

National Aeronautics and Space Administration



Draft Environmental Impact Statement
Sounding Rockets Program at Poker Flat Research Range
Volume II
Appendices A-H

September 2012

In Cooperation with:
Bureau of Land Management
U.S. Fish and Wildlife Service
University of Alaska Fairbanks

www.nasa.gov

Photo Credit: *Craig Heinselman, SRI*

Cover image: *The February 18, 2012 launch of the Magnetosphere-Ionosphere Coupling in the Alfvén Resonator (MICA) sounding rocket mission from Poker Flat Research Range, Alaska.*

**DRAFT ENVIRONMENTAL IMPACT STATEMENT
FOR THE SOUNDING ROCKETS PROGRAM AT
POKER FLAT RESEARCH RANGE**

VOLUME 2

APPENDICES A THROUGH H

**Sounding Rockets Program Office
National Aeronautics and Space Administration
Wallops Island, VA 23337**

September 2012

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LIST OF ABBREVIATIONS AND ACRONYMS

Σ	sigma, absolute dispersion
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
AK	Alaska
Al	aluminum
ANILCA	Alaska National Interest Lands Conservation Act
BLM	U.S. Bureau of Land Management
C	carbon
Ca	calcium
CAA	Clean Air Act
CAAA	Clean Air Act and its Amendments
Cd	cadmium
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	<i>Code of Federal Regulations</i>
Cl	chlorine
Cm	curium
Co	cobalt
CO ₂	carbon dioxide
Cu	copper
CWA	Clean Water Act
D	distance(s)
dBA	decibels A-weighted
DOD	U.S. Department of Defense
EA	Environmental Assessment(s)
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement(s)
EM	electromagnetic
EPA	U.S. Environmental Protection Agency
ERD	Environmental Resources Document(s)
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FB	Fairbanks, Alaska
Fe	iron
FEIS	Final Environmental Impact Statement
FR	<i>Federal Register</i>
FY	fiscal year
GMU	Game Management Unit
GPS	global positioning system
GRN	Sondre Stromfjord, Greenland
GSFC	Goddard Space Flight Center
H	hydrogen
HANLC	high altitude noctilucent clouds

LIST OF ABBREVIATIONS AND ACRONYMS (*Continued*)

HFEF	high frequency electron flux
HMTA	Hazardous Material Transportation Act
HSWA	Hazardous and Solid Waste Act
IR	infrared
kg	kilogram(s)
km	kilometer(s)
kNm	kilo-Newton-meters
kPa	kilopascal(s)
KWAJ	Kwajalein, Marshall Islands
LC	launch complex(es)
Li	Lithium
LVI	launch vehicle impact
Mg	magnesium
MISTI	mesospheric ionization structure and turbulence investigation
mm	millimeter(s)
MMPA	Marine Mammals Protection Act
MOTR	Multi-Object Tracking Radar
MS	mass spectrometer
msl	mean sea level
N	nitrogen
NAAQS	National Ambient Air Quality Standards
NACA	National Advisory Committee for Aeronautics
NASA	National Aeronautics and Space Administration
NCA	National Conservation Area
NEPA	National Environmental Policy Act
NHPA	<i>National Historic Preservation Act</i>
NMFS	<i>National Marine Fisheries Service</i>
NO _x	oxides of nitrogen
NPS	National Park Service
NRA	National Recreation Area
NRHP	National Register of Historic Places
NSROC	NASA Sounding Rocket Operations Contract
NWR	National Wildlife Refuge
OSHA	Occupational Safety and Health Administration
OSSA	Office of Space Science and Applications
Pb	lead
PFRR	Poker Flat Research Range
pH	the negative logarithm of the effective hydrogen ion concentration in gram equivalents per liter, used in expressing both acidity and alkalinity
PM _n	particulate matter with an aerodynamic diameter less than or equal to <i>n</i> micrometers
psi	pounds per square inch

LIST OF ABBREVIATIONS AND ACRONYMS (*Continued*)

QE	quadrant elevation or launch angle
RCRA	Resource Conservation and Recovery Act
RNA	Research Natural Area
ROI	Region of Influence
RS	Radioactive source
RSO	Range Safety Officer
S	sulfur
S-T	stratosphere - troposphere
SEC, sec	second(s)
SEIS	Supplemental Environmental Impact Statement
SHPO	State Historic Preservation Office
SO	stratospheric ozone
Sr	strontium
SRP	Sounding Rockets Program
STS	Space Transportation System (Space Shuttle)
T	threatened
TLV	threshold limit values
TSCA	Toxic Substances Control Act
UAF	University of Alaska Fairbanks
U.S.	United States
U.S.C.	<i>United States Code</i>
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
VA	Virginia
VRM	Visual Resource Management
WFF	Wallops Flight Facility
WI	Wallops Island, Virginia
WSMR	White Sands Missile Range

COMMON METRIC/BRITISH SYSTEM EQUIVALENTS

Length

1 centimeter (cm) = 0.3937 inch	1 inch = 2.54 cm
1 centimeter = 0.0328 foot (ft)	1 foot = 30.48 cm
1 meter (m) = 3.2808 feet	1 ft = 0.3048 m
1 meter = 0.0006 mile (mi)	1 mi = 1609.3440 m
1 kilometer (km) = 0.6214 mile	1 mi = 1.6093 km
1 kilometer = 0.53996 nautical mile (nmi)	1 nmi = 1.8520 km
	1 mi = 0.87 nmi
	1 nmi = 1.15 mi

Area

1 square centimeter (cm ²) = 0.1550 square inch (in ²)	1 in ² = 6.4516 cm ²
1 square meter (m ²) = 10.7639 square feet (ft ²)	1 ft ² = 0.09290 m ²
1 square kilometer (km ²) = 0.3861 square mile (mi ²)	1 mi ² = 2.5900 km ²
1 hectare (ha) = 2.4710 acres (ac)	1 ac = 0.4047 ha
1 hectare (ha) = 10,000 square meters (m ²)	1 ft ² = 0.000022957 ac

Volume

1 cubic centimeter (cm ³) = 0.0610 cubic inch (in ³)	1 in ³ = 16.3871 cm ³
1 cubic meter (m ³) = 35.3147 cubic feet (ft ³)	1 ft ³ = 0.0283 m ³
1 cubic meter (m ³) = 1.308 cubic yards (yd ³)	1 yd ³ = 0.76455 m ³
1 cubic meter (m ³) = 0.000811 acre-ft	1233 m ³ = 1 acre-ft
1 liter (l) = 1.0567 quarts (qt)	1 qt = 0.9463264 l
1 liter = 0.2642 gallon (gal)	1 gal = 3.7845 l
1 kiloliter (kl) = 264.2 gal	1 gal = 0.0038 kl

Mass/Weight

1 gram (g) = 0.0353 ounce (oz)	1 oz = 28.3495 g
1 kilogram (kg) = 2.2046 pounds (lb)	1 lb = 0.4536 kg
1 metric ton (mt) = 1.1023 tons	1 ton = 0.9072 metric ton

Energy

1 joule = 0.0009 British thermal unit (BTU)	1 BTU = 1054.18 joule
1 joule = 0.2392 gram-calorie (g-cal)	1 g-cal = 4.1819 joule

Pressure

1 newton/square meter (N/m ²) = 0.0208 pound/square foot (psf)	1 psf = 48 N/m ²
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Force

1 newton (N) = 0.2248 pound-force (lbf)	1 lbf = 4.4478 N
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APPENDIX A
COORDINATION AND CONSULTATION

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APPENDIX A. COORDINATION AND CONSULTATION

A.1 GENERAL SCOPING CORRESPONDENCE

DATE	FROM	TO
April 14, 2011	NASA, Example Scoping Letter and Attachments,	Potentially Interested Party

National Aeronautics and
Space Administration
Goddard Space Flight Center
Wallops Flight Facility
Wallops Island, VA 23337



Reply to Attn of: 250.W

April 14, 2011

Alaska Center for the Environment
807 G Street #100
Anchorage AK 99501

Dear Sir or Madam:

I am writing to you regarding the continued operations of the National Aeronautics and Space Administration's (NASA) Sounding Rockets Program at the University of Alaska Fairbanks' (UAF) Poker Flat Research Range (PFRR) near Fairbanks, Alaska. In September 2010, we requested input for an Environmental Assessment (EA) that we were preparing. After considering the comments provided by members of the public during the scoping process, we have now decided to prepare an Environmental Impact Statement (EIS). The EIS will evaluate the effects of NASA's continued operations at PFRR and will support the decision-making process for the U.S. Fish and Wildlife Service's (USFWS's) and the Bureau of Land Management's (BLM's) proposed issuance of permits for rocket impact and recovery at Arctic and Yukon Flats National Wildlife Refuges and the Steese National Conservation Area and the White Mountains National Recreation Area, respectively.

Owned and operated by UAF since 1968, the PFRR is a launch facility for sounding rockets, which carry scientific instruments into regions of the upper atmosphere and space that are inaccessible by other commonly used observation methods (e.g., satellites and balloons). The PFRR is located northeast of the unincorporated village of Chatanika, Alaska and consists of approximately 5,200 acres of land that house rocket and support facilities, launch pads, and tracking infrastructure. The primary types of missions conducted by NASA at PFRR are in partnership with university scientists who study the earth's atmosphere and its interaction with the space environment.

Pursuant to the National Environmental Policy Act (NEPA), the EIS will consider a range of alternatives that meet NASA's needs for obtaining the requisite earth and space science data afforded by high-latitude sounding rocket launches in support of its science and educational missions. Alternatives currently being considered for evaluation in the EIS include:

- Continuing the SRP in its present form and at the current level of effort;
- Continuing SRP launches from PFRR within the existing flight zones with differing requirements for identification and recovery of spent stages and payloads;
- Modifying the trajectories of the existing flight zones; and
- Conducting a subset of launches at other high-latitude launch sites, thereby avoiding the federally-managed lands.

The No Action Alternative is to discontinue sounding rocket launches from PFRR.

The EIS will analyze the effects of the alternatives on all applicable environmental media, including airspace, noise, safety, biological resources, socioeconomics, transportation, cultural resources, water resources, wetlands, air quality, land use, hazardous materials, recreation and visual resources, environmental justice, subsistence, and cumulative impacts. NASA anticipates that the areas of most interest to the public will be: the effects of rocket and payload landing and recovery on special interest lands (including Wilderness Areas and Wild Rivers), considerations to ensure public safety during rocket flight, and potential effects on subsistence uses on lands within the flight zones. Public and agency scoping may identify other environmental resources for consideration in the EIS.

The enclosed documents provide more detailed information regarding the PFRR and the history behind the EIS. Additionally, I encourage you to visit the project's website on a regular basis for the most up-to-date information about the project.

The website's address is http://sites.wff.nasa.gov/code250/pfrr_eis.html.

In scoping the EIS, we would like to request input from you regarding potential environmental concerns or project alternatives such that it can be considered in preparing the Draft document. As a part of this effort, we will be holding public meetings to provide further information and gather input from the public. The scoping meeting locations and dates identified at this time are shown below and on the enclosed flyer.

- Thursday, April 28, 1:00 to 3:00 p.m., at the Fort Yukon Tribal Hall, 3rd and Alder Street, in Fort Yukon, Alaska*
- Monday, May 2, 2:00 to 4:00 p.m., at the University of Alaska Fairbanks, William R. Wood Campus Center, 505 S. Chandalar Drive in Fairbanks, Alaska.
- Monday, May 2, 6:00 to 8:00 p.m. at Pioneer Park, Blue Room, 3rd Floor, 2300 Airport Way, in Fairbanks, Alaska.
- Tuesday, May 3, 2:00 to 4:00 p.m. and 6:00 to 8:00 p.m. at the U.S. Fish and Wildlife Service Alaska Regional Office, Gordon Watson Conference Room, 1011 East Tudor Road, in Anchorage, Alaska.

**Please note that the Fort Yukon meeting, originally scheduled for Friday, April 29, 2011, as indicated on the enclosed Federal Register notice, has been rescheduled for the date shown above due to conflicts that were not anticipated at the time the notice was published.*

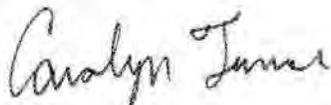
Each scoping meeting will begin with an open house where the public will have the opportunity to interact with members of the project team through one-on-one discussions. Approximately 30 minutes into the open house, NASA will provide an overview of the NEPA process and current PFRR operations. Following the presentations, public comments may be provided. During this time, all oral comments and questions will be recorded for consideration in preparing the Draft EIS. If you require special assistance to attend the meetings, please contact Joshua Bundick at the address below at least two (2) business days prior to the meeting. As an additional effort to inform the public of these meetings, we request your assistance in posting the enclosed flyer in a visible place within your community.

Comments may also be submitted by email, mail, phone, or fax, and will be accepted throughout the entire Draft EIS analysis process. However, for full early consideration and to best help shape and refine the proposal, please submit comments by June 1, 2011 to:

Joshua Bundick
Manager, Poker Flat Research Range EIS
NASA Goddard Space Flight Center's Wallops Flight Facility
Wallops Island, VA 23337
Phone: (757) 824-2319
Fax: (757) 824-1819
Email: Joshua.A.Bundick@nasa.gov

If you do not have input at this time, other means for involvement, including reviews of the Draft and Final EIS, will be offered in the future. You will be provided mailed notices regarding the availability of these documents unless you request to be removed from our distribution list. On behalf of the entire EIS team, I would like to thank you for your interest in this project. We look forward to working with you.

Sincerely,



Carolyn Turner
Associate Chief, Medical and Environmental Management Division

3 Enclosures:

1. *Federal Register* Notice
2. PFRR Flight Zone Map
3. Scoping Meeting Notification Flyer

qualitative feedback we mean information that provides useful insights on perceptions and opinions, but are not statistical surveys that yield quantitative results that can be generalized to the population of study. This feedback will provide insights into customer or stakeholder perceptions, experiences and expectations, provide an early warning of issues with service, or focus attention on areas where communication, training or changes in operations might improve delivery of products or services. These collections will allow for ongoing, collaborative and actionable communications between the Agency and its customers and stakeholders. It will also allow feedback to contribute directly to the improvement of program management.

Feedback collected under this generic clearance will provide useful information, but it will not yield data that can be generalized to the overall population. This type of generic clearance for qualitative information will not be used for quantitative information collections that are designed to yield reliably actionable results, such as monitoring trends over time or documenting program performance. Such data uses require more rigorous designs that address: The target population to which generalizations will be made, the sampling frame, the sample design (including stratification and clustering), the precision requirements or power calculations that justify the proposed sample size, the expected response rate, methods for assessing potential non-response bias, the protocols for data collection, and any testing procedures that were or will be undertaken prior to fielding the study. Depending on the degree of influence the results are likely to have, such collections may still be eligible for submission for other generic mechanisms that are designed to yield quantitative results.

The Agency received no comments in response to the 60-day notice published in the **Federal Register** of December 22, 2010 (75 FR 80542).

Below we provide NASA Headquarters projected average estimates for the next three years:¹

¹ The 60-day notice included the following estimate of the aggregate burden hours for this generic clearance federal-wide:

Average Expected Annual Number of Activities: 25,000.

Average Number of Respondents per Activity: 200.

Annual Responses: 5,000,000.

Frequency of Response: Once per request.

Average Minutes per Response: 30.

Burden Hours: 2,500,000.

Current Actions: New collection of information.

Type of Review: New Collection.

Affected Public: Individuals and Households, Businesses and Organizations, State, Local or Tribal Government.

Average Expected Annual Number of Activities: 1,000.

Respondents: 200,000 annually.

Annual Responses: 200,000.

Frequency of Response: Once per request.

Average Minutes per Response: 15 minutes.

Burden Hours: 50,000 hours (over three years).

An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid Office of Management and Budget control number.

Fran Teel,

Acting NASA Clearance Officer,

[FR Doc. 2011-8761 Filed 4-12-11; 8:45 am]

BILLING CODE 7510-13-P

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

[Notice (11-034)]

National Environmental Policy Act; Sounding Rockets Program; Poker Flat Research Range

AGENCY: National Aeronautics and Space Administration.

ACTION: Notice of intent to prepare an Environmental Impact Statement (EIS) and to conduct scoping for continuing sounding rocket operations at Poker Flat Research Range (PFRR), Alaska.

SUMMARY: Pursuant to the National Environmental Policy Act, as amended, (NEPA) (42 U.S.C. 4321 *et seq.*), the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (40 CFR parts 1500-1506), and NASA's NEPA policy and procedures (14 CFR part 1216, subpart 1216.3), NASA intends to prepare an EIS for its continued use of the University of Alaska-Fairbanks (UAF) owned and managed PFRR, outside of Fairbanks, Alaska. The U.S. Fish and Wildlife Service (USFWS), Bureau of Land Management (BLM), and UAF will serve as Cooperating Agencies as they possess both regulatory authority and specialized expertise regarding the Proposed Action that will be the subject of the EIS.

The purpose of this notice is to apprise interested agencies, organizations, tribal governments, and

individuals of NASA's intent to prepare the EIS and to request input regarding the definition of reasonable alternatives and significant environmental issues to be evaluated in the EIS.

In cooperation with BLM, UAF, and USFWS, NASA will hold public scoping meetings as part of the NEPA process associated with the development of the EIS. The scoping meeting locations and dates identified at this time are provided under **SUPPLEMENTARY INFORMATION** below.

DATES: Interested parties are invited to submit comments on environmental issues and concerns, preferably in writing, on or before June 1, 2011, to assure full consideration during the scoping process.

ADDRESSES: Comments submitted by mail should be addressed to Joshua Bundick, Manager, Poker Flat Research Range EIS, NASA Goddard Space Flight Center's Wallops Flight Facility, Wallops Island, Virginia 23337. Comments may be submitted via e-mail to Joshua.A.Bundick@nasa.gov.

FOR FURTHER INFORMATION CONTACT: Joshua Bundick, Manager, Poker Flat Research Range EIS, NASA Wallops Flight Facility, Wallops Island, Virginia 23337; telephone (757) 824-2319; e-mail: Joshua.A.Bundick@nasa.gov. Additional information about NASA's Sounding Rocket Program (SRP) and the University of Alaska-Fairbanks' PFRR may be found on the internet at <http://sites.wff.nasa.gov/code810> and <http://www.pfrr.alaska.edu>, respectively. Information regarding the NEPA process for this proposal and supporting documents (as available) are located at http://sites.wff.nasa.gov/code250/pfrr_vis.html.

SUPPLEMENTARY INFORMATION:

Programmatic Background

NASA's SRP, based at the Goddard Space Flight Center's Wallops Flight Facility (WFF), supports the NASA Science Mission Directorate's strategic vision and goals for understanding the phenomena affecting the past, present, and future of Earth and the solar system and supports the Agency's educational mission. The suborbital missions enabled by the SRP provide researchers with opportunities to build, test, and fly new instrument concepts while simultaneously conducting world class scientific research. With its hands-on approach to mission formulation and execution, the SRP also helps ensure that the next generation of space scientists receives the training and experience necessary to move on to NASA's larger, more complex missions.

Launch Sites

Sounding rockets can be launched from permanently established ranges or from temporary launch sites using NASA's mobile range assets. Permanent ranges include WFF in Wallops Island, Virginia; PFRR near Fairbanks, Alaska; White Sands Missile Range (WSMR) in White Sands, New Mexico; Kwajalein Island, Marshall Islands Republic; Esrange, Kiruna, Sweden; and the Norwegian Rocket Range, Andøya, Norway. In the past, temporary launch sites have included Australia, Brazil, Greenland, and Puerto Rico. The majority of sounding rocket launches occur at WSMR, WFF, and PFRR.

Where the SRP conducts its work is highly dependent on the scientific goals of each mission. For example, if equatorial phenomena must be observed, a site such as Brazil is used. For middle latitudes, Wallops Island, Virginia, or White Sands, New Mexico, are selected. If the aurora borealis must be observed, a northern latitude is required, such as at PFRR.

PFRR Background

The PFRR, located northeast of the unincorporated village of Chatanika, Alaska, consists of approximately 2,100 hectares (5,200 acres) of land that house rocket and payload support facilities, launch pads, and tracking infrastructure. Since the late 1960s, NASA, other government agencies, and educational institutions have supported suborbital rocket launches from the PFRR. While the PFRR is owned and managed by the Geophysical Institute of UAF, the NASA SRP has exclusively funded and managed the support contract with PFRR for more than 25 years.

The northern location of the PFRR is strategic for launching sounding rockets for scientific research in auroral space physics and earth science. The PFRR is the only high-latitude, auroral-zone rocket launching facility in the United States where a sounding rocket can readily study the aurora borealis and the sun-Earth connection. Recent Earth science-based missions have furthered the understanding of ozone depleting substances in the upper atmosphere. Such studies are critical for the continual refinement of theories and research on the topics of ozone depletion, global warming, and climate change. Recent space physics-focused missions have measured the upper atmospheric winds and auroras in the ionosphere. The information collected further assists the nation's scientists in understanding the interactions between the sun and Earth as well as the origin

and evolution of the solar system. Technology development and validation enabled by the SRP at the PFRR is critical in furthering the development of Earth and space science instruments at a fraction of the size and cost that would result from using other launch methods. The PFRR facility also supports educational outreach programs where students and scientists from various universities are able to conduct aeronautics and space research.

Additionally, from an operational perspective, PFRR is an ideal location for sounding rocket missions. Directly north (downrange) from the launch site are vast areas of open, very sparsely populated lands of interior Alaska and the Arctic Ocean to the extreme north. Having the ability to launch rockets over such a vast area with very low population density is critical to ensuring public safety.

Existing SRP NEPA Documents and Context

In 2000, NASA published a Final Supplemental EIS (FSEIS) for the SRP. The 2000 FSEIS considered SRP operations at a programmatic level and expanded upon the original SRP EIS prepared in 1973, to include multiple launch sites, new launch vehicles, and updated environmental conditions. In its Record of Decision for the 2000 FSEIS, NASA decided to continue SRP operations at its current level of effort at all launch sites, including PFRR. Since then, NASA has launched approximately four (4) sounding rockets annually from PFRR primarily during the winter months. It is expected that this launch rate at PFRR would continue to satisfy NASA's needs into the reasonably foreseeable future.

NASA recently reviewed its 2000 SRP FSEIS and determined that the overall environmental analysis in the 2000 SRP FSEIS remains sufficient to support the Agency's broad programmatic decision to continue the SRP, however potential changes in both PFRR operations and the environmental context of the launch corridor north of PFRR warrant preparation of additional PFRR-specific environmental analysis to better inform Agency decisions regarding PFRR. For example, PFRR is now considering a more rigorous rocket and payload recovery process. Additionally, a large portion of downrange lands are undergoing wilderness review, which could ultimately affect how rocket and payload recoveries are handled.

Accordingly, NASA began the preparation of an Environmental Assessment to determine if those changes presented potentially a significant impact necessitating an EIS.

During the scoping process for the EA in the fall of 2010, NASA solicited input from over 75 potentially interested agencies and organizations. A number of conservation organizations expressed concern regarding NASA's continued operations at PFRR and requested that a more detailed assessment be performed. As such, NASA decided that an EIS would be the most appropriate level of NEPA documentation for the proposal. The subject EIS will tier from the programmatic 2000 FSEIS and provide a focused analysis of SRP operations at PFRR.

Cooperating Agency Actions

The PFRR EIS will serve as a decision-making tool not only for NASA but also for its two Federal Cooperating Agencies, BLM and USFWS. Directly north of the PFRR facility are its downrange flight zones, over which rockets are launched and within which spent stages and payloads impact the ground. Within these flight zones are landmasses owned or managed by several Federal, State and Native Alaskan organizations, including the USFWS, BLM, Alaska Department of Natural Resources, Doyon Regional Corporation, and the Native Village of Venetie Tribal Government. More specifically, the subject Federal lands within the PFRR flight corridor are BLM's North Steese Conservation Area and White Mountain National Recreational Area, and the UFWS-managed Arctic and Yukon Flats National Wildlife Refuges (NWRs). Historically, the managing entities have issued UAF annual or multi-year special-use authorizations and agreements for impact of rockets and recovery operations on these lands. BLM and USFWS are currently considering if and how future authorizations for rocket landing and recovery would be issued for the properties under their management. Additionally, both agencies are currently preparing long-term management plans for their respective landholdings. BLM is currently drafting its Eastern Interior Resource Management Plan; Arctic NWR is currently updating its Comprehensive Conservation Plan (CCP); and the revision of the Yukon Flats NWR CCP is expected to begin within the next two years. The results of these planning processes will play a significant role in how future launches from PFRR would occur. As such, the PFRR EIS will consider the effects of each agency's respective permitting actions within the context of their long-term management objectives.

Alternatives

The EIS will consider a range of alternatives that meet NASA's needs for obtaining the requisite earth and space science data afforded by high-latitude sounding rocket launches in support of both NASA's science and educational missions.

Alternatives currently being considered for evaluation in the EIS include:

- Continuing the SRP in its present form and at the current level of effort;
- Continuing SRP launches from PFRR within the existing flight zones with differing requirements for identification and recovery of spent stages and payloads;
- Modifying the trajectories of the existing flight zones; and
- Conducting a subset of launches at other high-latitude launch sites, thereby avoiding the federally-managed lands.

The No Action Alternative is to discontinue sounding rocket launches from PFRR. NASA anticipates that the areas of potential environmental impact from each alternative of most interest to the public will be: The effects of rocket and payload landing and recovery on special interest lands (including Wilderness Areas and Wild Rivers), considerations to ensure public safety during rocket flight, and potential effects on subsistence uses on lands within the flight zones.

Scoping Meetings

NASA and its Cooperating Agencies plan to hold three public scoping meetings to provide information on the PFRR EIS and to solicit public comments regarding environmental concerns and alternatives to be considered in the EIS. The public scoping meetings are scheduled as follows:

- Friday, April 29, 2011, at the Tribal Hall, Third and Alder Streets, Fort Yukon, Alaska, 1 p.m.–4 p.m.
- Monday, May 2, 2011, at the University of Alaska-Fairbanks, William R. Wood Student Center, 505 South Chandalar Drive, Fairbanks, Alaska, 2 p.m.–4 p.m.
- Monday, May 2, 2011, at the Pioneer Park, Blue Room, 2300 Airport Way, Fairbanks, Alaska, 6 p.m.–8 p.m.
- Tuesday, May 3, 2011, at the United States Fish and Wildlife Service Alaska Regional Office, Gordon Watson Conference Room, 1011 East Tudor Road, Anchorage, Alaska, 2 p.m.–4 p.m. and 6 p.m.–8 p.m.

As the EIS is prepared, the public will be provided several opportunities for

involvement, the first of which is during scoping. Even if an interested party does not have input at this time, other avenues, including reviews of the Draft and Final EIS, will be offered in the future. The availability of these documents will be published in the **Federal Register** and through local news media to ensure that all members of the public have the ability to actively participate in the NEPA process.

In conclusion, written public input on alternatives and environmental issues and concerns associated with NASA's SRP launches at PFRR that should be addressed in the EIS are hereby requested.

Olga M. Dominguez,

Assistant Administrator, Office of Strategic Infrastructure.

[FR Doc. 2011-8844 Filed 4-12-11; 8:45 am]

BILLING CODE 7510-13-P

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

[Notice: (11-035)]

NASA Advisory Council; Space Operations Committee; Meeting.

AGENCY: National Aeronautics and Space Administration.

ACTION: Notice of meeting.

SUMMARY: In accordance with the Federal Advisory Committee Act, Public Law 92-463, as amended, the National Aeronautics and Space Administration announces a meeting of the NASA Advisory Council (NAC) Space Operations Committee.

DATES: Tuesday, May 3, 2011, 8 a.m.–2 p.m. local time.

ADDRESSES: Doubletree Hotel, 2080 North Atlantic Ave, Cocoa Beach, FL 32931.

FOR FURTHER INFORMATION CONTACT: Mr. Jacob Keaton, NAC Space Operations Committee Executive Secretary, National Aeronautics and Space Administration Headquarters, Washington, DC 20546, 202/358-1507, jacob.keaton@nasa.gov.

SUPPLEMENTARY INFORMATION: The agenda for the meeting includes the following topics:

- Space Operations Mission Directorate FY2012 Budget.
- Commercial Crew Development Program status.
- Commercial Orbital Transportation System status.
- 21st Century Launch Complex status.
- Recommendation preparation and discussion.

The meeting will be open to the public up to the seating capacity of the room. It is imperative that the meeting be held on this date to accommodate the scheduling priorities of the key participants.

P. Diane Rausch,

Advisory Committee Management Officer, National Aeronautics and Space Administration.

[FR Doc. 2011-8845 Filed 4-12-11; 8:45 am]

BILLING CODE 7510-13-P

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

[Notice: (11-036)]

NASA Advisory Council; Audit, Finance and Analysis Committee; Meeting

AGENCY: National Aeronautics and Space Administration.

ACTION: Notice of meeting.

SUMMARY: In accordance with the Federal Advisory Committee Act, Public Law 92-463, as amended, the National Aeronautics and Space Administration announces a meeting of the Audit, Finance and Analysis Committee of the NASA Advisory Council.

DATES: Tuesday, May 3, 2011, 9 a.m.–11:45 a.m., Local Time.

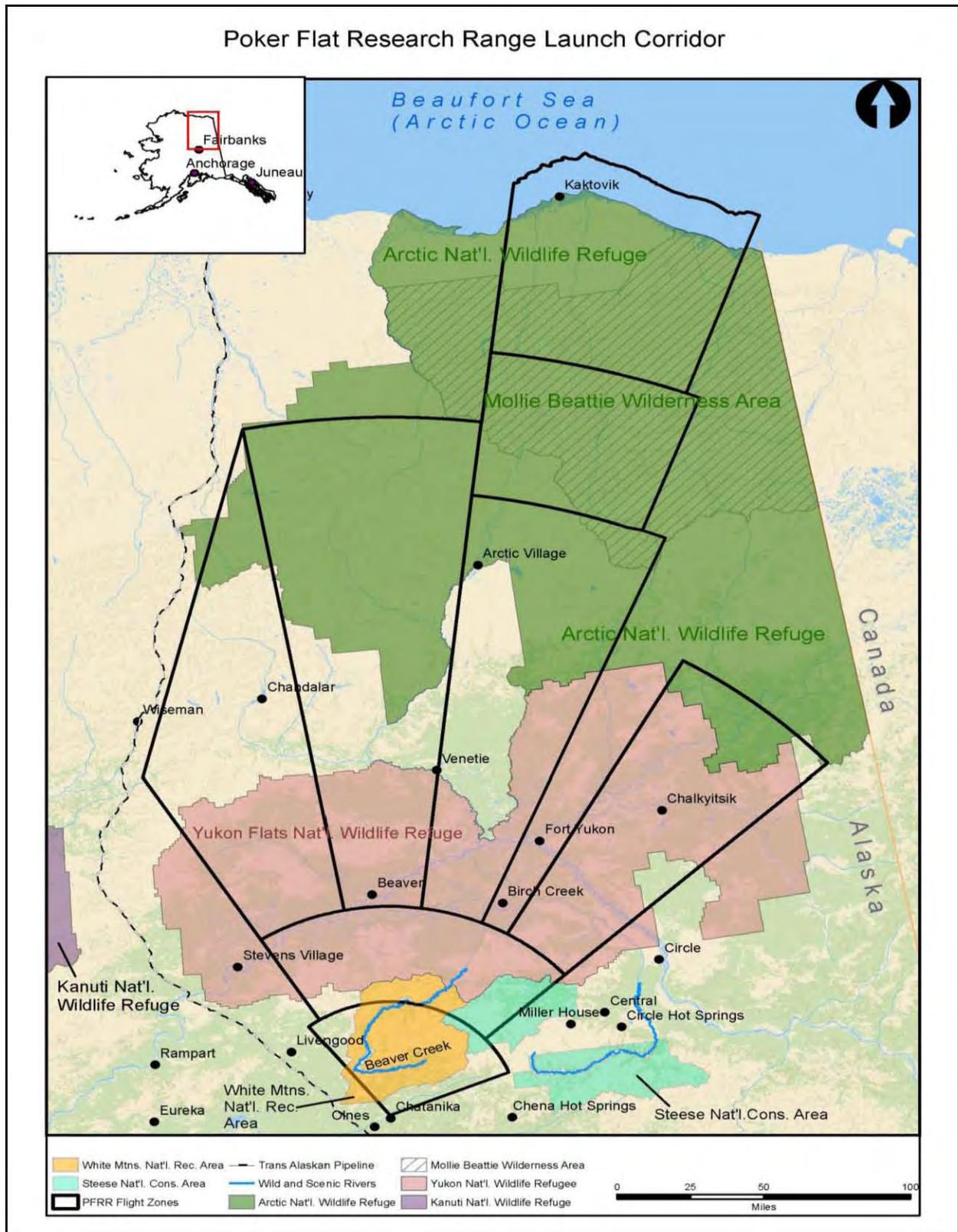
ADDRESSES: NASA Headquarters, Conference Room 8D48, 300 E Street, SW., Washington, DC 20546.

FOR FURTHER INFORMATION CONTACT: Ms. Charlene Williams, Office of the Chief Financial Officer, National Aeronautics and Space Administration Headquarters, Washington, DC 20546, Phone: 202-358-2183, fax: 202-358-4336.

SUPPLEMENTARY INFORMATION: The agenda for the meeting includes the following topics:

- Overview of the GAO Quick Look Book.
- Overview of the NASA Strategic Plan.
- Committee Discussion.

The meeting will be open to the public up to the seating capacity of the room. It is imperative that the meeting be held on this date to accommodate the scheduling priorities of the key participants. Visitors will need to show a valid picture identification such as a driver's license to enter the NASA Headquarters building (West Lobby—Visitor Control Center), and must state that they are attending the Audit, Finance, and Analysis Committee meeting in room 8D48 before receiving an access badge. All non-U.S. citizens





Environmental Impact Statement

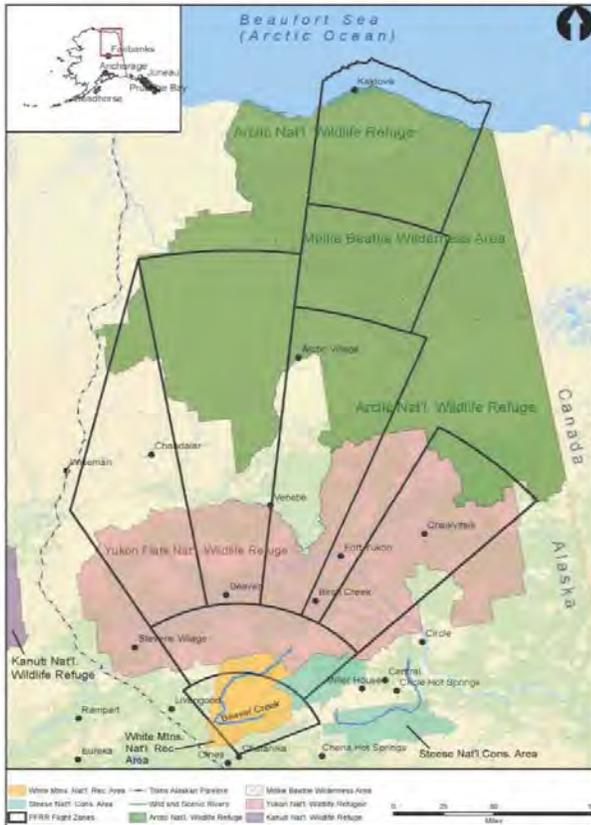
Public Scoping Meetings - Please Attend

The National Aeronautics and Space Administration (NASA) is preparing an Environmental Impact Statement (EIS) for its Sounding Rockets Program (SRP) at the University of Alaska Fairbank's (UAF's) Poker Flat Research Range (PFRR) 30 miles northeast of Fairbanks, Alaska.

Owned and operated by UAF since 1968, the PFRR is a launch facility for sounding rockets, which carry scientific instruments into regions of the upper atmosphere and space that are inaccessible by other commonly used observation methods (e.g., satellites and balloons). The primary types of missions conducted by NASA at PFRR are in partnership with university scientists who study the Earth's atmosphere and its interaction with the space environment.

Pursuant to the National Environmental Policy Act (NEPA), the EIS will evaluate the effects of NASA's continued operations at PFRR. The EIS will address a range of action alternatives as well as a No Action alternative.

NASA is hosting public scoping meetings prior to preparing the Draft EIS to provide further information regarding NASA's Sounding Rocket Program and to request input from the public and government representatives regarding potential environmental concerns or project alternatives. All interested parties are invited.



Poker Flat Research Range Launch Corridor

Additional information may be found on the internet at http://sites.wff.nasa.gov/code250/pfrr_eis.html

Scoping Meetings

Thursday, April 28, 2011
1 - 3 p.m.

Fort Yukon Tribal Hall
3rd and Alder Street
Fort Yukon, Alaska 99740

Monday, May 2, 2011
2 - 4 p.m.

University of Alaska Fairbanks
William R. Wood
Campus Center
Multi-level Lounge
505 S. Chandalar Drive
Fairbanks, AK 99775

Monday, May 2, 2011
6 - 8 p.m.

Pioneer Park, Blue Room
3rd Floor
2300 Airport Way
Fairbanks, AK 99701

Tuesday, May 3, 2011
2 - 4 p.m. and 6 - 8 p.m.

U.S. Fish and Wildlife
Service Regional Office
Gordon Watson
Conference Room
1011 East Tudor Rd.
Anchorage, AK 99503



Comments will be accepted throughout the entire Draft EIS analysis process. However, for full early consideration and to best help shape and refine the proposal, please submit comments by June 1, 2011 to:

Joshua Bundick, Manager
Poker Flat Research Range EIS
NASA Goddard Space Flight
Center's Wallops Flight Facility
Wallops Island, VA 23337
Phone: (757) 824-2319
Fax: (757) 824-1819
Email: Joshua.A.Bundick@nasa.gov

If you require special assistance to attend the meetings, please contact Joshua Bundick at least two (2) business days prior to the meeting.

A.2 TRIBAL AND NATIONAL HISTORIC PRESERVATION ACT CORRESPONDENCE

DATE	FROM	TO
April 14, 2011	NASA, Example Consultation Letter	Federally Recognized Tribes
April 14, 2011	NASA	Alaska State Historic Preservation Office
April 19, 2011	Naqsragnuit Tribal Council	NASA
May 3, 2011	Gwichyaa Zhee Gwich'in Tribal Government	NASA
September 20, 2011	Beaver Traditional Council	NASA
November 9, 2011	NASA	Advisory Council on Historic Preservation
November 29, 2011	Advisory Council on Historic Preservation	NASA
December 9, 2011	NASA, Example Section 106 Consulting Party Letter	Potential Stakeholder
January 5, 2012	Beaver Traditional Council	NASA
January 9, 2012	Native Village of Venetie Tribal Council	NASA
January 30, 2012	City of North Pole	NASA
May 15, 2012	Doyon, Limited	NASA
August 1, 2012	NASA, Letter Advising of Effects Determination Submittal	Alaska State Historic Preservation Office
August 1, 2012	NASA, Letter Advising of Effects Determination Submittal	Doyon, Limited
August 10, 2012	Alaska State Historic Preservation Office	NASA

National Aeronautics and
Space Administration
**Goddard Space Flight Center
Wallops Flight Facility
Wallops Island, VA 23337**



Reply to Attn of: 250.W

April 14, 2011

Patrick Hanson
Tribal Chief
Native Village of Venetie Tribal Government
PO Box 81080
Venetie, AK 99781

Dear Tribal Chief Hanson:

I am writing to you regarding the continued operations of the National Aeronautics and Space Administration's (NASA) Sounding Rockets Program at the University of Alaska Fairbanks' (UAF) Poker Flat Research Range (PFRR) near Fairbanks, Alaska. In September 2010, we requested input for an Environmental Assessment (EA) that we were preparing. After considering the comments provided by members of the public during the scoping process, we have now decided to prepare an Environmental Impact Statement (EIS).

The EIS will evaluate the effects of NASA's continued operations at PFRR and will support the decision-making process for the U.S. Fish and Wildlife Service and the Bureau of Land Management's proposed issuance of permits for rocket impact and recovery at Arctic and Yukon Flats National Wildlife Refuges and the Steese National Conservation Area and White Mountains National Recreation Area, respectively.

In scoping the EIS, we would like to request input from you regarding potential environmental concerns or project alternatives such that it can be considered in preparing the draft document. We are particularly interested in your thoughts about how the launch and subsequent recovery of NASA's scientific rockets and payloads may affect Tribal interests, including areas of spiritual importance and subsistence use. Additionally we would invite any input as to whether you believe there are any historic properties as defined by the National Historic Preservation Act that may be affected by our undertaking.

Additionally, should you so desire, we would like to engage in government-to-government consultation to establish a productive, collaborative partnership for current and future proposals at PFRR. If you would like to pursue such consultation, we suggest that the U.S. Fish and Wildlife Service and the Bureau of Land Management be included as consulting parties. Enclosed for your convenience is a consultation questionnaire. Please fill out the form indicating your level of interest and return it in the pre-addressed, postage-paid envelope.

We will be hosting scoping meetings in Anchorage, Fairbanks, and Fort Yukon, Alaska in late April/early May 2011. The enclosed materials provide additional information regarding the upcoming scoping process. If you are unable to attend the scoping meetings and would like to meet with us at a later date, we will gladly schedule another meeting when it is convenient for you.

If you do not find it necessary to provide input at this time, we will still keep you apprised of the project's progress by providing a copy of the Draft EIS once it is available. Any comments that you may have at that time will be fully considered in developing the Final EIS.

Thank you for your time and consideration of our request. If you would like to meet with our project team or have any comments regarding future consultations, please contact Ms. Jennifer Groman at (202) 358-0455 or by e-mail at Jennifer.A.Groman@nasa.gov. Alternately, you may contact Mr. Joshua Bundick, the project manager for the EIS, at (757) 824-2319 or email at Joshua.A.Bundick@nasa.gov. On behalf of the entire EIS project team, we look forward to working with you.

Sincerely,



Carolyn Turner
Associate Chief, Medical and Environmental Management Division

4 Enclosures

1. Federal Register Notice
2. PFRR Flight Zone Map
3. Scoping Flyer
4. Consultation Questionnaire

National Aeronautics and
Space Administration
Goddard Space Flight Center
Wallops Flight Facility
Wallops Island, VA 23337



Reply to Attn of: 250.W

April 14, 2011

Judith E. Bittner
Chief, Office of History and Archaeology, and State Historic Preservation Officer
550 West 7th Ave., Suite 1310
Anchorage, Alaska 99501-3565

Dear Ms. Bittner:

I am writing to you regarding the continued operations of the National Aeronautics and Space Administration's (NASA) Sounding Rockets Program (SRP) at the University of Alaska Fairbanks' (UAF) Poker Flat Research Range (PFRR) near Fairbanks, Alaska. In September 2010, we requested input for an Environmental Assessment (EA) that we were preparing. After considering the comments provided by members of the public during the scoping process, we have now decided to prepare an Environmental Impact Statement (EIS). The EIS will evaluate the effects of NASA's continued operations at PFRR and will support the decision-making process for the U.S. Fish and Wildlife Service (USFWS) and the Bureau of Land Management (BLM)'s proposed issuance of permits for rocket impact and recovery at Arctic and Yukon Flats National Wildlife Refuges and the Steese National Conservation Area and White Mountain National Recreation Area, respectively.

Owned and operated by UAF since 1968, the PFRR is a launch facility for sounding rockets, which carry scientific instruments into regions of the upper atmosphere and space that are inaccessible by other commonly used observation methods (e.g., satellites and balloons). The PFRR is located northeast of the unincorporated village of Chatanika, Alaska and consists of approximately 5,200 acres of land that house rocket and support facilities, launch pads, and tracking infrastructure. The primary types of missions conducted by NASA at PFRR are in partnership with university scientists who study the earth's atmosphere and its interaction with the space environment.

Pursuant to the National Environmental Policy Act (NEPA), the EIS will consider a range of alternatives that meet NASA's needs for obtaining the requisite earth and space science data afforded by high-latitude sounding rocket launches in support of its science and educational missions. Alternatives currently being considered for evaluation in the EIS include:

- Continuing the SRP in its present form and at the current level of effort;
- Continuing SRP launches from PFRR within the existing flight zones with differing requirements for identification and recovery of spent stages and payloads;
- Modifying the trajectories of the existing flight zones; and
- Conducting a subset of launches at other high-latitude launch sites, thereby avoiding the federally-managed lands.

The No Action Alternative is to discontinue sounding rocket launches from PFRR.

The EIS will analyze the effects of the alternatives on all applicable environmental media, including airspace, noise, safety, biological resources, socioeconomics, transportation, cultural resources, water resources, wetlands, air quality, land use, hazardous materials, recreation and visual resources, environmental justice, subsistence, and cumulative impacts. NASA anticipates that the areas of most interest to the public will be: the effects of rocket and payload landing and recovery on special interest lands (including Wilderness Areas and Wild Rivers), considerations to ensure public safety during rocket flight, and potential effects on subsistence uses on lands within the flight zones. Public and agency scoping may identify other environmental resources for consideration in the EIS.

With this correspondence, NASA would like to initiate the Section 106 process of the National Historic Preservation Act (NHPA) of 1966 (as amended, and as described in implementing regulations at 36 CFR 800) requiring consultation between NASA and the State Historic Preservation Office (SHPO) for federal undertakings. We are in the early stages of gathering information concerning the Area of Potential Effects and determining the level of data collection required. Any assistance you could provide in identifying concerns you may have about the potential effects of the proposed action on significant cultural resources would be appreciated. NASA intends to coordinate public involvement for the purpose of Section 106 review under NHPA with public involvement in the EIS.

As the project proponent, NASA is serving as the lead agency for NEPA and NHPA consultation with the Alaska SHPO. The U.S. Department of the Interior's BLM and USFWS would undertake actions connected to the proposed undertaking and are participating in NASA's NEPA process and Section 106 consultation. The effects of their actions will be considered in all project-related environmental documentation, including the EIS and any historic resources analysis. As such, please include all three agencies in future NHPA-related correspondence regarding NASA's SRP at PFRR.

The enclosed documents provide more detailed information regarding the PFRR and the history behind the EIS. Additionally, I encourage you to visit the project's website on a regular basis for the most up-to-date information about the project. The website's address is http://sites.wfn.nasa.gov/code250/pfrr_eis.html.

In scoping the EIS, we are also requesting input from other agencies and the public regarding potential environmental concerns or project alternatives such that it can be considered in preparing the Draft document. As a part of this effort, we will be holding public meetings to provide further information and gather input from the public. The scoping meeting locations and dates identified at this time are shown below and on the enclosed flyer.

- Thursday, April 28, 1:00 to 3:00 p.m., at the Fort Yukon Tribal Hall, 3rd and Alder Street, in Fort Yukon, Alaska*
- Monday, May 2, 2:00 to 4:00 p.m., at the University of Alaska Fairbanks, William R. Wood Campus Center, 505 S. Chandalar Drive in Fairbanks, Alaska.
- Monday, May 2, 6:00 to 8:00 p.m. at Pioneer Park, Blue Room, 3rd Floor, 2300 Airport Way, in Fairbanks, Alaska.

- Tuesday, May 3, 2:00 to 4:00 p.m. and 6:00 to 8:00 p.m. at the U.S. Fish and Wildlife Service Alaska Regional Office, Gordon Watson Conference Room, 1011 East Tudor Road, in Anchorage, Alaska.

**Please note that the Fort Yukon meeting, originally scheduled for Friday, April 29, 2011, as indicated on the enclosed Federal Register notice, has been rescheduled for the date shown above due to conflicts that were not anticipated at the time the notice was published.*

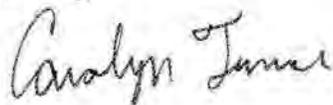
Each scoping meeting will begin with an open house where the public will have the opportunity to interact with members of the project team through one-on-one discussions. Approximately 30 minutes into the open house, NASA will provide an overview of the NEPA process and current PFRR operations. Following the presentations, public comments may be provided. During this time, all oral comments and questions will be recorded for consideration in preparing the Draft EIS. If you require special assistance to attend the meetings, please contact Joshua Bundick at the address below at least two (2) business days prior to the meeting. As an additional effort to inform the public of these meetings, we request your assistance in posting the enclosed flyer in a visible place within your community.

Comments may also be submitted by email, mail, phone, or fax, and will be accepted throughout the entire Draft EIS analysis process. However, for full early consideration and to best help shape and refine the proposal, please submit comments by June 1, 2011 to:

Joshua Bundick
Manager, Poker Flat Research Range EIS
NASA Goddard Space Flight Center's Wallops Flight Facility
Wallops Island, VA 23337
Phone: (757) 824-2319
Fax: (757) 824-1819
Email: Joshua.A.Bundick@nasa.gov

If you have any specific questions regarding the Section 106 process, please contact Mr. Randy Stanley, our Facility Historic Preservation Officer, at (757) 824-1309 or at Randall.M.Stanley@nasa.gov. Inquiries regarding the EIS should be directed to Mr. Bundick at the above address. On behalf of the entire EIS team, I would like to thank you for your interest in this project. We look forward to working with you.

Sincerely,



Carolyn Turner
Associate Chief, Medical and Environmental Management Division

3 Enclosures:

1. Federal Register Notice
2. Map
3. Scoping Meeting Notification Flyer

CONSULTATION QUESTIONNAIRE

Naqsrarmiut Tribal Council

Project Name: NASA Sounding Rockets Program at Poker Flat Research Range Environmental Impact Statement

Please check the appropriate response(s) from the list below and use the back of this form or additional sheets if you wish to make comments:

We have no traditional religious, cultural properties, or other interests that may be affected by the proposed project and further consultation is not required.

There are or may be issues of concern associated with this proposed project and we request further consultation. We prefer:

Meeting with NASA and its cooperating agencies at a tribal facility.

Communicating with NASA and its cooperating agencies by scheduled teleconference.

We want to continue to receive project information by mail and participate in the public involvement process.

Name of *Naqsrarmiut Tribal Council* designated contact for this proposed project:

FREIDA RULLAND Phone: 907.4661-8419

Please print email: akp.epa@hughes.net

Signed: [Signature] Date: 04/19/2011

Additional Comments:

Please mail response in provided postpaid envelope to:

Joshua Bundick
Poker Flat Research Range EIS
Mailcode 250.W
NASA Wallops Flight Facility
Wallops Island, VA 23337

CONSULTATION QUESTIONNAIRE

Gwichyaa Zhee Gwich'in Tribal Government

Project Name: NASA Sounding Rockets Program at Poker Flat Research Range Environmental Impact Statement

Please check the appropriate response(s) from the list below and use the back of this form or additional sheets if you wish to make comments:

We have no traditional religious, cultural properties, or other interests that may be affected by the proposed project and further consultation is not required.

There are or may be issues of concern associated with this proposed project and we request further consultation. We prefer:

Meeting with NASA and its cooperating agencies at a tribal facility.

Communicating with NASA and its cooperating agencies by scheduled teleconference.

We want to continue to receive project information by mail and participate in the public involvement process.

Name of *Gwichyaa Zhee Gwich'in Tribal Government* designated contact for this proposed project:

GRETE CHYTHLOK Phone: 907-662-2581

Please print email: grete.chythlok@fortyukon.org

Signed: *Grete Chythlok* Date: 4/25/11

Additional Comments:

this meeting is already scheduled for April 28, 2011 @ 1:00 pm in Fort Yukon.

Thank you!

Please mail response in provided postpaid envelope to: Joshua Bundick
Poker Flat Research Range EIS
Mailcode 250.W
NASA Wallops Flight Facility
Wallops Island, VA 23337

7578241819

Environmental Office

02:38:27 p.m.

04-25-2011

9/8

CONSULTATION QUESTIONNAIRE

Beaver Traditional Council

Project Name: NASA Sounding Rockets Program at Poker Flat Research Range Environmental Impact Statement

Please check the appropriate response(s) from the list below and use the back of this form or additional sheets if you wish to make comments:

We have no traditional religious, cultural properties, or other interests that may be affected by the proposed project and further consultation is not required.

There are or may be issues of concern associated with this proposed project and we request further consultation. We prefer:

Meeting with NASA and its cooperating agencies at a tribal facility.

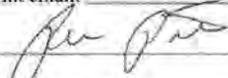
Communicating with NASA and its cooperating agencies by scheduled teleconference.

We want to continue to receive project information by mail and participate in the public involvement process.

Name of ***Beaver Village*** designated contact for this proposed project:

_____ Phone: _____

Please print email: _____

Signed:  Date: 09/20/11

Additional Comments:

Please mail response in provided postpaid envelope to:

Joshua Bundick
Poker Flat Research Range EIS
Mailcode 250 W
NASA Wallops Flight Facility
Wallops Island, VA 23337

National Aeronautics and
Space Administration
Goddard Space Flight Center
Wallops Flight Facility
Wallops Island, VA 23337



Reply to Attn of: 250.W

November 9, 2011

Mr. Tom McCulloch
Advisory Council on Historic Preservation
1100 Pennsylvania Avenue, NW, Suite 803
Old Post Office Building
Washington, DC 20004

Dear Mr. McCulloch:

I am writing to you regarding the continued operations of the National Aeronautics and Space Administration's (NASA) Sounding Rockets Program at the University of Alaska Fairbanks' Poker Flat Research Range (PFRR) near Fairbanks, Alaska. In 2010, we began preparing an Environmental Assessment (EA) for this action in accordance with the National Environmental Policy Act (NEPA). After considering the comments provided by members of the public during the scoping process, we are now preparing an Environmental Impact Statement (EIS). The EIS will evaluate the effects of NASA's continued operations at PFRR and will support the decision-making process for the U.S. Fish and Wildlife Service (USFWS) and the Bureau of Land Management (BLM)'s proposed issuance of permits for rocket impact and recovery at Arctic and Yukon Flats National Wildlife Refuges and the Steese National Conservation Area and White Mountains National Recreation Area, respectively.

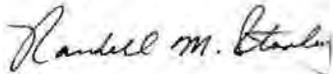
Concurrent with the NEPA process, NASA will also fulfill its obligations under Section 106 of the National Historic Preservation Act (NHPA). As the project proponent, NASA is serving as the lead Federal agency for NEPA and NHPA consultation with the Alaska State Historic Preservation Office (SHPO), Tribes, and other interested parties. The U.S. Department of the Interior's BLM and USFWS would undertake actions connected to the proposed undertaking and are participating in NASA's NEPA process and Section 106 consultation. The effects of their actions will be considered in all project-related environmental documentation, including the EIS and any historic resources reports. NASA has initiated Section 106 consultation with the Alaska SHPO and has requested input from potentially affected Tribes. We are currently collecting information concerning the Area of Potential Effects and determining the level of data collection required.

With this correspondence, we would like to invite the Advisory Council on Historic Preservation's (ACHP) participation in the PFRR Section 106 process. Given the unique nature of our undertaking, and the diverse interests in the lands that may be affected, we feel that ACHP would be a valuable member of our working group, especially in the event that Memoranda of Agreement or Programmatic Agreements are developed as part of this effort.

The enclosed documents provide more detailed information regarding the PFRR and the history behind the EIS. Additionally, I encourage you to visit the project's website on a regular basis for the most up-to-date information about the project. The website's address is http://sites.wff.nasa.gov/code250/pfrr_eis.html.

If you have any specific questions regarding the Section 106 process, please contact me at (757) 824-1309 or at Randall.M.Stanley@nasa.gov. Inquiries regarding the EIS should be directed to the Document Manager, Mr. Josh Bundick, at (757) 824-2319 or Joshua.A.Bundick@nasa.gov. On behalf of the entire project team, I would like to thank you for your consideration of our request. We look forward to working with you.

Sincerely,



Randall Stanley
Facility Historic Preservation Officer

2 Enclosures:

1. *Federal Register* Notice
2. Map

cc:

HQ/EMD/Ms. J. Groman
BLM/Mr. R. Mills
USFWS/Ms. D. Corbett

Millford Wayne Donaldson, FAIA
Chairman

Clement A. Price Ph.D.
Vice Chairman

John M. Fowler
Executive Director



November 29, 2011

Mr. Charles F. Bolden Jr.
Administrator
National Aeronautics and Space Administration
NASA Headquarters
Washington DC 20546-0001

REF: Continuing Sounding Rocket Operations, Poker Flat Research Range, Alaska

Dear Mr. Bolden:

In response to a notification and request by the National Aeronautics and Space Administration (NASA), the Advisory Council on Historic Preservation will participate in consultation to assist NASA in meeting its Section 106 responsibilities for the referenced program. NASA has invited our participation due to the "unique nature of our undertaking and the diverse interests in the lands that may be affected." Our decision to participate in this consultation is based on the Criteria for Council Involvement in Reviewing Individual Section 106 Cases, contained within our regulations (36 CFR Part 800). The criteria are met because the continued operation of this program has the potential to affect important historic properties in Alaska and could present procedural problems due to the need to coordinate with the U.S. Fish and Wildlife Service and the Bureau of Land Management, which are Cooperating Agencies with NASA.

Section 800.6(a)(1)(iii) of our regulations requires that we notify you, as the head of the agency, of our decision to participate in consultation. By copy of this letter, we are also notifying Mr. Randall Stanley, Wallops Flight Facility's Federal Preservation Officer, and Ms. Jennifer Groman, NASA's Historic Preservation Officer of our decision to participate.

Our participation in this consultation will be handled by Dr. Tom McCulloch, who can be reached at 202-606-8554 or at tmcculloch@achp.gov. We look forward to working with NASA on this program.

Sincerely,



John M. Fowler
Executive Director

ADVISORY COUNCIL ON HISTORIC PRESERVATION

1100 Pennsylvania Avenue NW, Suite 803 • Washington, DC 20004
Phone: 202-606-8503 • Fax: 202-606-8647 • achp@achp.gov • www.achp.gov

National Aeronautics and
Space Administration
Goddard Space Flight Center
Wallops Flight Facility
Wallops Island, VA 23337



Reply to Attn of: 250.W

December 9, 2011

Patrick Hanson
Tribal Chief
Native Village of Venetie Tribal Government
P.O. Box 81080
Venetie, AK 99781

Dear Tribal Chief Hanson:

I am writing to you regarding the continued operations of the National Aeronautics and Space Administration's (NASA) Sounding Rockets Program at the University of Alaska Fairbanks' (UAF) Poker Flat Research Range (PFRR) near Fairbanks, Alaska. In April 2011, we requested your input for the Environmental Impact Statement (EIS) that we are currently preparing. At the present time, we are working with the Alaska State Historic Preservation Office (SHPO), Advisory Council on Historic Preservation (ACHP), U.S. Fish and Wildlife Service, and Bureau of Land Management to identify and assess the potential effects of launch and recovery operations on cultural and historic resources.

Section 106 of the National Historic Preservation Act (NHPA) of 1966 requires Federal agencies to consider the effects of their actions on historic properties. The Section 106 process seeks to incorporate historic values into project planning through consultation among the Federal and state agencies, and other parties with an interest in the effects of the undertaking on historic properties.

Tribes, individuals, or organizations with a demonstrated interest in the effects of the undertaking on historic properties may be consulting parties. The various consulting parties work together to discuss options, provide multiple viewpoints, and strive to seek common agreement on the incorporation of historic preservation values into the project.

NASA is beginning the NHPA Section 106 consultation process and is seeking input from project stakeholders who may have an interest in becoming consulting parties. You have been identified as potentially having traditional religious or cultural properties that may be affected and accordingly you may want to be involved in this process.

With the Alaska SHPO and the ACHP, NASA will determine and make contact with all Section 106 consulting parties in the coming weeks. Keeping interested parties and community members fully informed and involved is one of NASA's goals as we evaluate the environmental impacts of our proposed actions. Accordingly, members of our project team will be traveling to interior

Alaska in January 2012 to meet with interested groups. If you would like to meet with members of our project team to discuss the EIS, the Section 106 process, or the enhanced recovery and rewards program, please indicate your interest and someone will contact you to coordinate the details of the meeting. We will do our best to accommodate all requests for meetings, as practicable.

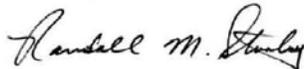
Enclosed for your convenience is a consultation questionnaire. Please fill out the form indicating your level of interest and return it in the pre-addressed, postage-paid envelope. Alternately, you are welcome to send an e-mail indicating your level of interest to one of the persons listed below.

If you do not find it necessary to provide input at this time, we will still keep you apprised of the project's progress by providing a copy of the Draft EIS once it is available. Any comments that you may have at that time will be fully considered in developing the Final EIS.

Additionally, we encourage you to follow the project's progress on our website at: http://sites.wff.nasa.gov/code250/pfrr_eis.html.

Thank you for your time and consideration of our request. If you would like to meet with our project team or have any comments regarding future consultations, please contact me at (757) 824-1309 or by e-mail at Randall.M.Stanley@nasa.gov. Or, you may contact Mr. Joshua Bundick, the EIS Document Manager, at (757) 824-2319 or email at Joshua.A.Bundick@nasa.gov. On behalf of the entire project team, we look forward to working with you.

Sincerely,



Randall Stanley
Facility Historic Preservation Officer

2 Enclosures

1. PFRR Flight Zone Map
2. Consultation Questionnaire

Beaver Council
Box 24029
Beaver, AK
99724

SECTION 106 CONSULTATION QUESTIONNAIRE

Project Name: NASA Sounding Rockets Program at Poker Flat Research Range
Environmental Impact Statement

Please check the appropriate response(s) from the list below and use the back of this form or additional sheets if you wish to make comments:

We have no traditional religious, cultural properties, or other interests that may be affected by the proposed project and further consultation is not required.

There are or may be issues of concern associated with this proposed project and we wish to be included as a Section 106 Consulting Party. We prefer:

Meeting with NASA and its cooperating agencies at a tribal facility.

Communicating with NASA and its cooperating agencies by scheduled teleconference.

We want to continue to receive project information by mail and participate in the public involvement process.

Name of designated contact for this proposed project:

Rhonda O Patta Phone: 628-61216

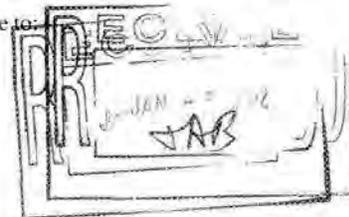
Please print email: ferdpl@hotmail.com

Signed: [Signature] Date: _____

Please explain your reason for interest in the PFRR EIS's Potential Effects on Cultural Resources:

Please mail response in provided postpaid envelope to:

Joshua Bundick
Poker Flat Research Range EIS
Mailcode 250.W
NASA Wallops Flight Facility
Wallops Island, VA 23337



Native Village of Venetie
Box 81080
Venetie, Alaska
99781

106 CONSULTATION QUESTIONNAIRE

Project Name: NASA Sounding Rockets Program at Poker Flat Research Range Environmental Impact Statement

Please check the appropriate response(s) from the list below and use the back of this form or additional sheets if you wish to make comments:

We have no traditional religious, cultural properties, or other interests that may be affected by the proposed project and further consultation is not required.

There are or may be issues of concern associated with this proposed project and we wish to be included as a Section 106 Consulting Party. We prefer:

Meeting with NASA and its cooperating agencies at a tribal facility.

Communicating with NASA and its cooperating agencies by scheduled teleconference.

We want to continue to receive project information by mail and participate in the public involvement process.

Name of designated contact for this proposed project:

Lance Whitwell Phone: 907-849-8205

Please print email: venetie@tribal@yahoo.com

Signed: [Signature] Date: 1-8-12

Please explain your reason for interest in the PFRR EIS's Potential Effects on Cultural Resources:

A large portion of tribal land is within the corridor

Please mail response in provided postpaid envelope to
Joshua Bundick
Poker Flat Research Range EIS
Mailcode 250.W
NASA Wallops Flight Facility
Wallops Island, VA 23337



Mayor Isaacson
CITY OF NORTH POLE
1 Snowman Lane
North Pole, Alaska 99705

SECTION 106 CONSULTATION QUESTIONNAIRE

Project Name: NASA Sounding Rockets Program at Poker Flat Research Range
Environmental Impact Statement

Please check the appropriate response(s) from the list below and use the back of this form or additional sheets if you wish to make comments:

We have no traditional religious, cultural properties, or other interests that may be affected by the proposed project and further consultation is not required.

There are or may be issues of concern associated with this proposed project and we wish to be included as a Section 106 Consulting Party. We prefer:

Meeting with NASA and its cooperating agencies at a tribal facility.

Communicating with NASA and its cooperating agencies by scheduled teleconference.

We want to continue to receive project information by mail and participate in the public involvement process.

Name of designated contact for this proposed project:

Mayor Debra Isaacson Phone: 907-488-8584

Please print email: mayor@northpole.alaska.com

Signed: [Signature] Date: 1/30/12

Please explain your reason for interest in the PFRR EIS's Potential Effects on Cultural Resources:

Poker Flats is a local + statewide economic driver but we want to ensure valid concerns are addressed. North Pole (area) residents work at Poker Flats and related agencies.
(I apologize for the delayed response due to an admin glitch)

Please mail response in provided postpaid envelope to:
Joshua Bundick
Poker Flat Research Range EIS
Mailcode 250.W
NASA Wallops Flight Facility
Wallops Island, VA 23337



Doyon Limited
Lands and Natural Resources Dept.
1 Doyon Place, Suite 300
Fairbanks, Alaska 99701-2941



SECTION 106 CONSULTATION QUESTIONNAIRE

Project Name: NASA Sounding Rockets Program at Poker Flat Research Range
Environmental Impact Statement

Please check the appropriate response(s) from the list below and use the back of this form or additional sheets if you wish to make comments:

We have no traditional religious, cultural properties, or other interests that may be affected by the proposed project and further consultation is not required.

There are or may be issues of concern associated with this proposed project and we wish to be included as a Section 106 Consulting Party. We prefer:

Meeting with NASA and its cooperating agencies at a tribal facility.

Communicating with NASA and its cooperating agencies by scheduled teleconference.

We want to continue to receive project information by mail and participate in the public involvement process.

Name of designated contact for this proposed project:

JEFF FILUT/JIM MERY Phone: 459-2000

Please print email: FILUTJE@Doyon.com / MERYJE@Doyon.com

Signed: [Signature] Date: 5/15/2012

Please explain your reason for interest in the PFRR EIS's Potential Effects on Cultural Resources:

DOYON OWNED LAND DOWNRANGE

Please mail response in provided postpaid envelope to:
Joshua Bundick
Poker Flat Research Range EIS
Mailcode 250.W
NASA Wallops Flight Facility
Wallops Island, VA 23337



National Aeronautics and
Space Administration
Headquarters
Washington, DC 20546-0001



Reply to Attn of: J. Groman

August 1st, 2012

Ms. Judith E. Bittner
Chief, Office of History and Archaeology, and State Historic Preservation Officer
550 West 7th Ave., Suite 1310
Anchorage, Alaska 99501-3565

Dear Ms. Bittner:

Judy,

Since we initiated Section 106 consultation with your office via our April 14, 2011 letter, we have continued our assessment of the National Aeronautics and Space Administration's (NASA) Sounding Rockets Program (SRP) at the University of Alaska Fairbanks' (UAF) Poker Flat Research Range (PFRR) near Fairbanks, Alaska. Also, in accordance with the National Environmental Policy Act of 1969 (NEPA), as amended, we have been preparing a Draft Environmental Impact Statement (DEIS). A copy of the DEIS will be made available to all consulting parties near the end of September 2012.

As outlined in our previous letter, UAF is seeking authorizations on behalf of NASA from the U.S. Fish and Wildlife Service (USFWS) and the Bureau of Land Management (BLM) to allow for the continued impact and recovery of sounding rockets launched from PFRR. These authorizations are required because both agencies administer lands downrange from PFRR: USFWS administers the Arctic and Yukon Flats National Wildlife Refuges (NWRs), and BLM administers the White Mountains National Recreation Area (NRA) and Steese National Conservation Area. NASA, as lead agency, is preparing the DEIS to fulfill all three Federal agencies' NEPA obligations. Consistent with the approach taken for NEPA, NASA has assumed the role as lead Federal agency for ensuring that all three action agencies' collective National Historic Preservation Act obligations are also met.

As part of the DEIS preparation and the Section 106 review, NASA identifies the Area of Potential Effect (APE) to be the vast PFRR launch corridor within which the rockets fly and falling items, released at different phases of the launch, impact the ground surface. Furthermore, following a launch, search and recovery efforts would occur within this area. Please see the enclosed map of downrange areas that depicts the APE (**Enclosure 1**).

In accordance with 36 CFR 800.4, NASA has considered the identification of historic properties within the APE. Recent planning efforts undertaken by USFWS and BLM, particularly the 2012 *Eastern Interior Resource Management Plan*, the 2012 *Revised Arctic Refuge Comprehensive Conservation Plan*, and the 2010 *Yukon Flats NWR Land Exchange EIS*, have provided valuable information regarding the type and extent of known historic properties within the Federally managed lands. Based upon available information, the majority of downrange lands contain

between approximately 20-30 sites per million acres. The Steese National Conservation Area, which is rarely impacted by sounding rockets, contains approximately 50 sites per million acres. The referenced reports acknowledge that there are likely more sites that have not yet been identified or assessed for National Register eligibility due to both the remote nature and sheer size of the subject lands.

To that end, given that the land area encompassed by the APE is approximately 28.2 million acres, it is impractical to survey those areas for resources yet to be identified. Consequently, NASA sought input from its cooperating agencies and a host of consulting parties, including Alaska Native organizations and the Advisory Council on Historic Preservation (ACHP) regarding the best approach for identifying these resources. As a result of its inquiries, NASA assumes that there are unidentified archeological sites and other potentially historic properties within the APE. Rather than attempting to identify the properties themselves, NASA has focused on the potential impacts to any given historic property based on the scope and frequency of the undertaking. Given that the potential for impacts is based on the possibility of a rocket related item landing on or immediately adjacent to a historic property and causing damage, NASA examined the way the items re-enter and are recovered. **Enclosure 3** provides a pictorial summary of the most common landing and recovery scenarios as observed within the past several years. Since the majority of launches occur in winter, the physical impact to the ground surface is very limited.

Based on this assessment and conversations with Alaska Natives, SHPO, and your office about the nature of how items fall back to earth, and the tools and methods employed during recovery, NASA has determined that it is highly unlikely that any historic properties in the APE will be affected by the proposed undertaking. The main concern raised by Alaska Natives was associated with any potential negative effects to subsistence activities. NASA and UAF have been launching suborbital rockets from PFRR since the late 1960s. During that time, subsistence activities continued within the launch corridor without known interruption. Additionally, the low frequency of launches and recoveries, coupled with landowner-imposed Standard Operating Procedures (outlined in **Enclosure 4**), would ensure that NASA's activities would not present a measurable effect above those aircraft-dependent activities also occurring within the APE, including guided hunting, wildlife survey, and mining. Discussions with Alaska Natives also indicated a general support for recovering items in downrange lands, and to the extent practicable, their participation in this effort.

In summary, it is impractical for NASA to identify all historic properties within the APE. However, based on the very small extent of land affected by either an item landing or during its removal, the infrequency and seasonality of launches, and the breadth of downrange lands, it is highly unlikely that any of the items will have an impact on possible historic properties. Consequently, NASA concludes that based on our analysis and input from consulting parties there would be *no historic properties affected* by the proposed undertaking; this determination applies to all five alternatives that are proposed in the DEIS. NASA requests your concurrence with this determination, and submits the enclosed Request for State Historic Preservation Office (SHPO) Section 106 Review (36 CFR 800), which describes this undertaking in more detail for your consideration (**Enclosure 4**). We hope that your office will concur with our finding of *no historic properties affected* and will take the opportunity to provide comments on our DEIS when it becomes available. Complementary to the assessment provided with this correspondence, NASA has included sections on Cultural Resources in the DEIS.

If you have any questions regarding the Section 106 process, please contact me at (202) 358-0455 or at Jennifer.A.Groman@nasa.gov, or Randall Stanley, Wallops Flight Facility Historic Preservation Officer, at (757) 824-1309 or Randall.M.Stanley@nasa.gov. Inquiries regarding the DEIS should be directed to Mr. Joshua Bundick at 757-824-2319 or at Joshua.A.Bundick@nasa.gov.

We thank you for your assistance and invite your office to comment on our determination and the forthcoming DEIS.

Respectfully,



Jennifer Groman
NASA Federal Preservation Officer

4 Enclosures:

1. APE Map
2. Background Information
3. Photographs of Sounding Rocket Items
4. Request for SHPO Section 106 Review

cc:

ACHP/Dr. T. McCullouch
BLM/Mr. R. Mills
Doyon, Limited/Mr. J. Mery
Native Village of Venetie Tribal Government/Mr. C. Frank
UAF/Ms. K. Rich
USFWS/Ms. D. Corbett

Enclosure 1: Area of Potential Effect

- The land, water, and airspace within Poker Flat Research Range Flight Zones 1, 2, 3, 4, 4 extended, 4 arctic extension, and 5; and
- The land, water, and airspace within a 400 km (248 mi) circle centered approximately 1,000 km (620 mi) north of the PFRR launch site.

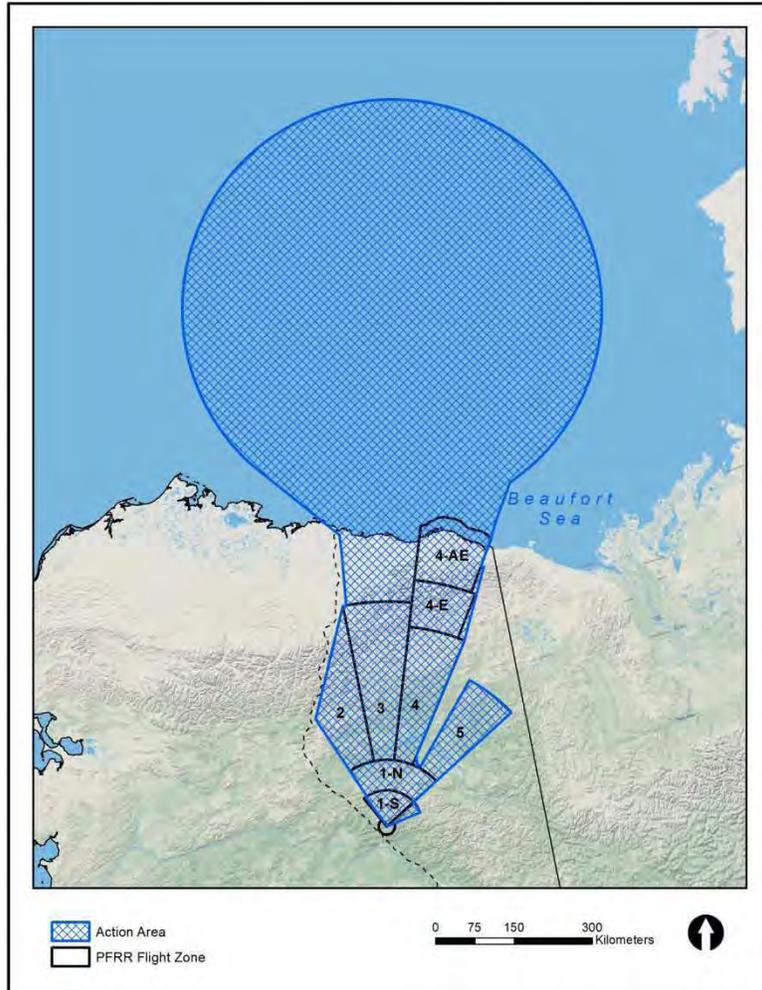


Figure 1. Area of Potential Effect

Enclosure 2: Background Information

Sounding Rockets

Sounding rockets take their name from the nautical term "to sound," which means to take measurements. Since 1959, NASA-sponsored space and earth science research has used sounding rockets to test instruments used on satellites and spacecraft and to provide information about the Sun, stars, galaxies and Earth's atmosphere and radiation. This type of testing is unique because it cost-effective and time efficient. A large range of phenomena can only be explored with *in situ* probes on sounding rockets, which gather vertical profiles of measured parameters and are essential for the study of the upper atmosphere. Other commonly employed tools to study earth and space science phenomena, including orbiting satellites and ground based observation stations, cannot collect the requisite data that is afforded by a sounding rocket launch. For example, in some cases, Earth-orbiting satellites cannot gather adequate measurements as the satellites are traveling too fast or are too high. In other cases, measurements taken during sounding rocket flights are used to calibrate or verify remote measurements taken from orbiting or land-based instruments.

Each NASA sounding rocket consists of one to four ground-launched; solid-propellant rocket motors, or *stages*, stacked in series, the purpose of which is to propel a scientific experiment, or *payload*, to the upper atmosphere (**Figure 1**). These rocket motors are configured to meet scientific requirements driven by payload size, flight time, and target altitude desired by the researchers. Individual motors range in size from 14 to 31 inches in diameter and are 76 to 223 inches (6 to 18.5 feet) long. At the time they have consumed all of their fuel, or become *spent*, most rocket stage weights are in the 600- to 1,800-pound range, however several of the final stages are lighter, with weights between 200 and 300 pounds. Payloads generally range in size from 30 to 210 inches (2.5 to 17.5 feet) long, are of similar diameter to the rocket motor on which they are flown, and weigh from less than 100 pounds to over 1,000 pounds. As NASA sounding rockets are suborbital, their upper stages or payloads do not enter an Earth orbit, rather they return to Earth along parabolic trajectories (**Figure 2**).

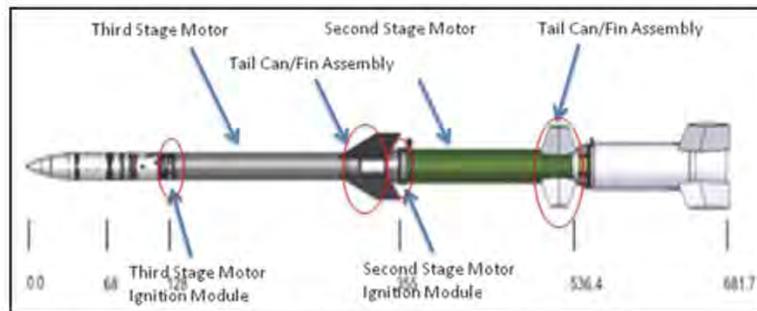


Figure 1. Example of a 3-stage sounding rocket

Following the ignition of the first rocket motor, or stage, which occurs at the launch site, as each rocket motor uses its fuel, it separates from remaining body of the rocket and falls back to Earth. Meanwhile, the scientific experiment, or payload, continues into space and begins collecting data. All metallic and other solid heavier-than-air objects that are propelled into the atmosphere

by sounding rockets land back on Earth in more or less ballistic trajectories. The objects include spent rocket stages, payloads; nose cone doors (released in flight for instruments to “see” their targets); and spin weights, which were released to change rotation of a rocket stage of a launch. Scientific payloads are carried to altitudes from 30 miles to more than 800 miles, with the overall time in space typically ranging from 5 to 20 minutes. The amount and final landing location of rocket hardware is highly mission-dependent, and varies based upon the rocket configuration and the ultimate scientific objectives. Depending on the nature of the experiment, some payloads may include parachute systems such that they can be recovered from their landing locations for analysis or subsequent re-use. Post-flight recovery operations are generally conducted with a combination of fixed and rotary wing aircraft.

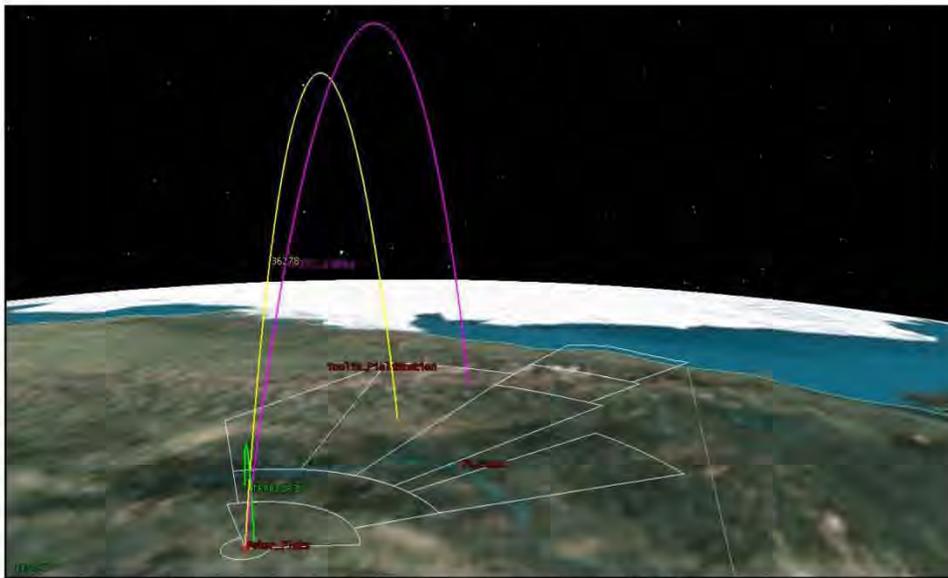


Figure 2. Trajectories of several recently launched PFRR sounding rockets

Sounding rockets can be launched from permanently established ranges or from temporary launch sites using NASA’s mobile range assets. Permanent ranges include WFF in Wallops Island, Virginia; PFRR near Fairbanks, Alaska; White Sands Missile Range (WSMR) in White Sands, New Mexico; Kwajalein Island in the Marshall Islands Republic; Esrange Space Center near Kiruna, Sweden; and the Norwegian Sounding Rocket Ranges in Andøya, Norway and Ny-Alesund, Svalbard. In the past, there have been temporary launch sites in Australia, Brazil, Greenland, and Puerto Rico. The majority of sounding rocket launches occur at WFF, PFRR, and WSMR. Where NASA SRP conducts its work is highly dependent on the scientific goals of each mission. For example, if equatorial phenomena must be observed, a site such as Brazil is used. For middle latitudes, WFF or WSMR is selected. If the aurora borealis must be observed, a site at very high latitudes is required, such as at PFRR.

Poker Flat Research Range

Owned and operated by the University of Alaska Fairbanks (UAF) since 1968, the Poker Flat Research Range (PFRR) is located northeast of the unincorporated village of Chatanika, Alaska and consists of approximately 5,200 acres of land that house rocket and support facilities, launch pads, and tracking infrastructure. PFRR is owned and managed by the Geophysical Institute of UAF; however, NASA has exclusively funded and managed the support contract with PFRR for more than 25 years. The primary types of missions conducted by NASA at PFRR are in partnership with university scientists who study the earth's atmosphere and its interaction with the space environment. Since its inception, PFRR has launched approximately 219 NASA sounding rockets and 116 for other entities. The location of PFRR is strategic for launching sounding rockets for scientific research in auroral space physics and earth science. PFRR is the only high-latitude, auroral-zone rocket launching facility in the United States where a sounding rocket can readily study the aurora borealis and the sun–earth connection. The information collected further assists the Nation's scientists in understanding the interactions between the sun and earth as well as the origin and evolution of the solar system. Technology development and validation enabled by NASA SRP at PFRR is critical in furthering the development of earth and space science instruments at a fraction of the size and cost that would result from using other launch methods. PFRR also supports educational outreach programs in which students and scientists from various universities conduct aeronautics and space research.

Consultation with Potentially Interested Parties

Pursuant to American Indian/Alaska Native Policy and Implementation Guidance, beginning in April 2011 with the scoping process for the EIS, NASA mailed letters providing project information and offering government-to-government consultation to the nine Federally recognized Tribes within and adjacent to the PFRR flight corridor. Included with the letters was a postage paid consultation questionnaire, which could be used to provide a project point of contact and express the Tribe's level of interest in the project. NASA also faxed copies of the project information package to the Tribal offices. The below nine Tribes were sent the letter and questionnaire:

- Beaver Traditional Council, Beaver
- Birch Creek Tribal Council, Birch Creek
- Chalkyitsik Village Council, Chalkyitsik
- Circle Native Community, Circle
- Gwitchyaa Zhee Gwich'in Tribal Government, Fort Yukon
- Naqsragnuit Tribal Council, Anaktuvuk Pass
- Native Village of Kaktovik Council, Kaktovik
- Native Village of Stevens Tribal Government, Stevens Village
- Native Village of Venetie Tribal Government, Venetie

Of the nine Tribes, Beaver Traditional Council, Gwitchyaa Zhee Gwich'in Tribal Government, and the Naqsragnuit Tribal Council responded to NASA's request. Beaver Traditional Council indicated that they had no potentially affected interests or concerns regarding the project. The Gwitchyaa Zhee Gwich'in Tribal Government and Naqsragnuit Tribal Council requested to meet with NASA at a tribal facility.

In December 2011, NASA mailed requests for interest in serving as Section 106 consulting parties to the potentially interested Tribal, cultural, and local government organizations listed below:

- Council on Athabascan Tribal Governments
- Tanana Chiefs Conference
- Fairbanks North Star Borough
- North Slope Borough
- Tanana-Yukon Historical Society
- Arctic Slope Regional Corporation
- Chalkyitsik Native Corporation
- Doyon Limited
- Kaktovik Inupiat Corporation
- Nunamiut Corporation
- City of Allakaket
- City of Anaktuvuk Pass
- City of Fairbanks
- City of Fort Yukon
- City of Kaktovik
- City of North Pole
- Beaver Traditional Council
- Birch Creek Tribal Council
- Chalkyitsik Village Council
- Circle Native Community
- Gwitchyaa Zhee Gwich'in Tribal Government
- Naqsragnuit Tribal Council
- Native Village of Kaktovik Council
- Native Village of Stevens Tribal Government
- Native Village of Venetie Tribal Government
- Arctic Village Council
- Beaver Kwit'chin
- Canyon Village Traditional Council
- Venetie Tribal Council
- Venetie Village Council

Following this request, NASA received a response from the Beaver Traditional Council, the Native Village of Venetie Tribal Government, and the City of North Pole. Beaver indicated that it did not have concern regarding potential effects on properties of cultural significance; Venetie requested to meet with NASA to discuss the project. The City of North Pole indicated that it did not have any concerns regarding potential effects on cultural resources specifically; however it wished that all valid concerns be addressed through NASA's environmental review process. In May 2012, Doyon, Limited expressed an interest in meeting with NASA regarding the Section 106 process.

Meetings

As a result of the interest expressed in the project, NASA, USFWS, and UAF met with the Tribal Council of the Gwitchyaa Zhee Gwich'in Tribal Government in April 2011 and the Native Village of Venetie Government in February 2012. Notices of the meetings were distributed to local venues within the Villages as well as broadcast on the local Yukon Flats radio station, KZPA 900 AM. In addition, NASA personnel participated in a call-in show on KZPA to give an overview of the project and answer questions.

The primary topics of concern expressed in both meetings were that 1) Villages were not well informed of launches; 2) Students from local Villages should be given a tour of PFRR and have the opportunity to explore scientific and engineering fields; 3) Hazardous materials in rockets should be evaluated as they could affect wildlife, and in turn, affect subsistence users; 4) the

Rewards Program would be beneficial to Village residents; and 5) Village residents should be employed to assist in searches for rocket hardware.

Regarding Venetie specifically, the Council expressed concern that the circa 1989 Memorandum of Agreement-prescribed level of compensation (around \$12k yearly) for the use of tribal land is inadequate and needs to be raised. UAF representatives are in the process of accomplishing this through a Memorandum of Agreement (MOA) that is in place.

In addition to the meetings with the Tribal governments, NASA, USFWS, and UAF personnel also gave presentations at the Fort Yukon and Venetie schools.

Following the Naqsragnuit Tribal Council's indication of an interest in the project, both NASA and UAF staff followed up with the specified point of contact through both e-mail and phone calls, however no additional responses were obtained. NASA is currently working to schedule a teleconference with Doyon at a mutually agreeable time.

Future Coordination

To ensure that all potentially affected Tribes are informed of the status of the project, the EIS mailing list includes all nine Federally recognized tribes and those organizations contacted during the identification of consulting parties. All parties will receive copies of any document distributed to the public, including copies of the Draft and Final EIS.

NASA recognizes that the government-to-government consultation process is ongoing and will continue to engage in written and phone communications directed specifically to the Tribes to encourage their engagement at any time. Additional meetings will be scheduled as requested.

Contact with Federal and State Agencies

Since commencing the NEPA process for this undertaking, NASA has held multiple conversations not only with its cooperating agencies, but also the Alaska SHPO and Advisory Council on Historic Preservation (ACHP) to discuss the Section 106 consultation process. Below is a brief summary of those conversations:

- On April 14, 2011, NASA mailed a letter to the SHPO requesting scoping input on the EIS and to request the initiation of the Section 106 consultation process.
- On August 2, 2011, NASA representatives Joshua Bundick (WFF NEPA document manager) and Randall Stanley (WFF Historic Preservation Officer) participated in a teleconference with USFWS Refuge staff and the local BLM field archaeologist. USFWS and BLM staff discussed their respective policies and procedures for managing cultural resources on lands within their jurisdiction. It was mutually agreed upon that NASA would assume the role as lead Federal agency for the Poker Flat Section 106 process.
- On August 11, 2011, NASA's cultural resources consultant, SAIC, held a phone discussion with Ms. Shina DuVall of the Alaska SHPO. Lorraine Gross, SAIC's cultural resources subject matter expert, provided an overview of the project, and Ms. DuVall discussed the general Alaska Section 106 consultation process. It was mutually agreed upon that additional information would be needed to determine the area of potential effect, the level of disturbance associated with each launch or recovery option, and the level of resource identification necessary for this consultation.

- On September 16, 2011, NASA's Joshua Bundick and Randall Stanley, USFWS, BLM, and NASA's cultural resources consultant, Lorraine Gross of SAIC, held a teleconference with Ms. Shina DuVall of the Alaska SHPO. NASA provided an overview of the sounding rockets program at PFRR, and Ms. DuVall discussed the general Alaska Section 106 consultation process. It was mutually agreed upon that additional information would be needed to complete the consultation. The concept of developing a Programmatic Agreement for PFR was informally presented and discussed.
- On November 9, 2011, NASA invited the ACHP to participate in the Section 106 process for this undertaking; in a November 29, 2011 letter, ACHP accepted NASA's offer.
- On February 7, 2012, NASA's Joshua Bundick, Randall Stanley, and Jennifer Groman (Federal Preservation Officer), took part in a conference call with Ms. Shina DuVall from the Alaska SHPO. During this teleconference, Mr. Bundick discussed his recent trip to Alaska to meet with various government entities and Alaska tribes concerning the DEIS. The concerns raised were also discussed among the group.
- After reviewing the internal DEIS, in a March 29, 2012 memorandum, Mr. Robin Mills, BLM Eastern Interior Archaeologist, concurred with NASA's conclusions that there would be the potential for "little to no impacts" to cultural resources on BLM lands from the proposed alternatives. Mr. Mills also recommended no further survey was warranted.

Enclosure 3: Photos demonstrating landing of rocket items in APE

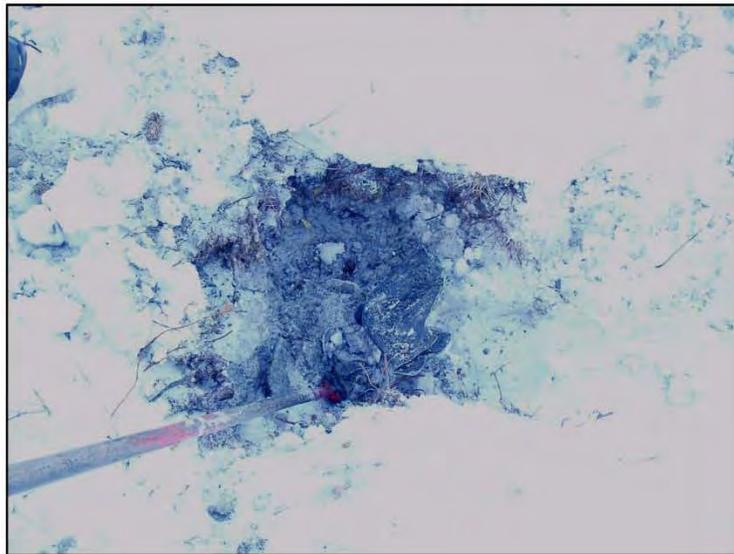
Nearly Complete Burial



Ground Penetration without Embedding



Hand Digging of impacts that embed





Before



After

Impact on Rocky Terrain



Parachuted Payload Landing



Enclosure 4: Request for SHPO Section 106 Review (36 CFR 800)

REQUIRED AGENCY INFORMATION

Federal or State Involvement? Yes, Funding (NASA, Lead Federal Agency); Permit/approval (BLM, USFWS, State of Alaska)

Federal or State Agency contact information: Jennifer Groman, NASA Federal Preservation Officer, 202-358-0455, Jennifer.A.Groman@nasa.gov

Signature of agency official: _____

Secondary Contact Information: Randall M. Stanley, NASA Wallops Flight Facility Historic Preservation Officer, 757-824-1309, Randall.M.Stanley@nasa.gov

I. GENERAL INFORMATION

Project Name: NASA Sounding Rockets Program at the University of Alaska Fairbanks Poker Flat Research Range

Landowners: University of Alaska Fairbanks; Alaska Department of Natural Resources; Bureau of Land Management; U.S. Fish and Wildlife Service; Native Village of Venetie Tribal Government; Doyon, Limited; multiple Village corporations.

Project Address / Location: Northeast of the unincorporated village of Chatanika, Alaska. The APE is extremely large, however its boundaries are shown on **Enclosure 1** and generally described below.

USGS Quad Map Names: Circle, Livengood, Fort Yukon, Beaver, Charley River, Chandalar, Christian, Philip Smith Mountains, Sagavanirktok, Arctic, Mount Michelson, Flaxman Island, Barter Island

Meridians: Fairbanks, Umiat

NAD 83 Latitude/Longitude: Eastern Boundary: 141 degrees W; Western Boundary 150 degrees W; Northern Boundary: 77.5 degrees N; Southern Boundary: 65 degrees N

II. GROUND DISTURBING ACTIVITY

DOES THIS PROJECT INVOLVE GROUND DISTURBANCE? Yes

Description of the length, width, and depth of ground disturbance: Portions of sounding rockets fall to ground anywhere in the area identified in the APE. Upon impacting the ground, each item will likely create a minor divot, however it will be highly dependent upon the actual landing site. Finless payload items rarely penetrate the ground surface. If the item, such as a rocket motor, were to land "nose down" after a normal launch, the width of the disturbance

would not be expected to exceed 1 meter in diameter; the depth to which the item would penetrate would vary, but could be as great as 3 meters if the item were to fully embed. If an item were to land on its side, length of the disturbance could be as great as 5 meters long, width on the order of 1 meter, and depth less than 1 meter. See **Enclosure 3** for pictures. Unless items are imbedded in soft soil, there is limited need to dig to remove the items. Digging around the item could result in approximately a 1-meter area of additional disturbance around the item if it were embedded. It is expected that all recovery related ground disturbance would be with hand tools, including shovels and pick axes. Once removed, the item would be transported via fixed or rotary wing aircraft; in rare cases on foot by the recovery crew. Therefore, ground disturbance related to transportation would be negligible.

Previous and current land use, condition, and disturbance: Nearly all lands within the APE are managed specifically for conservation and/or recreational purposes. With the exception of areas immediately surrounding rural villages, some historic placer mining within BLM lands, limited seismic line clearing within Yukon Flats Refuge and along the Coastal Plain of Arctic Refuge, mineral exploration on Doyon lands within the Yukon Flats, and various hunting or trapping cabins, the lands within the APE are relatively undisturbed except by natural processes. The lands directly north of the PFRR launch site, within which most of the first stages of sounding rockets impact, are designated as Special Use “for rocket impact” by the State of Alaska.

Are there archaeological resources on the property? Yes

How was this determined? Consultations with landowners and review of Federal planning documents (i.e., Environmental Impact Statements), which contain summaries of identified resources.

III. DESCRIPTION OF THE PROJECT (UNDERTAKING)

Detailed written description of the project: **Enclosure 2** provides a general description of sounding rockets, including their size and composition, as well as an overview of PFRR. Below provides a description of the alternatives NASA is considering for continuing its sounding rockets operations at PFRR:

Alternatives Evaluated in the DEIS

NASA has identified five alternatives as potentially satisfying the objectives identified in the purpose and need for consideration in the DEIS. Under all five alternatives, NASA would continue to fund UAF’s PFRR and conduct scientific investigations using sounding rockets. NASA forecasts that an average of about *four launches per year* would be conducted at PFRR, but *could range up to eight launches per year*. This launch rate is typical of past years, but, because of the very nature of scientific research and discovery, it is not possible to predict accurately what future needs might be. New discoveries or scientific needs might require more or fewer launches to accomplish NASA’s scientific goals.

Similarly, past scientific research has mandated that *most launches be conducted during the winter months (October through April)*, with most of the launches occurring at night or in darkness. While this is the expected mode of future operations, new scientific needs might raise the desirability of other launch periods. If such needs were to arise, additional analysis of the range safety requirements, as well as potential mitigation factors to reduce environmental impacts, would be required.

Standard Operating Procedures (SOPs)

The following are SOPs have been detailed in the DEIS for the removal of payloads and stages from within downrange lands and would apply to all five alternatives. Collectively, these restrictions and conditions imposed by USFWS and BLM provide the operational restraints on the program and dictate the practices that must be followed and ensure protections to both natural and cultural resources. Those with particular relevance to the protection of cultural resources are shown in bold:

- **The use of off-road vehicles (except snow machines) on USFWS properties is prohibited.**
- When flying over USFWS properties, all aircraft are recommended to maintain a minimum altitude of 2,000 feet above ground level, except during takeoff and landing, and when safety considerations require a lower altitude. Low-level slinging of gear from site to site is prohibited.
- **Large-scale clearing of vegetation for aircraft landing and takeoff is prohibited. Only minor clearing of brush and other minor obstructions is permitted. Any excavation or disturbance during recovery must be filled.**
- Fuel caches are allowed only in designated areas on the USFWS properties, and must be approved by the NWR manager before they are established. Storage must meet the standards of the USFWS, Alaska Region, Fuel Storage Policy.
- PFRR must ensure that its operations do not interfere with or harass NWR visitors or impede access to any site.
- **PFRR operations cannot interfere with subsistence activities of rural users or restrict the access of subsistence users.**
- **The removal or disturbance of historical, recent, ethnological, or archaeological artifacts is prohibited.**
- PFRR must ensure that a transponder or other radio location aid is incorporated with each payload to facilitate tracking and recovery after launch.
- PFRR must clean equipment used to recover rocket debris to prevent the spread of invasive and noxious weeds and plant species at recovery sites.

It is expected that post launch searches would be conducted following launch, and prior to new snowfall, whereas most recovery efforts would be conducted during non-winter months due to safety and more favorable weather conditions. *The key difference among the alternatives is the level of search and recovery effort that each would entail.*

- The **No Action Alternative** would not entail any recovery of items unless dictated by scientific need. The maximum recovery expected would be 1 payload per year.
- **Alternative 1** would entail a formal commitment to a “clean range” which would be guided by a formal Recovery Plan. In summary, a post-launch aerial search would occur for all newly launched, land-impacting items. If located, NASA would perform a recovery operation during non-winter months if it were deemed safe and in the best interest of the downrange lands. In essence, some items could be left partially or fully in place if effecting a full recovery would result in greater than negligible vegetative clearing, substantial excavation, or entry into areas where ruts could be formed (e.g., bogs). Employing the same philosophy, items within downrange lands from past launches would also be recovered when reported by users of downrange lands if determined to be environmentally responsible.
- **Alternative 2** would be similar to Alternative 1, however full recovery of items would be required unless it were deemed unsafe for recovery personnel to perform the operation. Given this philosophy, it is expected that the largest amount of material would be removed from downrange lands over time. However, some localized, short- and long-term evidence of the recovery operation could occur depending on the specific situation. If adopted, both landowners and NASA would be willing to accept these impacts in exchange for having fewer sounding rocket items in downrange lands. While the SOPs discussed above would apply to this alternative, it is possible that greater clearing or digging could be required, therefore requiring some modification to the extent of allowable actions.
- **Alternative 3** would be the same as Alternative 1, however it would also include a voluntary restriction on planning future stage or payload impacts within designated Wild or Scenic River corridors. Currently, Beaver Creek and the Sheenjek, Ivishak, and Wind Rivers are located within the PFRR launch corridor.
- **Alternative 4** would be the same as Alternative 2, however it would also include a voluntary restriction on planning future stage or payload impacts within designated Wild or Scenic River corridors.

Please refer to Chapter 2 of the DEIS for a complete description of each of these alternatives.

Attach localized project map: Please see **Enclosure 1**, which is a map of the PFRR launch corridor.

Attach photographs of the project area: Please see **Enclosure 3**, which provides photographs of the undertaking.

IV. AREA OF POTENTIAL EFFECTS (APE)

Identify the APE on the USGS map and localized project map: NASA has identified the boundaries of the PFRR launch corridor as the APE. Please refer to **Enclosure 1**. Given the size of the APE, it is not practical to provide the APE on each individual topographic map.

Explain how the APE was developed and how it encompasses potential direct and indirect effects: The APE encompasses all land and water areas over which the rockets fly and falling items, released at different phases of the launch, impact the ground surface. Furthermore, following a launch, search and recovery efforts would occur within this area.

V. IDENTIFICATION OF HISTORIC PROPERTIES

Describe the steps taken (methodology) to identify cultural resources in the APE:

NASA acknowledges that both previously identified and unknown cultural resources occur within the existing launch corridor. However it is impractical for NASA to identify all historic properties. NASA has relied upon data provided by other Federal Agencies and within the Alaska Heritage Resources Survey. In general, as summarized in the U.S. Fish and Wildlife's *Arctic Refuge Revised Comprehensive Conservation Plan/Environmental Impact Statement*, the resources within the APE include:

- Coastal settlements, consisting of semi-subterranean driftwood or whalebone houses, in some cases associated with cemeteries and/or additional structures. Post-contact and pre-contact houses are present along the coast of the Beaufort Sea.
- Inland settlements, consisting of semi-subterranean driftwood or whalebone houses, also in some cases associated with cemeteries and/or additional structures.
- Tent ring complexes, consisting of arrangements of stones used to secure skin tents to the ground, often with associated hearths in and outside of the ring. These features are found along river corridors on elevated terraces and likely relate to seasonal caribou hunting by coastal people. In some cases, these complexes are situated near or adjacent to caribou drive lines or fences.
- Caribou drive lines and fences are found on the north and south sides of the Brooks Range. These linear arrangements of stone cairns (in the north) and spruce (in the south) were used to funnel the movements of caribou herds into corrals where hunters harvested them.
- Lithic scatters, consisting of surface and subsurface collections of artifacts and debris resulting from the procurement, preparation, and manufacture of stone tools.
- Historic cabins built by indigenous peoples, early explorers, and trappers that offer insights into the early contact period.
- Prospecting and mining sites established during the late 19th and early 20th centuries.
- Graves and cemeteries.

NASA has also invited Alaska Natives in the APE to consult and help identify historic properties that they might think may be affected by the undertaking. During discussions with the villages, none have identified historic properties but rather have focused on subsistence practices. NASA has identified procedural protocol to avoid impacts to these practices and species of interest to the villages. Moreover, the infrequent nature of launches would not present a measurable risk of disturbing subsistence activities. While recovery operations would most likely occur during non-winter months when the majority of subsistence hunting occurs, in consideration of the low frequency of launches (and therefore recoveries), the wide dispersion of recovery sites, and landowner-imposed requirements to minimize low altitude flights, effects would be minor.

Information provided by U.S. Fish and Wildlife and Bureau of Land Management are summarized by land parcel below:

Arctic National Wildlife Refuge

Over 530 archeological and historic and paleontological sites have been recorded within the boundaries of Arctic Refuge. Currently, 212 archeological and 188 historical sites have been recorded within the boundaries of Arctic Refuge.

Total Land Area: 19.64 million acres

Site Density: 27 sites/million acres or 0.007 sites/sq km

Yukon Flats National Wildlife Refuge

197 AHRS sites were reported to be located within the Refuge. Of these, 50 are identified as prehistoric (before contact with non-Natives), 106 are identified as historic (after contact with non-Natives), and the remainder have either not been assigned to a period or are modern (last 50 years) in age.

Total Land Area: 10.938 million acres

Site Density: 18 sites/million acres or 0.004 sites/sq km

White Mountains National Recreation Area

Known Sites: 26 historic; 3 prehistoric; 1 both; 30 total

Total Land Area: 1.02 million acres

Site Density: 29.5 sites/million acres or 0.007 sites/sq km

Steese National Conservation Area

Known Sites: 49 historic; 18 prehistoric; 67 total

Total Land Area: 1.28 million acres

Site Density: 52.3 sites/million acres or 0.013 sites/sq km

VI. DETERMINATION OF ELIGIBILITY

There are documented historic properties present within the project area, and it is likely that additional undocumented and potentially eligible properties also exist within the project area. Therefore, it is reasonable to assume that *historic properties (36 CFR 800.16[d]) are present within the APE.*

VII. FINDING OF EFFECT

Available information indicates that there is approximately a range between 18 to 50 sites recorded in the general area per 1 million acres of land. Due to the low number of projected launches that occur annually and the large area of the projected impact zone shown on the enclosed map, NASA feels that it is highly unlikely any known or unknown historic properties would be affected by this undertaking. Such likelihood is so low that NASA finds that *no historic properties would be affected [36 CFR 800.4(d)(1)].* NASA hereby requests that the Alaska SHPO concurs with this finding.

Consulting Parties: See **Enclosure 2** for a complete list of parties that were consulted on this undertaking and the outcomes of those consultations. In addition, those organizations expressing an interest in this undertaking have been provided a copy of this material, including all Enclosures.

National Aeronautics and
Space Administration
Headquarters
Washington, DC 20546-0001



Reply to Attn of: J. Groman

August 1st, 2012

Jim Mery
Senior Vice President Lands and Resources
Doyon Limited
1 Doyon Place, Suite 300
Fairbanks, AK 99701

Dear Mr. Mery:

Please find enclosed a copy of our Section 106 consultation package to Ms. Judith Bittner, Alaska State Historic Preservation Officer (SHPO), regarding the continuation of National Aeronautics and Space Administration's (NASA) Sounding Rockets Program (SRP) at the University of Alaska Fairbanks' (UAF) Poker Flat Research Range (PFRR) near Fairbanks, Alaska. We have provided you a copy of this information as you expressed interest in being a consulting party in the Section 106 Process associated with this undertaking.

Our letter to SHPO identifies the Area of Potential Effect (APE) and our Determination of Effect. The letter also explains NASA's efforts to identify historic properties within the APE. NASA has made a determination of "*no historic properties affected*" based on the unlikely probability of anything from the SRP landing on known or unknown historic property within the APE. We invite you to read our letter and the accompanying information for your review.

In parallel with the Section 106 process, we are preparing a Draft Environmental Impact Statement (DEIS) for this program. We anticipate the DEIS for this program will be available for your review in late September 2012.

If you have any questions regarding the Section 106 process, please contact me at (202) 358-0455 or at Jennifer.A.Groman@nasa.gov, or Randall Stanley, Wallops Flight Facility Historic Preservation Officer, at (757) 824-1309 or Randall.M.Stanley@nasa.gov. Inquiries regarding the DEIS should be directed to Mr. Joshua Bundick at 757-824-2319 or at Joshua.A.Bundick@nasa.gov.

We thank you for your assistance and invite you to comment on our determination and the forthcoming DEIS.

Respectfully,



Jennifer Groman
NASA Federal Preservation Officer

5 Enclosures:

1. Copy of letter to SHPO regarding determination of effects
2. APE Map
3. Background Information
4. Photographs of Sounding Rocket Items
5. Request for SHPO Section 106 Review

8.10.2012

3130-1R NASA

National Aeronautics and
Space Administration

Headquarters
Washington, DC 20546-0001



No Historic Properties Affected
Alaska State Historic Preservation Officer
Date: 8-10-2012
File No. 3130-1R NASA
SAW

Reply to Attn of J. Groman

August 1st, 2012

Ms. Judith E. Bittner
Chief, Office of History and Archaeology, and State Historic Preservation Officer
550 West 7th Ave., Suite 1310
Anchorage, Alaska 99501-3565

RECEIVED

AUG 06 2012

OWA

Dear Ms. Bittner:

Judy,
Since we initiated Section 106 consultation with your office via our April 14, 2011 letter, we have continued our assessment of the National Aeronautics and Space Administration's (NASA) Sounding Rockets Program (SRP) at the University of Alaska Fairbanks' (UAF) Poker Flat Research Range (PFRR) near Fairbanks, Alaska. Also, in accordance with the National Environmental Policy Act of 1969 (NEPA), as amended, we have been preparing a Draft Environmental Impact Statement (DEIS). A copy of the DEIS will be made available to all consulting parties near the end of September 2012.

As outlined in our previous letter, UAF is seeking authorizations on behalf of NASA from the U.S. Fish and Wildlife Service (USFWS) and the Bureau of Land Management (BLM) to allow for the continued impact and recovery of sounding rockets launched from PFRR. These authorizations are required because both agencies administer lands downrange from PFRR: USFWS administers the Arctic and Yukon Flats National Wildlife Refuges (NWRs), and BLM administers the White Mountains National Recreation Area (NRA) and Steese National Conservation Area. NASA, as lead agency, is preparing the DEIS to fulfill all three Federal agencies' NEPA obligations. Consistent with the approach taken for NEPA, NASA has assumed the role as lead Federal agency for ensuring that all three action agencies' collective National Historic Preservation Act obligations are also met.

As part of the DEIS preparation and the Section 106 review, NASA identifies the Area of Potential Effect (APE) to be the vast PFRR launch corridor within which the rockets fly and falling items, released at different phases of the launch, impact the ground surface. Furthermore, following a launch, search and recovery efforts would occur within this area. Please see the enclosed map of downrange areas that depicts the APE (**Enclosure 1**).

In accordance with 36 CFR 800.4, NASA has considered the identification of historic properties within the APE. Recent planning efforts undertaken by USFWS and BLM, particularly the 2012 *Eastern Interior Resource Management Plan*, the 2012 *Revised Arctic Refuge Comprehensive Conservation Plan*, and the 2010 *Yukon Flats NWR Land Exchange EIS*, have provided valuable information regarding the type and extent of known historic properties within the Federally managed lands. Based upon available information, the majority of downrange lands contain

between approximately 20-30 sites per million acres. The Steese National Conservation Area, which is rarely impacted by sounding rockets, contains approximately 50 sites per million acres. The referenced reports acknowledge that there are likely more sites that have not yet been identified or assessed for National Register eligibility due to both the remote nature and sheer size of the subject lands.

To that end, given that the land area encompassed by the APE is approximately 28.2 million acres, it is impractical to survey those areas for resources yet to be identified. Consequently, NASA sought input from its cooperating agencies and a host of consulting parties, including Alaska Native organizations and the Advisory Council on Historic Preservation (ACHP) regarding the best approach for identifying these resources. As a result of its inquiries, NASA assumes that there are unidentified archeological sites and other potentially historic properties within the APE. Rather than attempting to identify the properties themselves, NASA has focused on the potential impacts to any given historic property based on the scope and frequency of the undertaking. Given that the potential for impacts is based on the possibility of a rocket related item landing on or immediately adjacent to a historic property and causing damage, NASA examined the way the items re-enter and are recovered. **Enclosure 3** provides a pictorial summary of the most common landing and recovery scenarios as observed within the past several years. Since the majority of launches occur in winter, the physical impact to the ground surface is very limited.

Based on this assessment and conversations with Alaska Natives, SHPO, and your office about the nature of how items fall back to earth, and the tools and methods employed during recovery, NASA has determined that it is highly unlikely that any historic properties in the APE will be affected by the proposed undertaking. The main concern raised by Alaska Natives was associated with any potential negative effects to subsistence activities. NASA and UAF have been launching suborbital rockets from PFRR since the late 1960s. During that time, subsistence activities continued within the launch corridor without known interruption. Additionally, the low frequency of launches and recoveries, coupled with landowner-imposed Standard Operating Procedures (outlined in **Enclosure 4**), would ensure that NASA's activities would not present a measurable effect above those aircraft-dependent activities also occurring within the APE, including guided hunting, wildlife survey, and mining. Discussions with Alaska Natives also indicated a general support for recovering items in downrange lands, and to the extent practicable, their participation in this effort.

In summary, it is impractical for NASA to identify all historic properties within the APE. However, based on the very small extent of land affected by either an item landing or during its removal, the infrequency and seasonality of launches, and the breadth of downrange lands, it is highly unlikely that any of the items will have an impact on possible historic properties. Consequently, NASA concludes that based on our analysis and input from consulting parties there would be *no historic properties affected* by the proposed undertaking; this determination applies to all five alternatives that are proposed in the DEIS. NASA requests your concurrence with this determination, and submits the enclosed Request for State Historic Preservation Office (SHPO) Section 106 Review (36 CFR 800), which describes this undertaking in more detail for your consideration (**Enclosure 4**). We hope that your office will concur with our finding of *no historic properties affected* and will take the opportunity to provide comments on our DEIS when it becomes available. Complementary to the assessment provided with this correspondence, NASA has included sections on Cultural Resources in the DEIS.

If you have any questions regarding the Section 106 process, please contact me at (202) 358-0455 or at Jennifer.A.Groman@nasa.gov, or Randall Stanley, Wallops Flight Facility Historic Preservation Officer, at (757) 824-1309 or Randall.M.Stanley@nasa.gov. Inquiries regarding the DEIS should be directed to Mr. Joshua Bundick at 757-824-2319 or at Joshua.A.Bundick@nasa.gov.

We thank you for your assistance and invite your office to comment on our determination and the forthcoming DEIS.

Respectfully,



Jennifer Groman
NASA Federal Preservation Officer

4 Enclosures:

1. APE Map
2. Background Information
3. Photographs of Sounding Rocket Items
4. Request for SHPO Section 106 Review

cc:

ACHP/Dr. T. McCullough
BLM/Mr. R. Mills
Doyon, Limited/Mr. J. Mery
Native Village of Venetie Tribal Government/Mr. C. Frank
UAF/Ms. K. Rich
USFWS/Ms. D. Corbett

A.3 ENDANGERED SPECIES ACT CORRESPONDENCE

DATE	FROM	TO
April 14, 2011	NASA	U.S. Fish and Wildlife Service
May 23, 2011	U.S. Fish and Wildlife Service	NASA
September 6, 2011	NASA	NOAA Fisheries Service
September 6, 2011	NOAA Fisheries Service	NASA
August 2, 2012	U.S. Fish and Wildlife Service	NASA

National Aeronautics and
Space Administration
Goddard Space Flight Center
Wallops Flight Facility
Wallops Island, VA 23337



Reply to Attn of: 250.W

April 14, 2011

Ted Swem
Branch Chief
Fairbanks Fish & Wildlife Field Office
U.S. Fish & Wildlife Service
101 12th Avenue, Room 110
Fairbanks, AK 99701

Dear Sir or Madam:

I am writing to you regarding the continued operations of the National Aeronautics and Space Administration's (NASA) Sounding Rockets Program (SRP) at the University of Alaska Fairbanks' (UAF) Poker Flat Research Range (PFRR) near Fairbanks, Alaska. In September 2010, we requested input for an Environmental Assessment (EA) that we were preparing. After considering the comments provided by members of the public during the scoping process, we have now decided to prepare an Environmental Impact Statement (EIS). The EIS will evaluate the effects of NASA's continued operations at PFRR and will support the decision-making process for the U.S. Fish and Wildlife Service's (USFWS's) and the Bureau of Land Management's (BLM's) proposed issuance of permits for rocket impact and recovery at Arctic and Yukon Flats National Wildlife Refuges and the Steese National Conservation Area and White Mountain National Recreation Area, respectively.

Owned and operated by UAF since 1968, the PFRR is a launch facility for sounding rockets, which carry scientific instruments into regions of the upper atmosphere and space that are inaccessible by other commonly used observation methods (e.g., satellites and balloons). The PFRR is located northeast of the unincorporated village of Chatanika, Alaska and consists of approximately 5,200 acres of land that house rocket and support facilities, launch pads, and tracking infrastructure. The primary types of missions conducted by NASA at PFRR are in partnership with university scientists who study the earth's atmosphere and its interaction with the space environment.

Pursuant to the National Environmental Policy Act (NEPA), the EIS will consider a range of alternatives that meet NASA's needs for obtaining the requisite earth and space science data afforded by high-latitude sounding rocket launches in support of its science and educational missions. Alternatives currently being considered for evaluation in the EIS include:

- Continuing the SRP in its present form and at the current level of effort;
- Continuing SRP launches from PFRR within the existing flight zones with differing requirements for identification and recovery of spent stages and payloads;

- Modifying the trajectories of the existing flight zones; and
- Conducting a subset of launches at other high-latitude launch sites, thereby avoiding the federally-managed lands.

The No Action Alternative is to discontinue sounding rocket launches from PFRR.

The EIS will analyze the effects of the alternatives on all applicable environmental media, including airspace, noise, safety, biological resources, socioeconomic, transportation, cultural resources, water resources, wetlands, air quality, land use, hazardous materials, recreation and visual resources, environmental justice, subsistence, and cumulative impacts. NASA anticipates that the areas of most interest to the public will be: the effects of rocket and payload landing and recovery on special interest lands (including Wilderness Areas and Wild Rivers), considerations to ensure public safety during rocket flight, and potential effects on subsistence uses on lands within the flight zones. Public and agency scoping may identify other environmental resources for consideration in the EIS.

With this correspondence, NASA would like to inquire as to whether USFWS believes there may be any species listed under the Endangered Species Act (ESA) of 1973 potentially within the general action area (see enclosed map of the PFRR flight corridors). Any assistance you could provide in identifying concerns you may have about the potential effects of the proposed action on listed species would be appreciated.

As the project proponent, NASA is serving as the lead agency for NEPA and ESA consultation with the USFWS. The U.S. Department of the Interior's BLM and USFWS would undertake connected actions and are participating in NASA's NEPA process and ESA consultation. The effects of their actions will be considered in all project-related environmental documentation, including the EIS and any biological assessments or evaluations. As such, please include all three agencies in future ESA-related correspondence regarding NASA's SRP at PFRR.

The enclosed documents provide more detailed information regarding the PFRR and the history behind the EIS. Additionally, I encourage you to visit the project's website on a regular basis for the most up-to-date information about the project. The website's address is http://sites.wff.nasa.gov/code250/pfir_eis.html.

In scoping the EIS, we are also requesting input from other agencies and the public regarding potential environmental concerns or project alternatives such that it can be considered in preparing the Draft document. As a part of this effort, we will be holding public meetings to provide further information and gather input from the public. The scoping meeting locations and dates identified at this time are shown below and on the enclosed flyer.

- Thursday, April 28, 1:00 to 3:00 p.m., at the Fort Yukon Tribal Hall, 3rd and Alder Street, in Fort Yukon, Alaska*
- Monday, May 2, 2:00 to 4:00 p.m., at the University of Alaska Fairbanks, William R. Wood Campus Center, 505 S. Chandalar Drive in Fairbanks, Alaska.
- Monday, May 2, 6:00 to 8:00 p.m. at Pioneer Park, Blue Room, 3rd Floor, 2300 Airport Way, in Fairbanks, Alaska.

- Tuesday, May 3, 2:00 to 4:00 p.m. and 6:00 to 8:00 p.m. at the U.S. Fish and Wildlife Service Alaska Regional Office, Gordon Watson Conference Room, 1011 East Tudor Road, in Anchorage, Alaska.

**Please note that the Fort Yukon meeting, originally scheduled for Friday, April 29, 2011, as indicated on the enclosed Federal Register notice, has been rescheduled for the date shown above due to conflicts that were not anticipated at the time the notice was published.*

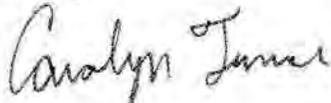
Each scoping meeting will begin with an open house where the public will have the opportunity to interact with members of the project team through one-on-one discussions. Approximately 30 minutes into the open house, NASA will provide an overview of the NEPA process and current PFRR operations. Following the presentations, public comments may be provided. During this time, all oral comments and questions will be recorded for consideration in preparing the Draft EIS. If you require special assistance to attend the meetings, please contact Joshua Bundick at the address below at least two (2) business days prior to the meeting. As an additional effort to inform the public of these meetings, we request your assistance in posting the enclosed flyer in a visible place within your community.

Comments may also be submitted by email, mail, phone, or fax, and will be accepted throughout the entire Draft EIS analysis process. However, for full early consideration and to best help shape and refine the proposal, please submit comments by June 1, 2011 to:

Joshua Bundick
Manager, Poker Flat Research Range EIS
NASA Goddard Space Flight Center's Wallops Flight Facility
Wallops Island, VA 23337
Phone: (757) 824-2319
Fax: (757) 824-1819
Email: Joshua.A.Bundick@nasa.gov

If you have any specific questions regarding the ESA process, please contact Mr. Joel Mitchell, our Natural Resources Program Manager, at (757) 824-1127 or at Joel.T.Mitchell@nasa.gov. Inquiries regarding the EIS should be directed to Mr. Bundick at the above address. On behalf of the entire EIS team, I would like to thank you for your interest in this project. We look forward to working with you.

Sincerely,



Carolyn Turner
Associate Chief, Medical and Environmental Management Division

3 Enclosures:

1. Federal Register Notice
2. PFRR Flight Zone Map
3. Scoping Meeting Notification Flyer



United States Department of the Interior

U.S. FISH AND WILDLIFE SERVICE
Fairbanks Fish and Wildlife Field Office
101 12th Avenue, Room 110
Fairbanks, Alaska 99701
May 23, 2011



Carolyn Turner
Associate Chief, Medical and Environmental Management Division
National Aeronautics and Space Administration
Goddard Space Flight Center
Wallops Flight Facility
Wallops Island, VA 23337

Re: Species listed under the Endangered Species Act within the Poker Flats Research Range Launch Corridor

Dear Ms. Turner:

Thank you for your letter dated April 14, 2011 requesting information on threatened and endangered species pursuant to section 7 of the Endangered Species Act of 1973, as amended (ESA). Based on your letter, we understand you are preparing an Environmental Impact Statement (EIS) to evaluate the effects of the National Aeronautics and Space Administration (NASA) Sounding Rockets Program's continued operations at the University of Alaska Fairbanks' Poker Flat Research Range (PFRR) near Fairbanks, Alaska. The EIS will also support U.S. Fish and Wildlife Service's (USFWS) and the Bureau of Land Management's (BLM) proposed issuance of permits for rocket impact and recovery at Arctic and Yukon Flats National Wildlife Refuges (NWR) and the Steese National Conservation Area and White Mountains National Recreation Area. The USFWS and BLM will serve as Cooperating Agencies in the preparation of the EIS.

Threatened Species

The U.S. Fish and Wildlife Service (USFWS) has reviewed the PFRR Flight Corridor map enclosed with your letter and has determined three species listed as threatened under the Act may occur in the northernmost portion of the Arctic NWR: spectacled eiders (*Somateria fischeri*), Alaska-breeding Steller's eiders (*Polysticta stelleri*), and polar bears (*Ursus maritimus*). Spectacled eiders nest in very low densities on the Arctic Coastal Plain within Arctic NWR. Although Steller's eiders historically nested in this area as well, they have not been observed in recent decades. Polar bears occupy sea ice and terrestrial habitats within Arctic NWR. For the purposes of Section 7 consultation, we assume polar bears may occur up to 25 miles inland from the Beaufort Sea coast. We also recommend contacting Craig Perham (907-786-3810; craig_perham@fws.gov) with the USFWS Alaska Region Marine Mammal Management Division to address potential effects to polar bears under the Marine Mammal Protection Act.

Designated critical habitat

The portion of the flight corridor that includes the Beaufort Sea and land within 20 miles (32 km) inland from the Beaufort Sea coast overlaps polar bear critical habitat. Please see detailed critical habitat maps or shapefiles provided at the USFWS Alaska Region Marine Mammal Management polar bear critical habitat website¹ for additional information on the extent of polar bear critical habitat within the action area.

Candidate species

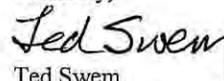
Yellow-billed loons (*Gavia adamsii*) breed at low densities within Arctic NWR and may also migrate through the region.

No listed species or designated critical habitats occur in Yukon Flats National Wildlife Refuges, the Steese National Conservation Area, or the White Mountains National Recreation Area.

This letter applies only to endangered and threatened species under USFWS jurisdiction.

Thank you for your cooperation in meeting our joint responsibilities under the Act. If you need further assistance, please contact Denise Walther at (907) 456-0277.

Sincerely,



Ted Swem
Branch Chief
Endangered Species

cc via e-mail:

Joel Mitchell, NASA
Joshua Bundick, NASA
Winona Brown, Yukon Flats NWR
Ann Marie Larosa, Arctic NWR
Lenore Heppler, BLM

¹ http://alaska.fws.gov/fisheries/mmm/polarbear/esa.htm#critical_habitat

National Aeronautics and
Space Administration
Goddard Space Flight Center
Wallops Flight Facility
Wallops Island, VA 23337



Reply to Attn of: 250.W

September 6, 2011

Mr. Brad Smith
Field Office Supervisor
National Marine Fisheries Service
Protected Resources Division
222 West 7th Avenue, #43
Anchorage, AK 99513-7577

Dear Mr. Smith:

On April 14, 2011, we wrote to you regarding the continued operations of the National Aeronautics and Space Administration's (NASA) Sounding Rockets Program (SRP) at the University of Alaska Fairbanks' (UAF) Poker Flat Research Range (PFRR) near Fairbanks, Alaska.

With this correspondence NASA would like to inquire as to whether the National Marine Fisheries Service (NMFS) believes there may be any species listed under the Endangered Species Act (ESA) of 1973 potentially within the general action area (see enclosed map of the PFRR flight corridors). Any assistance you could provide in identifying concerns you may have about the potential effects of the proposed action on listed species would be appreciated.

As the project proponent, NASA is serving as the lead agency for preparing the National Environmental Policy Act (NEPA) documentation and will also assume this role during any ESA consultation with the NMFS. The U.S. Department of the Interior's Bureau of Land Management (BLM) and U.S. Fish and Wildlife Service (USFWS) would undertake connected actions and accordingly are participating in NASA's NEPA process and ESA consultation. The effects of their actions will be considered in all project-related environmental documentation, including the Environmental Impact Statement (EIS) and any biological assessments or evaluations. As such, please include all three agencies in future ESA-related correspondence regarding NASA's SRP at PFRR.

The enclosed document provides more detailed information regarding the PFRR and the history behind the EIS. Additionally, I encourage you to visit the project's website on a regular basis for the most up-to-date information about the project. The website's address is http://sites.wff.nasa.gov/code250/pfrr_eis.html.

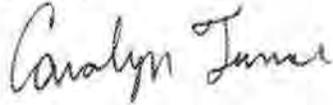
We respectfully request the courtesy of a reply within 30 days of receiving this letter. If you have any specific questions regarding the ESA process, please contact Mr. Joel Mitchell, our Natural Resources Program Manager, at (757) 824-1127 or at Joel.T.Mitchell@nasa.gov.

2

Inquiries regarding the EIS should be directed to Mr. Joshua Bundick at (757) 824-2319 or at Joshua.A.Bundick@nasa.gov.

On behalf of the entire EIS team, I would like to thank you for your interest in this project. We look forward to working with you.

Sincerely,

A handwritten signature in cursive script that reads "Carolyn Turner".

Carolyn Turner
Associate Chief, Medical and Environmental Management Division

2 Enclosures:

1. *Federal Register* Notice
2. PFRR Flight Zone Map

From: Brad Smith
To: Bundick, Joshua A. (WFF-2500);
Subject: Re: PFRR Section 7
Date: Tuesday, September 06, 2011 5:02:32 PM

Hi Joshua, thanks for this background material. It appears that portions of the launch corridor for the Poker Flats facility would extend over the Beaufort Sea. I could not tell whether the action includes azimuths that might involve the Chukchi Sea as well. For purposes of consultation under the ESA, the endangered bowhead whale occurs in both these waters, while the endangered humpback and fin whales are recorded within the Chukchi, but not the Beaufort. No critical habitat for any of these species occurs in or near this region. Additionally, NMFS has proposed to list the ringed and bearded seals as threatened (<http://www.fakr.noaa.gov/prules/75fr77496.pdf>).

Please contact me regarding any ESA consultation for this project, my desk number is 907-271-3023.

On 9/6/2011 10:56 AM, Bundick, Joshua A. (WFF-2500) wrote:

Hi Brad, it was nice speaking with you earlier today.

As we discussed, I have attached our April 2011 scoping letter (with incorrect address, but FYI) and September 2011 Section 7 tech info/species list request letter. I apologize for having sent the letter to the wrong address—that should explain why we hadn't heard anything from you..! Where both letters share the same attachments, I have just provided one "package" of attachments for you. I did not send the scoping meeting announcement flyer for obvious reasons....

Please take a look at the information, and let me know if you have any questions. We look forward to working with your office on this project.

Best,

Josh

Joshua Bundick

Lead, Environmental Planning

NASA Wallops Flight Facility

Wallops Island, VA 23337

Office: (757) 824-2319

Fax: (757) 824-1819

Joshua.A.Bundick@nasa.gov

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Brad K. Smith
Protected Resources Div.
Anchorage
(907) 271-3023
Brad.Smith@noaa.gov



United States Department of the Interior

U.S. FISH AND WILDLIFE SERVICE
Fairbanks Fish and Wildlife Field Office
101 12th Avenue, Room 110
Fairbanks, Alaska 99701



August 2, 2012

Joshua Bundick
Lead, Environmental Planning
NASA Wallops Flight Facility
Wallops Island, VA 23337

Re: section 7 consultation under the Endangered Species Act within the Poker Flats Research Range Launch Corridor

Dear Mr. Bundick:

This memorandum is in response to your July 24, 2012 request for concurrence for effects of the National Aeronautics and Space Administration (NASA) Sounding Rockets Program on endangered and threatened species, and critical habitats pursuant to Section 7 of the Endangered Species Act of 1973, as amended (ESA). NASA analyzed effects of the proposed action on three listed species, Steller's eiders (*Polysticta stelleri*), spectacled eiders (*Somateria fischeri*), and the polar bear (*Ursus maritimus*), and one candidate species, the yellow-billed loon (*Gavia adamsii*). The analysis also included an evaluation of the effects of the proposed action on polar bear critical habitat. NASA determined that the proposed action would have no effect on the avian species because of a lack of spatial overlap between these species and project effects, and we concur with this determination. Thus, the proposed action may only affect the polar bear and its critical habitat.

THE PROPOSED ACTION

Based on the biological assessment, we understand NASA's Sounding Rockets Program plans to continue operations at the University of Alaska Fairbanks' Poker Flat Research Range (PFRR) near Fairbanks, Alaska. Federal actions undertaken by the Bureau of Land Management (BLM) and the U.S. Fish and Wildlife Service (USFWS) are also considered in this consultation. These agencies manage lands within the eastern Interior of Alaska and issue authorizations to UAF (on NASA's behalf) for sounding rocket launches; specifically, BLM manages the Steese National Conservation Area and White Mountains National Recreation Area under the Federal Land Policy and Management Act of 1976, as amended; USFWS manages Arctic and Yukon Flats National Wildlife Refuges in accordance with its responsibilities under the National Wildlife Refuge System Administration Act of 1966, as amended.

Program activities

Although the Sounding Rockets program is proposed to continue indefinitely, this consultation considers effects for the next 10 years, the temporal boundary NASA selected for cumulative effects analysis in a forthcoming Environmental Impact Statement for its operations at PFRR.

NASA plans to continue launching two to four, but no more than eight multi-stage suborbital sounding rockets annually from PFRR near Fairbanks, Alaska. NASA expects no more than 4 Beaufort Sea-impacting rockets would be launched in a given year. If more than four rockets are launched in a given year, NASA expects that the remaining rockets would be of shorter-range configurations and would land well inshore (about 200 km) of the Beaufort Sea; thus, they would not affect listed species. The launches could occur across eight days or concentrated into two or three days. Launches are expected to occur during winter; however, a few non-winter launches could occur. If a non-winter launch were to be proposed, NASA would re-initiate Section 7 consultation at that time.

Description of sounding rockets

The rockets that could affect listed species or critical habitat are the Black Brant-class (or equivalent) vehicles, which employ either three or four rocket motors. NASA sounding rockets consist of one to four solid-propellant rocket motors staged in series. All rocket motors launched by NASA at PFRR would be spin-stabilized, unguided, and solid fueled. Propellants typically include ammonium perchlorate and aluminum or nitrocellulose and nitroglycerine.

Atop the motors are payloads (Figure 1). Payloads could be made of aluminum, steel, magnesium, other lightweight metals, or occasionally composites such as fiberglass or graphite/epoxy. Internal components consist mainly of electronic subsystems, batteries, pressure systems (pressure vessels, tubing, regulators, valves, etc.), and sensors and instruments such as magnetometers, optical devices, and antennas.

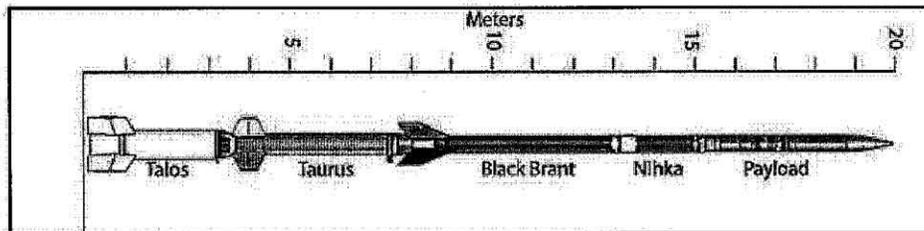


Figure 1. Black Brant XII sounding rocket. Other similar rockets within the Black Brant class of rocket could also be deployed.

Re-entry

Because NASA sounding rockets are suborbital, their upper motors or payloads do not enter an Earth orbit; rather, they return to Earth along parabolic trajectories. All metallic and other solid heavier-than-air objects that are propelled into the atmosphere by sounding rockets would land back on Earth. The objects include spent rocket motors, payloads; nose cone doors (released in flight for instruments to “see” their targets), and spin weights, which were released to change rotation of a rocket stage of a launch. It is expected that extreme re-entry dynamics would result in deployed booms and detectors being separated from their primary structures. However, the primary structures without aluminum skin sections would survive until impact. It is likely that these structures would undergo sufficient deformation such that they, along with any components

housed in these locations, would be dispersed around the impact point. It is possible that batteries could be located in these exposed assemblies, but this is not the typical case. Electronic boards, wiring, connectors and other small components are likely to be numerous in the debris field. Spent motors and enclosed portions of payloads would experience significant damage but are not likely to break apart to the extent that internal elements would be significantly exposed (e.g. residual propellant, telemetry components such as batteries, etc.).

THE ACTION AREA

The action area includes the land, water, and airspace within areas of northern Alaska and the Beaufort Sea as represented in Figure 2.

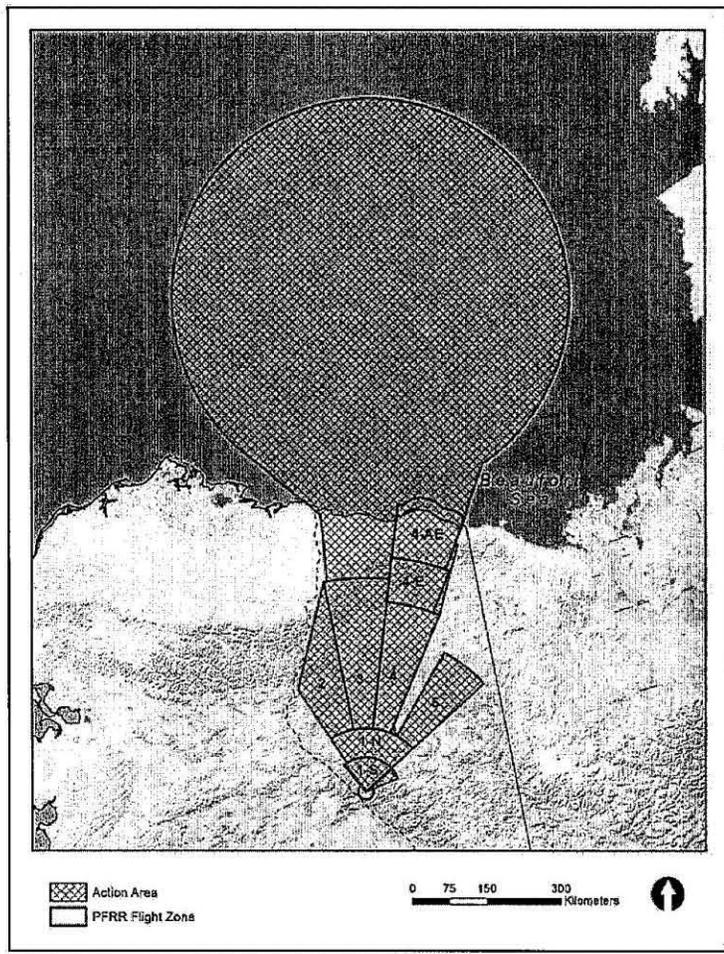


Figure 2. The action area for rockets launched by NASA from PFRR.

EFFECTS OF THE ACTION

Polar bear

On May 15, 2008, the polar bear was listed as threatened (73 FR 28212). Polar bears would likely be foraging, transiting, and denning in the action area, especially on barrier islands or on sea ice near shore. Polar bears also den in terrestrial areas of the action area. Potential impacts on polar bears from launch operations would be associated with re-entering debris landing within their habitat. Typically, debris would land far offshore in the Beaufort Sea or Arctic Ocean, but there is a small chance that they could land closer to shore in areas frequented by polar bears.

A potential concern for effects to polar bears could be flight debris-related injury, as polar bears are curious animals that typically investigate objects or smells that catch their attention (Stirling 1988). Polar bears have been observed to ingest a wide range of indigestible and hazardous materials and to feed at dumps (Clarkson and Stirling 1994). Instances of polar bear injury related to human made materials (e.g., pieces of a lead battery, ethylene glycol antifreeze) have been documented (Amstrup et al. 1989). However, these have been in unnatural settings (including roadsides treated with antifreeze and dye and the Churchill, Manitoba, municipal landfill) that are much different from the habitat within the PFRR flight corridor. The dump example involved individual bears habituated to finding supplemental food in landfills (Lunn and Stirling 1985).

Debris that lands on sea ice would be unlikely to harm a polar bear in the event one was to encounter it; additionally, polar bears are unlikely to encounter debris given the size of the action area and the relatively small debris field created by a rocket returning to earth. The item is expected to rapidly become covered by ice or drifting snow, essentially making it inaccessible to polar bears. As the ice melts the rocket hardware would subsequently sink into the ocean. If debris landed on multi-year sea ice, the chance that a polar bear would encounter it would be extremely low because polar bears usually use sea ice closer to shore where ice seals, their main prey, are more common. Additionally, the chance that rocket debris would hit a polar bear is very unlikely; thus, we expect effects from falling debris on bears to be discountable.

Assuming four launches per year, the maximum number of items that would enter the Beaufort Sea annually would be four payloads and up to four spent motors (from the final stage). Typical water depths within these areas would be at least 300 m. As discussed earlier, payloads and spent stages that enter the marine environment would sink. Unrecovered payloads contain materials (e.g., batteries) that would result in limited and localized contamination as the materials enter the aquatic environment. Considering the limited number of launches per year, the relatively small size and wide spatial dispersion of debris and its largely inert or non-reactive nature, we anticipate insignificant effects on polar bears.

The probability of a piece of flight hardware landing on a polar bear den was also estimated using information on known polar bear dens in the area. The chance that one of these launches directly impacting a polar bear den is less than one chance in 21 million (4.6×10^{-8}). Thus, we anticipate insignificant effects of polar bears denning in the action area.

Polar bears may hear the sounds generated by debris reentry; however, it is reasonable to conclude that such effects would be temporary, minor, and similar to other natural sounds in

their marine environment, such as the sounds of ice cracking, popping, and colliding (Greening and Zakarauskas 1994; Milne 1972; Milne and Ganton 1964; Xie and Farmer 1991). Therefore, effects of sound generated from rocket debris re-entry would be insignificant.

Polar bear critical habitat

The Service designated critical habitat for polar bears on November 24, 2010 (75 FR 76086). The Action Area overlaps with the three units of designated polar bear critical habitat: sea ice, terrestrial denning, and barrier islands (Figure 3). Typically, debris would land far offshore in the Beaufort Sea or Arctic Ocean; but, a small chance exists that debris could land in one of the critical habitat units. Critical denning habitat would not typically be affected by these launches as it is outside the normal debris fallout area. The chance that debris would typically impact the sea ice critical habitat unit is less than one chance in 150 (6.6×10^{-3}). While not calculated, the chance of rocket debris impacting barrier island critical habitat is also extremely low. Table 1 shows the probability of a typical spent rocket motor or payload landing within sea ice (feeding) and terrestrial denning polar bear critical habitat. Additionally, assuming an average sea ice thickness of 1 meter (Kwok and Rothrock 2009), it is highly unlikely that re-entry would result in a penetration depth that would exceed the average ice thickness. Payloads and spent motors would likely impact the ice and undergo elastic and plastic deformation while creating an impact crater but would not pierce the ice and immediately sink into the water (Wilcox 2012). Given the extremely low probability of rocket debris landing within and permanently occupying polar bear critical habitat, and the minor effects to sea ice's physical feature if debris did impact sea ice, we anticipate effects on critical habitat to be discountable and insignificant.

Table 1. Probability of impact on polar bear critical habitat and dens

Distance from the PFRR Launch Site (kilometers)	Polar Bear Critical Habitat	Potential Impact Ellipse (square kilometers)	Amount of Polar Bear Critical Habitat Within Ellipse (square kilometers)	Probability of a Spent Stage or Payload Landing in Polar Bear Critical Habitat
1,000	Feeding habitat	503,375	14,964	6.6×10^{-3}
1,000	Denning habitat	503,375	0	0
1,000	Polar bear dens within potential impact area ^a	503,375	0.022	4.6×10^{-8}

^a. An estimated 69 known polar bear dens could be within the area potentially impacted by a typical National Aeronautics and Space Administration launch into the Beaufort Sea (Based on information from Amstrup and Gardner 1994) based on information collected over the years by the National Oceanic and Atmospheric Administration. Assuming each den covers an area of approximately 3 square meters (30 square feet) (Stirling 1988); this analysis assumes a safety zone within a 10-meter (33-foot) radius of the den. The potential area of disturbance around a polar bear den that could result in either damage to the den or injury or death to the polar bear is estimated to be approximately 315 square meters (380 square yards) per den, or 0.022 square kilometers (0.0085 square miles) for 69 dens.

Note: To convert kilometers to miles, multiply by 0.62137; square kilometers to square miles, by 0.38610.

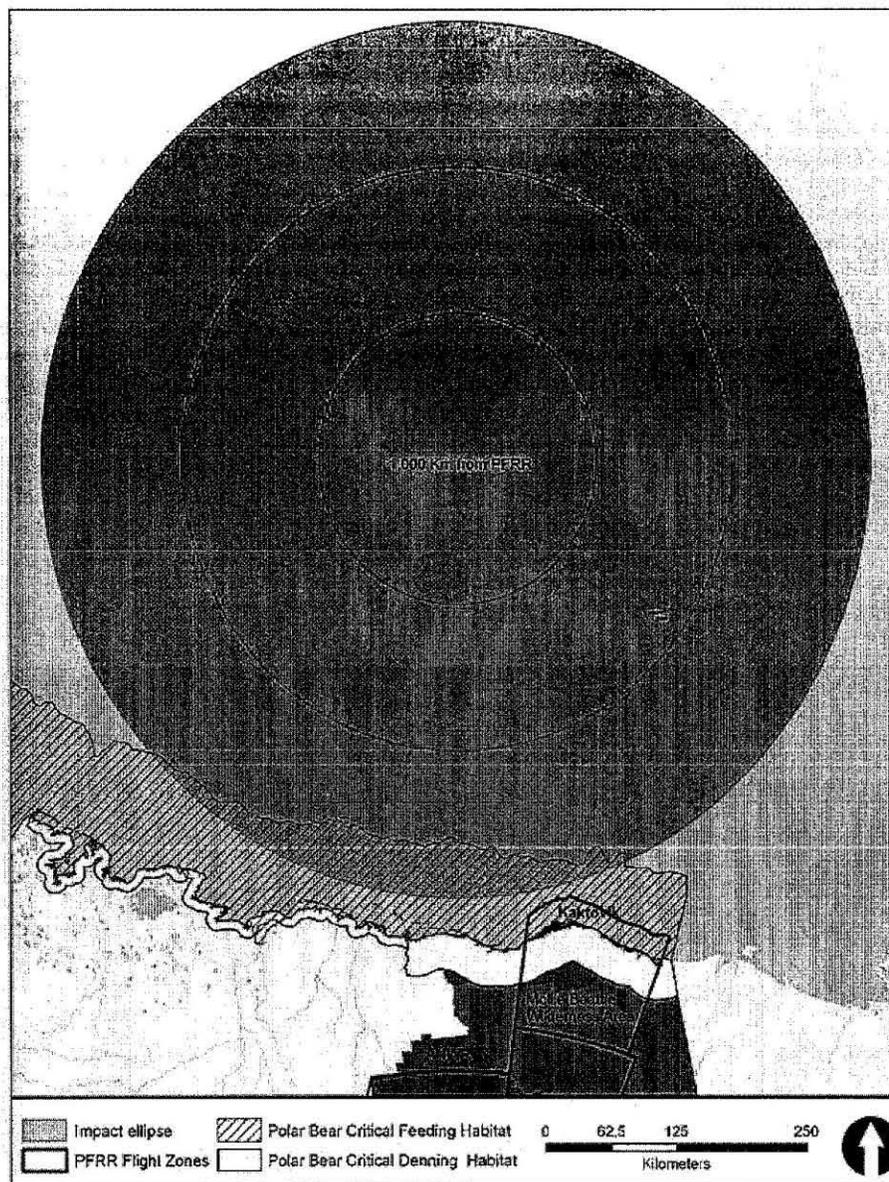


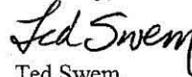
Figure 3. Overlap of the Action Area (impact ellipse and PFRR flight zones) and polar bear critical habitat.

Summary

While the proposed action may affect polar bears, potential effects would be discountable and insignificant. Likewise, the proposed action would have only insignificant and discountable effects on polar bear critical habitat. The Service therefore concurs that that the proposed action is not likely to adversely affect polar bears and designated critical habitat. We also concur that that the proposed action has no effect on listed eiders and is not likely to jeopardize the continued existence of yellow-billed loons.

Thank you for your cooperation in meeting our joint responsibilities under the ESA. If you need further assistance, please contact Shannon Torrence at (907) 455-1871.

Sincerely,



Ted Swem
Branch Chief
Endangered Species

Cc:

Mark Bertram, Yukon Flats NWR
Ann Marie Larosa, Arctic NWR
Lenore Heppler, BLM

LITERATURE CITED

Amstrup, S.C., Gardner, C., Myers, K.C., and Oehme, F.W. 1989. Ethylene Glycol (Antifreeze) Poisoning in a Free-Ranging Polar Bear. *Vet. Hum. Toxicol.* 31(4): 317-319.

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Kwok, R. and Rothrock, D. A. 2009. Decline in Arctic Sea Ice Thickness from Submarine and ICESat Records: 1958-2008. *Geophys. Res. Lett.* 36, L15501.

Lunn, N.J. and Stirling, I. 1985. The Significance of Supplemental Food to Polar Bears during the Ice-Free Period of Hudson Bay. *Can. J. Zool.* 63: 2291-2297.

Milne, A.R. and Ganton J.H. 1964. Ambient Noise under Arctic-Sea Ice, *J. Acoust. Soc. Am.* 36(5): 855-863.

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Wilcox, D. 2012. *Engineering Assessment of Black Brant XII Payloads and Motors Impacting Sea Ice in the Beaufort Sea*. February 17. 10 pp.

Xie, Y. and Farmer, D. M. 1991. Acoustical Radiation from Thermally Stressed Sea Ice. *J. Acoust. Soc. Am.*, 89 (5): 2215-2231.

APPENDIX B
SITING ANALYSIS

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APPENDIX B. SITING ANALYSIS

B.1 SITING OPTIONS

In Chapter 1 of this *Draft Environmental Impact Statement for the Sounding Rockets Program at Poker Flat Research Range*, “Purpose and Need for the Action,” the National Aeronautics and Space Administration (NASA) indicated that it intends to maintain a high-latitude launch site in the United States (U.S.) to support research critical to the understanding of the Sun–Earth connection and upper atmosphere. However, due to concerns raised by project stakeholders during the scoping process for this environmental impact statement (EIS), NASA considered several other sounding rocket launch sites that might meet some or all of the science requirements that have been identified for performing high-latitude and auroral science. The other sites considered are the Kodiak Launch Complex (KLC) in Alaska; the now-decommissioned Fort Churchill Rocket Range near Churchill, Manitoba; the Andøya Rocket Range (ARR) launch sites in Andøya, Norway, and Ny-Ålesund, Svalbard (an archipelago in the northernmost part of Norway); and the Esrange Space Center near Kiruna, Sweden. This Appendix summarizes NASA’s evaluation to determine if either site could be considered a reasonable alternative to Poker Flat Research Range (PFRR) and should thereby be evaluated in detail in this EIS.

B.1.1 Kodiak Launch Complex

The KLC on Kodiak Island, Alaska, is the only other U.S. facility at a latitude potentially compatible with the needs of the typical science missions supported by PFRR. However, the KLC is designed to launch in the southeast-to-southwest direction, over the open water of the Pacific Ocean (FAA 1996). The approved launch trajectories would prohibit reaching the northern launch azimuths necessary to obtain data that support the types of scientific missions conducted at PFRR. The large population centers north of the KLC (Anchorage and Matanuska-Susitna Valley areas) greatly increase the risk for rocket stages to impact populated areas following launch.

B.1.2 Churchill Research Range

The Churchill Research Range near Churchill, Manitoba, was a primary sounding rocket launch site for Arctic science, including auroral science, from its start in 1954 (Pfister 1967) (see **Figure B–1**). The rocket launching facilities were constructed adjacent to the Fort Churchill military base and operated by the U.S. Army and later U.S. Air Force until 1970, when management and funding became the responsibility of the Canadian National Research Council. Operations continued with limited funding until 1984, when the Canadian rocket program was canceled and funding for the Churchill Research Range terminated (Shepherd and Kruchio 2008).

The facilities were extensively used for northern latitude and auroral research until many U.S.-sponsored launches shifted to PFRR in the late 1960s. Launches continued at Fort Churchill through 1989, when two NASA launches occurred. Operations were then discontinued. A single launch occurred in April 1998 during an attempt to privatize the launch

complex and turn it into a commercial launch site at an announced cost of \$300 million (Astronautix 2011).

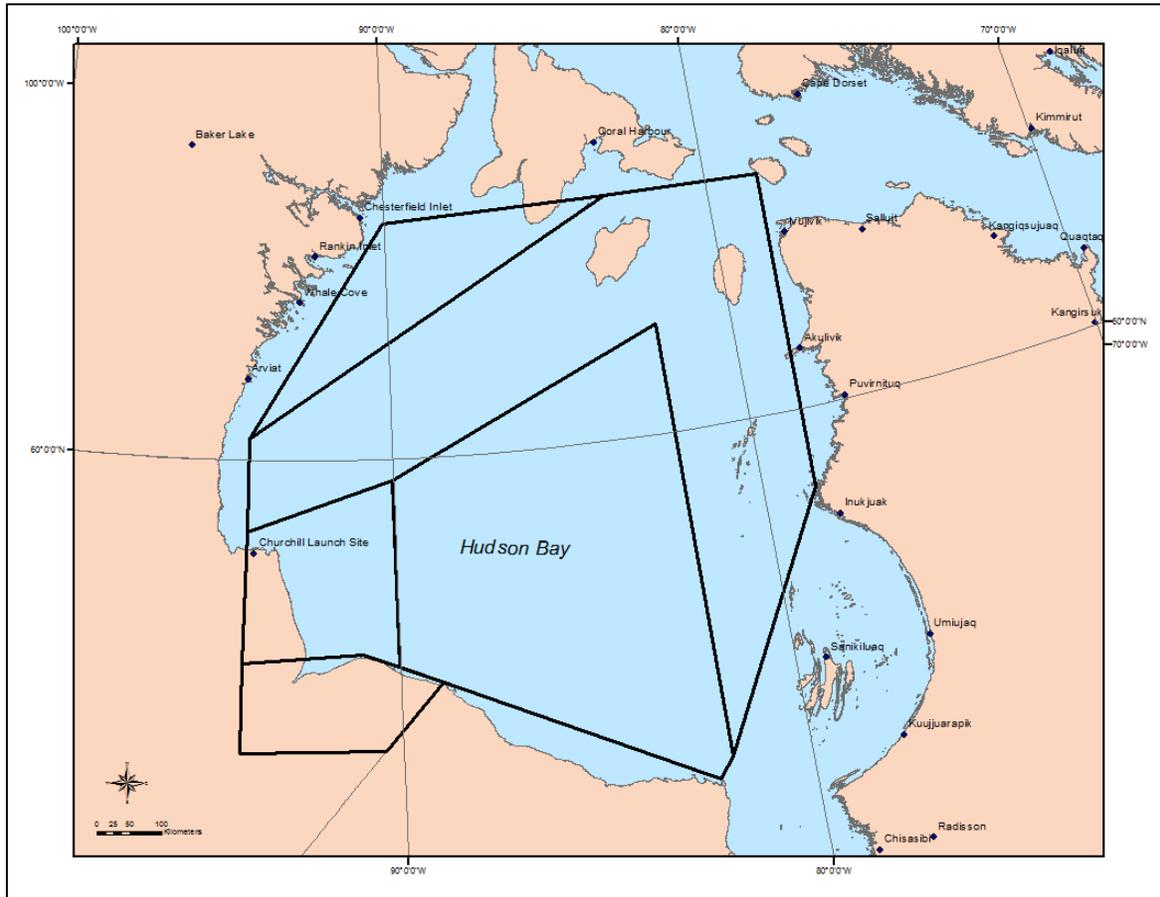


Figure B-1. Historic Fort Churchill Range Boundaries

All Fort Churchill launch and support facilities are now decommissioned and the actual remaining Fort Churchill launch facilities are designated the “Churchill Rocket Research Range National Historic Site of Canada.” The site is now home to the Churchill Northern Studies Centre, a non-profit environmental and biological research organization which occupies a number of the facilities that were used by the launch operation.

There is little, if any, ground-based support instrumentation at the launch site. Any launches carried out there would presumably be toward east into the Hudson Bay, and it would be essentially impossible to find downrange sites under the trajectories that could be used to deploy critical ground-based instruments. Churchill Research Range is also on foreign soil, which makes many operations more difficult.

For Churchill Research Range to be a viable alternative to PFRR it would need to be outfitted comparably as a permanent launch facility capable of supporting annual launch operations; temporary placement of mobile equipment is not practical on a regular basis. Accordingly, at least two, and most likely three, sheltered launchers would be required. In addition, new facilities, including a motor storage and assembly building and a payload processing building

(both with bridge cranes), would be needed. Downrange science instrumentation would need to be installed at least two, and possibly three, sites on the perimeter of Hudson's Bay at considerable expense (**Hickman 2011**). Communications infrastructure would also be needed, and it is likely that at least a large portion of this infrastructure, if not all, would need to be resurrected. This would be both a cost and environmental impact of considerable undertaking (**Hickman 2011**).

B.1.3 Andøya Rocket Range

ARR is located in northern Norway (see **Figure B-2**). The range cooperates with the European Space Agency and supports orbital satellite, sounding rocket, and balloon operations. ARR has two launch sites for sounding rocket operations (**NASA 2005**), as follows:

- Andøya, Norway: N 69°17' E 16°01'
- Ny-Ålesund, Svalbard: N 78°55', E 11°51'



Figure B-2. Andøya Rocket Range

Launch Facilities – ARR has seven launch pads in the launch area and can, if required, launch rockets simultaneously (generally not more than two). Several launch pads are covered by heated shelters. See **Figure B-3** for a photograph of launch facilities at ARR.

The launch facility in Ny-Ålesund, Svalbard, has one covered launch pad equipped with a universal launcher.



Source: NASA 2005.

Figure B-3. Launch Facilities at Andøya Rocket Range

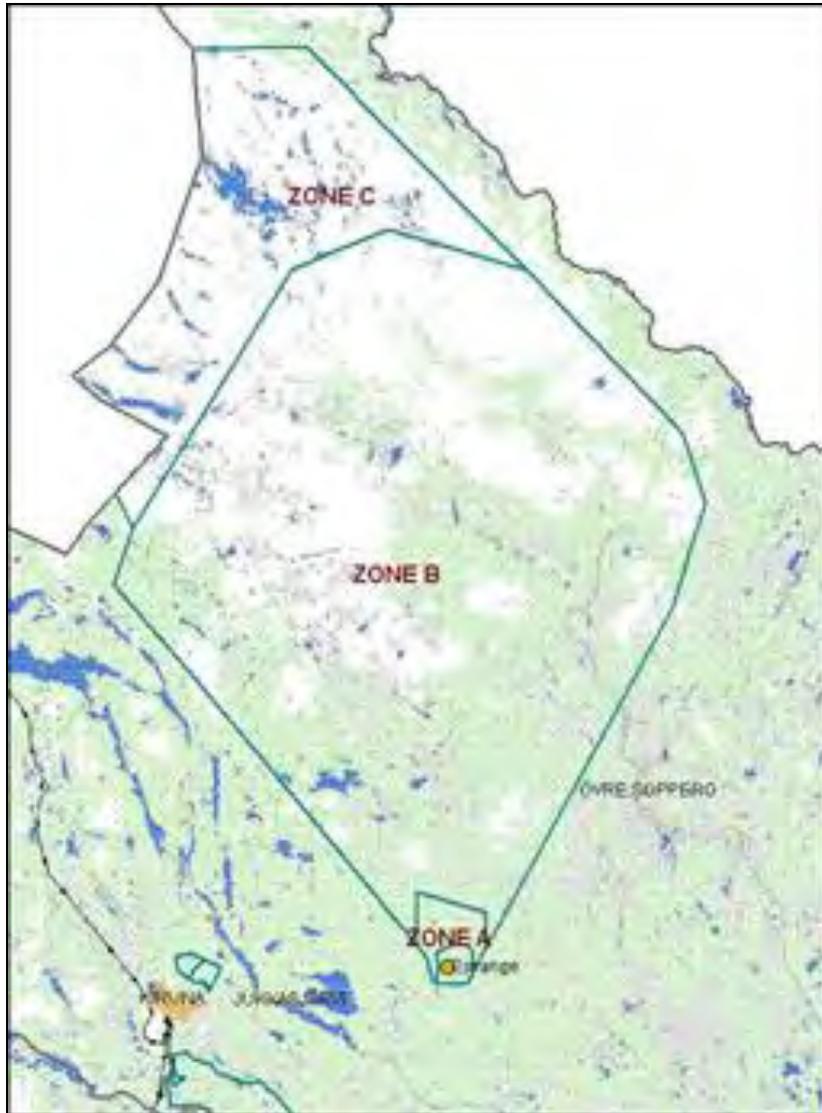
Support Facilities – The launch site at Andøya has offices and two payload preparation facilities, both fitted with gantry cranes, and associated infrastructure for payload systems checkout. ARR has two fixed telemetry systems and one mobile system. A Science Operation Centre is available onsite for determining optimum scientific launch conditions.

Recovery – ARR also provides recovery of the payload from the Norwegian Sea, provided that the payload is equipped with a recovery system (parachute and flotation system).

B.1.4 Esrange Space Center

Esrange Space Center is situated in northern Sweden above the Arctic Circle near Kiruna, Sweden at latitude 67° 53'N, longitude 21° 04'E. The base supports orbital satellite, sounding rocket, and balloon operations. The base is managed by the Swedish Space Corporation, which is a state-owned limited corporation under the Ministry of Industry (NASA 2005).

Launch Range – The rocket stages and payloads land in the Esrange Impact Area, a large uninhabited diamond shaped area north of Esrange Space Center in the Swedish tundra region, 120 kilometers (74 miles) long and 75 kilometers (46 miles) wide (see **Figure B-4**). The Esrange Impact Area is divided into three zones, A, B, and C, with a total area of 5,600 square kilometers (2,162 square miles). Zone A, the impact area for boosters, can be extended when rockets with long-range boosters are launched. Zones B and C are impact areas for second and third stages, as well as payloads. Zone C is not allowed for use from May 1st through September 15th. The nominal impact point normally chosen is situated 75 kilometers (46 miles) north of the launch pads (SSC 2009).



Source: SSC 2009.

Figure B–4. Esrange Impact Area

Launch Facilities – The site includes six permanent launchers and support facilities, including environmental shelters and a blockhouse. Multiple rockets (up to 2) can be launched in succession.

Support Facilities – There are two large rocket preparation buildings equipped with gantry cranes. A ground observation station, Kiruna Esrange Optical Platform System (KEOPS), is located onsite (SSC 2009). Downrange observations can be made from two different sites within the impact area north of the launch site. Additionally, a network of ground-based scientific instrumentation has been established in northern Scandinavia. One is the Swedish Institute of Space Physics. Another installation is the European Incoherent Scatter (EISCAT) Facility, comprising a system of stations in Norway, Sweden, and Finland. In Sweden is a climate research center, which supports scientific research in Arctic regions and location of ground-based instrumentation (SSC 2009).

Recovery – Recovery of payloads is a common requirement, with approximately 50 percent equipped with recovery systems. Recovery missions are generally successful.

Rocket motors are not recovered immediately following the launch. People visiting the impact area during non-winter months occasionally find the motors and are offered a small reward for finding the motor. It is then typically recovered.

B.2 SITE SELECTION PROCESS

The NASA Sounding Rockets Program (SRP) defined several criteria to determine if there are any reasonable alternative launch sites to PFRR for meeting the purpose and need for NASA's action. These criteria included:

Criterion 1: Site and Range Must Meet the Research Needs of the Scientific Community

The site and range must provide scientists the ability to meet the research goals identified in Chapter 1 of this EIS, including studies of aurora and the sun-earth connection. Since the stated purpose and need for this action is only for high-latitude science, this effectively restricts launch sites to those that would permit rocket flights within the northern (or southern) high-latitude areas of the Earth. For much of the expected future scientific needs of the NASA SRP, this area is further restricted to the auroral areas around the Earth's magnetic poles.

Figure B-5 illustrates the area around the magnetic pole where the aurora intensity is greatest and the northern launch sites that have historically been used for sounding rocket research. Most auroras occur in a band known as the auroral zone, which is typically 3 to 6 degrees in latitudinal extent and extends around the magnetic pole. The auroral zone is typically 10 to 20 degrees from the magnetic pole. During a geomagnetic storm, the auroral zone will expand to lower latitudes. Auroral research with sounding rockets is typically performed during periods of high activity and intense auroral displays. During these periods, the launches from PFRR can be made such that the payload transverses both sides of the auroral oval, which increases the scientific data returned.

The site should also have practical range characteristics that are necessary to directly support the collection of scientific data or substantially enhance the science that might be achieved. As a "land" range, PFRR has the advantage of having villages downrange with commercial aircraft access and the ability to establish permanent or semi-permanent monitoring stations. Prior to a launch, support staff can be safely deployed to these sites for weeks at a time, which is critical when awaiting a natural phenomenon, such as the aurora. PFRR's access to an array of established, ground-based research instruments (*e.g.*, magnetometers, all-sky cameras, and lidars) enables researchers to gauge optimum scientific conditions before deciding to launch. PFRR also has a database of observations from ground-based instruments that provides the environmental context into which the rocket measurements may be interpreted.



Figure B-5. General Graphic Depiction of the Auroral Oval

In addition to providing information vital to the understanding of optimal launch conditions, the downrange instrumentation often provides a significant contribution to the research objectives. For example, scientists can observe the aurora with ground-based optics and other instrumentation to put in context the measurements taken by the in situ instruments on board the payload during the flight. A good example is the measurement of neutral winds, which is an important aspect of auroral studies. This can only be done reliably using ground-based optics to track artificial clouds made in the ionosphere and employing triangulation to obtain wind speed and direction (triangulation requires three geographically separated sites) (**Hickman 2010**).

The range should also facilitate the recovery of the payload as desired for scientific reasons. Whether desired for re-use of an instrument (as in the case of a telescope-type payload) or analysis of samples collected (as in the case of an air sampler payload), the ability to recover proves to be a major advantage of PFRR for some missions.

Evaluation

Kodiak Launch Complex – the site is designed to launch in the southeast-to-southwest direction, over the open water of the Pacific Ocean (FAA 1996). The approved launch trajectories would prohibit reaching the northern launch azimuths necessary to obtain data that support the types of scientific missions conducted at PFRR. Therefore, the KLC is eliminated as a reasonable alternative and will not be discussed further in this appendix.

Fort Churchill – During periods of high auroral activity, the site is well with the auroral oval, and at times available scientific conditions may be similar to those that can be obtained at PFRR; however it is at a much lower geographic latitude than PFRR (58.76 degrees versus 65.08 degrees), making it much less suitable for those experiments that depend on high geographic latitude, such as the study of Polar Mesospheric Clouds and Polar Mesospheric Summer Echoes (Conde 2012).

By contrast, Fort Churchill's geomagnetic latitude is three degrees higher than PFRR, which could be considered a detriment for many auroral studies. Assuming that launches would fly generally in a northerly direction, it would place the rockets well north of the aurora in many cases. Even at PFRR scientists often face the challenge that if the aurora is active, it can be too far south to permit a launch. This challenge would be much worse at Churchill.

The same problem arises with any science mission targeting active aurora. Magnetic activity moves the aurora equatorward, so that PFRR is actually about as far north as researchers want to be to study bright and active auroral phenomena.

Fort Churchill could in fact have advantages for a very limited number of experiments for which it may be advantageous to fly eastward, along the auroral oval, which cannot be done from PFRR due to concerns regarding safety (discussed in more detail below) as well as the limitation for crossing the Canadian border.

Norway and Sweden – During periods of high auroral activity, these sites are at high geographic latitudes, but the magnetic latitudes, which determine the location relative to the auroral oval, are much lower than those at PFRR for the site at Andøya and the site at Esrange Space Center and much higher than those at PFRR for the site at Svalbard. PFRR provides access to the auroral oval that is not easily reached from these northern Scandinavian sites (Larsen 2011).

Depending on the type of science and the range/altitude of the experiment, only PFRR would be suitable as it is further north magnetically, which affects the location of the auroral substorms. The more disturbed the substorm, the further south it moves, and if the scientists want to study a particular phenomenon, Norway may not be suitable (Hickman 2010). There is good ground-based instrumentation support in the vicinity of all three ranges, including science radars and optical instrumentation. However, these sites have the same limitation as Fort Churchill in that locations for instrumentation under the rocket trajectories are not available for rockets launched over the ocean (Larsen 2011).

For typical SRP launches from Norway or Sweden, much of the flights would be over water and ship-based observations would be necessary. While not impossible, the cost of ship-based

observations at multiple sites would substantially raise the costs of equivalent science and introduce added uncertainty to the launch windows given the concerns related to long-duration (*e.g.*, for weeks at a time) ship-borne operations in areas with highly variable weather conditions.

A key limitation of the Swedish range is its size; thereby limiting launches to single-stage and smaller two-stage rockets. The inability to launch the most frequently employed vehicles for recent heliophysical research (*e.g.*, Terrier-Improved Orion, multi-stage Black Brants) from the Sweden site precludes it from being considered a reasonable alternative to PFRR.

Conclusion – Based on the evaluation of the “Scientific Need” criterion, only Churchill Research Range in Canada can achieve the majority of auroral and high-latitude science identified as needed by NASA in Chapter 1 of this EIS. However, its lack of downrange observatories would limit the types of missions conducted.

Although well-suited for conducting certain types of auroral research, the characteristics of the launch sites in Norway and Sweden do not permit them to fulfill the science objectives identified in the purpose and need of this EIS, and are therefore not considered reasonable alternatives to PFRR.

Criterion 2: Site and Range Would Allow Operations to be Conducted Safely

NASA strictly follows range safety requirements that are consistent with other Federal agencies and require that the safety risks to people, aircraft, and structures be extremely low, as described in Chapter 2 of this EIS. The practical implication for unguided sounding rockets is that the downrange areas over which the sounding rocket motors and stages travel and land must be remote with very few people. Thus, sounding rockets must be launched over water or, when over land, in areas where the population is very low.

Evaluation

Fort Churchill – Employing the same methodology as it uses in developing Flight Safety Plans and Risk Assessments for sounding rocket missions, NASA evaluated the potential for the Fort Churchill Range to safely support the flight of its Black Brant-class of vehicles (Black Brants IX, X, XI, and XII). These vehicles were chosen as they are the highest performing in the SRP’s fleet and are most likely to be specified by auroral scientists in the future.

The analysis, which employed the same risk acceptance criteria that is utilized for mission planning at PFRR, indicated that the Black Brant IX could be flown safely at a wide range of azimuths, however the Black Brants X, XI, and XII required much more easterly azimuths (greater than 30 degrees from true north for the Black Brant XI and greater than 60 degrees for Black Brant X) (**Computer Sciences Corporation 2012**). To provide context, typical missions flown from PFRR fly azimuths in the 5 degree (from true north) range. The analysis of the most powerful vehicle, the Black Brant XII, returned a range of acceptable launch azimuths (greater than 35 degrees); however, it was limited to a launcher setting that would provide a lower payload apogee, which could have some effect on its meeting both safety and scientific requirements. In all cases, trajectories were over the Hudson Bay, which avoided the populated Hudson Bay shoreline.

Conclusion – In summary, when compared to PFRR, Fort Churchill would provide only a very limited set of permissible northerly azimuths for the SRP’s highest performing vehicles; thereby, limiting the range of scientific opportunities available. Therefore, when safety considerations are weighed, Fort Churchill’s ability to support PFRR-like science is marginal at best.

Criterion 3: Site and Range Would Provide Practical and Cost-Effective Facilities and Infrastructure

The site and range must provide practical and cost-effective facilities and infrastructure that enhance the ability of the SRP to support the scientific and research community. Even the optimum location from purely a scientific perspective may not be practical if the logistics of conducting a launch, including installation of launchers, downrange support equipment, and facilitation of recovery, are not practical. Budgets within the SRP have always been quite limited, and its goal has always been to obtain the most scientific return at the lowest possible cost.

Evaluation

Fort Churchill – The practicality of PFRR stands out in comparison to Churchill Research Range as it does not contain any active launch infrastructure. Moreover, its remaining facilities have been retrofitted to support ecological research. While it is still technically possible to launch from Fort Churchill using mobile launchers, employing the “mobile campaign” approach as a long-term solution does not meet NASA’s needs as a PFRR site alternative, especially when considered within the context of its geographic limitations (that affect the scientific value), safety restrictions (that limit equivalent northerly azimuths), and lack of downrange support infrastructure. The cost of building new permanent launch and support facilities at a new site on foreign soil, such as at Fort Churchill, would be above the future budgets of the SRP, requiring severe curtailment of its activities, thereby not meeting NASA’s purpose and need. Due its lack of infrastructure, Churchill Research Range is eliminated as reasonable alternative launch site to PFRR.

B.2.1 Overall Evaluation of Launch Sites

Based on the three criteria which were science, safety, and available facilities, PFRR is the only site that fully meets all program requirements. Other existing U.S. launch sites cannot achieve the needed science objectives. Churchill Research Range could in principle meet some science needs; except it does not permit northward launches and its geomagnetic latitude would preclude it from providing the same level of scientific opportunities as PFRR. Furthermore, the practical details and costs associated with equipping the launch area and downrange sites with the needed scientific observation equipment would make this an impractical alternative for future scientific missions as currently envisioned. Other northern launch sites in Norway and Sweden are practical and will continue to be used for some NASA SRP missions, but because of their geographic location relative to the auroral zone, and certain range characteristics, they cannot achieve the science that is obtainable at PFRR. Based on this evaluation process, PFRR is the only site that fully meets the purpose and need for the SRP and the only site considered reasonable for this *PFRR EIS*. Therefore, this EIS only addresses alternative approaches for continuing NASA’s SRP mission at PFRR.

B.3 REFERENCES

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APPENDIX C

LAND USE PERMITS AND MEMORANDA OF UNDERSTANDING

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**APPENDIX C.
LAND USE PERMITS AND MEMORANDA OF
UNDERSTANDING**

**C.1 UNITED STATES DEPARTMENT OF THE INTERIOR, U.S. FISH AND WILDLIFE
SERVICE, ARCTIC NATIONAL WILDLIFE REFUGE**

United States Department of the Interior
U.S. Fish and Wildlife Service
National Wildlife Refuge System
Research and Monitoring Special Use
Application and Permit

OMB Control Number 1018-0102
Expiration Date: 06/30/2014

Name of Refuge Arctic NWR
Address 101 12th Ave, Room 236, Fairbanks ,AK 99701
Attn: (Refuge Official) Alan Brackney
Phone # 907-456-0450 E-mail alan_brackney@fws.gov

Application

(To be filled out by applicant. Note: Not all information is required for each use. See instructions at the end of the notice for specific information required.)

1) New Renewal Modification Other _____

Applicant Information

2) Principal Investigator: Greg Walker 3) Is curriculum vitae or resume attached?
 Yes No N/A
4) Address: P.O. Box 757320 University of Alaska 5) City/State/Zip: Fairbanks, AK 99775
6) Phone #: 907-455-2110 7) Fax #: 907-455-2120 8) E-mail: krich@gi.alaska.edu
9a) Affiliation/organization: Poker Flat Research Range, Geophysical Institute, UAF
9b) Relationship to affiliation/organization: (professor, staff, student, etc.) staff
10) Assistants/subcontractors/subpermittees: (List full names, addresses and phone #'s and specifically describe services provided if subcontractors are used.)

Project Information

(Depending on the project for which you are requesting a permit, we may ask you for the following project information. Please contact the specific refuge where the project is being conducted to determine what project information is required.)

11) Title: NASA Sounding Rocket Program

12a) Is full research proposal required? Yes No 12b) Is full research proposal attached? Yes No

13) Describe activity: (Specifically identify timing, frequency, and how the project is expected to proceed.)

Permit to impact lands within Arctic NWR with expended rocket motor (one), and payload (one), and entry onto Arctic NWR lands for purposes of recovery spent rocket stages

See Attached

14) Location: (Identify specific location; GPS location preferred)

SW of Arctic Village and NW of Venetie

15a) Is map of location(s) required? Yes No N/A 15b) Is map of location(s) attached? Yes No

16) Project/site occupancy timeline: (Specifically identify beginning and ending dates, site occupation timeline, hours, clean-up and other major events.)

Launch window is projected to be between February 13, 2012 and March 5, 2012. Recovery operations will occur shortly after launch to locate spent stages. Recovery itself may not occur until later in the spring and will be coordinated with refuge personnel prior to entry onto Arctic NWR lands.

See Attached

FWS Form 3-1383-R
03/11

OBS Control Number 1018-0102
Expiration Date 05/30/2014

17) Species or habitats being studied:
NQ

18) Purpose/hypothesis:
NA

19) Expected benefits of research/monitoring:
Upper atmospheric and auroral research which has impacts on communications and global warming concerns

20) Briefly describe project history and context of research/monitoring project:
REsearch has been ongoing since March of 1969

21) Briefly describe project's relationship to other research/monitoring projects either known of or conducted by the applicant:
NA

22) Identify the types of samples to be taken or data to be collected during the proposed project:
None

23) List other cooperators and institutions involved in the project:
Dartmouth University, University of new Hampshire, NASA Sounding Rocket Program Office, NASA Science Mission Directorate

24) Generally identify the anticipated timeline for analysis, write-up and publication:
Unknown

25) For research involving animals, has an Assurance of Animal Care Form, Institutional Animal Care and Use Committee approval (or equivalent) been completed? Yes No N/A

Is form attached?
 Yes No

FWS Form 3-1383-R
03/11

OMB Control Number 1018-0102
Expiration Date: 06/30/2014

Certifications/Permits

26a) Is rat free certification required?

Yes No N/A

Copy of certification provided:

Yes No

26b) Is hull inspection certification required?

Yes No N/A

Copy of certification provided:

Yes No

26c) Is EMT/first aid certification required?

Yes No N/A

Copy of certification provided:

Yes No

26d) Are other certifications required?

Yes No N/A

Copy of certification provided:

Yes No

27a) Are State permits required?

Yes No N/A

Copy of permits provided:

Yes No

27b) Are Federal permits required?

Yes No N/A

Copy of permits provided:

Yes No

27c) Are tribal permits required?

Yes No N/A

Copy of permits provided:

Yes No

27d) Are other permits required?

Yes No N/A

Copy of permits provided:

Yes No

Logistics and Transportation

28a) Does activity require personnel to stay overnight onsite?

Yes No

28b) Personnel involved:

3-5 for one day during recovery

29) Specifically describe all equipment/gear and materials used:

None

30a) Dates of installation of instrumentation:

na

30b) Dates of instrumentation removal:

na

30c) If instrumentation is permanent, describe need:

na

30d) Instrumentation maintenance schedule:

na

30e) Data collection schedule:

na

FWS Form 3-1383-R
03/11

OMB Control Number 1018-0102
Expiration Date: 06/30/2014

31) Logistical arrangements for offsite transportation of samples:
na

32a) Transportation description(s) and license number(s) to access refuge(s): (Provide description of and specific auto license/boat/plane registration number(s).)
na

32b) Specifically describe ship-to-shore transportation:
na

32c) Specifically describe interstate transportation:
na

32d) Specifically describe onsite transportation:
Entry onto refuge lands for recovery will be via helicopter and will be coordinated with the refuge prior to entry

33a) Is fuel cache needed?
 Yes No

33b) Specific location(s) of fuel caches: (GPS Coordinates preferred)

34a) Is Safety Plan required?
 Yes No

34b) Safety Plan attached:
 Yes No

Work and Living Accommodations

35) Specifically describe onsite work and/or living accommodations, including spike camps:
na

36) Specifically describe on or offsite hazardous material storage or other on or offsite material storage space (including on and offsite fuel caches):
na

37) Signature of Applicant Robert P. McCoy Date of Application: 1/13/12

Sign, date, and print this form and return it to the refuge for processing.
Do not fill out information below this page.

PRINT FORM

FWS Form 3-1383-R
03/11

OMB Control Number 1018-0102
Expiration Date: 06/30/2014

For Official Use Only (This section to be filled out by refuge personnel only.)

Special Use Permit

2012-S1
Permit #: _____

1) Date: 2/10/2012 - 10/30/2012 2) Permit Approved Permit Denied 3) Station #: 75600

4) Additional special conditions required: (Special conditions may include activity reports, before and after photographs, and other conditions.)

Additional sheets attached:

Yes No N/A

Yes No

5) Other licenses/permits required:

Verification of other licenses/permits, type:

Yes No N/A

6) Minimum requirements analysis has been conducted:

Assessment attached:

Yes No N/A

Yes No

7) Assurance of Animal Care Form or Institutional Animal Approval form attached:

Approval form attached:

Yes No N/A

Yes No

8) Record of Payments: Exempt Partial Full

Amount of payment: _____ Record of partial payment: _____

9) Bond Paid: Yes No N/A

This permit is issued by the U.S. Fish and Wildlife Service and accepted by the applicant signed below, subject to the terms, covenants, obligations, and reservations, expressed or implied herein, and to the notice, conditions, and requirements included or attached. A copy of this permit should be kept on hand so that it may be shown at any time to any refuge staff.

Permit approved and issued by (Signature and title):

 Date: 02-8-12

Permit accepted by (Signature of applicant):

 Date: 2.7.12

Kit Duke, AVP Facilities & Land Management
UNIVERSITY OF ALASKA

FWS Form 3-1383-R
03/11

Notice

In accordance with the Privacy Act (5 U.S.C. 552a) and the Paperwork Reduction Act (44 U.S.C. 3501), please note the following information:

1. The issuance of a permit and collection of fees on lands of the National Wildlife Refuge System are authorized by the National Wildlife Refuge System Administration Act (16 U.S.C. 668dd-ee) as amended, and the Refuge Recreation Act (16 U.S.C. 460k-460k-4).
2. The information that you provide is voluntary; however submission of requested information is required to evaluate the qualifications, determine eligibility, and document permit applicants under the above Acts. It is our policy not to use your name for any other purpose. The information is maintained in accordance with the Privacy Act. All information you provide will be considered in reviewing this application. False, fictitious, or fraudulent statements or representations made in the application may be grounds for revocation of the Special Use Permit and may be punishable by fine or imprisonment (18 U.S.C. 1001). Failure to provide all required information is sufficient cause for the U.S. Fish and Wildlife Service to deny a permit.
3. No Members of Congress or Resident Commissioner shall participate in any part of this contract or to any benefit that may arise from it, but this provision shall not pertain to this contract if made with a corporation for its general benefit.
4. The Permittee agrees to be bound by the equal opportunity "nondiscrimination in employment" clause of Executive Order 11246.
5. Routine use disclosures may also be made: (a) to the U.S. Department of Justice when related to litigation or anticipated litigation; (b) of information indicating a violation or potential violation of a statute, rule, order, or license to appropriate Federal, State, local or foreign agencies responsible for investigating or prosecuting the violation or for enforcing or implementing the statute, rule, regulations, order, or license; (c) from the record of the individual in response to an inquiry from a Congressional office made at the request of the individual (42 FR 19063; April 11, 1977); and (d) to provide addresses obtained from the Internal Revenue Service to debt collection agencies for purposes of locating a debtor to collect or compromise a Federal Claim against the debtor, or to consumer reporting agencies to prepare a commercial credit report for use by the Department (48 FR 54716; December 6, 1983).
6. An agency may not conduct or sponsor and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. This information collection has been approved by OMB and assigned control number 1018-0102. The public reporting burden for this information collection varies based on the specific refuge use being requested. The relevant public reporting burden for the Research and Monitoring Special Use Permit Application form is estimated to average 4 hours per response, including time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Comments on this form should be mailed to the Information Collection Clearance Officer, U.S. Fish and Wildlife Service, 4401 N. Fairfax Drive, MS 2042-PDM, Arlington, Virginia, 22203.

General Conditions and Requirements

1. **Responsibility of Permittee:** The permittee, by operating on the premises, shall be considered to have accepted these premises with all facilities, fixtures, or improvements in their existing condition as of the date of this permit. At the end of the period specified or upon earlier termination, the permittee shall give up the premises in as good order and condition as when received except for reasonable wear, tear, or damage occurring without fault or negligence. The permittee will fully repay the Service for any and all damage directly or indirectly resulting from negligence or failure on his/her part, and/or the part of anyone of his/her associates, to use reasonable care.
2. **Operating Rules and Laws:** The permittee shall keep the premises in a neat and orderly condition at all times, and shall comply with all municipal, county, and State laws applicable to the operations under the permit as well as all Federal laws, rules, and regulations governing national wildlife refuges and the area described in this permit. The permittee shall comply with all instructions applicable to this permit issued by the refuge official in charge. The permittee shall take all reasonable precautions to prevent the escape of fires and to suppress fires and shall render all reasonable assistance in the suppression of refuge fires.
3. **Use Limitations:** The permittee's use of the described premises is limited to the purposes herein specified and does not, unless provided for in this permit, allow him/her to restrict other authorized entry onto his/her area; and permits the Service to carry on whatever activities are necessary for: (1) protection and maintenance of the premises and adjacent lands administered by the Service; and (2) the management of wildlife and fish using the premises and other Service lands.
4. **Transfer of Privileges:** This permit is not transferable, and no privileges herein mentioned may be sublet or made available to any person or interest not mentioned in this permit. No interest hereunder may accrue through lien or be transferred to a third party without the approval of the Regional Director of the Service and the permit shall not be used for speculative purposes.
5. **Compliance:** The Service's failure to require strict compliance with any of this permit's terms, conditions, and requirements shall not constitute a waiver or be considered as a giving up of the Service's right to thereafter enforce any of the permit's terms or conditions.
6. **Conditions of Permit not Fulfilled:** If the permittee fails to fulfill any of the conditions and requirements set forth herein, all money paid under this permit shall be retained by the Government to be used to satisfy as much of the permittee's obligation as possible.
7. **Payments:** All payment shall be made on or before the due date to the local representative of the Service by a postal money order or check made payable to the U.S. Fish and Wildlife Service.
8. **Termination Policy:** At the termination of this permit the permittee shall immediately give up possession to the Service representative, reserving, however, the rights specified in paragraph 11. If he/she fails to do so, he/she will pay the government, as liquidated damages, an amount double the rate specified in this permit for the entire time possession is withheld. Upon yielding possession, the permittee will still be allowed to reenter as needed to remove his/her property as stated in paragraph 11. The acceptance of any fee for the liquidated damages or any other act of administration relating to the continued tenancy is not to be considered as an affirmation of the permittee's action nor shall it operate as a waiver of the Government's right to terminate or cancel the permit for the breach of any specified condition or requirement.
9. **Revocation Policy:** This permit may be revoked by the Regional Director of the Service without notice for noncompliance with the terms hereof or for violation of general and/or specific laws or regulations governing national wildlife refuges or for nonuse. It is at all times subject to discretionary revocation by the Director of the Service. Upon such revocation the Service, by and through any authorized representative, may take possession of the said premises for its own and sole use, and/or may enter and possess the premises as the agent of the permittee and for his/her account.

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10. Damages: The United States shall not be responsible for any loss or damage to property including, but not limited to, growing crops, animals, and machinery or injury to the permittee or his/her relatives, or to the officers, agents, employees, or any other who are on the premises from instructions or by the sufferance of wildlife or employees or representatives of the Government carrying out their official responsibilities. The permittee agrees to save the United States or any of its agencies harmless from any and all claims for damages or losses that may arise to be incident to the flooding of the premises resulting from any associated Government river and harbor, flood control, reclamation, or Tennessee Valley Authority activity.

11. Removal of Permittee's Property: Upon the expiration or termination of this permit, if all rental charges and/or damage claims due to the Government have been paid, the permittee may, within a reasonable period as stated in the permit or as determined by the refuge official in charge, but not to exceed 60 days, remove all structures, machinery, and/or equipment, etc. from the premises for which he/she is responsible. Within this period the permittee must also remove any other of his/her property including his/her acknowledged share of products or crops grown, cut, harvested, stored, or stacked on the premises. Upon failure to remove any of the above items within the aforesaid period, they shall become the property of the United States.

12. Collected Specimens: You may use specimens collected under this permit, any components of any specimens (including natural organisms, enzymes, genetic materials or seeds), and research results derived from collected specimens for scientific or educational purposes only, and not for commercial purposes unless you have entered into a Cooperative Research and Development Agreement (CRADA) with us. We prohibit the sale of collected research specimens or other transfers to third parties. Breach of any of the terms of this permit will be grounds for revocation of this permit and denial of future permits. Furthermore, if you sell or otherwise transfer collected specimens of any components without a CRADA, you will pay us a royalty rate of 20 percent of the gross revenue from such sales. In addition to such royalty, we may seek other damages and injunctive relief against you.

Instructions for Completing Application

You may complete the application portion verbally, in person or electronically and submit to the refuge for review. Note: Please read instructions carefully as not all information is required for each activity. Contact the specific refuge where the activity will take place if you have questions regarding the applicability of a particular item. Special conditions or permit stipulations may be added to permit prior to approval.

1. Identify if application is for a new permit or renewal or modification of an existing permit. Permit renewals may not need all information requested. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.

2-3. Provide principal investigator's or applicant's full name. Attach principal investigator's Curriculum Vitae or Resume, if required. Permit renewals generally do not require a Curriculum Vitae or Resume if the project is a continuation of a previously issued permit being conducted by the same investigator. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.

4-9. Provide investigator's address, phone, fax, e-mail, affiliation and or organization, and relationship to affiliation or organization (title, professor, student, etc.).

10. Provide the names and addresses of assistants, subcontractors or subpermittees. Names and address are only required if the assistants, subcontractors or subpermittees will be operating on the refuge without the permittee being present. Volunteers, assistants, subcontractors or subpermittees that are accompanied by the permittee need not be identified.

11. Provide title of research or monitoring project.

12a-12b. Attach a full research or monitoring proposal, if required. Permit renewals generally do not require a project proposal if the project is a continuation of a previously issued permit being conducted by the same investigator. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.

13. Describe Activity: provide detailed information on the activity, including timing, frequency, how the project is expected to proceed, etc. Permit renewals may not need activity description, if the activity is unchanged from previous permit. Most repetitive research projects do not require an activity description for each visit to the refuge. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.

14. Location: Identify specific location (GPS coordinates preferred), if not a named facility. Permit renewals may not require a location if the project is essentially unchanged from the previous permit. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.

15a-15b. Attach a map of location, if required and project is not conducted at a named facility. Permit renewals may not require a map if the project is essentially unchanged from the previous permit. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.

16. Activity/site occupancy timeline: Identify beginning and ending dates, site occupation timeline, hours, clean-up and other major events. Permit renewals may not need an activity/site occupancy timeline, if the activity is unchanged from previous permit. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.

17. Identify species or habitats being studied.

18-19. Specifically identify purpose or hypothesis of the research or monitoring project and describe expected benefits. Permit renewals may not need to identify purpose or hypothesis, if the project is a continuation of a previously issued permit being conducted by the same investigator. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.

20. Briefly describe project history and context. Permit renewals should describe previous research activities as part of a previously issued permit being conducted by the same investigator. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.

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21. Briefly describe project's relationship to other research/monitoring projects either known of or conducted by the applicant, if applicable. Include a brief statement of how the research or monitoring permit being applied for will add to or supplement other ongoing research or monitoring on the same, or related, species or habitats. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.

22. Identify samples to be taken or types of data to be collected. Permit renewals may not need to identify samples taken if the project is a continuation of a previously issued permit being conducted by the same investigator. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.

23. List other cooperators and institutions involved in the project, if applicable. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.

24. Generally, identify the anticipated time line for analysis, write-up and publication of project results. Include whether the project is a single, or multiple year project. Identification of an actual publication where the results are printed is not necessary. However, applicants should include the anticipated dissemination of project results. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.

25. Check box acknowledging a completed Assurance of Animal Care Form or an Institutional Animal Care and Use Committee (or equivalent) has granted approval been completed, and has been submitted to refuge station, if required. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.

26a-26c. Specifically identify types and numbers of other certifications, if required. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement, and to coordinate the simultaneous application of several types of certifications. This Special Use Permit may be processed while other certifications are being obtained.

27a-27d. Specifically identify types and numbers of other State, Federal or tribal permits, if required. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement, and to coordinate the simultaneous application of several types of State, Federal or tribal permits. This Special Use Permit may be processed while other State, Federal or tribal permits are being obtained.

28a-28b. Provide name(s) of any personnel required to stay overnight, if applicable.

29. Identify all equipment and materials, which will be used, if required. Permit renewals may not require a list of equipment if the project is essentially unchanged from a previously issued permit. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.

30a-30e. Identify types and dates of installation of any instrumentation, and data collection and maintenance schedule of instrumentation, if required. Permit renewals may not require a list of equipment if the project is essentially unchanged from a previously issued permit. However, dates of installation of any instrumentation, and data collection and maintenance schedule of instrumentation may still be required. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.

31. Identify logistic arrangements for offsite transportation of samples taken, if applicable.

32a-32d. Describe and provide vehicle descriptions and license plate or identification numbers of all vehicles, including boats and airplanes, if required. Motor vehicle descriptions are only required for permittee vehicle, and/or if the vehicle will be operated on the refuge without the permittee being present. Motor vehicles that are accompanied by the permittee as part of a group (convoy) activity need not be identified if cleared in advance by refuge supervisor. Specifically describe ship-to-shore, intersite (between islands, camps, or other sites) and onsite transportation mechanisms, and license plate or identification numbers, if required.

33a-33b. Identify specific location(s) of fuel cache(s) (GPS coordinates preferred), if required.

34a-34b. Attach safety plan, if required. Contact the specific refuge headquarters office where the project is going to be conducted to determine if a safety plan is required.

35. Specifically describe onsite work and/or living accommodations, if required. Include descriptions and locations (GPS coordinates preferred) of spike camps or other remote work and/or living accommodations that are not part of the base of operations. Contact the specific refuge headquarters office where the project is going to be conducted to determine if descriptions of onsite work and/or living accommodations are required.

36. Specifically describe onsite and offsite hazardous material storage, or other onsite material storage space (including on and offsite fuel caches), if required. Contact the specific refuge headquarters office where the project is going to be conducted to determine if descriptions of hazardous material storage or other onsite material storage are required.

37 Sign, date and print the application. Click on the Print button to print the application (if using the fillable version). The refuge official will review and, if approved, fill out the remaining information, sign, and return a copy to you for signature and acceptance.

The form is not valid as a permit unless it includes refuge approval, a station number, a refuge-assigned permit number, and is signed by a refuge official.

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Attachment

#13 Describe Activity.

Permit to impact lands within Arctic NWR with expended rocket motor (one), and payload (one), and entry onto Arctic NWR lands for purposes of recovery of spent stages

#16 Project Timeline

Launch window is projected to be between February 13, 2012 and March 5, 2012. Recover operations will occur shortly after launch to locate spent stages. Recovery itself may not occur until later in the spring and will be coordinated with refuge personnel prior to entry onto Arctic NWR lands.

#23 Cooperating Agencies

Dartmouth University, University of New Hampshire, NASA Sounding Rocket Program, NASA Science Mission Directorate

#32d Onsite Transportation

Entry onto refuge lands for recovery will be via helicopter and will be coordinated with the refuge prior to entry

Arctic National Wildlife Refuge
Special Conditions
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1. Failure to abide by any part of this special use permit; violation of any refuge related provision in Titles 43 (Part 36) or 50 Code of Federal Regulations (sub-chapters B and C); or violation of any pertinent state regulation (e.g., fish or game) will, with due process, be considered grounds for immediate revocation of this permit and could result in denial of future permit requests for lands administered by the U.S. Fish and Wildlife Service. This provision applies to all persons working under the authority of this permit. Appeals of decisions relative to permits are handled in accordance with 50 Code of Federal Regulations 36.41.
2. The permittee is responsible for ensuring that all employees, party members, aircraft pilots and other persons working for the permittee and conducting activities allowed by this permit are familiar with and adhere to the conditions of this permit.
3. Any problems with wildlife and/or animals taken in defense of life or property must be reported immediately to the refuge manager and Alaska Department of Fish and Game, and be salvaged in accordance with state regulations.
4. This permit does not grant the permittee and his/her clients exclusive use of the site(s) or lands covered by the permit.
5. This permit may be canceled or revised at any time by the refuge manager due to high fire danger, flooding, unusual resource problems, or other significant problems or emergencies.
6. The permittee or his/her designee shall notify the refuge manager during refuge working hours in person or by telephone before beginning and upon completing activities allowed by this permit.
7. Prior to beginning activities allowed by this permit, the permittee shall provide the refuge manager with: (1) the name and method of contact for the field party chief/supervisor; (2) the aircraft and other vehicle types to be used, including identification information; (3) names of assistants and helpers; and (4) any changes to information provided in the original permit application.
8. In accordance with the Archaeological Resources Protection Act (16 U.S.C. 470aa), the removal, excavation, disturbance, collection, or purchase of historical, recent, ethnological, or archaeological specimens or artifacts is prohibited.
9. The permittee will not make launches with a planned impact site within the Mollie Beattie Wilderness area. The use of helicopters outside the wilderness area is authorized provided that:
 - (a) Landing is prohibited except for the direct support of the activity covered by this permit and emergencies. No recreational use of helicopters is permitted.

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Date: 7/12

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- (b) Clearing of vegetation for landing/takeoff is prohibited. Incidental hand removal of rocks and other minor obstructions may be permitted.
 - (c) Activities are restricted to day use only. No overnight stays are anticipated.
 - (d) Personnel transported are restricted to only those necessary to conduct the debris recovery. Recreational use is not permitted.
 - (e) Low level slinging of gear from site to site is prohibited.
10. The use of off-road vehicles (except snow machines) is prohibited.
 11. The operation of aircraft at altitudes and in flight paths resulting in the herding, harassment, hazing, or driving of wildlife is prohibited. It is requested that all aircraft maintain a minimum altitude of 2000 feet above ground level, except during take-off, landing, and when safety considerations require a lower altitude.
 12. Fuel caches are allowed only in designated areas, must be identified on a US Geological Survey map (or map photocopy), and submitted in writing for approval by the refuge manager before they are established. Storage will meet standards of USFWS, Alaska Region, Fuel Storage Policy.
 13. Any action by a permittee or the permittee's employees that unduly interferes with or harasses refuge visitors or impedes access to any site is strictly prohibited. Examples of prohibited acts include, but are not limited to: 1) parking aircraft or placing other objects (rocks, tents, etc.) on any area so as to restrict use by other aircraft; 2) otherwise intentionally interfering in the activity of other refuge users; and 3) engaging in activity that is contrary to state and federal laws.
 14. The permit is for refuge lands only. This permit does not authorize use of private lands such as land owned by ANCSA Native corporations, individuals, or the State of Alaska.
 15. The permittee will take no action that interferes with subsistence activities of rural users or restricts the reasonable access of subsistence users to refuge lands. This may include, but is not limited to, disturbance of wildlife and their movements near subsistence hunters, and damage to cabins, trails, traditional campsites or caches used by subsistence users.
 16. All rocket launches will be well publicized in advance to forewarn travelers and residents of the area involved. A minimum of two weeks notice of rocket launch dates and impact zones will be provided in writing to the refuge manager.
 17. The permittee will insure that a transponder or other radio location aid is incorporated with each payload to facilitate tracking and recovery after launch.

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18. The permittee will maintain a viable rocket component recovery program to track, locate, and remove rocket debris at least once every two years. All determinations to remove or not remove debris will be made by the refuge manager. The refuge manager will be informed of locations (GPS coordinates in decimal degrees) of impact sites, un-recovered rockets and/or payloads, schedule for removal, actual activities to locate (see special condition #19) and remove rocket debris, and any potential hazards that may thereby be created. This information should be a 1-2 page summary with map submitted within 30-days of the permit expiration.
19. An annual trip report of activities on the refuge shall be provided to the Refuge Manager within 30-days of the permit expiration (normally 1-2 pages). In addition to potential impact sites within the refuge, an annual report must include a detailed summary of surveillance flights to locate and recover payload debris. Specific information of surveillance flights must include:
 - (a) type of aircraft used (helicopter or fixed-wing),
 - (b) aircraft model
 - (c) operator company or ownership,
 - (d) Special Use Permit number of operator
 - (e) date and time of surveillance flights,
 - (f) number of hours flown,
 - (g) map showing flight lines,
 - (h) landing locations with GPS coordinates in decimal degrees.
 - (i) and date and time of each landing.
20. Paragraph No. 10. Damages, under “General Conditions and Requirements” does not apply to this Permit. The following replaces it:

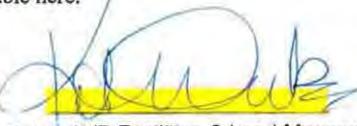
Damages and Indemnity: The United States shall not be responsible for any injuries to or death of the officers or employees of it or its agents or contractors, or for the loss or damage to the property of the permittee, its officers, employees, agents, or contractors, arising out of the activities authorized under this permit. The permittee shall defend, indemnify and hold the United States harmless from any and all claims, demands, losses liabilities and judgments, including costs and expenses, which may be suffered by, accrued against, be charged to, or recoverable from the United States by reason of injuries to or death of persons and damage to or losses to property arising out of the launch, impact, and recovery of permittee’s rockets.
21. The permittee will be responsible for reporting any fires arising from these activities and will immediately notify the Alaska Fire Service and the Fish and Wildlife Service.
22. Rocket or debris impacts within the refuge are prohibited from 1 May through 30 September to avoid periods of high public use. However, exceptions to this prohibition may be authorized for specific time periods and areas. Requests for impact use during this

Initials: 
Date: 9/1/12

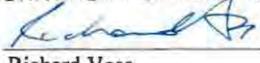
Arctic National Wildlife Refuge
Special Conditions
Permit 2012 – S1, University of Alaska - Duke

period must be received by the refuge manager forty-five days before intended use. (A launch schedule is not considered a request.) Exception requests must include a complete project description, a statement affirming that the proposed dates are essential, the alternatives considered an analysis of the increased risk incurred and a justification for this risk.

23. Recovery of rockets that enter the wilderness area inadvertently may be authorized on a case by case basis. If debris is located in the wilderness area a permittee must inform the manager who will consider the appropriate action under provisions of the Wilderness Act of 1964. Changes in the launch program that elevate the probability of impact into the wilderness area may require a new compatibility determination before a permit request can be considered.
24. Activities may not occur in some special use areas and/or during some time periods (e.g., caribou calving, snow goose staging, Sadlerochit Springs). Prior to specific recovery operations the permittee shall consult with the Refuge Manager to gain approval. Special area boundaries or the effective dates may be modified by the refuge manager as needed. Specific authorization to use localities within special areas may sometimes be obtained on a case-by-case basis, depending on the location of animal concentrations, access route, proposed activity, etc.
25. Occupied raptor nest sites may occur within your intended work area. Unless explicitly exempted, all activities including helicopter flights are prohibited within one-half mile of occupied nest sites during the following periods: (1) north of the continental divide, March 15 – August 15; and (2) south of the continental divide, April 15 – August 15. Sites may be approached on foot or by boat to determine if an occupied nest is located at the site.
26. The preeminent value of the Arctic Refuge lies in its unsurpassed wilderness condition. The permittee shall ensure that all employees and clients seek to minimize the effect of their activities on the wilderness character of the land, wildlife, and the unique experience available here.

Permittee: 
Kit Duke, AVP Facilities & Land Management
UNIVERSITY OF ALASKA

Date: 2-7-12

Issuing Officer: 
Richard Voss
Refuge Manager

Date: 2-8-12

COMPATIBILITY DETERMINATION

Use: Rocket & Payload Impact and Recovery

Refuge Name: Arctic National Wildlife Refuge, Fairbanks, Alaska

Establishing and Acquisition Authority

December 6, 1960 (Arctic National Wildlife Range). Name changed to Arctic National Wildlife Refuge and expanded on December 2, 1980. Establishing and Acquisition Authorities: The Arctic National Wildlife Range was established by Public Land Order 2214, December 6, 1960. Arctic National Wildlife Refuge (Arctic Refuge), incorporating the Wildlife Range, was established by Public Law 96-487; the Alaska National Interest Lands Conservation Act (ANILCA), December 2, 1980. Public Law 100-395 (1988) added 325,000 acres to Arctic Refuge.

Refuge Purpose(s)

In 1960 Public Land Order 2214 established the Arctic National Wildlife Range "For the purpose of preserving unique wildlife, wilderness and recreational values. . ." These purposes, to the extent they are consistent with the purposes established by ANILCA, apply to that portion of the refuge that was originally the Arctic National Wildlife Range (about 8.9 million acres, 8 million acres of which was designated wilderness by ANILCA).

In 1980, additional purposes for which Arctic Refuge, in its entirety, were established for management. As set forth in Section 303(2)(B) of ANILCA, they are:

(i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Porcupine caribou herd (including participation in coordinated ecological studies and management of this herd and the Western Arctic caribou herd), polar bears, grizzly bears, muskox, Dall sheep, wolves, wolverines, snow geese, peregrine falcons and other migratory birds, and Arctic char and grayling;

(ii) to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats;

(iii) to provide, in a manner consistent with purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and

(iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in subparagraph (i), water quality and necessary water quantity within the refuge.

[Supplemental Purposes of the Ivishak, upper Sheenjek, and Wind rivers as Wild River] Section 602 of the ANILCA designated the upper Sheenjek, and Wind rivers as Wild Rivers.

Accordingly the Arctic NWR CCP, Section 605 of Pub. L. 96-487, the Wild and Scenic Rivers Act (16 U.S.C. 1274(a)) require that those rivers will be managed under objectives that will “protect and maintain the physical and biological qualities of the drainage and adjacent refuge lands, including water quality and quantity.

The provisions of the Wilderness Act of 1964 apply to the 8 million acres designated as Wilderness by ANILCA with applicable exceptions provided by ANILCA. Accordingly the wilderness area is managed to preserve the intent of the Wilderness Act. Intent of the Wilderness Act is described in the definitions, include:

“A wilderness . . . is hereby recognized as an area where the earth and its community of life are untrammelled by man where man himself is a visitor who does not remain. . . protected and managed so as to preserve its natural conditions and which (1) generally appear to have been affected primarily by the forces of nature, with the imprint of mans work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservations and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific educational, scenic, or historical value.”

Wilderness Act section 4(b) includes further mandates to preservation of the wilderness character:

“... each agency administering wilderness shall be responsible for preserving wilderness character of the area and shall so administer such area for such other purposes for which it may have been established as also to preserve its wilderness character. Except as otherwise provided in this Act, wilderness areas shall be devoted to the public purposes of recreational, scenic, scientific, educational, conservation, and historic values.”

National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System is “to administer a national network of lands and waters for the conservation, management, and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans” (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee]).

Description of Use(s)

This compatibility determination re-evaluates the use of federal lands within Arctic NWR as a program component of Poker Flat Research Range that supports research programs from across the country in the study of northern atmospheric phenomenon and climate change. In 1994, the refuge found these activities compatible with refuge purposes. The refuge provides an impact zone for research rockets and payloads. This research requires associated landings of helicopters to retrieve scientific payloads and rocket debris. The University of Alaska Fairbanks – Geophysical Institute’s Poker Flat Research Range has been conducting auroral and middle to upper atmospheric research in Alaska for over ten years, including use of lands within the refuge and annual efforts to remove debris.

From four to ten sounding rockets are launched from the Poker Flat Research Range each year. The range is located approximately 150 miles south of the refuge, and about thirty miles north of Fairbanks, Alaska. The sounding rockets are single, two, three, or four-stage solid fuel rockets. The rockets carry instrumented payloads into the earth’s upper atmosphere to make direct measurements of the aurora borealis, ozone, solar protons, electric and magnetic fields, ultraviolet and other atmospheric phenomena unique to high latitudes.

The first stage of the rocket propels it to about 20,000 feet, separates from the remaining stages and payload, and falls back to earth about two miles from the launch site at Poker Flat. The second stage and payload follow the flight trajectory to typical altitudes of 50 to 300 miles and land 50 to 225 miles from the launch site. On the occasion when a three-stage rocket is utilized, both the rocket and payload over fly Alaska and land in international waters to the north. Most landing in the Arctic NWR occur in Flight Zones 2,3, and 4 (See attached map). Only one known landing has been documented in the designated wilderness.

It is the second stages and payloads that occasionally impact on the Arctic NWR. Managers planning rocket operations intentionally avoid impacts and landings in designated wilderness of Arctic NWR. The refuge is but one of several federal, state and private land managers that authorize the use of a combined twenty-five million acres of land for rocket and payload impact and recovery. The dimensions of the empty rocket and payload are approximately fifteen to twenty feet long, thirty inches in diameter and weigh a few hundred pounds. Most payloads launched on sounding rockets from Poker Flat are recovery payloads that contain locator beacons and descend slowly to earth by an orange and white parachute. They are tracked via radar, and recovered with a helicopter. When they are recovered, any disturbance to the landscape is repaired as much as feasible. All rockets launched from Poker Flat are unguided after launch. The Poker Flat managers use a risk assessment prepared by the National Aeronautics and Space Administration that takes into account wind speed, direction of flight and type of rocket to determine launch elevation and flight azimuth, and impact point to reduce risk to life and property to an absolute minimum. For a given year operations managers provide a detailed list of potential launch vehicle, launch windows, and potential impact zones for each launch (see attached map).

Any deviation from this description will require a separate compatibility determination.

Availability of Resources

Adequate refuge personnel and base operational funds are available to manage research activities at existing (approximately two requests to retrieve components are made annually) and projected levels. Administrative staff time (not more than five days) primarily involves phone conversations, written correspondence, proposal review, permit issuance and personal interaction with researchers. Field work associated with administering the program primarily involves monitoring researchers' compliance with the terms of the permit.

Anticipated Impacts of the Use(s)

Factors such as impact area(s), number of rockets or payloads, number of aircraft and anticipated amount of aircraft use will determine the extent of impacts on the refuge. Past impacts from this use have resulted in minor damage to vegetation, which is repaired as much as practical, and a few hours of helicopter flight time and landings to retrieve rocket payloads and debris, and perform site remediation.

At current levels, rocket and payload impact and recovery and associated activities should not have significant impacts on the wildlife resources, other refuge resources (e.g., water quality, soil, and vegetation), and other refuge users, especially subsistence users, due to the limited scope and complete administrative oversight of this research. Winter conditions (frozen soil) limit impact and landing damage.

Public Review and Comment

Public involvement for this document includes a public notice in the Fairbanks Daily News Miner newspaper and a thirty-day public comment period. This draft compatibility determination is available for review on the US Fish and Wildlife Service – Alaska Region's compatibility determination Web site, <http://alaska.fws.gov/nwr/planning/index.htm>

Determination

Use is Not Compatible

Use is Compatible

Stipulations Necessary to Ensure Compatibility

Refuge staff will monitor all research being conducted on the refuge. Findings from these monitoring efforts will be used to determine what additional management actions, if any, are needed to ensure that research activities remain compatible with refuge purposes. Monitoring of all authorized research activities will be continued to ensure compliance with specific terms and conditions tailored for each research permit as well as with the following general conditions that are incorporated into all research permits to minimize impacts on refuge lands and resources.

- Failure to abide by any part of this special use permit; violation of any refuge related provision in Titles 43 (Part 36) or 50 Code of Federal Regulations (sub-chapters B and C); or violation of any pertinent state regulation (e.g., fish or game) will, with due process, be considered grounds for immediate revocation of this permit and could result in denial of future permit requests for lands administered by the U.S. Fish and Wildlife Service. This provision applies to all persons working under the authority of this permit. Appeals of decisions relative to permits are handled in accordance with 50 Code of Federal Regulations 36.41.
- The permittee is responsible for ensuring that all employees, party members, aircraft pilots and other persons working for the permittee and conducting activities allowed by this permit are familiar with and adhere to the conditions of this permit.
- Any problems with wildlife and/or animals taken in defense of life or property must be reported immediately to the refuge manager and Alaska Department of Fish and Game, and be salvaged in accordance with state regulations.
- This permit does not grant the permittee and his/her clients exclusive use of the site(s) or lands covered by the permit.
- This permit may be canceled or revised at any time by the refuge manager due to high fire danger, flooding, unusual resource problems, or other significant problems or emergencies.
- The permittee or his/her designee shall notify the refuge manager during refuge working hours in person or by telephone before beginning and upon completing activities allowed by this permit.
- Prior to beginning activities allowed by this permit, the permittee shall provide the refuge manager with: (1) the name and method of contact for the field party chief/supervisor; (2) the aircraft and other vehicle types to be used, including identification information; (3) names of assistants and helpers; and (4) any changes to information provided in the original permit application.
- In accordance with the Archaeological Resources Protection Act (16 U.S.C. 470aa), the removal, excavation, disturbance, collection, or purchase of historical, recent, ethnological, or archaeological specimens or artifacts is prohibited.
- The permittee will not make launches with a planned impact site within the Mollie Beattie Wilderness area. The use of helicopters outside the wilderness area is authorized provided that:
 - (a) Landing is prohibited except for the direct support of the activity covered by this permit and emergencies. No recreational use of helicopters is permitted.

- (b) Clearing of vegetation for landing/takeoff is prohibited. Incidental hand removal of rocks and other minor obstructions may be permitted.
 - (c) Activities are restricted to day use only. No overnight stays are anticipated.
 - (d) Personnel transported are restricted to only those necessary to conduct the debris recovery. Recreational use is not permitted.
 - (e) Low level slinging of gear from site to site is prohibited.
- The use of off-road vehicles (except snow machines) is prohibited.
 - The operation of aircraft at altitudes and in flight paths resulting in the herding, harassment, hazing, or driving of wildlife is prohibited. It is requested that all aircraft maintain a minimum altitude of 2000 feet above ground level, except during take-off, landing, and when safety considerations require a lower altitude.
 - Fuel caches are allowed only in designated areas, must be identified on a US Geological Survey map (or map photocopy), and submitted in writing for approval by the refuge manager before they are established. Storage will meet standards of USFWS, Alaska Region, Fuel Storage Policy.
 - Any action by a permittee or the permittee's employees that unduly interferes with or harasses refuge visitors or impedes access to any site is strictly prohibited. Examples of prohibited acts include, but are not limited to: 1) parking aircraft or placing other objects (rocks, tents, etc.) on any area so as to restrict use by other aircraft; 2) otherwise intentionally interfering in the activity of other refuge users; and 3) engaging in activity that is contrary to state and federal laws.
 - The permit is for refuge lands only. This permit does not authorize use of private lands such as land owned by ANCSA Native corporations, individuals, or the State of Alaska.
 - The permittee will take no action that interferes with subsistence activities of rural users or restricts the reasonable access of subsistence users to refuge lands. This may include, but is not limited to, disturbance of wildlife and their movements near subsistence hunters, and damage to cabins, trails, traditional campsites or caches used by subsistence users.
 - All rocket launches will be well publicized in advance to forewarn travelers and residents of the area involved. A minimum of two weeks notice of rocket launch dates and impact zones will be provided in writing to the refuge manager.

- The permittee will insure that a transponder or other radio location aid is incorporated with each payload to facilitate tracking and recovery after launch.
- The permittee will maintain a viable rocket component recovery program to track, locate, and remove rocket debris annually. The refuge manager will be informed of locations (latitude and longitude) of impact sites, un-recovered rockets and/or payloads, and any potential hazards that may thereby be created.
- The Fish and Wildlife Service will not be liable for any act or omission of the permittee (or its employees, hereinafter referred to jointly as “permittee”) in operation of permittee’s rockets during all phases of operation from launch through recovery. The permittee agrees to hold harmless the Fish and Wildlife Service against any and all claims for loss or liability by any party arising out of launch, impact, and recovery of permittee’s rockets, however caused.
- The permittee will be responsible for reporting any fires arising from these activities and will immediately notify the Alaska Fire Service and the Fish and Wildlife Service.
- Rocket or debris impacts within the refuge are prohibited from 1 May through 30 September to avoid periods of high public use. However, exceptions to this prohibition may be authorized for specific time periods and areas. Requests for impact use during this period must be received by the refuge manager forty-five days before intended use. (A launch schedule is not considered a request.) Exception requests must include a complete project description, a statement affirming that the proposed dates are essential, the alternatives considered an analysis of the increased risk incurred and a justification for this risk.
- Recovery of rockets that enter the wilderness area inadvertently may be authorized on a case by case basis. If debris is located in the wilderness area a permittee must inform the manager who will consider the appropriate action under provisions of the Wilderness Act of 1964. Changes in the launch program that elevate the probability of impact into the wilderness area may require a new compatibility determination before a permit request can be considered.
- Activities may not occur in some special use areas and/or during some time periods (e.g., caribou calving, snow goose staging, Sadlerochit Springs). Prior to specific recovery operations the permittee shall consult with the Refuge Manager to gain approval. Special area boundaries or the effective dates may be modified by the refuge manager as needed. Specific authorization to use localities within special areas may sometimes be obtained on a case-by-case basis, depending on the location of animal concentrations, access route, proposed activity, etc.
- Raptor species typically build nests along cliff and bluff faces, which are extensive throughout the Arctic Refuge. Active nest sites may be in your intended work area. Helicopter activity is prohibited within one-half mile of these active

raptor nest sites north of the continental divide during the period May 1 through August 31 and south of the continental divide from May 1 through August 15.

- The preeminent value of the Arctic Refuge lies in its unsurpassed wilderness condition. The permittee shall ensure that all employees and clients seek to minimize the effect of their activities on the wilderness character of the land, wildlife, and the unique experience available here.

Justification

The Service may permit the use of a refuge for investigatory scientific purposes when such use is compatible with the objectives for which the refuge is managed. Priority will be given to studies that contribute to the enhancement, protection, use, preservation and management of current, indigenous wildlife populations and their habitats in their natural diversity. All proposed research conducted by other agencies or entities will be thoroughly evaluated prior to authorization and then monitored closely to ensure the activities do not materially interfere with or detract from the purposes of the refuge or the mission of the National Wildlife Refuge System.

Scientific investigations of wildlife, resources, and visitor experiences will support the refuge's ability to provide for wildlife-dependent priority public uses and to meet other refuge purposes. These investigations must be conducted safely.

Given the recent international Arctic Climate Impact Assessment (2004) report, research into global warming has become of paramount importance to understanding and protecting Arctic ecosystems like Arctic National Wildlife Refuge. It is the policy of the Service (4 RM 6.1) to encourage and support research and management studies in order to provide scientific data upon which to base decisions regarding management of units of the refuge system.

Public notice of the draft compatibility determination was published by the Fairbanks Daily News-Miner on Friday December 10, 2004. The draft compatibility determination was posted on the publicly accessible bulletin board at Refuge Headquarters, and it was available at the U.S. Fish and Wildlife Service Region 7 website for viewing and downloading during the thirty day comment period. No public comments were received. The Service concludes this is further evidence that the decision that the use described is compatible with refuge purposes and is sufficient as written.

Mandatory 10-Year Re-Evaluation Date (provide month and year for allowed uses only): January 2014

Mandatory 15-Year Re-Evaluation Date (for priority public uses):

NEPA Compliance for Refuge Use Decision

- Categorical Exclusion without Environmental Action Memorandum
- Categorical Exclusions and Environmental Action Memorandum
- Environmental Assessment and Finding of No Significant Impact
- Environmental Impact Statement and Record of Decision

Supporting Documents

- Environmental Analysis for Poker Flat Research Range, Geophysical Institute, University of Alaska Fairbanks, November 1991.
- Arctic National Wildlife Refuge, Final Comprehensive Conservation plan, Environmental Impact Statement, Wilderness Review, Wild River Plan. Record of Decision Signed November 10, 1988.
- Compatibility Determination, Public Leases and Uses (Other): Atmospheric Rocket Research. Found compatible; signed 10 August 1994.
- ACIA, Arctic Climate Impact Assessments. 2004. Impact of a Warm Arctic. Cambridge University Press. Cambridge. UK.

Refuge Determination

Prepared by: Zeris Underwood 1/10/05
(Signature) (Date)

Refuge Manager /
Project Leader Approval: Gary D. Shuler 1/10/05
(Signature) (Date)

Concurrence

Refuge Supervisor: Mike Bonke (Acting) 1/13/05
(Signature) (Date)

Regional Chief,
National Wildlife
Refuge System: Richard W. Helms 1/13/05
(Signature) (Date)



U.S. Fish & Wildlife Service

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Public Notice of Compatibility for Arctic & Yukon Flats National Wildlife Refuge

REFUGE:	Arctic and Yukon Flats
TITLE:	Compatibility Determinations re-evaluating the special use permit granted the Poker Flat Research Range for rocket & payload impact and recovery on refuge lands.
DATE OF DETERMINATION:	January 13, 2005
SUPPORTING DOCUMENTS:	Public Notice (pdf)
	Compatability Determination prepared by the Arctic Refuge (pdf)
	Compatability Determination prepared by the Yukon Flats Refuge (pdf)

Last updated: September 2, 2008

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C.2

**UNITED STATES DEPARTMENT OF THE INTERIOR, U.S. FISH AND WILDLIFE
SERVICE, YUKON FLATS NATIONAL WILDLIFE REFUGE**

United States Department of the Interior
U.S. Fish and Wildlife Service
National Wildlife Refuge System
Research and Monitoring Special Use
Application and Permit

OMB Control Number 1018-0102
Expiration Date: 06/30/2014

Name of Refuge Yukon Flats NWR
Address 101 12th Ave, Fairbanks, AK 99701
Attn: (Refuge Official) Wennona Brown
Phone # 907-456-0408 E-mail wennona_brown@fws.g

Application

(To be filled out by applicant. Note: Not all information is required for each use. See instructions at the end of the notice for specific information required.)

1) New Renewal Modification Other _____

Applicant Information

2) Principal investigator: Greg Walker 3) Is curriculum vitae or resume attached?
 Yes No N/A
4) Address: P.O. Box 757320 University of Alaska 5) City/State/Zip: Fairbanks, AK 99775
6) Phone #: 907-455-2110 7) Fax #: 907-455-2120 8) E-mail: krich@gi.alaska.edu
9a) Affiliation/organization: Poker Flat Research Range, Geophysical Institute, UAF
9b) Relationship to affiliation/organization: (professor, staff, student, etc.) staff
10) Assistants/subcontractors/subpermittees: (List full names, addresses and phone #'s and specifically describe services provided if subcontractors are used.)

Project Information

(Depending on the project for which you are requesting a permit, we may ask you for the following project information. Please contact the specific refuge where the project is being conducted to determine what project information is required.)

11) Title: NASA Sounding Rocket Program
12a) Is full research proposal required? Yes No 12b) Is full research proposal attached? Yes No
13) Describe activity: (Specifically identify timing, frequency, and how the project is expected to proceed.)
Permit to impact lands within Yukon Flats NWR with expended rocket motor (one), and payload (one), and entry onto Yukon Flats NWR lands for purposes of recovery spent rocket stages
14) Location: (Identify specific location, GPS location preferred.)
SW of Arctic Village and NW of Venetia for impact. Yukon Flats lands are needed as a safety buffer as the dispersion circle with encompass part of Yukon Flats NWR lands.
15a) Is map of location(s) required? Yes No N/A 15b) Is map of location(s) attached? Yes No
16) Project/site occupancy timeline: (Specifically identify beginning and ending dates, site occupation timeline, hours, clean-up and other major events.)
Launch window is projected to be between February 13, 2012 and March 5, 2012. Recovery operations will occur shortly after launch to locate spent stages. Recovery itself may not occur until later in the spring and will be coordinated with refuge personnel prior to entry onto Arctic NWR lands.

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17) Species or habitats being studied:
NQ

18) Purpose/hypothesis:
NA

19) Expected benefits of research/monitoring:
Upper atmospheric and auroral research which has impacts on communications and global warming concerns

20) Briefly describe project history and context of research/monitoring project:
REsearch has been ongoing since March of 1969

21) Briefly describe project's relationship to other research/monitoring projects either known of or conducted by the applicant:
NA

22) Identify the types of samples to be taken or data to be collected during the proposed project:
None

23) List other cooperators and institutions involved in the project:
Dartmouth University, University of new Hampshire, NASA Sounding Rocket Program Office, NASA Science Mission Directorate

24) Generally identify the anticipated timeline for analysis, write-up and publication:
Unknown

25) For research involving animals, has an Assurance of Animal Care Form, Institutional Animal Care and Use Committee approval (or equivalent) been completed? Yes No N/A

Is form attached?
 Yes No

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Certifications/Permits

26a) Is rat free certification required?

Yes No N/A

Copy of certification provided:

Yes No

26b) Is hull inspection certification required?

Yes No N/A

Copy of certification provided:

Yes No

26c) Is EMT/first aid certification required?

Yes No N/A

Copy of certification provided:

Yes No

26d) Are other certifications required?

Yes No N/A

Copy of certification provided:

Yes No

27a) Are State permits required?

Yes No N/A

Copy of permits provided:

Yes No

27b) Are Federal permits required?

Yes No N/A

Copy of permits provided:

Yes No

27c) Are tribal permits required?

Yes No N/A

Copy of permits provided:

Yes No

27d) Are other permits required?

Yes No N/A

Copy of permits provided:

Yes No

Logistics and Transportation

28a) Does activity require personnel to stay overnight onsite?

Yes No

28b) Personnel involved:

3-5 for one day during recovery

29) Specifically describe all equipment/gear and materials used:

None

30a) Dates of installation of instrumentation:

na

30b) Dates of instrumentation removal:

na

30c) If instrumentation is permanent, describe need:

na

30d) Instrumentation maintenance schedule:

na

30e) Data collection schedule:

na

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31) Logistical arrangements for offsite transportation of samples:
na

32a) Transportation description(s) and license number(s) to access refuge(s): (Provide description of and specific auto license/boat/plane registration number(s).)
na

32b) Specifically describe ship-to-shore transportation:
na

32c) Specifically describe intersite transportation:
na

32d) Specifically describe onsite transportation:
Entry onto refuge lands for recovery will be via small fixed wing and/or helicopter and will be coordinated with the refuge prior to entry

33a) Is fuel cache needed?
 Yes No

33b) Specific location(s) of fuel caches: (GPS Coordinates preferred)

34a) Is Safety Plan required?
 Yes No

34b) Safety Plan attached:
 Yes No

Work and Living Accommodations

35) Specifically describe onsite work and/or living accommodations, including spike camps:
na

36) Specifically describe on or offsite hazardous material storage or other on or offsite material storage space (including on and offsite fuel caches):
na

37) Signature of Applicant Robert PMS Coy Date of Application: 1/13/12

Sign, date, and print this form and return it to the refuge for processing.
Do not fill out information below this page.

PRINT FORM

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For Official Use Only (This section to be filled out by refuge personnel only.)

Special Use Permit

12-SR1-PFRR-YF

Permit #: _____

1) Date: 1/27/12 - 1/26/13 2) Permit Approved Permit Denied 3) Station #: Yukon Flats NWR

4) Additional special conditions required: (Special conditions may include activity reports, before and after photographs, and other conditions.)

Additional sheets attached:

Yes No N/A

Yes No

5) Other licenses/permits required:

Verification of other licenses/permits, type:

Yes No N/A

6) Minimum requirements analysis has been conducted:

Assessment attached:

Yes No N/A

Yes No

7) Assurance of Animal Care Form or Institutional Animal Approval form attached:

Approval form attached:

Yes No N/A

Yes No

8) Record of Payments: Exempt Partial Full

Amount of payment: _____ Record of partial payment: _____

9) Bond Paid: Yes No N/A

This permit is issued by the U.S. Fish and Wildlife Service and accepted by the applicant signed below, subject to the terms, covenants, obligations, and reservations, expressed or implied herein, and to the notice, conditions, and requirements included or attached. A copy of this permit should be kept on hand so that it may be shown at any time to any refuge staff.

Permit approved and issued by (Signature and title):

[Signature] Date: 2-8-12

Permit accepted by (Signature of applicant):

[Signature] Date: 2.7.12

Kit Duke, AVP Facilities & Land Management
UNIVERSITY OF ALASKA

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Notice

In accordance with the Privacy Act (5 U.S.C. 552a) and the Paperwork Reduction Act (44 U.S.C. 3501), please note the following information:

1. The issuance of a permit and collection of fees on lands of the National Wildlife Refuge System are authorized by the National Wildlife Refuge System Administration Act (16 U.S.C. 668dd-ee) as amended, and the Refuge Recreation Act (16 U.S.C. 460k-460k-4).
2. The information that you provide is voluntary; however submission of requested information is required to evaluate the qualifications, determine eligibility, and document permit applicants under the above Acts. It is our policy not to use your name for any other purpose. The information is maintained in accordance with the Privacy Act. All information you provide will be considered in reviewing this application. False, fictitious, or fraudulent statements or representations made in the application may be grounds for revocation of the Special Use Permit and may be punishable by fine or imprisonment (18 U.S.C. 1001). Failure to provide all required information is sufficient cause for the U.S. Fish and Wildlife Service to deny a permit.
3. No Members of Congress or Resident Commissioner shall participate in any part of this contract or to any benefit that may arise from it, but this provision shall not pertain to this contract if made with a corporation for its general benefit.
4. The Permittee agrees to be bound by the equal opportunity "nondiscrimination in employment" clause of Executive Order 11246.
5. Routine use disclosures may also be made: (a) to the U.S. Department of Justice when related to litigation or anticipated litigation; (b) of information indicating a violation or potential violation of a statute, rule, order, or license to appropriate Federal, State, local or foreign agencies responsible for investigating or prosecuting the violation or for enforcing or implementing the statute, rule, regulations, order, or license; (c) from the record of the individual in response to an inquiry from a Congressional office made at the request of the individual (42 FR 19083; April 11, 1977); and (d) to provide addresses obtained from the Internal Revenue Service to debt collection agencies for purposes of locating a debtor to collect or compromise a Federal Claim against the debtor, or to consumer reporting agencies to prepare a commercial credit report for use by the Department (48 FR 54716; December 6, 1983).
6. An agency may not conduct or sponsor and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. This information collection has been approved by OMB and assigned control number 1018-0102. The public reporting burden for this information collection varies based on the specific refuge use being requested. The relevant public reporting burden for the Research and Monitoring Special Use Permit Application form is estimated to average 4 hours per response, including time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Comments on this form should be mailed to the Information Collection Clearance Officer, U.S. Fish and Wildlife Service, 4401 N. Fairfax Drive, MS 2042-PDM, Arlington, Virginia, 22203.

General Conditions and Requirements

1. **Responsibility of Permittee:** The permittee, by operating on the premises, shall be considered to have accepted these premises with all facilities, fixtures, or improvements in their existing condition as of the date of this permit. At the end of the period specified or upon earlier termination, the permittee shall give up the premises in as good order and condition as when received except for reasonable wear, tear, or damage occurring without fault or negligence. The permittee will fully repay the Service for any and all damage directly or indirectly resulting from negligence or failure on his/her part, and/or the part of anyone of his/her associates, to use reasonable care.
2. **Operating Rules and Laws:** The permittee shall keep the premises in a neat and orderly condition at all times, and shall comply with all municipal, county, and State laws applicable to the operations under the permit as well as all Federal laws, rules, and regulations governing national wildlife refuges and the area described in this permit. The permittee shall comply with all instructions applicable to this permit issued by the refuge official in charge. The permittee shall take all reasonable precautions to prevent the escape of fires and to suppress fires and shall render all reasonable assistance in the suppression of refuge fires.
3. **Use Limitations:** The permittee's use of the described premises is limited to the purposes herein specified and does not, unless provided for in this permit, allow him/her to restrict other authorized entry onto his/her area; and permits the Service to carry on whatever activities are necessary for: (1) protection and maintenance of the premises and adjacent lands administered by the Service; and (2) the management of wildlife and fish using the premises and other Service lands.
4. **Transfer of Privileges:** This permit is not transferable, and no privileges herein mentioned may be sublet or made available to any person or interest not mentioned in this permit. No interest hereunder may accrue through lien or be transferred to a third party without the approval of the Regional Director of the Service and the permit shall not be used for speculative purposes.
5. **Compliance:** The Service's failure to require strict compliance with any of this permit's terms, conditions, and requirements shall not constitute a waiver or be considered as a giving up of the Service's right to thereafter enforce any of the permit's terms or conditions.
6. **Conditions of Permit not Fulfilled:** If the permittee fails to fulfill any of the conditions and requirements set forth herein, all money paid under this permit shall be retained by the Government to be used to satisfy as much of the permittee's obligation as possible.
7. **Payments:** All payment shall be made on or before the due date to the local representative of the Service by a postal money order or check made payable to the U.S. Fish and Wildlife Service.
8. **Termination Policy:** At the termination of this permit the permittee shall immediately give up possession to the Service representative, reserving, however, the rights specified in paragraph 11. If he/she fails to do so, he/she will pay the government, as liquidated damages, an amount double the rate specified in this permit for the entire time possession is withheld. Upon yielding possession, the permittee will still be allowed to reenter as needed to remove his/her property as stated in paragraph 11. The acceptance of any fee for the liquidated damages or any other act of administration relating to the continued tenancy is not to be considered as an affirmation of the permittee's action nor shall it operate as a waiver of the Government's right to terminate or cancel the permit for the breach of any specified condition or requirement.
9. **Revocation Policy:** This permit may be revoked by the Regional Director of the Service without notice for noncompliance with the terms hereof or for violation of general and/or specific laws or regulations governing national wildlife refuges or for nonuse. It is at all times subject to discretionary revocation by the Director of the Service. Upon such revocation the Service, by and through any authorized representative, may take possession of the said premises for its own and sole use, and/or may enter and possess the premises as the agent of the permittee and for his/her account.

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10. Damages: The United States shall not be responsible for any loss or damage to property including, but not limited to, growing crops, animals, and machinery or injury to the permittee or his/her relatives, or to the officers, agents, employees, or any other who are on the premises from instructions or by the sufferance of wildlife or employees or representatives of the Government carrying out their official responsibilities. The permittee agrees to save the United States or any of its agencies harmless from any and all claims for damages or losses that may arise to be incident to the flooding of the premises resulting from any associated Government river and harbor, flood control, reclamation, or Tennessee Valley Authority activity.

11. Removal of Permittee's Property: Upon the expiration or termination of this permit, if all rental charges and/or damage claims due to the Government have been paid, the permittee may, within a reasonable period as stated in the permit or as determined by the refuge official in charge, but not to exceed 60 days, remove all structures, machinery, and/or equipment, etc. from the premises for which he/she is responsible. Within this period the permittee must also remove any other of his/her property including his/her acknowledged share of products or crops grown, cut, harvested, stored, or stacked on the premises. Upon failure to remove any of the above items within the aforesaid period, they shall become the property of the United States.

12. Collected Specimens: You may use specimens collected under this permit, any components of any specimens (including natural organisms, enzymes, genetic materials or seeds), and research results derived from collected specimens for scientific or educational purposes only, and not for commercial purposes unless you have entered into a Cooperative Research and Development Agreement (CRADA) with us. We prohibit the sale of collected research specimens or other transfers to third parties. Breach of any of the terms of this permit will be grounds for revocation of this permit and denial of future permits. Furthermore, if you sell or otherwise transfer collected specimens of any components without a CRADA, you will pay us a royalty rate of 20 percent of the gross revenue from such sales. In addition to such royalty, we may seek other damages and injunctive relief against you.

Instructions for Completing Application

You may complete the application portion verbally, in person or electronically and submit to the refuge for review. Note: Please read instructions carefully as not all information is required for each activity. Contact the specific refuge where the activity will take place if you have questions regarding the applicability of a particular item. Special conditions or permit stipulations may be added to permit prior to approval.

1. Identify if application is for a new permit or renewal or modification of an existing permit. Permit renewals may not need all information requested. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.

2-3. Provide principal investigator's or applicant's full name. Attach principal investigator's Curriculum Vitae or Resume, if required. Permit renewals generally do not require a Curriculum Vitae or Resume if the project is a continuation of a previously issued permit being conducted by the same investigator. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.

4-9. Provide investigator's address, phone, fax, e-mail, affiliation and or organization, and relationship to affiliation or organization (title, professor, student, etc.).

10. Provide the names and addresses of assistants, subcontractors or subpermittees. Names and address are only required if the assistants, subcontractors or subpermittees will be operating on the refuge without the permittee being present. Volunteers, assistants, subcontractors or subpermittees that are accompanied by the permittee need not be identified.

11. Provide title of research or monitoring project.

12a-12b. Attach a full research or monitoring proposal, if required. Permit renewals generally do not require a project proposal if the project is a continuation of a previously issued permit being conducted by the same investigator. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.

13. Describe Activity: provide detailed information on the activity, including timing, frequency, how the project is expected to proceed, etc. Permit renewals may not need activity description, if the activity is unchanged from previous permit. Most repetitive research projects do not require an activity description for each visit to the refuge. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.

14. Location: identify specific location (GPS coordinates preferred), if not a named facility. Permit renewals may not require a location if the project is essentially unchanged from the previous permit. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.

15a-15b. Attach a map of location, if required and project is not conducted at a named facility. Permit renewals may not require a map if the project is essentially unchanged from the previous permit. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.

16. Activity/site occupancy timeline: identify beginning and ending dates, site occupation timeline, hours, clean-up and other major events. Permit renewals may not need an activity/site occupancy timeline, if the activity is unchanged from previous permit. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.

17. Identify species or habitats being studied.

18-19. Specifically identify purpose or hypothesis of the research or monitoring project and describe expected benefits. Permit renewals may not need to identify purpose or hypothesis, if the project is a continuation of a previously issued permit being conducted by the same investigator. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.

20. Briefly describe project history and context. Permit renewals should describe previous research activities as part of a previously issued permit being conducted by the same investigator. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.

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21. Briefly describe project's relationship to other research/monitoring projects either known of or conducted by the applicant, if applicable. Include a brief statement of how the research or monitoring permit being applied for will add to or supplement other ongoing research or monitoring on the same, or related, species or habitats. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.
22. Identify samples to be taken or types of data to be collected. Permit renewals may not need to identify samples taken if the project is a continuation of a previously issued permit being conducted by the same investigator. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.
23. List other cooperators and institutions involved in the project, if applicable. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.
24. Generally, identify the anticipated time line for analysis, write-up and publication of project results. Include whether the project is a single, or multiple year project. Identification of an actual publication where the results are printed is not necessary. However, applicants should include the anticipated dissemination of project results. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.
25. Check box acknowledging a completed Assurance of Animal Care Form or an Institutional Animal Care and Use Committee (or equivalent) has granted approval been completed, and has been submitted to refuge station, if required. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.
- 26a-26c. Specifically identify types and numbers of other certifications, if required. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement, and to coordinate the simultaneous application of several types of certifications. This Special Use Permit may be processed while other certifications are being obtained.
- 27a-27d. Specifically identify types and numbers of other State, Federal or tribal permits, if required. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement, and to coordinate the simultaneous application of several types of State, Federal or tribal permits. This Special Use Permit may be processed while other State, Federal or tribal permits are being obtained.
- 28a-28b. Provide name(s) of any personnel required to stay overnight, if applicable.
29. Identify all equipment and materials, which will be used, if required. Permit renewals may not require a list of equipment if the project is essentially unchanged from a previously issued permit. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.
- 30a-30e. Identify types and dates of installation of any instrumentation, and data collection and maintenance schedule of instrumentation, if required. Permit renewals may not require a list of equipment if the project is essentially unchanged from a previously issued permit. However, dates of installation of any instrumentation, and data collection and maintenance schedule of instrumentation may still be required. Contact the specific refuge headquarters office where the project is going to be conducted to determine applicability of this requirement.
31. Identify logistic arrangements for offsite transportation of samples taken, if applicable.
- 32a-32d. Describe and provide vehicle descriptions and license plate or identification numbers of all vehicles, including boats and airplanes, if required. Motor vehicle descriptions are only required for permittee vehicle, and/or if the vehicle will be operated on the refuge without the permittee being present. Motor vehicles that are accompanied by the permittee as part of a group (convoy) activity need not be identified if cleared in advance by refuge supervisor. Specifically describe ship-to-shore, intersite (between islands, camps, or other sites) and onsite transportation mechanisms, and license plate or identification numbers, if required.
- 33a-33b. Identify specific location(s) of fuel cache(s) (GPS coordinates preferred), if required.
- 34a-34b. Attach safety plan, if required. Contact the specific refuge headquarters office where the project is going to be conducted to determine if a safety plan is required.
35. Specifically describe onsite work and/or living accommodations, if required. Include descriptions and locations (GPS coordinates preferred) of spike camps or other remote work and/or living accommodations that are not part of the base of operations. Contact the specific refuge headquarters office where the project is going to be conducted to determine if descriptions of onsite work and/or living accommodations are required.
36. Specifically describe onsite and offsite hazardous material storage, or other onsite material storage space (including on and offsite fuel caches), if required. Contact the specific refuge headquarters office where the project is going to be conducted to determine if descriptions of hazardous material storage or other onsite material storage are required.
- 37 Sign, date and print the application. Click on the Print button to print the application (if using the fillable version). The refuge official will review and, if approved, fill out the remaining information, sign, and return a copy to you for signature and acceptance.

The form is not valid as a permit unless it includes refuge approval, a station number, a refuge-assigned permit number, and is signed by a refuge official.

FWS Form 3-1383-R
03/11

Yukon Flats National Wildlife Refuge
Special Conditions
Permit 2012-SR1-PFRR-YF, University of Alaska, Poker Flat Research Range

1. Failure to abide by any part of this special use permit; violation of any refuge related provision in Titles 43 (Part 36) or 50 Code of Federal Regulations (sub-chapters B and C); or violation of any pertinent state regulation (e.g., fish or game) will, with due process, be considered grounds for immediate revocation of this permit and could result in denial of future permit requests for lands administered by the U.S. Fish and Wildlife Service. This provision applies to all persons working under the authority of this permit. Appeals of decisions relative to permits are handled in accordance with 50 Code of Federal Regulations 36.41.
2. The permittee is responsible for ensuring that all employees, party members, aircraft pilots and other persons working for the permittee and conducting activities allowed by this permit are familiar with and adhere to the conditions of this permit.
3. Any problems with wildlife and/or animals taken in defense of life or property must be reported immediately to the refuge manager and Alaska Department of Fish and Game, and be salvaged in accordance with state regulations.
4. This permit does not grant the permittee and his/her clients exclusive use of the site(s) or lands covered by the permit.
5. This permit may be canceled or revised at any time by the refuge manager due to high fire danger, flooding, unusual resource problems, or other significant problems or emergencies.
6. The permittee or his/her designee shall notify the refuge manager during refuge working hours in person or by telephone before beginning and upon completing activities allowed by this permit.
7. Prior to beginning activities allowed by this permit, the permittee shall provide the refuge manager with: (1) the name and method of contact for the field party chief/supervisor; (2) the aircraft and other vehicle types to be used, including identification information; (3) names of assistants and helpers; and (4) any changes to information provided in the original permit application.
8. In accordance with the Archaeological Resources Protection Act (16 U.S.C. 470aa), the removal, excavation, disturbance, collection, or purchase of historical, recent, ethnological, or archaeological specimens or artifacts is prohibited.
9. The use of helicopters is authorized provided that:
 - (a) Landing is prohibited except for the direct support of the activity covered by this permit and emergencies. No recreational use of helicopters is permitted.
 - (b) Clearing of vegetation for landing/takeoff is prohibited. Incidental hand removal of rocks and other minor obstructions may be permitted.

Yukon Flats National Wildlife Refuge
Special Conditions
Permit 2012–SR1-PFRR-YF, University of Alaska, Poker Flat Research Range

- (c) Activities are restricted to day use only. No overnight stays are anticipated.
 - (d) Personnel transported are restricted to only those necessary to conduct the debris recovery. Recreational use is not permitted.
 - (e) Low level slinging of gear from site to site is prohibited.
10. The use of off-road vehicles (except snow machines) is prohibited.
 11. The operation of aircraft at altitudes and in flight paths resulting in the herding, harassment, hazing, or driving of wildlife is prohibited. It is requested that all aircraft maintain a minimum altitude of 2000 feet above ground level, except during take-off, landing, and when safety considerations require a lower altitude.
 12. Fuel caches are allowed only in designated areas, must be identified on a US Geological Survey map (or map photocopy), and submitted in writing for approval by the refuge manager before they are established. Storage will meet standards of USFWS, Alaska Region, Fuel Storage Policy.
 13. Any action by a permittee or the permittee's employees that unduly interferes with or harasses refuge visitors or impedes access to any site is strictly prohibited. Examples of prohibited acts include, but are not limited to: 1) parking aircraft or placing other objects (rocks, tents, etc.) on any area so as to restrict use by other aircraft; 2) otherwise intentionally interfering in the activity of other refuge users; and 3) engaging in activity that is contrary to state and federal laws.
 14. The permit is for refuge lands only. This permit does not authorize use of private lands such as land owned by ANCSA Native corporations, individuals, or the State of Alaska.
 15. The permittee will take no action that interferes with subsistence activities of rural users or restricts the reasonable access of subsistence users to refuge lands. This may include, but is not limited to, disturbance of wildlife and their movements near subsistence hunters, and damage to cabins, trails, traditional campsites or caches used by subsistence users.
 16. All rocket launches will be well publicized in advance, using print media and radio, to forewarn travelers and residents of the area involved. A minimum of two weeks notice of rocket launch dates and impact zones will be provided in writing to the refuge manager.
 17. The permittee will insure that a transponder or other radio location aid is incorporated with each payload to facilitate tracking and recovery after launch.
 18. The permittee will maintain a viable rocket component recovery program to track, locate, and remove rocket debris at least once every two years. All determinations to remove or

Yukon Flats National Wildlife Refuge
Special Conditions

Permit 2012-SR1-PFRR-YF, University of Alaska, Poker Flat Research Range

not remove debris will be made by the refuge manager. The refuge manager will be informed of locations (GPS coordinates in decimal degrees) of impact sites, un-recovered rockets and/or payloads, schedule for removal, actual activities to locate (see special condition #19) and remove rocket debris, and any potential hazards that may thereby be created. This information should be a 1-2 page summary with map submitted within 30-days of the permit expiration.

19. An annual trip report of activities on the refuge shall be provided to the Refuge Manager within 30-days of the permit expiration (normally 1-2 pages). In addition to potential impact sites within the refuge, an annual report must include a detailed summary of surveillance flights to locate and recover payload debris. Specific information of surveillance flights must include:
 - (a) type of aircraft used (helicopter or fixed-wing),
 - (b) aircraft model
 - (c) operator company or ownership,
 - (d) Special Use Permit number of operator
 - (e) date and time of surveillance flights,
 - (f) number of hours flown,
 - (g) map showing flight lines (for example, GPS track log),
 - (h) landing locations with GPS coordinates in decimal degrees,
 - (i) and date and time of each landing.
20. Paragraph No. 10. Damages, under "General Conditions and Requirements," does not apply to this Permit. The following replaces it:

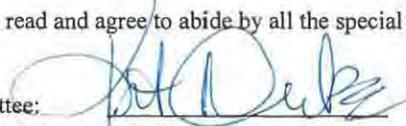
Damages and Indemnity: The United States shall not be responsible for any injuries to or death of the officers or employees of it or its agents or contractors, or for the loss or damage to the property of the permittee, its officers, employees, agents, or contractors, arising out of the activities authorized under this permit. The permittee shall defend, indemnify and hold the United States harmless from any and all claims, demands, losses liabilities and judgments, including costs and expenses, which may be suffered by, accrued against, be charged to, or recoverable from the United States by reason of injuries to or death of persons and damage to or losses to property arising out of the launch, impact, and recovery of permittee's rockets.
21. The permittee will be responsible for reporting any fires arising from these activities and will immediately notify the Alaska Fire Service and the Fish and Wildlife Service.
22. Rocket or debris impacts within the refuge are prohibited from 1 May through 30 September to avoid periods of high public use. However, exceptions to this prohibition may be authorized for specific time periods and areas. Requests for impact use during this

Yukon Flats National Wildlife Refuge
Special Conditions
Permit 2012-SR1-PFRR-YF, University of Alaska, Poker Flat Research Range

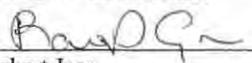
period must be received by the refuge manager forty-five days before intended use. (A launch schedule is not considered a request.) Exception requests must include a complete project description, a statement affirming that the proposed dates are essential, the alternatives considered an analysis of the increased risk incurred and a justification for this risk.

23. Peregrine falcons (*Falco peregrines anatum*) and other raptors may have active nest sites on cliffs and bluff faces with the refuge. Helicopter activity is prohibited within one-half mile of these active raptor nest sites during the period 1 May through 15 August. Sites may be approached on foot or by boat to determine if an occupied nest is located at the site.
24. All information, reports, photos, data, collections, and observations obtained as a result of this permit must be accessible from the permittee at any time upon request by the Service at no cost, unless specific arrangements are made to the contrary. The Service recognizes the proprietary nature of scientific data and will respect the researchers' privileged position regarding first publication. These data may be used in resource management decisions by the Service before their publication, however. Proprietary data of commercial value will be treated confidentially upon request, but may also be used in management decisions.
25. Before implementing field work, the permittee must provide documentation that activities involving an invasive procedure that harms, potentially harms or materially alters the behavior of an animal under study have been reviewed and approved by an Institutional Animal Care and Use committee (IACUC) pursuant to the Animal Welfare Act.

I have read and agree to abide by all the special conditions and requirements for this permit.

Permittee: 
Kit Duke, AVP Facilities & Land Management
UNIVERSITY OF ALASKA

Date: 2-7-12

Issuing Officer: 
Robert Jess
Refuge Manager

Date: 2-8-12

COMPATIBILITY DETERMINATION

Use: Rocket & Payload Impact and Recovery

Refuge Name: Yukon Flats National Wildlife Refuge, Fairbanks, Alaska

Establishing and Acquisition Authority

In 1978, President Jimmy Carter established the 10.6 million-acre Yukon Flats National Wildlife Monument with Presidential Proclamation 4627. The monument was established from lands in the public domain. In 1980, the Alaska National Interest Lands Conservation Act (ANILCA) (§ 302) adjusted the boundary to 8.6 million acres, and established the Yukon Flats National Wildlife Refuge as part of the National Wildlife Refuge System.

Refuge Purpose(s)

ANILCA sets out the primary purposes for each refuge in Alaska. The purposes of the Yukon Flats National Wildlife Refuge (NWR) are described in Section 302(9)(B). The ANILCA purposes for the Yukon Flats NWR are as follows:

- to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, canvasbacks and other migratory birds, Dall sheep, bears, moose, wolves, wolverines and other furbearers, caribou (including participation in coordinated ecological studies and management of the Porcupine and Fortymile caribou herds) and salmon
- to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats
- to provide, in a manner consistent with the purposes set forth above, the opportunity for continued subsistence uses by local residents
- to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth above, water quality and necessary water quantity within the refuge.

[Supplemental Purposes of the Beaver Creek Wild River and the recommended Lower Sheenjek Wild River] The River Management Plan for Beaver Creek National Wild River, dated December, 1983, states the river will be managed for the following long-term objectives. These are the outstandingly remarkable values and conditions to be protected and enhanced:

- preserve the river and its immediate environment in its natural, primitive condition;
- preserve the free-flowing condition of the river;
- protect water quality and quantity;
- provide high quality primitive recreational opportunities for present and future generations;

- provide a variety of opportunities for interpretive, scientific, educational and wildlands oriented uses;
- assure preservation and interpretation of historic and archeological values; and
- maintain and improve fish and wildlife habitat.

The Final Wild and Scenic River Study/EIS for the Lower Sheenjek, dated September 1999, found the river to be suitable and thus recommended to congress that it be designated part of the National Wild and Scenic Rivers System. Congress has not acted on this recommendation. In the meantime, management of the river should preserve the free-flowing condition of the river, and protect the outstandingly remarkable cultural (subsistence), wildlife, scenic and recreational values associated with the Lower Sheenjek, its water quality, and the adjacent lands.

National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System is “to administer a national network of lands and waters for the conservation, management, and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans” (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee]).

Description of Use(s)

This compatibility determination reevaluates the use of federal lands within Yukon Flats NWR as a program component of Poker Flat Research Range that supports research programs from across the country in the study of northern atmospheric phenomenon and climate change. In 1994, the refuge found these activities compatible with refuge purposes. The refuge provides an impact zone for research rockets and payloads. This research requires associated landings of helicopters to retrieve scientific payloads and rocket debris. The University of Alaska Fairbanks – Geophysical Institute’s Poker Flat Research Range has been conducting auroral and middle to upper atmospheric research in Alaska for over ten years, including use of lands within the refuge.

From four to ten sounding rockets are launched from the Poker Flat Research Range each winter. The range is located approximately fifty miles south of the refuge, and about thirty miles north of Fairbanks, Alaska (see attached map). The sounding rockets are single, two, three or four-stage solid fuel rockets. The rockets carry instrumented payloads into the earth’s upper atmosphere to make direct measurements of the aurora borealis, ozone, solar protons, electric and magnetic fields, ultraviolet and other atmospheric phenomena unique to these high latitudes.

The first stage of the rocket propels it to about 20,000 feet, separates from the remaining stages and payload, and falls back to earth about two miles from the launch site at Poker Flat. The second stage and payload follow the flight trajectory to typical altitudes of 50 to 300 miles and impact 50 to 225 miles from the launch

site. On the occasion when a three-stage rocket is utilized, both the rocket and payload over fly Alaska and land in international waters to the north.

It is the second stages and payloads that occasionally impact the Yukon Flats NWR. The refuge is but one of several federal, state and private land managers that authorize the use of a combined twenty-five million acres of land for rocket and payload impact and recovery. The dimensions of the empty rocket and payload are approximately fifteen to twenty feet long, thirty inches in diameter and weigh a few hundred pounds. Most payloads launched on sounding rockets from Poker Flat are recovery payloads that contain locator beacons and descend slowly to earth by an orange and white parachute. They are tracked via radar, and recovered with a helicopter. When they are recovered, any disturbance to the landscape is repaired as much as feasible. All rockets launched from Poker Flat are unguided after launch. The Poker Flat managers use a risk assessment prepared by the National Aeronautics and Space Administration that takes into account wind speed, direction of flight and type of rocket to determine launch elevation and flight azimuth, and impact point to reduce risk to life and property to an absolute minimum. For a given year, operations managers provide a detailed list of potential launch vehicle, launch windows, and potential impact zones for each launch (see attached map).

Any deviation from this description will require a separate compatibility determination.

Availability of Resources

Adequate refuge personnel and base operational funds are available to manage research activities at existing (approximately two requests to retrieve components are made annually) and projected levels. Administrative staff time (not more than five days) primarily involves phone conversations, written correspondence, proposal review, permit issuance and personal interaction with researchers. Field work associated with administering the program primarily involves monitoring researchers' compliance with the terms of the permit.

Anticipated Impacts of the Use(s)

Factors such as impact area(s), number of rockets or payloads, number of aircraft and anticipated amount of aircraft use will determine the extent of impacts on the refuge. Past impacts from this use have resulted in minor damage to vegetation, which is repaired as much as practical, and a few hours of helicopter flight time and landings to retrieve rocket payloads and debris, and perform site remediation.

At current levels, rocket and payload impact and recovery and associated activities should not have significant impacts on the wildlife resources, other refuge resources (e.g., water quality, soil, and vegetation), and other refuge users, especially subsistence users, due to the limited scope and complete administrative oversight of this research. Winter conditions (frozen soil) limit impact and landing damage.

Public Review and Comment

The refuge considers the proposed use to be a minor use with history of minimal impact. Public involvement for this document included a public notice in the Fairbanks Daily News Miner newspaper and a thirty-day public comment period. This compatibility determination was also available for review on the US Fish and Wildlife Service – Alaska Region’s compatibility determination Web site, <http://alaska.fws.gov/nwr/planning/index.htm>

Determination

Use is Not Compatible

Use is Compatible

Stipulations Necessary to Ensure Compatibility

Refuge staff will monitor all research being conducted on the refuge. Findings from these monitoring efforts will be used to determine what additional management actions, if any, are needed to ensure that research activities remain compatible with refuge purposes. Monitoring of all authorized research activities will be continued to ensure compliance with specific terms and conditions tailored for each research permit as well as with the following general conditions that are incorporated into all research permits to minimize impacts on refuge lands and resources.

- Failure to abide by any part of this special use permit; violation of any refuge related provision in Titles 43 (Part 36) or 50 Code of Federal Regulations (sub-chapters B and C); or violation of any pertinent state regulation (e.g., fish or game) will, with due process, be considered grounds for immediate revocation of this permit and could result in denial of future permit requests for lands administered by the U.S. Fish and Wildlife Service. This provision applies to all persons working under the authority of this permit. Appeals of decisions relative to permits are handled in accordance with 50 Code of Federal Regulations 36.41.
- The permittee is responsible for ensuring that all employees, party members, aircraft pilots and other persons working for the permittee and conducting activities allowed by this permit are familiar with and adhere to the conditions of this permit.
- Any problems with wildlife and/or animals taken in defense of life or property must be reported immediately to the refuge manager and Alaska Department of Fish and Game, and be salvaged in accordance with state regulations.
- This permit does not grant the permittee and his/her clients’ exclusive use of the site(s) or lands covered by the permit.
- This permit may be canceled or revised at any time by the refuge manager due to high fire danger, flooding, unusual resource problems, or other significant problems or emergencies.

- Failure to abide by any part of this special use permit; violation of any refuge related provision in Titles 43 (Part 36) or 50 Code of Federal Regulations (sub-chapters B and C); or violation of any pertinent state regulation (e.g., fish or game) will, with due process, be considered grounds for immediate revocation of this permit and could result in denial of future permit requests for lands administered by the U.S. Fish and Wildlife Service. This provision applies to all persons working under the authority of this permit. Appeals of decisions relative to permits are handled in accordance with 50 Code of Federal Regulations 36.41.
- The permittee is responsible for ensuring that all employees, party members, aircraft pilots and other persons working for the permittee and conducting activities allowed by this permit are familiar with and adhere to the conditions of this permit.
- Any problems with wildlife and/or animals taken in defense of life or property must be reported immediately to the refuge manager and Alaska Department of Fish and Game, and be salvaged in accordance with state regulations.
- This permit does not grant the permittee and his/her clients exclusive use of the site(s) or lands covered by the permit.
- This permit may be canceled or revised at any time by the refuge manager due to high fire danger, flooding, unusual resource problems, or other significant problems or emergencies.
- The permittee or his/her designee shall notify the refuge manager during refuge working hours in person or by telephone before beginning and upon completing activities allowed by this permit.
- Prior to beginning activities allowed by this permit, the permittee shall provide the refuge manager with: (1) the name and method of contact for the field party chief/supervisor; (2) the aircraft and other vehicle types to be used, including identification information; (3) names of assistants and helpers; and (4) any changes to information provided in the original permit application.
- In accordance with the Archaeological Resources Protection Act (16 U.S.C. 470aa), the removal, excavation, disturbance, collection, or purchase of historical, recent, ethnological, or archaeological specimens or artifacts is prohibited.
- The permittee will not make launches with a planned impact site within the Mollie Beattie Wilderness area. The use of helicopters outside the wilderness area is authorized provided that:
 - (a) Landing is prohibited except for the direct support of the activity covered by this permit and emergencies. No recreational use of helicopters is permitted.

near subsistence hunters, and damage to cabins, trails, traditional campsites or caches used by subsistence users.

- All rocket launches will be well publicized in advance to forewarn travelers and residents of the area involved. A minimum of two weeks notice of rocket launch dates and impact zones will be provided in writing to the refuge manager.
- The permittee will insure that a transponder or other radio location aid is incorporated with each payload to facilitate tracking and recovery after launch.
- The permittee will maintain a viable rocket component recovery program to track, locate, and remove rocket debris annually. The refuge manager will be informed of locations (latitude and longitude) of impact sites, un-recovered rockets and/or payloads, and any potential hazards that may thereby be created.
- The Fish and Wildlife Service will not be liable for any act or omission of the permittee (or its employees, hereinafter referred to jointly as "permittee") in operation of permittee's rockets during all phases of operation from launch through recovery. The permittee agrees to hold harmless the Fish and Wildlife Service against any and all claims for loss or liability by any party arising out of launch, impact, and recovery of permittee's rockets, however caused.
- The permittee will be responsible for reporting any fires arising from these activities and will immediately notify the Alaska Fire Service and the Fish and Wildlife Service.
- Rocket or debris impacts within the refuge are prohibited from 1 May through 30 September to avoid periods of high public use. However, exceptions to this prohibition may be authorized for specific time periods and areas. Requests for impact use during this period must be received by the refuge manager forty-five days before intended use. (A launch schedule is not considered a request.) Exception requests must include a complete project description, a statement affirming that the proposed dates are essential, the alternatives considered an analysis of the increased risk incurred and a justification for this risk.
- Peregrine falcons (*Falco peregrinus anatum*) and other raptors may have active nest sites on cliffs and bluff faces within the refuge. Helicopter activity is prohibited within one-half mile of these active raptor nest sites during the period 1 May through 15 August.

Justification

It is the policy of the Service (4 RM 6.1) to encourage and support research and management studies in order to provide scientific data upon which to base decisions regarding management of units of the refuge system.

The Service may permit the use of a refuge for investigatory scientific purposes when such use is compatible with the objectives for which the refuge is managed. Priority will be given to studies that contribute to the enhancement, protection, use, preservation and management of current, indigenous wildlife populations and their habitats in their natural diversity. All proposed research conducted by other agencies or entities will be thoroughly evaluated prior to authorization and then monitored closely to ensure the activities do not materially interfere with or detract from the purposes of the refuge or the mission of the National Wildlife Refuge System.

Scientific investigations of wildlife, resources, and social interactions will support the refuge's ability to provide for wildlife-dependent priority public uses and to meet other refuge purposes. These investigations must be conducted safely.

Public notice of the draft compatibility determination was published by the Fairbanks Daily News-Miner on Friday December 10, 2004. The draft compatibility determination was posted on the publicly-accessible bulletin board at Refuge Headquarters, and it was available at the U.S. Fish and Wildlife Service, Alaska Region Web site for viewing and downloading during the thirty-day comment period. No public comments were received. The Service concludes this as further evidence that this decision is sufficient as written.

Mandatory 10-Year Re-Evaluation Date (provide month and year for allowed uses only): _____

Mandatory 15-Year Re-Evaluation Date (for priority public uses): _____

NEPA Compliance for Refuge Use Decision

- _____ Categorical Exclusion without Environmental Action Memorandum
- _____ Categorical Exclusions and Environmental Action Memorandum
- _____ Environmental Assessment and Finding of No Significant Impact
- Environmental Impact Statement and Record of Decision

Supporting Documents

- Environmental Analysis for Poker Flat Research Range, Geophysical Institute, University of Alaska Fairbanks, November 1991.
- Compatibility Determination and ANILCA Section 810 Evaluations, Atmospheric Rocket Research, Yukon Flats National Wildlife Refuge, 23 July 1994.
- Compatibility Determination, Uses (includes research) allowed by the 1987 Yukon Flats National Wildlife Refuge Comprehensive Conservation Plan, 19 July 1994.
- Final Yukon Flats National Wildlife Refuge Comprehensive Conservation Plan, Environmental Impact Statement and Wilderness Review, Record of Decision, 29 December 1987.

Refuge Determination

Prepared by: Jimmy Fox 1/10/05
(Signature) (Date)

Refuge Manager /
Project Leader Approval: E. H. [Signature] 1/10/05
(Signature) (Date)

Concurrence

Refuge Supervisor: Mike Boda (Acting) 1/13/05
(Signature) (Date)

Regional Chief,
National Wildlife
Refuge System: Richard [Signature] (Acting) 1/13/05
(Signature) (Date)



U.S. Fish & Wildlife Service

Conservation Planning & Policy

Alaska Region

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Policy

Public Notice of Compatibility for Arctic & Yukon Flats National Wildlife Refuge

REFUGE:	Arctic and Yukon Flats
TITLE:	Compatibility Determinations re-evaluating the special use permit granted the Poker Flat Research Range for rocket & payload impact and recovery on refuge lands.
DATE OF DETERMINATION:	January 13, 2005
SUPPORTING DOCUMENTS:	Public Notice (pdf)
	Compatability Determination prepared by the Arctic Refuge (pdf)
	Compatability Determination prepared by the Yukon Flats Refuge (pdf)

Last updated: September 2, 2008

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C.3

**STATE OF ALASKA DEPARTMENT OF NATURAL RESOURCES DIVISION OF
MINING, LAND AND WATER**

STATE OF ALASKA DEPARTMENT OF NATURAL RESOURCES
DIVISION OF MINING, LAND AND WATER

Northern Region
3700 Airport Way
Fairbanks, AK 99709
(907) 451-2705

Southcentral Region
550 W 7th Ave Suite 900C
Anchorage, AK 99501-3577
(907) 269-8552

Southeast Region
400 Willoughby, #400
Juneau, AK 99801
(907) 465-3400

LAND USE PERMIT
Under AS 38.05.850

LAS 19102

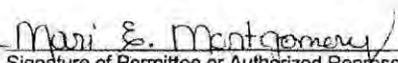
The University of Alaska/Geophysical Institute, Statewide Office of Land Management is issued this permit to use the following described lands: within state-owned lands located in numerous townships throughout the Northern Region. (see attached map)

This permit is issued for the purpose of: continuing research, collecting rocket debris, and as a payload safety area related to the Poker Flats Research Range.

This permit is issued subject to: payment of a use fee in the amount of \$N/A; posting of a performance guaranty bond in the amount of \$N/A; proof of insurance in the amount of \$N/A; and compliance with the Special Stipulations on Attachment A, in addition to those noted in this document.

This permit is not a property right. It is a temporary authorization, revocable by the state with or without cause. This permit is effective beginning March 1, 2009 and ending on February 28, 2014 unless sooner terminated at the state's discretion.


Signature of Authorized State Representative Natural Resource Specialist II 04-15-09
Title Date


Signature of Permittee or Authorized Representative Director, Land Management 03-30-09
Title Date
Mari E. Montgomery Director, University of Alaska Land Management

PO Box 755280 Fairbanks Ak 99775-5280
Permittee's Address City State Zip

907-450-8133 Dian Siegfried
Home Phone Work Phone Contact Person

*Permittee is responsible for maintaining a current address with the division during the life of this authorization.
*Permittee is responsible for obtaining authorizations required by other agencies for the permitted activity.

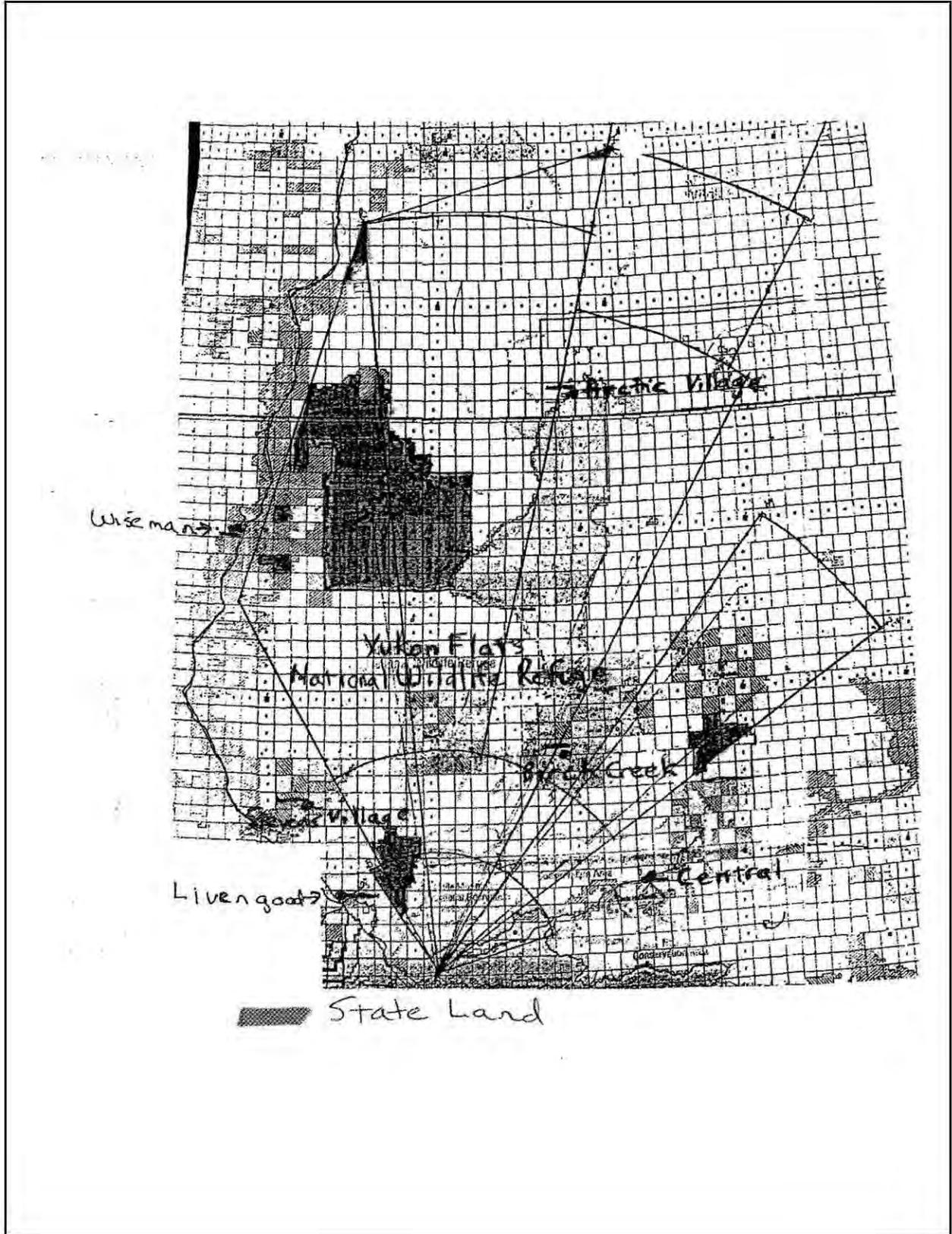
ATTACHMENT A SPECIAL STIPULATIONS

1. **Authorized Officer.** The Authorized Officer for the Department of Natural Resources is the Manager, Northern Region Lands Section, or his/her designee. The Authorized Officer may be contacted at 3700 Airport Way, Fairbanks, Alaska 99709, 04 (907) 451-2740.
2. **Indemnification.** In lieu of indemnification, the permittee shall be responsible for any claim or demand for loss or damage, including property damage, personal injury, wrongful death, and wage or employment claims, arising out of or in connection with the use or occupancy of the permit site.
3. **Valid Existing Rights.** This authorization is subject to all valid existing rights in and to the land under this authorization. The State of Alaska makes no representations or warranties whatsoever, either expressed or implied, as to the existence, number, or nature of such valid existing rights.
4. **Reservation of Rights.** The Division reserves the right to grant additional authorizations to third parties for compatible uses on or adjacent to the land under this authorization.
5. **Preference Right.** No preference right for use or conveyance of the land is granted or implied by this authorization.
6. **Alaska Historic Preservation Act.** The Alaska Historic Preservation Act (AS 41.35.200) prohibits the appropriation, excavation, removal, injury, or destruction of any state-owned historic, prehistoric (paleontological) or archaeological site without a permit from the commissioner. Should any sites be discovered during the course of field operations, activities that may damage the site will cease and the Office of History and Archaeology in the Division of Parks and Outdoor Recreation (907) 269-8720 shall be notified immediately.
7. **Fuel and Hazardous Substances.** No fuel or hazardous substances are to be stored on the subject parcel. Prior written approval from the Authorized Officer or designee is required for a change in this restriction.
8. **Notification.** The permittee shall immediately notify DNR and DEC by phone of any unauthorized discharge of oil to water, any discharge of hazardous substances (other than oil), and any discharge of oil greater than 55 gallons on land. All fires and explosions must also be reported.

The DNR 24 hour spill report number is (907) 451-2678; the Fax number is (907) 451-2751. The DEC spill report number is (800) 478-9300. DNR and DEC shall be supplied with all follow-up incident reports.
9. **Compliance with Governmental Requirements; Recovery of Costs.** Permittee shall, at its expense, comply with all applicable laws, regulations, rules and orders, and the requirements and stipulations included in this authorization. Permittee shall ensure compliance by its employees, agents, contractors, subcontractors, licensees, or invitees.
10. **Violations.** This authorization is revocable immediately upon violation of any of its terms, conditions, stipulations, nonpayment of fees, or upon failure to comply with any other applicable laws, statutes and regulations (federal and state).
11. **Public Access.** All operations must be conducted in a manner that will ensure minimum conflict with other users of the area. There shall be no interference with free public use of state lands and waters.
12. **Site Restoration.** Upon expiration, completion, or termination of this authorization, the site shall be restored to a condition acceptable to the Authorized Officer.
13. **Assignment.** This permit may not be transferred or assigned to another individual or corporation.
14. **Inspection.** Authorized representatives of the State of Alaska shall have reasonable access to the subject parcel for purposes of inspection.

15. Site Maintenance. The area subject to this authorization shall be maintained in a neat, clean and safe condition, free of any solid waste, debris or litter.

16. Holes and Excavations. All Holes created as a result of the activities authorized under this permit shall be back-filled with sand, gravel, native materials, or a substitute approved by the Division.



C.4

**MEMORANDUM OF AGREEMENT BY AND BETWEEN THE NATIVE VILLAGE OF
VENETIE TRIBAL GOVERNMENT AND THE GEOPHYSICAL INSTITUTE OF THE
UNIVERSITY OF ALASKA FAIRBANKS**

Memorandum of Agreement

by and between

The Native Village of Venetie Tribal Government, in this document referred to as VENETIE, and the Geophysical Institute of the University of Alaska Fairbanks, in this document referred to as UNIVERSITY, jointly establish this agreement for the conditional use by the UNIVERSITY of the tribal lands controlled by VENETIE.

Whereas, the UNIVERSITY has successfully launched hundreds of rockets since 1968 from the Poker Flat Research Range, a research sounding rocket launch facility located at Chatanika, Alaska, and

Whereas, the Poker Flat Research Range engages in a government-funded public service mission of research and research support, and

Whereas, the UNIVERSITY and VENETIE have in the past established agreements to their mutual satisfaction for the support of scientific rocket launch and impact operations from Poker Flat Research Range, and

Whereas, the rocket launch program planned at Poker Flat Research Range for the year commencing July 1, 1989 through June 30, 1990 includes rocket launch directions and altitudes which include a mathematical probability of possible rocket vehicle impact points within the Venetie lands, and

Whereas, Poker Flat Research Range rules prohibit the launch of rockets where the mathematical probability is greater than one chance in 100 of rocket impact on lands for which permission for impact is not secured,

Therefore, this agreement for the use of Venetie Tribal Lands is documented and signed by the legally authorized representatives of VENETIE and the UNIVERSITY. The agreement in whole is as follows:

- (1) The UNIVERSITY agrees to pay to VENETIE the sum of One Thousand Dollars (\$1,000.00) for the use of Venetie Tribal Lands for each full year of this agreement, payable on or before July 31st of each year that this agreement remains in effect. However, for the period September 1, 1989 through June 30, 1990 the UNIVERSITY agrees to pay to VENETIE the sum of Seven Hundred and Fifty Dollars (\$750.00) for the use of Venetie Tribal Lands, payable upon finalization of this agreement by signature of all cognizant individuals.
- (2) The UNIVERSITY agrees to pay to the Arctic Village and the Venetie Village Traditional Councils Five Thousand Dollars (\$5,000.00) each per year for the right to launch two rockets for which there is a mathematical probability of impact on VENETIE tribal lands, as determined by the UNIVERSITY, of one chance in 100 or greater, regardless if these rockets are subsequently ever actually launched. These payments shall be made on or before July 31st of each year that this agreement remains in effect.
- (3) The UNIVERSITY agrees to pay to the Arctic Village and Venetie Village Traditional Councils an additional Two Thousand Five Hundred Dollars (\$2,500.00) each for each additional rocket launched from Poker Flat Research Range which has a mathematical probability of impact on VENETIE lands of one chance in 100 or greater. These payments shall be made within forty-five (45) days following the actual launch of a rocket which qualifies the two councils for compensation.

Memorandum of Agreement
by and between
UNIVERSITY and VENETIE

- (4) The UNIVERSITY will pay Five Hundred Dollars (\$500.00) each to the Arctic Village and Venetie Village Traditional Councils for each whole rocket motor or whole payload found by the citizens of Arctic Village and Venetie Village on VENETIE lands if the location is reported to the designated contact person for the UNIVERSITY and can be relocated by the UNIVERSITY within the agreement term.
- (5) The UNIVERSITY agrees to remove within a reasonable time any portions of rocket vehicles or payloads found on VENETIE lands and will attempt, where practical in the judgment of the UNIVERSITY, to engage the people of Arctic Village and Venetie Village to assist in removing those items for reasonable compensation.
- (6) The period of this agreement is from September 1, 1989 through June 30, 1990 and the agreement will be automatically renewed for successive terms of one year beginning on July 1 of each successive year unless notice is received by April 1st in writing at the offices specified below of either party's desire to discontinue or modify the agreement.
- (7) The UNIVERSITY agrees to save VENETIE and the Arctic Village and Venetie Traditional Councils from any liability for the actions of the UNIVERSITY and UNIVERSITY employees which result in property damage or casualty as a result of the rocket launch operations from Poker Flat Research Range.
- (8) This agreement supersedes any and all other agreements between the two parties. The interim agreement entered into by the two parties for the period July 15, 1989 through August 31, 1989 qualified the two village traditional councils for the initial payment as described in paragraph (3) above. This long-term agreement does not duplicate that initial payment qualification standard but continues where the interim agreement ended. Specifically, the initial sum of \$5,000.00 has been paid to each respective village council for the first two rockets qualifying under this agreement, for the year commencing July 1, 1989 and ending June 30, 1990.

This agreement is the complete understanding of the parties with respect to the subject matter hereof.

The contact person for the UNIVERSITY is:

Charles Deehr
Scientific Director
Poker Flat Research Range
Geophysical Institute
University of Alaska Fairbanks
Fairbanks Alaska 99775-0800

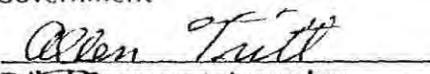
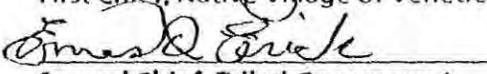
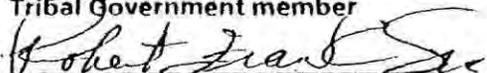
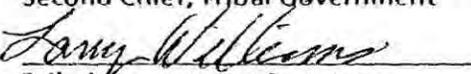
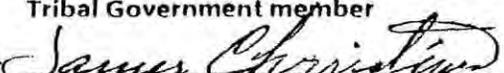
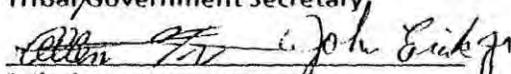
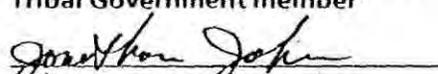
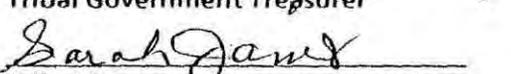
The contact person for VENETIE is:

Edchie Frank
Box 117
Venetie 99781
Ph- 849-8229

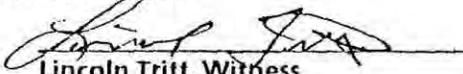
Memorandum of Agreement
by and between
UNIVERSITY and VENETIE

In witness hereof, the undersigned have signed this agreement this 22nd day of September 1989 in full understanding of its contents by the legally authorized representatives of VENETIE and the UNIVERSITY.

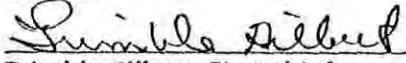
For VENETIE:

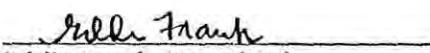
 Hudson Jones First Chief, Native Village of Venetie Tribal Government	 Allen Tritt Tribal Government member
 Ernest Erik Second Chief, Tribal Government	 Robert Frank Tribal Government member
 Larry Williams Tribal Government Secretary	 James Christian Tribal Government member
 John Erik Tribal Government Treasurer	 Jonathan John Tribal Government member
 Sarah James Tribal Government Sergeant at Arms	

In witness hereof:

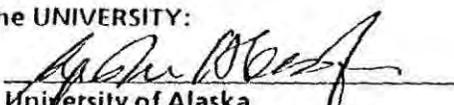

Lincoln Tritt, Witness
Arctic Village, Alaska

Concur:


Trimble Gilbert, First Chief
Arctic Village Traditional Council


Eddie Frank, First Chief
Venetie Village Traditional Council

For the UNIVERSITY:


University of Alaska
Synn-ichi Akasofu, Director
Geophysical Institute

C.5

**UNITED STATES DEPARTMENT OF THE INTERIOR, BUREAU OF LAND
MANAGEMENT, EASTERN INTERIOR FIELD OFFICE**

01/27/2010 WED 17:05 FAX 907 450 2120 Poker Flat Research Rnge

001/001

Form 2920-1
(February 2007)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
LAND USE APPLICATION AND PERMIT
(Sec. 302(b) of P.L. 94 - 579, October 21, 1976, 43 U.S.C. 1732)

FORM APPROVED
OMB NO. 1004-0009
Expires: December 31, 2007
FOR BUREAU OF LAND MANAGEMENT (BLM USE ONLY)
Application Number

1. Name: (first, middle initial, and last) Poker Flat Research Range	Address: (include zip code) C/O UA Land Management P.O. Box 755280 Fairbanks, AK 99775-5280	Phone: (include area code) 907-450-8133
--	---	---

2. Attach map or sketch showing public lands for which you are applying

3. Proposed date(s) of use: from **01/01/2010** to **12/31/2012**

4. Give legal basis for holding interest in lands in the State of _____
(Check appropriate box at right and explain.)

<input type="checkbox"/> Resident	<input type="checkbox"/> Partnership
<input type="checkbox"/> Corporation	<input type="checkbox"/> County
<input type="checkbox"/> Local Government	<input checked="" type="checkbox"/> State Government
<input type="checkbox"/> Other	

5. Are the lands now improved, occupied or used? Yes No (If "yes," describe improvements and purposes, identify users and occupants.)
Lands within the White Mountain National Recreation area contain a developed cabin/trail system for recreational use. The Steens Conservation Area and remaining BLM administered land are generally not occupied or improved.

6. Do you need access to the land? Yes No (Describe needed or existing access.)
Access is required to cleanup and remove rocket debris that may occur in these areas.

7a. What do you propose to use the lands for?
N/A

b. What improvements and/or land development do you propose? (To complete application processing, engineering and construction drawings may be required)
N/A

c. What is the estimated capital cost?
\$ 0

d. What is the source of water for the proposed use?
N/A

I CERTIFY that the information given by me in this application is true, complete, and correct to the best of my knowledge and belief and is given in good faith.

* *Patricia Reeh* * 1.27.10
(Signature of Applicant) (Date)

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious, or fraudulent statements or representations as to any matter within its jurisdiction.

(Continued on page 2)

8131

BLM 02/04/10 PM12:45



United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Eastern Interior Field Office
1150 University Avenue
Fairbanks, Alaska 99709
(907) 474-2200
Fax: (907) 474-2282
<http://www.blm.gov/ak>



IN REPLY REFER TO:
F-95084 (2920.01)

HAND DELIVERED BY *Wesley* ON DATE 2/8/10
RECEIVED BY *Alan S. [Signature]* ON DATE 2/8/10

DECISION

Permittee: University of Alaska Fairbanks Permit Application F-95084
Geophysical Institute-Poker Flat
Rocket Range
Address: PO Box 757320
City/ State: Fairbanks, AK 99775-7320

Land Use Authorized

Your land use proposal to retrieve rocket debris from BLM administered lands has been approved. This land use authorization is subject to the terms, conditions and stipulations attached to the grant. This authorization will terminate on December 31, 2012, and may be renewed at that time subject to compliance with the terms. If renewed, the land use authorization shall be subject to new regulations existing at the time of renewal and any other terms and conditions that the authorized officer deems necessary to protect public interest.

Please review the stipulations attached to the authorization and notify us in writing within 30 days of receipt of this letter if any information is not correct; otherwise you are confirming the information enclosed is correct and that you agree to the conditions and stipulations of this land use authorization.

Within 30 days of receipt of this decision, you have the right of appeal to the Interior Board of Land Appeals, Office of the Secretary, in accordance with the regulations at 43 CFR 4.400. If an appeal is taken, you must follow the procedures outlined on the enclosed Form 1842-1, Information on Taking Appeals to the Interior Board of Land Appeals.

If you feel this decision is adverse, it may be appealed to the Interior Board of Land Appeals, Office of the Secretary, in accordance with the regulations 43 CFR, Part 4 and the enclosed Form 1842-1. If an appeal is taken, your Notice of Appeal must be filed in this office (at the

above address) within 30 days from receipt of this decision. The appellant has the burden of showing that the decision appealed from is in error.

If you wish to file a petition pursuant to regulation 43 CFR 4.21 (58 Federal Register (FR) 4939, January 19, 1993) or 43 CFR 2804.1 for a stay of the effectiveness of this decision during the time that your appeal is being reviewed by the Board, the petition for a stay must accompany your notice of appeal. A petition of a stay is required to show sufficient justification based on the standards contained on Form 1842-1. Copies of the notice of appeal and petition for a stay **must** also be submitted to each party named in this decision and to the Interior Board of Land Appeals and to the appropriate Office of the Solicitor (see 43 CFR 4.413) at the same time the original documents are filed with this office. If you request a stay, you have the burden of proof to demonstrate that a stay should be granted.

Please contact Collin Cogley at (907) 474-2382 if you have any questions.

Sincerely,

Handwritten signature of Larry P. Jackson in blue ink. The signature is written in a cursive style and includes the text "Larry P. Jackson" and "acting for" written below it.

Lenore Heppler,
Field Manager
Eastern Interior Field Office

Attachments:

1. 2920 Land Use Permit – FF095084
2. Stipulations associated with Permit – FF095084
3. Appeal Information (Form 1842-1)

PERMIT			
Permission is hereby granted to Geophysical Institute, University of Fairbanks-Alaska, Poker Flat RR			Permit Number
of State of Alaska			FF-095084
to use the following described lands: BLM administered lands north of Fairbanks and east of the Dalton Highway			
TOWNSHIP	RANGE	SECTION	SUBDIVISION
T6N	R2E	1	Primary Township, but including all BLM administered lands north of Fairbanks and east of the Dalton Highway. Primary impact areas will be in the White Mountains National Recreation Area and Western Steese National Conservation Area.
Meridian	State	County	Acres (number)
Fairbanks	Alaska	NA	5

for the purpose of
Recovering rocket debris that may fall on BLM administered lands and any possible mitigation of the impact sites.

and subject to the following conditions:

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. This permit is issued for the period specified below. It is revocable at the discretion of the BLM, at any time upon notice. This permit is subject to valid adverse claims heretofore or hereafter acquired. 2. This permit is subject to all applicable provisions of the regulations (43 CFR 2920) which are made a part hereof. 3. This permit may not be assigned without prior approval of the BLM. 4. Permittee must not enclose roads or trails commonly in public use. 5. Authorized representatives of the Department of the Interior, other Federal agencies, and State and local law officials will at all times have the right to enter the premises on official business. 6. Permittee must pay the United States for any damage to its property resulting from the use. 7. Permittee must notify the BLM of address change immediately. 8. Permittee must observe all Federal, State, and local laws and regulations applicable to the premises and to erection or maintenance of signs or advertising displays including the regulations for the protection of game birds and game animals, and must keep the premises in a neat, orderly, and sanitary condition. 9. Permittee must pay the BLM, in advance, the lump sum of \$ _____ for the period of use authorized 16. Special conditions (attach additional sheets, if necessary)
 Special Stipulations attached.
 This will be a three year renewable permit with the option to renew. Permit fees will be \$250 annually as required. | <ol style="list-style-type: none"> by this permit or \$ 250.00 _____, annually, as rental or such other sum as may be required if a rental adjustment is made. 10. Use or occupancy of land under this permit will commence within _____ months from date hereof and must be exercised at least _____ days each year. 11. Permittee must take all reasonable precautions to prevent and suppress forest, brush, and grass fires and prevent pollution of waters on or in the vicinity of the lands. 12. Permittee must not cut any timber on the lands or remove other resources from the land without prior written permission from the BLM. Such permission may be conditioned by a requirement to pay fair market value for the timber or other resources. 13. Permittee agrees to have the serial number of this permit marked or painted on each advertising display or other facility erected or maintained under the authority of such permit. 14. This permit is subject to the provisions of Executive Order No. 11246 of September 24, 1965, as amended, which sets forth the Equal Opportunity clauses. A copy of this order may be obtained from the BLM. 15. Permittee acknowledges, by signing below, that he/she knows, understands and accepts the terms and conditions under which this permit is issued. |
|---|---|

Permit issued for period From <u>01/01/2010</u> To <u>12/31/2012</u>	Mari E. Montgomery, Director UA Land Management <u>Mari E. Montgomery</u> 01-28-10 (Permittee) <u>[Signature]</u> (BLM) <u>Filo Managau</u> 2/5/10 (Title) (Date)
--	---

INSTRUCTIONS

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. Submit, in duplicate, to any local office of the Bureau of Land Management having jurisdiction of the lands. 2. Applications for Land Use Permits will not be accepted unless a notification of the availability of the land for non-BLM use (Notice of Realty Action) has been published in the Federal Register and for 3 weeks thereafter in a newspaper of general circulation. This provision does not apply in those situations where the publication of | <ol style="list-style-type: none"> a (Notice of Realty Action) has been waived by the BLM. 3. If the annual rental exceeds \$250 dollars per year, costs of processing the application must be paid by the applicant in advance. 4. The BLM may require additional information to process an application. Processing will be deferred until the required information is furnished by the applicant. |
|--|--|

(Continued on page 3)

(Form 2920 1, Page 2)

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NOTICES

The Privacy Act of 1974 and the regulation in 43 CFR 2.48(d) provide that you be furnished the following information in connection with information required by this application for a Land Use Permit.

AUTHORITY: 43 U.S.C. 1201; 43 CFR Part 2920

PRINCIPAL PURPOSE: The information is to be used to process your application.

ROUTINE USES: (1) The adjudication of the applicant's request for a Land Use Permit. (2) Documentation for public information. (3) Transfer to appropriate Federal agencies when concurrence is required prior to granting a right in public lands or resources. (4)(5) Information from the record and/or the record will be transferred to appropriate Federal, State, local or foreign agencies, when relevant to civil, criminal or regulatory investigations or prosecutions.

EFFECT OF NOT PROVIDING INFORMATION: Disclosure of the information is voluntary. If all the information is not provided, the application may be rejected.

The Paperwork Reduction Act of 1995 requires us to inform you that:

Information is needed to process application for land use authorizations, pursuant to 43 CFR Section 2920.

Information shows if the applicant and proposed user meet the requirements of 43 CFR Section 2920.1.

Applicant must respond before he/she can be granted an authorization to use public lands.

BLM would like you to know that you do not have to respond to this or any other Federal agency-sponsored information collection unless it displays a currently valid OMB control number.

BURDEN HOURS STATEMENT: Public reporting burden for this form is estimated to average 1 hour per response for the majority of responses, including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. For proposed uses the scope of which is more complex, the public reporting burden is estimated to average 120 hours per response. Direct comments regarding the burden estimate or any other aspect of this form to U.S. Department of the Interior, Bureau of Land Management (1004-0009), Bureau Information Collection Clearance Officer (WO-630), 1849 C Street, N.W., Mail Stop 401 LS, Washington, D.C. 20240.

(Form 2920-1, page 3)

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SPECIAL STIPULATIONS for Land Use Permit FF095084

These Special Stipulations are in addition to the stipulations found on the Land Use Permit, and apply to use of BLM managed public lands.

BLM Contact Points- Lenore Heppler, Field Office Manager, or Collin Cogley, Resource Specialist, will be your primary points of contacts for reporting and involvement in any unscheduled event that may take place.

Lenore Heppler – 474-2320

Collin Cogley - 474-2382

Home -479-8357

- This authorization is for the use of BLM administered lands only.
- The Bureau of Land Management shall not be held responsible or liable for any injury or damage from any rocket component impact to the public, their personal equipment or property including dog teams or structures.
- Permittee will post, three days prior to launch, notices of planned rocket launches over BLM administered lands at the following trail heads:

Steese Highway

McKay Creek Trailhead, mile 42.5

Davidson Ditch Wayside, mile 57

Elliott Highway

Wickersham Dome Trailhead, mile 28

Colorado Creek Trailhead, mile 57

- Annual Information: The permittee shall provide BLM with a list of tentative launch dates by November 1st of the year preceding any proposed rocket launches. The permittee shall provide BLM with a list of impact sites on BLM managed lands by May 31 after each launch season. At least two weeks prior to recovery, the permittee shall provide BLM with a list of recovery sites on BLM managed lands, as well as the planned time period (weeks) of recovery actions. Some restrictions may be applied at that time to avoid impacts to sensitive wildlife resources. Impact and recovery sites may be identified by GPS coordinates or plotted on a 1:250,000 scale topographical map.
- Access: The permittee must comply with all Special Rules and Regulations for the White Mountains National Recreation Area, the Beaver and Birch Creeks National Wild and Scenic River Prohibited Acts and the Steese National Conservation Area. Any overland moves shall be done within the confines of current OHV regulations pertaining to the area or be limited to winter between December 1 and April 15 and with a minimum of 6 inches of snow cover and 12 inches of frost depth are present. A map showing the motorized use areas in the White Mountains NRA and Steese NCA is attached as part of this permit.

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- **Site Rehabilitation:** The permittee accepts responsibility for the condition of any impact sites and will be liable for all site damages, which occur as a result of the activity. Any excavation or disturbance during the recovery needs to be filled to avoid water ponding, soil erosion or thermokarsting from these activities. If the permittee fails to restore the site, they will be held liable for the cost of restoration.
- **Vegetation Clearing:** Minor clearing of brush, less than 20 foot by 20 foot total area, for extracting rocket parts is allowed by this permit, although extensive clearing of trees or brush for helipads is prohibited.
- **Refuse:** All refuse will be hauled out by the permittee and disposed of in a proper landfill. This includes any partially burned items and the removal of any markers or survey tape associated with this trip.
- **Cultural and Paleontological Resources:** The Antiquities Act of June 8, 1906 (34 Stat. 225; 16 USC 431-433), prohibits the appropriation, excavation, injury, or destruction of any historic or prehistoric ruin or monument, or any object of antiquity, situated on lands owned or controlled by the United States. The Archaeological Resource Protection Act, P.L. 96-95 protects archaeological resources and sites on public lands by providing stiff penalties to those found guilty of excavation, removing, transporting or selling these resources without a permit. The Act provides the Bureau and other Federal land managers with a strong legal position from which to curtail the illegal removal and excavation of cultural resources from the public lands. No historic site, archaeological site, or camp, either active or abandoned, shall be disturbed in any manner or shall any item be removed there from. Should such sites be discovered during the course of field operations the Authorized Officer will be promptly notified.
- **Hazardous Materials:** All rocket components will be removed from the public lands within three years of the last general range clean-up. All rocket components, including unspent propellant, will be removed from the public lands as soon as reasonable access is available if it is determined by BLM or permittee the component(s) are a hazard to the public or resources. Appropriate spill response equipment and supplies should be on hand when hazardous materials or petroleum products are being used. It is recommended that secondary containment or drip pans be placed under all fuel container inlet and outlet points, hose connections and hose ends during fuel transfers. All petroleum product or hazardous material spills outside secondary containment should be cleaned up immediately taking precedence over all other matters except health and safety of personnel and, reported within 24 hours to the DEC at (907) 478-9300.
- **Use of Aircraft and Improvement of Airstrips:** This permit does not authorize construction of new airstrips or helicopter landing areas. Use of helicopters and commercial air services are already allowed without permit in the resource management plan. Actual construction of new strips or helipads by extensive clearing would require conformance with FAA guidelines, and a long-term authorization such as a lease. Minor improvements, such as moving rocks or logs, to allow an area to be used for aircraft landings must be conducted under the limitations of 43 CFR 8365.1-5 to limit impacts to

BLM 02/04/10 PM12:46

vegetation and soils. This permit does not authorize exclusive use of airstrips on Public Lands.

- Fire: Gas powered equipment shall be equipped with manufacturer approved and functional spark arresters. Helicopters used for any activity, which requires landing in wildland fuels, must have the exhaust/cooling system located high on the fuselage. Helicopters, which have exhaust/cooling systems that are located low on the fuselage and expels the exhaust straight back or downward, may not be used. Any helicopter that has a history of igniting wildland fuels when they land may not be used.
- All operations will be conducted in such a manner as not to cause damage or disturbance to any fish or wildlife and subsistence resources.
- All activities shall be conducted so as to avoid or minimize disturbance to vegetation.
- Appropriate action will be taken to clean equipment used to recover rocket debris to prevent propagating invasive and noxious weeds and plant species at recovery sites.
- All operations must not impede rural residents from pursuing their traditional subsistence activities (ANILCA, PL 96-487).

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UNIVERSITY
of ALASKA
Many Traditions One Alaska

LETTER OF TRANSMITTAL

TO: Collin Cogley
Resource Specialist
Bureau of Land Management
1150 University Ave
Fairbanks, AK 99709-3844

DATE: February 1, 2010
SUBJ: LUP FF-095084

I am transmitting the following items:

NUMBER OF COPIES	DESCRIPTION
2	Land Use Permit FF-095084 w/UA original signatures
1	LUP Application for FF-095084

These are transmitted:

For Your Approval Returned for Corrections As Requested
 Resubmit for Review For your Review For your Records

Remarks: Collin, I have included the application for your records. Please forward a fully executed copy of the Land Use Permit to the address below. I will forward a copy to Poker Flat. I will also inform you when the launch(s) have been completed. Thanks for all of your help. It was nice being able to meet you.

cc: _____

UNIVERSITY OF ALASKA
LAND MANAGEMENT

Dian Siegfried, Administrative Assistant

Land Management
910 Yukon Drive • Suite 106
P.O. Box 755280 • Fairbanks, Alaska 99775
Phone: (907) 450-8133 • Fax: (907) 450-8131

BLM 02/04/10 PM12:45

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APPENDIX D

**ALASKA NATIONAL INTEREST LANDS CONSERVATION ACT SECTION 810(A)
SUMMARY OF EVALUATIONS AND FINDINGS**

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APPENDIX D. ALASKA NATIONAL INTEREST LANDS CONSERVATION ACT SECTION 810(A) SUMMARY OF EVALUATIONS AND FINDINGS

D.1 INTRODUCTION

This summary of evaluations and findings has been prepared to comply with the requirements incumbent upon the U.S. Fish and Wildlife Service and Bureau of Land Management as established by Title VIII, Section 810, of the Alaska National Interest Lands Conservation Act (ANILCA). It evaluates the potential restrictions on subsistence activities that could result from implementation of the alternatives considered in the National Aeronautics and Space Administration (NASA's) *Draft Environmental Impact Statement for the Sounding Rockets Program at Poker Flat Research Range (PFRR EIS)*.

As described in this environmental impact statement (EIS), the NASA Sounding Rockets Program (SRP) has conducted missions from Poker Flat Research Range (PFRR) in interior Alaska since the late 1960s. This EIS evaluates four action alternatives that include continuation of the SRP at PFRR with varying amounts of search and recovery to retrieve payloads and spent rocket stages. This EIS also evaluates a No Action Alternative, in which SRP operations, including launches and subsequent search and recovery efforts, would continue as currently conducted.

Chapters 3 and 4 of this EIS provide a detailed description of the baseline conditions and the potential adverse effects on subsistence of the alternatives. The analysis in this appendix leverages the detailed information presented in this EIS to evaluate the potential impacts on subsistence pursuant to Section 810(a) of ANILCA.

D.2 THE EVALUATION PROCESS

Section 810(a) of ANILCA states:

“In determining whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands...the head of the Federal agency...over such lands...shall evaluate the effect of such use, occupancy, or disposition on subsistence uses and needs, the availability of other lands for the purposes sought to be achieved, and other alternatives which would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes. No such withdrawal, reservation, lease, permit, or other use, occupancy or disposition of such lands that would significantly restrict subsistence uses shall be affected until the head of such Federal agency:

1. gives notice to the appropriate State agency and the appropriate local committees and regional councils established pursuant to Section 805;

2. gives notice of, and holds, a hearing in the vicinity of the area involved; and
3. determines that (a) such a significant restriction of subsistence uses is necessary, consistent with sound management principles for the utilization of the public lands, (b) the proposed activity would involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or other disposition, and (c) reasonable steps would be taken to minimize adverse impacts upon subsistence uses and resources resulting from such actions.”

To determine if a significant restriction of subsistence uses and needs may result from any one of the alternatives discussed in this EIS, the following three factors in particular are considered:

- A reduction in subsistence uses due to factors such as direct impacts on the resource, adverse impacts on habitat, or increased competition for the resources;
- A reduction in the subsistence uses due to changes in the availability of resources caused by an alteration in their distribution, migration, or location; and
- A reduction in subsistence uses due to limitations on the access to harvestable resources such as physical or legal barriers.

Subsistence evaluations and findings under ANILCA Section 810 also must consider cumulative impacts. In the context of this evaluation, cumulative impacts are additive limitations on subsistence uses or resources caused by the proposed alternatives when considered within the context of past, present, and future activities affecting those same uses or resources. Cumulative impacts are discussed in Chapter 4, Section 4.1.5, of this EIS.

When analyzing the effects of the five alternatives, those villages that may harvest subsistence resources within or adjacent to the PFRR flight zones are considered (see Section D.4, below).

D.3 PROPOSED ACTION ON FEDERAL LANDS

Chapter 2 of this EIS (“Description and Comparison of Alternatives”) describes in detail the alternatives under consideration. Following is a brief summary of each. The primary focus of activity would take place within the PFRR flight zones, which include Federal, state, and Tribal lands.

Under either alternative, the use of Federal lands would be required for the landing and recovery of flight hardware. As such, the U.S. Fish and Wildlife Service (USFWS) and the U.S. Bureau of Land Management would be required to respond to a request for such authorization, thereby taking an action connected to those alternatives proposed by NASA below.

D.3.1 No Action Alternative – Continue NASA SRP at PFRR in its Present Form and at the Current Level of Effort

Under the No Action Alternative, the SRP activities at PFRR would continue in their present form and at the current level of effort (approximately four launches per year). NASA would continue to avoid the Mollie Beattie Wilderness Area within Arctic NWR. Under this alternative, no significant efforts would be taken to recover spent stages unless desired for programmatic reasons, and payloads would be recovered as planned by the scientists. See Chapter 2, Section 2.3.1, of this EIS, for a full description of this alternative.

D.3.2 Alternative 1 – Continue NASA SRP Activities and Flights at PFRR within Existing Flight Zones, with Environmental Screening for Recovery of New and Existing NASA Stages and Payloads (Environmentally Responsible Search and Recovery Alternative)

Alternative 1 would continue NASA SRP launch and recovery operations at PFRR as in the recent past with enhanced efforts to track and locate existing spent stages and payloads. Launches would average 4 per year with a maximum of 8 per year. Attempts would be made to recover newly expended stages and payloads within the PFRR flight corridor. Spent stages and payloads would be recovered in an environmentally responsible manner if it is determined that they can be recovered safely. See Chapter 2, Section 2.3.2, of this EIS, for a full description of this alternative.

D.3.3 Alternative 2 – Continue NASA SRP Activities and Flights at PFRR within Existing Flight Zones, with Removal of Spent Stages and Payloads (Maximum Cleanup Search and Recovery Alternative)

Alternative 2 is the same as Alternative 1, except maximum practicable effort would be exerted to recover newly expended and existing spent stages from downrange lands if it is determined that they can be recovered safely, even if the efforts result in some long-term environmental impacts. See Chapter 2, Section 2.3.3, of this EIS, for a full description of this alternative.

D.3.4 Alternative 3 – Continue NASA SRP Activities and Flights at PFRR with Restricted Trajectories to Reduce Impacts on Designated Environmentally Sensitive Areas (Environmentally Responsible Search and Recovery Alternative with Restricted Trajectories)

Alternative 3 is the same as Alternative 1, except trajectories of future NASA launches would be restricted to reduce the possibility of stages or payloads landing within areas identified as environmentally sensitive, such as designated Wilderness or Wild and Scenic Rivers. See Chapter 2, Section 2.3.4, of this EIS, for a full description of this alternative.

D.3.5 Alternative 4 – Continue NASA SRP Activities and Flights at PFRR with Restricted Trajectories to Reduce Impacts on Designated Environmentally Sensitive Areas (Maximum Cleanup Search and Recovery Alternative with restricted Trajectories)

Alternative 4 would be the same as Alternative 2, except trajectories of future PFRR missions would be restricted to reduce the possibility of payloads or stages landing within areas identified as environmentally sensitive, such as designated Wilderness or Wild and Scenic Rivers. See Chapter 2, Section 2.3.5, of this EIS, for a full description of this alternative.

D.4 AFFECTED ENVIRONMENT

The region of influence (ROI) for subsistence use resources includes communities under or within 37 kilometers (20 nautical miles) of the PFRR launch site and flight corridor. These communities include Arctic Village, Beaver, Birch Creek, Central-Circle Hot Springs, Chalkyitsik, Circle, Coldfoot, Fort Yukon, Kaktovik, Livengood, Stevens Village, Venetie, and Wiseman. The ROI includes these areas because there are communities directly under the PFRR flight zones or ones that may travel into the areas beneath the flight zones to harvest subsistence resources in response to wildlife or vegetation availability (see **Figures D–1** through **D–9** for composite subsistence use maps for the larger communities). A distance of 37 kilometers (23 miles) was used as a best estimate for the maximum distance traveled without the use of aircraft to harvest subsistence resources. Detailed characteristics of these communities and the Game Management Units (GMUs) in which these communities are located and characteristics of the Federal and state subsistence uses, are provided in Chapter 3, Section 3.10, Table 3–17, of this EIS.

The PFRR launch site is within the Fairbanks North Star Borough, which is considered a nonrural area under Federal subsistence regulations and a non-subsistence area under State regulations. Therefore, it is assumed that subsistence activities are not conducted in the immediate vicinity of the PFRR launch site.

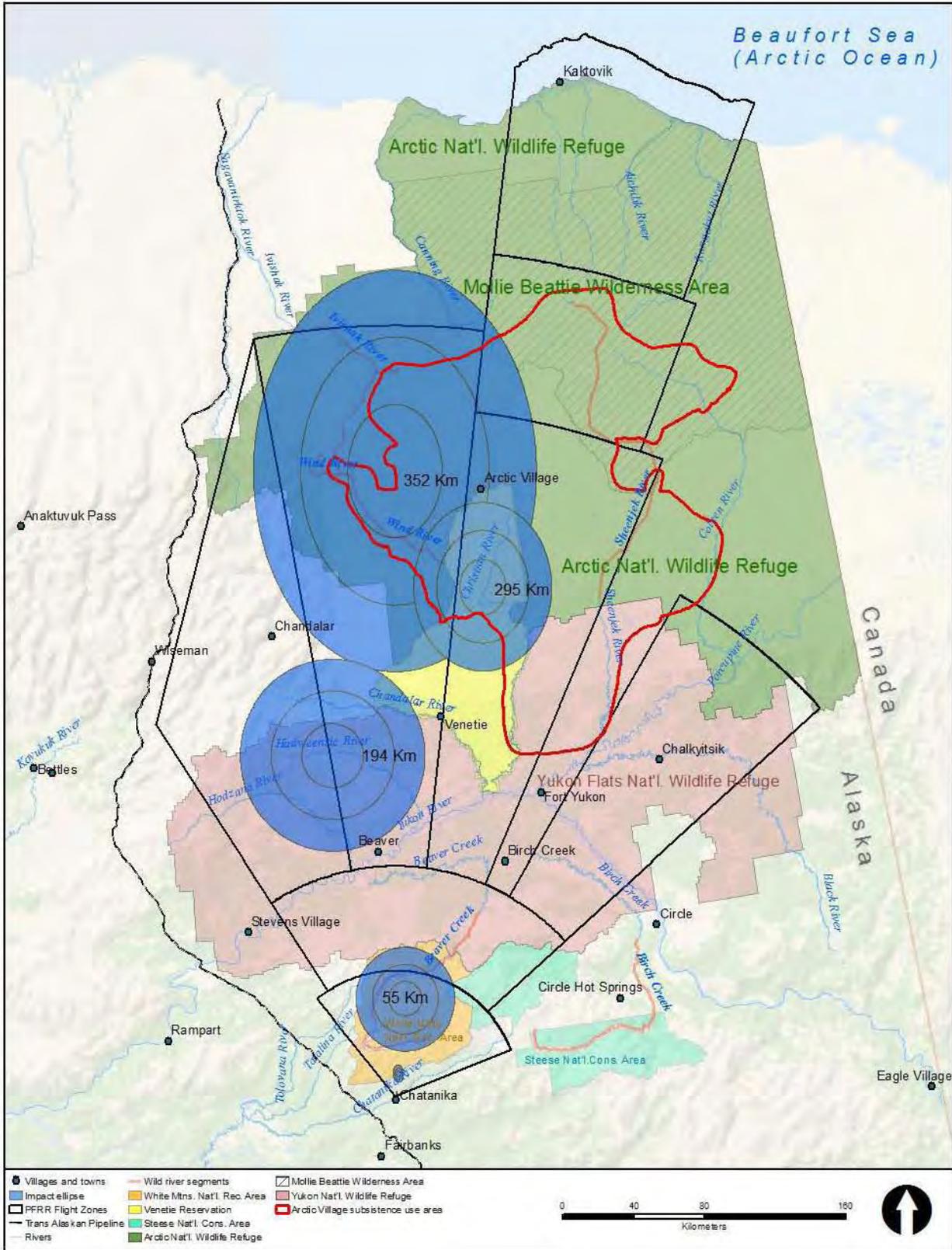


Figure D-1. Primary Subsistence Use Area Surrounding Arctic Village

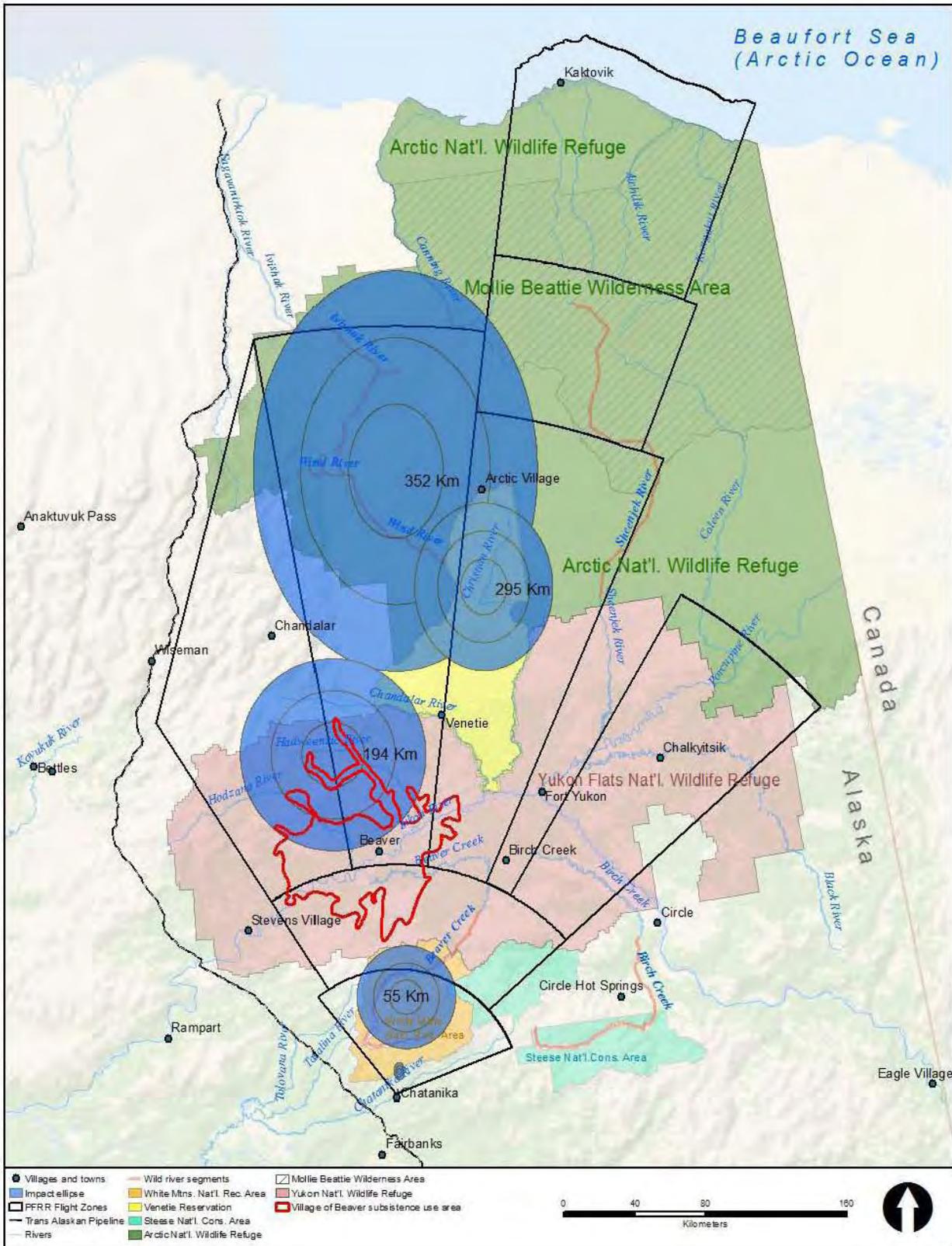


Figure D-2. Primary Subsistence Use Area Surrounding Beaver

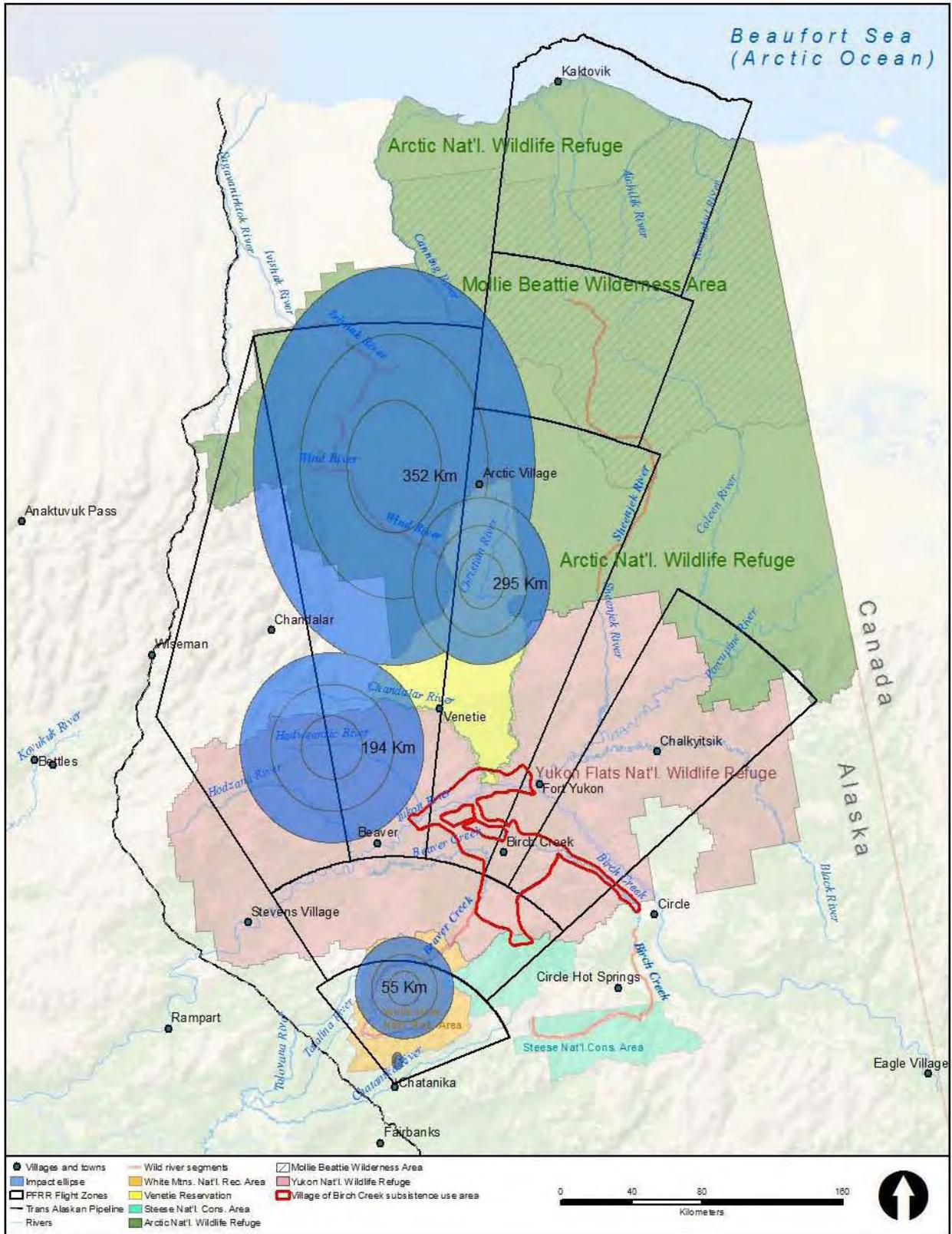


Figure D-3. Primary Subsistence Use Area Surrounding Birch Creek

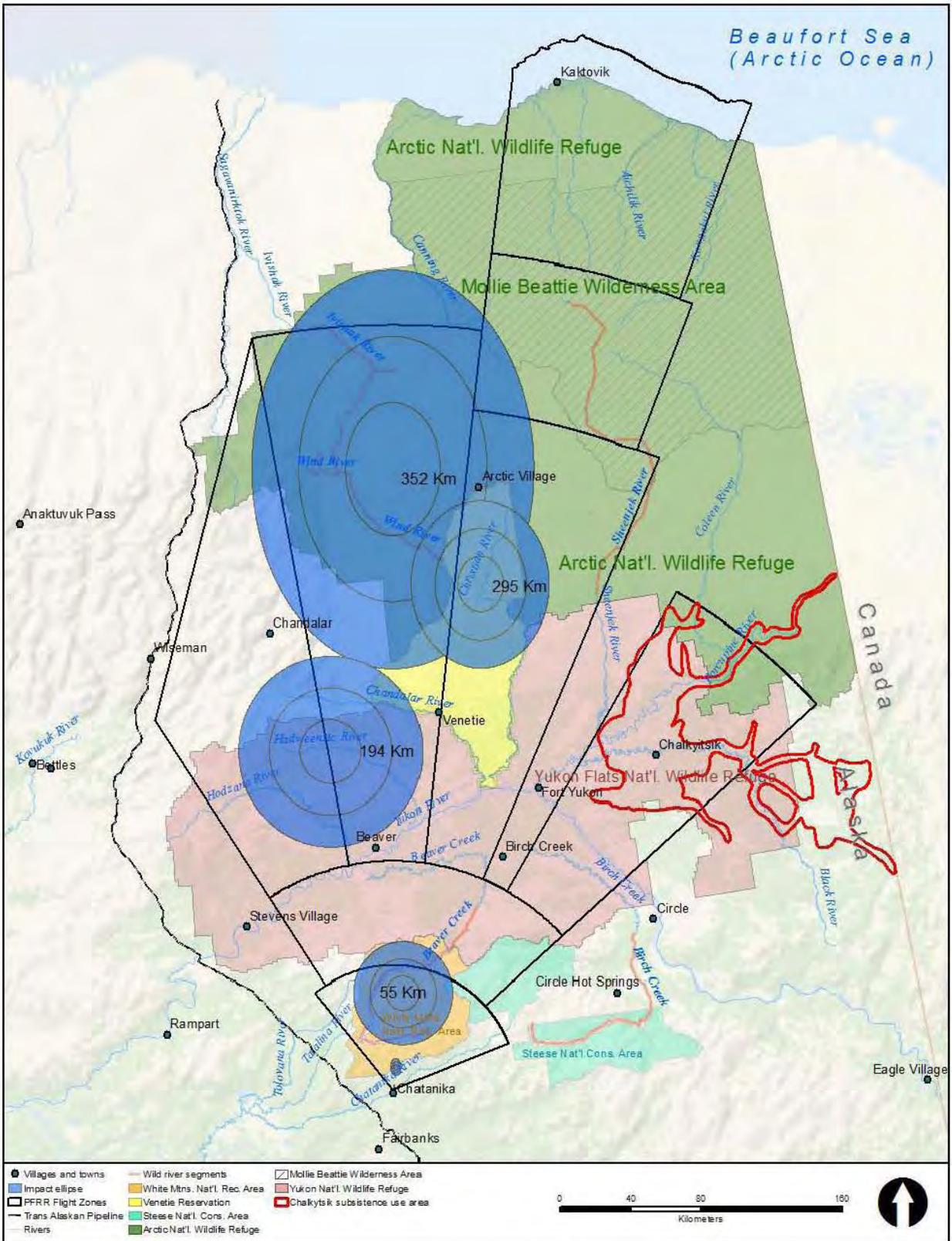


Figure D-4. Primary Subsistence Use Area Surrounding Chalkyitsik

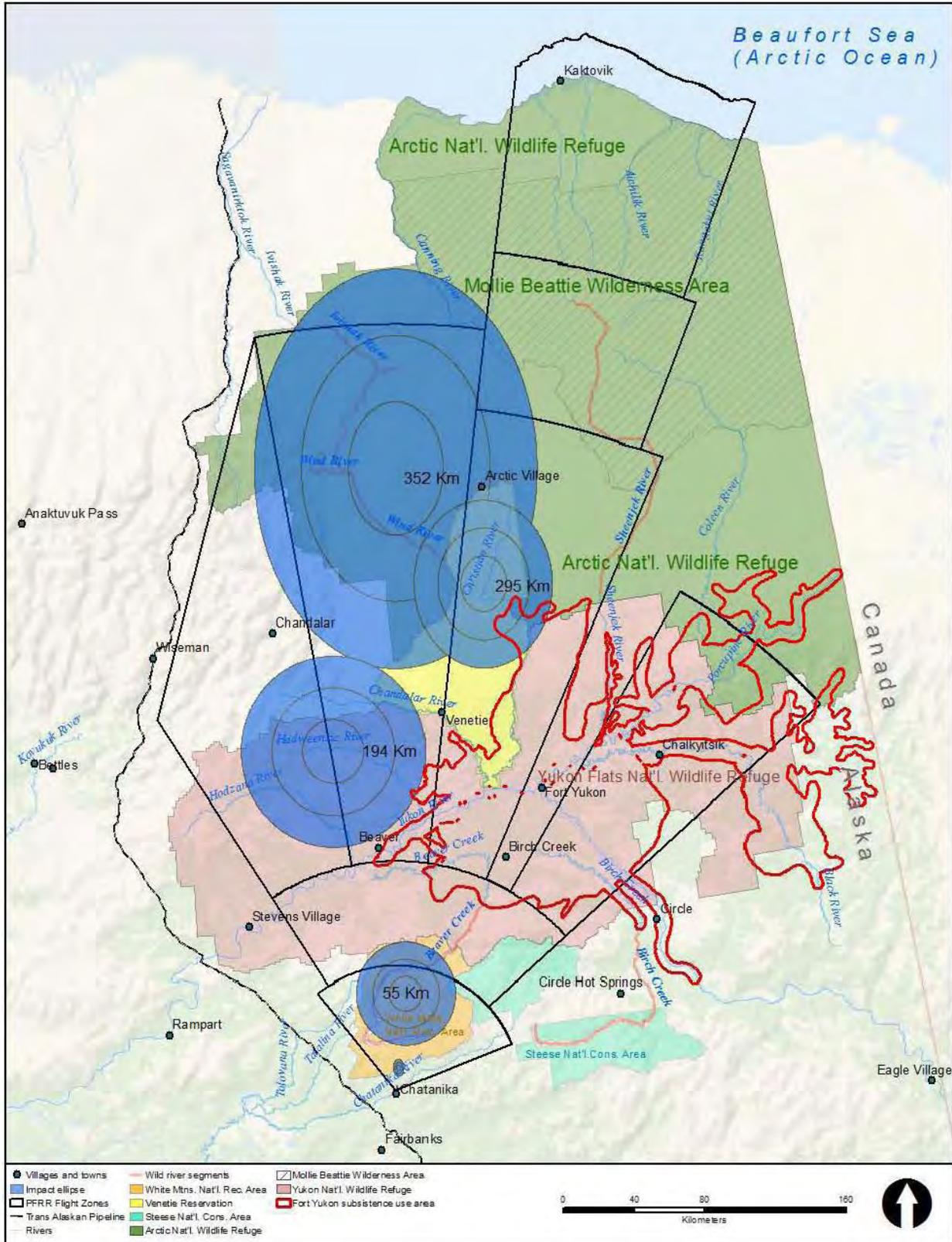


Figure D-5. Primary Subsistence Use Area Surrounding Fort Yukon

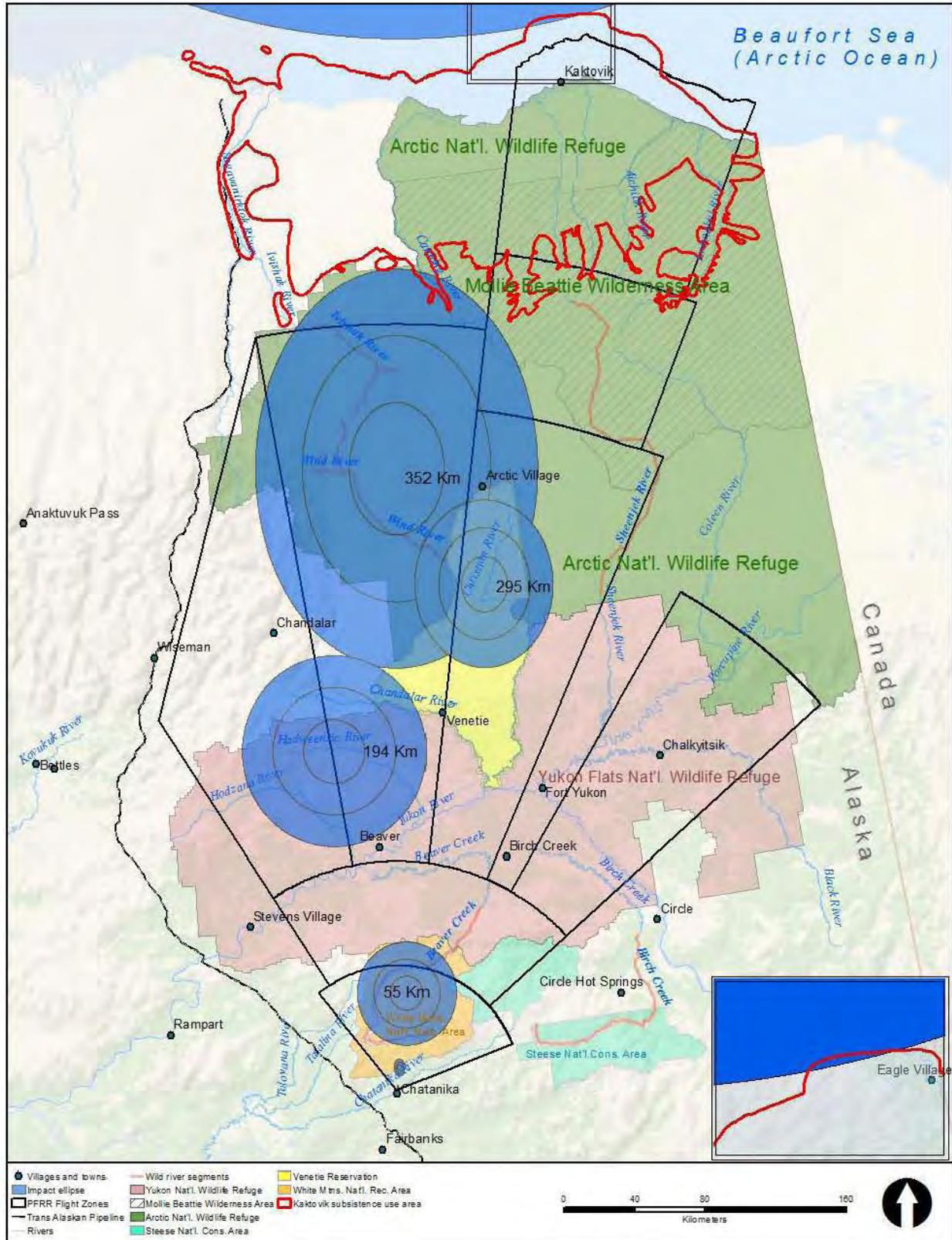


Figure D-6. Primary Subsistence Use Area Surrounding Kaktovik

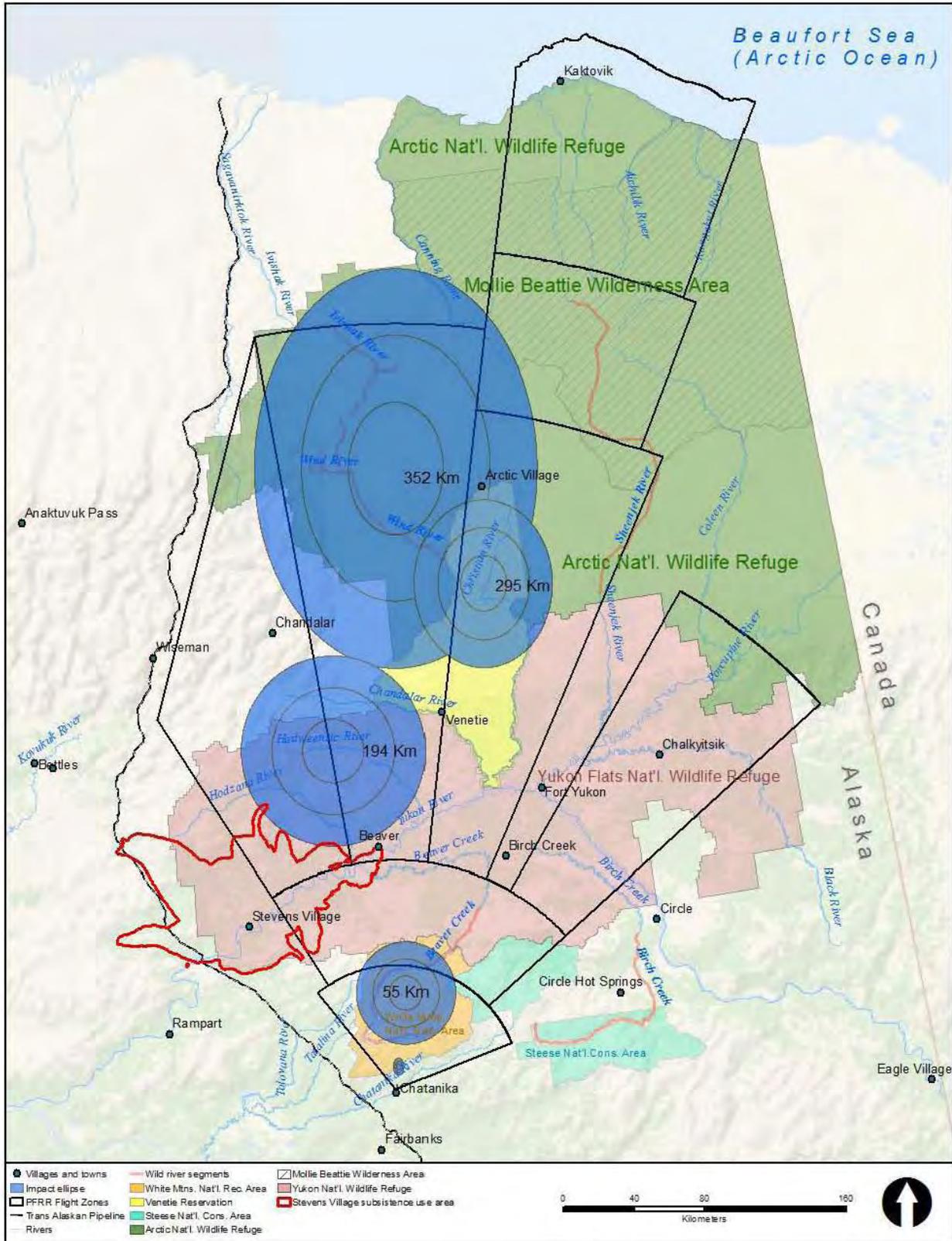


Figure D-7. Primary Subsistence Use Area Surrounding Stevens Village

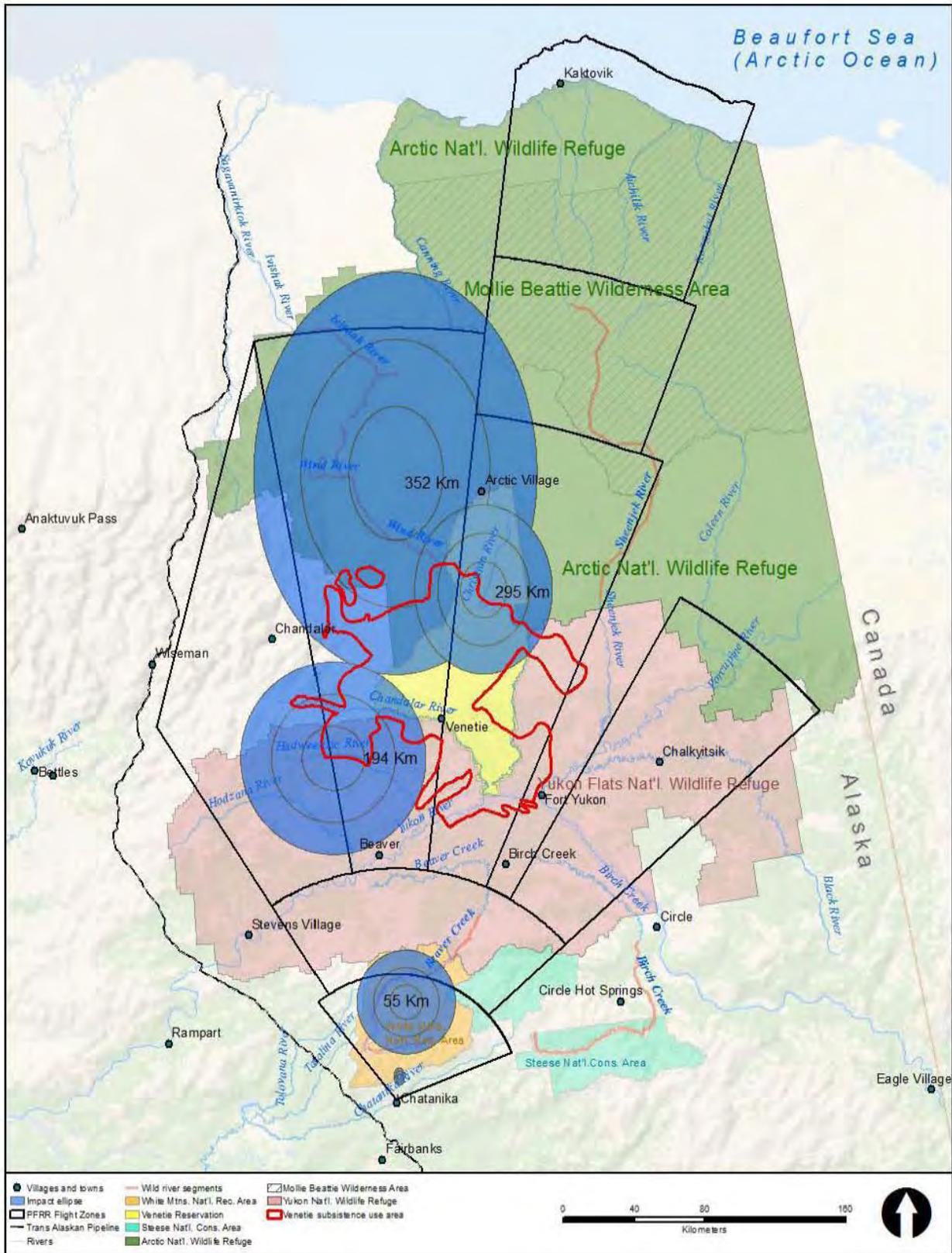


Figure D-8. Primary Subsistence Use Area Surrounding Venetie

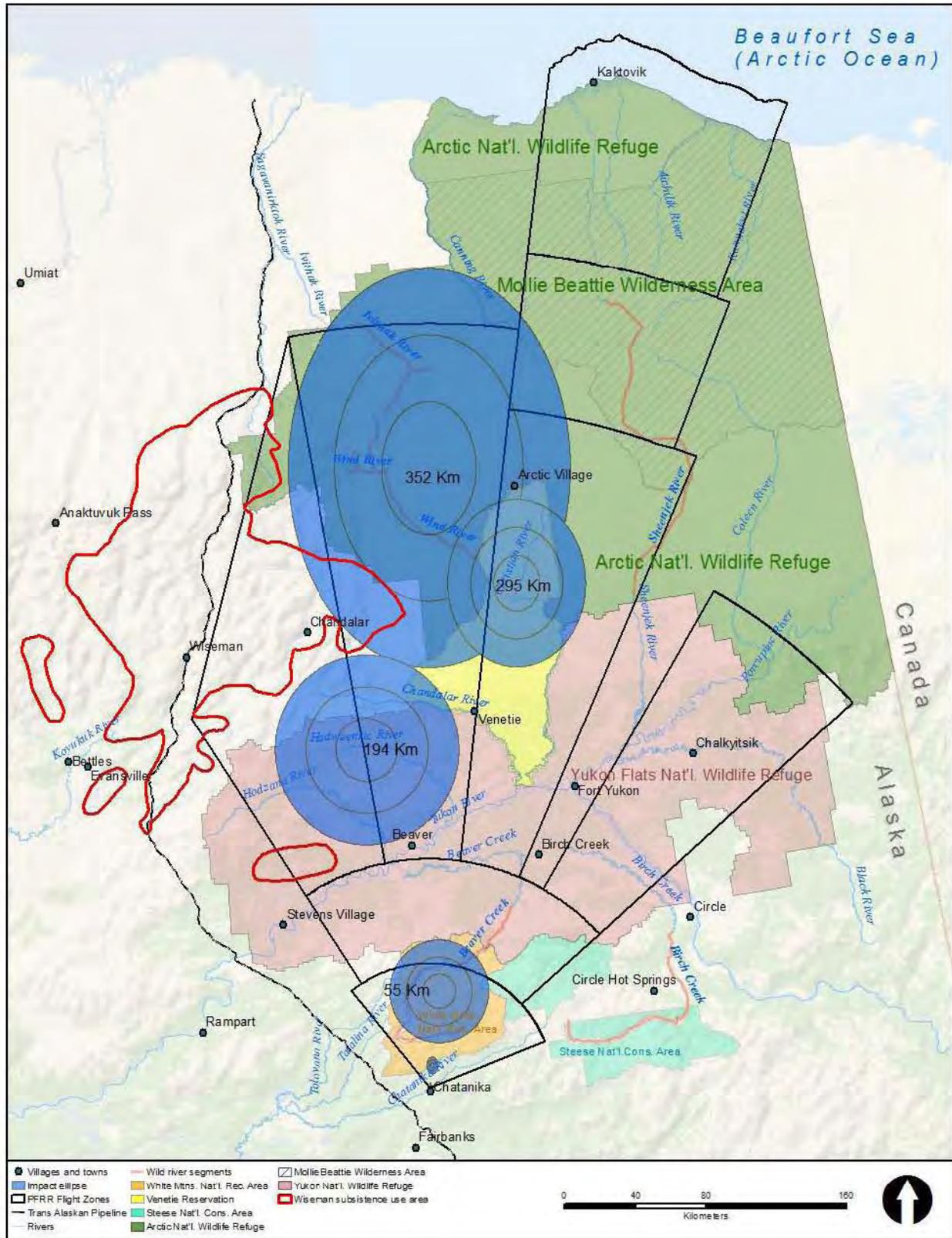


Figure D-9. Primary Subsistence Use Area Surrounding Wiseman

Available Resources

Within the PFRR launch corridor, many subsistence based communities rely on fishing for both salmon and non-salmon species, and hunting and trapping large and small land mammals, and a variety of bird species. Fish is one of the most reliable sources of meat that can be harvested nearly year-round either through nets or ice fishing. The Yukon River, the Chandalar River, the Black River, and the Porcupine River are main providers of salmon species (**Caulfield 1983**). A number of other lakes and creeks within the PFRR flight zones provide non-salmon species. Land mammals such as caribou, moose, and Dall sheep in particular are used as sources of meat. These species are often hunted by boat or snowmachine as they are usually found in close proximity to rivers. Furbearers, including muskrat, lynx, beaver, and wolf are commonly pursued for use in traditional garments. Waterfowl are hunted as food sources, particularly in the spring and early fall months. Marine mammals can be harvested for subsistence purposes, but only by Alaska Natives, as permitted in the Marine Mammals Protection Act (**16 U.S.C. 1361 et seq.**). The regulations governing subsistence harvests of marine mammals are co-managed by Alaska Natives, USFWS, and the National Marine Fisheries Service. In addition to caribou, Dall sheep, small mammals, migratory birds, and fish, the Kaktovik community is dependent on the subsistence hunting of marine mammals, including bowhead whale, bearded seal, ringed seal, and occasionally polar bears (**Bacon et al. 2009**).

Seasonality of Activities

Harvesting vegetation such as berries or other roots or vegetables typically occurs in late summer as the vegetation ripens. Subsistence hunting and trapping are regulated by the hunting and trapping seasons established by species. These seasons can vary among the GMUs and between Federal and state regulations, depending on the population of the species in question. For example, on Federal and state lands, there is no closed season for black bears in GMU-25 (**ADF&G 2011; USFWS 2010a**). For caribou, open season in GMU-25 is different, depending on the GMU subunit. In portions of GMU-25A, there is no closed season for hunting caribou bulls; however, hunting caribou cows is not permitted between early July and mid-May (**ADF&G 2011; USFWS 2010a**). Therefore, subsistence activities occur year-round, depending on the open seasons and availability of the variety of vegetation and wildlife species harvested.

Geographic Extent of Activities

As a component of previously conducted studies, several of the villages within the PFRR flight corridor have identified areas within which subsistence activities would be expected on a regular basis. Maps of the various subsistence use areas for the larger villages included in this appendix (Figures D-1 through D-9) were identified during the *Yukon Flats Land Exchange Final EIS* (**USFWS 2010b**) and the *Arctic National Wildlife Refuge Draft Revised Comprehensive Conservation Plan* (**USFWS 2011**). These areas are defined by a number of factors including habitat and migration patterns of the wildlife and accessibility of the areas to individuals participating in subsistence. It is recognized that these do not likely represent the full geographic extent of subsistence activities within the ROI; however, they can be viewed in relation to the “typical” impact areas of spent stages and payloads to identify the communities mostly likely affected. Of these subsistence use areas, the areas for Arctic Village, Beaver, Fort Yukon, and

Venetie overlap probable impact points for spent stages and payloads. As a result, subsistence activities conducted by residents in these villages are more likely to experience potential impacts as a result of continued launches from PFRR. Information on subsistence use areas associated with the smaller villages or towns (Coldfoot, Chandalar, and Livengood) is not readily available but it is likely that the Chandalar use area would overlap with probable impact points and that the Coldfoot use area would be similar to the Wiseman subsistence use area given the proximity of the two.

D.5 SUBSISTENCE USES AND NEEDS EVALUATION

In 1980, Congress established a framework for protecting subsistence uses by both Native Alaskans and non-Native Alaskans in Title VIII of ANILCA. Title VIII authorizes the State of Alaska to regulate subsistence uses on Federal public lands if several requirements are met.

The State of Alaska managed statewide subsistence harvests until late 1989, when the Alaska Supreme Court ruled that the residency preference required by Federal law violated the Alaska Constitution. The state was unable to come into compliance and on July 1, 1990, the Federal Government assumed responsibility for the management of subsistence taking of wildlife on Federal public lands in Alaska. Further litigation and court decisions resulted in the October 1, 1999, assumption of Federal subsistence fisheries management in Alaskan rivers and lakes within and adjacent to Federal public lands.

The Federal Government, through the Federal Subsistence Board, manages subsistence use of fish and wildlife resources on Federal lands, and the State of Alaska, through the Boards of Fisheries and Game, manages general subsistence and commercial use of fish and wildlife resources on non-federal lands and National Preserve lands open to multiple use. The Federal and state management systems operate under individual legislation and enforce separate regulations.

Both Federal and state laws define subsistence as the “customary and traditional” uses of wild resources for food, clothing, fuel, transportation, construction, art, crafts, sharing, and customary trade. Customary and traditional uses of fish and game are important to Alaskans from diverse cultural backgrounds.

Federal and state law differs in who qualifies for subsistence uses. Under Federal law, only local rural residents and communities with customary and traditional use of Federal lands qualify for subsistence fishing and hunting on Federal lands. Currently, all state residents qualify for subsistence fishing and hunting under state law.

Within the PFRR flight zones, Federal subsistence use is permitted on federally-owned land and state subsistence use is permitted on state-owned land. For Alaskan native land, such as the land owned by Doyon, Limited, subsistence use is permitted under state regulations, but Doyon, Limited, controls access to the lands. On federally owned land, state general hunting is also allowed unless specifically closed by federal law.

D.5.1 Potential Impacts on Subsistence

Potential impacts on subsistence from the alternatives considered in this EIS include impacts on wildlife and the harvest of wildlife from the noise and disturbance created by the launch and re-entry of the sounding rockets and the fixed-wing aircraft and helicopters used in the search and recovery operations. Impacts on subsistence would depend on the level of intensity and duration of these disturbances.

D.5.2 Evaluation Criteria

To determine the potential impacts of the alternatives on existing subsistence activities, three evaluation criteria were analyzed relative to existing subsistence resources:

1. The potential to reduce important subsistence fish and wildlife populations by (a) reductions in number, (b) redistribution of subsistence resources, or (c) habitat losses;
2. What effect the action might have on subsistence fisher or hunter access;
3. The potential for the action to increase fisher or hunter competition for subsistence resources.

D.5.2.1 *The Potential to Reduce Populations*

Reduction in Numbers

Neither the direct, indirect, or cumulative impacts resulting from the alternatives considered in this EIS are expected to reduce numbers of wildlife (see Chapter 4, Sections 4.7, 4.10, and 4.15 of this EIS).

Redistribution of Resources

Neither the direct, indirect, or cumulative impacts resulting from the alternatives considered in this EIS are expected to permanently redistribute resources. Disturbance caused by noise from low-flying aircraft may cause terrestrial wildlife to temporarily vacate the overflow area. However, the wildlife species are expected to return to the area once the source of the noise has left the area (see Chapter 4, Sections 4.7, 4.10, and 4.15 of this EIS).

Habitat Loss

Neither the direct, indirect, or cumulative impacts resulting from the alternatives considered in this EIS are expected to result in measurable habitat loss. Only small disturbances of land, water, or vegetation would result; such impacts would be confined to the footprint of where flight hardware would land and recovery activities would occur (see Chapter 4, Sections 4.7, 4.10, and 4.15 of this EIS).

D.5.2.2 *Restriction of Access*

None of the alternatives would restrict access for subsistence.

D.5.2.3 *Increase in Competition*

None of the alternatives are expected to result in increased competition for subsistence resources.

D.6 AVAILABILITY OF OTHER LANDS

No other lands can be substituted in the alternatives. A detailed discussion of consideration of other launch sites or trajectories is located within Section 2.2.1 and Appendix B of this EIS.

D.7 FINDINGS

This analysis concludes that neither of the alternatives under consideration would result in a significant restriction of subsistence users, resources, or opportunities.

D.8 REFERENCES

Caulfield, R.A., 1983, Subsistence Land Use in Upper Yukon Porcupine Communities, Alaska. Dinjii Nats'aa Nan Kak Adagwaandaii, Technical Paper Number 16, June.

Bacon, J.J., Hepa T.R., Brower, Jr., H.K., Pederson, M., Olemaun, T.P., George, J.C., and Corrigan, B.G., 2009, Estimates of Subsistence Harvest for Villages on the North Slope of Alaska, 1994–2003, December.

ADF&G (Alaska Department of Fish and Game), 2011, 2011–2012 Alaska Hunting Regulations, effective July 1, 2011, to June 30, 2012.

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USFWS (U.S. Fish and Wildlife Service), 2010b, *Proposed Land Exchange Yukon Flats National Wildlife Refuge Final Environmental Impact Statement*, Alaska Regional Field Office, accessed through http://yukonflatseis.ensr.com/yukon_flats/documents_FEIS.htm on August 22, 2011.

USFWS (U.S. Fish and Wildlife Service), 2011, Arctic National Wildlife Refuge, Draft Revised Comprehensive Conservation Plan, Draft Environmental Impact Statement, Wilderness Review, Wild and Scenic River Review, Volume 1, June.

United States Code

16 U.S.C. 1361 et seq., Marine Mammal Protection Act.

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APPENDIX E
RECOVERY PLAN

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DRAFT LAUNCH VEHICLE AND PAYLOAD RECOVERY PLAN

**NASA SOUNDING ROCKETS PROGRAM AT
POKER FLAT RESEARCH RANGE**



National Aeronautics and Space Administration

Goddard Space Flight Center

Wallops Flight Facility

Wallops Island, VA 23337

September 2012

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CHANGE RECORD SHEET

ISSUE	DATE OF RELEASE	REASONS FOR REVISION	APPROVAL
0	09/01/2010	Initial Draft by John Hickman	JCH
-		Baseline	
1	03/15/2012	Inclusion of additional requirements	JCH
2	07/20/2012	Incorporation of USFWS, PFRR comments on Revision 1	JCH



IMPORTANT CONTACT INFORMATION:

Bureau of Land Management

Eastern Interior Field Office

Colin Cogley: (907) 474-2200

E-mail: ccogley@blm.gov

Lenore Heppler: (907) 474-2320

E-mail: lheppler@blm.gov

1150 University Avenue

Fairbanks, AK 99709

Fax: (907) 474-2280

U.S. Fish and Wildlife Service

Arctic National Wildlife Refuge

Richard Voss: (907) 456-0250

E-mail: richard_voss@fws.gov

Anne Marie LaRosa: (907) 456-0250

E-mail: AnneMarie_LaRosa@fws.gov

Fax: (907) 456-0428

101 12th Avenue, Room 236

Fairbanks, AK 99701

Yukon Flats National Wildlife Refuge

Steve Berendzen: (907) 456-0440

E-mail: steve_berendzen@fws.gov

Native Village of Venetie Tribal Government

Tribal Office

(907) 849-8105

E-mail: venetietribal@yahoo.com

P.O. Box 81080

Venetie, AK 99781

Mark Bertram: (907) 456-0446

E-mail: mark_bertram@fws.gov

101 12th Avenue, Room 264 MS 575

Fairbanks, AK 99701

Fax: (907) 456-0447

Doyon, Limited

Lands and Natural Resources Department

(907) 459-2000

1 Doyon Place, Suite 300

Fairbanks, AK 99701

Poker Flat Research Range

Launch Site

Kathe Rich: (907) 455-2103

E-mail: krich@gi.alaska.edu

30 Mile Steese Highway

P.O. Box 757320

Fairbanks, AK 99775

NASA Wallops Flight Facility

Sounding Rockets Program, Code 810

John Hickman: (757) 824-2374

E-mail: John.C.Hickman@nasa.gov

Environmental Office, Code 250

Josh Bundick: (757) 824-2319

E-mail: Joshua.A.Bundick@nasa.gov

34200 Fulton Street

Wallops Island, VA 23337

Fax: (757) 824-1819



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APPENDICES

APPENDIX A: EXAMPLE LANDOWNER LAUNCH NOTIFICATION

APPENDIX B: EXAMPLE PUBLIC OUTREACH FLYER

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1.0 INTRODUCTION

1.1 BACKGROUND

The NASA Sounding Rockets Program (SRP) has launched suborbital sounding rockets from the University of Alaska Fairbanks (UAF) managed Poker Flat Research Range (PFRR) since the late 1960s in support of basic space and atmospheric science research. Until now, there has been no formal plan or policy specifically addressing recovery of flight hardware from downrange lands. Historically, recovery of payload and vehicle components has been performed on an as-needed basis with the requirement to do so dictated primarily by the respective mission's scientific investigator.

1.2 POLICY

It is now NASA's policy to provide for a "clean range" at PFRR whereby all launch related hardware that can be effectively located and identified on downrange lands will be removed when deemed practicable by the landowner, UAF, and NASA. This policy applies to future launches as well as hardware remaining in downrange lands from past sounding rocket flights, including those sponsored by non-NASA entities. It is recognized that locating all of the small objects over such a vast area presents a number of technical challenges that cannot be addressed by current technology. However, NASA is committed to implementing a multi-tiered approach that addresses both past and future launches in order to continue operations at PFRR within a sensitive environmental context.

1.3 PURPOSE OF THIS DOCUMENT

The purpose of this document is to outline the general practices that NASA and UAF will employ to locate and remove flight hardware from within PFRR's downrange lands (see **Figure 1**). It is not intended to provide details of specific recovery operations, as these will be situation specific and dependent on multiple factors including weather, location of the hardware, etc. Additionally, this document does not provide a comprehensive discussion of PFRR operations or an assessment of potential environmental effects. For this information, the reader is directed to the 2000 *Final Supplemental Environmental Impact Statement for the NASA Sounding Rockets Program* and the 2012 *Draft Environmental Impact Statement for the NASA Sounding Rockets Program at Poker Flat Research Range*.

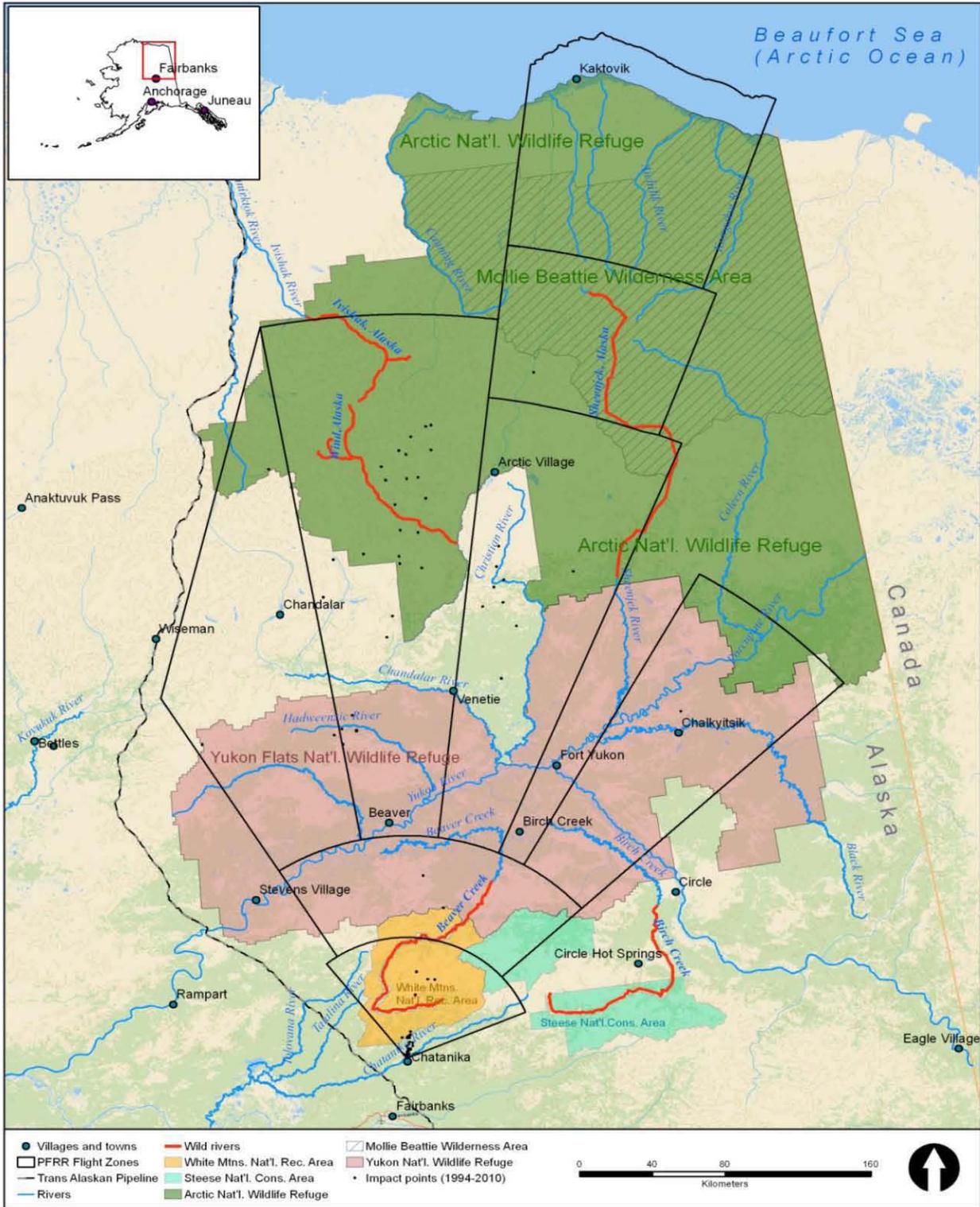


Figure 1. Poker Flat Research Range Launch Corridor and Downrange Lands



2.0 PROGRAMMATIC COMMITMENTS

2.1 CONTINUAL IMPROVEMENT OF LOCATION AIDES

Accurately locating flight hardware in downrange lands is very difficult given the vast area encompassed within the range boundaries (approximately 114,000 square kilometers) and the relatively small size of the targeted items. Given this challenge, NASA will continue to research and evaluate technologies and methods that could improve its ability to locate all major sections of flight hardware, including each rocket motor and the main payload assembly. Listed below are methods/practices currently being tested and/or flown that have shown the most promise:

Radar/Global Positioning Systems – GPS systems that do not require a line-of-sight telemetry link to the launch site have been successfully tested on several recent sounding rocket flights. One system, which relies on the Iridium constellation of earth-orbiting satellites, survived flight and provided reliable coordinates for the location two parachuted payloads in the 2011 launch season. It should be noted that this system had been flown several times before with no success; however the continual testing uncovered a technical detail that once resolved has provided very promising results.

Implementation of a system to provide location data for rocket motors; however, has proven to be more challenging due to the harsher flight environment. A system that relies on a commercially available GPS was flown on an April 2011 mission; however it did not survive flight. Given this challenge, NASA is currently working with providers of location devices designed specifically for high-impact environments to determine if such a system may be technically feasible for sounding rockets.

Analytical Predictions – The NASA Safety Office has recently developed enhanced techniques for determining the impact location of rocket motor stages and payload components. Once the vehicle is no longer thrusting (all its fuel has been consumed), the objects follow a simple ballistic trajectory. To enhance the probability of locating these objects, flight safety analysts have more effectively combined datasets provided from payload telemetry systems (known as the “state vector” which encompasses position, velocity, direction, and momentum) with atmospheric wind measurements taken during the launch process. This provides the most accurate prediction of the impact site, as it is based on the actual flight path of the rocket, and it can be performed for all objects released as part of the experiment (nose cone, sub-payloads, main payload, etc.). Using current computer-aided analytical tools, it can be accomplished within several hours of the actual launch, thus expediting the search phase of the recovery operations. The methodology has been employed on recent PFRR-launched missions and has proven helpful in refining location estimates for items that are not tracked by radar nor have onboard telemetry equipment (e.g., rocket motors). NASA will continue to refine this process that has become a standard post-launch procedure for PFRR launches.



Non-Traditional Location Aides – In addition to electronic devices, NASA has recently employed visual aides to assist in the location of rocket motors. For example, on an April 2011 mission, both ejectable strobe lights and search and recovery streamers were added to the head cap of the second stage motor, however neither proved to be successful as the motor was not located. The application of fluorescent colored markings on the rocket motors has recently been employed at PFRR. Although this technique would only prove effective if the motor landed on its side (and was not covered by snow), it is possible that these markings could assist in the location of stages during the non-winter months when snow would be absent. NASA and UAF will continue to evaluate the use of non-traditional location aides deemed technically feasible.

2.2 RECOVERY BUDGET

Each Fiscal Year, NASA will allocate a minimum of \$250,000 of the PFRR annual budget for recovery activities. Actual expenditures are expected to vary from year to year, and would be dictated primarily by launch activity, the amount of hardware reported by agencies and members of the public (discussed in more detail below), the limited time available to recover hardware dictated by weather, and the limited seasonal availability of recovery assets (primarily rotary wing aircraft). If needed, available recovery funding from one previous Fiscal Year could be utilized to augment the \$250,000 recovery budget if circumstances warranted, such as if members of the public report a much larger amount of hardware.

Prioritization of Recovery Funds – As the PFRR annual recovery budget would be essentially fixed from year to year, and to maximize available funds, NASA would have to assign priority to recovery from downrange lands. Highest priority would be given to Wilderness areas followed by Wild and Scenic River Corridors. After these areas are addressed, priority would be dictated by which identified recovery would remove the most flight hardware in the least amount of time for the least cost. In performing recovery, it would be NASA's intent to maximize economies of scale or "out of the box" recovery opportunities, such as the employment of government firefighting or natural resources related personnel who may already be present in the vicinity of an identified flight hardware item. Accordingly, these opportunities would be given elevated priority once recovery of items within the most sensitive lands was satisfied.

2.3 SEARCH FOR ALL NEWLY LAUNCHED STAGES AND PAYLOADS; RECOVER IF PRACTICABLE

NASA and UAF will conduct post-launch searches for the on-land flight hardware components (i.e., rocket stages and main payload) for all future missions. This has been implemented for 2011 and 2012 launch seasons with varying degrees of success. Missions are planned such that a fixed wing search of the predicted impact areas are conducted as soon as practical after launch; generally the next day at first light. The concept is to look for freshly disturbed areas of snow before the objects are covered with windblown snow or additional precipitation. If flight hardware is successfully located within downrange lands, a decision-making process (involving



the respective landowner) then follows to determine the necessity and practicality of performing a recovery operation as outlined below.

It is important to note that the focus of the recovery efforts is the downrange lands located north of the State of Alaska special use property just across the Steese Highway from the PFRR launch site. Given the land use within the special use property; there is heightened sensitivity to land-disturbing activities, particularly those associated with a recovery operation. Therefore, regular (i.e., annual) recovery activities would likely not take place within this property. NASA and UAF intend to remove easily accessible spent rocket motors on an occasional basis in coordination with the property's managing organization, however it is expected that these efforts would be less frequent (e.g., every several years) and would likely result in a greater proportion of those left in place (as compared to other properties within the flight corridor) if it is determined that a measurable amount of land disturbance would be required.

2.4 LEVERAGE AVAILABLE OUTSIDE RESOURCES

NASA is aware of the numerous commercial and private aircraft that overfly the downrange lands, particularly during the non-winter months. Also, the large amount of downrange land that is either hunted or fished on a regular basis, particularly by hundreds of subsistence users, lends itself to a partnership opportunity for locating flight hardware. UAF will employ Alaska Native Village residents in search efforts to the extent practicable. For certain missions that have expected hardware landing locations within either Tribal lands or within areas historically used by a particular Village regardless of land ownership, PFRR will consult with the respective Village Council.

Rewards Program – NASA and PFRR will institute a formal rewards program to assist in locating and recovering rocket and payload hardware. A public awareness campaign (discussed below under **Outreach**) will be mounted to inform villages, hunters, resource agency personnel, and others, as appropriate, of the rewards program. The public will be instructed to contact PFRR and provide GPS coordinates and a photograph (or verbal description) of the suspected item. Assuming that the report appears credible, PFRR would then commission a flight to confirm the item's location and its disposition. If the item were confirmed to be a component of a sounding rocket flight, UAF would then pay the reward to the person who originally reported the item. The reward will vary depending on what the item is; the highest reward would be paid for spent rocket motors, and all other flight hardware (e.g., payload, nosecone, doors, etc.) would have the same lesser reward value. To avoid the potential for paying multiple rewards for the same object before its ultimate recovery, the reported item's location will be recorded in the UAF-managed database for future reference. Funding for rewards will be taken from the **Recovery Budget** discussed above. In the 2011 and 2012 launch seasons this concept has been tested, and has proven to be one of the most successful means of locating expended flight hardware.



When possible, each major component on future missions, including each vehicle stage and main payload, will have contact information affixed to it for positive identification. Depending on mission requirements, this could be a plate attached with words inscribed, stamped, or stenciled in paint.

Rewards Eligibility – Consistent with the goal of focusing recovery efforts on lands north of the special use areas immediately across the Steese Highway from the PFRR (Alaska Department of Natural Resources Poker Flat North and South Special Use Areas), the Rewards Program will not apply to these lands. Additionally, resource agency personnel who locate items when performing their official duties as public employees will not be eligible for payment.

2.5 EVALUATE REPORTS OF ITEMS FROM PAST FLIGHTS; RECOVER IF PRACTICABLE

Consistent with the process outlined above under **Rewards Program**, when agency personnel or members of the public report items, UAF will evaluate the report, perform a reconnaissance flight if necessary, and then recover the items as described below.

3.0 LOCATION AND RECOVERY PROCEDURES

3.1 LOCATION

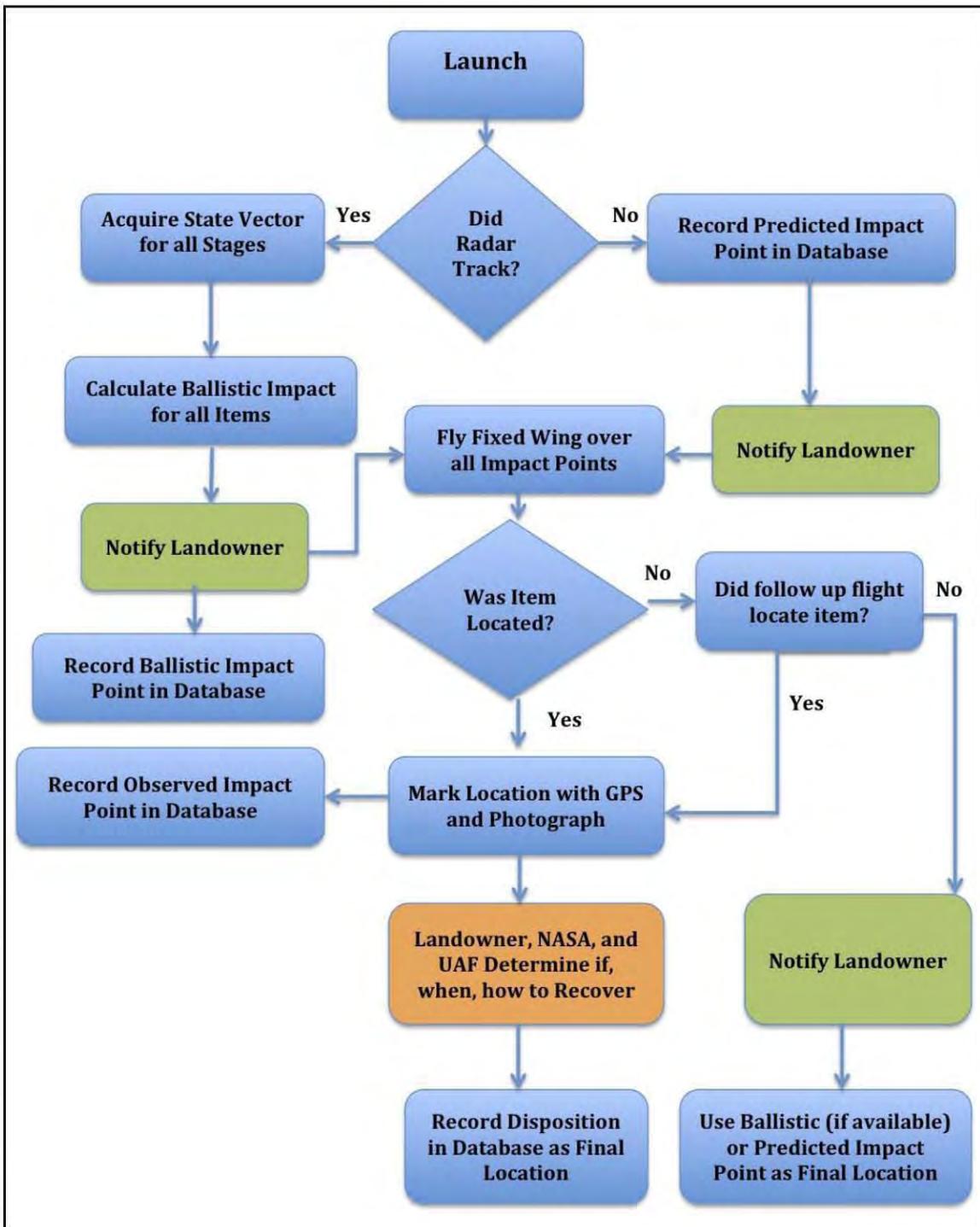
Figure 2 outlines the process by which post-launch search operations would be executed. The most effective way to predict the location of the major launch-related items is to use the actual burnout conditions (state vector) and calculate a ballistic impact using state-of-the-art trajectory programs.

This process would involve immediate collection of the last available position data (either GPS or radar) and use of these data in trajectory simulation programs to calculate impact points for all stages and major payload pieces (as described above under **Analytical Predictions**).

Once NASA's flight analyst has provided these points, they will be entered into the PFRR recovery database (discussed below under **Recordkeeping**), and arrangements would then be made to fly an aircraft over the points. The goal would be to do this as soon as possible after launch (within 24 hours if practicable), such that snow would not cover the items prior to the search. Due to launch times driven by scientific conditions, coordination with aircraft providers, limited daylight or weather constraints in winter months, and the impact range of some objects, it may not always be practical to meet the 24-hour goal. In these instances, it may be elected to wait until the snow has melted to begin the search. Regardless, coordination with the landowner will be part of the decision process. In all cases, the landowner (e.g., Yukon Flats NWR, Arctic NWR, and/or BLM) will be offered a seat on the recovery aircraft to assist in spotting any objects. Given the potential for either short-notice or early morning search flight, or both, the landowner will be asked to provide a phone number and point of contact each launch season. The designated point of contact will be notified of pending search operations as soon as



practicable, however if no response is obtained, the search flight will be initiated in an effort to maximize the potential for locating an object prior to new snowfall. If the objects are not located immediately after launch, at least one additional flight will be conducted as soon as practical after snowmelt to see if the object can be located.



****Green** shapes indicate landowner consultation required; **orange** indicates landowner approval required before proceeding

Figure 2. Post Launch Search Process Flow Chart



3.2 RECOVERY

Once an object has been located, pertinent information needs to be collected about the impact site such that an objective decision can be made whether to attempt a recovery. During the decision making process, the recovery team will consult local landowners to seek their input as recovering pieces of hardware in remote lowlands or mountainous terrain presents a number of technical and logistical challenges. Proximity to roads or landing sites, the type of terrain, type of vegetation, safety of personnel, the size of the object, season, and sensitivity of the impact site are all factors that must be considered when planning a recovery operation. If recovery is to be attempted, the team will need sufficient information in all areas discussed above. If there is insufficient information to make these determinations, further investigation of the impact site would be conducted to collect relevant information to aid in the decision making process.

The first major decision point is to determine whether it is safe for personnel to access the impact site. If the natural location of the impact site is deemed too hazardous for personnel to enter/operate (e.g., side of a cliff), the object would be left in place and duly noted in the database. The second major decision point is to evaluate both the environmental and cost impacts of executing the recovery operation. If there is minimal environmental impact of retrieving an object and reasonable cost associated with doing so, recovery would be performed as soon as practicable. If this is not immediately obvious, an analysis considering both environmental impact and cost will be conducted. Both are equally relevant considerations that must be evaluated before the decision is made to execute a recovery operation. For example, if recovering this one object would exhaust available funds due to the extremely difficult nature of the operation, it would make logical sense to allocate the funds to recovery of several other objects that may be pending. Regardless, all located objects will be tracked in the database and logical decisions on when and how to recover will be made in consideration of the larger context of all downrange lands and NASA's commitment to providing a "clean range."

The third major decision point is whether the impact site can be mitigated in the event the decision is made to forego a full recovery operation. Impact site mitigation may entail burial of the object, partial recovery, or other activity deemed appropriate to mitigate its effects. Again, these decisions will be situation-specific and made in consultation with the respective landowner. However, the following standard operating principles will guide the recovery process.

- Employ the least invasive recovery tools as the situation dictates;
- Clean all tools of soil and plant material before leaving site to prevent the spread of invasive species;
- Give priority to locating and removing electronic components which could contain batteries or other potentially hazardous materials;
- All fins, wires, and related debris dispersed about the impact site shall be collected and removed;
- If left in place, the embedded item shall be severed such that it does not protrude above the ground surface, as practicable; and



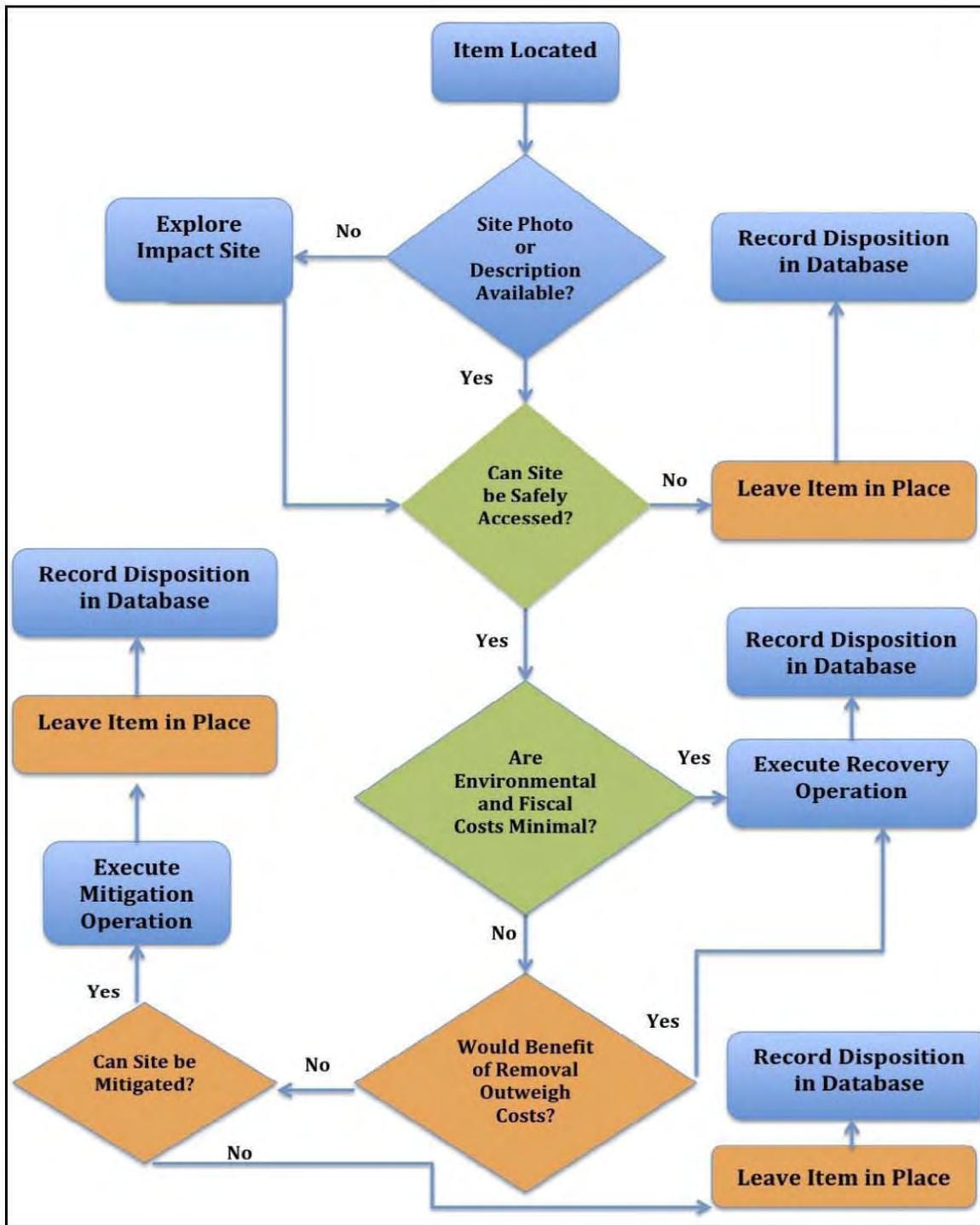
- The impact site and any remaining embedded hardware shall be backfilled with native material (e.g., soil, rock) before recovery crew departure.

While not anticipated, the potential exists for a recovery operation to be needed within a designated Wilderness area. If this were to happen, extensive coordination would be required with the respective landowner due to restrictions on helicopter landings and a requirement to utilize the minimum tools necessary to accomplish the task. Items within designated Wilderness will rank as NASA's highest priority for recovery.

The following flow chart summarizes the recovery decision-making process (see **Figure 3**), throughout which the landowner would be involved.

3.3 DISPOSAL OF RECOVERED HARDWARE

The disposal of recovered hardware will be managed by UAF. All hardware recovered will be taken to the PFRR and temporarily stored until proper disposal in accordance with applicable regulations. For the most part, this will consist of scrap metals and associated "rocket parts" and will be of a non-hazardous nature. Those materials classified as hazardous (e.g., asbestos-containing insulation, nickel-cadmium batteries) will be handled and disposed of in accordance with applicable Federal, state, and local regulations (e.g., Comprehensive Environmental Response, Compensation, and Liability Act (**42 U.S.C. 9601 *et seq.***) and Resource Conservation and Recovery Act (**42 U.S.C. 6901 *et seq.***)).



****Green shapes indicate landowner consultation required; orange indicates landowner approval required before proceeding**

Figure 3. Recovery Process Flow Diagram



4.0 OUTREACH AND RECORDKEEPING

4.1 OUTREACH

A key component of ensuring the effectiveness of this program and to best leverage the “eyes and ears” of users of downrange lands is to establish and maintain active public outreach efforts.

Accordingly, at least two weeks prior to the opening of a launch window, UAF will post a notice in local media (e.g., newspaper) to inform the public of the upcoming launch. Concurrently with publishing this notice, UAF will provide downrange landowners a mission “fact sheet” that includes a brief summary of the mission’s objectives, the launch vehicle and recovery aides to be used, a map and location of the planned impact points, and span of the launch window. Included with this fact sheet will be a list of any onboard materials that could be potentially hazardous. Material Safety Data Sheets (MSDS) for such materials will be kept on file at the PFRR launch site, and will be provided to landowners upon request. An example of a mission fact sheet is included as **Appendix A**. Prior to launch; UAF will also post notices of the planned launch at all trailheads within the White Mountains National Recreation Area as directed by BLM.

Each year, by June 1 (the approximate start of the “snow free” season), UAF will distribute a handout (similar to that shown in **Appendix B**) to all local commercial aircraft companies, the local chapter of the private pilots association, and local guides. The purpose of this handout will be to remind aviators and guides of the rewards program and the process to follow should either a staff member or client encounter a suspected piece of flight hardware. This same handout will also be distributed to all Alaska Native Village Councils within and adjacent to the PFRR flight corridor.

4.2 RECORDKEEPING

UAF will maintain an up-to-date database to compile data regarding rockets launched and the locations at which the objects return to earth. The primary purpose of the database is to ensure all relevant data is gathered and stored in one central location. Data from past launches will be imported to the greatest extent possible. The database allows entry of the following information:

- a. Rocket type, number of stages, date and time of launch
- b. Predicted impact location of each stage, payload or subpayload
- c. Actual impact point from radar or GPS (if available)
- d. Predicted ballistic impact points from post-burn out analysis (if available)
- e. Date, time, and name of landowner representative contacted
- f. Type of aircraft used for search and recovery
- g. Confirmation of objects located including latitude and longitude
- h. Final disposition of located items
- i. Reward monies paid (if applicable)



Any objects located will be photographed; their GPS coordinates logged, and any adjacent identifying landmarks noted and photographed as they may assist in recovery planning/operations. All information contained within the database will be made available to downrange landowners upon request.

4.3 REPORTING

UAF will submit a report to downrange landowners on an annual basis detailing the extent of its launch and recovery operations for the previous year. This report will include inputs to the aforementioned database and a summary of recovery operations for each rocket launched and historic items reported by users of downrange lands. Additionally, as NASA evaluates new methods for locating flight hardware, the results of these efforts will be provided.

5.0 CONTINGENCY OPERATIONS

By the very nature of sounding rockets, hazardous systems are often flown that may occasionally malfunction, therefore presenting a potential safety hazard on the ground. It is NASA and UAF policy to ensure no acutely hazardous hardware is unaccounted for following such an unplanned event. For example, through either interpretation of telemetry data or visual inspection, it may be evident that either a high-pressure gas system did not vent its contents or a pyrotechnic device did not perform its intended function (e.g. deploying a door). In these cases, NASA has developed procedures where trained technicians are deployed to the impact site to restrain and “safe” the electronically activated pyrotechnic system or to manually vent the contents of the high pressure gas system.

Furthermore, in some cases it may be necessary to immediately initiate recovery actions to mitigate a particular hazard. For example, following the failure of a Terrier-Orion flight in March 2003, NASA enlisted specialists from the Air Force’s Explosive Ordinance Disposal team to puncture the payload’s trimethyl aluminum canister before PFRR crews returned the second-stage motor and payload debris back to the range via helicopter for analysis. In such cases, landowners will be notified as soon as practicable and apprised of the situation and the proposed final disposition of the item. Landowners will have the final approval over proposed remedies prior the issue being considered “closed.” Further coordination will be implemented as the dictated by the situation.

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APPENDIX A
EXAMPLE LANDOWNER LAUNCH NOTIFICATION

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Poker Flat Research Range Downrange Landowner Mission Summary Sheet

Mission: Powell 36.273 UE; Cornell University

The MICA (Magnetosphere-Ionosphere Coupling in the Alfvén resonator) mission will measure ion temperature and density, electron temperature and density, electron precipitation, ion upflow, convection and ULF electric fields, magnetic fields from which field-aligned current (FAC) can be inferred, and plasma waves. The objectives of the experiment are to investigate the role of active ionospheric feedback in the development of large amplitude and small scale electromagnetic waves and density depletions in the low altitude (< 400 km), downward current, auroral ionosphere.

Launch Window: 2/13/12 – 3/1/2012; 7pm-2am local time

Launch Vehicle: Black Brant IX

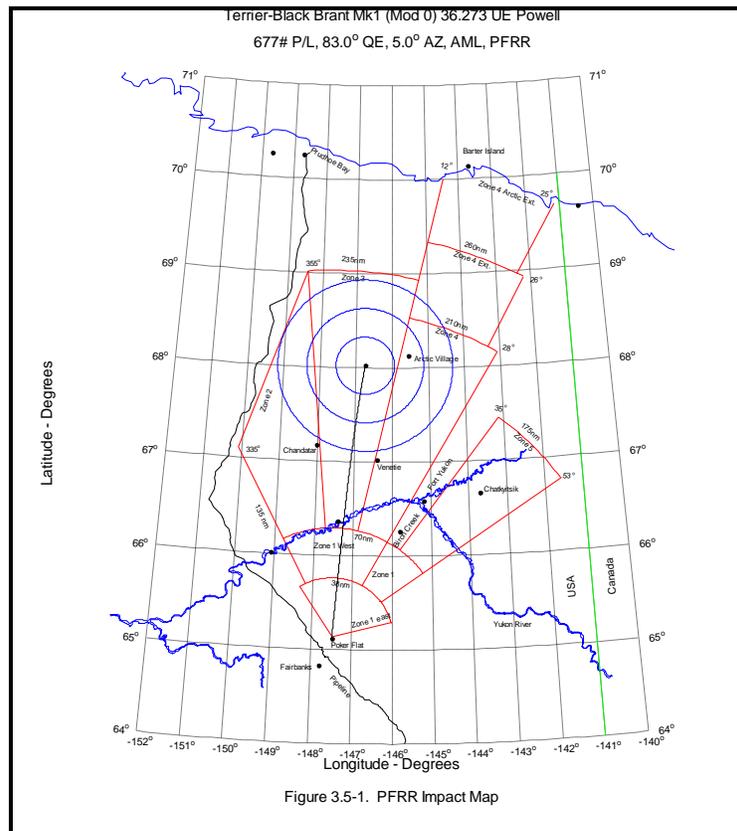
Planned Impacts: First Stage 65.1411; -147.4831

Second Stage 68.0250; -146.7470

Location Aides: GPS receiver on payloads; C-band transponder on main payload

Hazardous Materials: Ni-Cd batteries on motors and main payload.

MSDS available upon request



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APPENDIX B
EXAMPLE PUBLIC OUTREACH FLYER

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WANTED

SOUNDING ROCKET LOCATIONS



REWARD

\$1,200 FOR ROCKET MOTORS (PICTURED)

\$500 FOR OTHER ITEMS

CALL (907) 455-2110

WHAT TO PROVIDE:

- 1. GPS COORDINATES**
- 2. PICTURE OR DESCRIPTION OF ITEM**

PLEASE DO NOT TOUCH ANYTHING!

SOME ITEMS MAY BE DANGEROUS

REPORT IT AND WE WILL REMOVE IT

THANKS FOR HELPING US KEEP THE LANDS CLEAN!

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APPENDIX F
SEARCH AND RECOVERY ASSUMPTIONS

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APPENDIX F. SEARCH AND RECOVERY ASSUMPTIONS

F.1 PURPOSE OF THIS APPENDIX

The characteristics (*e.g.*, launch vehicle, trajectory, and payload) and frequency of missions conducted at the Poker Flat Research Range (PFRR) are highly dependent upon the scientific objectives of the sponsoring researcher and the National Aeronautics and Space Administration's (NASA's) scientific priorities. Therefore, it is not possible to assess every possible mission scenario that could be proposed for PFRR in the next 10 years.

Accordingly, certain assumptions were made regarding the types of rocket, payload, and recovery operations that would most likely occur; these were based primarily upon past experience, interviews with key personnel and best professional judgment.

It is important to recognize that recovery efforts would only be undertaken if a post-launch (or post-report in the case of an existing stage or payload) search flight resulted in the positive identification of NASA Sounding Rockets Program (SRP) associated hardware. In the case of newly launched hardware, recent searches have resulted in the identification of approximately half of the known items. This success rate is expected to increase as location devices are improved; however the reader should not assume that all downrange flight hardware would be found in every case. Therefore, the most reliable (and conservative) product of these assumptions is an estimated quantification of fuel usage (and resulting air emissions) of recovery-related vehicles. Estimates of flight times (and fuel usage) associated with both search and recovery would be considered conservative in that greater emissions would occur. However, when other resource areas, including the wilderness values of special use lands, are considered, these scenarios may underestimate impacts in that not all hardware would be removed. Therefore, within certain resource sections of this EIS, ranges of potential impacts are presented for the reader's consideration.

F.2 GENERAL ASSUMPTIONS

For all searches, it is assumed that the search plane would be a two-person, fixed-wing aircraft that would depart from Fairbanks International Airport. Flights to and from the search area would be about 610 meters (2,000 feet) above ground level (AGL) at a speed of approximately 225 kilometers (120 knots) per hour. Once the search area is reached, the plane would fly between approximately 61 m (200 ft) and 150 meters (500 feet) AGL and slow to allow for searching. Searches are assumed to last an average of 2 hours or as long as a single tank of fuel would allow. If a payload is not located on the first search operation, a maximum of 2 days would be spent searching for it. For this analysis, it is assumed that payload search operations would take 2 days and spent stage search operations would take 1 day.

For recovery operations, helicopters are assumed to depart from Fairbanks. Flights to the recovery area would be about 460 meters (1,500 feet) AGL at a speed of approximately 225 kilometers (120 knots) per hour. Once the recovery area is reached, it is assumed that the helicopter would spend approximately 30 minutes hovering at the recovery site and 2 hours of

downtime while the payload or spent stage was rigged for transport away from the site. While transporting a payload or spent stage, it was assumed that the helicopter would fly about 60 to 150 meters (200 to 500 feet) AGL at an average speed of about 65 kilometers (35 knots) per hour. For recovery operations within 50 kilometers (30 miles) of the PFRR launch site, it was assumed that the recovered object would be flown back to the PFRR launch site underneath the helicopter. For distances beyond 50 kilometers (30 miles), it was assumed that the recovered object would be transported to a nearby airstrip (assumed to be within 30 kilometers [20 miles] of the recovery site), where the object would be left for pickup by a fixed-wing transport plane. Objects returned by transport plane to Fairbanks would be trucked from Fairbanks to the PFRR launch site.

In general, spent stages and payloads would not be recovered during the winter months (October through April). Only in special cases, such as recovery of a payload for scientific reasons or response to an off-nominal flight, would a payload or a spent stage be recovered in the winter. In the event of a winter recovery, two helicopters (for safety reasons) would be used to support the recovery.

F.3 STAGE RECOVERY WITHIN 2 KILOMETERS (1.2 MILES) OF THE PFRR LAUNCH SITE (TARGETING TALOS (1ST STAGE BLACK BRANT XII) OR TERRIER (1ST STAGE T-IO))

On its way to search for a more distant spent stage or payload, a two-person search plane would briefly search the immediate area near the PFRR launch site for the spent stage in question. After the spent stage was located, the search plane would mark the location using a global positioning system (GPS) coordinates and take pictures of the site for the recovery crew and continue on to its primary search destination.

At a later date, the recovery helicopter would depart from Fairbanks and travel to the location marked by the search plane. The helicopter crew would then land and begin rigging the spent stage for transport back to the PFRR launch site. During this time, the helicopter would be turned off so no fuel is burned. After the rigging has been completed, the helicopter would recover the spent stage to be transported and would travel back to the PFRR launch site at 65 kilometers per hour (35 knots). The spent stage would be dropped off and the helicopter would return to its base of operations.

In some cases for recoveries close-in to the PFRR launch site, it may be possible to recover the spent stages using an off-road vehicle (*e.g.*, snowmachine) without causing any environmental damage in the area. However, to be conservative in terms of estimating the environmental impacts in this EIS, all recovery operations in this area are assumed to be accomplished with a helicopter. **Table F-1** shows a summary of transportation time and fuel usage for this recovery operation.

Table F–1. Transportation Times and Fuel Used During Search and Recovery Operations (Spent Stages) to the State Lands Above the PFRR Launch site

	Helicopter Used for Stage Recovery^a
Travel time	4 hours
Fuel used	450 liters

a. It is assumed that a more robust helicopter would be needed to handle these stages due to their weight.

Note: To convert liters to gallons, multiply by 0.26417.

F.4 STAGE RECOVERY WITHIN 20 KILOMETERS (12 MILES) OF THE PFRR LAUNCH SITE (TARGETING TAURUS [2ND STAGE BLACK BRANT XII])

A two-person search plane would depart from Fairbanks International Airport and travel toward the recovery site. Once on site, it would circle around searching for the spent stage in question. After the spent stage was located, the search plane would mark the location using GPS coordinates and take pictures of the site for the helicopter crew and return to Fairbanks.

At a later date, the recovery helicopter would depart from Fairbanks and travel to the location marked by the search plane. The helicopter crew would then land and begin rigging the spent stage for transport back to the PFRR launch site. During this time, the helicopter would be turned off so no fuel is burned. After the rigging has been completed, the helicopter would recover the spent stage to be transported and would travel back to the PFRR launch site at 65 kilometers (35 knots) per hour. The spent stage would be dropped off and the helicopter would return to its base of operations. **Table F–2** shows a summary of transportation times and fuel usage for this recovery operation.

Table F–2. Transportation Times and Fuel Used During Search and Recovery Operations (Spent Stages) to the State Lands Above the PFRR Launch site

	Fixed-Wing Search Plane	Helicopter Used for Stage Recovery^a
Travel time	4 hours	5 hours
Fuel used	75 liters	640 liters

a. It is assumed that a more robust helicopter would be needed to handle these stages due to their weight.

Note: To convert liters to gallons, multiply by 0.26417.

F.5 STAGE RECOVERY WITHIN WHITE MOUNTAINS NATIONAL RECREATION AREA (APPROXIMATELY 50 KILOMETERS [30 MILES] FROM THE PFRR LAUNCH SITE) (TARGETING IMPROVED ORION [IO] AND PAYLOAD FROM 1-STAGE VEHICLE [30.XXX])

A two-person search plane would depart from Fairbanks International Airport and travel toward the recovery site. Once on site, it would circle around searching for the spent stage in question. After the spent stage was located, the search plane would mark the location using GPS coordinates and take pictures of the site for the helicopter crew and return to Fairbanks.

At a later date, the recovery helicopter would depart from Fairbanks and travel to the location marked by the search plane. The helicopter crew would then land and begin rigging the spent stage for transport back to the PFRR launch site. During this time, the helicopter would be turned off so no fuel is burned. After the rigging has been completed, the helicopter would recover the spent stage to be transported and would travel back to the PFRR launch site at 65 kilometers (35 knots) per hour. The spent stage would be dropped off and the helicopter would return to its base of operations. **Table F-3** shows a summary of transportation times and fuel usage for this recovery operation.

Table F-3. Transportation Times and Fuel Used During Search and Recovery Operations (Spent Stages) to the White Mountains NRA

	Fixed-Wing Search Plane	Helicopter Used for Stage Recovery
Travel time	4 hours	5 hours
Fuel used	75 liters	190 liters

Note: To convert liters to gallons, multiply by 0.26417.

Key: NRA=National Recreation Area.

F.6 PAYLOAD OR STAGE RECOVERY IN THE YUKON FLATS NWR (APPROXIMATELY 200 KILOMETERS [120 MILES] FROM THE PFRR LAUNCH SITE) (TARGETING IMPROVED ORION [IO] AND PAYLOAD FROM MK 12 T-TIO CONFIGURATION)

A two-person search plane would depart from Fairbanks International Airport and travel toward the recovery site. Once on site, it would circle around searching for the spent stage or payload in question. After the spent stage or payload was located, the search plane would mark the location using GPS coordinates and take pictures of the site for the helicopter crew and return to Fairbanks.

At a later date, the recovery helicopter would depart from Fairbanks and travel to the location marked by the search plane. The helicopter crew would then land and begin rigging the spent stage for transport back to the PFRR launch site. During this time, the helicopter would be turned off so no fuel is burned. After the rigging has been completed, the helicopter would recover the spent stage to be transported and would travel to a nearby landing strip at 65 kilometers (35 knots) per hour. The spent stage or payload would be dropped near the landing strip for pickup by a fixed-wing plane, and the helicopter would refuel before returning to its base of operations.

At the landing strip, the spent stage or payload would be loaded onto a chartered fixed-wing transport plane and transported back to Fairbanks, where it would be loaded onto a flatbed truck and transported to the PFRR launch site. **Tables F-4** (for spent stages) and **F-5** (for payloads) show a summary of transportation times and fuel usage for this recovery operation.

Table F–4. Transportation Times and Fuel Used During Search and Recovery Operations (Spent Stages) to the Yukon Flats NWR

	Fixed-Wing Search Plane	Helicopter Used for Stage or Payload Recovery ^a	Fixed-Wing Transport Plane (from Venetie to Fairbanks)	Flatbed Truck (round trip from Fairbanks to the PFRR launch site)
Travel time	5 hours	6 hours	4 hours	1 hour
Fuel used	130 liters	1,600 liters	450 liters	20 liters

a. It is assumed that a more robust helicopter would be needed to recover these stages because the helicopter would carry extra fuel.

Note: To convert liters to gallons, multiply by 0.26417.

Key: NWR=National Wildlife Refuge.

Table F–5. Transportation Times and Fuel Used During Search and Recovery Operations (Payloads) to the Yukon Flats NWR

	Fixed-Wing Search Plane ^a	Helicopter Used for Stage or Payload Recovery ^b	Fixed-Wing Transport Plane (from Venetie to Fairbanks)	Flatbed Truck (round trip from Fairbanks to the PFRR launch site)
Travel time	10 hours	6 hours	4 hours	1 hour
Fuel used	260 liters	1,600 liters	450 liters	20 liters

a. Search time and fuel used is doubled assuming a 2-day search for payloads.

b. It is assumed that a more robust helicopter would be needed to recover these stages because the helicopter would carry extra fuel.

Note: To convert liters to gallons, multiply by 0.26417.

Key: NWR=National Wildlife Refuge.

F.7 PAYLOAD OR STAGE RECOVERY IN THE VENETIE RESERVATION (APPROXIMATELY 305 KILOMETERS [190 MILES] FROM THE PFRR LAUNCH SITE) (TARGETING PAYLOAD AND IMPROVED-ORION [2ND STAGE FROM MK 70 T-IO CONFIGURATION])

A two-person search plane would depart from Fairbanks International Airport and travel toward the recovery site. Once on site, it would circle around searching for the spent stage or payload in question. After the spent stage or payload was located, the search plane would mark the location using GPS coordinates and take pictures of the site for the helicopter crew and return to Fairbanks.

At a later date, the recovery helicopter would depart from Fairbanks and travel to the location marked by the search plane. The helicopter crew would then land and begin rigging the spent stage for transport back to the PFRR launch site. During this time, the helicopter would be turned off so no fuel is burned. After the rigging has been completed, the helicopter would recover the spent stage to be transported and would travel to a nearby landing strip at 65 kilometers (35 knots) per hour. The spent stage or payload would be dropped near the landing strip for pickup by a fixed-wing plane, and the helicopter would refuel before returning to its base of operations.

At the landing strip, the spent stage or payload would be loaded onto a chartered fixed-wing transport plane and transported back to Fairbanks, where it would be loaded onto a flatbed truck and transported to the PFRR launch site. **Tables F–6** (for spent stages) and **F–7** (for payloads) show a summary of transportation times and fuel usage for this recovery operation.

Table F–6. Transportation Times and Fuel Used During Search and Recovery Operations (Spent Stages) to the Venetie Reservation

	Fixed-Wing Search Plane	Helicopter Used for Stage or Payload Recovery ^a	Fixed-Wing Transport Plane (from Venetie to Fairbanks)	Flatbed Truck (round trip from Fairbanks to the PFRR launch site)
Travel time	6 hours	7 hours	5 hours	1 hour
Fuel used	150 liters	2,000 liters	680 liters	20 liters

a. It is assumed that a more robust helicopter would be needed to recover these stages because the helicopter would carry extra fuel.

Note: To convert liters to gallons, multiply by 0.26417.

Table F–7. Transportation Times and Fuel Used During Search and Recovery Operations (Payloads) to the Venetie Reservation

	Fixed-Wing Search Plane ^a	Helicopter Used for Stage or Payload Recovery ^b	Fixed-Wing Transport Plane (from Venetie to Fairbanks)	Flatbed Truck (round trip from Fairbanks to the PFRR launch site)
Travel time	12 hours	7 hours	5 hours	1 hour
Fuel used	320 liters	2,000 liters	680 liters	20 liters

a. Search time and fuel used is doubled assuming a 2-day search for payloads.

b. It is assumed that a more robust helicopter would be needed to recover these stages because the helicopter would carry extra fuel.

Note: To convert liters to gallons, multiply by 0.26417.

F.8 STAGE RECOVERY IN THE WIND RIVER AREA (APPROXIMATELY 370 KILOMETERS [230 MILES] FROM THE PFRR LAUNCH SITE) (TARGETING BLACK BRANT VC MOTOR [BLACK BRANT XII 3RD STAGE])

A two-person search plane would depart from Fairbanks International Airport and travel toward the recovery site. Once on site, it would circle around searching for the spent stage or payload in question for as long as a single tank of fuel would allow. After the spent stage or payload was located, the search plane would mark the location using GPS coordinates and take pictures of the site for the helicopter crew and return to Fairbanks.

At a later date, the recovery helicopter would depart from Fairbanks and travel to the location marked by the search plane. The helicopter crew would then land and begin rigging the spent stage for transport back to the PFRR launch site. During this time, the helicopter would be turned off so no fuel is burned. After the rigging has been completed, the helicopter would recover the spent stage to be transported and would travel to a nearby landing strip at 65 kilometers (35 knots) per hour. The spent stage or payload would be dropped near the landing

strip for pickup by a fixed-wing plane, and the helicopter would refuel before returning to its base of operations.

At the landing strip, the spent stage or payload would be loaded onto a chartered fixed-wing transport plane and transported back to Fairbanks, where it would be loaded onto a flatbed truck and transported to the PFRR launch site. **Table F–8** shows a summary of transportation times and fuel usage for this recovery operation.

Table F–8. Transportation Times and Fuel Used During Search and Recovery Operations (Spent Stages) to the Wind River Area

	Fixed-Wing Search Plane	Helicopter Used for Stage or Payload Recovery ^a	Fixed-Wing Transport Plane (from Venetie to Fairbanks)	Flatbed Truck (round trip from Fairbanks to the PFRR launch site)
Travel time	7 hours	8 hours	5 hours	1 hour
Fuel used	190 liters	2,300 liters	830 liters	20 liters

a. It is assumed that a more robust helicopter would be needed to recover these stages because the helicopter would carry extra fuel.

Note: To convert liters to gallons, multiply by 0.26417.

F.9 ANNUAL ESTIMATES OF TRANSPORTATION REQUIREMENTS ASSOCIATED WITH THE RECOVERY OF PAYLOADS AND SPENT STAGES UNDER THE DIFFERENT ALTERNATIVES

Table F–9 shows the number of attempted recoveries of new and existing spent stages and payloads that are projected to be recovered each year under the different alternatives being considered in this EIS. These numbers assume an average of four new launches per year.

Table F–9. Annual Projected Recovery of Spent Stages and Payloads

	No Action Alternative	Alternatives 1 and 3	Alternatives 2 and 4
Payloads	1	2	4
Spent Stages	0	10	16

Payload recoveries are assumed to be from the Venetie Reservation and Yukon Flats National Wildlife Refuge and spent stage recoveries are assumed to be the various locations discussed above. Using these projected recoveries, the airplane, helicopter, and truck transport times were estimated for each alternative along with the fuel that would be burned under each alternative, as shown in **Tables F–10** and **F–11**.

Table F–10. Annual Projected Airplane, Helicopter, and Truck Transport Times (hours)

	No Action Alternative	Alternatives 1 and 3	Alternatives 2 and 4
Airplane Transit Time	6 hours	28 hours	47 hours
Airplane Search Time	4 hours	26 hours	44 hours
Helicopter Transit Time	3 hours	23 hours	37 hours
Helicopter Down Time	2 hours	24 hours	40 hours
Helicopter Hovering Time	0.5 hours	6 hours	10 hours
Helicopter Recovery Time	0.5 hours	6 hours	9 hours
Airplane Transport Time	2 hours	13 hours	21 hours
Truck Transport Time	1 hour	7 hours	12 hours

Table F–11. Annual Projected Airplane, Helicopter, and Truck Fuel Usage (gallons)

	No Action Alternative	Alternatives 1 and 3	Alternatives 2 and 4
Airplane	1,000 liters	6,100 liters	9,800 liters
Helicopter	2,000 liters	15,000 liters	25,000 liters
Truck	20 liters	110 liters	190 liters

Note: To convert liters to gallons, multiply by 0.26417.

Assuming four launches per year, the following recovery actions would take place. **Table F–12** shows the number and location of recoveries of new and existing spent stages and payloads that are projected to be recovered each year under the different alternatives being considered in this EIS. This assumes an average of four new launches per year.

Table F–12. Summary of Recovery Operations Based on Four Launches per Year

	No Action Alternative	Alternatives 1 and 3	Alternatives 2 and 4
New Payloads Recovered	1 from Venetie Reservation	1 from Yukon Flats NWR 1 from Venetie Reservation	Same as Alternatives 1 and 3
Existing Payloads Recovered	0 based on past history	0 based on past history	1 from Yukon Flats NWR 1 from Venetie Reservation
Newly Spent Stages	0 based on past history	1 from Wind River Area 1 from Venetie Reservation 2 from Yukon Flats NWR 2 from White Mountains NRA	1 from Wind River Area 1 from Venetie Reservation 2 from Yukon Flats NWR 2 from White Mountains NRA 2 from ADNR land
Existing Spent Stages	0 based on past history	1 from Wind River Area 0 from Yukon Flats NWR 1 from White Mountains NRA 2 from ADNR land	1 from Wind River Area 1 from Venetie Reservation 2 from Yukon Flats NWR 2 from White Mountains NRA 2 from ADNR land

Key: ADNR=Alaska Department of Natural Resources; NRA=National Recreation Area; NWR=National Wildlife Refuge.

APPENDIX G
IMPACT PROBABILITIES

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APPENDIX G. IMPACT PROBABILITIES

G.1 PURPOSE OF THIS APPENDIX

This appendix describes the method by which payload and spent stage impact probabilities are calculated for National Aeronautics and Space Administration (NASA) Sounding Rockets Program launches. This information was used to support various resource area impact analyses in this environmental impact statement (EIS).

G.2 PROBABILITY OF IMPACT WITHIN DIFFERENT AREAS OF CONCERN

Typical impact points were analyzed for seven different distances from the Poker Flat Research Range (PFRR) operational areas, covering a range of possible launch vehicles, to determine the probability of a spent stage or payload hitting a number of potential areas of concern and to develop search and recovery scenarios. These impact points represent composite points for a number of rocket launches from the PFRR operational areas over the years. They are not intended to represent the predicted impact points for all future launches from PFRR, but are intended to show the distances flown by the different launch vehicles in use at PFRR and the relative uncertainty associated with predicted impact points at various distances from the PFRR operational areas. The distances analyzed were as follows:

- 2 kilometers (1.2 miles) – 1st stage of Black Brant IX or Black Brant XII
- 13 kilometers (8.1 miles) – 1st stage of Terrier-Orion or Terrier-Improved Orion or 2nd stage of Black Brant XII
- 55 kilometers (35 miles) – Orion
- 200 kilometers (120 miles) – 2nd stage of T-O
- 300 kilometers (180 miles) – 2nd stage of Black Brant IX or Black Brant X
- 350 kilometers (220 miles) – 3rd stage of Black Brant XII or 2nd stage of Terrier-Improved Orion
- 1,000 kilometers (620 miles) – 4th stage of Black Brant XII

The potential impact areas were determined using downrange and cross-range dispersion estimates from past NASA launches at PFRR. During the launch sequence, NASA and University of Alaska Fairbanks calculate the estimated impact points for the stages and the payload based on information known about the launch (*e.g.*, azimuth, payload weight, direction, and wind speed). These calculations provide a starting point for any subsequent searches. Note that while these calculations provide NASA's best estimates of where these items are expected to impact the Earth, there is a level of uncertainty associated with these estimates because of the large number of variables associated with each launch. These variables include payload weight, wind, temperature, and variations in the performance of the solid rocket fuel. These variations

become even more pronounced the higher the payload or spent stage is launched from the launch site. The biggest variants are thrust misalignment, which is a measure of how straight the rocket really is, and uncompensated winds. This is the change in wind from the time it is last measured prior to launch until the instant the rocket is launched (for example, a wind gust).

As a result, the predicted impact points have bands of uncertainty associated with them that can vary north and south (downrange) and east and west (cross-range) by relatively small amounts on a percentage basis (for example, 5 to 10 percent), but that end up being relatively large distances for spent stages or payloads that are predicted to land further from the launch site. For example, a typical Black Brant XII launch has a third stage that would be predicted to land approximately 350 kilometers (220 miles) from the launch site with a 1-sigma¹ downrange dispersion of approximately 38 kilometers (24 miles) and a 1-sigma cross-range dispersion of 27 kilometers (17 miles).² Using these dispersion estimates, it is possible to estimate a predicted impact area within the ellipse formed by these dispersion factors. The 1-sigma impact area for this example would be an ellipse with an area of approximately 3,200 square kilometers (1,235 square miles).

Using a bivariate circular probability distribution, approximately 39 percent of its launches are expected to land within 1 sigma of the predicted impact point, 86 percent within 2 sigma, and 99 percent within 3 sigma. Expanding the predicted impact area to account for 2-sigma dispersion increases the potential impact area by a factor of 4, and expanding the area to account for 3-sigma dispersion increases the potential impact area by a factor of 9 compared to the 1-sigma predicted impact area.

Figure G–1 shows the typical 1-, 2-, and 3-sigma ellipses for different distances evaluated as typical impact points for launches from PFRR within the PFRR on White Mountains National Recreation Area, the Venetie Reservation, and Yukon Flats and Arctic National Wildlife Refuges. These ellipses were used to calculate the probability of a payload or spent stage landing within these areas as well as other areas of concern that may reside within these areas, such as Wilderness Areas and Wild River segments. **Figure G–2** shows the potential overlap of a typical impact point within the Beaufort Sea on the northern border of the PFRR and polar bear critical habitat. **Figure G–3** shows the potential overlap of a typical impact point within the Beaufort Sea on the areas where ringed seals are known to congregate during the winter months when launches are assumed to take place from PFRR and the potential overlap with sea ice out to 200 nautical miles where ringed seals could be present during such launches. **Figure G–4** shows the potential overlap of the typical impact points within the PFRR on areas where caribou herds are known to congregate during the winter months when launches are assumed to take place from PFRR. **Figure G–5** shows the potential overlap of a typical impact point within the Beaufort Sea on areas that are covered with sea ice year-round (sea ice in this region of the Beaufort Sea retreats until early September each year and then begins to freeze over again until it is hard up against the Alaska coastline during the winter months) (NSIDC 2011).

¹ Sigma or standard deviation is a measure of how much variation or “dispersion” there is from the average (the mean, or, in this case, predicted impact point).

² Since the launches from PFRR are generally from south to north, downrange dispersion refers to differences in the actual impact point along the south-to-north axis and cross-range dispersion refers to possible differences in the actual impact point along the west-to-east axis.

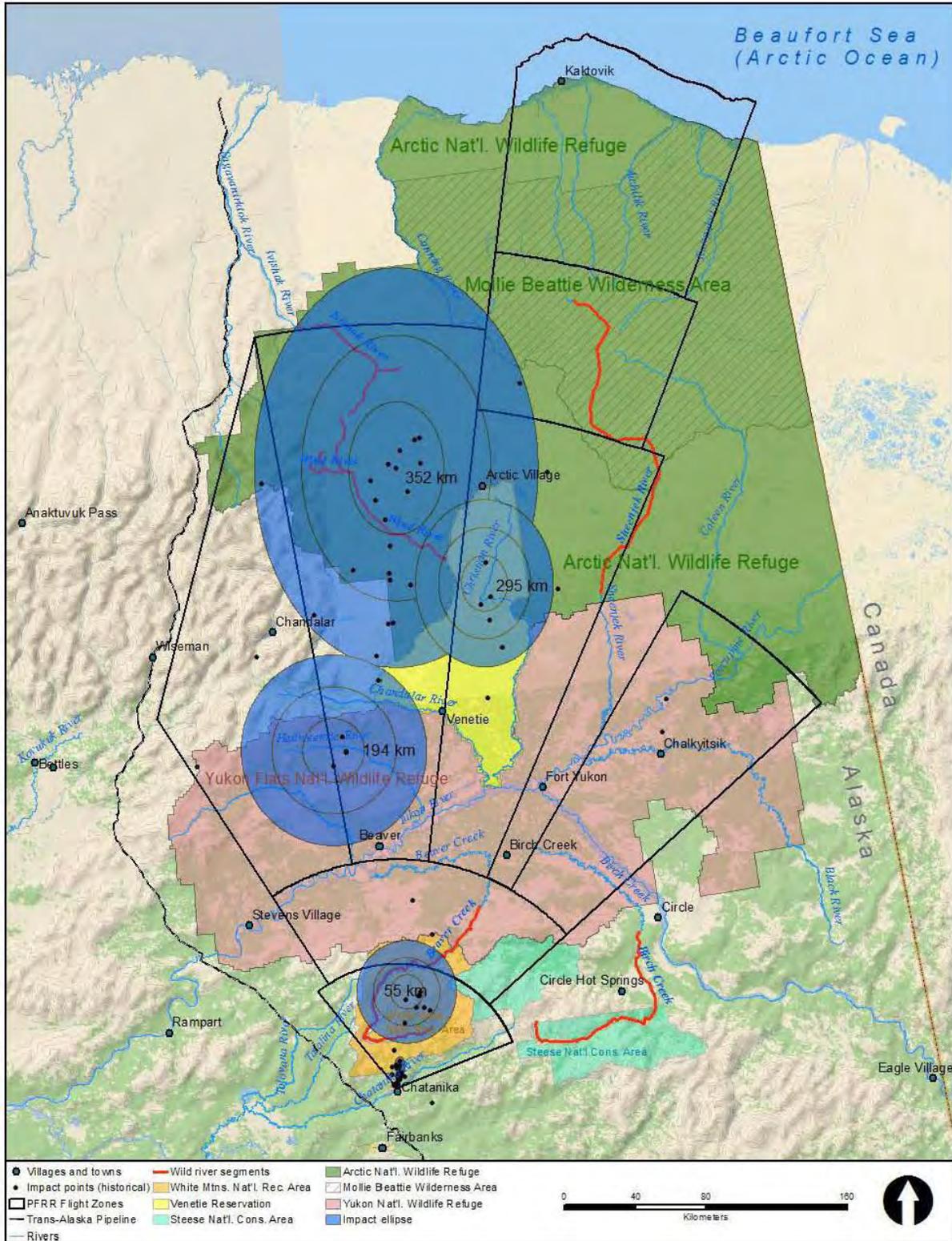
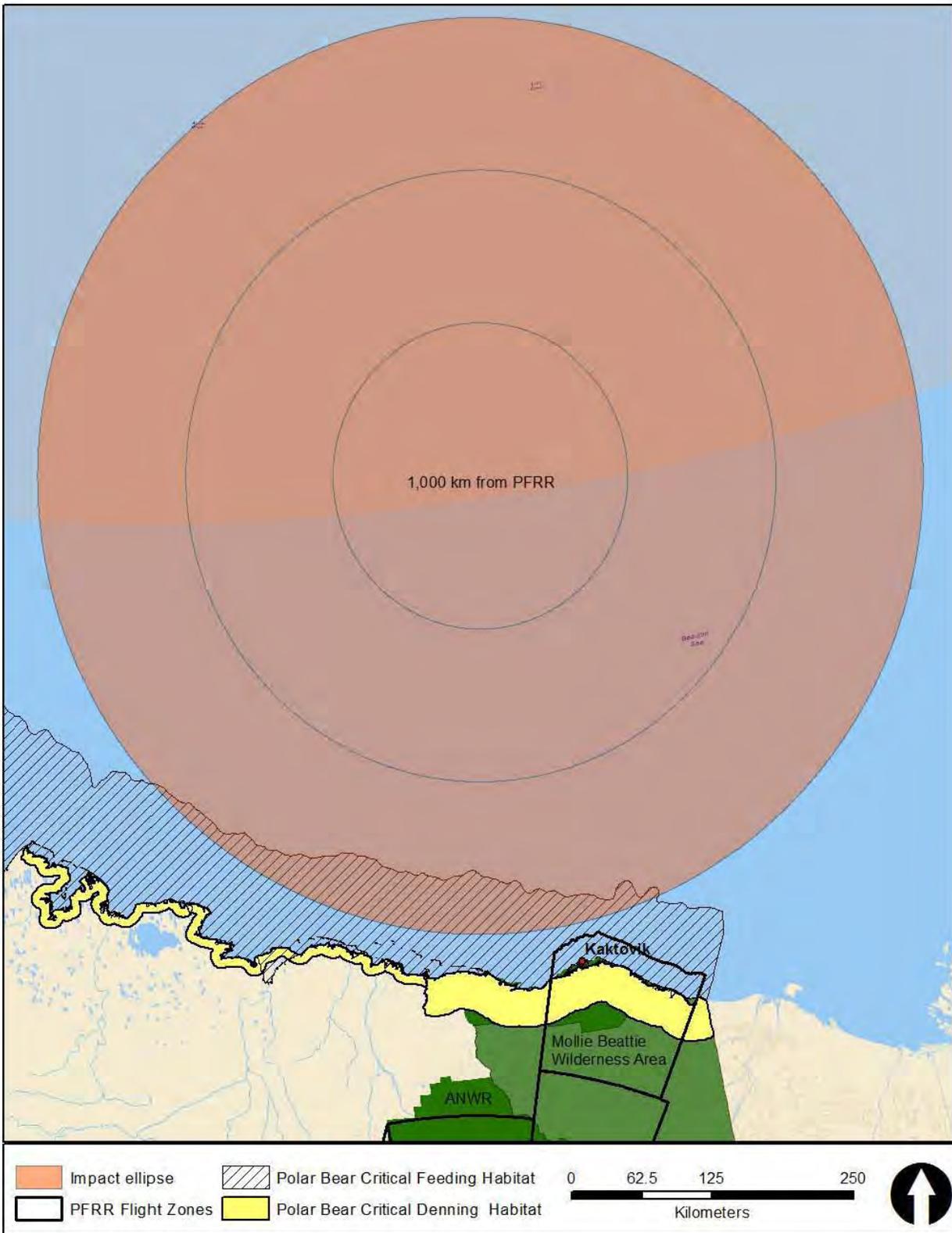


Figure G-1. Typical Impact Areas within the Poker Flat Research Range



Key: km=kilometers.

Figure G-2. Typical Impact Areas within the Beaufort Sea

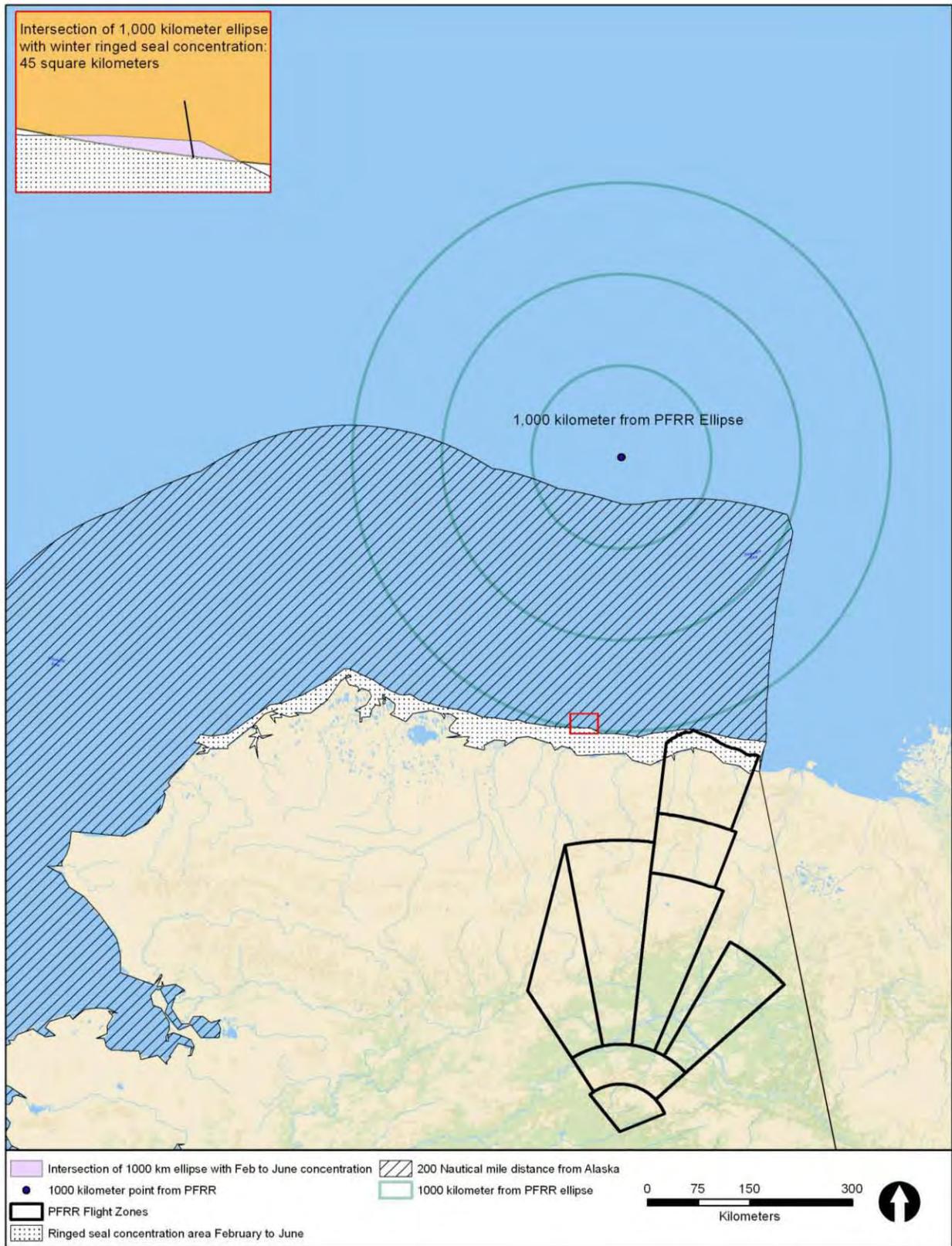
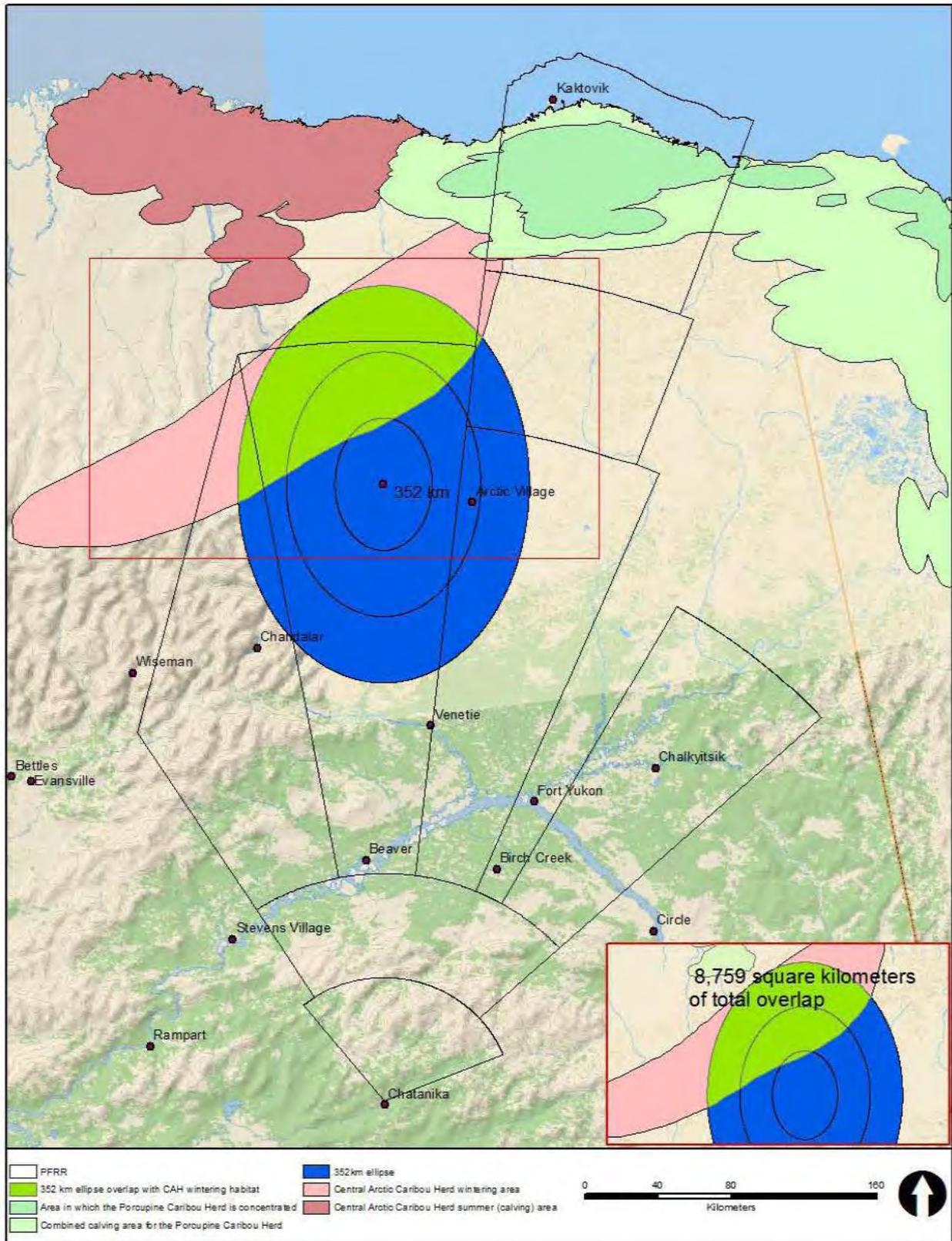
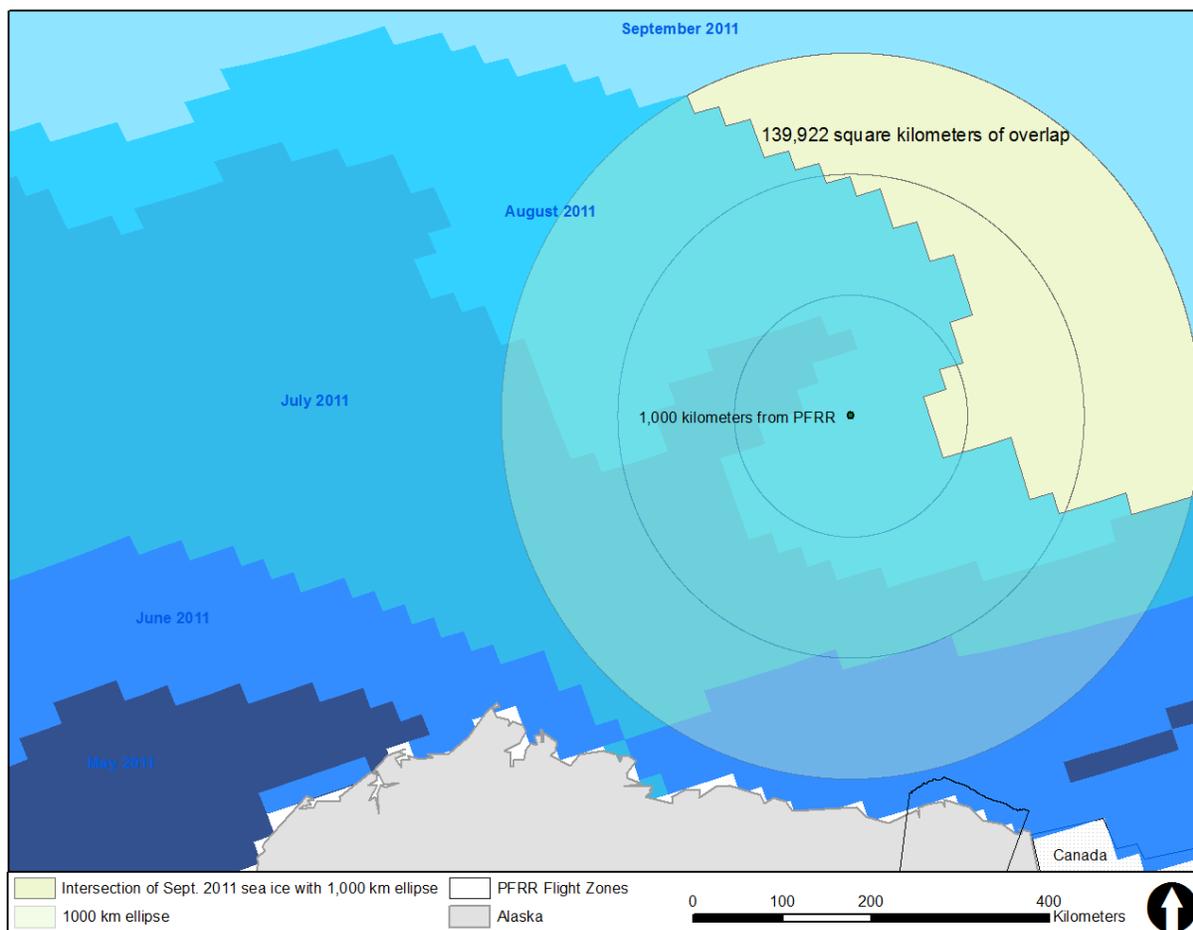


Figure G-3. Typical Impact Points Related to Ringed Seal





Key: km=kilometers.

Figure G-5. Typical Impact Points Related to Permanent Sea Ice

This EIS evaluates the potential impact of these spent stages and payloads on a variety of natural areas, land ownership, land designations, wildlife habitats, villages, and the Venetie Reservation. **Tables G-1 through G-7** show the probability of a typical spent stage or payload impacting in these different areas of concern.

Table G-1 shows the probability of a typical spent stage or payload impacting Federal lands for the different potential impact points. Depending on the launch vehicle, these probabilities range from less than one chance in 12,000 (8.3×10^{-5}) that an Orion rocket would land within Yukon Flats NWR to a 98 percent probability that an Orion rocket would land within the White Mountain NRA.

Table G–1. Probability of Impact on Federal Lands

Distance from the PFRR Operational Areas (kilometers)	Federal Land	Potential Impact Ellipse (square kilometers)	Amount of Federal Land Within Ellipse (square kilometers)	Probability of a Spent Stage or Payload Landing on Federal Land
13	White Mountains NRA	45	20	0.42
55	White Mountains NRA	2,551	2,461	0.98
55	Steese NCA	2,551	24	0.0021
55	Yukon Flats NWR	2,551	1	8.3×10^{-5}
194	Yukon Flats NWR	8,856	6,367	0.84
295	Yukon Flats NWR	5,808	70	0.0027
295	Arctic NWR	5,808	1,941	0.14
352	Mollie Beattie Wilderness Area	28,370	603	0.0047
352	Arctic NWR	28,370	21,843	0.91

Key: NCA=National Conservation Area; NRA=National Recreation Area; NWR=National Wildlife Refuge.

Note: To convert kilometers to miles, multiply by 0.62137; square kilometers to square miles, by 0.38610.

Table G–2 shows the probability of a typical spent stage or payload impacting designated Wild River segments including the lands on either side of the rivers for the different potential impact points based on information provided by the **USFWS (2011)**. Depending on the launch vehicle, these probabilities range from less than one chance in 230 (0.0043) that the second stage of a Black Brant X would land within the designated Wind River Wild River segment to a 6 percent probability that an Orion rocket would land within the designated Beaver Creek Wild River segment.

Table G–2. Probability of Impact on Designated Wild River Segments

Distance from the PFRR Launch Site (kilometers)	Designated Wild River Segment	Potential Impact Ellipse (square kilometers)	Amount of Wild River Segment Within Ellipse (square kilometers)	Probability of a Spent Stage or Payload Landing in the Wild River Segment
55	Beaver Creek	2,551	216	0.062
295	Wind River	5,808	63	0.0043
352	Wind River	28,370	786	0.053
352	Ivishak River	28,370	795	0.036

Note: To convert kilometers to miles, multiply by 0.62137; square kilometers to square miles, by 0.38610.

Table G–3 shows the probability of a typical spent stage or payload impacting lands owned by regional landowners with significant holdings within the PFRR launch corridor. Depending on the launch vehicle, these probabilities range from less than one chance in 2,700 (3.6×10^{-4}) that the third stage of a Black Brant XII or second stage of a Terrier-Improved Orion would land within Venetie lands to an 87 percent probability that the second stage of a Black Brant X would land within Venetie lands.

Table G–3. Probability of Impact on Regional Landowners

Distance from the PFRR Operational Areas (kilometers)	Regional Landowner	Potential Impact Ellipse (square kilometers)	Amount of Regional Land Within Ellipse (square kilometers)	Probability of a Spent Stage or Payload Landing on Regional Lands
194	Venetie Reservation	8,856	311	7.8×10^{-3}
194	Doyon, Limited	8,856	301	7.6×10^{-3}
295	Venetie Reservation	5,808	3,993	0.87
295	Doyon, Limited	5,808	105	4.1×10^{-3}
352	Venetie Reservation	28,370	3,436	0.054
352	Doyon, Limited	28,370	188	9.7×10^{-3}

Note: To convert kilometers to miles, multiply by 0.62137; square kilometers to square miles, by 0.38610.

Table G–4 shows the probability of a typical spent stage or payload impacting polar bear critical habitat within the PFRR. The only launch vehicle capable of reaching these areas would be the fourth stage and payload of a Black Brant XII. Typically these items would land far offshore in the Beaufort Sea or Arctic Ocean but there is a small chance that they could land along the shore that includes designated critical polar bear feeding and denning habitat. Critical denning habitat would not typically be affected by these launches. The chance that one of these launches would typically impact designated critical feeding habitat is less than one chance in 150 (6.6×10^{-3}).

Table G–4. Probability of Impact on Polar Bear Critical Habitat and Dens

Distance from the PFRR Operational Areas (kilometers)	Polar Bear Critical Habitat	Potential Impact Ellipse (square kilometers)	Amount of Polar Bear Critical Habitat Within Ellipse (square kilometers)	Probability of a Spent Stage or Payload Landing in Polar Bear Critical Habitat
1,000	Feeding habitat	503,375	14,964	6.6×10^{-3}
1,000	Denning habitat	503,375	0	0
1,000	Polar bear dens within potential impact area ^a	503,375	0.022	4.6×10^{-8}

a. An estimated 69 known polar bear dens could be within the area potentially impacted by a typical National Aeronautics and Space Administration launch into the Beaufort Sea (based on information from **Amstrup and Gardner 1994**) based on information collected over the years by the National Oceanic and Atmospheric Administration. Assuming each den covers an area of approximately 3 square meters (30 square feet) (**Stirling 1988**), this analysis assumes a safety zone within a 10-meter (33-foot) radius of the den. The potential area of disturbance around a polar bear den that could result in either damage to the den or injury or death to the polar bear is estimated to be approximately 315 square meters (380 square yards) per den, or 0.022 square kilometers (0.0085 square miles) for 69 dens.

Note: To convert kilometers to miles, multiply by 0.62137; square kilometers to square miles, by 0.38610.

The probability of one of these items actually impacting a polar bear den was also estimated using information on known polar bear dens in the area. The chance that one of these launches directly impacting a polar bear den is less than one chance in 21 million (4.6×10^{-8}).

Table G–5 shows the probability of a typical spent stage or payload impacting areas where ringed seals congregate during the winter within the PFRR. Similar to polar bear critical habitat, the only launch vehicle capable of reaching these areas would be the fourth stage and payload of a Black Brant XII. Typically these items would land far offshore in the Beaufort Sea or Arctic Ocean but there is a small chance that they could land along the shore that includes areas where ringed seals are known to congregate during the winter when such launches would take place. The chance that one of these launches would typically impact areas where ringed seals are known to congregate is one chance in 50,000 (2.0×10^{-5}). The probability of one of these items actually impacting a ringed seal was also estimated using information on ringed seal concentrations in the Beaufort Sea. Assuming a conservative density of 1 individual per square kilometer throughout the Beaufort Sea and Arctic Ocean and allowing for a 10-meter (33-foot) radius buffer zone around each seal, the per-launch chance of an impact near a ringed seal is very low, approximately 3.1×10^{-4} , or 1 chance in 3,200 (see Table G–5).

Table G–5. Probability of Impact on Ringed Seals in the Beaufort Sea

Ringed Seal Resource	Potential Impact Ellipse (square kilometers)	Ringed Seal Resource Area (square kilometers)	Probability of Spent Stage or Payload Impacting Ringed Seal Resource
Nearshore ice ^a	503,375	45	2.0×10^{-5}
Individual within 3-Sigma Dispersion ^b	503,375	159	3.1×10^{-4}

a. Assumed to be concentrated on the nearshore ice during the winter months. Wintering concentration areas for the ringed seal (*Pusa hispida*) were interpreted and mapped from **Smith et al. 2010**, Figure 37.

b. Based on information collected over the years, a population density of 1 ringed seal per square kilometer was assumed across the entire Beaufort Sea (**Ireland et al 2009**) within the typical 3-sigma dispersion. Assuming a safety zone within a 10-meter (33-foot) radius of seal, the potential area of disturbance around a ringed seal that could result in either injury or death is estimated to be approximately 315 square meters (380 square yards) per seal, or 159 square kilometers (61 square miles) for the approximately 503,375 ringed seals that could be within the impact ellipse.

Note: To convert kilometers to miles, multiply by 0.62137; square kilometers to square miles, by 0.38610.

Table G–6 shows the probability of a typical spent stage or payload impacting areas where caribou herds congregate during the winter within the PFRR. The chance that the third stage of a Black Brant XII or second stage of a Terrier-Improved Orion would land where the Central Arctic Caribou Herd is known to congregate is approximately one chance in 5 (0.20). The Porcupine Caribou Herd would not typically be affected by these launches because they would be completely outside the typical impact ellipses.

Table G–6. Probability of Impact on Caribou Herds

Distance from the PFRR Operational Areas (kilometer)	Caribou Herd Area	Potential Impact Ellipse (square kilometers)	Area Frequented by Caribou Herds During the Winter Months (square kilometers)	Probability of a Spent Stage or Payload Hitting the Area of Caribou Concentration
352	Central Arctic Caribou Herd	28,370	8,759	0.20
352	Porcupine Caribou Herd	28,370	0	0

Note: To convert kilometers to miles, multiply by 0.62137; square kilometers to square miles, by 0.38610.

Table G–7 shows the probability of a typical spent stage or payload impacting permanent sea ice off the coast of Alaska. The chance that the fourth stage or payload of a Black Brant XII would land on permanent sea ice is approximately one chance in 6 (0.17) based on information from the National Sea Ice Data Center (NSIDC 2011).

Table G–7. Probability of Impact on Permanent Sea Ice

Distance from the PFRR Operational Areas (kilometers)	Sea Ice Coast of Alaska	Potential Impact Ellipse (square kilometers)	Area Covered by Permanent Sea Ice (square kilometers)	Probability of a Spent Stage or Payload Hitting the Area of Permanent Sea Ice
1,000	Permanent Sea Ice	503,735	140	0.17

Note: To convert kilometers to miles, multiply by 0.62137; square kilometers to square miles, by 0.38610.

G.3 REFERENCES

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APPENDIX H
BIOLOGICAL ASSESSMENT

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National Aeronautics and
Space Administration
**Goddard Space Flight Center
Wallops Flight Facility
Wallops Island, VA 23337**



Reply to Attn of: 250.W

July 24, 2012

Mr. Brad Smith
Protected Resources Division
NOAA Fisheries Service
222 West 7th Avenue, #43
Anchorage, Alaska 99513-7577

Dear Mr. Smith:

In accordance with Section 7 of the Endangered Species Act of 1973 (ESA), as amended, and its implementing regulations, this letter serves as the National Aeronautics and Space Administration's (NASA) request for conference and concurrence with its determinations of effect on listed and proposed species.

The action that is the subject of this conference is NASA's continued launch of sounding rockets from the University of Alaska Fairbanks-owned Poker Flat Research Range (PFRR). In consideration of the scope of the proposed action and the extent of species and habitat within the action area, NASA has concluded that it is "not likely to jeopardize the continued existence of" Ringed seal (*Phoca hispida*). Other listed and proposed species identified by NOAA Fisheries as potentially occurring within the action area have been assessed and given a "no effect" determination. Please find enclosed a Biological Assessment (BA) that provides analysis and justification for NASA's determinations of effect.

As the Federal agency funding the launch of sounding rockets from PFRR, NASA is serving as the lead agency for ESA compliance. The U.S. Department of the Interior's Bureau of Land Management and U.S. Fish and Wildlife Service would undertake actions connected to NASA's and are participating in NASA's ESA process. The effects of their actions are also considered in the enclosed BA. As such, please include all three action agencies in future correspondence regarding this conference.

If you have any questions, please contact me at (757) 824-2319 or Joshua.A.Bundick@nasa.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Joshua A. Bundick", with a long horizontal flourish extending to the right.

Joshua A. Bundick
Lead, Environmental Planning

Enclosure

cc:
BLM/Ms. L. Heppler
USFWS Arctic NWR/Mr. R. Voss
USFWS Yukon Flats NWR/Mr. M. Bertram

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National Aeronautics and
Space Administration
**Goddard Space Flight Center
Wallops Flight Facility
Wallops Island, VA 23337**



Reply to Attn of: 250.W

July 24, 2012

Mr. Ted Swem
Ecological Services Office
U.S. Fish and Wildlife Service
101 12th Avenue, Room 110
Fairbanks, Alaska 99701

Dear Mr. Swem:

In accordance with Section 7 of the Endangered Species Act of 1973 (ESA), as amended, and its implementing regulations, this letter serves as the National Aeronautics and Space Administration's (NASA) request for U.S. Fish and Wildlife Service (USFWS) concurrence with its determinations of effect on listed species and designated critical habitat.

The action that is the subject of this consultation is NASA's continued launch of sounding rockets from the University of Alaska Fairbanks-owned Poker Flat Research Range (PFRR). In consideration of the scope of the proposed action and the extent of species and habitat within the action area, NASA has concluded that it "may affect, not likely to adversely affect," Polar bear (*Ursus maritimus*) and its designated critical habitat. Other listed and candidate species identified by USFWS as potentially occurring within the action area are assessed and have been given a "no effect" determination. Please find enclosed a Biological Assessment (BA) that provides analysis and justification for NASA's determinations of effect.

As the Federal agency funding the launch of sounding rockets from PFRR, NASA is serving as the lead agency for ESA compliance. The U.S. Department of the Interior's Bureau of Land Management and USFWS would undertake actions connected to NASA's and are participating in NASA's ESA consultation. The effects of their actions are also considered in the enclosed BA. As such, please include all three action agencies in future correspondence regarding this consultation.

If you have any questions, please contact me at (757) 824-2319 or Joshua.A.Bundick@nasa.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Joshua A. Bundick". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Joshua A. Bundick
Lead, Environmental Planning

Enclosure

cc:
BLM/Ms. L. Heppler
USFWS Arctic NWR/Mr. R. Voss
USFWS Yukon Flats NWR/Mr. M. Bertram

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Biological Assessment

NASA Sounding Rockets Program at Poker Flat Research Range



**National Aeronautics and Space Administration
Goddard Space Flight Center
Wallops Flight Facility
Wallops Island, VA 23337**

July 2012

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1. Introduction

1.1. Purpose of this Document

Section 7(c) of the Endangered Species Act (ESA) of 1973 requires that a Biological Assessment (BA) be prepared for all Federal actions that may affect Federally-listed threatened or endangered species or critical habitat. The National Aeronautics and Space Administration (NASA) has prepared this BA to consider the potential impacts of its Sounding Rockets Program (SRP) at the University of Alaska Fairbanks (UAF) – owned Poker Flat Research Range (PFRR), Alaska (AK). This BA considers the potential effects of the SRP on listed, proposed, and candidate species, as well as designated critical habitat under the jurisdiction of both the NOAA Fisheries Service (NOAA Fisheries) and U.S. Fish and Wildlife Service (USFWS) (collectively, “the Services”).

Also considered in this BA are connected Federal actions undertaken by two independent agencies of the Department of the Interior - the Bureau of Land Management (BLM) and the USFWS. Each agency manages lands within the eastern Interior of Alaska and issue authorizations to UAF (on NASA’s behalf) for sounding rocket launches; specifically BLM manages the Steese National Conservation Area and White Mountains National Recreation Area under the Federal Land Policy and Management Act of 1976, as amended; USFWS manages Arctic and Yukon Flats National Wildlife Refuges in accordance with its responsibilities under the National Wildlife Refuge System Administration Act of 1966, as amended.

This BA has been prepared to assist NASA and its cooperating agencies in determining whether the proposed action is “likely to adversely affect” listed species or critical habitat, thereby warranting formal consultation pursuant to the ESA. In the case of proposed species, a determination of “likely to jeopardize the continued existence of” would trigger the need to undertake formal conference. If, based upon the findings within this BA, NASA determines that the proposed action would have “no effect” or is “not likely to adversely affect” listed species or critical habitat, or “not likely to jeopardize the continued existence of” proposed species, NASA would request written concurrence from the Services with its determinations. In the case of a “likely to adversely affect” or “likely to jeopardize the continued existence of” determination, formal consultation (or conference in the case of proposed species) with the Services would then ensue.

Although including candidate species in this BA is not required by law, it is USFWS policy to consider candidate species during its decision-making process. Therefore, NASA has included an assessment of potential effects on candidate species in this BA.

1.2. Previous ESA Communications

NOAA Fisheries

On September 6, 2011 NASA sent a letter requesting information from NOAA Fisheries regarding listed species within the PFRR flight corridor. NOAA Fisheries responded in a September 6, 2011 email, providing the requested information.

On February 3, 2012, NASA and UAF met with NOAA Fisheries at its office in Anchorage, AK to continue project-related ESA discussions.

On March 21, 2012, NASA requested confirmation that the project's species list was still valid; NOAA Fisheries provided confirmation.

USFWS

On April 14, 2011, NASA sent a letter to USFWS requesting information regarding ESA listed species within the PFRR flight corridor. On May 23, 2011, USFWS provided the requested species list.

Subsequent to the written correspondence, NASA and its environmental contractor held a teleconference with USFWS on September 30, 2011 to discuss the proposed action and the ESA consultation. On February 2, 2012, NASA met with USFWS at its office in Fairbanks, AK to continue such discussions.

On March 21, 2012, NASA requested confirmation that the project's species list was still valid; USFWS provided confirmation.

2. Description of the Action

NASA has prepared a Draft Environmental Impact Statement (EIS) that addresses both its launch and recovery operations at PFRR; the Draft EIS considers four action alternatives as well as a no action alternative. Although NASA has not yet identified a preferred alternative in the EIS (upon which an ESA consultation would typically be based), the key difference among all alternatives is the level of recovery or avoidance of interior lands, none of which would have a potential effect on areas known to harbor ESA listed, proposed, or candidate species.

The component common to all alternatives that would have the potential to affect areas ESA species or habitat is the flight and subsequent re-entry of sounding rocket motors and payloads within the Beaufort Sea/Arctic Ocean. Accordingly, this section of the BA provides only a description of the launch, flight, and re-entry of NASA sounding rockets with no further reference to recovery operations. Furthermore, only those sounding rocket configurations (and typically associated payloads) that have the potential to overfly or land within ESA species habitat are presented in detail.

For a full description of the NASA SRP and its operations at PFRR, the reader is directed to the *Sounding Rockets Program Final Supplemental EIS (NASA 2000)* and the *Sounding Rockets Program at Poker Flat Research Range EIS (NASA 2012)*.

2.1. *Poker Flat Research Range*

PFRR is located in the center of Alaska near Fairbanks, approximately 1.5 degrees below the Arctic Circle at 65°2' N latitude and 147°5' W longitude. The facility consists of approximately 2,100 hectares (5,200 acres) on Steese Highway (Alaska Route 6) in the village of Chatanika, approximately 48 kilometers (30 miles) northeast of Fairbanks. Directly north of PFRR are its downrange flight zones, over which rockets are launched and within which spent stages and payloads impact the ground.

Since the late 1960s, NASA and other government agencies have launched suborbital rockets from PFRR (**Davis 2006**). While PFRR is owned and managed by the Geophysical Institute of UAF, since the 1980s, the NASA SRP has provided sole funding support to PFRR.

2.2. NASA Sounding Rockets

Each NASA sounding rocket consists of one to four ground-launched; solid-propellant rocket motors staged in series, the purpose of which is to propel a scientific payload to the upper atmosphere. These rocket motors are configured to meet scientific requirements driven by payload size, flight time, and target altitude desired by the researchers. As NASA sounding rockets are suborbital, their upper stages or payloads do not enter an Earth orbit, rather they return to Earth along parabolic trajectories (**Figure 1**).

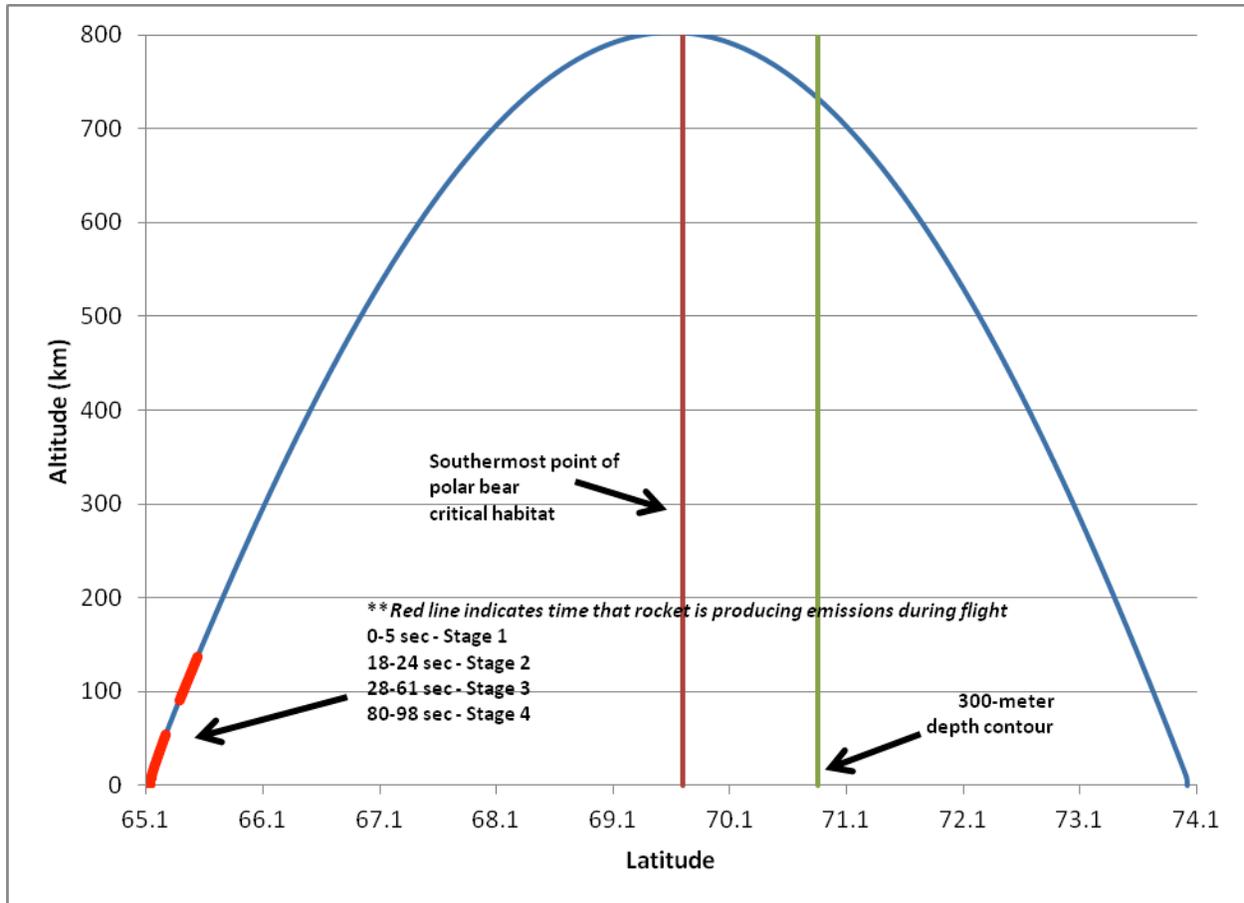


Figure 1. Example Sounding Rocket Trajectory (only 4th stage and payload depicted for clarity)

The rockets having the potential to either overfly or land within the Beaufort Sea/Arctic Ocean are the Black Brant-class vehicles which employ either three or four rocket motors. Although only the Black Brant XII is shown below in **Figure 2**, other similar vehicles, including the Black Brant X, could be flown, however they would not materially differ from the Black Brant XII in terms of potential effects on listed species or habitat. In fact, the Black Brants X and XII share the same final stage (the Nihka rocket motor), which is discussed in more detail below.

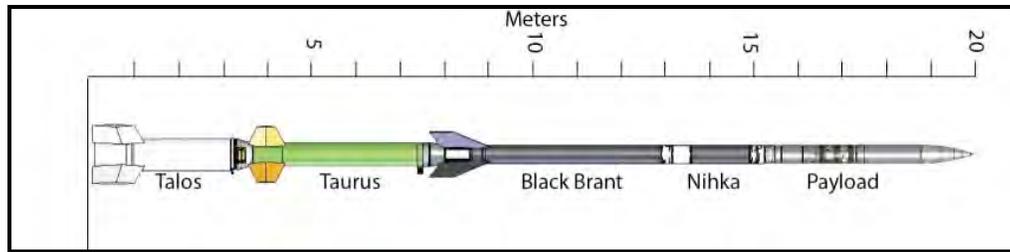


Figure 2. Black Brant XII Sounding Rocket

Rocket Motors

All rocket motors launched by NASA at PFRR are spin stabilized, unguided, and solid fueled. Propellants typically include ammonium perchlorate and aluminum or nitrocellulose and nitroglycerine. Section 2.2 of the *SRP SEIS (NASA 2000)* defines these propellants and their exhaust products in full detail. Individual motors range in size from 36 to 78.7 centimeters (14 to 31 inches) in diameter and are 1.9 to 5.7 meters (76 to 223 inches) long. In **Figure 2**, the Black Brant XII's motors are identified as the Talos, Taurus, Black Brant, and Nihka. Of those motors, only the fourth stage Nihka would overfly or land within the Beaufort Sea/Arctic Ocean.

The diameter of the Nihka is about 44 centimeters (17 inches) and its length is about 1.90 meters (76 inches). The loaded motor weight is 408 kilograms (900 pounds), which includes 320 kilograms (700 pounds) of propellant of the ammonium perchlorate/aluminum/plastic binder type, with carbon black, iron, sulfur, and ferric oxide additives. The rocket exhaust emissions are mainly aluminum oxide, hydrogen chloride, carbon monoxide, water, and nitrogen. They occur during the 18-second burning time over a typical altitude range from 96 to 150 kilometers (60 to 96 miles), with a spent rocket weight at final impact of 93 kilograms (200 pounds). Due to the nature of solid rocket motors, all propellant is burned once ignited; therefore, only trace residual amounts remain on each stage after flight.

The rocket motors used by NASA consist of steel cases and steel, aluminum, or similar metallic alloy fins and attachment hardware. The Nihka is finless due to its exo-atmospheric flight. Future rocket motor cases may be made of composite materials such as fiberglass, Kevlar, or similar materials. However, the dimensions and overall appearance would remain consistent with current inventory for the foreseeable future.

Payloads

There are a variety of payloads and experiments that are flown on SRP missions at PFRR. These payloads/experiments range in size from 0.76 to 5.3 meters (30 to 210 inches) long, are of similar diameter to the rocket motor on which they are flown, and weigh from less than 45 kilograms (100 pounds) to over 140 kilograms (300 pounds). They all utilize mechanical structures made of a variety of materials, including aluminum, steel, magnesium, other lightweight metals, or occasionally composites such as fiberglass, graphite/epoxy, etc. Internal components consist mainly of electronic subsystems, batteries, pressure systems (pressure vessels, tubing, regulators, valves, etc.), and a variety of sensors and instruments such as magnetometers, optical devices, and antennas of varying shapes and sizes. A drawing of a typical payload after deployment is shown below in **Figure 3**.

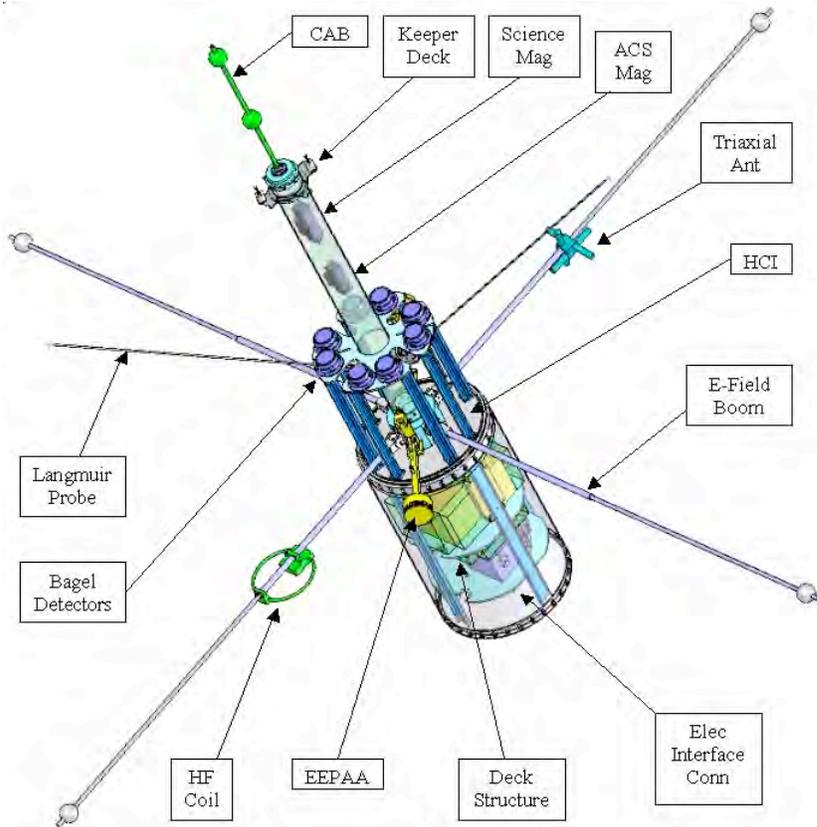


Figure 3. Typical PFRR Sounding Rocket Payload

The payloads often contain deployable devices, such as a nose cone used to cover sensitive electronic instruments during ascent, releasable doors, antennas, de-spin weights, cables, and other similar components. In many cases, a payload flown on a single rocket will be separated in flight into multiple pieces, each designed to carry out a specific scientific objective.

Re-Entry

All metallic and other solid heavier-than-air objects that are propelled into the atmosphere by sounding rockets land back on Earth in more or less ballistic trajectories. The objects include spent rocket stages, payloads; nose cone doors (released in flight for instruments to “see” their targets); and spin weights, which were released to change rotation of a rocket stage of a launch.

Recent data on average sea ice thickness in the Beaufort Sea (**Kwok and Rothrock 2009**) was used as a gauge to determine whether the re-entering objects would fully penetrate the ice. Assuming an average sea ice thickness of 1 meter (3.3 feet), it is highly unlikely that re-entry would result in a penetration depth that would exceed the average ice thickness. Payloads and spent motors would likely impact the ice and undergo elastic and plastic deformation while creating an impact crater but would not pierce the ice and immediately sink into the water (**Wilcox 2012**).

Upon impacting the sea ice, it is expected that the enclosed sections of the payload (telemetry sections, attitude control systems, etc.) would experience damage but would be largely intact as a

result of impact. On the other hand, exposed experiment sections (such as the booms and probes shown in **Figure 3**) would be broken up as a result of the impact; a resulting debris field would include structural elements as well as experiment components of various material make-up.

It is expected that extreme re-entry dynamics would result in deployed booms and detectors being separated from their primary structures. However, the primary structures without aluminum skin sections would survive until impact. It is likely that these structures would undergo sufficient deformation such that they, along with any components housed in these locations, would be dispersed around the impact point. It is possible that batteries could be located in these exposed assemblies but this is not the typical case. Electronic boards, wiring, connectors and other small components are likely to be numerous in the debris field.

Spent motors and enclosed portions of payloads would experience plastic deformation and significant damage but are not likely to break apart to the extent that internal elements would be significantly exposed (e.g. residual propellant, telemetry components such as batteries, etc.).

A description of materials and equipment that would be relevant in assessing potential effects on listed species or habitat is presented below.

Materials of Interest

Pyrotechnics - In addition to the rocket propellant, each rocket motor contains a series of small explosive charges. To provide perspective regarding size, the largest charge currently employed is just less than 0.3 grams (0.01 ounce). These charges serve two primary functions: rocket motor ignition and separation of the stage after it has finished burning.

Payloads also contain a number of the above-described pyrotechnic charges for purposes such as removing doors and nosecones to expose the scientific experiment. The size and number of these charges would be mission-specific and would vary; however even in the case that all charges were of the largest variety, the total charge mass would be less than 28 grams (g) (1ounce [oz]). Once activated, under normal flight conditions, these pyrotechnic systems would pose no hazard to wildlife on the ground.

Batteries – Small electrical systems are required on each rocket motor such that the ignition and separation functions described above may occur. As only the first stage can be ignited from a ground-based circuit, rechargeable batteries are employed (**Figure 4**). On the forward end of each motor, approximately 1.8 kg (4 lbs) of nickel-cadmium cells are housed within rigid plastic containers bolted to the head cap of the motor. To assist in providing perspective, this quantity of batteries is comparable to approximately 48 “AA” cells typically used in consumer electronic devices. Of the total battery mass, approximately 15 percent is the cadmium metal, totaling approximately 270 g (0.6 lb) per stage. In addition to the nickel-cadmium cells, small quantities of silver oxide cells are used in the motor ignition systems. Weighing less than a gram each, this equates to an approximate mass of 50 grams (0.1 lb) onboard each motor. These types of batteries are most commonly used in small personal electronic devices, including wristwatches.



Figure 4. Typical Rocket Motor Ignition Battery Pack

In addition to the batteries onboard the rocket motor, the payload would contain batteries for the attitude control system, telemetry, and scientific experiments (**Figure 5**). The total mass of batteries onboard would vary based upon mission requirements; however, a typical mission would be expected to employ approximately 9 kg (20 lb) of nickel-cadmium batteries. This would equate to approximately three packs of 24 “C” cells and single packs of 24 and 16 “A” cells. Assuming that the payload’s batteries contain 15 percent cadmium by mass, the total cadmium returning to Earth would be approximately 1.4 kg (3 lb) per flight.



Figure 5. Typical Payload Battery Configuration

In addition to the cadmium found in the batteries themselves, very small quantities of lead containing solder are used on sounding rocket electrical systems. Although the majority of electrical systems are connected with crimps, some soldered connections are still employed, including those in the battery packs. It is estimated that approximately 100 g (3.5 oz) of solder would be used on a rocket's entire electrical system, with 40 percent (40 g [1.4 oz]) of this solder consisting of lead. To assist in providing perspective, this quantity of lead is slightly more than what is contained within a single 12-gauge shotgun shell used for small-game hunting.

Balance Weights – To ensure that the spinning rocket components do not “wobble,” between 2.3 and 4.5 kg (5-10 lb) of lead balance weights are employed on most sounding rocket payloads. These weights would typically be in the form of 0.6 or 1.3 cm (0.25 or 0.5 in) thick curved plates that are bolted to the inside of the payload skin sections. It would be highly unlikely that these weights would be dislodged such that they would separate from the payload upon impact.

Pressure Systems – Onboard the payload section of the rocket are small cylinders of high pressure (generally 5,000 psi) compressed gas, typically argon or nitrogen (**Figure 6**). These gases are vented during normal flight to align the payload in optimum position for taking its respective measurement. The typical quantity onboard a sounding rocket is small, estimated to be approximately 0.009 m³ (0.05 ft³). Although both gases are non-hazardous, damage to the cylinder could cause the cylinder to rupture or act as a projectile. However, the likelihood of such an incident occurring would be very low as this system is designed to vent its contents during reentry.



Figure 6. Typical 43 cm (17 inch) diameter Payload High Pressure Tank Configuration

Chemical Tracers – Payloads launched from PFRR sometimes carry small quantities of metal vapors (including barium, lithium sodium, strontium, and samarium) or trimethyl aluminum (TMA) that are intentionally dispersed at high altitude to study high-altitude phenomena. Sodium and lithium releases are produced by burning a mixture of thermite (titanium diboride, the reaction product of boron and titanium) and the metal to produce a vapor. TMA, on the other hand, is a pyrophoric liquid that reacts on contact with oxygen to produce chemiluminescence.

To provide the reader perspective, compounds containing several of these elements are commonly used in non-science-related applications requiring luminescence. In particular, barium creates the green color in fireworks whereas strontium produces the red color.

To provide perspective regarding size, for some TMA payloads (the most commonly employed tracer), modules are released during flight with each containing approximately 380 ml (12.9 oz) of the liquid; slightly more than the contents of a typical soda can. Larger canisters are most commonly used as they release the material along a longer duration of the trajectory and typically hold approximately 6 liters (1.6 gallons). In general, the primary on-the-ground hazard associated with these materials is the potential for fire or burns. During normal flight, these materials are released high in the atmosphere, with only trace amounts (estimated to be less than 100 g [3.5 oz]) present in hardware that returns to earth. The small soda can sized modules would not contain any residual as they rupture during flight; the most likely location of the trace quantities would be within the piping of the canister-type systems.

Dispersion in Impact Locations

A key concept to understand when discussing sounding rockets is the effect that dispersion can have on the ultimate landing location of spent stages, payloads, and other miscellaneous flight hardware. The term “dispersion” in this BA means the statistical deviation of the actual impact location of a spent rocket stage from the predicted value. All sounding rocket launch vehicles lack onboard guidance systems, which are typically employed on larger rocket systems such that the vehicle will fly along a pre-programmed route, correcting its flight path along the way.

Due to slight differences in the physical properties of each rocket (e.g., fin misalignment, weight variation) and the variability of atmospheric conditions, actual trajectories deviate from the predicted ones. The dispersion has downrange (short or long) and cross-range (left or right) components and is used to calculate the probability of impacting within a given distance of the nominal impact point. This distance is referenced to a standard deviation, or “sigma” value, from the mean point of impact (**Figure 7**). In the case of sounding rockets, a circular dispersion is employed; such that for each launch the probability of a stage landing within 1-sigma of its predicted impact point is approximately 40 percent; within 2-sigma, 87 percent; and within 3-sigma, 99 percent.

In general, dispersion is dependent on apogee, e.g., dispersion is higher for a light payload with higher apogee than for a heavy payload with lower apogee (for a given launch vehicle), and dispersion is somewhat higher as the number of rocket stages in a launch vehicle increases. Although dispersion values will be mission-specific, a “typical” 1-sigma dispersion for the fourth stage or payload of a Black Brant XII would be between 125 and 150 km (78 and 93 mi), with the downrange component being the longer of the two.

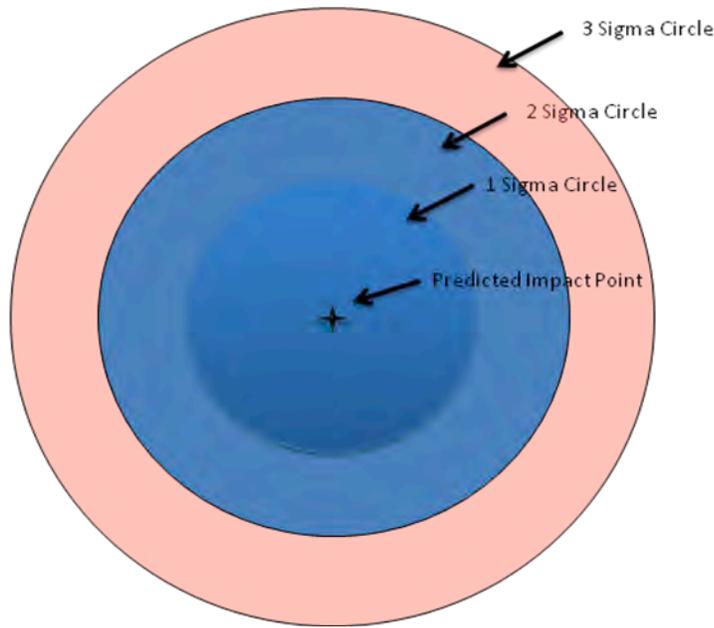


Figure 7. Illustration of a Sounding Rocket Dispersion

2.3. *Launch Frequency*

Future NASA SRP missions at PFRR could average from two to four launches every year. It is expected that no more than eight multi-stage suborbital rockets would be launched in any one year from PFRR under any action alternative. The eight launches could be spread across 8 separate days or concentrated into only 2 or 3 separate days with multiple launches.

This launch frequency estimate is based upon the past ten years of PFRR activity; this timeframe was selected to be representative of recent launch activity at PFRR and to demonstrate the anticipated future level of activity and resultant impact associated with SRP at PFRR. Sounding rocket launches at PFRR prior to this time were typically of shorter range and are therefore not representative of recent SRP activities at PFRR.

2.4. *Launch Season*

Future launches are expected to occur within the winter months, consistent with PFRR launch activity over the past ten years. However, the potential for a researcher to propose an experiment during the non-winter months cannot be discounted. Furthermore, the potential environmental effects from a non-winter launch would be highly mission-specific. In the event that a future non-winter launch were to be proposed, supplemental analysis would be required to determine potential effects on ESA species or habitat, potentially requiring further consultation with the Services.

2.5. Cooperating Agency Actions

BLM and USFWS would continue to review UAF-submitted permit applications and decide whether the proposed activities could be authorized, which would allow NASA to continue to land rocket motors and payloads on Federal properties. BLM-managed properties to which this action would apply are the White Mountains National Recreation Area and Steese National Conservation Area; USFWS-managed properties are the Arctic and Yukon Flats National Wildlife Refuges. Authorizations by BLM and USFWS, if granted, would be issued to the UAF on NASA's behalf.

3. Action Area

The action area is defined in 50 CFR 402.02 as "All areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." **Figure 8** depicts the action area for the SRP at PFRR. The action area for this BA includes the following:

- The land, water, and airspace within PFRR Flight Zones 1, 2, 3, 4, 4 extended, 4 arctic extension, and 5; and
- The land, water, and airspace within a 400 km (248 mi) circle centered approximately 1,000 km (620 mi) north of the PFRR launch site.

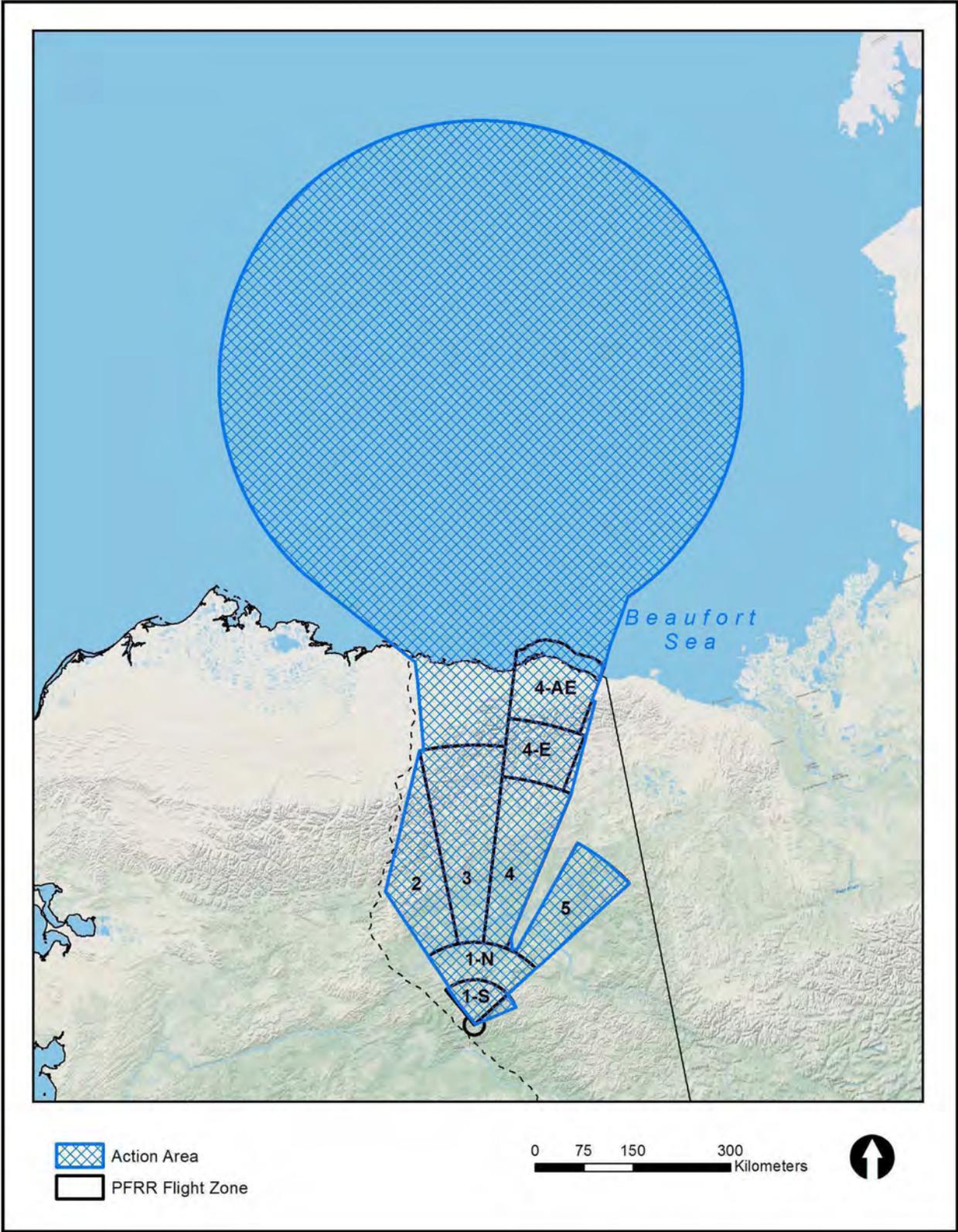


Figure 8. SRP at PFRR Action Area

4. Species Potentially within the Action Area

4.1. Species under NOAA Fisheries' Jurisdiction

4.1.1. Bowhead Whale

The western Arctic stock of bowhead whales (*Balaena mysticetus*) was listed as endangered on June 2, 1970, and has been on the endangered species list since then. Because of the ESA listing, the stock is classified as a depleted and a strategic stock under MMPA (**Angliss and Allen 2009**). However, the western Arctic bowhead whale population appears to be healthy and growing under a managed hunt and has recovered to historic abundance levels. NMFS will use criteria developed for the recovery of large whales in general (**Angliss et al. 2002**) and bowhead whales in particular in the next 5-year ESA status review to determine if a change in listing status is needed (**Shelden et al. 2001**).

The bowhead whale spends its entire life in the Arctic. There are four stocks recognized, of which the Bering-Chukchi-Beaufort stock occurs within the PFRR launch corridor. Based on a bowhead whale census in 2001, the population growth rate was estimated to be about 3.4 percent and the estimated population size, 10,470 (**George et al. 2004**), revised to 10,545 by **Zeh and Punt (2005)**. Most of the western Arctic bowhead whales migrate annually from wintering areas in the northern Bering Sea, through the Chukchi Sea in the spring, and into the Beaufort Sea, where they spend the summer. In autumn, they migrate through nearshore and offshore waters of the Beaufort Sea to return to their wintering grounds in the Bering Sea. Alaskan coastal villages along this migratory route, mainly Kaktovik, participate in traditional subsistence hunts of these whales (**Angliss and Allen 2009**) along the coast of the Beaufort Sea and within the PFRR launch corridor. Bowheads appear to migrate farther offshore during heavy-ice years and nearer shore during years of light sea ice (**Treacy et al. 2006**).

4.1.2. Ringed Seal

Ringed seals (*Phoca hispida*) have a circumpolar distribution and are year-round residents of the Beaufort Sea, where they are the most commonly encountered seal species in the area. No reliable population size estimate of the Alaska ringed seal stock is currently available (**Angliss and Allen 2009**). Ringed seal population estimates in the Bering-Chukchi-Beaufort area ranged from 1–1.5 million (**Frost 1985**) to 3.3–3.6 million (**Frost et al. 1988**). **Frost and Lowry (1981)** estimated the population in the Alaskan Beaufort Sea to be 80,000 during the summer and 40,000 during the winter. More recent estimates based on extrapolation from aerial surveys and on predation estimates for polar bears (**Amstrup 1995**) suggest an Alaskan Beaufort Sea population of approximately 326,500 animals. NMFS is considering listing the Alaska stock of ringed seals species under the ESA due to the potential loss of seal habitats resulting from current warming trends. On December 10, 2010, NMFS published a proposed rule to list three subspecies of the ringed seal as threatened under the ESA (**75 FR 77496**). This proposed listing includes the Arctic subspecies (*Phoca hispida hispida*), the distribution of which includes the Beaufort Sea. Ringed seal densities depend on food availability, water depth, ice stability, and distance from human disturbance. Seal densities reflect changes in the ecosystem's overall productivity in different areas (**Stirling and Oritsland 1995**). When sexually mature, they establish territories during the fall and maintain them during the pupping season (time of year

seals give birth to seal pups). Pups are born in late March and April in lairs that seals excavate in snowdrifts and pressure ridges. During the breeding and pupping season, adults on shorefast ice (floating ice attached to land) usually move less than individuals in other habitats. In this habitat, they depend on a relatively small number of holes and cracks in the ice for breathing and foraging. During nursing (4 to 6 weeks), pups usually stay in the birth lair. This species is a major resource harvested by Alaskan subsistence hunters. Ringed seal is also the chief prey species for polar bears.

4.1.3. Bearded Seal

Bearded seals (*Erignathus barbatus*) are the largest of Alaska's seals, weighing up to 340 kilograms (750 pounds). Bearded seals are found throughout the Arctic Ocean and usually prefer areas of less stable or broken sea ice, a zone where breakup occurs early (**Cleator and Stirling 1990**). Most of the 300,000 to 450,000 bearded seals estimated to occur in the Alaskan outer continental shelf area are found in the Bering and Chukchi Seas (**USDOJ 1996**). Reliable estimates of the abundance of bearded seals in Alaska Beaufort Sea waters currently are unavailable, although bearded seals are reported annually during aerial surveys for other marine mammals. Seasonal movements of bearded seals are directly related to water depth and the advance and retreat of sea ice (**Boveng et al. 2009**). During winter, most bearded seals in Alaskan waters are found in the Bering Sea. Favorable conditions are more limited in the Chukchi and Beaufort Seas, and consequently, bearded seals are not abundant there during winter. Pupping takes place on the ice from late March through May, mainly in the Bering and Chukchi Seas, although some pupping might take place in the Beaufort Sea. Bearded seals do not form herds, but sometimes form loose groups. Bearded seals are a main subsistence resource and a highly valued food of subsistence hunters. The form of bearded seal that occurs in the Beaufort Sea under the PFRR launch corridor is part of the Beringia Distinct Population Segment of *Erignathus barbatus barbatus*, which was proposed for listing as endangered on December 10, 2010 (**75 FR 77496**).

4.2. Species under USFWS Jurisdiction

4.2.1. Polar Bear

Polar bears (*Ursus maritimus*) are the top predator in the Arctic ecosystem and the largest land carnivore in the world. Occurring in 19 relatively discrete subpopulations, polar bears have a circumpolar Arctic distribution. The total number of polar bears worldwide is estimated to be between 20,000 and 25,000 (**Schliebe et al. 2008**). The subpopulation ranges overlapping the action area are the Southern Beaufort Sea (SBS), Northern Beaufort Sea (NBS), and Arctic Basin (AB). The most recent population estimate for the SBS subpopulation is approximately 1,526 (**Regehr et al. 2006**); 980 for the NBS subpopulation (**Stirling et al. 2011**); and unknown for the AB.

Polar bears are classified as marine mammals because of their dependence on sea ice; as such, they are protected under MMPA as well as the ESA. On May 15, 2008, USFWS listed the polar bear as threatened throughout its range under the ESA (**73 FR 28212**). The listing is in part a response to increased concerns about the effect of climate change on sea ice. Sea ice provides a hunting platform for polar bears and has been in decline in recent years. A polar bear's diet is

made up almost exclusively of marine mammals, mainly ice seals that also depend on sea ice habitat. Additionally, sea ice provides a portion of winter denning habitat for pregnant female polar bears. On November 24, 2010, USFWS announced the designation of 484,000 square kilometers (187,000 square miles) of polar bear critical habitat containing sea ice, terrestrial denning habitat, and barrier islands. The designated critical habitat occurs under the northern portion of the PFRR launch corridor (**Figure 10**). The critical habitat includes the Beaufort Sea and land within 32 kilometers (20 miles) inland from the Beaufort Sea coast within the PFRR launch corridor. For purposes of this BA, NASA assumes polar bears may occur up to 40 kilometers (25 miles) inland from the Beaufort Sea coast (**USFWS 2011c**).

Polar bear movements are influenced by sea ice conditions and follow a predictable seasonal pattern. In July and August, polar bears move offshore as the pack ice recedes. In the case of the SBS and CBS populations, polar bears may move hundreds of miles to stay with the ice during summer. From August through October, polar bears hunt ringed seals (their most important prey species) near shore in areas of unstable ice and leads between ice floes. From November to June, male polar bears remain on offshore ice. Years with less sea ice seem to result in bears being on land for longer periods of time. Their preferred habitat is the annual ice over the relatively shallower waters of the continental shelf and inter-island channels, where biological productivity is higher and seals are more abundant than in the deep polar basin (**Stirling and Øritsland 1995**).

Mating occurs from March to May (**Ramsay and Stirling 1986**). Approximately 50 percent of females den on drifting pack ice from November until April, although evidence suggests that this number is decreasing with recent changes in sea ice extent and distribution (**Fischbach et al. 2007**). The remaining females that are in reproductive condition den on land from November through April then move offshore.

November through April is the most sensitive period of the year for polar bears. Dens are dug in snow drifts in areas of shallow relief along sea ice pressure ridges, creek and stream banks, river bluffs, and shorelines. Cubs are born in December and continue to develop in the den until April. Dens have been located up to 40 kilometers (25 miles) inland in landscape features that trap drifting snow in sufficient depth to allow a female polar bear to dig a den (**Durner et al. 2006**). The highest density of land dens in Alaska occurs along the coastal barrier islands of the eastern Beaufort Sea and within Arctic NWR (**Angliss and Allen 2009**).

Current regulations prohibit work activities within a 1.6-kilometer (1-mile) radius of a known den location. Denning females are sensitive to disturbance and may abandon cubs if disturbed. Cubs are very vulnerable at this stage, so protection of the maternal den habitat is vital to polar bear conservation (**Angliss and Allen 2009**). The results of surveys for polar bears confirm that large numbers of polar bears aggregate around Barter Island (on which Kaktovik is located) and Cross Island (west of the ROI between Prudhoe Bay and Point Barrow), probably due to the presence of hunter-harvested bowhead whale remains, which provide an alternate food source for polar bears.

4.2.2. Spectacled Eider

Spectacled eiders (*Somateria fischeri*) are large sea ducks and rare breeder and uncommon visitor along Alaska's north coast. They spend most of the year in marine waters feeding on bottom-dwelling mollusks and crustaceans. Nesting and breeding typically occur in wet coastal tundra to the west of the PFRR launch corridor, although the historical range extended along the Arctic coastal plain, including the coastal portion of the PFRR launch corridor, nearly as far east as the Canadian border (USFWS 2011a). Critical habitat designated for this species is far outside the boundaries of the PFRR launch corridor. Primary molting areas are generally west and south of Point Lay, well outside of the action area. Spectacled eiders winter primarily in the Bering Sea, moving far offshore, following areas of open water (USFWS 2011a).

4.2.3. Steller's Eider

Although formerly considered locally common at a few sites on both the Yukon-Kuskokwim Delta in western Alaska and the Arctic coastal plain of northern Alaska, Steller's eiders (*Polysticta stelleri*) have nearly disappeared from most nesting areas in Alaska (USFWS 2011b), and the Alaska population is listed as threatened. Of the world breeding population of Steller's eiders, most nest in Russia. The nearest known nesting area is located to the west of the action area at Prudhoe Bay. Molting and wintering is in the southern Alaska from the eastern Aleutians to the lower Cook Inlet, well outside of the action area.

4.2.4. Yellow-Billed Loon

The yellow-billed loon (*Gavia adamsii*) is listed as a candidate species. Feeding mostly on small fish and invertebrates, it breeds in low densities in coastal and inland low-lying tundra within the arctic coastal plain of Alaska. The greatest breeding concentrations in Alaska are found on the North Slope, with highest densities between the Meade and Ikpikpuk rivers, on the Colville River Delta, and in areas west, southwest and east of Teshekpuk Lake (USFWS 2006). These areas are west of the action area. It is possible that individuals may migrate through coastal plain portion of the action area during either spring or fall migration. The wintering range includes coastal waters of southern Alaska from the Aleutian Islands to Puget Sound, well outside of the action area.

5. Effects of the Action

This section addresses potential impacts on listed, proposed, and candidate endangered or threatened species that NOAA Fisheries and USFWS have identified as having the potential to occur within the action area. There are no listed, proposed, or candidate species known to live in the vicinity of the PFRR launch site or under the launch corridor until it approaches the coast of the Beaufort Sea. Of the species discussed in Section 4 of this BA, only the ringed seal (proposed threatened) and the polar bear (threatened) have the potential to occur year-round within the action area and could be affected by descending payloads or spent stages.

The bowhead whale (endangered), bearded seal (proposed endangered), and yellow-billed loon (candidate) are summer residents and would be absent during the winter season when launches would occur. Spectacled and Steller's eiders (threatened) are accidental in occurrence and

uncommon within the action area. They would also most likely be present during the summer months, if they were present at all. Therefore, given these species' seasonal absence from the action area, they will not be discussed further.

5.1. Species under NOAA Fisheries' Jurisdiction

5.1.1. Ringed Seal

Potential impacts on ringed seals from launch operations would be associated with re-entering payloads and/or stages landing within seal habitat, and more specifically, seal concentration areas. During the months when the sea ice extends to the coast (October to June), ringed seals tend to concentrate on shorefast ice adjacent to the coastal areas of Alaska (**Marz 2004**). From July to September, when the sea ice retreats northward and large stretches of open water appear along the coast, the seals tend to expand their range both northward and westward, diminishing their overall density in the project area.

Probability of Impact

To evaluate the probability of a direct impact adversely affecting a ringed seal, a typical 3-sigma impact ellipse was created for a spent stage or payload predicted to land in the Beaufort Sea (1,000 kilometers [621 miles] from PFRR). The large size of this ellipse (over 500,000 square kilometers [190,000 square miles]) is due to the various factors (such as winds) that affect the flight and descent of the unguided rocket. The impact point location is typical of launches from PFRR into the Beaufort Sea. Of the 24,000-square-kilometer (9,400-square-mile) winter habitat concentrated along the coast, only 45 square kilometers (17 square miles) were intersected by the ellipse (see **Figure 4**). This equates to a probability of approximately 2.0×10^{-5} (one chance in 50,000 per launch) that a spent stage or payload would land within the winter concentration area of the ringed seals (see **Table 1**).

It is possible that ringed seals could exist throughout the entire Beaufort Sea on sea ice during the winter. Expected density values for ringed seal in areas of concentrated occurrence in the Beaufort Sea are 0.35 individuals per square kilometer (average density) and 1.42 individual per square kilometer (maximum density) for nearshore areas, where the seals are most concentrated, and 0.25 individuals per square kilometer (average density) and 1.00 individual per square kilometer (maximum density) for ice margins (**Shell Exploration and Production, Inc. and LGL Alaska Research Associates, Inc. 2010, referencing Moulton and Lawson [2002] and Kingsley [1986]**). Assuming a conservative density of 1 individual per square kilometer throughout the Beaufort Sea and Arctic Ocean and allowing for a 10-meter (33-foot) radius buffer zone around each seal, the per-launch chance of an impact near a ringed seal is very low, approximately 3.1×10^{-4} , or 1 chance in 3,200 (see **Table 1**).

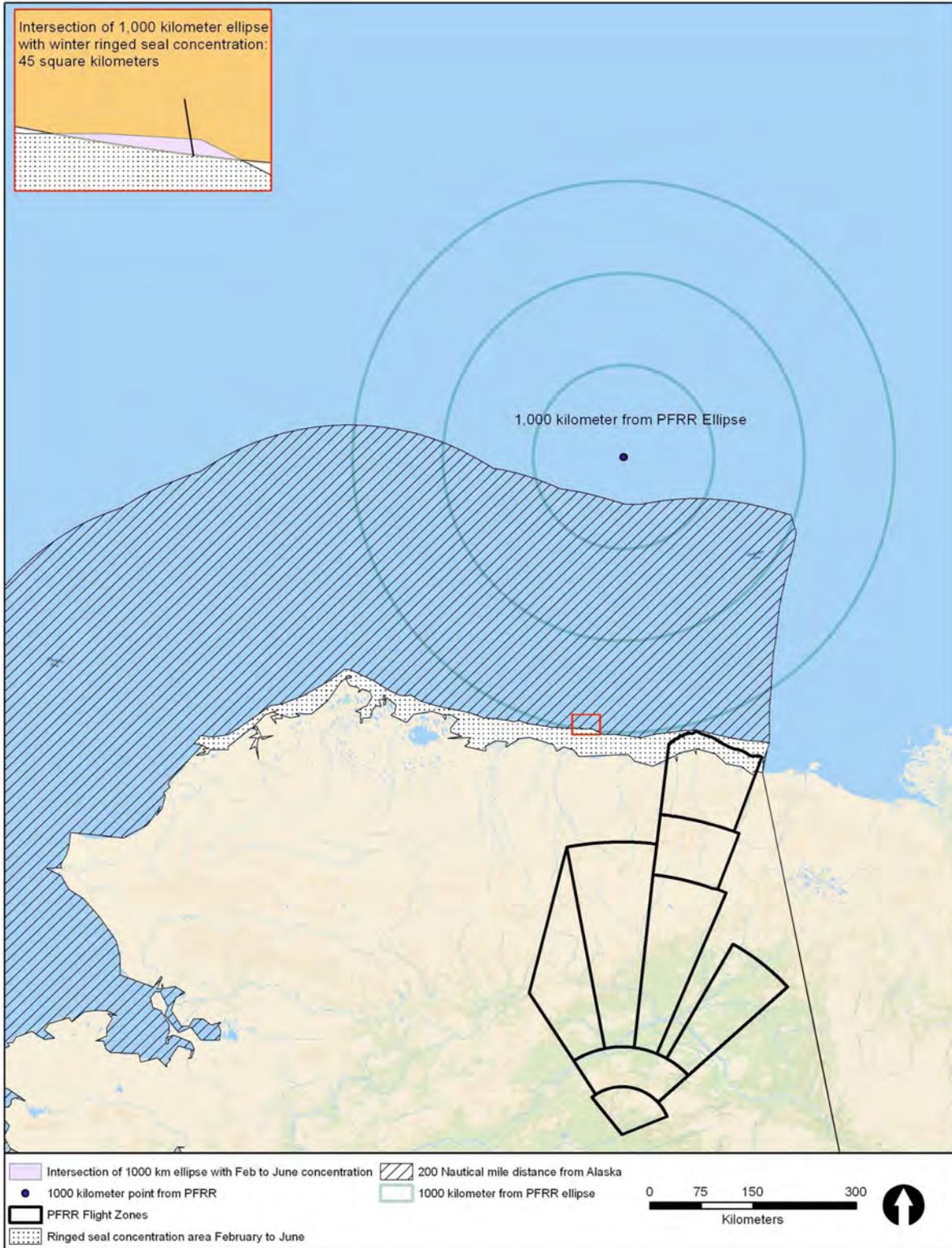


Figure 9. Typical Offshore Impact Location with Respect to Highest Winter Ringed Seal Concentration (adapted from Smith 2010)

Table 1. Probability of Impact on Ringed Seals in the Beaufort Sea

Ringed Seal Resource	Potential Impact Ellipse (square kilometers)	Ringed Seal Resource Area (square kilometers)	Probability of Spent Stage or Payload Impacting Ringed Seal Resource
Nearshore ice ^a	503,375	45	2.0×10^{-5}
Individual within 3-Sigma Dispersion ^b	503,375	159	3.1×10^{-4}

^a. Assumed to be concentrated on the nearshore ice during the winter months. Wintering concentration areas for the ringed seal (*Pusa hispida*) were interpreted and mapped from **Smith et al. 2010**, Figure 37.

^b. Based on information collected over the years, a population density of 1 ringed seal per square kilometer was assumed across the entire Beaufort Sea (**Shell Exploration and Production, Inc. and LGL Alaska Research Associates, Inc. 2010**) within the typical 3-sigma dispersion. Assuming a safety zone within a 10-meter (33-foot) radius of seal, the potential area of disturbance around a ringed seal that could result in either injury or death is estimated to be approximately 315 square meters (380 square yards) per seal, or 159 square kilometers (61 square miles) for the approximately 503,375 ringed seals that could be within the impact ellipse.

Note: To convert kilometers to miles, multiply by 0.62137; square kilometers to square miles, by 0.38610.

Sounding Rocket-Generated Sound

Sounding rockets reach supersonic speeds very quickly (i.e., after several seconds); however they generally would not generate a sonic boom noticeable on the ground due to their high angle of ascent (**Downing 2011**). As long as the rockets motors are burning, noise would be generated, especially at the lower altitudes when the air density is appreciable. Above a 10-kilometer (6-mile) altitude, where vacuum conditions are approached, no sound would be propagated. A typical Black Brant XII would be expected to reach this altitude at just over 25 seconds of flight time, well south of the action area (**Figure 1**). When the rockets motors are no longer burning, only aerodynamic noise will prevail.

The ballistic re-entry of a representative stage or payload would generate a mild sonic boom (0.2 pounds per square foot) at an altitude between 18,000 m (60,000 ft) and 9,000 m (30,000 ft) AGL. The peak instantaneous sound pressure received on the ice would be approximately 114 dB and be of very low frequency (less than 100 Hz) (**Downing 2011**). The duration on the low frequency sound would be very brief at approximately 30 milliseconds. In an unrelated study of sonic booms of similar magnitude, observers on the ground who were operating the sonic boom recording equipment within the predicted footprint of the sounding rocket boom “heard the boom but felt that they would not have noticed it had they been engaged in an unrelated activity” (**Plotkin et al. 2006**). By comparison, sonic booms generated by supersonic aircraft typically have overpressures 5 to 10 times as large (5 to 10 kilograms per square meter [1 to 2 pounds per square foot]) and last for 100 to 500 milliseconds.

In addition to the sonic boom, the stage or payload would eventually land on the presumably frozen surface of snow-covered ice, generating a momentary impulse sound estimated to be 131 dB (at 15 m [50 ft] distance from the impact site) in air; 192 dB in the water below the impact site. This conservative estimate is based upon the kinetic energy of the impacting piece of flight hardware.

Applicable Regulatory Criteria

Under the MMPA, NOAA Fisheries has defined levels of harassment for marine mammals. Level A harassment is defined as “...any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild.” Level B harassment is defined as “...any act of pursuit, torment, or annoyance which has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering.” NOAA Fisheries has adopted the MMPA take definition for assessing effects on ESA listed marine mammals.

Since 1997, NOAA Fisheries has been using generic sound exposure thresholds to determine when an activity in the ocean produces sound potentially resulting in impacts to a marine mammal and causing take by harassment (**70 FR 1871**). The current Level A (injury) threshold for underwater impulse noise is 190 dB root mean square (rms) for pinnipeds (e.g., seals). The current Level B (disturbance) threshold for underwater impulse noise is 160 dB rms for cetaceans and pinnipeds.

In addition, NOAA Fisheries is developing new science-based thresholds to improve and replace the current generic exposure level thresholds, but the criteria have not been finalized (**Southall *et al.* 2007**). Based upon the recommendations of the referenced study, the generic exposure criteria are likely conservative, however they are currently in use by NOAA Fisheries for ESA consultations. Therefore, this BA assesses potential effects within the context of both the generic and the science-based criteria.

Physiological Effects

A primary concern of sound exposure on pinnipeds is whether the source would result in either temporary or permanent hearing loss. Although based upon the conservatively derived source levels from flight hardware impacting the sea ice, it is possible that individuals directly under the area of impact could be exposed to levels above the 190 dB Level A threshold (which in essence would be equivalent to a direct hit), it is highly unlikely that this would occur based upon the probability of impact calculations presented in **Table 1**.

Regarding science-based criteria, **Southall *et al.* (2007)** proposed a 149 dB exposure criterion for assessing the potential injury to pinnipeds in air exposed to a single sound pulse. Likewise, a similar conservative criterion for injury (218 dB) was suggested for pinnpeds in water. Therefore, when considered within the context of these recommended criteria, the expected sonic boom and snow/ice impact of a re-entering sounding rocket payload or stage would cause no temporary or permanent hearing damage to ringed seals.

Behavioral Effects

Similar to the discussion of potential physiological effects from the impact of a flight hardware on the sea ice, it is likely that the sound levels in the immediate vicinity of the landing site would exceed the 160 dB criterion that is used to gauge a behavioral response, however as shown in **Table 1**, the chance of landing near an individual such that it would be exposed to elevated sound levels would be slight.

Regarding science-based criteria, the same study (**Southall *et al.* 2007**) also proposed a 109 dB criterion for single pulse sound behavioral disturbance of pinnipeds in air. The criterion, noted by the authors as likely conservative, was mostly based upon observation of strong responses (e.g., stampeding behavior) of some species, especially harbor seals, to sonic booms from aircraft and missile launches in certain conditions (**Berg *et al.*, 2001, 2002; Holst *et al.*, 2005a, 2005b**). A 212 dB criterion for pinnipeds in water was proposed based upon the level at which some temporary hearing effects may be observed in some species.

The most notable sound-related behavioral response for out-of-water seals would be the potential for trampling and/or separation of young from females, especially following birth. PFRR launch operations could overlap the general birthing and suckling period (i.e., mid-March to April). During much of this time, female seals and their young remain in snow dens, which have been found to be very effective in muffling sound (**Blix and Lentfer 1992**). In the referenced article, the authors highlight one particular event during which a helicopter noise level of 115 dB was reduced to 77 dB in an artificial polar bear den covered by less than 1 m (3 ft) of snow just 3 m (10 ft) away. The snow dens were also found to be effective in absorbing vibration. Even with relatively modest attenuation, it may be concluded that in-den received sound levels from an incoming sounding rocket section would be below the criteria proposed by **Southall *et al.* (2007)** and would have negligible adverse effects. Furthermore, as nearly all of the sound energy of the sonic boom is below 75 Hz (the minimum estimated range of hearing as presented in **Southall *et al.* [2007]**), it is doubtful that boom-induced sounds received outside of dens would be detected by seals. Impacts on in-water seals would be negligible as source levels of the impacting flight hardware are estimated to be below the 212 dB recommended criterion.

In summary, the sound resulting from the impact on the snow and ice would not be expected to cause adverse effects on individuals in or out of water. Although this analysis cannot discount the possibility that ringed seals would hear the sounds generated by stage and payload reentry, it is reasonable to conclude that such effects would be temporary and similar to other natural sounds in their marine environment, such as the sounds of ice cracking, popping, and colliding (**Greening and Zakarauskas 1994; Milne 1972; Milne and Ganton 1964; Xie and Farmer 1991**).

Effects of Remaining Flight Hardware

Although a re-entered sounding rocket payload is unlikely to fully penetrate the sea ice, given the buildup of heat generated by friction with the atmosphere, some items may be expected to sink into the ice where they would eventually be frozen over and covered by drifting or blown snow. Other items would remain on the ice surface until covered by snow and would remain there until

the summer thaw. This is the same expected fate of a spent rocket stage, with the exception that it would be less susceptible to breakup.

Based on the melting patterns of sea ice in the Beaufort Sea over the last few years (**NSIDC 2011**), over 80 percent of the payloads and spent fourth stages are expected to land on sea ice that melts annually, at which time they would sink to the bottom of the ocean. Employing the same analysis, less than 20 percent of the payloads and spent fourth stages are expected to land on “permanent” ice. Assuming an average of four launches per year, the maximum number of items that would enter the Beaufort Sea annually would be four payloads and up to four spent stages (from the final stage).

Payloads and spent stages that enter the marine environment are expected to reach the ocean floor and lodge in oxygen-poor sediments or remain on the ocean floor and corrode or become encrusted by marine organisms. In nearly all cases, these items would ultimately be interred at water depths greater than 300 m (1,000 ft). Under normal conditions, spent stages are essentially inert steel tubes with an electronic system on the forward end, which contains batteries and wiring. Payloads contain small quantities of batteries and other materials that would gradually enter the water column, resulting in limited and localized contamination that would be rapidly dispersed by currents.

Summary

Considering the low per-launch probability of landing near an individual, the limited number of launches per year (an average of four), the relatively small size of spent stages and payloads, and the largely inert or non-reactive nature of the items, negligible adverse impacts on ringed seals and their habitat are anticipated.

5.2. Species under USFWS Jurisdiction

5.2.1. Polar Bear

Potential impacts on polar bears from launch operations would be associated with re-entering payloads and/or stages landing within their habitat. Given their trophic relationship to ringed seals, during the winter months polar bears are also in greatest concentrations along the coast. Defined by the offshore extent of the 300 m (1,000 ft) depth contour (**Regehr et al. 2006**), this area of preferred habitat also corresponds with the boundaries of designated critical feeding habitat. Within the general extent of this preferred area is where the majority (70-80 percent) of individuals would be expected to occur based on past observations (**Durner et al. 2009**).

Probability of Impact

To quantify potential impacts on polar bears, NASA performed a similar probability calculation to that described for ringed seals. **Table 2** shows the probability of a typical spent stage or payload landing within polar bear critical habitat. Typically these items would land far offshore in the Beaufort Sea or Arctic Ocean but there is a small chance that they could land closer to shore in areas that include designated critical feeding and denning habitat. Critical denning habitat would not typically be affected by these launches as it is outside the 3-sigma dispersion. The chance that one of these launches would typically impact designated critical feeding habitat is less than one chance in 150 (6.6×10^{-3}).

The probability of a piece of flight hardware landing on a polar bear den was also estimated using information on known polar bear dens in the area. The chance that one of these launches directly impacting a polar bear den is less than one chance in 21 million (4.6×10^{-8}).

Table 2. Probability of Impact on Polar Bear Critical Habitat and Dens

Distance from the PFRR Launch Site (kilometers)	Polar Bear Critical Habitat	Potential Impact Ellipse (square kilometers)	Amount of Polar Bear Critical Habitat Within Ellipse (square kilometers)	Probability of a Spent Stage or Payload Landing in Polar Bear Critical Habitat
1,000	Feeding habitat	503,375	14,964	6.6×10^{-3}
1,000	Denning habitat	503,375	0	0
1,000	Polar bear dens within potential impact area ^a	503,375	0.022	4.6×10^{-8}

^a. An estimated 69 known polar bear dens could be within the area potentially impacted by a typical National Aeronautics and Space Administration launch into the Beaufort Sea (Based on information from **Amstrup and Gardner 1994**) based on information collected over the years by the National Oceanic and Atmospheric Administration. Assuming each den covers an area of approximately 3 square meters (30 square feet) (**Stirling 1988**); this analysis assumes a safety zone within a 10-meter (33-foot) radius of the den. The potential area of disturbance around a polar bear den that could result in either damage to the den or injury or death to the polar bear is estimated to be approximately 315 square meters (380 square yards) per den, or 0.022 square kilometers (0.0085 square miles) for 69 dens.

Note: To convert kilometers to miles, multiply by 0.62137; square kilometers to square miles, by 0.38610.

In addition, **Figure 10** provides a graphic representation of the analysis presented in **Table 2**.

This analysis shows that the potential for direct impact on polar bears or their critical habitat would be very low.

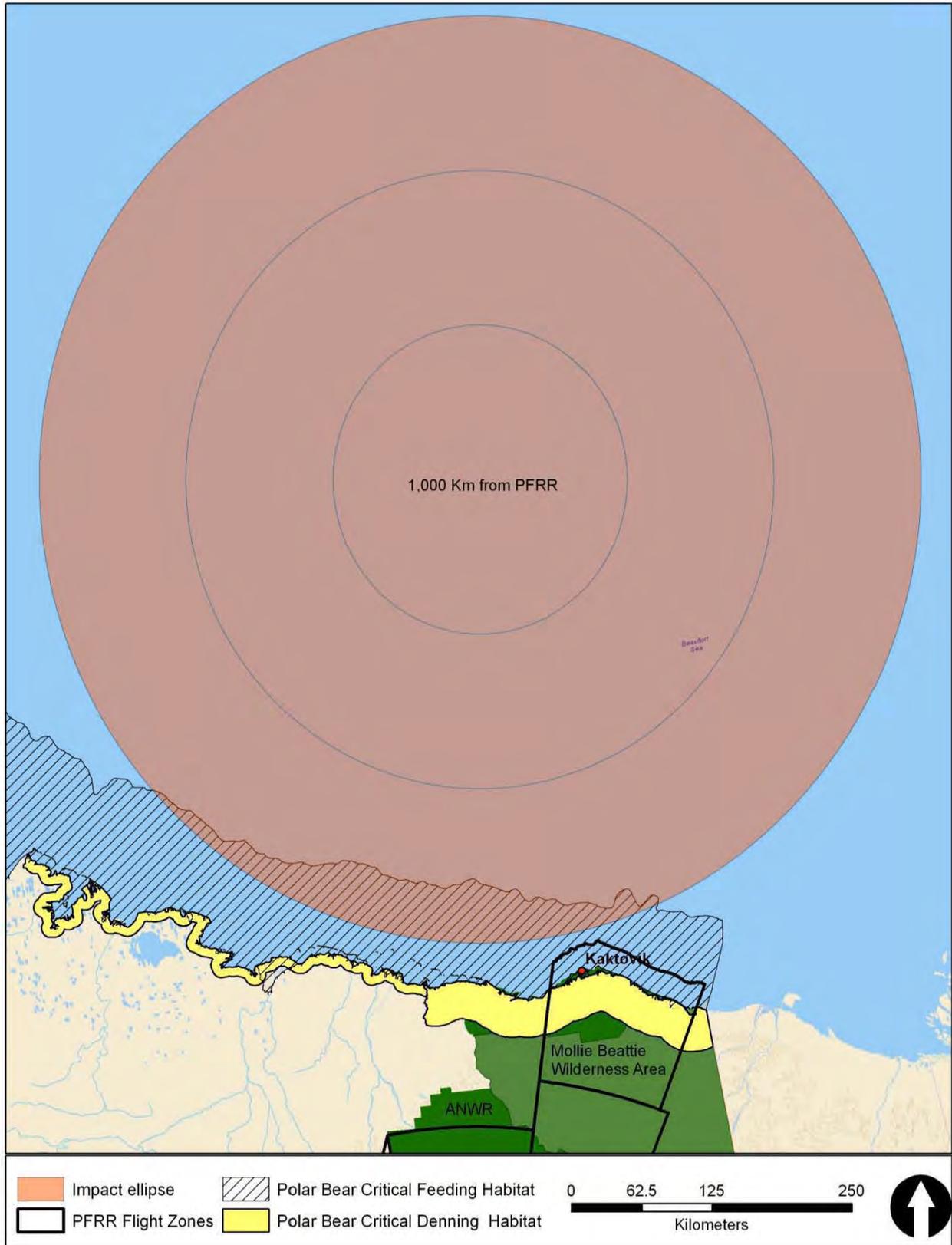


Figure 10. Likelihood of a Spent Stage or Payload Landing within Polar Bear Critical Habitat

Effects of Sound

Sounds associated with an incoming spent stage or payload are discussed in **Section 5.1.1** of this BA under *Sounding Rocket-Generated Sound*.

Polar bears have relatively acute hearing (**Nachtigall et al. 2007; Owen and Bowles 2011**). As with ringed seals, the primary noise-induced, disturbance-related concern would be the time following the birth of young, which generally occurs in December or early January (**Ramsay and Dunbrack 1986**). The cubs remain in dens for several months following birth and therefore are potentially vulnerable to disturbances near dens (**Amstrup 1993**).

As summarized under the discussion of potential effects on Ringed seals, **Blix and Lentfer (1992)** observed that only seismic testing less than 100 m (330 ft) from a den and a helicopter taking off at a distance of 3 m (10 ft) produced noises inside artificial dens that were notably above background levels. The authors also concluded that a polar bear in its den is unlikely to feel vibrations unless the source is very close. Supporting their findings is **Amstrup (1993)** and (**MacGillivray et al. 2003**), both of which also reported that polar bears residing within dens are well insulated from outside sound and vibration.

Similar to the analysis for ringed seals, this analysis cannot discount the possibility that a polar bear would hear the sounds generated by stage and payload reentry, however it is reasonable to conclude that such effects would be temporary, minor, and similar to other natural sounds in their marine environment, such as the sounds of ice cracking, popping, and colliding (**Greening and Zakaruskas 1994; Milne 1972; Milne and Ganton 1964; Xie and Farmer 1991**). Therefore, effects of sound would be negligible.

Effects of Remaining Flight Hardware

A potential concern could be flight hardware - related injury as polar bears are curious animals that typically investigate objects or smells that catch their attention (**Stirling 1988**). Polar bears have been observed to ingest a wide range of indigestible and hazardous materials and to feed at dumps (**Clarkson and Stirling 1994**). Instances of polar bear injury related to human made materials (e.g., pieces of a lead battery, ethylene glycol antifreeze) have been documented (**Amstrup et al. 1989**). However, these have been in unnatural settings (including roadsides treated with antifreeze and dye and the Churchill, Manitoba, municipal landfill) that are much different from the habitat within the PFRR flight corridor. The dump example involved individual bears habituated to finding supplemental food in landfills (**Lunn and Stirling 1985**).

Payloads and spent stages that land on sea ice would be unlikely to harm a polar bear in the unlikely event that an individual polar bear were to encounter one. The item is expected to rapidly become covered by ice or drifting snow, essentially isolating it from the environment. As the ice melts the rocket hardware would subsequently enter the marine environment, as discussed above for Ringed seals. Any accumulation of spent stages or payloads that remained would be on the permanent sea ice approximately 400 kilometers (250 miles) from the coast and over 300 kilometers (185 miles) from the nearest designated Critical Habitat (based on information from **NSIDC [2011]**).

Assuming four launches per year, the maximum number of items that would enter the Beaufort Sea annually would be four payloads and up to four spent stages (from the final stage). Typical water depths within these areas would be at least 300 m (1,000 ft). As discussed earlier, payloads and spent stages that enter the marine environment would sink to the bottom and be rapidly colonized by benthic encrusting organisms and become part of the substratum. Unrecovered payloads contain materials (e.g., batteries) that would result in limited and localized contamination as the materials gradually enter the aquatic environment. Considering the limited number of launches per year, the relatively small size and wide spatial dispersion of spent stages and payloads, and the largely inert or non-reactive nature of the items, no impacts on polar bears from these items on the ice or entering the marine environment are anticipated.

Summary

Considering the low per-launch probability of landing near an individual or within designated critical habitat, the limited number of launches per year (an average of four), the relatively small size and wide dispersion of spent stages and payloads, and the largely inert or non-reactive nature of the items, negligible adverse impacts on polar bears and their habitat are anticipated.

Regarding potential indirect effects, the analysis of potential effects on ringed seals (the polar bear’s primary food source during the winter months) would also be negligible (see **Section 5.1.1** of this BA), rendering any resultant effects on the polar bear to be nearly non-existent.

5.3. Conclusion and Determinations of Effect

Based upon the analyses contained within this document, NASA expects the effects from its SRP at PFRR on ESA listed, proposed, and candidate species to be negligible. **Table 3** below presents a summary of its determinations:

Table 3. Summary of Endangered Species Act Determinations for Listed, Proposed, and Candidate Species Potentially Occurring within PFRR Flight Corridor

Species	ESA Status	Agency with ESA Jurisdiction	NASA ESA Determination
Bowhead whale	Endangered	NOAA Fisheries	No effect (seasonal absence)
Ringed seal	Proposed Threatened	NOAA Fisheries	Not likely to jeopardize continued existence of
Bearded seal	Proposed Endangered	NOAA Fisheries	No effect (seasonal absence)
Polar bear	Threatened	USFWS	May affect, not likely to adversely affect
Polar bear critical habitat	Designated	USFWS	May affect, not likely to adversely affect
Spectacled eider	Threatened	USFWS	No effect (seasonal absence)
Steller’s eider	Threatened	USFWS	No effect (seasonal absence)
Yellow-billed loon	Candidate	USFWS	No effect (seasonal absence)

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