

Human footprint factors, as quantified by basic areal statistics, are required to track human activities and enable the modeling of undisturbed reference conditions. We performed a preliminary quantification of the human footprint over the 1656 Alberta Biodiversity Monitoring Institute (ABMI) sites, based on existing Provincial GIS layers.

For each of the 1656 ABMI survey sites, a 3 km x 6 km photo-plot was created. The plots are located 20 km apart and oriented so that the long axis of each rectangle was parallel to the imaginary line between a given site and its western (or eastern) neighbour.

## GIS Data

We used a variety of Government of Alberta GIS data sources (Table 1) to represent human footprint features on the landscape, which were obtained through a data-sharing agreement with Alberta Sustainable Resource Development. Cutblocks were derived from Provincial Alberta Vegetation Inventory (AVI) data.

Table 1: Sources for base features used to represent human footprint.

Features	Source	Year Represented
Cutblocks	AVI and AVI Cutblock Updates, Alberta Sustainable Resource Development (ASRD)	1987–2005
Agriculture	National Land and Water Information Service	2000
Cities and Settlements	Manually delineated (based on ASRD's SPOT 2007 mosaic of the Province)	2007
Roads	Provincial "roads" GIS data layer (line), ASRD	2008
Wellsites	Provincial "wellsites" GIS data layer (point), ASRD	2008
Pipelines	Provincial "pipelines" GIS data layer (line), ASRD	2008
Power Lines	Provincial "powerlines" GIS data layer (line), ASRD	2008
Rail Lines	Provincial "raillines" GIS data layer (line), ASRD	2006
Cutlines	Provincial "cutlines" GIS data layer (line), ASRD	2008
Facilities	Provincial "facilities" GIS data layer (point), ASRD	2006

Agriculture data (circa 2000) were derived from the National Land and Water Information Service (NLWIS) prairie agricultural classification, derived from Landsat, which has an overall accuracy for separating agricultural land from non-agricultural land at 89.1%. We converted the pure agricultural classes to polygons, and used this vector data for the remainder of the work. City and settlement data, oil sands, farmsteads, etc. were completely re-done manually to conform to the new human footprint categories. For example, we separated residential areas in cities from commercial areas. Other data used included roads, well sites, facilities, pipelines, power lines, railways, and cutlines (seismic lines and narrow trails). For detailed methods see [ABMI 20037—ABMI RSG Brief Report 2007 Human Footprint Characterization and Preliminary Statistics](#).

## Human Footprint

I file

The area covered by polygons of the same human footprint category in each photo-plot was calculated using the Hawth's Tools extension in ArcMap. This tool was used to calculate area (in metres<sup>2</sup>), and placed the result in an Area attribute for each polygon in the human footprint layer. Because of the

particular shape of polygons in the linear feature human footprint layers (e.g. roads, cutlines), the length of these features was assumed to be approximately equal to half their perimeter. Thus, perimeter (in metres) was derived using the Hawth's Tools extension, and length for linear features calculated as half this value. Thus, each polygon in the human footprint layer was attributed with an area, and where appropriate, length.

Remotely-sensed lake and river polygons were assigned an estimated human footprint based on average human footprint from the watershed in which the polygon is located. The average percentage human footprint in each of nineteen watersheds across the province was calculated using ABMI data. This average footprint was then applied to each water polygon. For example, the average percentage human footprint in the Upper South Saskatchewan Watershed is 60%. This average value was applied to every lake and wetland polygon in the entire watershed.