# SUMMARY

Two concrete methods for calculating the non-market recreational value of a land base are presented: One based of landscape types, and the other on the mix of recreational activities used in the landscape. Both provide relatively easy and effective ways of quantifying the value of recreation in a given area over and above the total costs that recreational users had to pay, but I recommend the second method where possible because it is more precise and benefits from better regional estimates.

In addition, I have included a discussion about how these estimates could be projected into the future using estimates derived from the ALCES model. The easiest way to do this is to assume that per hectare landscape values will remain constant over time for different landscape types, and to adjust the non-market value estimate based on landscape change. However, this assumes that other factors such as road penetration or the quantity of big game (in the case of hunters) have a small or negligible effect on the value of a landscape. While it would take more work, I believe that a more detailed projection of value (and therefore a better idea of what tradeoffs are in play) is possible in the case of hunting, and I discuss a few ways of doing this in a separate section. Unfortunately, projection of value for other types of recreation is difficult, because the relationship between landuse change and the recreational value of a landscape has been subject to few studies and reports to my knowledge.

# CURRENT METHOD

In the ASPEN report, while the market value of tourism to Albertans is discussed in depth, the non-market value of ecological services is not. While a number is given ($36.3 million) in Table 4, I cannot find where this number is derived.

The issue with only discussing the market value for nature based services is that 100% of the expenses listed in the study have already been counted in the Gross Domestic Product. This is because the variable measured, “tourism expenditures,” is measuring exchanges of goods and services in the economy. What the Ecological Services Product is supposed to measure is the value of public goods and services provided by the environment for free that are not included in the current definition of GDP.

# POSSIBLE NEW METHODS

## 1 – Landscape-Based Metrics

#### TEEB Study

The simplest and easiest way to derive the value of landscape values is to use values that are reasonable given studies by TEEB (The Economics of Ecosystems and Biodiversity), which is led by the United Nations Environment Program with the support of a number of governments. TEEB has released a detailed meta-study of global valuation studies which estimate the range of per hectare recreation values for a variety of landscape types.[[1]](#footnote-1) The results of this study are:

|  |  |  |  |
| --- | --- | --- | --- |
| Landscape Type | Number of Studies Sampled | Minimum Recreation Value (2007 Int $/ha/yr)[[2]](#footnote-2) | Maximum Recreation Value (2007 $/ha/yr) |
| Temperate and Boreal Forests | 4 | 1 | 96 |
| Grasslands | 3 | 0 | 11 |
| Inland Wetlands | 9 | 1 | 3700 |
| Rivers and Lakes | 5 | 305 | 2733 |
| Polar and High Mountain Systems | 0 | NA | NA |

The obvious problem with this study is that it is a global study, and they have not yet released more specific estimates per region, making it very difficult to figure out where within those ranges the study area falls.

#### Costanza et. all Nature Paper

This paper, which appeared in Nature Magazine in 1997, gave estimates of the various Ecological Goods and Services values of certain landscape types. A summary of the recreation values follows:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Landscape Type | Location of Studies | Average Recreation Value (1994 US $/ha/yr) | Minimum Recreation Value (1994 US $/ha/yr) | Maximum Recreation Value (1994 US $/ha/yr) |
| Temperate /Boreal Forest | Scotland and US (2 studies) | **36** | 15 | 57 |
| Grassland /Rangeland | Africa, Wyoming (4 studies which were added together) | **2** | NA | NA |
| Inland Wetlands (Swamps and Floodplains) | US, Australia, and Malaysia (7 studies) | **491** | 71 | 1261 |
| Lakes and Rivers | USA (1 study on sport fishing) | **230** |  NA | NA |

Like the previous TEEB study, this paper gives us a global approximation without making regional distinctions. It is encouraging that only one category (lakes and rivers) does not seem to agree with the TEEB ranges, and this category is based on only one study which only takes into account sport fishing. The TEEB study may take into account more recreation values than just fishing, which would result in a higher estimate (although this is impossible to know until they release the full list of studies that they base their estimates on).

## 2 – Commodity or Resource – Based Metrics

#### Value of Specific Activities

The following table lists non-market values that people attribute to the following activities:

|  |  |  |
| --- | --- | --- |
| **Activity** | **Average Value/Person/Day (1996 dollars)[[3]](#footnote-3)** | **Value Range/Person (1996 Dollars, except where noted)[[4]](#footnote-4)** |
| Outdoor (non-wildlife) activities in natural areas | $8.20 |  |
| Camping |  | $52.77 (Value per trip for residents, 1994 dollars) |
| Wildlife Viewing  | $6.60 |  |
| Recreational Fishing | $10.70 | $2-$10.22 (Value per day for residents)$6-$30.66 (Value per day for non-residents) |
| Recreational Hunting (all types) | $15.20 | $6-$21 (Value per hunting trip) |
| Specific hunting* Large Mammals
* Small Mammals
* Waterfowl
* Other birds
 | $12.30$6.10\*$18.30\*$11.40\* |  |
| Resource Use by Indigenous Users |  | $5000-$11000 per household per year.  |

\*Has a high sampling variability, and may consequently be unreliable.

In my view, these above values are the best of the easy to calculate ways of estimating total non-market values for recreation in the study area in question at the current year. However, modeling how these numbers will change in the future is a much trickier question for two reasons. First, I don’t think the ALCES model is well suited (although I would be happy to be proven wrong) to predicting the number of trips made by Albertans to the wild, with the one possible exception of hunting trips (described below). Second, the value of a piece of land is based both on the number of trips to that land *and* the quality of each of those trips. One plausible future scenario is that the number of camping trips to the wild is increased due to population pressures in Alberta, but increased congestion and the declining quality of the natural ecosystems will make each trip less valuable. Simply forecasting the changing number of trips taken to the wild holding the value per trip constant completely ignores the latter effect, which I believe is important to be analyzed.

Note: The validity of this approach depends on whether or not we have reason to believe the Upper Bow Basin is comparable to the average values for Alberta. If there are major differences between the Upper Bow Basin’s characteristics and Alberta as a whole, particularly when considering the types of outdoor recreation used, then it could be better to search for more representative studies either of the Upper Bow Basin in particular, or other areas with features similar to the Upper Bow Basin. This is the technique used by Kennedy and Wilson in 2009 for the Credit Valley Watershed, because the mix of recreational activities available in the heavily urban watershed was quite different from Ontario as a whole (particularly Northern Ontario)[[5]](#footnote-5).

In order to calculate all of these values, an estimate of the number of trips taken per region is required. According to [this paper](http://ageconsearch.umn.edu/bitstream/19986/1/sp04ne03.pdf), the 1996 National Survey on the Importance of Nature to Canadians has associated GIS files that show this distribution. While I couldn’t find these files available online, if needed I’m sure they could be dug up.

#### Hunting Metrics

The ALCES model now has a very detailed wildlife management module, and even without using this module, has the ability to export basic statistics about wildlife numbers and harvest. If the average value of a day of hunting or harvest of one animal was known, it would be a very simple procedure to convert these numbers into a meaningful estimation of the total value of hunting in the region.

Thankfully, the value of hunting different types of animals has been established through many studies.[[6]](#footnote-6) The most extensive study available is the *Net Economic Values of Wildlife-Related Recreation*, which is published roughly every five years by the U.S. Fish & Wildlife Service as an addendum to the *Survey National Survey of Fishing, Hunting and Wildlife-Associated Recreation*. The most recent study was published in 2006, and gives estimates broken down by state of the value per day per hunter associated with hunting moose, deer, elk, and elk; fishing walleye, trout, and bass; and wildlife viewing. [[7]](#footnote-7) Less extensive Canadian studies are also discussed above in the “Value of Specific Activities” section. Using these studies, it would be possible to forecast the value of specific hunting practices based on annual harvest targets over time.

However, with a bit more work, the forecasting process could get even more precise. There already exist some studies that attempt to model econometrically the welfare effects of a suite of variables on hunting. By pulling coefficients from these studies, it would be possible to estimate the welfare effects on hunters of variables like increased road penetration, or increased presence of forestry operations, which can affect the value of a hunting experience even if the population of hunted animals remains constant. For example, Boxall (1994) has estimated an econometric equation that derives the economic welfare of hunters of trophy antelope in Alberta, and found that a 25% reduction in habitat would reduce economic welfare of antelope hunters by about $50,000, even when antelope populations are held constant.[[8]](#footnote-8) The value of these studies is that economic value can be forecasted into the future based on a suite of landuse variables, giving a much more robust and meaningful estimation of changes over time. Unfortunately, I have found only a few specific models for Alberta, none of which provide an approach that is general enough for widespread use with the ALCES model. So, while this approach is in my view the most accurate way of forecasting the effects of landuse change on the value of hunting, I do not think it is feasible unless more resources were spent digging for better estimates.

1. The Economics of Ecosystems and Biodiversity. (2010). Appendix C: Estimates of Monetary Values of Ecosystem Services. *Ecological and Economic Foundation*. Retrieved from: <http://www.teebweb.org/EcologicalandEconomicFoundation/tabid/1018/language/en-US/Default.aspx> (accessed July 30, 2010). [↑](#footnote-ref-1)
2. An international dollar is a unit of currency that has the same purchasing power as an American dollar in 2007. [↑](#footnote-ref-2)
3. Environment Canada (2000). Economic value of nature-related activities for Alberta in 1996 (Table 21). *The Importance of Nature to Canadians: The Economic Significance of Nature-related Activities*. Last updated January 8, 2003. <https://www.ec.gc.ca/nature/14EconoBen.htm> (accessed August 3, 2010). [↑](#footnote-ref-3)
4. Haener, M.K. & Adamowicz, W.L. (2000). Regional forest resource accounting: a northern Alberta case study. *Canadian Journal of Forest Research, 30* (2), 264–273. doi:10.1139/cjfr-30-2-264 [↑](#footnote-ref-4)
5. Kennedy, M. & Wilson, J. (2009). Natural Credit: Estimating the Value of Natural Capital in the Credit River Watershed. [↑](#footnote-ref-5)
6. The word “value” in this case is referring to the economic concept of Consumer Surplus. It attempts to quantify the total benefits that a hunter derives from hunting minus the total costs already paid. [↑](#footnote-ref-6)
7. The study can be found at <http://library.fws.gov/pubs/nat_survey2006_economicvalues.pdf> [↑](#footnote-ref-7)
8. Boxall, P. (1995). The Economic Value of Lottery-rationed Recreational Hunting. *Canadian Journal of Agricultural Economics, 43,* 119-131*.*  [↑](#footnote-ref-8)