

# ESRI'S CONSERVATION MAP COMPETITION ESSAY

BY

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## 1.0. INTRODUCTION

The American black bear (*Ursus americanus*) is part of our heritage up here in Saskatchewan, Canada. This magnificent creature is timid and intelligent, and much of its behaviour is governed by its search for food: A trait that comes in handy in our effort to conserve healthy populations because luring black bears to sardine-baited stations allows us to monitor population size.

This essay compliments the thematic map layout titled "2010 Fourth Annual Black Bear Bait-Station Surveys, Saskatchewan's East Boreal Plains" created by Lori L. Arnold for the Saskatchewan Ministry of Environment's ongoing conservation project catered to sustainably manage American black bear populations. Four topics are discussed here: (1) The conservation project: It's protocol and other details, including the hardware and Environmental Systems Research Institute (ESRI) software used to collect the field data and to create the map, (2) The purpose of the map and the intended audience, (3) The map design, including how the map was created to achieve its purpose and best illustrate the topic to the intended audience, and (4) Impacts that the map has had.

## 2.0. THE CONSERVATION PROJECT

In order to perform sustainable management of black bear populations, the Saskatchewan Ministry of Environment's Fish and Wildlife Branch conducts an annual survey. Specifically, the use of bait hit rates over consecutive years by black bears at a series of bait stations is used as an index for tracking changes in black bear population size though time. Bait stations are used to obtain such an index because a direct count of black bear is difficult for several reasons: They are not easily detected by sight, are sparsely distributed, do not leave readily detectable sign, and harvest statistics from the black bear hunt can be misleading.

A total of 16 lines are surveyed in the Province, and seven of these are located in Saskatchewan's East Boreal Plains, as illustrated on the map that accompanies this essay. A line consists of 50 bait stations spaced 1 km apart, though 2009 surveys began implementing an increased spacing between stations to up to 2 km to reduce the probability of one bear visiting

successive stations. Habitat along all survey lines is typical of bear habitat and includes a variety of forest cover types including clear cuts and burned areas.

The annual bear survey is consistently conducted in the last two weeks of June: The best time to monitor resident bear population and minimize the effect of yearly variation in food supply on bait station visitation rates. The first week involves setting up the bait stations, and exactly one week later, each bait station is checked for a hit by a black bear.

Global positioning systems (GPS) and geographic information systems (GIS) are used to navigate to stations, map routes, and collect data in the field: This mobile GIS is delivered via a Panasonic Toughbook with integrated GPS and loaded with ESRI's ArcPad software. Data collection in the field originally achieved by entering data onto a hard copy form has been replaced by digital collection using a stylus pen to enter data into an ArcPad form, eliminating the need to transfer data from paper to computer when back in the office. Data is entered directly into the shapefile's attribute table, brought into an mxd and used to update the annual Black Bear Bait-Station Surveys map that was created in ESRI's ArcMap software.

### 3.0. THE PURPOSE OF THE MAP

A map is worth at least 1000 words, and when assembled into an ArcMap layout along with complimentary documentation and photos, even more, hence, the Black Bear Bait-Station Surveys map layout offers a collection of much more information regarding the project's absolute and relative location, hit rates on bait stations, topography, habitat, and the project's protocol and methodologies than could ever be written in the space above. And this is essentially the intent of the map: to educate those unaware of the Saskatchewan Ministry of Environment's American black bear survey project and how it is progressing from year to year.

It is the Ministry of Environment's job to perform sustainable management of Saskatchewan's wildlife populations. This map was created, poster style, to hang along- side and to assist lead area ecologist, Edward Kowal, with presentations to a variety of individuals and groups, including those with a vested interest such as outfitters and First Nations people who harvest the black bear, residents who live in black bear habitat, colleagues and executives, and other conservation organizations.

### 4.0. MAP DESIGN

In order to communicate with the intended audience as mentioned in the section above, the Black Bear Bait-Station Surveys map was designed as a poster map with an optimal viewing distance of ten feet: A distance based on the average attendance of such staff and public meetings in which Edward Kowal presents to small groups of up to ten people.

The drift that should be caught, or should I say, "answered", from ten feet away is threefold:

- (1) What are we doing?
- (2) Where are we doing it?
- (3) Why are we doing it?

If the answers presented to the above three questions have sparked an interest and the viewer wants to know “how”, then, he or she must move in a little closer for the smaller details, that is, if Edward hasn’t already elaborated while referencing the map during his presentation.

The viewer’s eye is directed from the main points, which are larger and brighter, and then around the page to grouped and layered themes as follows:

#### 4.1. What are we doing?

A large, bold, banner-like title on the top of the layout directly above the main map draws the eye in to answer this question.

#### 4.2. Where we are doing it?

Perhaps you have heard some rumours or have seen our survey crews out and about and want to know if we are going to show up in your back yard. Presenting the location of the black bear bait-station survey lines, both absolute and relative, is the focus of this poster map. Showing the relative location of the survey lines to one another and other topographic features was achieved by centering the main map, which takes up the majority of space on the layout, on the page and using a rich yellow box to highlight each survey line. The map was simplified by fading out and generalizing the regions that border the survey area of interest. Fading out is accomplished via a transparent overlay, and the elimination of labels lessens detail.

The absolute location of each bait station was taken advantage of by using each point to symbolize the hit rate (how many times a bear has visited the bait station). Since these points are small, bright colours are used to make them stand out.

The location question is partly answered in the title as well: Directly under the geographic textual description included in the title are grouped and layered index maps going from a small to larger scale.

#### 4.3. Why are we doing it?

To compliment the bannered title on the top of the layout, a banner also borders the bottom of the layout giving the viewer a general explanation as to why we are bear- baiting. Additionally, a more detailed account is offered in way of a legend that symbolizes the hit rates obtained over consecutive years. Since these results are of primary importance in answering the “why” question, they have been isolated into a larger, bolder legend, separated from the

more obvious map features, that are identified in a smaller legend, that most anyone who has ever looked at a map can easily recognize such as highways, rivers and lakes, etc.

#### 4.4. How are we doing it?

Balanced along the edges of the layout are groupings and layers of photographs with narrative text for the viewer to come in a little closer and read should they want to know more. These are linked to the main map by way of numbered survey lines.

#### 5.0. IMPACT

A very good thing, I must add, is that my boss, Edward Kowal, likes the map. When he first saw it, he was impressed with how much information it holds and how it unfolds. Each year he orders several copies to accompany him during presentations.

From a technical point of view, my favourite reaction to the map, as it hung on my office wall, came from a passing visitor from another branch who was drawn in to inquire. She walked over and ran her fingers over the Porcupine Hills, commenting that she was checking for 3D: confirmation that ArcMap's hillshade does, indeed, create the effect that it should, while also confirming that Saskatchewan is not *all* flat as some people think. One does not have to venture too far from the Trans Canada highway to discover that Saskatchewan is really quite a beautiful place full of natural beauty well worth conserving.

#### 6.0. CONCLUSION

The thematic poster map titled "2010 Fourth Annual Black Bear Bait-Station Surveys, Saskatchewan's East Boreal Plains" created by Lori L. Arnold for the Saskatchewan Ministry of Environment's ongoing conservation program to sustainably manage American black bear populations utilizes two ESRI products: ArcPad's mobile GIS in the field, and ArcMap back in the office. The poster map was created to aid lead ecologist, Edward Kowal, in public presentations to a variety of groups, helping to answer: what, where, why, and how.