

# The 46th Reconnaissance Squadron: Arctic Exploration and Questions of Sovereignty in the Early Cold War

**David Murray**

*In the early Cold War, the Arctic emerged as a key region in American military planning. In 1946, the newly formed US Strategic Air Command deployed the 46th Reconnaissance Squadron to Alaska to improve navigational and cold weather flying capabilities. Major projects assigned to the squadron included the search for undiscovered land masses in the polar region, should any exist, and the establishment of an air route between Ladd Airfield, Alaska and the US base at Meeks Field, Iceland, which involved overflights of the Canadian Arctic Archipelago. This paper will explore the core projects within this initiative and how the US sought to manage Canadian sovereignty interests as it pursued its strategic objectives against the Soviet Union.*

*Au début de la Guerre froide, l'Arctique est devenu une région clé de la planification militaire américaine. En 1946, le nouveau Strategic Air Command des États-Unis a déployé le 46<sup>e</sup> escadron de reconnaissance en Alaska pour améliorer les capacités de navigation et de vol par temps froid. Les principaux projets assignés à l'escadron comprenaient la recherche de masses terrestres non découvertes dans la région polaire, s'il en existait, et l'établissement d'une route aérienne entre l'aérodrome de Ladd, en Alaska, et la base américaine de Meeks Field, en Islande, qui supposait des survols de l'Archipel arctique canadien. Cet article étudie les principaux projets de cette initiative et les efforts déployés par les États-Unis pour gérer les intérêts de souveraineté du Canada alors qu'ils poursuivaient leurs objectifs stratégiques contre l'Union soviétique.*

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The downed aircraft still lies on its icy couch, a grim reminder of the implacable fury of the north.

- Operations Report, 46th Reconnaissance Squadron, USAAF, Ladd Field, Alaska, 1947<sup>1</sup>

## Introduction

The above citation is a brief moment of literary flare in an otherwise dry official report on *Kee Bird*, a United States Army Air Forces (USAAF) B-29 that crash landed on a glacial lake in Greenland in February 1947, lost in bad weather and out of fuel. *Kee Bird's* story is widely known, with the American network PBS having aired a 1996 documentary on a group of aviation enthusiasts who located, repaired, and attempted to re-fly the aircraft after decades locked in the ice. Close to success, vibrations on take-off of the restored B-29 caused a fuel leak which ignited, destroying the aircraft in a fireball. While this story received much publicity, behind *Kee Bird's* fate stands a lesser known but significant example of Arctic maritime aerial exploration that occurred between 1946 and 1947 – an effort led by the USAAF 46th Reconnaissance Squadron, Very Long Range, Photographic and supported by an observer unit from the Royal Canadian Air Force (RCAF), both of which were based out of Ladd Field, Alaska.<sup>2</sup> So extensive were the operations, one American participant concluded that the squadron would “be responsible for the last major cartographic changes to the earth’s maps with the possible exception of Antarctica.”<sup>3</sup> What stands out in the historical record is evidence of a highly structured and successful aerial exploration of the Arctic Ocean and Archipelago that faced substantive challenges, including the loss of lives and aircraft, and that was shaped by the early Cold War and a long-standing US-Canada disagreement over sovereignty in the region.

Working within the parameters of a broad initiative code-named Project

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<sup>1</sup> Operations Report, 46th Reconnaissance Squadron Unit History, October 1 – 12, 1947, Reel A0892, US Air Force Historical Research Agency (AFHRA), Maxwell AFB, AL, pdf 1975.

<sup>2</sup> The 46th Reconnaissance Squadron VLR operated at Ladd Field from June 1946 to October 1947 at which point it was de-activated and reformed into the US Air Force 72nd Reconnaissance Squadron. This paper will focus on the period specific to 46th Squadron operations, overlapping with the presence of the RCAF observer unit. In this regard, this paper represents a focussed window into a much larger and extended effort by the US Air Force to position itself in the Arctic. In September 1947, the US Army Air Forces (USAAF) was disbanded and reformed into the United States Air Force (USAF), to operate as separate branch of the US Armed Forces.

<sup>3</sup> Navigation Report, 46th Unit History, October 1 – 12, 1947, Reel A0892, AFHRA, pdf 1997.



*Kee Bird* flying in formation, 1947. (Wikimedia Commons)

Nanook, the undertaking helped lay the groundwork for expanded American-Canadian military cooperation in the Arctic, while providing critical knowledge concerning maritime aerial navigation in the region, flying in extreme conditions, and survival skills for the crews on downed aircraft. As will be argued, the initiative also reflected an intent by the US to manage relations with its neighbour and ally through engagement, concessions, and strict lines of separation where interests diverged, including the compartmentalization of a highly classified program searching for undiscovered land masses in the north polar region – including missions within the Arctic sector claimed by Canada. In what was a unique intersection of exploration and defence cooperation, American authorities both recognized and, as a matter of operational policy, discretely side-stepped Canadian sovereignty concerns as they pursued their larger strategic agenda against the Soviet Union.

### **Background and Context: Floodlight and Polaris**

The research and reconnaissance activities carried out by the 46th Squadron were a direct extension of US military planning. Strategic bombing played a key role in American operations during World War Two and this capability was re-focussed in preparation for potential conflict with the Soviets. In March

1946, the US War Department established the Strategic Air Command (SAC) as one of three “combat commands” of the USAAF, with SAC receiving primacy “because of the air leaders’ conviction that strategic bombardment represented the future of war.”<sup>4</sup> Although stockpiles were limited, the stakes were heightened considerably by the fact that the US was, at this point, the world’s only nuclear power. Given the proximity of Alaska and Siberia, the Arctic region quickly became a priority in USAAF-SAC considerations. The US was equally concerned about Soviet capabilities, with limited knowledge about the extent of their military activities in the Arctic. Washington’s interest in the region led to engagement with the Canadian government, with the Americans requesting Ottawa’s support and cooperation on a wide array of initiatives, from the establishment of weathers stations in the Arctic Archipelago to various defence research projects.<sup>5</sup>

The 46th Reconnaissance Squadron was SAC’s first long-range operational component. It was deployed to Ladd Field, Fairbanks, Alaska in June 1946. The unit was broadly tasked with improving navigational capabilities, securing meteorological data, and assessing the Soviet threat. It would spearhead an overarching program code-named Nanook, within which was conducted a series of classified projects, each with their own project number and code name. Given how much of the region remained unexplored, the squadron was also issued orders in July 1946 to undertake surveillance for undiscovered land masses in the Arctic Ocean, should any exist – an initiative called Project 5, code-named Floodlight (classified top secret).<sup>6</sup> The objective was to use any newly discovered land masses or islands for military advantage, either as forward bases or for meteorological stations. Project 14, coded-named Polaris,

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<sup>4</sup> John Farquhar, *A Need to Know: The Role of Air Force Reconnaissance in War Planning, 1945–1953* (Maxwell Air Force Base: Air University Press, 2004), 30.

<sup>5</sup> For an overview of US-Canadian military cooperation in the Arctic see; Peter Kikkert and P.W. Lackenbauer, “The Militarization of the Arctic to 1990,” in *The Palgrave Handbook of Arctic Policy and Politics*, eds. K. Coates and C. Holroyd (Palgrave Macmillan, Cham, 2020), [https://doi.org/10.1007/978-3-030-20557-7\\_30](https://doi.org/10.1007/978-3-030-20557-7_30); and Shelagh Grant, *Sovereignty or Security?: Government Policy in the Canadian North, 1936–1950* (Vancouver: University of British Columbia, 1988).

<sup>6</sup> Narrative Report, 46th Unit History, October 1 – 12, 1947, Reel A0892, AFHRA, pdf 1948. This report summarized a top secret directive from SAC HQ dated 18 July 1946 which “directed the squadron to reconnoiter and search the polar area for possible land masses.” The first of the squadron’s compliment of long-range aircraft arrived the following day, with operations beginning shortly thereafter. In the reconnaissance conducted under Project 5, “primary attention” was given to the search for land – code-named Floodlight. Project 5 also involved the collection of navigational and metrological data and monitoring for any Soviet presence. In addition, Floodlight missions tracked the movements of an ice-island (T-1), discovered in the first month of operations (evidently sub-coded as Project 5B or Bronco). See Narrative, History: Strategic Air Command, Volume 1, 1948, Reel A4013, AFHRA, pdf 1676.

was another core program and involved the reconnaissance of a possible air route between Ladd Field and the US base at Meeks Field, Iceland, which would require overflights of the Canadian Archipelago (classified confidential).<sup>7</sup> Initial Polaris objectives expanded to include detailed revisions to existing charts of the region.<sup>8</sup> Floodlight and Polaris proved the two largest and most resource intensive initiatives undertaken as part of Nanook.

In April 1946, the Americans shared their plans with the Canadian representatives on the Permanent Joint Board on Defence, the senior bilateral advisory body on continental defence, first established in 1940. As the USAAF initiated the deployment of the 46th Squadron to Alaska, the Canadian government reviewed the US request for the Polaris overflights of the Arctic Archipelago, which the Americans explained would allow for a reconnaissance of the potential route between Ladd Field and Meeks Field, provide opportunities for training, and facilitate the study of navigation and communication challenges and meteorological conditions.<sup>9</sup> Canadian political and military officials were themselves concerned about Soviet intentions, while acknowledging that aviation capabilities in extreme polar conditions were not well understood, with equipment untested and limited navigational knowledge available.

Canada's Cabinet Defence Committee approved Polaris, but with much concern over the degree to which the US acknowledged Canadian sovereignty over the High Arctic islands and the possibility that the US might discover and claim uncharted islands within the Archipelago or within Canada's sector claim.<sup>10</sup> In 1925, Canadian Minister of the Interior Charles Stewart had publicly announced Canada's claim to all the land between the country's Arctic

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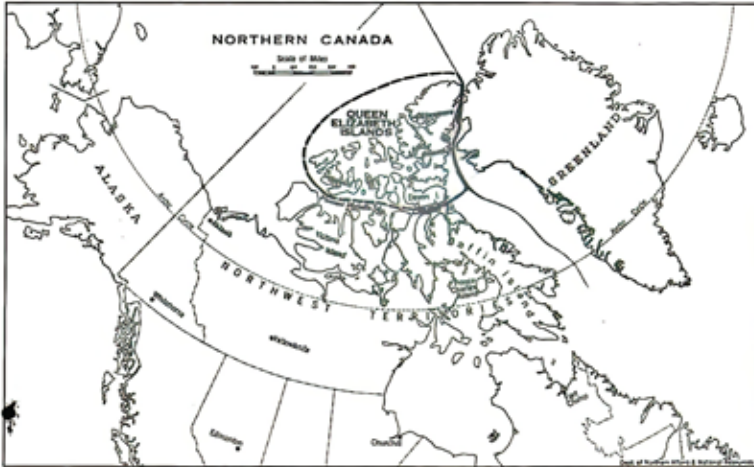
<sup>7</sup> Operations Report, 46<sup>th</sup> Unit History, October 1 – 31, 1946, Reel A0892, AFHRA, pdf 286. Polaris was assigned its own separate project number, with Polaris and Project 14 used interchangeably in 46<sup>th</sup> Squadron reporting. In terms of classification, "Top Secret" meant that damage to national security would be "exceptionally grave" if made publicly available. A lower-level classification, "Confidential" meant that public release would cause "damage" to national security (ie. Project 5 was classified at a significantly higher level than Project 14 / Polaris).

<sup>8</sup> Squadron orders for Polaris, dated 4 October 1946, were to conduct exploratory flights related to the proposed air route; determine navigational difficulties and develop procedures to overcome these; investigate communication difficulties; investigate electronic phenomena; and conduct photographic and visual reconnaissance of landmarks along the route. These requirements were augmented in the weeks to follow to include magnetic studies, radar and visual photography of coastlines in "prescribed areas," identifying locations for emergency landings and weather stations, and the recording of all weather encountered. Updated existing charts also became a key focus. See Operations Report, 46th Unit History, June 1 - 30, 1947, Reel A0892, AFHRA, pdf 1664.

<sup>9</sup> Peter Kikkert, "The Polaris Incident: 'Going to the Mat' with the Americans," *Journal of Military and Strategic Studies* 11, no. 3 (Spring 2009): 14-15.

<sup>10</sup> Kikkert, "The Polaris Incident."

coastline “right up to the North Pole” and “between the degrees of longitude 60 and 141.” While the Canadian government had taken steps to bolster its sovereignty over the region, particularly through the establishment of Royal Canadian Mounted Police posts in key entry points into the Archipelago, many of the High Arctic islands within this sector claim remained unoccupied, and the possibility remained that new islands could be discovered in the sector north of Ellesmere Island. Further, the Canadian sector claim clashed with the American approach to polar sovereignty known as the Hughes Doctrine, which held that countries had to settle, colonize, and exploit polar lands before



Map showing Canada's sector. (RG 25, vol. 4253, file 9057-40, Library and Archives Canada)

they could successfully claim them. On several occasions in the years prior to World War Two, Washington had implied that it did not accept Canada's sector claim or its sovereignty to the northern part of the Archipelago. Given these ongoing sovereignty concerns, Ottawa insisted that Canadian observers be present on all Polaris flights. Importantly, there is no indication that the Americans raised the objectives relating to Project 5 or Floodlight – the search for undiscovered lands in the Arctic Ocean and within Canada's sector claim – with the Canadians.<sup>11</sup>

Prior to the Alaska deployment in June 1946, the newly designated 46th Squadron commander, Major Maynard White, attended an intelligence

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<sup>11</sup> For a concise overview, see P. Whitney Lackenbauer and Peter Kikkert, “The Dog in the Manger – and Letting Sleeping Dogs Lie: The United States, Canada and the Sector Principle, 1924-1955,” in *The Arctic Ocean: Essays in Honour of Donat Pharand*, ed. Suzanne Lalonde and Ted McDorman (Leiden: Brill, 2014), 216-239.

briefing on the mission in Washington. A number of issues were raised relating to Canada, specifically that the US was coordinating with the Canadian government and that a contingent of RCAF observers would be present each time a 46th Squadron aircraft overflew the Arctic Archipelago. In addition, the briefing included information about Canada's sector claim, with White being advised that the "Canadians also felt that the portion of the polar cap bordered by straight lines from the western and eastern shores of Canada to the North Geographic Pole belonged to Canada." Given Canadian sensitivities about their sovereignty in the Arctic, "A point was made that all coordination with the Canadians would be made at diplomatic levels between our two governments, and not discussed at squadron level."<sup>12</sup>

The intelligence briefing is significant as it laid the groundwork for how the USAAF planned to engage and manage the Canadian presence at Ladd Field. On one level, the US would facilitate Canadian observers on all flights over the Archipelago. As *Polaris* moved forward, the participation of the attached RCAF unit even came to involve direct mission planning. Beyond that, however, squadron level coordination with the Canadians was to be restricted and operate on a need-to-know basis, factoring in not only the security required for Project 5 – Floodlight, but also Canadian sovereignty concerns. The Americans involved in Project Nanook understood Canada's stance on the sector principle and sought to avoid actions that might enflame their ally's sovereignty concerns by managing and containing their relationship with the RCAF observers.

Another element of the briefing is also revealing. On the issue of uncharted lands and Soviet activities, intelligence staff noted there "was great concern that there might be land in the polar cap on which the Russians might have already established forward operating bases" and that "concerns were made known that the Soviets might even have operating bases in the Canadian Archipelago."<sup>13</sup> These comments are notable, indicating some of the drivers behind the USAAF search for land and showing an American interest in the Archipelago that extended beyond the parameters for *Polaris* that had been shared with Canadian officials. Both drivers underscored the substantive intelligence gaps relating to the Canadian Archipelago and the polar region to the north, which rested in the sector claimed by Canada. As one assessment of the 46th Squadron later emphasized, "We didn't know where (the Soviets)

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<sup>12</sup> Ken White, *World in Peril: The Origin, Mission & Scientific Findings of the 46th / 72nd Reconnaissance Squadron* (Elkhart, Indiana: K. W. White & Associates, 1994), 12. In writing this book, White collaborated with his father, USAF Colonel Maynard White (ret.), who served as 46th Squadron commander during Project Nanook, noting that the work was written "unabashedly" from his father's perspective.

<sup>13</sup> White, *World in Peril*, 11.



A 46th Squadron B-29, no. 521846, nick-named *Over Exposed*. This aircraft was used on a Polaris mission dated 19 March 1947, listed as “Photo. King William Isle” with the flight lasting over 17 hours. The wing edges and tail fin were painted red to assist locating the aircraft in the event of a crash landing. (46th/72nd Strategic Recon Association website, <http://46th72nd.org/>)

were in the Arctic, how far they had advanced and whether they were even within 100 miles offshore from Alaska.”<sup>14</sup> These intelligence gaps were clearly something the US intended to correct. As the programs moved forward, these interconnected concerns came to influence the security and organizational structures and procedures adopted by the 46th Squadron.

### **Technology and Organization**

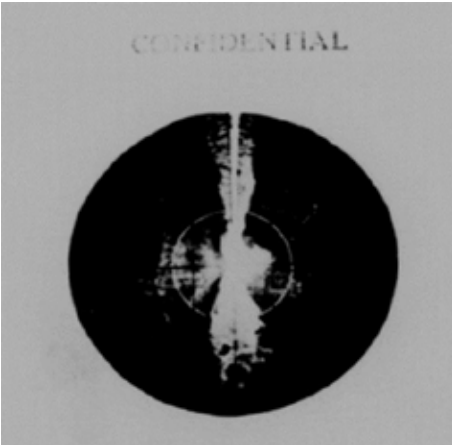
Under the command of Major White, the 46th Squadron adopted a structured approach, with the full program taking shape by the early fall of 1946. Major and minor projects were identified, prioritized, and resourced accordingly. Three operational flights were established, with crews from A Flight assigned to Project 5 – Floodlight, B Flight responsible for Project 14 – Polaris, and C Flight managing a series of photographic initiatives largely related to photo-mapping projects in Alaska, while also supporting the US Navy in assessing potential oil reserves. A and B flights were responsible for

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<sup>14</sup> Tim Wright, “Firing First Shots of Cold War,” *Alaska Magazine* 78, no. 9, (November 2012): 36.

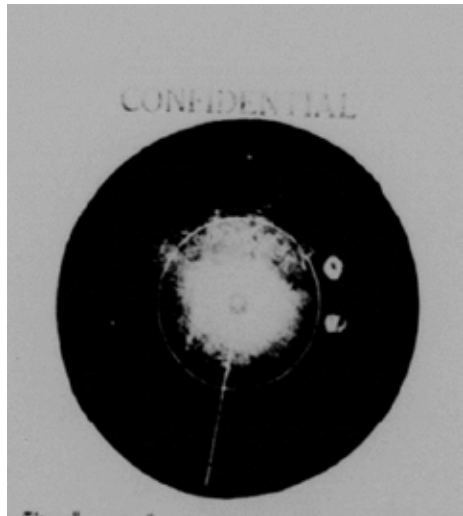






A Polaris radar scope photograph from the west coast of Banks Island. The bright image in the middle is pack ice, situated between the shore and the ice cap. The dark area on the right is land, giving the same dark return as the ice on far left, a result that initially surprised the radar operators. (46<sup>th</sup> Reconnaissance Squadron, Flight in the Arctic and Polar Regions, 46<sup>th</sup> Unit History, October 1 – 12, 1947, Reel A0892, AFHRA)

A Polaris radar scope of Melville Island. What appear to be small islands are actually mountains. These images are drawn from a draft 46th Squadron Arctic training manual, designed to help radar operators understand “in-flight” observations during the winter darkness. For cartographical purposes, the photos were enlarged and examined at length at Ladd Field. Radar scope photos were validated by visuals and trimetrogon photography as the days lengthened. Hundreds of shots were assembled into mosaics for each island on the proposed air route. (46<sup>th</sup> Reconnaissance Squadron, Flight in the Arctic and Polar Regions, 46<sup>th</sup> Unit History, October 1 – 12, 1947, Reel A0892, AFHRA)



tanks were added to the bomb bays to extend their range. A series of advanced cameras and radar scope photographic capabilities were added to both the B-29 and the F-13A variant, with the latter capable of flights exceeding thirty hours. Radar scope photography – the film record of the returns shown by a radar screen – became the primary capability used by the 46th in the polar winter, as darkness prevented standard photography (it was also a useful navigation tool). Another important asset was the trimetrogon camera, a three-camera system, with one camera pointed straight down and two aligned and mounted at angles, providing a stereographic perspective on the topography. Both methods consumed much analytical energy as participants grappled with the challenges of working in arctic conditions and interpreting data results from polar ice and snow-covered landscapes.

Many members of the squadron had gained experience collecting and analysing data in preparation for bombing missions on military and industrial targets during the war, and squadron records highlight the operational adjustments required as the 46th collected and assessed information on an “area” rather than an “enemy.”<sup>17</sup> To help assess project results, Flight Management Boards were established to review each mission and to consider best practices. A primary Technical Control Board was also created to oversee the fifty projects undertaken during 1946-1947, with monthly status reports prepared and results forwarded to SAC headquarters, or the US Aeronautical Chart Service. Despite security restrictions, visits by academic experts were facilitated, including a representative from the Harvard Institute of Geographic Exploration and a visit by a Canadian botanist who joined a Polaris mission over the Archipelago.<sup>18</sup> Private sector support was also engaged, with Boeing representatives brought in to assist with cold-weather modifications to the B-29 and to facilitate a testing regime for the development of Non-Electrostatic Formulation A (NESA) windows (layered and heated aviation glass designed to lessen fogging and cracking in sub-zero conditions).<sup>19</sup>

From an internal security standpoint, flight operations and project management were compartmentalized. Personal and official records contain various references to the heightened level of security related to the program, and a clear sense of concern and uncertainty about the extent of Soviet intelligence activities. Major White briefed each flight separately and he advised crews that Soviet agents were active in Fairbanks and possibly at Ladd Field, and that there was to be no operational discussion related to their missions between flights or in public venues.<sup>20</sup> This was the early stages of the Cold War and security precautions were given heavy emphasis. To this end, the alignment of the squadron into A, B, and C flights, with respective responsibilities formalized in September 1946, reflected not only functionality but also security.<sup>21</sup> Tasked with Project 5 – Floodlight, A Flight was assigned

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<sup>17</sup> Intelligence Section Report, 46th Unit History, September 1 – 30, 1946, Reel A0892, AFHRA, pdf 146.

<sup>18</sup> 46th Unit History, October 1 – 12, 1947, Reel A0892, AFHRA, pdf 1872, 1959. Dr. Erwin Raisz, Institution of Geographic Exploration, Harvard University and Dr. A.E. Porsild, Chief Botanist, National Herbarium of Canada.

<sup>19</sup> 46th Unit History, October 1 – 12, 1947, Reel A0892, AFHRA, pdf 1958.

<sup>20</sup> Major White also advised the flight crews that the USAAF Criminal Investigation Division had undercover officers present to monitor security. See White, *World in Peril*, 28-29.

<sup>21</sup> The three flights were established in August, but B Flight’s role was initially undefined, listed as “waiting assignment,” with the flight in training mode. In September, the formal alignment of responsibilities, noted above, was implemented.

six of twenty flight crews, each sworn to secrecy, and provided a separate and secure planning and mapping room – to which only select staff had access.<sup>22</sup> Orders were issued that no document could leave the Project 5 room without first being stamped top secret. On early missions, some crew members in A Flight were not even briefed on the full purpose of their flights. Restrictions were also placed on personnel exchanges between the different flights. For example, radar specialists from B Flight were not permitted on Project 5 missions given the top secret nature of the search for uncharted lands – this despite a shortage of trained radar personnel. Even with these precautions, security breaches still occurred. One early A Flight mission to the North Pole, for instance, was cancelled when an officer's spouse expressed knowledge of the planned destination, prompting an investigation.<sup>23</sup>

### **The Hunt for New Land**

In the search for land, coverage by Project 5 – Floodlight was substantive, with the main area of concern being from “the Alaskan coastline (between the Soviet Union and the easternmost Canadian Archipelago) and northward over the polar cap, concentrating on the area on the Alaskan side of the north geographic pole.”<sup>24</sup> According to SAC archival records, under Project 5 the 46th Squadron established an area-based model with reconnaissance flights searching for land covering Area A (between 160° and 180° E longitude and 73° and 77° N latitude), Area B (to the north and east of A), and Area D (between the North Pole and 85° N latitude except for a portion northeast of Greenland). Managed separately, Area C was the route between Alaska and Iceland covered by the Polaris flights. As noted by SAC, “Aerial reconnaissance of most of the polar area was planned. . . .”<sup>25</sup> Due to its proximity to Siberia, reconnaissance of Area A was cancelled shortly after it began, with focus given instead to areas

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<sup>22</sup> “Lt. W. Whitney Williams, Personal Diary, 31 August 1946,” 46th/72nd Strategic Recon Squadrons, 1946 to 1955, last modified 17 March 2008, <http://46th72nd.org/HistoryCDs/Disk-G/8W%20WILLIAMS%201ST%20NAV%20FOR%201ST%20FLT%20OVER%20THE%20NORTH%20POLE/>, 10001.tif; Squadron records also specify that Project 5 details were restricted to those crews assigned to A Flight. Squadron Radar Observer Report, 46th Unit History, October 1 – 12, 1947, Reel A0892, AFHRA.

<sup>23</sup> “Lt. W. Whitney Williams, Personal Diary, 31 August 1946,” 46th/72nd Strategic Recon Squadrons.

<sup>24</sup> White, *World in Peril*, 46. As noted, White wrote his account in collaboration with the father, Major Maynard White, commander of the 46th Reconnaissance Squadron in Alaska.

<sup>25</sup> Narrative Section, History: Strategic Air Command, Historical Branch, 1948, Vol. 1 Reel A4013, AFHRA, pdf 1676 - 1677. See also Farquhar, *A Need to Know*, 57. Photo-mapping flights of Greenland were handled separately by the USAAF under a subsequent project, code named Eardrum.

B and D in the search for land.<sup>26</sup>

The terms of reference and related mission data for Project 5 – Floodlight indicate that Areas B and D also overlapped with parts of Canada’s sector claim, particularly the triangular region north of the Archipelago extending to the Pole. Area D, for instance, covered between the North Pole and 85° N latitude, with the noted exception of a portion to the northeast of Greenland. Mission specific data also suggests overflights of the Canadian sector. For example, a September 1946 mission to Area B went as far as 82° 15’ N, 139° W – a distance of 30 km past Longitude 141° W and into the sector claimed by Canada.<sup>27</sup> *Kee Bird’s* last mission to Area D under Project 5 routed north of the Canadian Archipelago via 81° 40’ N, 135° 50’ W, well within the area encompassed by Canada’s sector claim, subsequently approaching the North Pole from 60th West Meridian.<sup>28</sup> Based on the records reviewed, it is not possible to provide a full account of the degree to which US operations overlapped with or included parts of the claimed Canadian sector. At a minimum, however, some of these operations infringed upon the Canadian sector and were conducted without RCAF observers. This reflected security compartmentalization but also provides evidence that tacit American acceptance of Canadian sovereignty over the Archipelago did not extend north to the Pole along sectoral lines.

At the squadron level, the working brief for those engaged in Project 5 was clear. As later noted by Lt. Fred Wack, a member of the squadron, the most

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<sup>26</sup> Narrative Section, History: Strategic Air Command, Historical Branch, 1948, Vol. 1 Reel A4013, AFHRA, pdf 1676 - 1677.

<sup>27</sup> “Lt. W. Whitney Williams, Personal Diary, 17 September 1946,” 46th/72nd Strategic Recon Squadrons, see <http://46th72nd.org/HistoryCDs/Disk-G/8W%20WILLIAMS%201ST%20NAV%20FOR%201ST%20FLT%20OVER%20THE%20NORTH%20POLE/>, 40001.tif. Williams noted that this was an alternate route, and their shortest mission yet, with earlier flights sent to waters north of Siberia. The overlap is actually more substantial as the aircraft would make a wide turn, beginning a return leg parallel to the previous line – providing structured survey coverage (see the Cowan map, reproduced in this article, for a visual of Project 5 flight patterns).

<sup>28</sup> White, *World in Peril*, 90. This mission was conducted without RCAF observers. A flight map, completed by *Kee Bird’s* lead navigator, supports White’s information. The map also suggests that while *Kee Bird* approached the North Pole for data collection purposes from the 60<sup>th</sup> Meridian West, the parallel return leg was over the Canadian sector within Area D (see the Cowan map). This map further indicates that a mission on 8 October 1946, also crossed the “sectoral line.” Even after Project 5 was completed in the summer of 1948, the US continued to fly secret missions for investigative purposes, some falling within the Canadian sector. For example, Project 000-T, classified at the secret level, was initiated on 29 September 1948 to investigate “a reported sighting on the ice cap” in the vicinity of 82° North, 126° West in the Arctic waters north of the Canadian Archipelago. The report does not specify the nature of the object in question: see 72nd Unit History, 1 July to 30 September 1948, Reel A0894, AFHRA, pdf 50.

important objective was “finding new lands if any existed, and for the United States to lay claim to these.”<sup>29</sup> Another participant, Lt. W. Whitney Williams, echoed the primary goals. Williams was lead US navigator for A Flight and one of the few with access to the Project 5 secure room. In a private diary he maintained at Ladd Field, he quoted directly from a top secret field observation report prepared by Dr. Paul Siple, a polar expert with the US Biogeographer Program Branch, in October 1946: “Conclusions: the original concept of the Flood Light project (Project 5) ‘was primarily to locate the possible existence of undiscovered land. This was important first in order that the U.S.A. might use such land to advantage for national defense and second that we could not be surprised by operations from the islands which the enemy may have discovered that we did not know existed.’”<sup>30</sup>

According to squadron records, from August 1946 to October 1947, ninety-one missions were flown under Project 5 – Floodlight, covering 949, 912 nautical square miles using radar scope photography and 829, 525 nautical square miles searched visually. Reconnaissance using two parallel flight lines was standard, with missions conducted at varying altitudes depending on the time of year and on the photographic and reconnaissance methods employed. Weather data was accumulated and each flight over the Pole also collected magnetic data.<sup>31</sup>

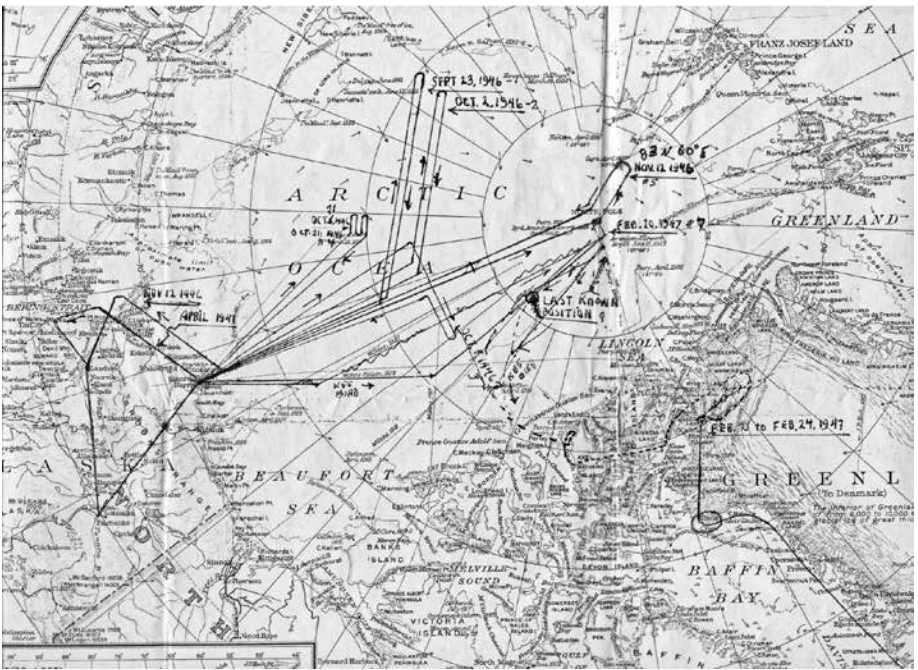
As arrangements with the Canadians were being finalized, the search for uncharted lands under Project 5 – Floodlight was already underway with what

<sup>29</sup> Fred John Wack, *Secret Explorers: Saga of the 46th / 72nd Reconnaissance Squadrons* (Turlock, Calif.: Seeger’s Printing, 1992), 1. Whether the US planned to claim any lands discovered in the polar region would have involved high level policy decisions in Washington and is beyond the scope of this paper. That said, for those working at the operational level at Ladd Field, this was understood as a core objective.

<sup>30</sup> “Lt. W. Whitney Williams, Personal Diary, 26 November 1946,” 46th/72nd Strategic Recon Squadrons, <http://46th72nd.org/HistoryCDs/Disk-G/8W%20WILLIAMS%201ST%20NAV%20FOR%201ST%20FLT%20OVER%20THE%20NORTH%20POLE/W%20WILLIAMS%201ST%20NAV%201ST%20FLIGHT%20OVER%20THE%20NP%20%20OCT%201946/>, 8W Williams 290001.jpg, 31001.jpg, 32001.jpg.

<sup>31</sup> Narrative Section, 46th Unit History, October 1 – 12, 1947, Reel A0892, AFHRA, pdf 1960. This was an interim report, with Project 5 missions continuing into the summer of 1948 under the subsequent direction of the of 72nd Reconnaissance Squadron. By this point all of Area D had been photographed by radar and 80 percent covered visually (see also History: Strategic Air Command, Volume 1, 1948, Reel A4013 AFHRA, pdf 1677). In an official SAC unit citation, awarded in 1996, the 46th Squadron was recognized for having “successfully mapped the entire five and one-half million square miles of the Arctic using a combination of photo and radar photography – although this likely included coverage conducted by successor squadrons.” [http://46th72nd.org/HistoryCDs/Disk-A/46th%2072nd%20SRS%20Ladd%20AD%20AK%201946-1949%20%20%20TRAVIS%20AFB%20CA%201950%201955/Unit\\_Citation0001.jpg;Citation0002.jpg](http://46th72nd.org/HistoryCDs/Disk-A/46th%2072nd%20SRS%20Ladd%20AD%20AK%201946-1949%20%20%20TRAVIS%20AFB%20CA%201950%201955/Unit_Citation0001.jpg;Citation0002.jpg)





A Flight routings for *Kee Bird* as prepared by a USAAF navigator who was aboard the last mission. The parallel flight lines were employed in the search for land. *Kee Bird's* last flight on 20-21 February 1947 was to Area D, which it approached from north of the Canadian Archipelago. The dotted lines on the map represent the aircraft's presumed route over Ellesmere Island after becoming lost and its eventual crash-landing in Greenland. (United States Air Force Photo via 46th/72nd Recon Association website, <http://46th72nd.org/HistoryCDs/Disk-E-Old/KeeBird%20PART%20II/BurlCowanMap/themaporigbig.jpg>)

appeared to be promising initial results. In mid-August, an early Project 5 mission detected a possible island, a mass 17 miles long by 8 miles wide, approximately 300 miles north of Point Barrow, Alaska. In assessing the early photographic and photo radar results, Dr. Siple noted evidence of surface striations not consistent with normal ice crevasses, which turned out to be streams. Further evidence of rocks and other debris added to speculation that this might be land. Dr. Siple noted that the object differed from any ice formation he had ever seen.<sup>32</sup> The discovery caused much initial excitement, with high level briefings and an intensified focus on the object. Dr. Siple himself travelled

<sup>32</sup> Dr. Paul A. Siple, Biogeographer Program Branch, Planning Group Research and Development Division, RG XSIPL, Entry A14-N, Box 49A, File Paul Siple. I wish to acknowledge the assistance of Dr. Peter Kikkert in providing the referenced document. In this report on the discovery, Dr. Siple noted that other islands of importance may also be discovered, "particularly to the north and eastward."

to Alaska and joined on some Project 5 flights. Known initially as the “object,” then “Target X,” and later “T-1,” it proved to be an ice-island, assessed as having likely broken off from Ellesmere Island or Greenland. Composed of dense frozen fresh water, it moved with the current, pushing its way through the less dense, salt water polar ice. The object was handled within a discrete project code – X12R2, labelled “Radar Target Studies” – and A Flight tracked it regularly over the course of the next year, plotting its course and assessing its potential as a site for a weather station or as a landing ground.<sup>33</sup>

### **Working with the Canadian Observers**

The squadron’s arrangement into three distinct flights coincided with the arrival of the RCAF observer unit, which helps to explain the strict separation of personnel, both from a functional and a security standpoint. The RCAF unit consisted of six officers, led by Squadron Leader Harry Forbes, a decorated wartime navigator. The remainder of the unit was made up of two pilots with strong wartime records (both also trained navigators), an additional navigator, a meteorologist, and a radar specialist – a serious commitment by the RCAF. The 46th Squadron’s flight structure in turn allowed for compartmentalization between Project 5, the top secret search for uncharted lands, and Project 14, the Polaris air route initiative. To observe the activities conducted under the auspices of Polaris, the RCAF officers were attached to B Flight.<sup>34</sup>

The arrival of the Canadians brought the sovereignty issue into greater focus. While the US government had not formally recognized Canadian control over the Archipelago and did not agree to the sector principle, Polaris represented a step in what was a gradual shift in US policy towards tacit acceptance of Canada’s control over the Archipelago.<sup>35</sup> The very act of US

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<sup>33</sup> Radar Target Studies Report: Project X12R2, Unit History, April 30, 1947, Reel A0892, AFHRA, pdf 1510.

<sup>34</sup> The B Flight Operations Report for October 1946 noted that duties for the Canadians were “to fill in on Air Crews, make observations and prepare reports,” while gaining Arctic flying experience. Operations Report, 46th Unit History, October 1 – 31, 1946, Reel A0892, AFHRA, pdf 264.

<sup>35</sup> Lackenbauer and Kikkert, “The Dog in the Manger – and Letting Sleeping Dogs Lie: The United States, Canada and the Sector Principle, 1924-1955,” 216-239. On Canadian-American Arctic sovereignty considerations during the Early Cold War, see also Peter Kikkert, “Grasping for the Ends of the Earth: Framing and Contesting Polar Sovereignty, 1900-1955” (PhD diss., University of Western Ontario, 2015), 420-2; Elizabeth Elliot-Meisel, *Arctic Diplomacy: Canada and the United States in the Northwest Passage* (New York: Peter Land, 1998); P. Whitney Lackenbauer and Peter Kikkert, “Sovereignty and Security: The Department of External Affairs, the United States, and Arctic Sovereignty, 1945-68,” in *In the National Interest: Canadian Foreign Policy and the Department of Foreign Affairs and International Trade, 1909-2009*, Greg Donaghy and Michael Carroll eds. (Calgary: University of Calgary Press, 2011), 101-20.



officials engaging Ottawa on Polaris, seeking concurrence, and accepting observers, is evidence of that process. This also played out on the ground at Ladd Field. At the operational level, USAAF records make clear the standing premise that the Archipelago was Canadian territory. The squadron operational summary for November 1946 noted: “The six Canadian Officers attached to this project have been assigned to the crews and one is on each aircraft that goes into Canadian Territory.”<sup>36</sup> As all Polaris flights were over the Archipelago, the meaning was clear. Furthermore, as Polaris unfolded, the RCAF unit also played a direct role in the overall planning and execution of each mission. As one USAAF participant would later note, the Canadians had a particular interest “in plotting the islands of the Archipelago” – perhaps not surprising given Ottawa’s uncertainty about US intentions and its ongoing sovereignty concerns.<sup>37</sup> In this regard, the observers effectively played a dual role as active participants under the operational command authority of the USAAF, while also representing an extension of Canadian sovereign interests for flights over the Archipelago.<sup>38</sup>

The security protocols for the project, however, added an unexpected risk. In February 1947, a Project 5 mission flown on *Kee Bird* was routed north of the Canadian Archipelago to Area D (between the North Pole and 85° N latitude). On the return flight, it became lost. The crew eventually sighted a landmass which they could not identify, with the pilot circling over the general area for several hours hoping to find their bearings. Encountering bad weather, the crew was forced to break radio silence to report their situation, adding that they were “over land but do not know where” and that they could see the sun but that it was too low to obtain an astro reading. Running out of fuel, *Kee Bird* force landed on a glacial lake on what proved to be northern Greenland. The crew survived and was rescued after an intensive search, with their general location determined through radio bearings based on the aircraft’s transmissions, supported by search flights from Ladd Field. In the early hours after the crash, so uncertain was Ladd Field about *Kee Bird*’s location that the first search plane was initially sent out over Mackenzie Bay, Yukon with plans to travel west 50 miles inland towards Alaska.<sup>39</sup>

A post-crash report noted that the first landfall *Kee Bird*’s crew sighted was likely Ellesmere Island. Critically, the report assessed that had a Polaris

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<sup>36</sup> Operations Report, 46th Unit History, November 1 – 30, 1946, Reel A0892, AFHRA, pdf 442.

<sup>37</sup> Wack, *Secret Explorers*, 16.

<sup>38</sup> RCAF observer flight logs were signed-off by US flight officers. See R.G. Murray, RCAF Pilot’s Log, October 1946 entries.

<sup>39</sup> Miscellaneous Report, 46th Squadron History, February 1 – 28, 1947, Reel A0892, AFHRA, pdf 1268, 1288. See also White, *World in Peril*, 90.



Photo of *Kee Bird* crash site. (Wikimedia Commons)

radar operator been onboard, almost certainly the operator would have recognized this as the Canadian Archipelago (and the crash averted). However, as the report added, due to the high classification of Project 5, the number of personnel cleared for the project had been kept to a minimum, restricting the use of radar operators from other flights.<sup>40</sup>

Post-crash assessments also criticized the mission navigators for not conducting a thorough assessment process during the flight, failing to eliminate Alaska and Siberia as possibilities for the land they were sighting below (also an indication of how lost they were), and for not bringing with them an emergency navigation kit which had recently been prepared by B Flight, with maps and details of the Canadian Archipelago.<sup>41</sup> The crash inspired major changes, with restrictions loosened on the use of radar specialists from other flights for Project 5 – Floodlight missions and emergency navigation kits for the Archipelago provided on all long-range missions. Planned flights to Area D were cancelled for the rest of February and again in March 1947 due to “the twilight” and concerns over safety. *Kee Bird*’s loss had clearly disrupted and

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<sup>40</sup> Radar Analysis of the Crash of Airplane #45-21768 on the 21<sup>st</sup> February 1947, 46th Unit History, March 1-31, 1947, Reel A0892, AFHRA, pdf 1440.

<sup>41</sup> Navigation Analysis of the Crash of Airplane #45-21768 on the 21<sup>st</sup> February 1947, 46th Unit History, March 1-31, 1947, Reel A0892, AFHRA; and Radar Analysis of the Crash of Airplane #45-21768, pdf 1436, 1440.

re-shaped squadron operations.<sup>42</sup>

## Navigational Challenges

*Kee-Bird's* crash highlights just how challenging navigation proved from the outset. Even for flights over the Canadian Archipelago, where charts existed, navigation was often problematic, and it was not uncommon for flights to “be lost” – at least for a period. On one early long-range A Flight mission, the aircraft became lost, with the navigator suspecting they were far off course. As it turned out, they were “only” 50 miles off their flight plan. After this initial mishap, squadron command required that pre-flight photographs of each crew be taken in the event the aircraft were to go missing.<sup>43</sup> A September 1946 navigation section report explained the issue in simple terms:

The greatest problem in polar navigation is that of determining and maintaining the heading of an aircraft and the difficulty is due to two main reasons. First, the magnetic compass can be considered useless in the arctic. Secondly, in the polar regions the earth's meridians converge rapidly, and consequently are crossed so often that the conventional method of measuring the angle between the meridian and the desired true course is impractical.<sup>44</sup>

Reporting from both A and B flights reflected focussed efforts to test systems and instrumentation and to develop new navigational techniques. Celestial navigation was fundamental to polar navigation, with steps taken to standardize astro navigator logs to facilitate comparative evaluations. Experimentation was encouraged and, at weekly meetings of the navigation section, they were “urged to present any new theories” to be tested and either “borne out or disproved.”<sup>45</sup> The squadron adopted a grid navigation system for

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<sup>42</sup> Following the loss of *Kee Bird*, operations to Area D (the polar cap north of latitude 85 degrees north) would resume in the early spring. By the end of April 1947, A Flight was able to report that forty-one percent of the area had been completed by visual means and ninety percent by radar. Also of note from a Canadian sovereignty standpoint: while all POLARIS flights had an RCAF observer abroad, the three search missions for *Kee Bird*, which overflowed the Archipelago, had US only crews (based on a review of the crew manifests). This likely reflects that the *Kee Bird* mission was classified under Project 5. That said, at some point, the Canadian unit was informed about the loss of the *Kee Bird*. 46th Squadron participant Fred Wack's account notes that tentative plans for an actual rescue flight were done in collaboration with an RCAF navigator from the Canadian unit. In the end, the rescue flight came from the eastern seaboard, not Ladd Field. “A” Flight Report, Unit History, April 1 – 30, 1947, Reel A0892, AFHRA. See also Wack, *Secret Explorers*, 29.

<sup>43</sup> Centre for Environmental Management of Military Lands, *Cold Weather Testing in Alaska: 1940-1970* (Fort Collins: Colorado State University, 2020), 10.

<sup>44</sup> Navigation Section Report, 46th Unit History, June 1- July 31, Reel A0892, AFHRA, pdf 169.

<sup>45</sup> Navigation Section Report, 46th Unit History, June 1- July 31, pdf 170.

polar flights above 70° N latitude, a methodology first conceptualized by the Royal Air Force and RCAF. On this, the relationship with the RCAF played a key role, with squadron navigators sent to Edmonton where a USAAF unit, supported by an RCAF navigator on assignment, had made important strides in applying a polar grid system.<sup>46</sup> The approach involved a system of lines drawn parallel on a chart to the Greenwich meridian, with the 180-meridian – labelled “0 degrees grid” – becoming the grid north and Greenwich meridian the grid south.<sup>47</sup> The 46th Squadron adopted the system and refined and validated it through testing, with the grid becoming standard procedure for polar aerial navigation.<sup>48</sup> Extensive weather data was also accumulated and assessed, with the Polaris project preparing weather charts to aid in future air travel across the Archipelago.

While magnetic compasses were assumed to be “useless,” testing under Polaris found important utility in the fluxgate compass, an electromagnetic device that senses the direction of the horizontal component of earth’s magnetic field. By the end of February 1947, Polaris had recorded over 1000 fluxgate readings and slightly fewer “bowl compass” readings. While the bowl style compass proved unreliable, the fluxgate was deemed effective over the “critical area” near the Pole and generally “within an area in which the horizontal intensity component of the earth’s magnetic field is less than .05 CGS units.”<sup>49</sup> The 46th Squadron’s assessment was that earlier, overly general conclusions about the magnetic compass had been proven “fallacious.”<sup>50</sup> Although the fluxgate compass could not overcome the core challenge, for use at high latitudes the squadron found that it provided an important emergency method of steering the aircraft “when passing through extended twilight zones.”<sup>51</sup>

Attention was also placed on magnetic readings and on identifying the location of the Magnetic North Pole. Again, the process was methodical. As the navigation section described for Polaris mission 7M-2 on 8 January 1947: “two pairs of reciprocal legs were flown in the vicinity where the Magnetic Pole is believed to exist. On each leg both the fluxgate compass

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<sup>46</sup> White, *World in Peril*, 28 and 65. Kathy Bergquist, *Great Circles: The Keith Greenaway Story* (ArtBookBindery.com, 2008), 86.

<sup>47</sup> Navigation Report, 46th Unit History, September 1 – 30, 1946 Reel A0892, AFHRA, pdf 169.

<sup>48</sup> Navigation Report, 46th Unit History, November 1 – 30, 1946, Reel A0892, AFHRA, pdf 452.

<sup>49</sup> Project X3N3: Terrestrial Magnetic Studies, February 1 – 28, 1947, Unit History, Reel 0892, AFHRA, pdf 1276. The centimetre-gram-second system of units (abbreviated CGS or cgs) has the centimeter, gram, and second as its base units.

<sup>50</sup> Ibid.

<sup>51</sup> 46th Unit History, October 1 – 12, 1947, Reel A0892, AFHRA, pdf 1996.

and the periodic compass were read at ten second intervals. True headings were also determined by the astro compass.”<sup>52</sup> Combined with data plotted from many flights, the navigational section eventually assessed the central pole to be located on northwestern Prince of Wales Island. The latitude and longitude identified by Polaris was separately confirmed by a Canadian ground mission, within very close proximity.<sup>53</sup> In 1949, as classification restrictions on the program were loosened, the lead Polaris navigator, Lt. Frank Klein, published a preliminary magnetic chart in *Eos, Transactions of the American Geophysical Union*, based on approximately 600 inclination values (magnetic readings).<sup>54</sup>

### **Revising the “Top of the World Map”: Photography, Mapping, and Charting**

Mapping and charting the Arctic region was central to mission operations. Although no new lands were discovered under Project 5 – Floodlight, in cartographical terms confirmation on this question represented an important step. As one squadron report noted, “in this particular instance, a definite negative report was almost as much value as a positive report would have been.”<sup>55</sup> Under Polaris, B Flight worked with existing but outdated charts of the Canadian Archipelago. Early missions revealed “the Canadian Archipelago is poorly mapped and only fairly charted,” with visual reconnaissance, photography, and radar scope photography being combined to undertake substantial revisions.<sup>56</sup> Radar scope photography was used for both navigational purposes and photo-mapping during the winter months when standard photography was not viable. Large scale mosaics of the radar-photo shots were assembled, validated, and adjusted by visuals and trimetrogon photography as the days lengthened. Winter posed a particular photographic challenge. By December, Polaris radar specialists noticed an anomaly, as radar returns over low lying lands began

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<sup>52</sup> Flight Analysis Board, Flight “B,” 46th Unit History, January 1 – 31, 1947, Reel A0892, AFHRA, pdf 970.

<sup>53</sup> White, *World in Peril*, 179. Based on the results of a Canadian ground mission, in July 1948, Glenn Madill, Chief Terrestrial Magnetism, Energy, Mines and Resources, Canada wrote to the lead Polaris Navigator, Lt. Frank Klein, that, “Your value of 73°15’N and 99°45’W is in excellent agreement, and I suggest that you use your value by all means....” B Flight also assessed secondary magnetic poles, although on this the Canadians did not concur.

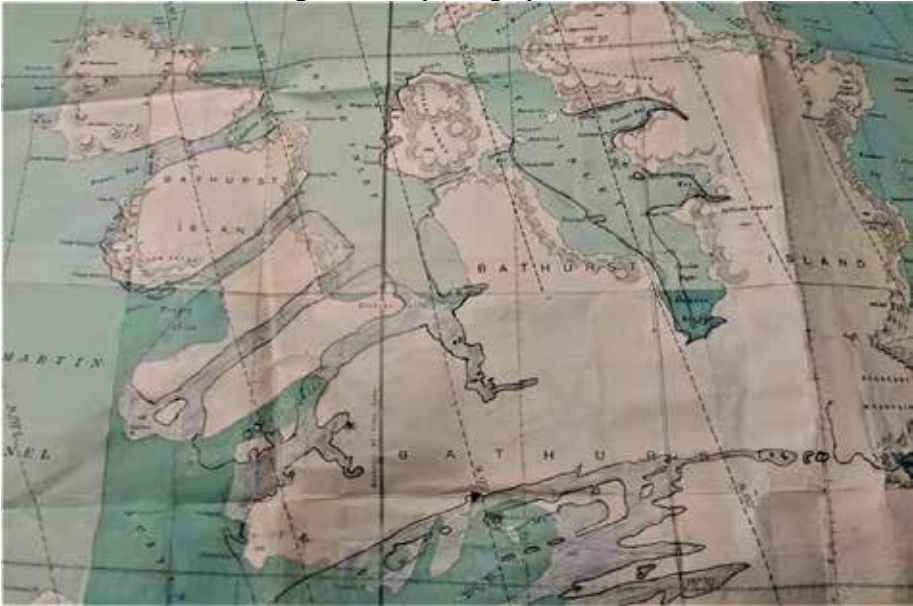
<sup>54</sup> Frank O. Klein, “Preliminary Magnetic Chart for 1947,” *Eos, Transactions of the American Geophysical Union*, 30, no. 2 (April 1949): 221-222.

<sup>55</sup> Squadron Radar Observer Report, 46th Unit History, October 1 – 12, 1947, Reel A0892, AFHRA, pdf 2002.

<sup>56</sup> Navigation Report, 46th Unit History, November 1 – 30, 1946, Reel A0892, AFHRA, pdf 452.

to give negative returns, the opposite of a normal return. The conclusion was that snowfalls on low-lying, featureless areas were filling the hollows and reflecting the beam, producing radar returns that appeared similar to those received over the polar ice. By enlarging and examining the scope photos at length, the radar specialists gradually developed the expertise to interpret the results. Assembly of the larger scale mosaics was supported by hand sketched adjustments to existing charts.

In terms of standard photography, the process was challenging on Polaris flights, requiring constant coordination between three navigators. One navigator would take continuous astrocompass readings while a second monitored aircraft drift, reporting to both the pilot and the “astro man,” while a third navigator was positioned in the nose of the aircraft, acting as a visual observer and coordinating with the photographers in the rear of the aircraft.<sup>57</sup>



Excerpt from hand sketched revisions to an existing chart of Bathurst Island, completed by an RCAF observer attached to B Flight, POLARIS. The northwestern portion of Bathurst, charted as part of a single island in the original, was revealed to be a series of islands. Areas previously thought to be land are coloured in blue pencil and coastlines adjusted accordingly. Sketches were completed as mission photographs were being processed and assembled into photo-mosaics, circa spring 1947. (R.G. Murray, RCAF Pilot's Log)

<sup>57</sup> Flight “B” Navigation Study, 46th Unit History, March 1 – 31, 1947, Reel A0892, AFHRA, pdf 1382.

By September 1947, the map comparison Project X22M5 could report that a “series of Canadian charts (scale 1:506,880) covering the entire area has been assembled, and the details of the various discrepancies are being sketched in as the photographs are processed.”<sup>58</sup> With a heavy focus on the coastlines, the full area covered by Polaris included much of the Archipelago, from Banks Island and Victoria Island in the south, extending east to the Brodeur Peninsula and northwestern Baffin Island, and encompassing the region up to the northern tip of Ellesmere Island.<sup>59</sup>

A 1948 USAF summary of the operation indicated that between October 1946 and August 1947, Polaris missions “photographed over 640,000 square miles of ice and terrain features, ice coverage, different periods of shore ice, glacial activity, coastal lines, winter-summer variation, and animal life and vegetation as observed on the many islands in the Canadian Archipelago.”<sup>60</sup> Results were routinely forwarded to the US Aeronautical Chart Service, with information subsequently released publicly. In October 1949, *National Geographic Magazine* dedicated an edition to the Arctic and acknowledged the role that the USAF and its personnel at Ladd Field had played in revising the publication’s “Top of the World Map.”<sup>61</sup>

### **Risking Life and Limb**

For the aircrew, the demands were high, as were the risks. Physical exhaustion was a constant, especially for navigators and radar operators. A medical officer who travelled on one 20-hour flight noted that the navigators did not sleep. Amphetamines (Benzedrine) were regularly prescribed, although with uneven results according to medical staff. The 46th Squadron lost its first aircraft in December 1946, when B-29/F-13 no. 521853 crash landed on take-off, laden with fuel for its long-range A Flight mission. The crew escaped without serious injury, although the downed aircraft was engulfed in flames. Conditions for the flight had been poor: -54 degrees Fahrenheit and a heavy ice fog, with two engines failing due to the extreme cold. As previously noted, *Kee Bird* was lost in February due to navigational issues. The first loss of life occurred in May 1947, when B-29/F-13A no. 21848, also on an A Flight

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<sup>58</sup> Map Comparison and Correction Project, X22M5, 46th Unit History, September 1 – 30, 1947. Reel A0892, AFHRA, pdf 1925.

<sup>59</sup> A full list of islands in the Canadian Archipelago covered by the 46th Squadron is available on Project File: X11R1, Radar Recoding Techniques, 46th Unit History, May 1 - 30, 1947, Reel A0892, AFHRA, pdf 1615.

<sup>60</sup> Wack, *Secret Explorers*, 69.

<sup>61</sup> Kathy Price, *Northern Defenders: Cold War Context of Ladd Air Force Base, Fairbanks, Alaska, 1947-1961* (Fort Collins: Centre for Environmental Management of Military Lands / Colorado State University, 2001), 14.

mission, crashed into nearby Beacon Hill on take-off from Ladd Field, killing three.<sup>62</sup> All three aircraft, lost in a six-month period, had been used on both Project 5 and Polaris missions.

At the flight maintenance level, attention was given to understanding the impact of extreme cold temperatures on aircraft. Detailed records were maintained, and calculations completed as to the impact of temperature ranges on flight preparations. For example, a lesson learned from the December 1946 crash highlighted that between -30 to -50 degrees Fahrenheit poor fuel vaporization was a critical issue.<sup>63</sup> In flight, cold temperatures for crews proved a problem, with exhaust manifolds adjusted by Boeing to channel more



B-29/F-13 no. 521853 destroyed on take-off from Ladd Field in December 1946. (United States Air Force Photo via 46th/72nd Recon Association Website <http://46th72nd.org/HistoryCDs/Disk-D/B-29%20CRASHES/>)

heat into the aircraft. After complaints about cold meals, electrically heated food warmers were introduced (a relatively new concept) but resulted in cases of food poisoning. Medical staff commented on the resulting “food warmer phobia” among crews.<sup>64</sup> Every step forward seemed to bring challenges that had to be overcome. Given the risks of becoming lost and the potential for a crash landing, much crew time was spent on training in arctic survival skills.

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<sup>62</sup> 46th Unit History, May 1 – 31, 1947, Reel A0892, AFHRA, pdf 1568. Conducted by A Flight under Project 5, these missions had US crews only, with no RCAF observers on board. In December 1947, after the period under review, a fourth B-29/F-13 crash landed in northern Alaska. Due to injuries onboard, rather than remaining with the downed aircraft, the pilot and a crew member attempted to walk to an Indigenous settlement in difficult winter conditions. Despite full winter equipment, as well as wrapping themselves in parachutes for added layers, they died of exposure. They were 38 miles southwest of their assumed location when they set off. White, *World in Peril*, 154.

<sup>63</sup> Effects of Various Temperatures on Ground and Flight Operations, 46th Unit History March 1 – 30, 1947, Reel A0902, AFHRA, pdf 1429.

<sup>64</sup> Dispensary Report, 46th Unit History, April 1 – 30, 1947, Reel A0892, AFHRA, pdf 1474.



Bailout was considered a last resort but, if necessary, emphasis was placed on keeping the downed aircraft in sight while descending by parachute. Even if the plane was destroyed on the ground, in an Arctic environment the crash site would contain items key for survival.<sup>65</sup> As they knew from the *Kee Bird* accident, rescue may take time.

### **Managing the American-Canadian Relationship**

Cooperation with the RCAF unit for Polaris appears to have been reasonably seamless. In the early weeks of the mission, RCAF navigators were assessed by their American colleagues as fitting in very well, particularly given the similar methodologies they employed. By this point, the Canadians were reported to be involved in the “planning, flying and reporting” of all Polaris missions.<sup>66</sup> The navigation section noted that the US navigators “unanimously” preferred charts brought by the Canadians, due their scale, ease of use, and the fact they were already overlaid with the grid navigation system.<sup>67</sup> The Canadians also played an important role in post-mission photographic analysis, with Polaris photographs delivered to the RCAF observers after flights. In October 1947, one 46th Squadron summary report concluded that the “policy of mutual cooperation existent between the United States and the Canadian Government aided materially in the collection of vital navigational and electronic information.”<sup>68</sup>

In November 1946, the Canadians facilitated a visit by two US navigators to RCAF facilities in Edmonton, Hamlin (Saskatchewan), and Ottawa, as they explored issues ranging from navigation to improved radio communications in the Arctic. Termed “The Canadian Mission,” the trip proved productive, with RCAF HQ agreeing to provide current maps, radio frequencies, and station locations, as well as monthly forecasts on favourable wireless frequencies (which varied seasonally), with details channelled through the observers at Ladd Field. The US visitors also noted areas where the Canadians could potentially provide training and information to the 46th Squadron. The RCAF had, for instance, already sent ground teams into the Arctic to identify potential emergency landing grounds, something that was proving difficult for the squadron to confirm from the air. “Compensation” for the Canadian assistance

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<sup>65</sup> Emergency Procedures for Bailout and Emergency Landing over the Polar Region, 25 November 1946, 46th Unit History, January 1 – 31, 1947, Reel A0892, AFHRA.

<sup>66</sup> Operations Report, 46th Unit History, January 1 – 31, 1947, Reel A0892, AFHRA.

<sup>67</sup> Flight Analysis Board Report “B” Flight, 46th Unit History, December 1 -31, 1946, Reel A0892, AFHRA.

<sup>68</sup> Operations Report, 46th Unit History, October 1 – 12, 1947, Reel A0892, AFHRA.

was framed in terms of the value to be received from future Polaris reports.<sup>69</sup>

One meeting appeared to receive special attention. In Edmonton, the visiting US navigators were informed by the Royal Canadian Signals Corps about overflights by unidentified foreign aircraft, later determined to be American. The RCAF officer in charge requested a list of US aircraft call numbers and transmitting frequencies – “deemed necessary by the Canadians for their security program, and to facilitate identification.”<sup>70</sup> In their trip report,



Photo of Melville Island taken from the nose of a B-29 during a Polaris flight. (White, *World in Peril*, 176)

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<sup>69</sup> Lt. Frank Klein (USAAF), Lt. Martin Greenberg (USAAF), Squadron Leader Harry Forbes (RCAF), and Flight Leader Eric Smith (RCAF), Report of the Canadian Mission, 26 November 1946, 46th Squadron History, November 1 – 31, 1946, Reel A0892, AFHRA. The visit report made evident that this was not intended as a one-way-street for the Americans, as the RCAF units anticipated a benefit in return for their assistance. The trip report was drafted by the two US navigators and signed off by RCAF Squadron Leader Forbes, in charge of the Canadian unit, and a second observer, who appear to have accompanied the Americans on the trip. Arrangements were also made to provide details to the squadron on the location of RCMP stations and northern settlements, crucial in the event of a crash landing.

<sup>70</sup> Report of the Canadian Mission, 26 November 1946. The reports of US overflights received by the Canadian Signals Corps were from Hudson's Bay Company stations, not from a technical capability, a point noted with interest by the American navigators. On the request for call numbers and frequencies, the two sides agreed this could also potentially facilitate two-way communication with the aircraft, although via a complicated routing back through Fairbanks. The two sides agreed to the value of this, pending higher level approval. Discussions were also held on enhancing Long Range Aid to Navigation capability, a long-range hyperbolic radio navigation system then being developed and expanded between the USAAF and RCAF for

the US visitors noted with interest that their flights had been picked up. The implications of the Signals Corps request were clear: the Canadian unit wanted to be able to identify and potentially monitor any flights over Canada's territory.

Returning to the issue of compartmentalization, it is unclear whether the attached RCAF observer unit was later advised or learned about Project 5 – Floodlight. Given the context of the program and its top secret classification, managing the Canadian contingent would have been an ongoing consideration for Major White and his staff. The aircraft used for Project 5 and Polaris were, however, used interchangeably between A and B flights, and a close working relationship was established with the RCAF observer unit.<sup>71</sup> Presumably something must have been said to the Canadians to account for the many A Flight missions – whether a nuanced explanation or a simple direct statement that the flights were classified and strictly “need-to-know.” How this was managed is not evident from the files reviewed. In mid-November 1946, approximately two months after the arrival of the Canadians, A Flight's Lt. Williams raised the issue of Polaris in his diary, noting that Major White had “briefed Polaris on Proj. 5.” Williams wondered why “they should get Top Secret stuff.”<sup>72</sup> Given the high security classification and precautions taken in limiting knowledge of the program, this briefing was likely directed at USAAF officers within B Flight, rather than the Canadians. That said, this is an open question and reflective of the complexities from all sides, as the Americans sought to position themselves against the Soviets, while managing the presence of a friendly, but nonetheless foreign observer group, whose political leadership was concerned about US intentions.

While Polaris operations progressed at Ladd Field, questions began to surface in Ottawa about the expansive reach of the program. In assessing the sovereignty implications of Polaris, historian Peter Kikkert has documented Canadian concerns raised at both military and political levels about the project. Initial approval from the Cabinet Defence Committee for Polaris had been for overflights of the Archipelago for training and navigational purposes – not for photography or what was essentially an extensive aerial survey of the Canadian

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Arctic navigation.

<sup>71</sup> While there were security restrictions on the exchange of crews, USAAF pilots were exempted from this and flew on both A and B Flight missions.

<sup>72</sup> “Lt. W. Whitney Williams, Personal Diary, 14 November 1946,” 46th/72nd Strategic Recon Squadrons, 1946 to 1955, last modified 17 March 2008, <http://46th72nd.org/HistoryCDs/Disk-G/8W%20WILLIAMS%201ST%20NAV%20FOR%201ST%20FLT%20OVER%20THE%20NORTH%20POLE/W%20WILLIAMS%201ST%20NAV%201ST%20FLIGHT%20OVER%20THE%20NP%20%20OCT%201946/> 8W Williams 23001.jpg. According to his diary entries, Williams was assigned as security officer for Project 5 – Floodlight. On occasion, he recorded security observations in his private diary.

Arctic. Ottawa considered the aerial photography an unauthorized activity.<sup>73</sup> Indeed, even the initial orders for Polaris received by the 46th Squadron in early October 1946 from SAC HQ corroborate the Canadian position as they referenced only photographic reconnaissance of “landmarks” along the air route.<sup>74</sup> In September 1947, RCAF Air Marshall Wilf Curtis raised the matter with an American counterpart, beginning a series of back-and-forth exchanges via the Permanent Joint Board on Defence. At one point, Assistant Vice Chief of Staff of the USAF General William McKee advised that there was no mapping going on under Polaris and that any photography was used for identifying shorelines and potential weather and radar station sites, best described as “photography of opportunity.”<sup>75</sup> This was clearly a significant understatement given the thousands of standard and radar photographs that had been taken. As noted by Kikkert, the subsequent discussions led to what amounted to a tentative US apology – with the Americans effectively acknowledging that the initial terms of reference for Polaris had been exceeded – an important concession to the Canadians in the context of the larger question of sovereignty over the Archipelago.<sup>76</sup>

The US concession on Polaris helps underscore the drivers behind US intentions in the Arctic during this period. Nanook was a military operation, designed at its core to help enable strategic bombing of the Soviet Union in any future war and to facilitate defensive preparations. In positioning the US for polar operations, Canada was a potential ally – but one that needed to be managed and cultivated – whether through engagement, concessions, pressure

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<sup>73</sup> Kikkert, “The Polaris Incident,” 17.

<sup>74</sup> Operations Report, 46th Unit History, June 1 – 30, 1947, A0892, AFHRA. See also footnote 6 for the full list of orders issued by SAC HQ for Polaris.

<sup>75</sup> Kikkert, “The Polaris Incident,” 16. The political back-and-forth is suggestive of bureaucratic miscommunication on both sides rather than efforts to dissimulate. The photographic activity by the USAAF under Polaris was extensive and systematic, clearly not “photography of opportunity” as stated by General McKee. Also, the statement about “no mapping” taking place did not reflect the facts on the ground at Ladd Field. That said, to have intentionally misled Canadian officials would have been rather futile given the presence and active engagement of the RCAF unit attached to the 46th Squadron. Furthermore, the fact that it took senior Canadian officials until the early fall of 1947 to formally raise their concerns suggests bureaucratic delays or miscommunication within the Canadian system as well. Lastly, the dual role of the RCAF unit adds another layer of nuance, as the unit operated under the command authority of the USAAF in carrying out detailed photographic survey flights over the Archipelago, while also representing the Canadian government in an observer capacity. Although there were key sovereignty concerns in Ottawa about the extent of US activities, the evidence that Canadian observers were active participants in the charting process and the acknowledgement in 46th Squadron official reports of the region as “Canadian Territory” suggest American efforts to alleviate these concerns.

<sup>76</sup> Kikkert, “The Polaris Incident,” 23.

or strict lines of separation where interests diverged. Project 5 and Polaris are evidence of this process, with the US effectively conceding the Archipelago as sovereign Canadian territory and embracing the RCAF unit as an asset, but also compartmentalizing the observers within larger security protocols – as the US separately and secretly searched for undiscovered lands in the north polar region. Canada also gained in terms of increased knowledge of Arctic operations and benefitted from the tacit US acceptance of its sovereignty over the Arctic Archipelago.

The US concessions on the Canadian Archipelago are notable but were balanced by continued opposition to Canada's sector claim. On this, the US pursued a larger set of objectives, linking its considerations on the Arctic with those of the Antarctic where the US had potential interests and was resisting sector claims by the United Kingdom, Australia, Argentina, Chile, and others.<sup>77</sup> In the spring of 1948, as the formal search for land under Project 5 was nearing completion, US Defence Secretary James Forrestal outlined the nature of these connecting interests in correspondence with Secretary of State George C. Marshall.<sup>78</sup> Forrestal explained:

It is important that in the determination of our Antarctic policy, we should make certain that our possible future Arctic interests are in no [way] weakened by any precedents established with respect to the Antarctic. Although no land has been discovered nearer to the North Pole than northern Greenland by any polar expedition nor by numerous recent Air Force polar flights, the possibility remains that there may be undiscovered land in the Arctic area. Such land, even if relatively minor in size, could well be of great strategic importance.<sup>79</sup>

The implications of Forrestal's letter are evident, with US Arctic and Antarctic interests tied, at least in part, to the question of undiscovered land. His statements also echo back to the 46th Squadron's understanding of their mission noted earlier: that the most important objective was "finding new lands if any existed, and for the United States to lay claim to these."

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<sup>77</sup> On broader US considerations involving the Arctic and Antarctic, see Kikkert, "Grasping for the Ends of the Earth," Chapters 6-8.

<sup>78</sup> SAC records indicate that Project 5 was officially cancelled on 15 July 1948. By this point, the initiative was being managed by the 72nd Squadron which had replaced the 46th Squadron. Strategic Air Command, 72<sup>nd</sup> Squadron Unit History, July 1, 1948 to September 30, 1948, Reel A0894, AFHRA.

<sup>79</sup> James Forrestal, Secretary of Defence, to George C. Marshall, Secretary of State, 12 April 1948, in *Foreign Relations of the United States 1948*, The United Nations, Volume 1, Part 2, <https://history.state.gov/historicaldocuments/frus1948v01p2/d232>; See also Kikkert, "Grasping for the Ends of the Earth," 432. At this point the US was considering a condominium arrangement in the Antarctic, involving a "pooling" of the conflicting claims to sovereignty.

These comments suggest a desire for flexibility. By opposing sector claims in both the Arctic and Antarctic, the US equally maintained the potential to claim new lands in the north under the primacy of right of discovery and occupation – lands that could have rested in the sector claims of the Soviet Union or, potentially, Canada.<sup>80</sup> Again, we return to a complex alignment of US interests – cultivating Canadian support for overflights of the Archipelago and navigational assistance, while keeping options open in the polar cap to the north, potentially of greater strategic advantage against the Soviets. Had new land been discovered by Project 5 – Floodlight within Canada’s sector north of the Archipelago Washington would have had a difficult choice to make: respect the Canadian sector claim or claim the new territory for the US and risk fracturing the pivotal American-Canadian defence relationship.<sup>81</sup>

## Conclusion

While questions of sovereignty and the necessities of military planning were key issues in the activities carried out by the 46th Squadron, another dimension of the over-arching Project Nanook stands out. In 1992, to celebrate the achievements of the 46th and its successor, the 72nd Reconnaissance Squadron, one of the participants drafted a commemorative book which he titled “Secret Explorers.”<sup>82</sup> Given the nature of the mission, this was not an unfair description. In the archival record, the military intent for the 46th Squadron is remarkably silent for many of the projects, with issues of navigation, weather, magnetism, and cartographical efforts treated as part of

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<sup>80</sup> It is noteworthy that in its early missions under Project 5, the 46th Squadron focussed heavily on waters directly north of Alaska. While this made sense from a practical standpoint, it may have also reflected the larger policy context. The suggestion is that any discovery in waters directly north of Alaska would have blocked Soviet use of such lands, while ensuring US claims would be based firmly on the right of discovery and occupation, fully consistent with broader US polar policy.

<sup>81</sup> In several reports written in 1946, US officials recognized the high stakes involved in such a decision. One USAAF report highlighted the importance of joint defence and recommended that the US make it “unequivocally clear that this country entertains no possessive design upon the polar territories to which Canada lays claim.” Another report suggested that, although the Americans could not explicitly recognize Canada’s sector, “the dictates of political expediency... forbid [U.S.] encroachment” on any territory lying within it. See Kikkert, “Grasping for the Ends of the Earth, 422.

<sup>82</sup> Wack, *Secret Explorers*, 1. In 1996, fifty years after the events, the squadron would also receive the USAF “Outstanding Unit Award,” marking the hazardous missions and accomplishments of the unit’s Arctic operations, 1946-47. See, “Unit Citation, 46th/72nd Strategic Recon Squadrons, 1946 to 1955, last modified 26 April 2021, <http://46th72nd.org/HistoryCDs/Disk-A/46th%2072nd%20SRS%20Ladd%20AD%20AK%201946-1949%20%20%20TRAVIS%20AFB%20CA%201950%201955/>, Unit Citation0001.jpg; Citation0002.jpg



Crew of the *Kee Bird* at the crash site in Greenland, February 1947. (Wikimedia Commons)

a structured study of the Arctic – which in effect it was. While Nanook was a substantive military operation, it was also one of the largest and most resource intensive explorations of the North American Arctic seen to that time.

In drawing these elements together, this paper has addressed three intersecting issues: Arctic maritime aerial exploration, questions of sovereignty, as well as how the US military managed relations with its northern neighbour during the early Cold War. In terms of Arctic exploration, archival records provide a unique window into the challenges and lessons learned for aerial operations carried out under extreme conditions and with many unknowns. These were critical steps in American plans to use the Arctic as a major theatre of operations. While the overall mission was led by the USAAF, the supporting role played by the RCAF is evident, with a distinctive overlap between matters of exploration and direct military-to-military cooperation. Another picture that emerges is that of a determined US pursuit of its strategic objectives, conceding ground to Canada with respect to the Archipelago, actively embracing the RCAF as a potential partner in Arctic operations, but equally willing to compartmentalize operations in the top secret search for undiscovered lands. USAAF records and personnel accounts document that Project 5 had a broad

reach and involved areas within Canada's sector claim, with flights conducted without the presence of the RCAF observers. In this context, the operations of 46th Squadron provide a window into larger tendencies in US policy – those of a layering of interests that both aligned and competed with Canada, with the US actively seeking to manage its engagements in a way that cultivated Canadian cooperation while ensuring maximum operational flexibility where interests diverged, as the US pursued its larger strategic agenda against the Soviet Union.

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