or 30 minutes (pond sizes 2-4).
  - a. *One Observer*: Observer records their observations by voice and transcribes observations afterwards onto tablets. If there is a single observer who is also recording data, there **must** be a system to ensure standardization of

observation time at either 10 or 30 minutes such as using a stop watch and stopping the observation clock whenever the observer looks down to record data, starting again when observations resume. In 2014, tablet forms have been adjusted to permit start and stop options within scans.

- b. *Two Observers*: First observer scans the water, the shore and the air with binoculars and uses the spotting scope to identify difficult or distant birds. Second observer records the data as dictated by the first observer and assists with identification and location details to ensure observation time is not lost
- c. *Three Observers*: First observer scans with binoculars. Second observer uses a scope and provides identification and location details for the first observer's observations. Third observer records the data dictated by the first two observers

## Procedure

### 1. Observe the pond during arrival to the site and record incidental detections

- a. Count the birds that flush as you arrive and before you get out of the truck. Record these **only** as incidental observations in 2014 Incidental Observation Form.
- b. Birds can be recorded in the designated observation session if they subsequently land or fly over the survey area during the session
- c. Bird observers should not be responsible for hazing birds and hazing should not occur while a monitoring session is in progress **unless** a species at risk appears to be in imminent danger.

### 2. Park at survey station and prepare equipment

- a. Set up the spotting scope on a tripod or window mount at the designated survey station.
- b. Turn off motor if observing from the truck. Note that a compass will not work from within or very close to a metal truck.
- c. Ensure each piece of equipment is ready for use (binoculars, range finder, compass, tablet, notebook, bird guide).

**3. Initiate a data session by completing the station characteristics.** NB: Do not start the timer because this information is not part of the observation session.

- a. Scan the bar code to register pond name and survey station ID.
- b. Record the date and observers via drop down menus.
- c. Record weather variables via drop down menus.
- d. Record visibility via drop down menus and presence of heat shimmer if applicable.
- e. Record bitumen coverage via drop down menus. In 2014 bitumen coverage should be broken into finer interval categories none (0%), 1-5%, 5-15%, 15-25%, 25-50%, 50-75%, 75-100%; definitions and photographic examples should be provided during training.
- f. Record whether deterrents near monitoring station were turned off during survey

**4. Initiate bird observations by indicating a start time**

- a. Set timer for the intended duration (10 or 30 minutes).
- b. Stop observing when the timer ends and indicate an end time then. Note: this process will be automated on tablets when one observer conducts survey alone, and will indicate to monitors when time spent surveying is less than 30 minutes (to account for time spent looking down to record bird observations).

**5. Conduct a surface and shoreline scan**

- a. Scan the water surface, adjacent shorelines, and air above the survey station systematically with imaginary transects that travel up and down or side to side.
- b. Complete a “bird observation” for each bird or bird group detected. A bird group is a group of birds of the same species that appear to be traveling together.
- c. Identify birds with as much detail as possible by classifying the bird via the following criteria (Appendix A) using the drop-down menus on the tablet.

- i. Target (target, non-target, don't know)
  - ii. Foraging mode (dives, dabbles, wades, flies, scavenges, gleans, depredates, pecks)
  - iii. Foraging mode subgroup (e.g. large wader vs. shorebird both fall under wades)
  - iv. Species (e.g. lesser scaup or unknown scaup)
- d. For each identified bird or bird group, record its position with a distance and direction.
- i. Indicate whether the bird is flying or landed. A bird is only entered as flying if it never lands.
  - ii. If the bird is landed, use a range finder on a target of a similar distance to estimate distance (in meters).
  - iii. Use a compass (with a declination set to +14° or 14° East) to describe its direction from the survey station.
  - iv. Record birds in the air only if they are within 100 m elevation and within the survey area.
  - v. Survey area includes the water, shore that could be reached at any time of the year by changing water levels and air below 100 m within a 500 m radius of the survey station. Do not record birds that are farther than 500 m or above 100 m as part of the observation session; they may be recorded as incidentals (below).
    - 1. Record each bird or bird group as a new entry in the datasheet.
    - 2. It is imperative that observers also document monitoring activity on days when no birds are recorded (i.e. "zero" data).
- e. Close the observation session when the designated amount of survey time has elapsed
- 6. Submit data to the data manager** at least monthly, preferably daily or weekly, and only on designated forms via tablets or the internet.

## MORTALITY SEARCHES (2014 MORTALITY SEARCH FORM)

The purpose of mortality searches is to generate a minimum estimate of known mortalities associated with designated areas for each pond. Standardized information about mortalities will identify the species most at risk of mortality and support adjustments to deterrent systems within and among ponds. Mortality data from the first three years of the OSBCMP was not as standardized as the observations of live birds and could not support robust extrapolations. Increasing this standardization will increase confidence in preliminary conclusions that few mortalities occur relative to the number of landings. Minor changes have been made to the mortality monitoring protocol for 2014 and a more robust protocol will be discussed and implemented for 2015.

### Schedule

1. Conduct designated mortality searches every two weeks during spring and fall migration periods (April 16 – July 6 and July 25-October 31). All ponds that were previously designated for mortality searches are to be continued in 2014.
2. Where necessary, mortality searches can be conducted in the afternoon to support morning attention to pond inventories.

### Search types

In previous years, all operators conducted a combination of route-based searches, focused searches dedicated to particular areas, and incidental reports. In 2014, all three search types will continue, but with increased standardization of the methods by which search effort is recorded.

1. **Route-based searches.** Conduct a specific route-based search and repeat it each two weeks.
  - a. Small ponds and shore areas can be surveyed by foot, with transportation between survey points by truck. Previous data suggests that few or no mortalities are detected from within trucks and so observers should leave trucks to conduct searches by foot.
  - b. Large ponds must be surveyed by boat. Previous protocols suggested use of at least four transects, but the distance and frequency of transects was highly variable among operators. Operators should aim to survey at least the

distance that equates to the circumference of the pond ( $2\pi r$ ), which would equate to three transects that cross the entire pond. Boat operators must specify the route and detection limit during every search. Designated routes should be followed via clear landmarks or GPS and provided to the data manager as line features that can be plotted on a GIS.

2. **Focused searches.** Use the following criteria to designate areas for focused searches on or adjacent to tailings ponds. Name each area and calculate the size and surface type of the area being searched. Areas for focused searches can be reached by truck or boat according to operational conditions.
  - a. There is known risk to birds (e.g., fresh tailings).
  - b. Mortalities have been reported previously.
3. **Incidental reports.** Incidental reporting of mortalities that are associated with PAW ponds should be recorded with the other mortalities, but clearly identified as this type. Incidental mortalities typically do not occur in designated search areas and are discovered as part of other mine work. This category includes birds that are found oiled and must be euthanized.

## Procedure

### 1. Ensure data are recorded consistently

- a. Require that data be entered on mortality forms via tablets, not on paper for entry later. If paper must be used, ensure it has the same format (e.g., includes menu options) as the tablets. Additionally ensure that paper-based records are entered to the mortality database within two days.
  - b. Restrict the choices that can be entered in forms. Make mortality information provided in mortality search form the same as information in incidental mortality form and homogenize both with provincial requirements.
  - c. Be sure to record mortality searches on days when no birds are recorded (i.e. “zero” data).
2. **Within each pond, follow designated survey types and locations** as closely as is practical

- a. Indicate the type of search being performed and its location by UTM.
  - i. Route
  - ii. Area
  - iii. Incidental
- b. Search both pond surfaces and shorelines for bird mortalities.

### **3. Describe the survey area**

- a. Indicate precise start and stop times for searches and separately for different modes of transportation (e.g., by foot, by truck, by boat).
- b. Indicate the route traveled, ideally with a hand-held GPS. Specific mapped transects can be repeated. On small ponds, surveys of both water surface and shore areas should be possible from shore; large ponds require boats for adequate searches. Data from previous years indicates that mortalities are rarely spotted from trucks.
- c. When a dead bird is detected, record the details on distance and bird state described below.

### **4. Describe the birds found**

- a. Restrict the choices that can be entered in forms. Make mortality information provided in mortality search form the same as information in incidental mortality form and homogenize both with provincial requirements.
- b. Label bird with the information below. Designate a bird expert on each crew that invests in learning to identify birds, even when they are heavily oiled. Oiled bird guides could be used to aid in identification (examples are available from U of A).
- c. Classify the bird via these criteria in the following order (Appendix A)
  - i. Target (target, non-target)
  - ii. Foraging mode (dives, dabbles, wades, other)

- iii. Foraging mode subgroup
  - iv. Species, if possible. The mortality crew should have access to the bird monitors for help in identification.
- d. Indicate bird characteristics
- i. the state bird was found in (alive or dead, only options)
    - 1. Indicate if bird was euthanized (yes, if found alive; no if bird was not recovered; n/a if bird was found dead)
    - 2. Indicate end state of bird (alive or dead; on tablets this question could be conditional on the bird being recorded as found alive)
    - 3. NB: Only birds that were discovered as mortalities should be recorded in mortality searches. If live, unoiled birds are found during mortality search and successfully hazed off ponds, those birds should be recorded as incidental live birds as per incidental monitoring protocol. If live birds are not successfully hazed off ponds and eventually become oiled and must be euthanized, those birds should be described as incidental mortalities, not the products of mortality searches.
  - ii. Indicate whether the carcass was collected (yes or no; collect whenever possible)
  - iii. Indicate whether the bird was oiled
    - 1. If bird was oiled, indicate percent oiled: None (0%), 1-25%, 25-50%, 50-75%, 75-100%
  - iv. Indicate the exact GPS location where the dead bird was initially found if possible, or location where bird was collected, and specify which location is given. In both cases include a description of the location. When a GPS point was not taken with handheld GPS at the location of capture, a GPS point should be identified using GIS soon after collection. If neither option is possible, record at least the closest survey station for live birds.



- v. Surface: pond or shore
  - vi. Potential attractants: vegetation, anthropogenic light
  - vii. Any other relevant information
  - viii. For 2014, establish specific criteria for classifying mortalities as being associated with specific ponds or not (e.g. within 200 m of medium to large PA pond, or within 100 m of small PA pond)
5. **Collect bird remains** in accordance with provincial requirements and safety standards.
- a. Label bird with the date, time, location, and as much identifying information as possible.
  - b. Provide a unique ID (DD-MMM-YYYY-001) for the bagged bird and indicate this number on the data sheet.
  - c. Store bagged birds in the freezer until they are inspected by AESRD.
6. **Review the completeness of mortality data weekly.** Pay particular attention to the completeness of information about survey times and areas, and on the location and characteristics (especially species and oiled status) of mortalities.

### **INCIDENTAL OBSERVATIONS (2014 INCIDENTAL OBSERVATION FORM)**

The purpose of incidental observations is to provide a record of opportunistic observations of birds made at or near process-affected or freshwater ponds. These records will supplement those collected during the pond inventories and mortality searches, but they will not be used to quantify bird use of lease sites. Some discretion is needed to know which incidental observations should be recorded and which can be safely ignored. Different procedures apply for incidental observations of live vs. dead birds.

1. **Incidental live birds.** Operators may record data in the field using either a paper form or the tablet-based form provided by U of A. Paper-based records should be transferred to web-based forms on the day of their collection (no more than one week) to preserve details that are reliant on memory.

- a. For each observation, record the date, time, location and species details (species, number). If the tablet form is used, multiple options for recording location will be available.
  - b. Complete additional forms if they are required. Birds that contact process-affected water are to be documented as incidents using the standardized reporting form provided by AESRD for wildlife sightings and incidences for submission in the annual conservation and reclamation report.
  - c. Incidental observations should include all of the following types:
    - d. any 'new' species that have not been detected previously in standardized bird surveys on that lease site in that year; together monitors should keep a cumulative 'life list' of the birds on site;
    - e. every sighting of a species at risk that occurs outside an observation system;
    - f. every sighting of a bird contacting process-affected water; and
    - g. species that are abundant on site, but appear to be under-represented at surveys and any unusual behaviours or sightings that attract observer interest. Keen observation of under-represented and rare sightings has much potential to advance bird protection in the oil sands region.
2. **Incidental mortalities.** All incidental detections of dead birds should be documented and collected as per mortality search procedure (above). Information required on the provincial forms should be part of all incidental reports.

## SPECIES AT RISK

Both provincial and federal regulations require operators to report contact by species at risk with the surface or margins of ponds containing process-affected waters. Margins are shore areas that could come in contact with process-affected water via wind or wave action or changing water levels. By definition, species at risk are rarely seen and special training effort is required to ensure they are identified accurately when they are encountered. The protocols above are not designed explicitly to detect rare species. This section refines information on the risk status of species that might occur in the oil sands region (Appendix A) and identifies the species that require extra attention (Appendix B)

Observers should be able to identify all 45 of the species at risk with a designation of sensitive and above in Alberta (Appendix B), particularly those in the target foraging guilds of dabbling, diving and wading. The term 'sensitive' is used by the Government of Alberta to describe species that might have vulnerable populations in Alberta as listed under the General Status of Alberta Wild Species, which is reviewed each 5 years (Government of Alberta 2010). Extra care should be taken to detect and accurately identify the 34 species listed as sensitive (Appendix B) and these species should always be recorded as incidentals whenever they are detected on mine sites. They are also to be recorded as part of routine bird surveys and mortality searches, but no further action needs to be taken if they are detected as part of these processes.

Additional reporting requirements apply to the 11 species that have been reviewed and designated for a listing status by either federal (Committee on the Status of Endangered Wildlife in Canada) or provincial (Endangered Species Conservation Committee) evaluation (Appendix B). If a species with these legal designations is detected landing on a process-affected pond or as a dead bird anywhere on a mine site, it must be reported immediately to AESRD and recorded as an incidental report. Of these 11 species, only 4 exhibit the target foraging guilds of dabbling, diving, or wading (trumpeter swan, whooping crane, yellow rail, red knot). Of these four, only the whooping crane is federally endangered. If this species is detected, it must be reported to AESRD immediately if it is detected anywhere on a lease site. Sightings of any of these four species are unlikely, but possible.

In summary, species at risk should be recorded as part of the Monitoring Program as follows:

1. **Determine if immediate reporting to regulators is necessary (Appendix B).**
2. **Record sighting in appropriate form.** Sensitive species detected during regular observations sessions are recorded in the Bird Survey Form; a species with any risk designation should be recorded as an Incidental Observation whenever it is seen or heard on lease sites. Additional reporting requirements apply to federally or provincially-listed species.
3. **Collect and document any incidental dead birds as per mortality protocols.** Mortalities can be recorded via tablets with automated data upload, or on paper. Paper-based records must be transferred to web-based forms, ideally on the day of their collection, but at least within one month.

## PROCEDURAL STANDARDS

Important procedural standards apply to every aspect of the Bird Monitoring Program and data collected for it will be limited as much by adherence to these standards as by completion of protocols. In addition to the details provided in the introduction and protocol, the following standards will support the program. It is imperative that those conducting observations and especially those designating observation sites and search routes read, understand, and implement these standards.

### Staffing and Training

Crews responsible for conducting bird surveys and bird deterrence should be distinct. This will limit the disruption to monitoring and increase its standardization. It will also increase the efficiency of deterrent and hazing activity.

Observers conducting bird surveys (Bird Survey Form) require training in bird identification, the monitoring protocol, and proper completion of data forms. To improve the standardization of data collection, provide all observers access to training comparable to the webinar offered by U of A in 2013. This training should address bird identification, monitoring protocols, and data recording via paper and tablet-based platforms. Questions about the protocol and associated methodology can be directed to the U of A beyond the spring of 2014 if desired by anyone interested in the monitoring program.

Observers will be trained to identify landed birds to foraging guild (e.g., waders, dabblers, divers), to know the characteristics for species identification for some of the most common birds (Appendix A) as well as the designated species at risk (Appendix B), and to enter data completely and accurately on data forms. Training will also include setting-up, using, storing, and protecting optical equipment including binoculars, spotting scopes, range finders, and compasses.

Observation protocols have been adjusted to focus on target birds (i.e. more likely to come in contact with process-affected water) and designate them using an ecological, rather than taxonomic, description in the form of primary foraging mode. Training will reinforce this hierarchical method of identifying birds via webinars, on-site training, and on-going practice by observers. Additional identification and reporting requirements apply to birds designated with a risk status.

Training will cover bird observation protocols with particular focus on overcoming challenges of observations beside process-affected ponds. Observers will be taught the techniques for searching via systematic scans with binoculars and scopes trained on the air above survey stations, the surface of ponds, and the shore adjacent to ponds. Observers need to know how to determine or estimate flock size, flight direction, and altitudes above vs. below 100 m. Although some simulation of field settings is possible in the classroom and via the web, field-based training and practice will be essential to mastering all three protocols.

All individuals involved with the OSBMP (monitoring and mortality searching) should be named annually for the purposes of fact-checking and acknowledgements. Operators should submit in tabular format the names of all individuals, their job description, and, then applicable, the sub-contracting company for whom they work.

### **Documentation of Training**

It is essential that all crew members are familiar with both the protocols and the procedural standards that support them.

1. The Operator must provide a copy of this Plan to all personnel involved with implementing it. This includes individuals conducting both bird surveys and mortality searches. Both groups should be trained in protocols for incidental reporting.

2. The Operator must ensure that all personnel have attended appropriate training in bird identification and have been supplied with proper equipment for recording bird observations and survey locations and routes.
3. The Operator must ensure that all personnel must also be trained in the hazards and emergency procedures involved in working in the vicinity of tailings ponds in accordance with Operator Health and Safety standards.
4. Any deviation from this SOP requires approval from ESRD in consultation with U of A
5. Operators must record and submit to the Regulator a list of the names of the individuals who participated in plan implementation and specifying that they have read the plan. These lists will be appended to annual reports.

### Data entry and management

Tablets have proven to be reliable and efficient aids for the collection of data for the Oil Sands Bird Monitoring Program. However, there is always the possibility that they will fail to operate. To ensure comparable data collection can occur, observers must **always** carry a clipboard or binder with paper versions of all data sheets. GPS and time stamps that are provided automatically by the tablets will need to be provided manually and a smart phone or hand-held GPS should be carried for this purpose. Later, these data sheets can be entered on the web with forms comparable to the tablets forms. This should be done on the same day as data were collected and never more than a week later to retain memory-based support. Data should be entered by an individual who participated in data collection. To protect data consistency, U of A will only accept data entered via tablet or web-based forms. Because of past problems, it will not be possible to submit data as independent spreadsheets or to append data directly to the master database.

Between 2011 and 2013, data from the Oil Sands Bird Monitoring Program have been provided by industry to the University of Alberta as a requirement of government-mandated participation in the Oil Sands Bird Monitoring Program. Those data are housed, along with several other resources associated with bird protection in the oil sands region, on servers that are backed up automatically and daily. After review by government and operators, summaries of these data are contained in annual reports of the Oil Sands Bird Monitoring Program that are made available to the public in accordance with the requirements of the court order that supports the *Research on Avian Protection Project (RAPP)*. Public access to this information will continue beyond

the duration of the RAPP project via links via the home page of the principal investigator, Colleen Cassidy St. Clair and, potentially, other sources. A new arrangement for data management will commence in Spring 2014.

## Recommendations for future adjustments to the OSBCMP

### PROTECT PAST INVESTMENT IN THE OSBCMP

1. Analyses of the data collected with the 2014 Plan are ongoing. As they are produced, these products will be shared with operators and may be used to extend the monitoring program in four specific ways to advance bird protection via adaptive management. The products include:
  - a. Comparisons of monitoring data among years, seasons, and sites;
  - b. Examples of detectability functions (e.g., similar to Buckland *et al.* 2001) that can be used to extrapolate and compare observation-based data;
  - c. Estimates of the total number of live birds that contact process-affected water in the oil sands (e.g., similar to Camphuysen and Heubeck 2001; Wiese and Ryan 2003; Wiese and Robertson 2004; O'Hara and Morgan 2006) as well as mortalities (e.g., similar to Ferrer *et al.* 2012; Zimmerling *et al.* 2013); and
  - d. Examinations of the total estimates of bird contacts and mortalities with the characteristics of both ponds and survey stations to evaluate the efficacy of current deterrent systems (e.g., similar to St. Clair *et al.* 2012).
2. Additional analytical products will be possible with the ongoing investment by industry in the OSBCMP provided the data are collected and managed to support these functions. In March, 2014, AESRD provided guidance about the necessary attributes for data collection and storage.
  - a. Data needs to be in a form that is easy to manipulate and analyze; data must be relational (spatial), query able, and compatible with the current data integrity and quality standards

- b. The entity that ends up being the repository needs to work with industry and ESRD to design the data base to ensure data are easy to manipulate and analyze
- c. There must not be any charge to ESRD for providing data as needed and data must be made available in perpetuity; a duplicate database must be provided annually to ESRD
- d. The data must be easily transferable to another agency
- e. Security of the database must be assured
- f. The consultant shall not be held responsible to meet the EPEA Approval Conditions as these conditions remain the requirement of the operator.

#### **DETERMINE DETECTABILITY OF LIVE BIRD SURVEYS FOR EACH POND AND STATION**

Work being conducted by the U of A with the 2012 and 2013 data and contained in the 2014 Final Report on the Avian Protection Project will offer a starting point for the use of detectability functions in the OSBCMP. These functions will support more accurate extrapolations of the total number of birds that land and make it possible to correct for differences among stations in the probability of detecting birds.

#### **DETERMINE THE DETECTABILITY AND REPRESENTATIVENESS OF MORTALITY SEARCHES**

Preliminary discussions for the 2014 OSBCMP identified three types of information that is needed to quantify the robustness of mortality searches. These issues should be revisited for the 2015 plan.

1. **Quantify detectability distances** by placing objects comparable to ducks in size, colour and buoyancy, at known distances from observers, but with a process that is blind to them. Determine the rate of detection as a function of distance.



2. **Quantify the risk of focused search locations** by pairing them with sites designated randomly for comparable search effort to assess differences between perceived and measured risk.
  
3. **Quantify the accuracy of detecting mortalities** with search routes by depositing objects comparable to ducks in size, colour, and buoyancy, in the search area with a process that is blind to observers. Determine the rate of detections in the search area.

### **ADDRESS THE STANDARDIZATION OF BIRD PROTECTION VIA DETERRENCE**

To date, the OSBCMP has not attempted to describe the responses of birds to specific deterrent configurations or deployment methods, which are tremendously variable both within and among lease sites. Coarse comparisons between deterrent types and intensity were made at the level of whole ponds in 2013 (St. Clair et al. 2013) and will be refined with the 2013 data. Greater attention to the spatial resolution of mortality data specified in the 2014 plan will support comparable analyses at the level of monitoring stations. Individual operators may choose to examine site-specific performance of different deterrent configurations and deployment methods. A list of relevant biological questions and plausible experimental designs will be contained in the 2014 report on the Research on Avian Protection Project.

### **ENGAGE THE PUBLIC**

Early in program development, there was discussion of the potential to engage the public living in the Regional Municipality of Wood Buffalo in the monitoring program by encouraging them to visit a series of reference sites and recording the birds they observed there, potentially using the same observation protocol employed by the monitoring program. Supporting resources could be provided easily, such as public presentations, a help forum via telephone or internet, and freely downloadable forms for tablets or smart phones. Engaging the community in this way could:

- Foster a greater appreciation and enjoyment of avian diversity and natural sites;
- Help individuals develop skills that could support career changes;
- Develop a labour base for the monitoring program;

- Create a sense of ownership of the natural resources of the region that could support a more holistic view, greater stewardship, and more pride of the resource base of the region; and
- Provide comparative data for the monitoring program to interpret changes in the abundance and distribution of birds associated with unique weather patterns, climate change, and effects on winter ranges, but which might otherwise be presumed to result from activities in the oil sands region.

Water bodies in the region that are relevant to the program and also publicly accessible and otherwise suitable for monitoring by the public include:

- Rivers: Athabasca River, McKay River, Muskeg River
- Artificial Lakes: Crane Lake, Poplar Reservoir
- Natural Lakes: Isidore Lake, Kearl Lake, McClelland Lake, Gregoire Lake

## Bibliography

- Berthold, P. (1993) *Bird Migration: A General Survey*. Oxford University Press, Oxford, UK.
- Blokpoel, H. (1973) *Bird Migration Forecasts for Military Air Operations*. Occasional Paper No. 16. Canadian Wildlife Service, Ottawa, Canada.
- Boag, D.A. and V. Lewin (1980) Effectiveness of three waterfowl deterrents on natural and polluted ponds. *Journal of Wildlife Management* 44: 145-154.
- Buckland S.T., D.R. Anderson, K.P. Burnham, J.L Laake, D.L. Borchers, and L. Thomas (2001) Introduction to distance sampling: estimating abundance of biological populations. Oxford University Press, Oxford
- Burke, C., W. Montevecchi, and F. Wiese (2012) Inadequate environmental monitoring around offshore oil and gas platforms on the Grand Bank of Eastern Canada: Are risks to marine birds known? *Journal of environmental management* 104: 121–126.
- Camphuysen, C.J. and M. Heubeck (2001) Marine oil pollution and beached bird surveys: the development of a sensitive monitoring instrument. *Environmental Pollution* 112: 443–461.
- Dipper, B. (1998) Monitoring and post-auditing in environmental impact assessment: a review. *Journal of Environmental Planning and Management* 41: 731–747.
- Elzinga, C.L., D.W. Salzer, J.W. Willoughby, and J.P. Gibbs (2001) Monitoring Plant and Animal Populations. Blackwell Science, Inc., Oxford, England. 660 pp.
- Ferrer, M., M. De Lucas, G.F. Janss, E. Casado, A.R. Munoz, M.J. Bechard and C.P. Calabuig (2012) Weak relationship between risk assessment studies and recorded mortality in wind farms. *Journal of Applied Ecology* 49: 38–46.
- US Fish and Wildlife Service (2012). *US Fish and Wildlife Service Land-based Wind Energy Guidelines*. OMB Control No, 1018-0148. US Fish and Wildlife Service.
- Government of Alberta (2010). General Status of Alberta Wild Species. Last accessed 8 April 2013 at <http://srd.alberta.ca/fishwildlife/speciesatrisk/GeneralStatusOfAlbertaWildSpecies/Default.aspx>

- Gulley, J.R. (1980) *Factors influencing the efficacy of human effigies in deterring waterfowl from polluted ponds*. Unpublished master's thesis, University of Alberta, Edmonton, Canada.
- Hennan, E.G. and B. Munson (1979) *Species Distribution and Habitat Relationships of Waterfowl in Northeastern Alberta*. AOSERP Report No. 81 for Alberta Oil Sands Environmental Research Program. Canadian Wildlife Service, Edmonton, AB, Canada.
- Johnson, G. D., W.P. Erickson, M.D. Strickland, M.F. Shepherd, D.A. Shepherd, & S.A. Sarappo (2002) Collision mortality of local and migrant birds at a large-scale wind-power development on Buffalo Ridge, Minnesota. *Wildlife Society Bulletin*, 879–887.
- McComb, B., B. Zuckerberg, D. Vesely, and C. Jordan (2010) *Monitoring Animal Populations and Their Habitats: a Practitioner's Guide*. CRC Press, Boca Raton, FL. 277 pp.
- O'Hara, P.D. and K.H. Morgan (2006) Do low rates of oiled carcass recovery in beached bird surveys indicate low rates of ship-source oil spills? *Marine Ornithology* 34: 133–140.
- Richardson, W.J. and W.W.H. Gunn (1971) Radar observations of bird movements in east-central Alberta. *Studies of Bird Hazards to Aircraft* (ed. V.E.F. Solman), pp. 35–68. Report No. 14. Canadian Wildlife Service, Ottawa, Canada.
- Ronconi, R.A. and C.C. St. Clair (2006) Efficacy of radar-activated on-demand systems for deterring waterfowl from oil sands tailings ponds. *Journal of Applied Ecology* 43: 111-119.
- Ronconi, R.A. (2006) Predicting bird oiling events at oil sands tailings ponds and assessing the importance of alternate water bodies for waterfowl: a preliminary assessment. *Canadian Field-Naturalist* 120: 1-9.
- Ronconi, R.A. (2011) Oil Sands Bird Contact Monitoring Plan for 2011. April 2011.
- St. Clair, C.C. (2011) Report on the October 2010 landings by birds in the oil sands region. Prepared for Alberta Environment and Alberta Justice at their request. November 2011, 37 pp. plus appendices.
- St. Clair, C.C. and S. Loots (2012) Oil sands bird contact monitoring plan for 2012. Prepared for oil sands operators, Alberta Environment and Water, and Alberta Sustainable Resource Development at their request. March 2012, 34 pp.

- St Clair, C.C., T. Habib, J. Ball and S. Loots (2012) *Regional Bird Monitoring Plan 2011 Annual Report*. Prepared for Alberta Environment and Water and mineable oil sands operators. March 2012, 144 pp. plus appendices.
- Shick, C.D. and D.R. Ambrock (1974) *Waterfowl investigations in the Athabasca tar sands area*. Canadian Wildlife Service.
- Walters, C.J. (1986) *Adaptive Management of Renewable Resources*. MacMillan Publishing Company, Vancouver, BC. 374 pp.
- Wiese, F. and P. Ryan (2003) The extent of chronic marine oil pollution in southeastern Newfoundland waters assessed through beached bird surveys 1984–1999. *Marine Pollution Bulletin* 46: 1090–1101.
- Wiese, F.K. and G.J. Robertson (2004) Assessing seabird mortality from chronic oil discharges at sea. *Journal of Wildlife Management* 68: 627-638.
- Yoccoz, N.G., J.D. Nichols, and T. Boulinier (2001) Monitoring of biological diversity in space and time. *Trends in Ecology and Evolution* 16: 446–453.
- Yonge, K. S., M. L., Christiansen, H. P. Samoil, J. A. Smith, and T. Van Meer (1981) Syncrude bird surveillance program: A methodology for assessing bird activity and bird losses associated with the tailings pond. Prepared for Syncrude Canada, Ltd. Edmonton.
- Yonge, K. S. and M. L. Christiansen (1979) A review of bird migration patterns and techniques for monitoring migration. Syncrude Canada, Ltd. Professional Paper 1981-2.
- Zimmerling, J.R. and C.M. Francis (2012) *Expediting wind energy development through improved and more efficient environmental assessment*. Canadian Wildlife Service, Environment Canada, Ottawa, Ontario.

### **TABLET FORMS**

Forms are available for download on tablets and will be provided via internet links in emails sent directly to operators.

### **TRAINING SEMINAR**

Several powerpoint presentations were provided to GoA and operators by email 5 April 2013 in four pdf documents. These are available on the RAPP site at the U of A.

### **APPENDIX A. ATTRIBUTES OF SPECIES DETECTED IN THE 2013 OSBCMP**

Bird type identifies target birds as those with foraging modes of dabbling, diving, or wading because they are more likely to come in contact with process-affected water. Within groups, birds are ordered taxonomically with the number assigned by the American Ornithologists' Union. Common names are given for families and species and risk status refers to provincial and federal standards.

### **APPENDIX B. SUMMARY OF LISTINGS FOR SPECIES AT RISK**

Designations are provided by the Committee on the Status of Endangered Wildlife in Canada (Federal Legal Status), the Endangered Species Conservation Committee (Provincial Legal Status) and the Government of Alberta's General Status of Alberta Wild Species (2010) with associated reporting requirements for Alberta Environment and Sustainable Resource Development (AESRD).

**Appendix A.** Attributes of species detected in the Oil Sands Bird Monitoring Program in 2013. Bird type identifies target birds as those with foraging modes of dabbling, diving, or wading because they are more likely to come in contact with process-affected water. Within groups, birds are ordered taxonomically with the number assigned by the American Ornithologists' Union. Common names are given for families and species and risk status refers to provincial and federal standards. Font colours highlight species with provincial and federal designations of risk status.

Target	Foraging Guild	Common Family	Common Name	Scientific Name	Alberta Risk Status	Federal Risk Status	AOU
Target	Dabbles	Geese	Greater White-fronted Goose	Anser albifrons	Secure	No listing	14
Target	Dabbles	Geese	Snow Goose	Chen caerulescens	Secure	No listing	17
Target	Dabbles	Geese	Cackling Goose	Branta hutchinsii	Accidental	No listing	21
Target	Dabbles	Geese	Canada Goose	Branta canadensis	Secure	No listing	22
Target	Dabbles	Swans	Tundra Swan	Cygnus columbianus	Secure	No listing	26
Target	Dabbles	Dabbling Ducks	Gadwall	Anas strepera	Secure	No listing	32
Target	Dabbles	Dabbling Ducks	American Wigeon	Anas americana	Secure	No listing	35
Target	Dabbles	Dabbling Ducks	Mallard	Anas platyrhynchos	Secure	No listing	37
Target	Dabbles	Dabbling Ducks	Blue-winged Teal	Anas discors	Secure	No listing	42
Target	Dabbles	Dabbling Ducks	Northern Shoveler	Anas clypeata	Secure	No listing	44
Target	Dabbles	Dabbling Ducks	Northern Pintail	Anas acuta	Sensitive	No listing	46
Target	Dabbles	Dabbling Ducks	Green-winged Teal	Anas crecca	Sensitive	No listing	49
Target	Dabbles	Pelicans	American White Pelican	Pelecanus erythrorhynchos	Sensitive	Not at Risk	205
Target	Dabbles	Rails	American Coot	Fulica americana	Secure	Not at Risk	360
Target	Dabbles	Dabbling Ducks	UNK Dabbling				
Target	Dabbles	Geese	UNK Goose				
Target	Dabbles	Swans	UNK Swan				
Target	Dabbles		UNK Dabbling Non-duck				
Target	Dives	Diving Ducks	Canvasback	Aythya valisineria	Secure	No listing	50
Target	Dives	Diving Ducks	Redhead	Aythya americana	Secure	No listing	51
Target	Dives	Diving Ducks	Ring-necked Duck	Aythya collaris	Secure	No listing	53
Target	Dives	Diving Ducks	Greater Scaup	Aythya marila	Secure	No listing	55
Target	Dives	Diving Ducks	Lesser Scaup	Aythya affinis	Sensitive	No listing	56
Target	Dives	Diving Ducks	Surf Scoter	Melanitta perspicillata	Secure	No listing	63
Target	Dives	Diving Ducks	White-winged Scoter	Melanitta fusca	Special Concern	No listing	64
Target	Dives	Diving Ducks	Long-tailed Duck	Clangula hyemalis	Secure	No listing	66
Target	Dives	Diving Ducks	Bufflehead	Bucephala albeola	Secure	No listing	67
Target	Dives	Diving Ducks	Common Goldeneye	Bucephala clangula	Secure	No listing	68
Target	Dives	Diving Ducks	Barrow's Goldeneye	Bucephala islandica	Secure	No listing	69
Target	Dives	Diving Ducks	Hooded Merganser	Lophodytes cucullatus	Secure	No listing	71
Target	Dives	Diving Ducks	Common Merganser	Mergus merganser	Secure	No listing	72
Target	Dives	Diving Ducks	Red-breasted Merganser	Mergus serrator	Secure	No listing	73
Target	Dives	Diving Ducks	Ruddy Duck	Oxyura jamaicensis	Secure	No listing	75
Target	Dives	Loons	Common Loon	Gavia immer	Secure	Not at Risk	136
Target	Dives	Grebes	Pied-billed Grebe	Podilymbus podiceps	Sensitive	No listing	138
Target	Dives	Grebes	Western Grebe	Aechmophorus occidentalis	Special Concern	No listing	140
Target	Dives	Pelicans	American White Pelican	Pelecanus erythrorhynchos	Sensitive	Not at Risk	205
Target	Dives	Cormorants	Double-crested Cormorant	Phalacrocorax auritus	Secure	Not at Risk	209
Target	Dives	Rails	American Coot	Fulica americana	Secure	Not at Risk	360
Target	Dives	Terns	Black Tern	Chlidonias niger	Sensitive	Not at Risk	497
Target	Dives	Terns	Common Tern	Sterna hirundo	Secure	Not at Risk	501
Target	Dives	Terns	Arctic Tern	Sterna paradisaea	Secure	No listing	502
Target	Dives	Kingfishers	Belted Kingfisher	Megaceryle alcyon	Secure	No listing	912
Target	Dives	Grebes	Eared Grebe	Podiceps nigricollis	Secure	No listing	1985
Target	Dives	Grebes	Horned Grebe	Podiceps auritus	Sensitive	Special Concern	1986
Target	Dives	Grebes	Red-necked Grebe	Podiceps grisegena	Secure	Not at Risk	1987
Target	Dives	Diurnal Raptors	Osprey	Pandion haliaetus	Sensitive	No listing	2005
Target	Dives	Diving Ducks	UNK Diver Duck				
Target	Dives	Diving Ducks	UNK Scaup				
Target	Dives		UNK Diver				
Target	Dives	Diving Ducks	UNK Merganser				
Target	Dives	Terns	UNK Tern				
Target	Dives	Diving Ducks	UNK Scoter				
Target	Dives	Grebes	UNK Grebe				
Target	Wades	Wading Birds	American Bittern	Botaurus lentiginosus	Sensitive	No listing	218
Target	Wades	Wading Birds	Great Blue Heron	Ardea herodias	Sensitive	No listing	224
Target	Wades	Rails	Yellow Rail	Coturnicops noveboracensis	Undetermined	Special Concern	333
Target	Wades	Rails	Sora	Porzana carolina	Sensitive	No listing	348
Target	Wades	Rails	American Coot	Fulica americana	Secure	Not at Risk	360
Target	Wades	Cranes	Sandhill Crane	Grus canadensis	Sensitive	No listing	365
Target	Wades	Cranes	Whooping Crane	Grus americana	At Risk	Endangered	367
Target	Wades	Plovers	Black-bellied Plover	Pluvialis squatarola	Secure	No listing	371
Target	Wades	Plovers	American Golden-Plover	Pluvialis dominica	Secure	No listing	373
Target	Wades	Plovers	Semipalmated Plover	Charadrius semipalmatus	Secure	No listing	381
Target	Wades	Plovers	Killdeer	Charadrius vociferus	Secure	No listing	384
Target	Wades	Stilts	American Avocet	Recurvirostra americana	Secure	No listing	392
Target	Wades	Sandpipers	Spotted Sandpiper	Actitis macularius	Secure	No listing	397

Target	Foraging Guild	Common Family	Common Name	Scientific Name	Alberta Risk Status	Federal Risk Status	AOU
Target	Wades	Sandpipers	Solitary Sandpiper	Tringa solitaria	Secure	No listing	399
Target	Wades	Sandpipers	Greater Yellowlegs	Tringa melanoleuca	Secure	No listing	403
Target	Wades	Sandpipers	Lesser Yellowlegs	Tringa flavipes	Secure	No listing	406
Target	Wades	Sandpipers	Upland Sandpiper	Bartramia longicauda	Sensitive	No listing	410
Target	Wades	Sandpipers	Whimbrel	Numenius phaeopus	Secure	No listing	413
Target	Wades	Sandpipers	Marbled Godwit	Limosa fedoa	Secure	No listing	422
Target	Wades	Sandpipers	Ruddy Turnstone	Arenaria interpres	Secure	No listing	423
Target	Wades	Sandpipers	Sanderling	Calidris alba	Secure	No listing	428
Target	Wades	Sandpipers	Semipalmated Sandpiper	Calidris pusilla	Secure	No listing	429
Target	Wades	Sandpipers	Least Sandpiper	Calidris minutilla	Secure	No listing	435
Target	Wades	Sandpipers	White-rumped Sandpiper	Calidris fuscicollis	Secure	No listing	436
Target	Wades	Sandpipers	Baird's Sandpiper	Calidris bairdii	Secure	No listing	437
Target	Wades	Sandpipers	Pectoral Sandpiper	Calidris melanotos	Secure	No listing	438
Target	Wades	Sandpipers	Dunlin	Calidris alpina	Secure	No listing	442
Target	Wades	Sandpipers	Stilt Sandpiper	Calidris himantopus	Secure	No listing	444
Target	Wades	Sandpipers	Short-billed Dowitcher	Limnodromus griseus	Undetermined	No listing	449
Target	Wades	Sandpipers	Wilson's Snipe	Gallinago delicata	Secure	No listing	452
Target	Wades	Sandpipers	Wilson's Phalarope	Phalaropus tricolor	Secure	No listing	457
Target	Wades	Sandpipers	Red-necked Phalarope	Phalaropus lobatus	Secure	No listing	458
Target	Wades	Unk shorebirds	UNK Shorebird				
Target	Wades	Sandpipers	UNK Yellowlegs				
Target	Wades	Sandpipers	UNK Sandpiper				
Target	Wades	Sandpipers	UNK Calidris				
Target	Wades	Unk Plovers	UNK Plover				
Target	Wades	Sandpipers	UNK Dowitcher				
Target	Wades	Sandpipers	UNK Phalarope				
Target	Wades	Cranes	UNK Crane				
Target	Wades		UNK Wader				
Target		Unk Ducks	UNK Duck				
Non-target	Depredates	Diurnal Raptors	Bald Eagle	Haliaeetus leucocephalus	Sensitive	Not at Risk	270
Non-target	Depredates	Diurnal Raptors	Northern Harrier	Circus cyaneus	Sensitive	Not at Risk	274
Non-target	Depredates	Diurnal Raptors	Sharp-shinned Hawk	Accipiter striatus	Secure	Not at Risk	278
Non-target	Depredates	Diurnal Raptors	Red-tailed Hawk	Buteo jamaicensis	Secure	Not at Risk	305
Non-target	Depredates	Diurnal Raptors	Rough-legged Hawk	Buteo lagopus	Secure	No listing	307
Non-target	Depredates	Diurnal Raptors	Golden Eagle	Aquila chrysaetos	Sensitive	Not at Risk	310
Non-target	Depredates	Diurnal Raptors	American Kestrel	Falco sparverius	Sensitive	No listing	323
Non-target	Depredates	Diurnal Raptors	Merlin	Falco columbarius	Secure	Not at Risk	325
Non-target	Depredates	Diurnal Raptors	Peregrine Falcon	Falco peregrinus	Threatened	Special Concern	331
Non-target	Depredates	Owls	Great Horned Owl	Bubo virginianus	Secure	No listing	681
Non-target	Depredates	Owls	Great Gray Owl	Strix nebulosa	Sensitive	Not at Risk	698
Non-target	Depredates		UNK Depredates				
Non-target	Flies	Nighthawks	Common Nighthawk	Chordeiles minor	Sensitive	Threatened	709
Non-target	Flies	Flycatchers	Yellow-bellied Flycatcher	Empidonax flaviventris	Undetermined	No listing	1070
Non-target	Flies	Flycatchers	Alder Flycatcher	Empidonax alnorum	Secure	No listing	1140
Non-target	Flies	Flycatchers	Least Flycatcher	Empidonax minimus	Sensitive	No listing	1143
Non-target	Flies	Flycatchers	Eastern Kingbird	Tyrannus tyrannus	Secure	No listing	1196
Non-target	Flies	Swallows	Tree Swallow	Tachycineta bicolor	Secure	No listing	1318
Non-target	Flies	Swallows	Northern Rough-winged Swallow	Stelgidopteryx serripennis	Secure	No listing	1326
Non-target	Flies	Swallows	Bank Swallow	Riparia riparia	Secure	Threatened	1328
Non-target	Flies	Swallows	Cliff Swallow	Petrochelidon pyrrhonota	Secure	No listing	1329
Non-target	Flies	Swallows	Barn Swallow	Hirundo rustica	Sensitive	Threatened	1331
Non-target	Flies	Starlings	European Starling	Sturnus vulgaris	Exotic	No listing	1509
Non-target	Flies	Longspurs	Lapland Longspur	Calcarius lapponicus	Secure	No listing	1733
Non-target	Flies	Swallows	UNK Swallow				
Non-target	Gleans	Woodpeckers	Yellow-bellied Sapsucker	Sphyrapicus varius	Secure	No listing	956
Non-target	Gleans	Woodpeckers	Northern Flicker	Colaptes auratus	Secure	No listing	979
Non-target	Gleans	Chickadees	Black-capped Chickadee	Poecile atricapillus	Secure	No listing	1334
Non-target	Gleans	Pipits	American Pipit	Anthus rubescens	Secure	No listing	1521
Non-target	Gleans	Warblers	Yellow Warbler	Setophaga petechia	Secure	No listing	1545
Non-target	Gleans	Warblers	Yellow-rumped Warbler	Setophaga coronata	Secure	No listing	1550
Non-target	Gleans	Warblers	Common Yellowthroat	Geothlypis trichas	Sensitive	No listing	1587
Non-target	Gleans	Sparrows	Savannah Sparrow	Passerculus sandwichensis	Secure	No listing	1715
Non-target	Gleans	Sparrows	Song Sparrow	Melospiza melodia	Secure	No listing	1722
Non-target	Gleans	Sparrows	White-throated Sparrow	Zonotrichia albicollis	Secure	No listing	1726
Non-target	Gleans	Longspurs	Lapland Longspur	Calcarius lapponicus	Secure	No listing	1733
Non-target	Gleans	Sparrows	Clay-colored Sparrow	Spizella pallida	Secure	No listing	2048
Non-target	Gleans		UNK Gleans				
Non-target	Gleans	Woodpeckers	UNK Woodpecker				
Non-target	Pecks	Upland Game Birds	Ruffed Grouse	Bonasa umbellus	Secure	No listing	98
Non-target	Pecks	Upland Game Birds	Sharp-tailed Grouse	Tympanuchus phasianellus	Sensitive	No listing	107
Non-target	Pecks	Plovers	Killdeer	Charadrius vociferus	Secure	No listing	384
Non-target	Pecks	Terns	Common Tern	Sterna hirundo	Secure	Not at Risk	501



Target	Foraging Guild	Common Family	Common Name	Scientific Name	Alberta Risk Status	Federal Risk Status	AOU
Non-target	Pecks	Doves	Mourning Dove	Zenaidura macroura	Secure	No listing	556
Non-target	Pecks	Woodpeckers	Northern Flicker	Colaptes auratus	Secure	No listing	979
Non-target	Pecks	Flycatchers	Eastern Phoebe	Sayornis phoebe	Sensitive	No listing	1154
Non-target	Pecks	Larks	Horned Lark	Eremophila alpestris	Secure	No listing	1310
Non-target	Pecks	Swallows	Barn Swallow	Hirundo rustica	Sensitive	Threatened	1331
Non-target	Pecks	Thrushes	American Robin	Turdus migratorius	Secure	No listing	1472
Non-target	Pecks	Starlings	European Starling	Sturnus vulgaris	Exotic	No listing	1509
Non-target	Pecks	Pipits	American Pipit	Anthus rubescens	Secure	No listing	1521
Non-target	Pecks	Sparrows	American Tree Sparrow	Spizella arborea	Secure	No listing	1704
Non-target	Pecks	Sparrows	Chipping Sparrow	Spizella passerina	Secure	No listing	1705
Non-target	Pecks	Sparrows	Savannah Sparrow	Passerculus sandwichensis	Secure	No listing	1715
Non-target	Pecks	Sparrows	Fox Sparrow	Passerella iliaca	Secure	No listing	1721
Non-target	Pecks	Sparrows	Song Sparrow	Melospiza melodia	Secure	No listing	1722
Non-target	Pecks	Sparrows	Lincoln's Sparrow	Melospiza lincolni	Secure	No listing	1723
Non-target	Pecks	Sparrows	Swamp Sparrow	Melospiza georgiana	Secure	No listing	1724
Non-target	Pecks	Sparrows	White-throated Sparrow	Zonotrichia albicollis	Secure	No listing	1726
Non-target	Pecks	Sparrows	Harris's Sparrow	Zonotrichia querula	Secure	No listing	1727
Non-target	Pecks	Sparrows	Dark-eyed Junco	Junco hyemalis	Secure	No listing	1730
Non-target	Pecks	Longspurs	Lapland Longspur	Calcarius lapponicus	Secure	No listing	1733
Non-target	Pecks	Longspurs	Smith's Longspur	Calcarius pictus	Secure	No listing	1734
Non-target	Pecks	Buntings	Snow Bunting	Plectrophenax nivalis	Secure	No listing	1744
Non-target	Pecks	Blackbirds	Red-winged Blackbird	Agelaius phoeniceus	Secure	No listing	1772
Non-target	Pecks	Blackbirds	Rusty Blackbird	Euphagus carolinus	Sensitive	Special Concern	1784
Non-target	Pecks	Blackbirds	Brewer's Blackbird	Euphagus cyanocephalus	Secure	No listing	1785
Non-target	Pecks	Blackbirds	Common Grackle	Quiscalus quiscula	Secure	No listing	1786
Non-target	Pecks	Blackbirds	Brown-headed Cowbird	Molothrus ater	Secure	No listing	1795
Non-target	Pecks	Sparrows	Le Conte's Sparrow	Ammodramus leconteii	Secure	No listing	2040
Non-target	Pecks	Sparrows	Clay-colored Sparrow	Spizella pallida	Secure	No listing	2048
Non-target	Pecks	Blackbirds	Yellow-headed Blackbird	Xanthocephalus xanthocephalus	Secure	No listing	2067
Non-target	Pecks	Finches	Purple Finch	Carpodacus purpureus	Secure	No listing	10351
Non-target	Pecks		UNK Passerine				
Non-target	Pecks		UNK Pecks				
Non-target	Pecks	Sparrows	UNK Sparrow				
Non-target	Pecks	Blackbirds	UNK Blackbird				
Non-target	Scavenges	Gulls	Ring-billed Gull	Larus delawarensis	Secure	No listing	465
Non-target	Scavenges	Gulls	California Gull	Larus californicus	Secure	No listing	466
Non-target	Scavenges	Gulls	Herring Gull	Larus argentatus	Secure	No listing	467
Non-target	Scavenges	Gulls	Franklin's Gull	Leucophaeus pipixcan	Secure	No listing	479
Non-target	Scavenges	Corvids	Black-billed Magpie	Pica hudsonia	Secure	No listing	1293
Non-target	Scavenges	Corvids	American Crow	Corvus brachyrhynchos	Secure	No listing	1296
Non-target	Scavenges	Corvids	Common Raven	Corvus corax	Secure	No listing	1307
Non-target	Scavenges	Corvids	Rusty Blackbird	Euphagus carolinus	Sensitive	Special Concern	1784
Non-target	Scavenges	Corvids	Gray Jay	Perisoreus canadensis	Secure	No listing	1978
Non-target	Scavenges	Gulls	Bonaparte's Gull	Chroicocephalus philadelphia	Secure	No listing	1993
Non-target	Scavenges	Gulls	UNK Gull				
Non-target	Scavenges	Gulls	UNK BH Gull				
Non-target	Scavenges	Corvids	UNK Corvid				

**Appendix B.** Summary of listings for species at risk as designated by the Committee on the Status of Endangered Wildlife in Canada (Federal Legal Status), the Endangered Species Conservation Committee (Provincial Legal Status) and the Government of Alberta's General Status from 2010 with associated reporting requirements for Alberta Environment and Sustainable Resource Development (AESRD).

Species	Federal Legal Status	Provincial Legal Status	Provincial General Status	Immediate Reporting - Landing	Immediate Reporting - Observation	Incidental Recording
Bank Swallow ( <i>Riparia riparia</i> )	Threatened	N/A	Secure	Yes	No	Yes
Barn Swallow ( <i>Hirundo rustica</i> )	Threatened	N/A	Sensitive	Yes	No	Yes
Buff-breasted Sandpiper ( <i>Tryngites subruficollis</i> )	Special Concern	N/A	Secure	Yes	No	Yes
Canada Warbler ( <i>Wilsonia canadensis</i> )	Threatened	N/A	Sensitive	Yes	No	Yes
Common Nighthawk ( <i>Chordeiles minor</i> )	Threatened	N/A	Sensitive	Yes	No	Yes
Horned Grebe ( <i>Podiceps auritus</i> )	Special Concern	N/A	Sensitive	Yes	No	Yes
Olive-sided Flycatcher ( <i>Contopus cooperi</i> )	Threatened	N/A	Secure	Yes	No	Yes
Peregrine Falcon ( <i>Falco peregrinus</i> )	Special Concern	Threatened	At Risk	Yes	No	Yes
Red Knot ( <i>Calidris canutus rufa</i> )	Endangered	N/A	May be at risk	Yes	No	Yes
Rusty Blackbird ( <i>Euphagus carolinus</i> )	Special Concern	N/A	Sensitive	Yes	No	Yes
Short-eared Owl ( <i>Asio flammeus</i> )	Special Concern	N/A	May be at risk	Yes	No	Yes
Trumpeter Swan ( <i>Cygnus buccinator</i> )	Not at Risk	Threatened	At Risk	Yes	No	Yes
Whooping Crane ( <i>Grus americana</i> )	Endangered	Endangered	At Risk	Yes	Yes	Yes
Yellow Rail ( <i>Coturnicops noveboracensis</i> )	Special Concern	N/A	Undetermined	Yes	No	Yes
American Bittern ( <i>Botaurus lentiginosus</i> )	N/A	N/A	Sensitive	No	No	Yes
American Kestrel ( <i>Falco sparverius</i> )	N/A	N/A	Sensitive	No	No	Yes
American White Pelican ( <i>Pelecanus erythrorhynchos</i> )	Not at Risk	N/A	Sensitive	No	No	Yes
Bald Eagle ( <i>Haliaeetus leucocephalus</i> )	Not at Risk	N/A	Sensitive	No	No	Yes
Barred Owl ( <i>Strix varia</i> )	N/A	Special Concern	Sensitive	No	No	Yes
Bay-breasted Warbler ( <i>Dendroica castanea</i> )	N/A	In Process	Sensitive	No	No	Yes
Black Tern ( <i>Chlidonias niger</i> )	Not at Risk	N/A	Sensitive	No	No	Yes
Black-backed Woodpecker ( <i>Picoides arcticus</i> )	N/A	N/A	Sensitive	No	No	Yes
Black-throated Green Warbler ( <i>Dendroica virens</i> )	N/A	Special Concern	Sensitive	No	No	Yes
Brown Creeper ( <i>Certhia americana</i> )	N/A	N/A	Sensitive	No	No	Yes
Cape May Warbler ( <i>Dendroica tigrina</i> )	N/A	In Process	Sensitive	No	No	Yes
Caspian Tern ( <i>Sterna caspia</i> )	Not at Risk	N/A	Sensitive	No	No	Yes
Common Yellowthroat ( <i>Geothlypis trichas</i> )	N/A	N/A	Sensitive	No	No	Yes
Eastern Phoebe ( <i>Sayornis phoebe</i> )	N/A	N/A	Sensitive	No	No	Yes
Golden Eagle ( <i>Aquila chrysaetos</i> )	Not at Risk	N/A	Sensitive	No	No	Yes
Great Blue Heron ( <i>Ardea herodias</i> )	N/A	N/A	Sensitive	No	No	Yes
Great Gray Owl ( <i>Strix nebulosa</i> )	Not at Risk	N/A	Sensitive	No	No	Yes
Green-winged Teal ( <i>Anas crecca</i> )	N/A	N/A	Sensitive	No	No	Yes
Least Flycatcher ( <i>Empidonax minimus</i> )	N/A	N/A	Sensitive	No	No	Yes
Lesser Scaup ( <i>Aythya affinis</i> )	N/A	N/A	Sensitive	No	No	Yes
Northern Goshawk ( <i>Accipiter gentilis</i> )	Not at Risk	N/A	Sensitive	No	No	Yes
Northern Harrier ( <i>Circus cyaneus</i> )	Not at Risk	N/A	Sensitive	No	No	Yes
Northern Hawk Owl ( <i>Surnia ulula</i> )	Not at Risk	N/A	Sensitive	No	No	Yes
Northern Pintail ( <i>Anas acuta</i> )	N/A	N/A	Sensitive	No	No	Yes
Osprey ( <i>Pandion haliaetus</i> )	N/A	N/A	Sensitive	No	No	Yes
Pied-billed Grebe ( <i>Podilymbus podiceps</i> )	N/A	N/A	Sensitive	No	No	Yes
Pileated Woodpecker ( <i>Dryocopus pileatus</i> )	N/A	N/A	Sensitive	No	No	Yes
Sandhill Crane ( <i>Grus canadensis</i> )	N/A	N/A	Sensitive	No	No	Yes
Sharp-tailed Grouse ( <i>Tympanuchus phasianellus</i> )	N/A	N/A	Sensitive	No	No	Yes
Short-billed Dowitcher ( <i>Limnodromus griseus</i> )	N/A	N/A	Undetermined	No	No	Yes
Sora ( <i>Porzana carolina</i> )	N/A	N/A	Sensitive	No	No	Yes
Upland Sandpiper ( <i>Bartramia longicauda</i> )	N/A	N/A	Sensitive	No	No	Yes
Western Grebe ( <i>Aechmophorus occidentalis</i> )	N/A	Special Concern	Sensitive	No	No	Yes
Western Tanager ( <i>Piranga ludoviciana</i> )	N/A	N/A	Sensitive	No	No	Yes
White-winged Scoter ( <i>Melanitta fusca</i> )	N/A	Special Concern	Sensitive	No	No	Yes
Yellow-bellied Flycatcher ( <i>Empidonax flaviventris</i> )	N/A	N/A	Undetermined	No	No	Yes