Alberta Biodiversity Monitoring Institute

The STATUS OF LANDBIRDS in Alberta's Boreal Plains Ecozone

Supplementary Report 2012

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1.0 Introduction

The report *The Status of Landbirds in Alberta's Boreal Plains Ecozone* provides a high-level overview of landbirds, habitat attributes and human development in Alberta's portion of the Boreal Plains Ecozone. This supplemental report provides the detailed methods and results that the Alberta Biodiversity Monitoring Institute (ABMI) used to generate the high-level findings presented in the status report (available at: www.abmi.ca).

2.0 About the ABMI

The ABMI is a province-wide, long-term monitoring program designed to support natural resource decision making. The ABMI provides relevant, timely and credible scientific knowledge on the state of provincial biodiversity and wildlife. Monitoring survey design and methods are regularly and extensively peer-reviewed by the greater scientific community to ensure scientific credibility.

Services offered by the Institute include: public access to raw data and value-added information products. These two services are designed to encourage:

1. ***Application –*** Return on investment in biodiversity monitoring is realized only if the resulting knowledge is applied. Public and timely access to ABMI products encourages the use of information in decision-making processes including resource management and public policy.
2. ***Transparency*** – Scientific credibility is at the foundation of the ABMI. Scientific inference produced by the Institute, or any other third-party, must be subject to independent audit and verification by the greater research and management community.
3. ***Efficiency –*** Collection and management of comprehensive, science-based biodiversity data is a significant investment. Use of this information by many stakeholders will reduce redundancy and costs in provincial environmental monitoring.
4. ***Innovation*** – Long-term, scientifically rigorous environmental data sets are highly valuable to the research and management communities. By making the ABMI's data publicly available, significant innovation is anticipated to occur in the discipline of sustainable resource management.
5. ***Awareness*** –The ABMI produces publicly available information on the status of biodiversity in different regions of interest in the province. Public access to this information raises awareness about changes in provincial biodiversity over time.

Under sustainable resource management systems, monitoring information is needed to assess the effectiveness of policies and programs: the ABMI is a key component in achieving the vision of sustainable resource management. Monitoring allows for confirmation when actions are successful or provides insight into what changes might be needed when desired outcomes are not being attained. As applied to biodiversity, monitoring should assess the effectiveness of resource management and support its improvement. The ABMI's information can be used to support the preparation of management plans and responses, as well as to identify any gaps in our understanding of the implications associated with changes in biodiversity.

This description of the ABMI's strengths is not meant to be restrictive. The ABMI recognizes, and encourages, the innovative use of the Institute's information. However, we strongly urge practitioners to make use of ABMI information in a responsible manner.

2.1 "Preliminary" Characterization of the Status Report

We characterize the status report as a preliminary assessment of landbirds in Alberta's Boreal Plains Ecozone (BPE) for two reasons. First, we have not implemented ABMI protocols at all sites in the BPE. As a result, the statistical confidence associated with results presented in the status report will be enhanced as additional data is collected and analyzed for this ecozone. As we collect this additional data, we will remove the "preliminary" characterization of the report.

Second, we have not presented results for all the indicator types that are monitored by the ABMI. Future reports will include the assessment of status and trends for more landbird species and habitats as monitoring information continues to build. These same assessments will be available for other planning regions in Alberta as well.

3.0 Sampling Design

The ABMI has 950 permanent sites systematically located throughout the BPE representing all ecoregions in Alberta (Figure 1; Table 1). We implemented ABMI spring data collection protocols at 347 permanent ABMI monitoring sites between 2003 and 2011 in Alberta's BPE, and 162 out of 415 sites in the JCA oil sands region. Starting in May, through to the end of June, we sample breeding birds, trees, downed woody materials, site capability, and physical characteristics. We implement protocols in the same way at all sites in each sampling year, except where protocol updates are noted in our methodology (see Further Reading at the end of this document). Detailed data analysis protocols are available from the ABMI website (www.abmi.ca) under Reports: ABMI documents 20029 and 20030 (see Further Reading at the end of this document). We report on the status of biodiversity in the BPE using only statistical results relevant to this ecozone, or regions specified therein.

Table 1. Summary of ecoregions contained in the Boreal Plains Ecozone including an area summary and a summary of ABMI monitoring activity. Includes only those ecoregions that occur in Alberta.

Ecoregions	Total Area (km^2)	Area in AB (km^2)	% Area in AB	% Area of AB	Total # of ABMI Sites	Total # of Sites Sampled
Boreal Transition	101,370	43,580	43	7	108	37
Clear Hills Upland	45,522	23,511	52	4	60	10
Mid-Boreal Uplands	202,900	87,915	43	13	215	106
Peace Lowland	69,974	60,131	86	9	144	23
Slave River Lowland	51,013	34,782	68	5	85	26
Wabasca Lowland	51,569	51,569	100	8	134	56
Western Alberta Upland	75,758	68,475	90	10	177	76
Western Boreal	11,716	11,393	97	2	27	13
Entire Boreal Plains Ecozone	745,000	381,000	54	58	950	347

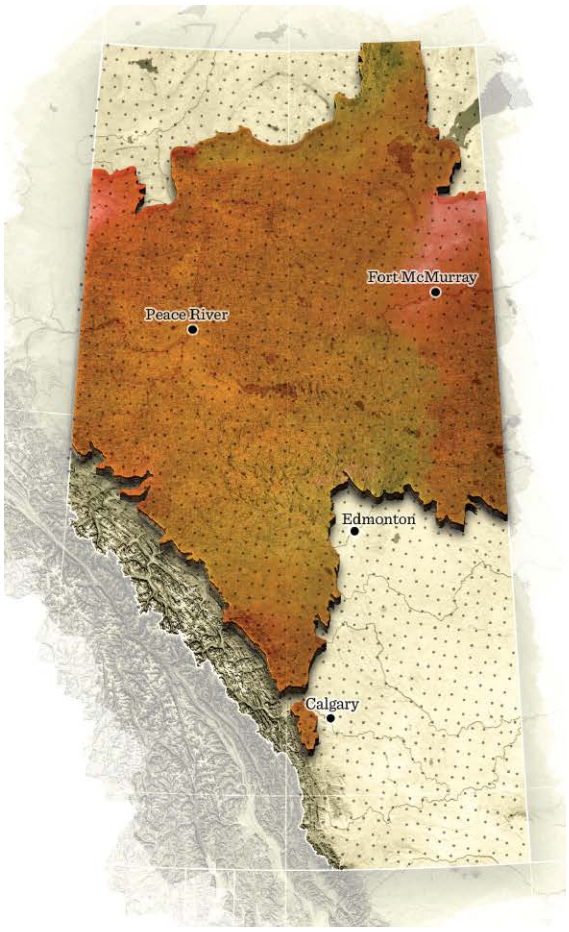

Figure 1. The ABMI has 950 survey sites in Alberta's portion of the Boreal Plains Ecozone**.**

4.0 Amount of Human Footprint – Remote Sensing Surveys

We have developed an inventory of human footprint for Alberta in order to track the status and trends in land use for any region in the province. At present, we have developed and validated an inventory for Alberta (circa 2007 and 2010) for all major human development activity. We use this information to report on changes in human footprint. We plan to update this inventory every two to three years.

The ABMI defines human footprint (aka, human land use) as the visible conversion of native ecosystems to temporary or permanent residential, recreational, or industrial landscapes. This includes land conversion activities that support the forest, agriculture and energy industries, commercial and residential settlement, recreational infrastructure, and transportation infrastructure.

4.1 Methods

Using existing provincial GIS layers in conjunction with ABMI-created or -validated provincial inventories, we assessed human footprint across Alberta, including the BPE. We started with Government of Alberta (GoA) GIS data sources (Table 2) to represent human footprint features on the landscape. To the degree practical, we corrected or created human footprint features when source data was inaccurate or missing. We developed new provincial inventories for human residential features and for provincial agriculture. We validated source data and created new provincial inventories using SPOTS imagery (circa 2007 and 2010).

Table 2. Sources for base features used to represent human footprint.

Features	Source	Year Represented
Forest harvesting	Alberta Vegetation Inventory (AVI) and AVI Updates and in conjunction with ABMI-created inventory (based on SPOT 2007 and 2010 mosaic of the province)	2007 and 2010
Agriculture	Grassland Vegetation Inventory (GVI) in conjunction with ABMI-created provincial inventory (based on SPOT 2007 and 2010 mosaic of the province)	2007 and 2010
Cities and Settlements	ABMI created inventory (based on SPOT 2007 and 2010 mosaic of the province)	2007 and 2010
Roads	Provincial "roads" GIS data layer (line; GoA source) and in conjunction with ABMI-created area estimates for linear features.	2008 and 2010
Wellsites	Provincial "wellsites" GIS data layer (point;GoA source) and in conjunction with ABMI validation procedures	2007 and 2010
Pipelines	Provincial "pipelines" GIS data layer (line; GoA source)	2008 and 2010
Power Lines	Provincial "powerlines" GIS data layer (line; GoA source)	2008 and 2010
Rail Lines	Provincial "raillines" GIS data layer (line; GoA source)	2006 and 2010
Cutlines	Provincial "cutlines" GIS data layer (line; GoA source)	2008 and 2010
Facilities	Provincial "facilities" GIS data layer (line; GoA source) and in conjunction with ABMI validation procedures	2007 and 2010

We created new inventory for cities, human settlement, oil sands facilities and mines, and farmsteads so that data would conform to the ABMI's human footprint categories and were scientifically credible. Other data used included: roads, well sites, facilities, pipelines, power lines, railways, and cutlines (seismic lines and narrow trails).

4.2 Results

As of 2010, the total human footprint across the entire BPE was 21% and included 12% agricultural cultivation as the largest total human footprint (Table 3). In comparison, the JCA oil sands region had 12% total human footprint and 6% cultivation (Table 4).

The type and amount of human footprint in the BPE provides context for interpreting the status of landbird species and habitats.

Table 3. The percentage of human footprint in the entire Boreal Plains Ecozone and in the eight federal ecoregions that compose the BPE. (Note: detail may not sum to totals because of rounding)

Ecoregions	Cultivation and Irrigation Infrastructure	Forest Harvesting	Transportation Infrastructure	Residential, Commercial, and Energy Infrastructure	Total human Footprint by Ecoregion
Boreal Transition	47	1	3	4	54
Clear Hills Upland	<1	5	<1	2	8
Mid-Boreal Uplands	1	4	<1	2	8
Peace Lowland	31	3	1	2	37
Slave River Lowland	<1	<1	<1	1	1
Wabasca Lowland	<1	3	<1	2	6
Western Alberta Upland	4	18	1	3	27
Western Boreal	11	9	1	3	24
Total Human Footprint (%)	12	6	1	3	21

Table 4. The percentage of human footprint in the JCA oil sands region, 90% of which falls within the Boreal Plains Ecozone. (Note: detail may not sum to totals because of rounding)

Human Footprint Category	Total Human Footprint (%)
Cultivation and Irrigation Infrastructure	6
Forest Harvesting	3
Residential, Commercial, and Energy Infrastructure	2
Transportation Infrastructure	<1
Total	12

5.0 Predicted Landbird Abundance Mapping Methods and Results

The ABMI builds statistical models that describe the relationship between land use, habitat, and the relative abundance of individual species. These statistical models are developed and maintained for hundreds of species across Alberta. One of the uses of these statistical models is to predict the intactness of each landbird species in every quarter section of land in the BPE. Using the ABMI's Inventory of Human Footprint (circa 2010), it is possible to project the average intactness for 74 landbird species in the BPE. Predictive mapping of species abundance is an example of a tool that can be used to enhance certainty in policy and management activities in the BPE.

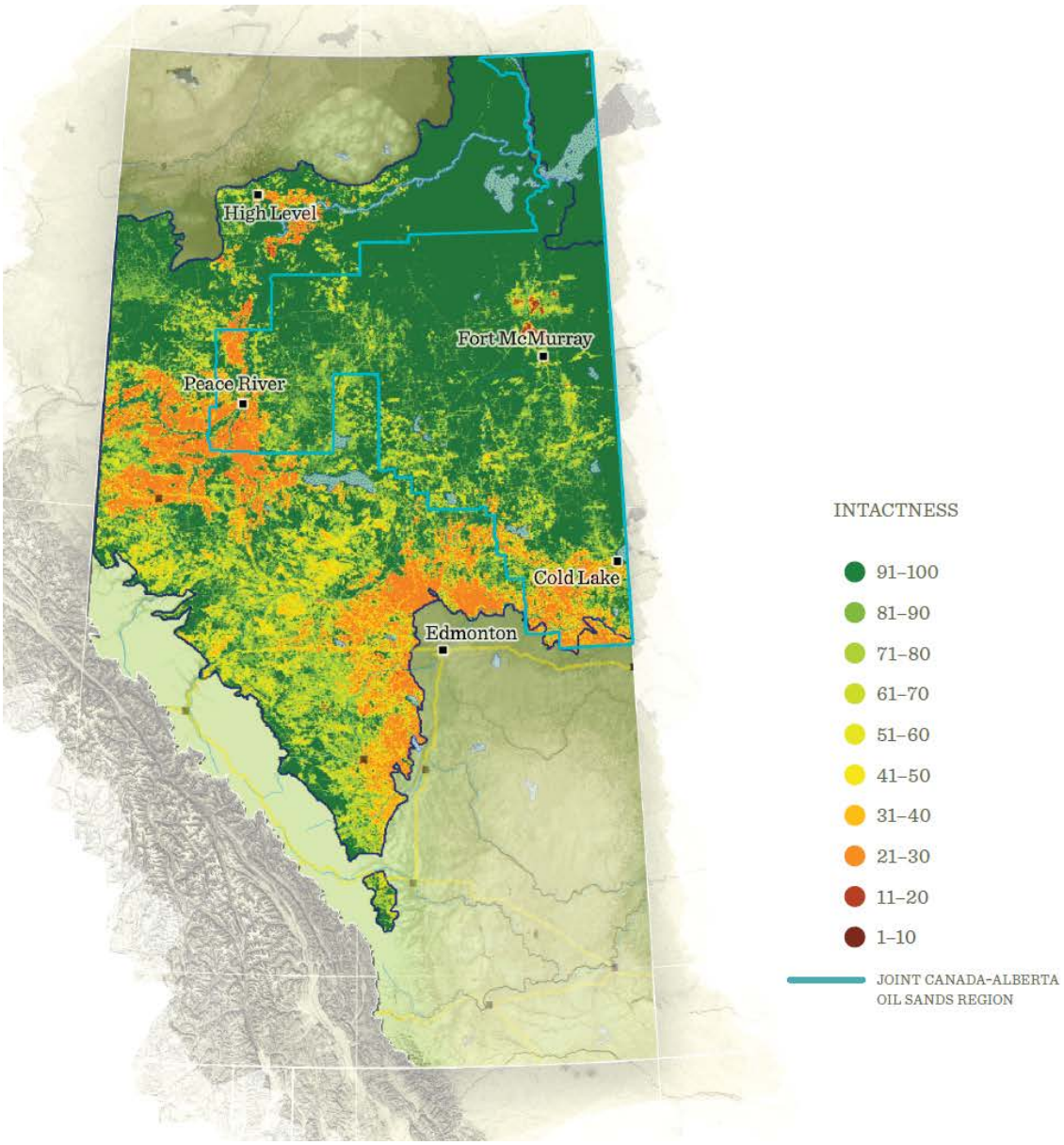

Figure 2. Average predicted intactness for 74 landbird species in the Boreal Plains Ecozone of Alberta. Dark red identifies the quarter-sections that are predicted to have the lowest average landbird intactness values.

6.0 Breeding Bird Methods and Results

6.1 Breeding Bird Survey Methods

At each site, we measured breeding birds at nine point-count stations arranged in a grid pattern with point-count station #1 located at site-centre and the remaining stations located at 300 m intervals in a

square around site centre (Figure 3). We conducted breeding bird surveys from one half hour before sunrise to 10:00 am.

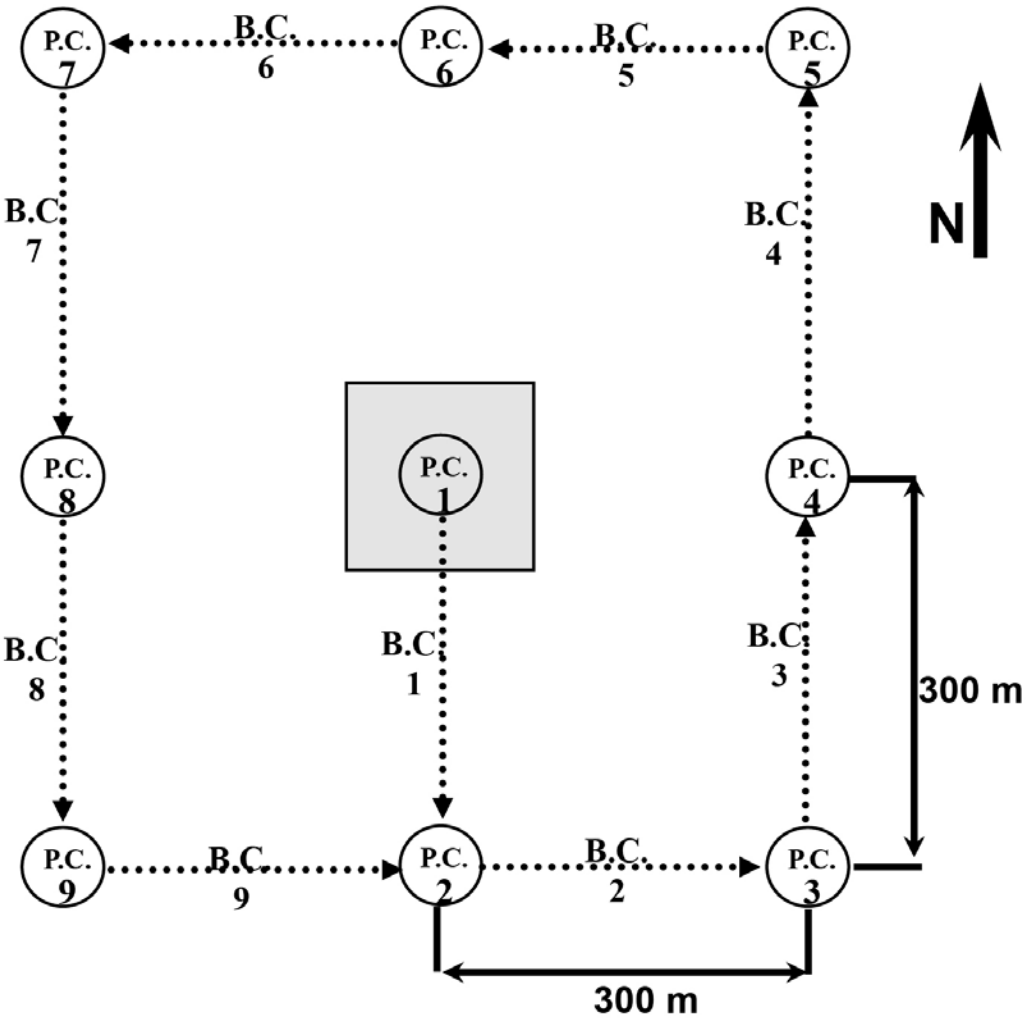

Figure 3. Diagram showing the layout of the nine bird-point count stations at the ABMI's terrestrial survey sites. Technicians proceed consecutively from station 1 to station 9.

We recorded vocalizations of birds for 10 minutes at each point-count station using an omni-directional microphone (CZM microphone; River Forks Research Corp.) mounted at ear level on a professional tripod and connected to a mini recorder. We recorded birds on an iRiver HP-120 Recorder or a Marantz PMD670 Solid State recorder at 320 kbps in .mp3 format. We calibrated the recorder volume to be in the mid ranges.

While conducting the 10-minute bird recordings, we scanned the areas surrounding the point-count station for all birds (even those vocalizing), noting species, number of individuals (including flock sizes of birds flying overhead), and distance from the point-count station, for all bird observations. We also noted factors that potentially bias bird recordings, such as wind speed, precipitation, and human-caused noise. In addition, we recorded detailed information on the physical and ecological characteristics within 150 m around the point-count station. Ecological information recorded included the ecosite type, any human and/or natural disturbance (e.g. cutblocks, fires, roads), the dominant tree species, average distance between trees, tree heights, and shrub and herbaceous cover. Physical conditions include the slope, aspect, and proportion of bare ground and/or water present.

When bird point-count stations were located within a waterbody, we established a new station if we were able to get within 100 m of the original point (i.e., <200 m from the last point), recording the new GPS location and distance and direction from the original station. If it was not possible to get within 100 m of the point (i.e., <200 m from the last point), we conducted a 10-minute visual point-count of the waterbody, noting observations with the recorder. We may not have sampled certain points because they were inaccessible (e.g., a stream made access hazardous or impossible).

We analyzed bird recordings in a laboratory setting. We identified the species, time of first detection (within 10 second intervals), behaviour (e.g., singing, calling, or alarm-calling), and the time interval that individual birds were detected. We recognized three time intervals: Interval 1 (0–200 seconds), Interval 2 (201–400 seconds), and Interval 3 (401–600 seconds). Individual birds were detected in 1, 2, or 3 of the time intervals.

6.2 Breeding Bird Data Analysis

For each species detected at each site, we calculated the relative abundance as the occurrence at each point-count station (0 through 9). We determined intactness values for each species that was detected at a minimum of 15 sites in the Boreal Plains Ecozone. We also summarized intactness for birds in the Alberta's oil sands region as it is defined in the Joint Canada-Alberta Implementation Plan for Oil Sands Monitoring Report (JCA oil sands region), 90% of which is located in the BPE. A comprehensive description of the scientific methods used in analyses of data for this report is described in:

- Alberta Biodiversity Monitoring Institute. 2011. *Manual for Estimating Species and Habitat Structure Intactness* (20029), Version 2011-07-07. Alberta Biodiversity Monitoring Institute, Alberta, Canada. Report available at http://abmi.ca/abmi/reports/reports.jsp .

Results are summarized for all landbirds and six landbird guilds. We classified landbirds into five guilds based on life history characteristics or habitat requirements: neotropical migrants; old-forest specialists; forest interior specialists; winter residents, and human-associated landbirds. We also derived intactness values for landbird species at risk as designated by the following sources (**Table 5**):

1. General Status of Alberta Wild Species 2010

2. Canada's Species at Risk Act (SARA),
3. Alberta's Wildlife Act
4. Canada's Committee on the Status of Endangered Wildlife in Canada (COSEWIC)
5. Alberta's Endangered Species Conservation Committee (ESCC)

Table 5. Summary of landbird species of at risk with at least 15 detections by the ABMI in the Boreal Plains Ecozone. No species analyzed by the ABMI is considered Threatened or Endangered under the Wildlife Act in Alberta.

Common Name	Scientific Name	Occurrence (%)	AB Status	SARA Status	COSEWIC	AB ESCC 2010
Barn Swallow	*Hirundo rustica*	6	Sensitive		Threatened	
Bay-breasted Warbler	*Dendroica castanea*	12	Sensitive			In Process
Black-throated Green Warbler	*Dendroica virens*	14	Sensitive			Special Concern
Brown Creeper	*Certhia americana*	6	Sensitive			
Canada Warbler	*Wilsonia canadensis*	16	Sensitive	Threatened	Threatened	
Cape May Warbler	*Dendroica tigrina*	24	Sensitive			In Process
Common Yellowthroat	*Geothlypis trichas*	36	Sensitive			
Least Flycatcher	*Empidonax minimus*	56	Sensitive			
Olive-sided Flycatcher	*Contopus cooperi*	15	May Be At Risk	Threatened	Threatened	
Pileated Woodpecker	*Dryocopus pileatus*	17	Sensitive			
Rusty Blackbird	*Euphagus carolinus*	8	Sensitive	Special Concern	Special Concern	
Western Tanager	*Piranga ludoviciana*	40	Sensitive			
Western Wood Pewee	*Contopus sordidulus*	18	Sensitive			
Yellow-bellied Flycatcher	*Empidonax flaviventris*	9	Undetermined			

6.3 Landbird Results

6.3.1 Intactness of Landbirds in the Boreal Plains Ecozone

Table 6. Complete list of breeding landbird species analyzed in the BPE and the JCA oil sands region including: Species common name, Species scientific name, Percent (%) Occurrence, Intactness, and whether it was more abundant (Above) or less abundant (below) than expected compared to reference conditions. Detailed statistics available in The Status of Landbirds in the Boreal Plains Ecozone: Supplementary Data File 2012 (00070), Version 2012-09-15, Alberta Biodiversity Monitoring Institute, Alberta, Canada.

		Boreal Plains Ecozone			JCA Oil Sands Region	
Species (Common Name)	**Species (Scientific Name)**	**Occurrence in the Boreal Plains Ecozone (%)**	**Intactness Index (0-100 scale)**	**Above or Below Reference Conditions**	**Intactness Index (0-100 scale)**	**Above or Below Reference Conditions**
Alder Flycatcher	*Empidonax alnorum*	40	78	Above	87	Above
American Crow	*Corvus brachyrhynchos*	23	26	Above	39	Above
American Goldfinch	*Carduelis tristis*	22	56	Above	67	Above
American Redstart	*Setophaga ruticilla*	39	99	Below	99	Below
American Robin	*Turdus migratorius*	50	71	Above	80	Above
Bank Swallow	*Riparia riparia*	7	54	Above	69	Above
Barn Swallow	*Hirundo rustica*	6	21	Above	26	Above
Bay-breasted Warbler	*Dendroica castanea*	12	89	Below	92	Below
Black and White Warbler	*Mniotilta varia*	31	94	Below	97	Below
Black-billed Magpie	*Pica hudsonia*	8	18	Above	23	Above
Black-capped Chickadee	*Poecile atricapillus*	30	99	Above	99	Above
Blackpoll Warbler	*Dendroica striata*	7	82	Below	89	Below
Black-throated Green Warbler	*Dendroica virens*	14	81	Below	87	Below
Blue-headed (solitary) Vireo	*Vireo solitarius*	31	80	Below	89	Below
Blue Jay	*Cyanocitta cristata*	14	100	Below	100	Below
Boreal Chickadee	*Poecile hudsonica*	32	76	Below	85	Below
Brewer's Blackbird	*Euphagus cyanocephalus*	6	99	Above	100	Above
Brown Creeper	*Certhia americana*	6	74	Below	87	Below
Brown-headed Cowbird	*Molothrus ater*	27	91	Above	92	Above
Canada Warbler	*Wilsonia canadensis*	16	100	Above	100	Above
Cape May Warbler	*Dendroica tigrina*	24	92	Below	95	Below
Cedar Waxwing	*Bombycilla cedrorum*	27	100	Below	99	Below
Chipping Sparrow	*Spizella passerina*	92	91	Below	96	Below
Clay-colored Sparrow	*Spizella pallida*	32	45	Above	55	Above
Common Raven	*Corvus corax*	60	98	Above	99	Above
Common Yellowthroat	*Geothlypis trichas*	36	95	Above	99	Above
Connecticut Warbler	*Oporornis agilis*	23	83	Below	90	Below

Dark-eyed Junco	*Junco hyemalis*	69	83	Below	91	Below
European Starling*	*Sturnus vulgaris*	6	65	Above	85	Above
Evening Grosbeak	*Coccothraustes vespertinus*	6	81	Below	89	Below
Fox Sparrow	*Passerella iliaca*	7	83	Below	93	Below
Golden-crowned Kinglet	*Regulus satrapa*	16	75	Below	81	Below
Gray Jay	*Perisoreus canadensis*	83	84	Below	91	Below
Hairy Woodpecker	*Picoides villosus*	9	96	Below	98	Below
Hermit Thrush	*Catharus guttatus*	71	83	Below	91	Below
House Wren	*Troglodytes aedon*	10	51	Above	44	Above
Least Flycatcher	*Empidonax minimus*	56	100	Below	100	Below
Le Conte's Sparrow	*Ammodramus leconteii*	23	100	Above	100	Above
Lincoln's Sparrow	*Melospiza lincolnii*	68	100	Above	100	Above
Magnolia Warbler	*Dendroica magnolia*	51	98	Above	99	Above
Mourning Warbler	*Oporornis philadelphia*	25	100	Below	100	Above
Northern Flicker	*Colaptes auratus*	25	67	Above	80	Above
Northern Waterthrush	*Parkesia noveboracensis*	15	95	Below	96	Below
Olive-sided Flycatcher	*Contopus cooperi*	15	91	Below	94	Below
Orange-crowned Warbler	*Oreothlypis celata*	30	100	Below	100	Below
Ovenbird	*Seiurus aurocapilla*	63	85	Below	89	Below
Palm Warbler	*Dendroica palmarum*	43	70	Below	83	Below
Pileated Woodpecker	*Dryocopus pileatus*	17	99	Above	100	Above
Pine Siskin	*Carduelis pinus*	37	94	Below	95	Below
Red-breasted Nuthatch	*Sitta canadensis*	39	99	Below	100	Below
Red-eyed Vireo	*Vireo olivaceus*	61	95	Above	97	Above
Red-winged Blackbird	*Agelaius phoeniceus*	29	53	Above	69	Above
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	43	79	Below	86	Below
Ruby-crowned Kinglet	*Regulus calendula*	81	82	Below	90	Below
Ruffed Grouse	*Bonasa umbellus*	23	72	Below	81	Below
Rusty Blackbird	*Euphagus carolinus*	8	61	Below	76	Below
Savannah Sparrow	*Passerculus sandwichensis*	15	14	Above	22	Above
Song Sparrow	*Melospiza melodia*	15	14	Above	21	Above
Swainson's Thrush	*Catharus ustulatus*	80	93	Below	96	Below
Swamp Sparrow	*Melospiza georgiana*	15	88	Below	93	Below
Tennessee Warbler	*Oreothlypis peregrina*	66	95	Below	98	Below
Tree Swallow	*Tachycineta bicolor*	25	96	Above	98	Above
Vesper Sparrow	*Pooecetes gramineus*	7	18	Above	20	Above
Warbling Vireo	*Vireo gilvus*	27	84	Above	94	Above
Western Tanager	*Piranga ludoviciana*	40	93	Below	96	Below
Western Wood Pewee	*Contopus sordidulus*	18	83	Above	88	Above

White-throated Sparrow	*Zonotrichia albicollis*	88	99	Below	100	Below
White-winged Crossbill	*Loxia leucoptera*	47	93	Below	96	Below
Wilson's Warbler	*Wilsonia pusilla*	8	97	Below	98	Below
Winter Wren	*Troglodytes troglodytes*	32	97	Below	99	Below
Yellow-bellied Flycatcher	*Empidonax flaviventris*	9	99	Above	100	Below
Yellow-bellied Sapsucker	*Sphyrapicus varius*	45	100	Below	100	Below
Yellow-rumped Warbler	*Dendroica coronata*	93	82	Below	88	Below
Yellow Warbler	*Dendroica petechia*	22	66	Above	78	Above

*Non-native species

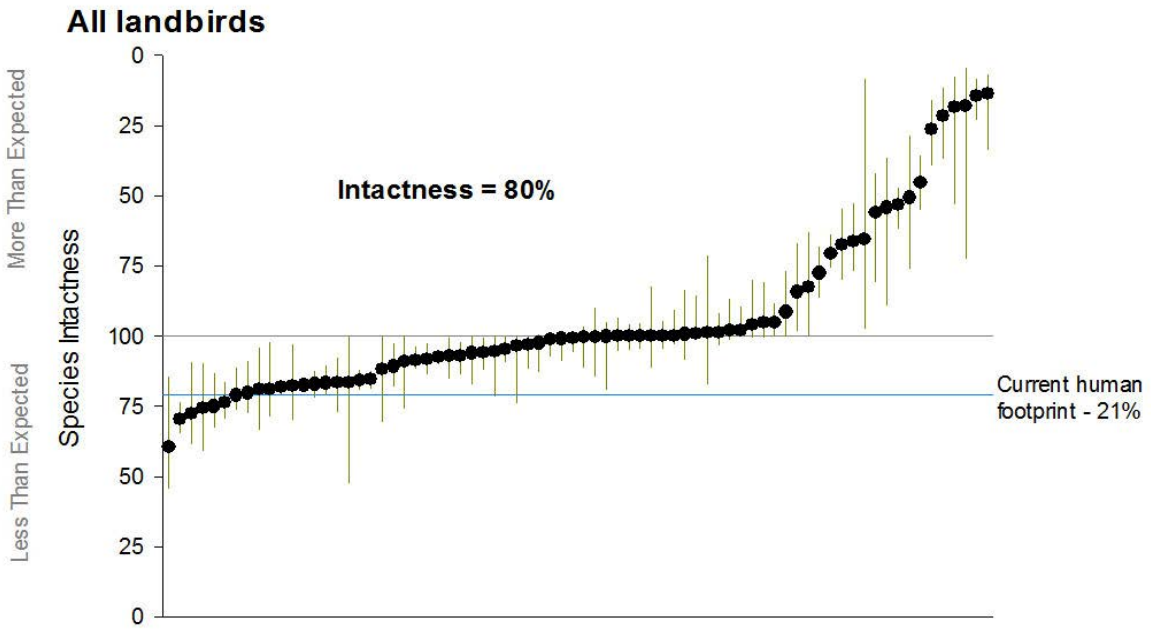

Figure 4. Intactness (±90%) of 74 native breeding landbird species in the Boreal Plains Ecozone measured at 347 locations between 2003 and 2011. The average intactness value for native breeding birds is 80. The current level of human footprint in the Boreal Plains Ecozone is 21%. Detailed statistics available in The Status of Landbirds in the Boreal Plains Ecozone: Supplementary Data File 2012 (00070), Version 2012-09-15, Alberta Biodiversity Monitoring Institute, Alberta, Canada.

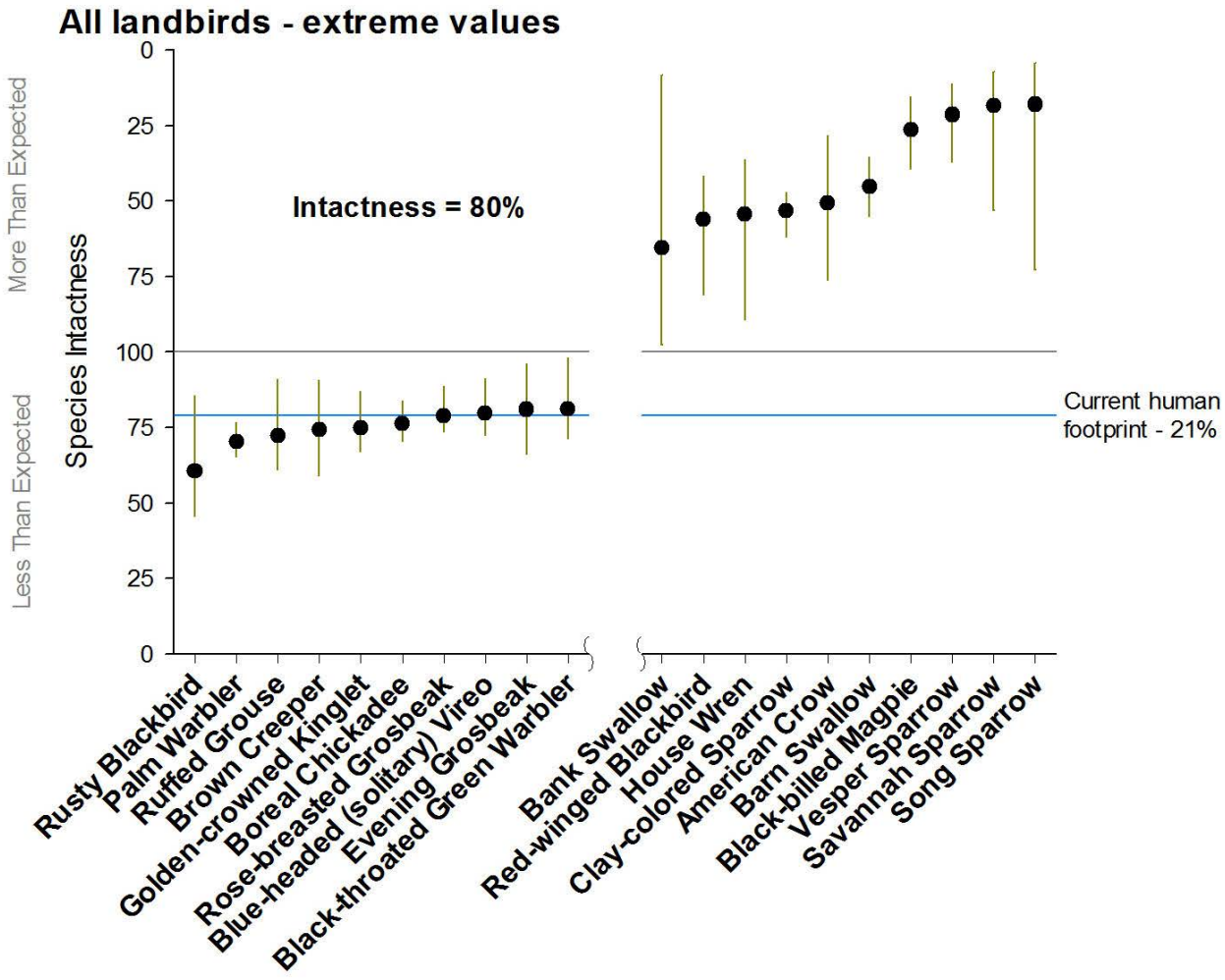

Figure 5. Intactness (±90%) of the 20 native breeding landbird species in the Boreal Plains Ecozone showing the biggest increases and the biggest decreases relative to reference conditions at 347 locations between 2003 and 2011. Detailed statistics available in Status of Landbirds in the Boreal Plains Ecozone: Supplementary Data File 2012 (00070), Version 2012-09-15, Alberta Biodiversity Monitoring Institute, Alberta, Canada.

6.3.2 Intactness of Neotropical Migrants in the Boreal Plains Ecozone

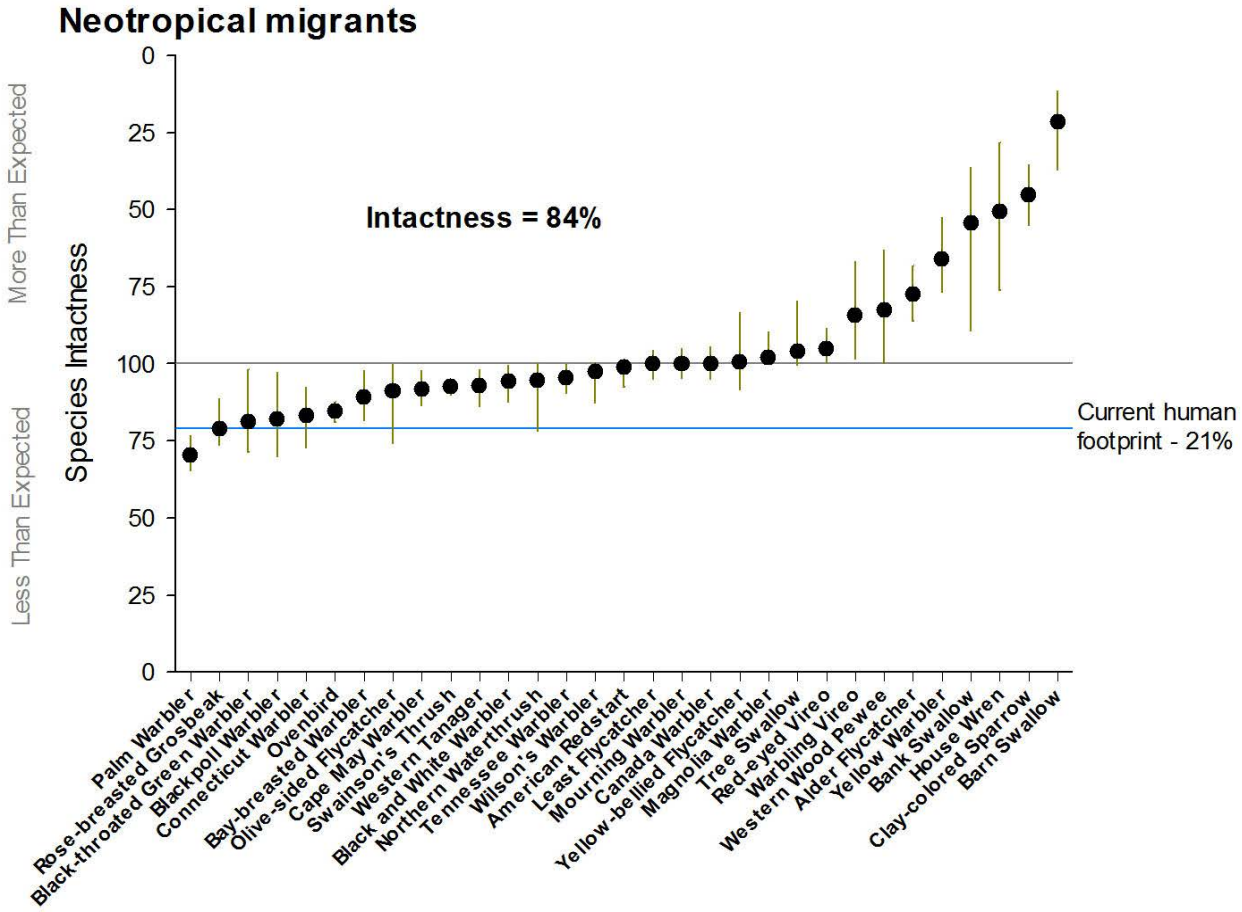

Figure 6. Intactness (±90%) of 31 neotropical migrant landbird species in the Boreal Plains Ecozone measured at 347 locations between 2003 and 2011. The average intactness value for neotropical migrants species is 84%. The current level of human footprint in the Boreal Plains Ecozone is 21%. Detailed statistics available in Status of Landbirds in the Boreal Plains Ecozone: Supplementary Data File 2012 (00070), Version 2012-09-15, Alberta Biodiversity Monitoring Institute, Alberta, Canada.

6.3.3 Intactness of Old-forest Specialists in the Boreal Plains Ecozone

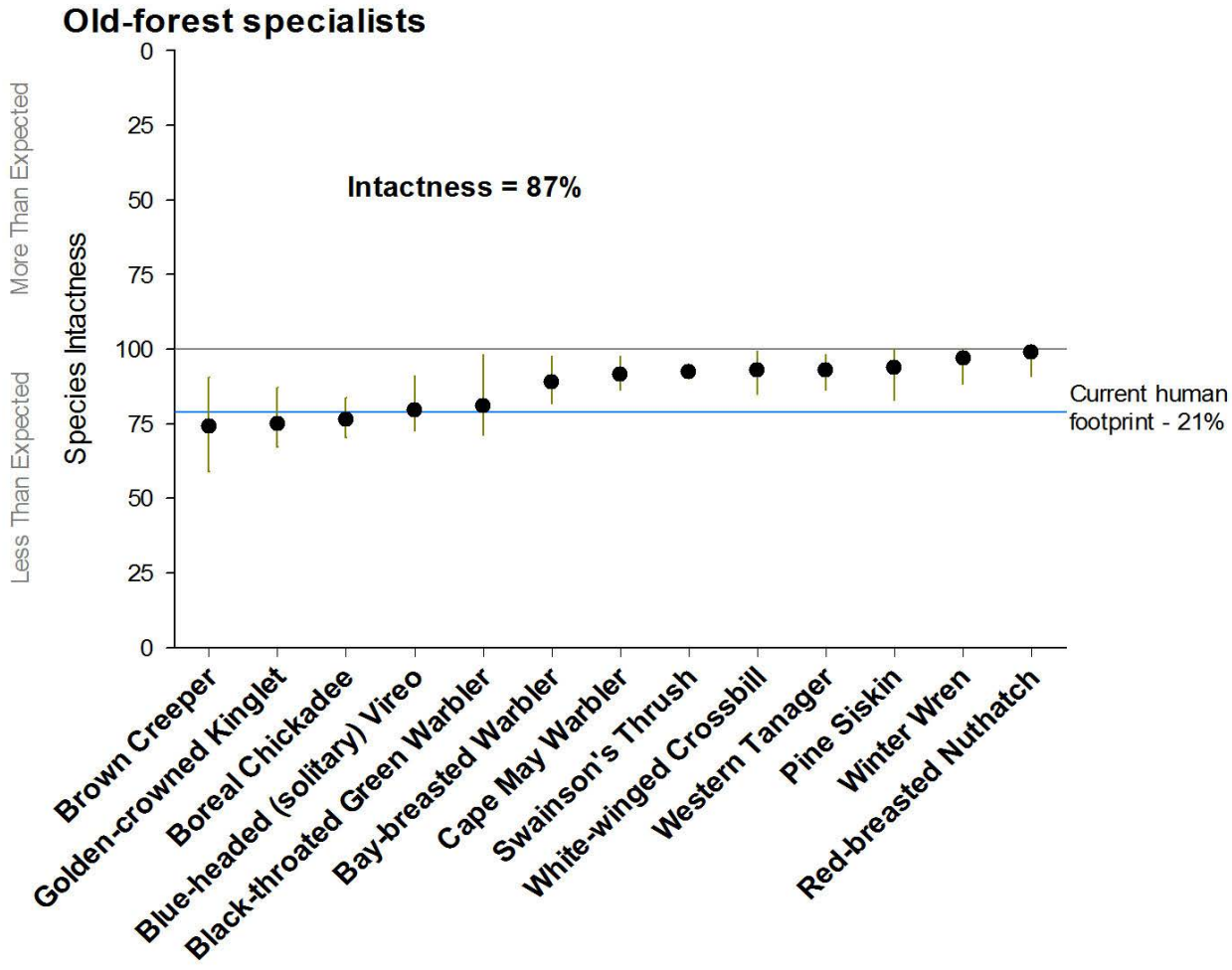

Figure 7. Intactness (±90%) of 13 old-forest specialist landbirds in the Boreal Plains Ecozone measured at 347 locations between 2003 and 2011. The average intactness value for old-forest specialists is 87%. The current level of human footprint in the Boreal Plains Ecozone is 21%. Detailed statistics available in Status of Landbirds in the Boreal Plains Ecozone: Supplementary Data File 2012 (00070), Version 2012-09-15, Alberta Biodiversity Monitoring Institute, Alberta, Canada.

6.3.4 Intactness of Forest Interior Specialists in the Boreal Plains Ecozone

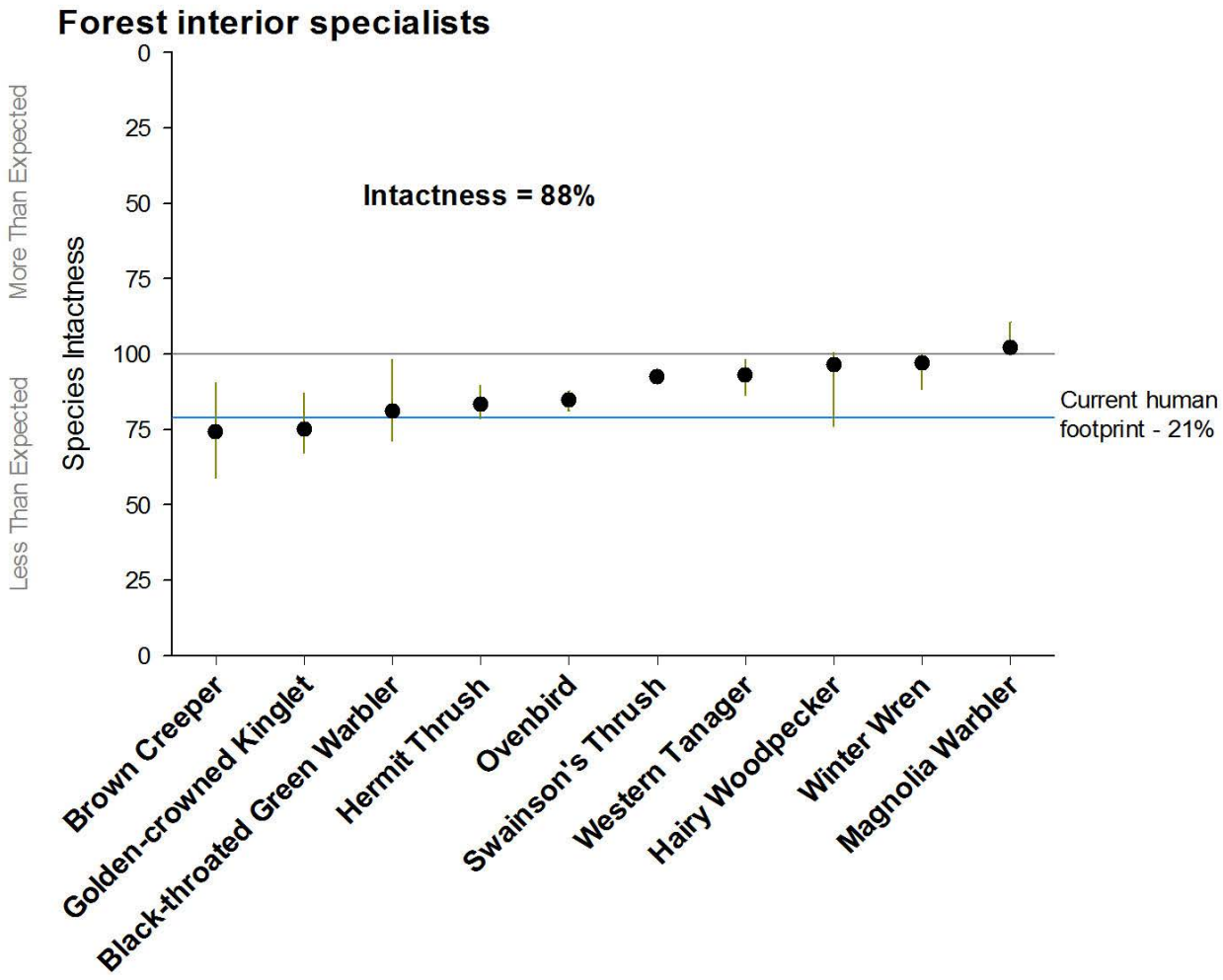

Figure 8. Intactness (±90%) of 10 forest interior landbird species in the Boreal Plains Ecozone measured at 347 locations between 2003 and 2011. The average intactness value for forest interior specialists is 88%. The current level of human footprint in the Boreal Plains Ecozone is 21%. Detailed statistics available in Status of Landbirds in the Boreal Plains Ecozone: Supplementary Data File 2012 (00070), Version 2012-09-15, Alberta Biodiversity Monitoring Institute, Alberta, Canada.

6.3.5 Intactness of Winter Residents in the Boreal Plains Ecozone

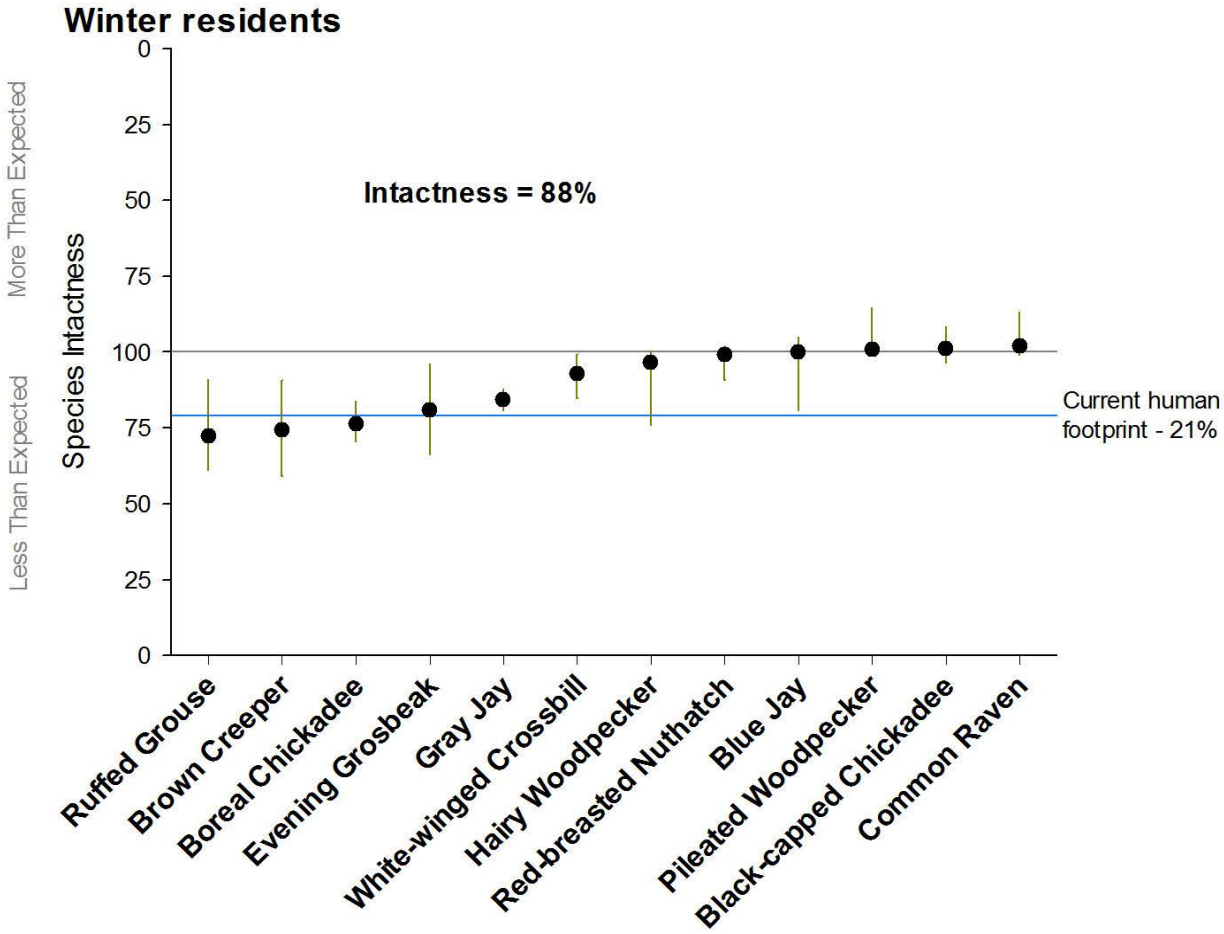

Figure 9. Intactness (±90%) of 12 winter resident landbirds in the Boreal Plains Ecozone measured at 347 locations between 2003 and 2011. The average intactness value for old-forest specialists is 88%. The current level of human footprint in the Boreal Plains Ecozone is 21%. Detailed statistics available in Status of Landbirds in the Boreal Plains Ecozone: Supplementary Data File 2012 (00070), Version 2012-09-15, Alberta Biodiversity Monitoring Institute, Alberta, Canada.

6.3.6 Intactness of Landbird Species at Risk in the Boreal Plains Ecozone

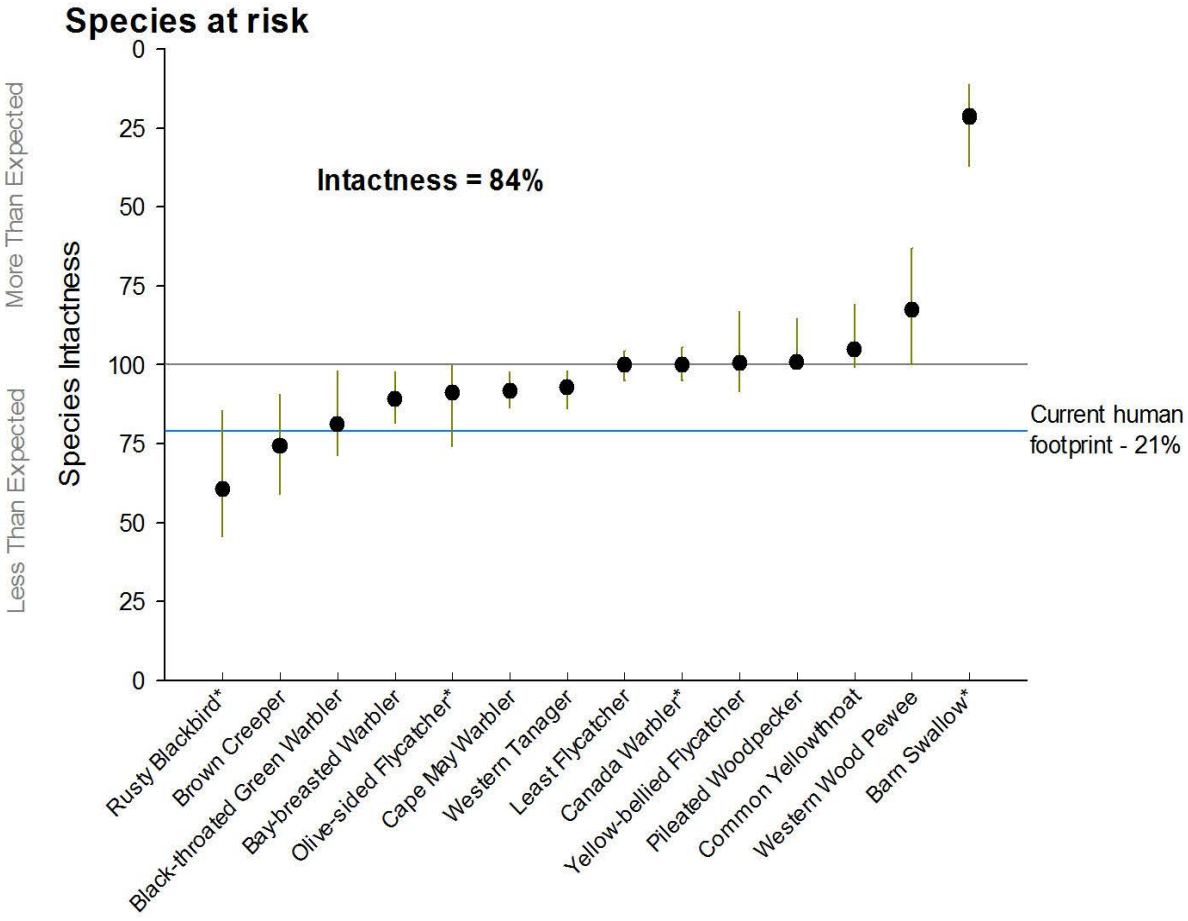

Figure 10. Intactness (±90%) of 14 landbird species at risk in the Boreal Plains Ecozone measured at 347 locations between 2003 and 2011. The average intactness value for landbird species of conservation concern is 84%. The current level of human footprint in the Boreal Plains Ecozone is 21%. * = Those landbirds listed federally under SARA and/or COSEWIC. Detailed statistics available in Status of Landbirds in the Boreal Plains Ecozone: Supplementary Data File 2012 (00070), Version 2012-09-15, Alberta Biodiversity Monitoring Institute, Alberta, Canada.

6.3.7 Intactness of Human-associated Landbirds in the Boreal Plains Ecozone

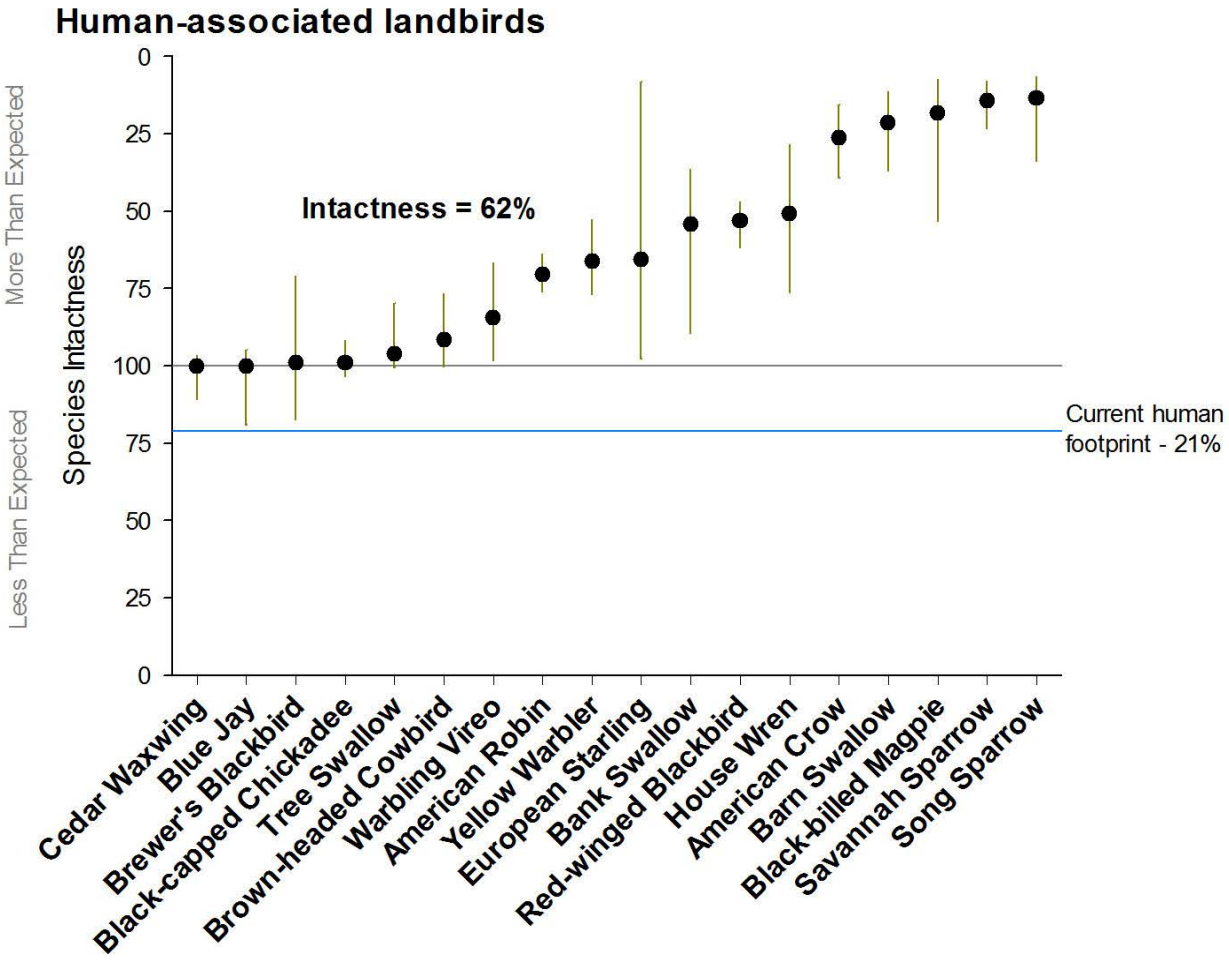

Figure 11. Intactness (±90%) of 17 human-associated landbirds in the Boreal Plains Ecozone measured at 347 locations between 2003 and 2011. The average intactness value for human-associated landbirds is 62%. The current level of human footprint in the Boreal Plains Ecozone is 21%. Detailed statistics available in Status of Landbirds in the Boreal Plains Ecozone: Supplementary Data File 2012 (00070), Version 2012-09-15, Alberta Biodiversity Monitoring Institute, Alberta, Canada.

6.3.8 Intactness of all landbird species in Alberta's oil sands region

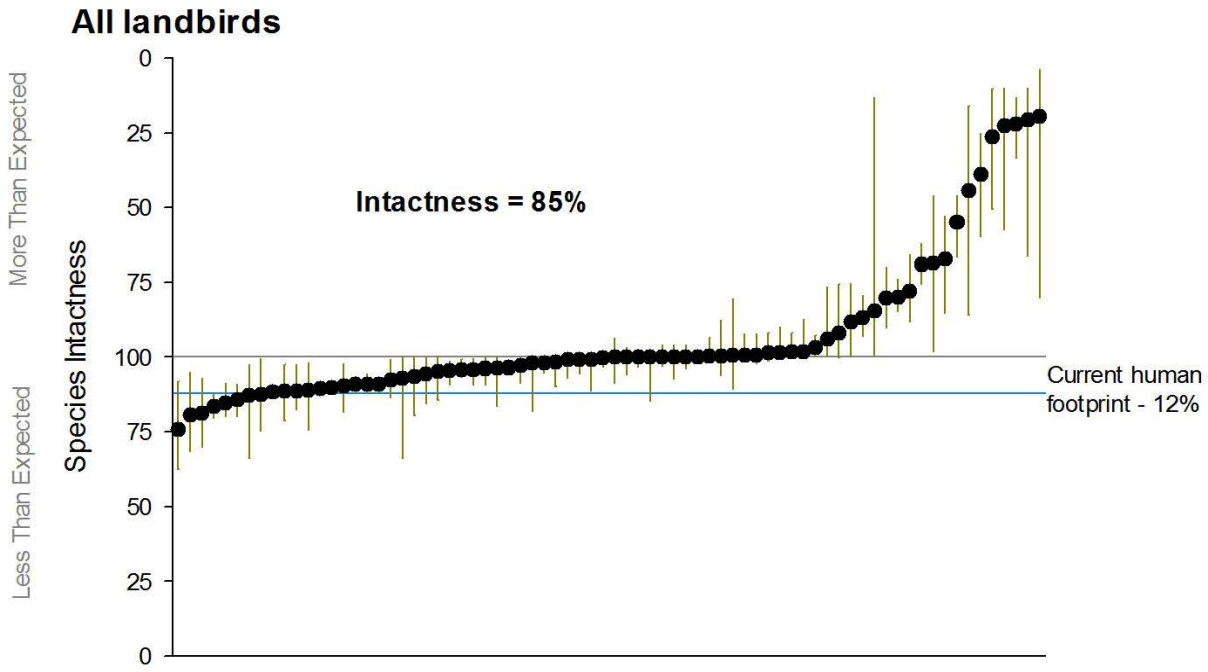

Figure 12. Intactness (±90%) of 74 native breeding landbird species in the Alberta's oil sands region as it is defined in the *Joint Canada-Alberta Implementation Plan for Oil Sands Monitoring* Report[1] (JCA oil sands region) measured at 162locations between 2003 and 2011. The average intactness value for native breeding birds is 85%. The current level of human footprint in the JCA oil sands region is 12%. Detailed statistics available in Status of Landbirds in the Boreal Plains Ecozone: Supplementary Data File 2012 (00070), Version 2012-09-15, Alberta Biodiversity Monitoring Institute, Alberta, Canada.

[1] Report available at http://environment.alberta.ca/03902.html

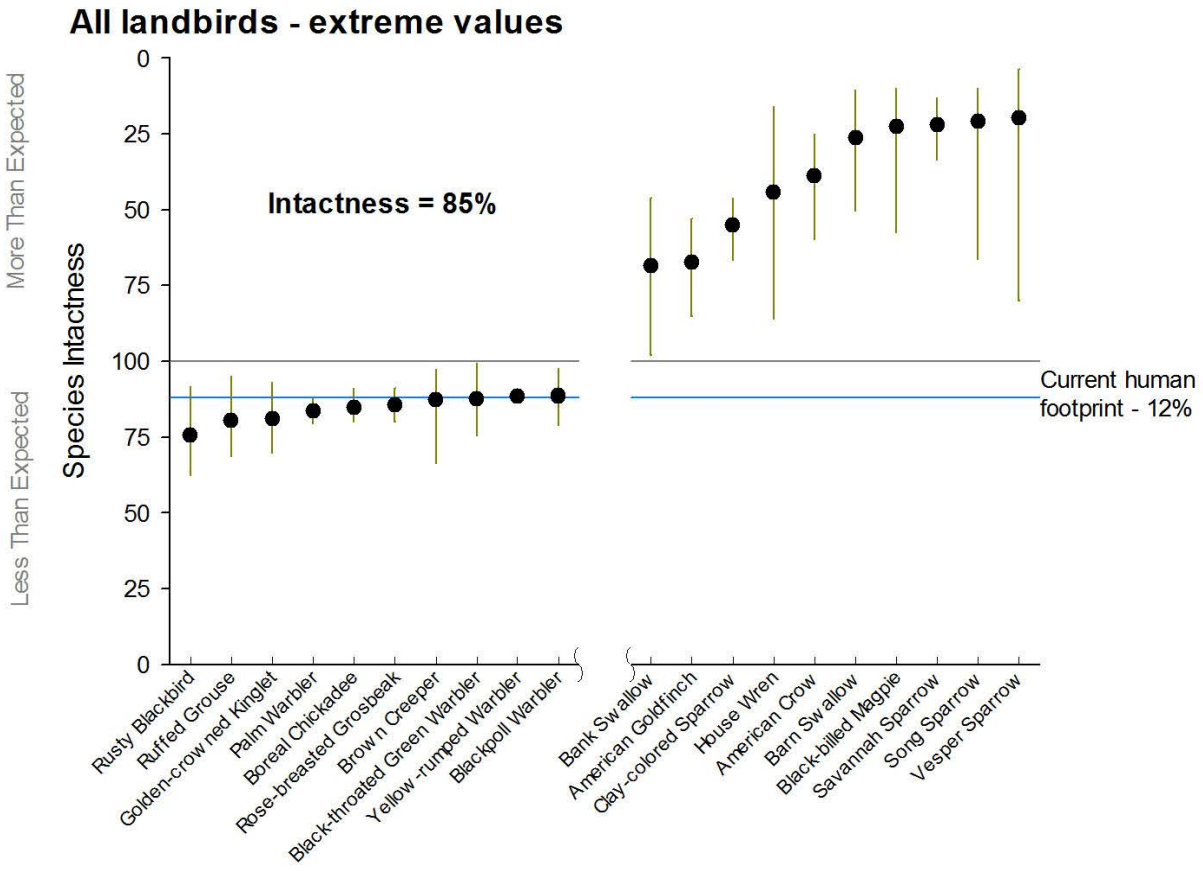

Figure 13. Intactness (±90%) of the 20 native breeding landbird species showing the biggest increases and the biggest decreases relative to reference conditions in the Alberta's oil sands region as it is defined in the *Joint Canada-Alberta Implementation Plan for Oil Sands Monitoring* Report[1] (JCA oil sands region) measured at 162 locations between 2003 and 2011. Detailed statistics available in Status of Landbirds in the Boreal Plains Ecozone: Supplementary Data File 2012 (00070), Version 2012-09-15, Alberta Biodiversity Monitoring Institute, Alberta, Canada.

7.0 Protected Area Methods and Results

The ABMI used geographic information system (GIS) analyses to summarize the percentage of Alberta's BPE and its ecoregions that are managed as protected areas. The ABMI's definition of protected areas in the BPE includes Alberta's parks and protected areas network, Federal Parks, and National Wildlife Areas. This protected area analysis includes the Birch River Conservation Area which is classified as a Public Land-use Conservation Area within the Lower Athabasca Regional Plan 2012 – 2022 (available at: www.landuse.alberta.ca/RegionalPlans/LowerAthabascaRegion). Unlike other protected areas, resource management plans for the Birch River Conservation Area may allow for forest harvesting.

Overall, 11.3% of the BPE in Alberta is managed as protected areas. That percentage is not evenly distributed across ecoregions (Table 7). Of the 11.3% managed as protected areas, approximately two-thirds (63%) is located in the Slave River Lowland Ecoregion. This ecoregion is largely coincidental with Wood Buffalo National Park, one of the world's largest national parks (44,807 km^2), and a UNESCO world heritage site.

Alberta holds greater than 90% responsibility for three ecoregions: Wabasca Lowland, Western Boreal, and Western Alberta Upland. Respectively, 6%, 0.3%, and 1% of these ecoregions are managed as protected areas.

Table 7. Amount and distribution of protected areas in Alberta's portion of the BPE ecoregions.

Ecoregions	Total Area	Area in AB	% Area in AB	% Area of AB	Managed as Protected Area (%)	Total Human Footprint by Ecoregion (%)
Boreal Transition	101,370	43,580	43	7	1	54
Clear Hills Upland	45,522	23,511	52	4	3	7
Mid-Boreal Uplands	202,900	87,915	43	13	12	7
Peace Lowland	69,974	60,131	86	9	2	37
Slave River Lowland	51,013	34,782	68	5	78	1
Wabasca Lowland	51,569	51,569	100	8	6	5
Western Alberta Upland	75,758	68,475	90	10	1	47
Western Boreal	11,716	11,393	97	2	0.3	23
Total Boreal Plains	745,121	381,406	54	58	11.3	21

8.0 Habitat Element Methods and Results

8.1 Live and Dead Trees

8.1.1 Live and Dead Tree Surveys

We counted trees, snags (dead trees), and stumps (cut or broken dead trees) at each ABMI site using four 25 × 25 m plots with two nested sub-plots (10 × 10 m and 5 × 5 m) (Figure 14). We anchored the four subplots at 35.35 m from site-centre in each of the four sub-ordinal directions (i.e., NE, SE, SW, NW). We recorded all trees and snags ≥ 1.3 m in height and ≤ 7 cm dbh (diameter-at breast- height) in the 5 × 5 m sub-plots, all trees, snags, and stumps > 7 cm dbh in the 10 × 10 m sub-plot, and all trees and snags ≥ 25 cm dbh in the 25 × 25 m plot. We recorded tree species, dbh (cm) and height (m) of all trees, snags, and stumps. For all trees >7 cm dbh we also recorded height to crown base. We measured the height of the crown top and crown base for 9 live trees when more than 10 live trees were present in the 10 × 10 m sub-plot; we estimated heights for the remaining trees. We further classified trees > 7 cm dbh into five crown classification categories:

1. Veteran trees, are older than the rest of the forest stand and usually a remnant from a previous forest.
2. Dominant trees, have well-developed crowns extending slightly above the canopy of the surrounding trees.
3. Co-dominant trees, are slightly smaller than dominant trees and at the general height of surrounding trees.
4. Intermediate trees, crowns below the average canopy height but extending to the general level of the surrounding trees.
5. Suppressed trees, have crowns entirely below the general level of the surrounding trees.

We defined snags as ≥ 1.3 m tall and leaning no more than 45° from perpendicular, and stumps as < 1.3 m in height and having an inside diameter (not including bark) > 4 cm. We classified snags into one of three decay stages:

1. Recently dead, all twigs/branches present, wood hard, bark (normally) intact
2. Twigs and small branches missing (major branches remain), wood hard
3. No branches, bole mostly intact, wood starting to soften. If the snag was broken below the canopy and no branches and twigs were present to evaluate decay class, we evaluated decay class based on the condition of the remaining stump: 1–2S—recently dead, wood hard, bark (normally) intact; 3S—wood starting to soften, and; 4S—wood soft throughout the snag. We recorded tree species (if possible), height, and inside diameter of each stump.

We calculated the average density (number/ha) and basal area (m^2/ha) of trees, snags, and stumps at each site by averaging the values derived from plots or subplots. For example, we calculated the density of large trees by taking the average count from the 4 25 × 25 m plots and then standardizing to 1 hectare. We also sorted the data to obtain the basal area of all trees and snags and large trees and snags (>25 cm dbh) subdivided into the following categories: lowland coniferous (black spruce, tamarack, jack pine); upland coniferous (white spruce, lodgepole pine, balsam fir); and deciduous.

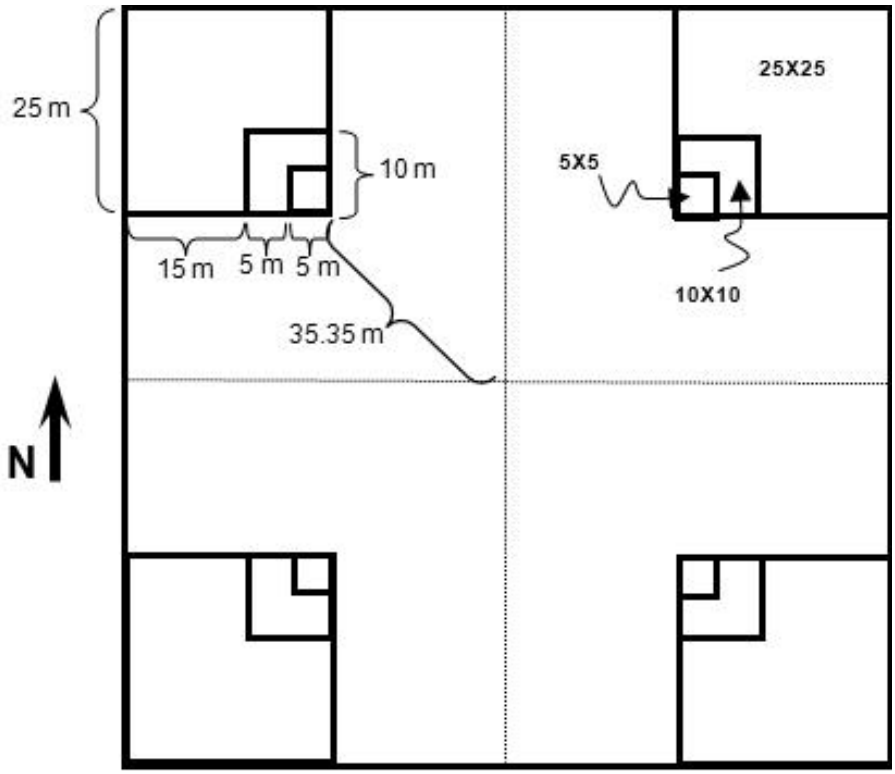

Figure 14. Diagram showing the layout of the live and dead tree sample protocol.

8.1.2 Live and Dead Tree Results

Table 8. Summary statistics and intactness values for live and dead trees in the Boreal Plains Ecozone measured at 347 locations between 2003 and 2011.

Element	Mean Basal Area - 10th Percentile	Mean Basal Area per Hectare (m2/ha)	Mean Basal Area 90th Percentile	Intactness	Above or Below Reference Conditions
Live Deciduous	6.57	7.96	9.84	68	Below
Large Live Deciduous (>25 cm DBH)	2.26	2.85	3.58	50	Below
Live Upland Conifer	2.16	2.83	3.55	70	Below
Large Live Upland Conifer (> 25 cm DBH)	0.69	0.94	1.16	64	Below
Live Lowland Conifer	7.10	8.47	11.02	87	Below
Large Live Lowland Conifer (>25 cm DBH)	0.22	0.34	0.97	90	Below
All Snags	2.99	3.46	4.07	80	Below
Large Snags (>25 cm DBH)	0.56	0.67	0.81	75	Below

8.2 Downed Woody Material

8.2.1 Downed Woody Material Surveys

We measured coarse woody debris (CWD) along four 25 m transects. Each transect was started at 10.35 m from plot centre extended 25 m in each of the sub-ordinal directions (i.e., NE, SE, SW, NW) (Figure 14). We recorded species and measured the diameter of all pieces that intersected the 25 m transects for all CWD > 7 cm in diameter (Figure 15). We classified CWD into one of five decay classes:

1. Recently dead, with bark (normally) attached to the wood
2. Weakly decayed, with loose bark (intact or partly missing)
3. Moderately decayed, with rot extending >3 cm into the wood but the core still hard
4. Very decayed, and rotten throughout with the log shape conforming to the forest floor
5. Almost decomposed, with the outline of the log discernible but strongly fragmented, partially overgrown and the wood disintegrating when lifted

If an accumulation (pile) of CWD was encountered and it was too time consuming to measure each piece individually, we measured a portion of the accumulation and estimated the total from the partial measurement.

We calculated the volume of CWD using the diameter at point of interception (Van Wagner, C.E. 1968. The line intersect method for forest fuel sampling. Forest Science 14:20-26.), and sorted the data by size classes.

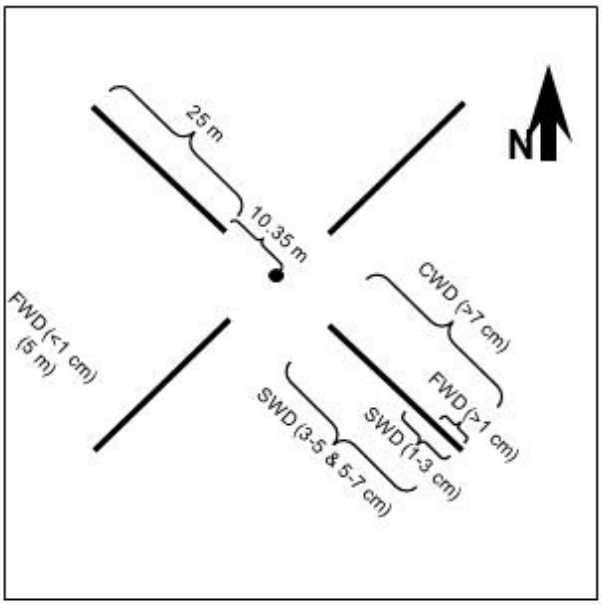

Figure 15. Layout of the downed woody material sample protocol.

8.2.2 Downed Woody Material Results

Table 9. Summary statistics and intactness values for downed woody material in the Boreal Plains Ecozone measured at 347 locations between 2003 and 2011.

Element	Mean Volume - 10th Percentile	Mean Volume per Hectare (m3/ha)	Mean Volume - 90th Percentile	Intactness	Above or Below Reference Conditions
All Downed Woody Material	31.20	42.11	65.83	92	Below
Large Downed Woody Material (>25 cm DBH)	9.87	11.75	14.44	93	Above

9.0 Spotlight on Rare Species

In an effort to better understand the detail status of the Olive-sided Flycatcher and other individual species in Alberta, the ABMI partnered with the Boreal Avian Modelling (BAM) project. Through this partnership we aimed to develop a deeper understanding of how the management of wildlife habitat and human footprint affects birds in the boreal forests of Alberta.

10.0 Further Reading

Additional detail on the ABMI field protocols and analytical methodology can be found on our website under the Reports section (www.abmi.ca) including:

- ABMI Report 10001 — Terrestrial Data Collection Protocols
- ABMI Report 10003 — Terrestrial Data Collection Field Sheets
- ABMI Report 10006 — Breeding Bird Laboratory Identification Protocols
- ABMI Report 10045 — Terrestrial Data Collection Protocols (Abridged)
- ABMI Report 20029 — Manual for Estimating Species and Habitat Structure Intactness
- ABMI Report 20030 — Manual for Reporting Human Footprint