An Inconvenient Truth? Scientific Photography and Archival Ambivalence

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RÉSUMÉ Depuis les tout premiers jours de la photographie jusqu'à nos jours, sa valeur a été reconnue par la communauté scientifique afin de lui permettre de documenter et de comprendre le monde naturel. Les archivistes de la photographie à Bibliothèque et Archives Canada (et ses prédécesseurs) ont longtemps reconnu l'importance de la photographie d'arpentage afin de décrire les dif férents efforts pour conquérir la vaste géographie du Canada. Dans la plupart des cas, cependant, des photographies de ce genre ont été acquises pour leur importance culturelle et historique (« *nation building* »), plutôt que pour leur utilité scientifique. L'éducation et la formation des archivistes les ont souvent menés à négliger la valeur scientifique potentielle de tels documents.

L'initiative Mountain Legacy Project/Rocky Mountain Repeat Photography Project est un projet de partenariat entre Bibliothèque et Archives Canada et le Département d'études environnementales de la University of Victoria. En bref, ce projet se sert d'images d'arpentage photo-topographiques historiques des Rocheuses (conservées à BAC) et des images contemporaines de ces mêmes emplacements, afin de permettre aux scientifiques de mener une analyse comparée détaillée des changements survenus au paysage montagneux. Puisqu'on s'intéresse davantage au Canada et dans le monde entier au changement climatique, le projet est d'actualité. Cependant, la création et la consultation des images historiques engendrent un nombre de questions plus larges pour la communauté archivistique. La grande collection de photographies suscite des questions par rapport à l'évaluation et l'acquisition des documents scientifiques et la valeur de ce genre de documents qui ne sont pas nouvelles. En même temps, ces photographies ouvrent une nouvelle fenêtre qui permet de mieux comprendre une tradition fondamentale de la photographie documentaire parfois négligée, la photographie scientifique.

ABSTRACT From the earliest days of the photograph to the present, its value has been recognized by the scientific community to help them document and understand the natural world. Photography archivists at Library and Archives Canada (and its predecessors) have long recognized the importance of survey photography in documenting various attempts to conquer the vast geography of Canada. But more often than not, such photographs were acquired for their cultural and historical (nation building) importance rather than their scientific utility. Archivists' education and training has often led us to neglect the potential scientific value of such records.

ARCHIVARIA 65 (Spring 2008): 75–95

The Mountain Legacy Project/Rocky Mountain Repeat Photography Project is a partnership project between Library and Archives Canada and the Environmental Studies Department of the University of Victoria. In brief, the project uses historical phototopographic survey images (held at LAC) taken in the Rocky Mountains, and exact repeat images taken today, to allow scientists to conduct detailed comparative-change analysis on the mountain landscape. With the increasing attention being paid to climate change in Canada and around the world, the project is timely. However, the creation and use of the historic images opens up a number of broader questions for the archival community. The large collection of photographs raises longstanding issues about appraisal and acquisition decisions regarding scientific records, and the value of such records. At the same time, these photographs open up a window to understanding a sometimes neglected yet foundational tradition in documentary photography: the scientific photograph.

The disciplines of science and photography have a long affiliation spanning the history of photography. The development of photography itself was based on scientific understandings of light and chemistry. At the same time, scientists have used the fundamental ability of photography to fix an image of their object of study for future reference and scrutiny in virtually every specialty, including botany, chemistry, physics, astronomy, and geology. Since the 1840s, science has consistently recognized the utility of the photograph as a tool for advancing the study of the natural world, from bacteria to planets.

The Photography Acquisition and Research Section of Library and Archives Canada (LAC) has long recognized and acquired historic Canadian scientific survey photographs, some of which date back to the 1850s.[1] In 2002, a unique opportunity arose for LAC to work with a remarkable set of survey photographs in partnership with a team from the University of Victoria.[2] The Mountain Legacy Project consisted of creating new photographs which were exact repeats of phototopographic survey photographs created in the Canadian Rockies in the late-nineteenth and early-twentieth centuries, in order to provide a comparative tool for scientists conducting environmental-change analysis in the region. In this article, I want to use this ongoing project as an opportunity to discuss very broadly the relationship

1 In fact, the acquisition of the first collection of survey photographs by the then Public Archives of Canada happened in 1936, before the Photography Section itself existed.

2 The partnership was originally discussed with Dr. Eric Higgs while he was at the University of Alberta in 2002. I would like to acknowledge the work and collegiality of Eric Higgs, Trudi Smith, and Graham Watt-Gremm from the University of Victoria, and especially Rob Watt from Waterton Lakes National Park. Numerous people from LAC who have provided much appreciated assistance and guidance include Jeffrey Murray, Jim Burant, Brian Thurgood, Eric Boudreau, Kara Quann, Chris Lachance, and Sophie Dazé. I would also like to thank the reviewers for their insightful comments on an earlier draft of this article. It should also be noted that at the 2007 Association of Canadian Archivists's Annual Meeting, following a session on Climate Change and Archives, a new Special Interest Section was formed, called the Climate Records and Information Special Interest Section.

between scientific records and archives, and more particularly the environmental science record and its historical value. The first part of the article is an historical overview of the relationship between photography and science, particularly as it relates to geographical surveying. The second part will look in more detail at the Mountain Legacy Project and discuss general problems related to the appraisal of environmental scientific data or field records. The article asks whether archivists can better understand the historical value of the scientific record through both the nineteenth century's more holistic vision of art and science and by looking at the use of that record by environmental scientists. While drawing on literature about the appraisal of government scientific records, the article is not meant to be a detailed discussion on macroappraisal theory or methodology as it relates to scientific records. Rather, it reflects a series of issues raised in the author's mind while working on a particular photographic collection both within an archival institution (LAC), and with a group of scientists over the last several years.

This group, led by Dr. Higgs at the University of Victoria, proposed using high-resolution scans of the phototopographic survey images taken in the Canadian Rockies for a repeat photography project, in order to conduct and facilitate change analysis on the montane ecology. The origins of the project date back to 1996 with the Culture, Ecology, and Restoration Project at the University of Alberta where Eric Higgs was heading a team of researchers looking at ecological restoration in Jasper National Park in Alberta. One of his graduate students, Jeanine Rhemtulla, was studying historical changes in vegetation in the Park. As part of her research, Rhemtulla was alerted to a collection of more than seven hundred historic photographic views of the park, which were stored in the basement of a Parks Canada building. [3] The photographic prints were a comprehensive set of images covering the Park's territory taken by surveyors from the Dominion Land Survey in 1915. Rhemtulla and Higgs decided on a strategy of re-photographing the original sites and thus initiated what has become one of the most systematic and broad repeat photography projects in the world. [4] To date, the Mountain Legacy Project, as it is now known, has re-photographed large sections of Jasper

3 Ian McLaren, Eric Higgs, and Gabrielle Zezulka-Mailloux, *Mapper of Mountains. M.P. Bridgland in the Canadian Rockies, 1902–1930* (Edmonton, 2005), p. 215.

4 What was to become known as the Bridgland Repeat Photography Project, the Rocky Mountain Repeat Photography Project and now the Mountain Legacy Project, was not the first re-photography project of this type. For a detailed if somewhat dated list of projects see: Garry F. Rogers, Harold E. Malde, and Raymond M. Turner, *Bibliography of Repeat Photography for Evaluating Landscape Change* (Salt Lake City, 1984). Also see J.M. Rhemtulla, "Eighty Years of Change: The Montane Vegetation of Jasper National Park," (MSc, University of Alberta, 1999), and Trudi Smith,"Repeat Photography as a Method in Visual Anthropology," *Visual Anthropology*, vol. 20, no. 2, pp. 179–200. Smith cites the earliest repeat photography as occurring in the United States in the 1880s for a study of glacial advance and recession.

National Park, virtually all of Waterton Lakes National Park, and parts of Kootenay National Park.

Although Rhemtulla and Higgs initially knew little about those photographs first seen in 1996, the team soon realized the potential of what they had found and began to want to know more about their origins. But it was not until 2002 that members of the team made their way to Ottawa, first to the offices of the Surveyor General (Natural Resources Canada) and ultimately to LAC. LAC held a much lar ger set of the photographic prints in its cartography collections, while Natural Resources Canada held the motherlode: around sixty thousand glass plate negatives produced by the Dominion Land Survey , and possibly other federal government surveyors, as part of a stunningly comprehensive survey of the Canadian Rocky Mountains and other parts of the country conducted between 1887 and 1958. [5] Higgs's team realized that they had a formidable and unprecedented scientific tool at their disposal, and embarked on a multi-year , multidisciplinary journey to have the original photographs recognized for the treasure they were, and to aid in their use as an important resource for environmental study. This collection, the Geodetic Survey of Canada photographic collection, now resides at LAC.[6]

Photography and Science

We tend to view photography today as either a very personal or very commercial practice, allowing us to capture memories of holidays, family and friends, and beautiful holiday vistas, or to sell us those things/events pictured in advertisements, magazines, and books. But photography and science have a close and interdependent history dating back to the initial "heliographic" experiments of the 1820s and 1830s. [7] Although the official birth of photography tends to be linked with Joseph Nicéphore Niépce, William Henry Fox Talbot, and Louis-Jacques-Mandé Daguerre, between about 1826 and 1839, its origins predate those patents and public announcements, which secured the place of these names in the history books. Scientists, inventors, and artists of all persuasions had long been looking for a way to permanently fix the representation of "nature" produced accurately *in situ*, but only temporarily, by the use of a camera obscura. [8] Scientists especially recognized the advantage of a

5 Personal correspondence with Rob Watt, 2005. The original survey photographs visually and comprehensively cover a huge swath of the Canadian Rockies, from the border with Washington State to the border with Alaska, albeit with some gaps in between.

6 Library and Archives Canada, R214-35-3-E, Geodetic Survey of Canada sous-fonds, Accession 2003-01255-9.

7 See Geoffrey Batchen, *Burning with Desir e. The Conception of Photography* (Cambridge, 1997).

8 Indeed, most educated men (and more occasionally women) of the period would have been proficient in all three areas, rather than specializing in just one.

fixed image that could precisely reproduce a scene from nature in aid of both the careful study of objects or lar ger views, and the capture of details, which may have otherwise escaped the more casual, human observer . The vaunted objectivity and accuracy of the photograph was seen as having a distinct advantage over the possibly flawed interpretation produced by even the most careful artist. Daguerre and Talbot were just two amongst the many early users of photography to capture images of fossils and botany specimens for their own scientific pursuits.[9] Photographic Historian Geoffrey Batchen identifies the desire to instantaneously and permanently capture "views (of landscape), the objects of nature," as a universally held objective amongst the early "protophotographers." We must bear in mind that the use of the term "nature" in the nineteenth century was much broader than that popularly used today, entailing literally everything "under the sun," and including the sun itself. By entitling the publication of his early photographs "The Pencil of Nature," Talbot was not only alluding to photography' s ability to accurately copy views from the natural world around him, but also the active participation of nature (through the reflection of light from the object through the lens and on to the chemically-reactive negative) in the creation of the photograph itself. Thus photography, science, and nature were seen to be deeply interwoven in photography's early years.[10]

At the same time, the clear separation between scientific and artistic endeavours that has become standard today was undeveloped, making the classification of an image as either purely one or the other not as easy as it seems today. The earliest precursors to the Dominion Land Survey photographs seem to have been taken by Aimé Civile, who hoped, through his images, to further the knowledge of the geological features of the Western Alps. Civile produced fifty-five detail views and twenty-eight panoramas of the mountains between 1859 and 1866, which were widely appreciated not only for their scientific utility , but also for capturing the beauty of the mountain landscape.[11] The nineteenth-century understanding of both the sublime and picturesque attributes of the rugged and awe-inspiring mountain landscape, made it a favoured subject matter by amateur and professional photographers, and scientists alike. Photographers felt that both could be accomplished simultaneously and indeed improve each other.[12] Even the commercial photographers who accompanied survey teams during this period saw

9 Ann Thomas, "The Search for Pattern," in *Beauty of Another Order. Photography in Science* (New Haven, CT, 1997), pp. 67–1 19, pp. 76–78. But see also Jennifer Tucker, "Photography as Witness, Detective and Imposter: Visual Representation in Victorian Science," in *Victorian Science in Context*, ed. Bernard Lightman (Chicago, 1997), pp. 378–408.

10 Batchen, pp. 62–69.

11 Thomas, pp. 87–88.

12 James R. R yan, *Picturing Empire. Photography and the V isualization of the British Empir e* (Chicago, 1997), p. 21.

themselves as both artist and scientist.[13] Photography was to become an indispensable tool for those seeking to understand all aspects of geography in the second half of the nineteenth century.

Photography and Surveying

The use of photography to capture landscape views thus originates in the earliest days of its practice, and was influenced by both scientific and artistic aspirations. Within months of the public release of Daguerre's process in August 1839, photographers were traveling to distant lands to capture views to share with their fellow citizens at home.

For the Victorians and other imperial powers, the documentation of geography was part of the larger project of Empire, and photography's seemingly inviolable ability to represent the exact reality of a foreign landscape was quickly appreciated by both scientists and governments of the mid-nineteenth century. As Joan Schwartz and James Ryan have written, "photographs were ideally suited to the empiricism and the nineteenth century passion for collecting, classifying and controlling facts."[14] The rise of both geography and photography during this age of colonialism was not a coincidence – both were key tools in establishing control and dominance over territory, be it at home or abroad. "Photography facilitates 'the transformation of space on the ground into the place in the mind'," and the ability to "picture" was key for the process of appropriation.[15] At the same time, a thorough survey of a territory (whether produced with the aid of photography or not) was essential to the proper administration of the land.[16]

In Canada, the earliest photographs of the West known to exist were taken by military survey parties. Andrew Birrell has given an excellent overview of these early photographs in his publications, *Into the Silent Land*, and "The North American Boundary Commission: Three Photographic Expeditions."[17] Prior to the invention of the glass-plate negative (which enabled a reproducible photographic image), engineers trained in drawing generally accompanied survey parties in order to document the activities of the party, the results of their survey, as well as the surrounding terrain, including any

13 Ibid., p. 47.

14 Joan M. Schwartz and James R. Ryan, "Introduction," in *Picturing Place. Photography and the Geographical Imagination*, eds. Schwartz and Ryan (London, 2003), p. 2.

15 Jeremy Foster, "Capturing and Losing the 'Lie of the Land': Photography and Colonial Nationalism in Early Twentieth Century South Africa," in Ibid., p. 142.

16 Edouard Deville, *Photographic Surveying* (Ottawa, 1895), p. iv.

17 Andrew J. Birrell, *Into the Silent Land. Survey Photography in the Canadian West, 1858–1900* (Ottawa, 1975), and "The North American Boundary Commission: Three Photographic Expeditions, 1872–74," *History of Photography,* vol. 20, no. 2 (Summer 1996), pp. 113–21.

features of special interest and the indigenous peoples. But in the mid-1850s, Colonel Aimé Laussedat of the French Battalion of Engineers began advocating the use of photography as a scientific tool for surveying.[18] The tool was tried in Canada just a few years later by the 1858 Assiniboine and Saskatchewan Exploratory Expedition when Humphrey Lloyd Hime, a young photographer from Upper Canada, was engaged to accompany the survey team, along with the more standard two artists (Figure 1). The purpose of the survey was to explore possible routes to the Red River area, which would be acquired from the Hudson's Bay Company as part of Rupert's Land, and the photographs were to be used in the report to be delivered to the Crown in England. Although this first attempt at using photography during a survey was only a partial success due to the technical difficulties of the fussy and laborious wet-plate process in often inclement weather, it did set a precedent for future surveys of the West. Between 1859 and 1861, two photographers from the British Royal Engineers documented the work of delineating and marking the North American Boundary between British Columbia and the Oregon Territory, and between 1872 and 1875, photographers accompanied survey parties delineating the boundary between Lake of the Woods and the Rocky Mountains (Figure 2).

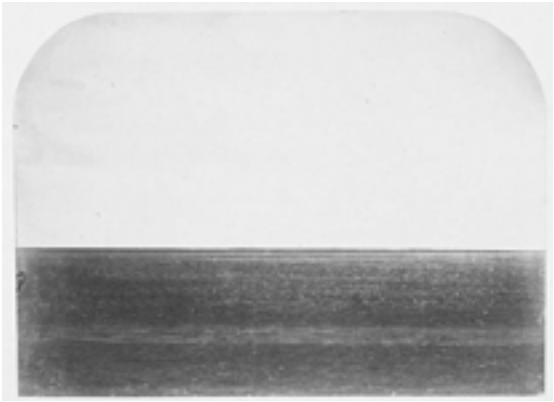

Figure 1: The Prairie, on the Banks of the Red River, looking West. Humphrey Lloyd Hime, Manitoba, 1858. H.L. Hime/Library and Archives Canada/C–018694.

18 M.P. Bridgland, *Photographic Surveying: Department of the Interior Bulletin No. 56* (Ottawa, 1924), p. 2. There are two peaks in the Canadian Rockies named in honour of Colonel Laussedat: Mount Laussedat and The Colonel.

Figure 2: Milk River from West Bank down coulé. North American Boundary Commission, Milk River [Alberta], July–August, 1874. Library and Archives Canada/C–008334.

The Geological Survey of Canada (GSC) adopted photography for its surveys of the geology and resource possibilities in many parts of the country starting in about 1872. The GSC commissioned professional photographer Benjamin Baltzly (through the studio of William Notman) to accompany its team into the wilderness of British Columbia in the early 1870s. Although the head of the GSC decided that a photographer was too expensive to consider on a permanent basis, Baltzly' s photographs were widely circulated by Notman to government ministers, the Canadian Pacific Railway (CPR) (through Sandford Fleming), and to an interested public through his studio.[19] Such a flurry of activity was not limited to Canada. Surveying was an essential aspect of colonialization and occupied the British military engineers in various parts of the empire during this period, and a photographer became an increasingly common part of the team.

The photographs taken on these Canadian colonial surveys in the 1850s and 1860s, and those taken later by the GSC, were understood as scientific documents by both the photographers and the commissions. Even what we may perceive today to be the more scenic images, as well as those depicting the local natives and their settlements, were seen as conveying precise information, which could be used for scientific purposes to further understand the geography, ecology, and population of the regions.[20] These photographs were, in fact, the visual equivalent to a geologist' s field notes, essential to the gath-

19 Birrell, "The North American Boundary Commission," p. 28.
20 Ibid., p. 114.

ering and dissemination of knowledge about the land.[21] Such notes were not personal diaries, but scientific observational records intended to be used in the preparation of detailed reports of findings, and treated as professional documents, both then and now. But it was not until the inception of the surveys of the Rocky Mountains by the office of the Dominion Land Survey, in 1887, that photography was used as a tool in map-making work itself, rather than as a means of documenting the process and the landscape.

The Dominion Land Survey and Phototopography in the Rocky Mountains

Colonel Laussedat had experimeted with his method in the 1850s in which a 360∞ view of the landscape would be taken with a camera from an elevated known point (a tethered balloon), and triangulation applied to the images to produce a topographical map.[22] Laussedat had experimented with the method using unmanned balloons to produce an aerial view, but another Frenchman, Édouard-Gaston Deville, later saw the possibilities in adapting this method to mountainous terrain. Deville had been an engineering student at the French Naval College at Brest when he first learned of Laussedat's experiments, but applied this knowledge after becoming Surveyor General of Canada in 1881. He had first come to Canada in 1874 after a career with the French hydrographic service, quickly becoming the province of Quebec's top surveyor. Shortly thereafter, he earned his certificate as a dominion topographical surveyor, joined the federal Department of the Interior, and began to work on surveying the prairies to lay out townships and sections. By 1885 Deville had risen to become the Surveyor General of Canada, and thus the person in charge of the Dominion Land Survey and its work to map Western Canada.[23]

Although the survey of the prairies had been completed relatively quickly and easily using conventional survey techniques, Deville realized that mapping the mountains would present substantial difficulties.[24] Because of the rugged terrain those traditional methods were excruciatingly slow or even impossible, and attempts to devise quicker methods of triangulation proved unsatisfactory. Deville then turned to a revised version of Laussedat's phototopographic

21 On field notes as scientific records see Brien Brothman, "Generic Approaches to the Disposition of the Scientific Records of the Federal Government of Canada," (National Archives of Canada internal report, 1997), in the section: "Generic Appraisal Guidelines: Records of Research," part 7.

22 Library and Archives Canada, RG 88, Surveys and Mapping Branch, vol. 185, File 6659, E. Deville, "Photographic Surveying," c. 1896.

23 Jeffery S. Murray, "Mapping the Mountains," *Legion Magazine* (May/June 2001), pp. 47-49.

24 Edouard Deville, "Abstract of the Results Obtained in Canada by the Application of Photography to Surveying," in *Chicago International Exhibition. The Map of the Rocky Mountains of Canada and Surr ounding Country and the Canadian T opographical Surveys Executed by means of Photography* (Ottawa, 1893), p. 3.

method, proposing panoramic "oblique" images from mountain peaks rather than the more "vertical" images produced from the balloon above Paris.[25] Although Deville had no first-hand knowledge of photography before this, he began experimenting with cameras. In 1886 he traveled along the line of the recently completed CPR with a camera, producing 1 15 views of the surrounding landscape features and towns (Figure 3). [26] He was satisfied enough with his results to give Dominion Land Surveyor J.J. McArthur a camera he designed himself, in order to conduct further experiments in the field in 1886 or 1887.[27] McArthur, an experienced surveyor and climber , was directed to take his first experimental views along the CPR corridor in the Rockies. The following year, McArthur completed a more substantial survey in Rocky Mountains Park (later Banf f National Park). Although a change in camera equipment was necessary after those initial field trials, the method was deemed a great success, and it was thereafter adopted as the method of topographic surveying in the Rockies. The chief advantage of the method was its speed and efficacy. By 1891–1892, McArthur 's experienced team could complete five hundred square miles in one season, which typically lasted from the end of June to early October if the weather co-operated. As Deville explained,

> The topographer does not need more than a few minutes at each station to observe angles and expose his plates; the time thus employed during a whole season is trifling and practically he is always travelling except during bad weather . After the short summer is over , the packer and labourer are dischar ged and the topographer and his assistant employ the balance of the year in plotting their surveys.[28]

The method allowed the Dominion Land Survey to keep costs low .[29] The summer field season was devoted to simply collecting the data, which could be done with relatively small teams of men, since they were covering much of the terrain visually, rather than physically . The undeveloped plates were then packed carefully and sent back to the of fice in Ottawa, where the surveyor himself would return at the end of the season. He and his assistants would then spend the winter plotting the photographs and creating the topographic maps, which were the ultimate aim of the work.[30]

25 Murray, p. 48.

26 These photographs were printed and mounted in at least one album, which was given to a senior Canadian of ficial, Sir Donald A. MacPherson, by the Department of the Interior , in 1888. See Library and Archives Canada Photo Accession 1933-240.

27 The exact date is dif ficult to pinpoint. There are various citations for 1886 and 1887 as the first use of the phototopographic method, but given that in 1886 Deville had experimented with photography on his trip along the CPR, it seems possible that he asked McArthur to try the method in the following field season of 1887.

28 Deville, "Abstract,"p. 5.

29 Deville, *Photographic Surveying*, p. viii.

30 Deville, "Abstract," p. 6.

Figure 3: Canadian Pacific Railway Tunnel, Mt. Stephen, 1886. Edouard Deville/Library and Archives Canada/C–038679.

Of course the method was somewhat more complicated than Deville set out in his promotional article of 1893. [31] The surveyors were required to take measurements with a "transit" from an established survey station to the new camera station, so that the exact location of the images could be determined for future plotting. Jeffrey Murray briefly describes the method:

> With the camera set on a mountain peak and its low-distortion lens carefully levelled and trained on the horizon, the surveyor would take panoramas of the nearby peaks. The precise orientation of each of these views relative to the survey station would be measured using a transit, a surveying instrument used for measuring horizontal angles. The process would be repeated from another mountain peak so that each feature would be photographed from at least two dif ferent angles. Back in the of fice, the surveyor would plot the camera station on paper , orient each of the photographs relative to the angles recorded by the transit, and draw lines out from the station to each significant feature noted in the photograph. The point at which the lines intersected from two or more stations would be the true position of the feature relative to the camera stations.[32]

But even this description fails to convey the dif ficulties faced by the surveyors, lar gely presented by the notoriously unstable mountain weather . M.P. Bridgland was to join the phototopographic survey in 1902 and become one of its most prolific surveyors. Although he felt that the rugged terrain of the Rocky Mountains in Alberta and British Columbia presented an ideal geography for the oblique method, he also added that the season was short, with "high winds, storms, clouds and extreme cold," which meant that, "work must often be done hurriedly and under great dif ficulty."[33] As well, Bridgland pointed out that choosing the highest peak was not always the best, as it might be too high to present enough oblique details of the surrounding landscape for plotting purposes. The surveyor also noted that the extreme contrasts of light in the mountain landscape made good photography dif ficult, ranging as it did from snow on sunlit mountain peaks to heavily-forested and shadowed valleys, as well as often hazy conditions for distant views (Figure 4). New lenses and a variety of types of plates tried over the years helped to alleviate such dif ficulties, but experience in the field was indispensable to achieve decent results, which could be used later in the office.[34]

31 Deville later acknowledged the challenges in his 1895 publication.
32 Murray, p. 48.
33 Bridgland, p. 24.
34 Ibid. Deville also discusses these technical dif ficulties in various publications, including a draft of an article submitted to *Scribner's* magazine. LAC RG 88, vol. 185, file 6659, 1896.

Figure 4: View of Pekisko Creek Region of Alberta 1915. D.A. Nichols/Library and Archives Canada/e002418183.

Despite these challenges, the photographic survey was adopted as the methodology for mapping the western mountains, giving the Federal Government a very comprehensive picture of the geographical and geological features that could be used to determine the resource value of the region. As well as exploiting the natural resources of the region, the government and the CPR had realized the tourist potential of the mountains from the early 1880s, and were keen to develop this aspect as well. So while the images taken by the surveyors were carefully constructed scientific documents, they were also culled by the Department of the Interior to provide images for tourism potential.[35] In all, close to sixty thousand negatives were produced for the survey between the years 1888 and 1958, when the government switched exclusively to aerial photography for survey purposes.[36] It is this collection, known as the Geodetic Survey of Canada collection (R214), and now permanently housed at LAC, which has provided today's Mountain Legacy Project with its historic baseline.[37]

35 *Scribner's* had specifically asked for picturesque images to accompany Deville's article. See also M.P. Bridgland, *Description of and Guide to Jasper Park (* Department of the Interior , 1917), which utilized Bridgland's survey photographs to illustrate what was essentially a tourist brochure.

36 Aerial survey photography began to be used in the 1930s in Canada, but was not considered reliable enough until the 1950s to become the sole method used.

37 The collection of negatives, which had been in long-term storage, was formally transferred from Natural Resources Canada (NRCan) to LAC in 2001–2002.

Figure 5: View from Akamima Station South. Interprovincial Boundary Survey, 1915 (1–1–15.W–I.B.). A.O. Wheeler/Library and Archives Canada/e002107355.

Figure 6: Repeat Image from Akamina South Station. 2004. c.Rocky Mountain Repeat Photography Project. University of Victoria (HIG2004–W15–1–SE).

The Mountain Legacy Project

As briefly outlined earlier, the Mountain Legacy Project is centred on a repeat photography process.[38] However, as Trudi Smith, one of the principal photographers for the project, writes, it is not simply a process of returning to the site of the first photograph and snapping the same image (Figure 7). Smith defines repeat photography as

> a significant and particular kind of engagement with both a subject and a photograph, usually beginning with locating relevant archival materials (such as photographs, paintings and drawings) and culminating in taking a photograph of the same scene from the exact original location."[39]

It is through a combination of thorough archival research on all aspects of production of the original images and the often complex technical understanding of not only where, but how the original photo was taken, that a relevant repeat image is produced.[40] In much the same way that the original surveyors spent their summers conducting fieldwork and their winters in Ottawa behind a desk, the core members of the Mountain Legacy Project spend their summers in the field, and their winters conducting archival research and preparation for the following season. The end purpose is somewhat the same in that the pairs of photographs are promoted for the analysis of ecological change, which is in itself a tool for our ongoing attempts to understand, and to some degree, continue to control the landscape. However , such a project could never have been undertaken without the existence and preservation of the archival documents, including the negatives, prints, maps, fieldbooks, and other textual records.[41]

38 The website for the Mountain Legacy Project is http://www. mountainlegacy.ca/ (accessed 12 March 2008).

39 Smith, p.184.

40 Ibid. "The repeat photographer may look at secondary documents (such as maps or historical accounts) and discuss the project with local people in an attempt to identify and refine the geographic or social context. Once one is in the field, accurate repeat photography becomes a study in generating a camera position, or photo-point, using the principle of parallax to match foreground, midground, and background features seen through the lens of the camera with those in the historical photograph."

41 Fieldbooks are notebooks that would have been kept by the surveyors to record the observations of their findings (especially for geologists), the conditions under which they were working (weather, terrain, problems with equipment, and unexpected events, as well as a varying level of technical details about the survey work itself). Such notebooks are commonly kept by surveyors, geologists, and environmental scientists.

Figure 7: Repeat Photography project photographer Trudi Smith sets up camera for repeat photo from Prairie Bluff, Alberta. Photo by author, 2005.

Survey Photography as Archival Document

LAC's acquisition of the massive collection of historical, scientific survey photographs was not a straightforward process. The difference between the decision to collect other (earlier) survey photography and the one made for this collection points to a certain earlier bias to "cultural" records and a discomfort with scientific records, but there were also challenges in relation to LAC's use of functional analysis for the appraisal of government records.

The Public Archives of Canada began to deliberately acquire survey photography in the early twentieth-century, although much came in more passively through government collections in the 1960s and 1970s.[42]

42 For example, the H.L. Hime photographs from the Assiniboine and Saskatchewan Exploring Expedition of 1857–58 were acquired prior to 1920 (LAC Photo Accession 1936–273). Other photographs from the North American Boundary Commissions are in Geological Survey of Canada collections (LAC Photo accession 1970–088), Department of Energy, Mines and Resources (LAC Photo accession 1969–095) and Department of Mines and Technical Surveys (LAC Photo accession 1960–125), the RCMP (LAC Photo accession 1974–066), as well as a collection of George Dawson provenance from McGill University (LAC Photo accession 1975–122).

Nonetheless, photography archivists were quick to appreciate the value of the early survey images, even if they were acquired indirectly. But the collections were valued more for either their reference to national identity (through documenting the Canadian border), or for their ethnographic or historical geographic content. Indeed, the survey photographs acquired by the Public Archives fit into a larger international interest in early survey photography, which helped to document "exotic" colonial locales, such as India, colonial Africa and Asia, and Canada. Most of today's contemporary literature on survey photography focuses on discussions of the cultural meanings of these images from a post-colonial, theoretical position. I am not by any means trying to negate the importance of this type of photograph, as well as the outstanding importance of recent analysis and criticism, but merely to note the tendency within both the archival and historical (and historical geographical) communities to privilege certain types of photographs over others.[43] Scientific content has generally taken a back seat, or is dismissed as having little archival value. Although he was later to soften his position, the then head of the National Photography Collection at the Public Archives remarked in 1975 about the Dominion Land Survey collection, "... owing to the scientific nature of the work carried out by the ... surveyors, few of the views have any historical or aesthetic interest. Only the photographs taken during off hours ... have some historical value for us."[44]

The bias was institutional (and perhaps cultural), rather than simply individual, and later attempts to rectify the situation and acquire the collection for its informational value were rejected at higher levels within the Archives, except for four containers, which held photographs primarily relating to the International Boundary Commission Survey between British Columbia and the state of Washington around 1900–1901.[45] The Records Management Branch, which had responsibility for permitting the disposal of government records, later agreed that Natural Resources Canada could dispose of the plates when the Department felt they were no longer operational, as they were deemed not to have archival value.[46] One memo from a Natural Resources Canada employee was prescient, however, when he stated that, "The historical

43 There are too many essays and books on this topic to mention, but a very good selection of essays and references can be found in Schwartz and Ryan, *Picturing Place.*

44 Birrell, *Into the Silent Land*, p. 47. However, in his later article on the photographs of the North American Boundary Commission in *History of Photography*, Birrell states, "The real intent [of the survey photographs] which was scientific and documentary, must always remain the bedrock of our judgment" (p. 120, endnote 3).

45 LAC Photo Accession 1976–283.

46 LAC, Records Disposition Authority 80/021 (Department of Energy, Mines and Resources, Surveys and Mapping Branch), on NA–6240–50/E7–80/021.

47 Memo to Dominion Geodesist 23 December 1971 (copy held on LAC Photography Research and Acquisition Section working file).

value of this record will be of more important use to the glaciology and environmental research, than of any future mapping."[47]

This memo also points to a dilemma for an archivist judging the potential archival value of these records, and other similar records with a high informational content. Even if these records had been identified as being of archival value using the functional analysis and macroappraisal criteria that are now the basis for appraising government records at LAC, the definition of the "informational value" of those records would have been very narrow:

> In the context of the government records disposition program, informational value is very narrowly defined. It is ascribed to records containing information on people, events, places, ideas or social phenomena. The records must be created, collected, or maintained *exclusively* by the federal government *and*, they must have *national significance.* Records of national significance substantially enrich our understanding about Canada's history, society, culture, ideas and people at the level of nation-wide prominence or major national activity.[48]

The methodology document cited above also notes that informational value "is the most dif ficult qualification of macro-appraisal, since all records by definition have some informational value to someone." [49] The fact that the creating department of these records saw no future use for the records within their own sector may have contributed to a negative decision on the part of the then Public Archives. It is a problem common to records with largely informational value that their best future value may lie outside the area and even department which created them. For the phototopographic collection, the interim value to making maps was finished, but the value to environmental change studies was only just being recognized.

In her article on the appraisal of environmental records, Candace Loewen neatly summarizes the problems that beset an archivist faced with a mass of documentation from a scientific institution or creator:

> We have assumed that detailed information about natural resources and scientific processes was less important to the collective memory of Canadians ... than records of a social or ... administrative nature ... We have been less comfortable making irrevocable archival decisions about records we often do not understand, coming as we do to the archival profession with training primarily in the humanities. We have been intimidated by the process of science ...[50]

48 NAC, "Appraisal Methodology: Macro-Appraisal and Functional Analysis Part B" Guidelines for Performing an Archival Appraisal on Government Records," p. 12, http://www.collectionscanada.gc.ca/information-management/007/007007-1041-e.html (accessed 5 March 2008).

49 Ibid.

50 Candace Loewen, "From Human Neglect to Planetary Survival: New Approaches to the Appraisal of Environmental Records," *Archivaria* 33 (Winter 1991–92), p. 90.

Historical scientific "data" records such as the photographs from the Dominion Land Survey, which do not document specific discoveries or inventions, have not generally been viewed as necessary to documenting human progress (often a major, if largely unspoken, mandate of archives). Archivists have tended to view scientific data records, such as these photographs, as having little potential archival or research value. Nevertheless, the discipline of environmental science led the way in realizing the value of such records for scientific study. By the 1970s, as Catchpole and Moodie noted in their 1978 article, these scientists were looking to the past to understand the constant change and flux of the earth's ecosystem, whether brought on by "natural" phenomenon or human intervention. While the use of the historical record had existed for many decades, it became increasingly popular in that decade with the increased focus on pollution and environmental exploitation. Environmental science disciplines such as climatology began to rely on the archival record to help them predict future weather patterns. But while Catchpole and Moodie predicted an increased pressure on archives to protect historical records, which documented environmental conditions, it does seem that scientific data records are still struggling for archival recognition today.[51]

Indeed there seems to be a general movement in archival institutions today toward the decision that while scientific data sets may be important to the scientific community itself, they do not necessarily have enough societal value to be stored in archival institutions, and should continue to fall under the responsibility of their creators.[52] And while the sheer volume of such records is a serious challenge to archives that are under increasing pressure to become more and more efficient (the same is true for scientific institutions, which creates a dangerous combination), we do need to consider whether our record-collecting practices are still too "human-centred," in a way which may in the long term act against the interests of humankind.[53]

While appraisal and analysis of individual scientific projects may prove to be a largely impractical strategy for the selection of archival documents, we must also be cautious not to broaden our analysis so much that we neglect the content (informational value) of the records, be they photographic or otherwise. Macroappraisal and functional analysis, with their focus on documenting the functions and activities of an organization, with a strong interest in records created at the higher levels, must be tempered in this case to allow for the inclusion of informational value in the appraisal decision. Science is

51 A.J.W. Catchpole and D.W. Moodie, "Archives and the Environmental Scientist," *Archivaria* 6 (Summer 1978), pp. 113–36.

52 Cartographic archives, which have a history of dealing with scientific records as their substantive source, while also carrying a strong cultural (and political) component in terms of their content, seem an exception to this position.

53 Loewen, p. 91.

fundamentally about the creation of new knowledge, and if the appraisal process does not take this into consideration, much could be lost. [54] As Helen Mercer of the National Archives of the United Kingdom argued in her background paper on appraisal policy, while functional appraisal works on many levels, it does a poor job of dealing with case files (in which she includes data records), which potentially contain information which will be considered highly valuable to historical researchers of all disciplines.[55] Archivists must continue to work to devise a method which not only documents the functions of a scientific organization, but the actual science, which is at the core mandate of that organization or program. At the same time, we need to be more sensitive to the value of the raw data that is collected during a scientific process, and its potential future research value. As Helen Samuels states, "the challenge is to choose those research projects that deserve fuller documentation," including the potential reuse value of data collected.[56] She makes a nice distinction between experimental and observational data, noting that observational data is "time bound," and recognizes the generally higher value of the latter for future use.

We need to guard against taking too narrow an approach to understanding the potential research value of such types of scientific records. Loewen rightfully calls for a better understanding of the context of creation of environmental records, but the archivist (and scientist) also needs to carefully consider the potential informational value outside the immediate discipline of creation. The photographs of the Dominion Land Survey and their reuse by the Mountain Legacy Project, point to the fact that data gathered for one purpose can often be used for other purposes down the road (as is also true with most types of documents). This informational potential is perhaps easier to comprehend with photographs, which carry so much unintentional information that has been captured by the indiscriminatory lens, that is legible to many different "readers," but this characteristic is also present in other data. [57] In the case of the phototopographic images, the original intention was simply to capture the topographic features of the landscape for translation to maps. However, as

54 Brothman cites The Final Report of the Joint Committee on the Archives of Science and Technology (JCAST) *Undertanding Progress as Process*, as one document which makes this argument. Brothman, p. 47.

55 Helen Mercer, "The National Archives Appraisal Policy Background Paper – The 'Grigg System' and Beyond" (unpublished report, National Archives of the United Kingdom, March 2004), pp. 7–8. Brothman makes an argument that historical scientific, records are of greatest value for those studying the history of science, but, as the Mountain Legacy Project shows, they may also be of great value for scientists themselves.

56 Helen Samuels, "Appraising the Records of Modern Science and Technology," *Janus* 2 (1995), p.14.

57 Photographer Lee Friedlander referred to this characteristic of photography as its "generosity."

many of the ecologists, geologists, forestry and fire specialists, and other environmental scientists who have joined the Mountain Legacy Project have discovered, the survey images are also providing a stunning range of information from changes in glaciers, tree lines, and types of forest cover, to the types of lichen found on the rocks in the foregrounds of the images.

It is a formidable challenge, but perhaps by looking more closely at the use of the historical record by the discipline of environmental science, as well as the nineteenth century's more holistic vision of art and science, we can begin to further understand the layers of value in the historic, scientific document. By reconsidering, and perhaps reintegrating science and its documentation into the archivist's definition of what constitutes our history, we will find a place for the records that are documenting the environment that our culture inhabits and interacts with everyday.