ARTHUR CARHART NATIONAL WILDERNESS TRAINING CENTER

MINIMUM REQUIREMENTS DECISION GUIDE WORKBOOK

"…except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act…"

-- The Wilderness Act of 1964

Project Title: **FIA Tanana Valley Inventory**

MRDG Step 1

Determine if Administrative Action is Necessary

Description of the Situation
What is the situation that may prompt administrative action?

Denali National Park & Preserve has received a research proposal from the Forest Inventory Analysis (FIA) program to implement the inventory within the park, including in eligible wilderness. The purpose of this MRA is to review how, and if, the proposal will proceed in the wilderness areas covered by the proposal.

Relevant portions of the FIA proposal and context for review are summarized below. Please refer to the FIA proposal (RPRS ID # 274280) for complete descriptions of the project objectives, methods, and other details.

Background and scientific contributions
The FIA is a nation-wide research project and dataset on the status and condition of forest resources, including indicators of ecological change and land cover trends. The FIA program has a scientifically and statistically rigorous plot sampling design, and includes nation-wide data coverage. The addition of boreal forest ecotypes to the FIA dataset represents a key contribution of expanding the project into Denali.

Interior Alaska is the last remaining forested area within the United States to implement the FIA program. This proposal is the first step in this expansion to cover the Tanana Valley, which includes Denali. In the coming years, proposals to implement FIA across Alaska are anticipated, including units of the National Park System and designated and eligible

wilderness therein.

Scope of impacts, as proposed
The FIA proposal includes 64 proposed plots inside the Denali park boundary. Of these, 62 plots would be in eligible wilderness, 0 in designated Wilderness, and 2 in ineligible wilderness. Daily operations would consist of a crew of 2-4 members flying by helicopter to an unobstructed, unimproved landing zone within 2 miles from plot center, based upon topography and accessibility, and consultation with Denali staff. Crews will spend no more than 1 day at each plot and will return to a basecamp outside of the park each night.

The total inventoried area per the project proposal is 12.8 acres (64 plots, which are comprised of 4 subplots that are each 24 ft in radius; 12.4 acres would be in eligible wilderness, 0 acres in designated wilderness, and 0.4 acres in ineligible wilderness). Active sampling only occurs in these subplots. Monumentation is placed at each subplot.

As proposed, a minimum of 1,088 pieces of permanent monumentation would be installed as part of this project (512 mag spikes= 4 subplots x 64 plots; 576 witness trees = 9 trees x 64 plots). Additionally, as proposed all trees over 5 inches in diameter at breast height and all trees greater than 3 inches in diameter within the subplot will receive a tree tag and a nail painted brown at the base of the tree. The number of additional pieces of monumentation that would be placed is unknown.

Plots will be re-sampled every 10-12 years, in perpetuity.

FIA's proposed protocol includes modifications to the FIA's traditional sampling method that were made via a Memorandum of Understanding between the Forest Service and the National Park Service (NPS). FIA limited its proposal to exclude plots in designated wilderness and to use degradable monumentation where feasible.

Context for proposal
Denali is an iconic backcountry and wilderness park that provides for unparalleled visitor experiences of solitude and remoteness from the sights and sounds of modern human activity. Denali receives some of the highest levels of backcountry visitor use of the Alaska NPS units. The roadless and inaccessible nature of Denali's backcountry sometimes necessitates more intensive operations (such as helicopter use) when projects are approved and determined as necessary to preserve wilderness character. Opportunities for scientific research, as well as preservation of wilderness resource values, are identified as some of the purposes for which Denali and all NPS units in Alaska were established (ANILCA Section 101(b)). Scientific use is one of the public purposes of Wilderness per Section 4(b).

Context of previous FIA initiatives in Alaska
Specific to Alaska, the FIA program has been operating in the coastal portions of Wrangell-St. Elias, Klondike Gold Rush National Historical Park, and Kenai Fjords since the 1990s, including in designated and eligible wilderness. Glacier Bay denied the FIA's proposal in the

1990s due to the magnitude of the proposal and associated helicopter use. Further, the Alaska Region Forest Service denied access to wilderness areas in a 2007 EIS, citing impacts to wilderness character and safety concerns.

Options Outside of Wilderness
Can action be taken outside of wilderness that adequately addresses the situation?

☐ YES **STOP – DO NOT TAKE ACTION IN WILDERNESS**

☒ NO **EXPLAIN AND COMPLETE STEP 1 OF THE MRDG**

Explain:

FIA wouldn't be able to meet the goals of the project if the project was excluded from all categories of wilderness because there are only two proposed plots (of 64 total plots) in ineligible wilderness.
To meet project objectives as proposed, the FIA research needs to occur in eligible wilderness. However, that conclusion is notwithstanding the evaluation of the impacts to wilderness character versus benefits to science.

Criteria for Determining Necessity
Is action necessary to meet any of the criteria below?

A. Valid Existing Rights or Special Provisions of Wilderness Legislation

*Is action necessary to satisfy valid existing rights or a special provision in wilderness legislation (the Wilderness Act of 1964 or subsequent wilderness laws) that **requires** action? Cite law and section.*

☐ YES ☒ NO

Explain:

No wilderness legislation provides existing rights or special provisions to authorize this action.

B. Requirements of Other Legislation

Is action necessary to meet the requirements of other federal laws? Cite law and section.

☐ YES ☒ NO

Explain:

FIA is currently mandated by the Agricultural Act of 2014 (Public Law 113-79) (2014 Farm

Bill). Section 8301 of the bill -- Revision of Strategic Plan for Forest Inventory and Analysis, directs FIA to include Interior Alaska. The FIA program was initially mandated by the 1928 McSweeney-McNary Forest Research Act (Public Law 70-466) which directed the Forest Service to "make and keep current a comprehensive inventory and analysis of the present and prospective conditions of and requirements for the renewable resources of the forests and rangelands of the United States." The emphasis on timber and extractable resources has subsequently shifted to focus more broadly on ecology, ecosystem dynamics, disturbance regimes, and research.

USFS has successfully implemented FIA on lands across many ownerships throughout the United States and also has in place a current Memorandum of Understanding (MOU) with the NPS to foster collaboration during FIA data collection on NPS lands (13-MU-11132652-535). Although FIA is a congressionally mandated program, any individual, corporation, or land management agency has the right to deny the USFS access to FIA plots on their lands.

C. Wilderness Character

Is action necessary to preserve one or more of the five qualities of wilderness character?

UNTRAMMELED

☐ YES ☒ NO

Explain:

This proposal is not necessary to preserve the Untrammeled Quality of wilderness character.

UNDEVELOPED

☐ YES ☒ NO

Explain:

This proposal is not necessary to preserve the Undeveloped Quality of wilderness character.

NATURAL

☒ YES ☐ NO

Explain:

The definition of the Natural Quality states that “[p]reserving this quality ensures that indigenous species, patterns and ecological processes are protected and allows us to

understand and learn from natural features." This FIA project directly relates to this because by providing information about these resources the NPS can better protect indigenous species, patterns and ecological processes relative to vegetation resources in the park. The data resulting from the FIA project in Denali will allow further understanding and learning from natural features. The NPS needs reference condition information and data to understand what features the natural quality of wilderness character includes and how they may be changing over time. While FIA data is not imperative to our understanding of the natural quality, the FIA data will add to the existing body of information about natural features in the park.

This research is not a direct stewardship action that will preserve the Natural Quality. Over time however, the data will inform our knowledge of how the park may be deviating from natural conditions and if intervention may be warranted.

In summary, the FIA research is necessary to preserve the Natural Quality of wilderness character because of the information resources the FIA research would provide that directly relate to and inform the wilderness character of Denali.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

☐ YES ☒ NO

Explain:

This proposal is not necessary to preserve the Solitude or Primitive & Unconfined Recreation Quality of wilderness character.

OTHER FEATURES OF VALUE

☐ YES ☒ NO

Explain:

This proposal is not necessary to preserve the Other Features of Value Quality of wilderness character.

Step 1 Decision
Is administrative action <u>necessary</u> in wilderness?

<u>Decision Criteria</u>

A.	Existing Rights or Special Provisions	☐ YES	☒ NO
B.	Requirements of Other Legislation	☐ YES	☒ NO

C. Wilderness Character

Untrammeled	☐ YES	☒ NO
Undeveloped	☐ YES	☒ NO
Natural	☒ YES	☐ NO
Outstanding Opportunities	☐ YES	☒ NO
Other Features of Value	☐ YES	☒ NO

Is administrative action necessary in wilderness?

☒ YES	**EXPLAIN AND PROCEED TO STEP 2 OF THE MRDG**
☐ NO	**STOP – DO NOT TAKE ACTION IN WILDERNESS**

Explain:

NPS policy provides that scientific activities should be encouraged in wilderness, so long as the benefits of what can be learned outweigh the impacts on wilderness resources and values.

After evaluating the benefits and impacts of this project, DENA has concluded that the project has substantive benefits to the Natural Quality and contributions to park information resources.

Simultaneously, this research also has significant negative impacts to other qualities of wilderness character. These effects are incurred to the Undeveloped Quality from the use of helicopters to access the plots and by installing monumentation. As proposed, this project will double the number of installations currently in Denali today. Effects are also incurred to the Outstanding Opportunities Quality from the impacts to visitor opportunities for solitude, as the helicopter use and intensive work by field crews diminish visitors' opportunities from remoteness from the sights and sounds of modern civilization. The project may negatively impact the Untrammeled Quality by providing information that may prompt additional proposals for ecological interventions in order to try to correct or restore natural conditions. As a result, there are some substantial negative impacts that the park is interested in mitigating to the extent feasible.

Step 2 of the MRA will specifically evaluate these benefits and impacts to determine which aspects of the project move forward and where. In other words, it will determine where the project can be conducted and in what ways, such that impacts to wilderness character are minimized, while still achieving the needed scientific objectives. The analysis in Step 2 will specifically address the project's contribution to existing and cumulative impacts for each alternative.

MRDG Step 2

Determine the Minimum Activity

Other Direction

*Is there "special provisions" language in legislation (or other Congressional direction) that explicitly **allows** consideration of a use otherwise prohibited by Section 4(c)?*

AND/OR

Has the issue been addressed in agency policy, management plans, species recovery plans, or agreements with other agencies or partners?

☐ YES **DESCRIBE OTHER DIRECTION**

☒ NO **SKIP AHEAD TO TIME CONSTRAINTS BELOW**

Describe Other Direction:

Time Constraints

What, if any, are the time constraints that may affect the action?

August 2018 is the preferable time frame for initiating Denali work which would take approximately 4 weeks. Fire season is typically over by August and it is the time frame of maximum thaw depth of the active soil layer. Maximum thaw depth is an important metric of permafrost health, and will allow crew to obtain deeper soil samples. This urgency is due to funding availability for sampling Interior Alaska by the FIA project.

Components of the Action

What are the discrete components or phases of the action?

Component X:	*Example: Transportation of personnel to the project site*
Component 1:	Transportation of personnel into the field.
Component 2:	Transportation from LZ to work site.
Component 3:	Number of crew and time on the ground.
Component 4:	Mark subplots.
Component 5:	Mark trees.
Component 6:	Bore trees and collect vegetation specimens.

Component 7:	Take soil samples.
Component 8:	Transportation of personnel out of the field.
Component 9:	

Proceed to the alternatives.

Refer to the **MRDG Instructions** regarding alternatives and the effects to each of the comparison criteria.

Alternative 1

Alternative 1:

FIA Project as proposed by USFS

Description of the Alternative
What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?

FIA Project as proposed by USFS

Component Activities
How will each of the components of the action be performed under this alternative?

Component of the Action		Activity for this Alternative
X	*Example: Transportation of personnel to the project site*	*Example: Personnel will travel by horseback*
1	Transportation of personnel into the field.	Crew of 2-4 members fly by Type 3 helicopter (<6,000 lbs, 4-8 passengers) to an unobstructed unimproved Landing Zone within 2 miles from plot center, based on topography and accessibility.
2	Transportation from LZ to work site.	Crew members hike any remaining distance to plot center.
3	Crew time on the ground.	Crews spend an average of 3-6 hours at plot, up to 1 day, for field collection.
4	Mark subplots.	Crews bury 8-inch-long steel Mag Spike survey nails at 4 subplot centers and 4 microplot centers.
5	Mark trees.	Crews place 2-inch unpainted tin rounds on 1 witness tree off plot, and 2 witness trees at each subplot nailed with 16d aluminum nails approximately 6 feet off ground. For all trees greater than or equal to 3 inches diameter, crews nail 1 ¼ inch tin round tree tags with 16d aluminum nails at 1 foot above ground and non-offensive color of Markal paintstick at DBH measurement

		location 4.5 feet above ground. For all trees less than 3 inches diameter, crews wire 1 ¼ inch tin round tree tags loosely onto trees with coated aluminum floral wire approximately 1 foot above ground and non-offensive color of Markal paintstick at DBH measurement location 4.5 feet above ground.
6	Bore trees and collect vegetation specimens.	Boring of trees with hand borer will be done when necessary to estimate site, age, or tree growth and physiological conditions (this will generally be the case during initial establishment of permanent plots to assess site productivity.) Collection of vegetation specimens will occur when field identification of unknown species is impossible due to time or resource limitations.
7	Take soil samples.	One soil sample will be collected from each of three subplots using battery-powered drill. At each of the three subplots, a 2.125" diameter soil core is drilled into the ground to a maximum depth of 40".
8	Transportation of personnel out of the field.	Crew members hike back to LZ and return to base via Type 3 helicopter.
9		

Wilderness Character

What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

UNTRAMMELED

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	Crew of 2-4 members fly by Type 3 helicopter (<6,000 lbs, 4-8 passengers) to an unobstructed unimproved Landing Zone within 2 miles from plot center, based on topography and accessibility.	☐	☐	☒
2	Crew members hike any remaining distance to plot	☐	☐	☒

	center.			
3	Crews spend an average of 3-6 hours at plot, up to 1 day, for field collection.	☐	☐	☒
4	Crews bury 8-inch-long steel Mag Spike survey nails at 4 subplot centers and 4 microplot centers.	☐	☐	☒
5	Crews place 2-inch unpainted tin rounds on 1 witness tree off plot, and 2 witness trees at each subplot nailed with 16d aluminum nails approximately 6 feet off ground. For all trees greater than or equal to 3 inches diameter, crews nail 1 ¼ inch tin round tree tags with 16d aluminum nails at 1 foot above ground and non-offensive color of Markal paintstick at DBH measurement location 4.5 feet above ground. For all trees less than 3 inches diameter, crews wire 1 ¼ inch tin round tree tags loosely onto trees with coated aluminum floral wire approximately 1 foot above ground and non-offensive color of Markal paintstick at DBH measurement location 4.5 feet above ground.	☐	☐	☒
6	Boring of trees with hand borer will be done when necessary to estimate site, age, or tree growth and physiological conditions (this will generally be the case during initial establishment of permanent plots to assess site productivity.) Collection of vegetation specimens will occur when field identification of unknown species is impossible due to time or resource limitations.	☐	☐	☒
7	One soil sample will be collected from each of three subplots using battery-powered drill. At each of the three subplots, a 2.125” diameter soil core is drilled into the ground to a maximum depth of 40”.	☐	☐	☒
8	Crew members hike back to LZ and return to base via Type 3 helicopter.	☐	☐	☒
9		☐	☐	☒
Total Number of Effects			0	NE
Untrammeled Total Rating		**0**		

Explain:

UNDEVELOPED

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	Crew of 2-4 members fly by Type 3 helicopter (<6,000 lbs, 4-8 passengers) to an unobstructed unimproved Landing Zone within 2 miles from plot center, based on topography and accessibility.	☐	☒	☐
2	Crew members hike any remaining distance to plot center.	☐	☐	☒
3	Crews spend an average of 3-6 hours at plot, up to 1 day, for field collection.	☐	☐	☒
4	Crews bury 8-inch-long steel Mag Spike survey nails at 4 subplot centers and 4 microplot centers.	☐	☒	☐
5	Crews place 2-inch unpainted tin rounds on 1 witness tree off plot, and 2 witness trees at each subplot nailed with 16d aluminum nails approximately 6 feet off ground. For all trees greater than or equal to 3 inches diameter, crews nail 1 ¼ inch tin round tree tags with 16d aluminum nails at 1 foot above ground and non-offensive color of Markal paintstick at DBH measurement location 4.5 feet above ground. For all trees less than 3 inches diameter, crews wire 1 ¼ inch tin round tree tags loosely onto trees with coated aluminum floral wire approximately 1 foot above ground and non-offensive color of Markal paintstick at DBH measurement location 4.5 feet above ground.	☐	☒	☐
6	Boring of trees with hand borer will be done when necessary to estimate site, age, or tree growth and physiological conditions (this will generally be the case during initial establishment of permanent plots to assess site productivity.) Collection of vegetation specimens will occur when field identification of unknown species is impossible due to time or resource limitations.	☐	☐	☒
7	One soil sample will be collected from each of three subplots using battery-powered drill. At each of the three subplots, a 2.125” diameter soil core is drilled into the ground to a maximum depth of 40”.	☐	☒	☐
8	Crew members hike back to LZ and return to base via	☐	☒	☐

	Type 3 helicopter.			
9		☐	☐	☐
Total Number of Effects			5	NE
Undeveloped Total Rating		**-5**		

Explain:

Indicators that degrade the “Undeveloped” quality of wilderness character include non-recreational structures, installations and developments and the use of motor vehicles, motorized equipment or mechanical transport. As proposed, this alternative will have a minimum of 1,088 installations.

NATURAL

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	Crew of 2-4 members fly by Type 3 helicopter (<6,000 lbs, 4-8 passengers) to an unobstructed unimproved Landing Zone within 2 miles from plot center, based on topography and accessibility.	☐	☐	☒
2	Crew members hike any remaining distance to plot center.	☐	☐	☒
3	Crews spend an average of 3-6 hours at plot, up to 1 day, for field collection.	☐	☐	☒
4	Crews bury 8-inch-long steel Mag Spike survey nails at 4 subplot centers and 4 microplot centers.	☐	☐	☒
5	Crews place 2-inch unpainted tin rounds on 1 witness tree off plot, and 2 witness trees at each subplot nailed with 16d aluminum nails approximately 6 feet off ground. For all trees greater than or equal to 3 inches diameter, crews nail 1 ¼ inch tin round tree tags with 16d aluminum nails at 1 foot above ground and non-offensive color of Markal paintstick at DBH measurement location 4.5 feet above ground. For all trees less than 3 inches diameter, crews wire 1 ¼ inch tin round tree tags loosely onto trees with coated aluminum floral wire approximately 1 foot above ground and non-offensive color of Markal paintstick at DBH measurement location 4.5 feet above ground.	☐	☐	☒
6	Boring of trees with hand borer will be done when	☐	☐	☒

	necessary to estimate site, age, or tree growth and physiological conditions (this will generally be the case during initial establishment of permanent plots to assess site productivity.) Collection of vegetation specimens will occur when field identification of unknown species is impossible due to time or resource limitations.			
7	One soil sample will be collected from each of three subplots using battery-powered drill. At each of the three subplots, a 2.125" diameter soil core is drilled into the ground to a maximum depth of 40".	☐	☐	☒
8	Crew members hike back to LZ and return to base via Type 3 helicopter.	☐	☐	☒
9		☐	☐	☒
Total Number of Effects			0	NE
Natural Total Rating			**0**	

Explain:

Wilderness is protected and managed so as to preserve its natural conditions. These methods mostly align with the current best practices (with the exception of the use of tree tags) and are likely to have minimal to non-detectable effects on the local ecosystem.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	Crew of 2-4 members fly by Type 3 helicopter (<6,000 lbs, 4-8 passengers) to an unobstructed unimproved Landing Zone within 2 miles from plot center, based on topography and accessibility.	☐	☒	☐
2	Crew members hike any remaining distance to plot center.	☐	☐	☒
3	Crews spend an average of 3-6 hours at plot, up to 1 day, for field collection.	☐	☐	☒
4	Crews bury 8-inch-long steel Mag Spike survey nails at 4 subplot centers and 4 microplot centers.	☐	☐	☒
5	Crews place 2-inch unpainted tin rounds on 1 witness tree off plot, and 2 witness trees at each subplot nailed with 16d aluminum nails approximately 6 feet	☐	☒	☐

	off ground. For all trees greater than or equal to 3 inches diameter, crews nail 1 ¼ inch tin round tree tags with 16d aluminum nails at 1 foot above ground and non-offensive color of Markal paintstick at DBH measurement location 4.5 feet above ground. For all trees less than 3 inches diameter, crews wire 1 ¼ inch tin round tree tags loosely onto trees with coated aluminum floral wire approximately 1 foot above ground and non-offensive color of Markal paintstick at DBH measurement location 4.5 feet above ground.			
6	Boring of trees with hand borer will be done when necessary to estimate site, age, or tree growth and physiological conditions (this will generally be the case during initial establishment of permanent plots to assess site productivity.) Collection of vegetation specimens will occur when field identification of unknown species is impossible due to time or resource limitations.	☐	☐	☒
7	One soil sample will be collected from each of three subplots using battery-powered drill. At each of the three subplots, a 2.125" diameter soil core is drilled into the ground to a maximum depth of 40".	☐	☒	☐
8	Crew members hike back to LZ and return to base via Type 3 helicopter.	☐	☒	☐
9		☐	☐	☒
Total Number of Effects			4	NE
Solitude or Primitive & Unconfined Rec. Total Rating		**-4**		

Explain:

Indicators for the "Solitude" quality include "remoteness from sights and sounds of people inside the wilderness." Measures for this quality include "impacts to soundscape". The transport of the crew via helicopter significantly impacts the "Solitude" quality, and the potential for visitors to encounter crew members while they work in the field, as well as the sights and sounds of their work implements, impacts "Solitude" less significantly as very few to no visitors venture to most of the proposed plot points. However, they are impacts nonetheless, and this alternative proposes a minimum of 1,088 installations that visitors could encounter.

OTHER FEATURES OF VALUE

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	Crew of 2-4 members fly by Type 3 helicopter (<6,000 lbs, 4-8 passengers) to an unobstructed unimproved Landing Zone within 2 miles from plot center, based on topography and accessibility.	☐	☐	☒
2	Crew members hike any remaining distance to plot center.	☐	☐	☒
3	Crews spend an average of 3-6 hours at plot, up to 1 day, for field collection.	☐	☐	☒
4	Crews bury 8-inch-long steel Mag Spike survey nails at 4 subplot centers and 4 microplot centers.	☐	☒	☐
5	Crews place 2-inch unpainted tin rounds on 1 witness tree off plot, and 2 witness trees at each subplot nailed with 16d aluminum nails approximately 6 feet off ground. For all trees greater than or equal to 3 inches diameter, crews nail 1 ¼ inch tin round tree tags with 16d aluminum nails at 1 foot above ground and non-offensive color of Markal paintstick at DBH measurement location 4.5 feet above ground. For all trees less than 3 inches diameter, crews wire 1 ¼ inch tin round tree tags loosely onto trees with coated aluminum floral wire approximately 1 foot above ground and non-offensive color of Markal paintstick at DBH measurement location 4.5 feet above ground.	☐	☐	☒
6	Boring of trees with hand borer will be done when necessary to estimate site, age, or tree growth and physiological conditions (this will generally be the case during initial establishment of permanent plots to assess site productivity.) Collection of vegetation specimens will occur when field identification of unknown species is impossible due to time or resource limitations.	☐	☐	☒
7	One soil sample will be collected from each of three subplots using battery-powered drill. At each of the three subplots, a 2.125” diameter soil core is drilled into the ground to a maximum depth of 40”.	☐	☒	☒
8	Crew members hike back to LZ and return to base via	☐	☐	☒

	Type 3 helicopter.			
9		☐	☐	☐
Total Number of Effects			2	NE
Other Features of Value Total Rating		**-2**		

Explain:

Any ground disturbance has the potential to negatively impact the “Other” quality of wilderness character, which encompasses archaeological and cultural resources. An existing Section 106 programmatic agreement only allows for “borings that must be limited to pipes less than 2 inches in diameter and surface samples to less than 12 inches in size and minimal in number.”

Summary Ratings for Alternative 1

Wilderness Character	
Untrammeled	0
Undeveloped	-5
Natural	0
Solitude or Primitive & Unconfined Recreation	-4
Other Features of Value	-2
Wilderness Character Summary Rating	**-11**

Alternative 2

Alternative 2: Some 4c prohibited uses allowed.

Description of the Alternative
What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?

This alternative allows for helicopter transport of crew to some plots, no above-ground monumentation, all proposed below-ground installations and some use of power tools. It is the direction of the NPS (Director's Order 41) to manage eligible wilderness in the same manner as designated wilderness. Therefore, we should use the minimum means required to accomplish project goals. If it is possible to accomplish project goals on foot or with fixed wing aircraft instead of helicopters, those means will be pursued in this alternative. If it is possible to accomplish project goals with less monumentation and more GIS, those means will be pursued in this alternative.

Component Activities
How will each of the components of the action be performed under this alternative?

Component of the Action		Activity for this Alternative
X	*Example: Transportation of personnel to the project site*	*Example: Personnel will travel by horseback*
1	Transportation of personnel into the field.	Crew of 2-4 members fly by Type 3 helicopter (<6,000 lbs, 4-8 passengers) to an unobstructed unimproved Landing Zone within 2 miles from plot center, based on topography and accessibility, with the following exception: Consider alternative means of travel to plot points accessible by Stampede Road (2) ; Stampede Air Strip (1); Purkeypile Air Strip (1-2); Lake Minchumina (2); Kantishna Air Strip (1); Skyline Drive (1); Moose Creek Road (1) and Cantwell (1) [11 total plots]
2	Transportation from LZ to work site.	Crew members hike any remaining distance to plot center.
3	Number of crew and time on the ground.	Crews spend an average of 3-6 hours at

		plot, up to 1 day, for field collection.
4	Mark subplots.	Crews bury 8-inch-long steel Mag Spike survey nails at 4 subplot centers and 4 microplot centers.
5	Mark trees.	Crews use GIS and photo documentation to mark any trees in a plot. This is the minimum activity to accomplish project goals.
6	Bore trees and collect vegetation specimens.	Boring of trees with hand borer will be done when necessary to estimate site, age, or tree growth and physiological conditions (this will generally be the case during initial establishment of permanent plots to assess site productivity.) Collection of vegetation specimens will occur when field identification of unknown species is impossible due to time or resource limitations.
7	Take soil samples.	One soil sample will be collected from each of three subplots using battery-powered drill. Soil sample must be taken in accordance with Section 106 programmatic agreement for soil collection, which states, “borings must be limited to pipes less than 2 inches in diameter.”
8	Transportation of personnel out of the field.	Crew members hike back to LZ and return to base via Type 3 helicopter; or crew members hike back to park road; or crew members hike back to airstrip and return to base via fixed wing aircraft.
9		

Wilderness Character
What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

UNTRAMMELED

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	Crew of 2-4 members fly by Type 3 helicopter (<6,000 lbs, 4-8 passengers) to an unobstructed unimproved Landing Zone within 2 miles from plot center, based on topography and accessibility, with the following exception: Consider alternative means of travel to plot points accessible by Stampede Road (2) ; Stampede Air Strip (1); Purkeypile Air Strip (1-2); Lake Minchumina (2); Kantishna Air Strip (1); Skyline Drive (1); Moose Creek Road (1) and Cantwell (1) [11 total plots]	☐	☐	☒
2	Crew members hike any remaining distance to plot center.	☐	☐	☒
3	Crews spend an average of 3-6 hours at plot, up to 1 day, for field collection.	☐	☐	☒
4	Crews bury 8-inch-long steel Mag Spike survey nails at 4 subplot centers and 4 microplot centers.	☐	☐	☒
5	Crews use GIS and photo documentation to mark any trees in a plot. This is the minimum activity to accomplish project goals.	☐	☐	☒
6	Boring of trees with hand borer will be done when necessary to estimate site, age, or tree growth and physiological conditions (this will generally be the case during initial establishment of permanent plots to assess site productivity.) Collection of vegetation specimens will occur when field identification of unknown species is impossible due to time or resource limitations.	☐	☐	☒

7	One soil sample will be collected from each of three subplots using battery-powered drill. Soil sample must be taken in accordance with Section 106 programmatic agreement for soil collection, which states, “borings must be limited to pipes less than 2 inches in diameter.”	☐	☐	☒
8	Crew members hike back to LZ and return to base via Type 3 helicopter; or crew members hike back to park road; or crew members hike back to airstrip and return to base via fixed wing aircraft.	☐	☐	☒
9		☐	☐	☒
Total Number of Effects				NE
Untrammeled Total Rating		**0**		

Explain:

No component will impact the Untrammeled quality of wilderness character.

UNDEVELOPED

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	Crew of 2-4 members fly by Type 3 helicopter (<6,000 lbs, 4-8 passengers) to an unobstructed unimproved Landing Zone within 2 miles from plot center, based on topography and accessibility, with the following exception: Consider alternative means of travel to plot points accessible by Stampede Road (2) ; Stampede Air Strip (1); Purkeypile Air Strip (1-2); Lake Minchumina (2); Kantishna Air Strip (1); Skyline Drive (1); Moose Creek Road (1) and Cantwell (1) [11 total plots] *(Plot points accessed via fixed wing, foot or vehicle would be “no effect”).*	☐	☒	☐
2	Crew members hike any remaining distance to plot center.	☐	☐	☒
3	Crews spend an average of 3-6 hours at plot, up to 1 day, for field collection.	☐	☐	☒

4	Crews bury 8-inch-long steel Mag Spike survey nails at 4 subplot centers and 4 microplot centers.	☐	☐	☒
5	Crews use GIS and photo documentation to mark any trees in a plot. This is the minimum activity to accomplish project goals.	☐	☐	☒
6	Boring of trees with hand borer will be done when necessary to estimate site, age, or tree growth and physiological conditions (this will generally be the case during initial establishment of permanent plots to assess site productivity.) Collection of vegetation specimens will occur when field identification of unknown species is impossible due to time or resource limitations.	☐	☐	☒
7	One soil sample will be collected from each of three subplots using battery-powered drill. Soil sample must be taken in accordance with Section 106 programmatic agreement for soil collection, which states, “borings must be limited to pipes less than 2 inches in diameter.”	☐	☒	☐
8	Crew members hike back to LZ and return to base via Type 3 helicopter; or crew members hike back to park road; or crew members hike back to airstrip and return to base via fixed wing aircraft. *(Plots wherein crew members hike back to the park road or to an airstrip would be “no effect.”)*	☐	☒	☐
9		☐	☐	☐
Total Number of Effects		0	3	NE
Undeveloped Total Rating		**-3**		

Explain:

Helicopter use degrades the Undeveloped quality of wilderness character. The use of power tools to take soil samples degrades the Undeveloped quality as well. Traveling to 11 specified plot points via fixed wing aircraft or on foot or by vehicle will lessen helicopter-associated impacts to wilderness character. Crewmembers hiking to plots and using GIS and photo documentation in place of monumentation are actions that preserve the Undeveloped quality of wilderness character. It is the expert opinion of the NPS botanist that the use of GIS and photo documentation are the minimum activities required to meet project goals.

NATURAL

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	Crew of 2-4 members fly by Type 3 helicopter (<6,000 lbs, 4-8 passengers) to an unobstructed unimproved Landing Zone within 2 miles from plot center, based on topography and accessibility, with the following exception: Consider alternative means of travel to plot points accessible by Stampede Road (2) ; Stampede Air Strip (1); Purkeypile Air Strip (1-2); Lake Minchumina (2); Kantishna Air Strip (1); Skyline Drive (1); Moose Creek Road (1) and Cantwell (1) [11 total plots]	☐	☐	☒
2	Crew members hike any remaining distance to plot center.	☐	☐	☒
3	Crews spend an average of 3-6 hours at plot, up to 1 day, for field collection.	☐	☐	☒
4	Crews bury 8-inch-long steel Mag Spike survey nails at 4 subplot centers and 4 microplot centers.	☐	☐	☒
5	Crews use GIS and photo documentation to mark any trees in a plot. This is the minimum activity to accomplish project goals.	☐	☐	☒
6	Boring of trees with hand borer will be done when necessary to estimate site, age, or tree growth and physiological conditions (this will generally be the case during initial establishment of permanent plots to assess site productivity.) Collection of vegetation specimens will occur when field identification of unknown species is impossible due to time or resource limitations.	☐	☐	☒
7	One soil sample will be collected from each of three subplots using battery-powered drill. Soil sample must be taken in accordance with Section 106 programmatic agreement for soil collection, which states, “borings must be limited to pipes less than 2 inches in diameter.”	☐	☐	☒
8	Crew members hike back to LZ and return to base via Type 3 helicopter; or crew members hike back to park road; or crew members hike back to airstrip and return to base via fixed wing aircraft.	☐	☐	☒

9		☐	☐	☒
Total Number of Effects			0	NE
Natural Total Rating			**0**	

Explain:

No component significantly affects ecological processes, plants or animals and therefore does not degrade the Natural quality of wilderness character.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	Crew of 2-4 members fly by Type 3 helicopter (<6,000 lbs, 4-8 passengers) to an unobstructed unimproved Landing Zone within 2 miles from plot center, based on topography and accessibility, with the following exception: Consider alternative means of travel to plot points accessible by Stampede Road (2) ; Stampede Air Strip (1); Purkeypile Air Strip (1-2); Lake Minchumina (2); Kantishna Air Strip (1); Skyline Drive (1); Moose Creek Road (1) and Cantwell (1) [11 total plots] *(Plot points accessed via fixed wing, foot or vehicle would be "no effect").*	☐	☒	☐
2	Crew members hike any remaining distance to plot center.	☐	☐	☒
3	Crews spend an average of 3-6 hours at plot, up to 1 day, for field collection.	☐	☐	☒
4	Crews bury 8-inch-long steel Mag Spike survey nails at 4 subplot centers and 4 microplot centers.	☐	☐	☒
5	Crews use GIS and photo documentation to mark any trees in a plot. This is the minimum activity to accomplish project goals.	☐	☐	☒
6	Boring of trees with hand borer will be done when necessary to estimate site, age, or tree growth and physiological conditions (this will generally be the case during initial establishment of permanent plots to assess site productivity.) Collection of vegetation specimens will occur when field identification of unknown species is impossible due to time or resource limitations.	☐	☐	☒

7	One soil sample will be collected from each of three subplots using battery-powered drill. Soil sample must be taken in accordance with Section 106 programmatic agreement for soil collection, which states, “borings must be limited to pipes less than 2 inches in diameter.”	☐	☒	☐
8	Crew members hike back to LZ and return to base via Type 3 helicopter; or crew members hike back to park road; or crew members hike back to airstrip and return to base via fixed wing aircraft.	☐	☒	☐
9		☐	☐	☐
Total Number of Effects		0	3	NE
Solitude or Primitive & Unconfined Rec. Total Rating		**-3**		

Explain:

The sight and sound of helicopters negatively affect the Solitude quality of wilderness character, as do the sight and sound of power tools used to take soil cores. Crew members hiking to plots or taking fixed wing aircraft (to landing strip) or a vehicle (on the park road) and then hiking (in place of a helicopter) preserves the Solitude quality of wilderness character. The use of GIS and photo documentation in place of monumentation preserves the Solitude quality of wilderness character, as these actions allow for no metal tags or other accoutrements to be left behind in eligible wilderness It is the opinion of our NPS botanist that no above-ground monumentation is necessary for completing project work, including the marking of witness trees. NPS expert opinion is that marking trees in the manner described in Alternative 1 is not consistent with best practices in this particular forest type. FIA should make an attempt to complete the project work using the minimum necessary to do so. And the minimum necessary would be GIS and photo documentation.

OTHER FEATURES OF VALUE

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	Crew of 2-4 members fly by Type 3 helicopter (<6,000 lbs, 4-8 passengers) to an unobstructed unimproved Landing Zone within 2 miles from plot center, based on topography and accessibility, with the following exception: Consider alternative means of travel to plot points accessible by Stampede Road (2) ; Stampede Air Strip (1); Purkeypile Air Strip (1-2); Lake Minchumina (2); Kantishna Air Strip (1); Skyline Drive (1); Moose Creek Road (1) and Cantwell (1) [11	☐	☐	☒

	total plots]			
2	Crew members hike any remaining distance to plot center.	☐	☐	☒
3	Crews spend an average of 3-6 hours at plot, up to 1 day, for field collection.	☐	☐	☒
4	Crews bury 8-inch-long steel Mag Spike survey nails at 4 subplot centers and 4 microplot centers.	☐	☒	☐
5	Crews use GIS and photo documentation to mark any trees in a plot. This is the minimum activity to accomplish project goals.	☐	☐	☒
6	Boring of trees with hand borer will be done when necessary to estimate site, age, or tree growth and physiological conditions (this will generally be the case during initial establishment of permanent plots to assess site productivity.) Collection of vegetation specimens will occur when field identification of unknown species is impossible due to time or resource limitations.	☐	☐	☒
7	One soil sample will be collected from each of three subplots using battery-powered drill. Soil sample must be taken in accordance with Section 106 programmatic agreement for soil collection, which states, “borings must be limited to pipes less than 2 inches in diameter.” If taken in accordance with archeologist this activity should not impact resource.	☐	☐	☒
8	Crew members hike back to LZ and return to base via Type 3 helicopter; or crew members hike back to park road; or crew members hike back to airstrip and return to base via fixed wing aircraft.	☐	☐	☒
9		☐	☐	☐
Total Number of Effects		0	1	NE
Other Features of Value Total Rating		**-1**		

Explain:

Any ground disturbance has the potential to negatively affect the Other quality of wilderness character, which encompasses archaeological and cultural resources. Requiring crews to be accompanied by an archaeologist would palliate these concerns. Soil samples must be taken in accordance with the Section 106 programmatic agreement (borings must be limited to pipes less than 2 inches in diameter and surface samples to less than 12 inches in size and

minimal in number).

Summary Ratings for Alternative 2

Wilderness Character	
Untrammeled	0
Undeveloped	-3
Natural	0
Solitude or Primitive & Unconfined Recreation	-3
Other Features of Value	-1
Wilderness Character Summary Rating	**-7**

Alternatives Not Analyzed

Alternatives Not Analyzed
What alternatives were considered but not analyzed? Why were they not analyzed?

No Section 4c prohibited uses in eligible wilderness. This alternative does not seem feasible. The USFS most likely cannot realistically do the work and accomplish project objectives without 4c uses.This alternative is dismissed because it would not be possible to meet project objectives without using 4c prohibited methods.

No Action Alternative. A No Action Alternative would have no negative impacts to any of the qualities of wilderness character. By not doing the project, the NPS would not gain the information that will be used to better understand the Natural Quality of wilderness character.

Alternative Comparison

Alternative 1:	FIA Tanana Valley Inventory as proposed
Alternative 2:	Some 4c prohibited uses allowed

Wilderness Character	Alternative 1		Alternative 2		Alternative 3		Alternative 4	
	+	-	+	-	+	-	+	-
Untrammeled	0	0	0	0				
Undeveloped	0	-5	0	-3				
Natural	0	0	0	0				
Solitude/Primitive/Unconfined	0	-4	0	-3				
Other Features of Value	0	-2	0	-1				
Total Number of Effects	0	-11	0	-7				
Wilderness Character Rating	-11		-7					

Determination

Refer to the **MRDG Instructions** before identifying the selected alternative and explaining the rationale for the selection.

Selected Alternative		
☐	Alternative 1:	FIA Tanana Valley Inventory as proposed
☒	Alternative 2:	Some 4c prohibited uses allowed
☐	Alternative 3:	No Action
☐	Alternative 4:	
☐	Alternative 5:	
☐	Alternative 6:	
☐	Alternative 7:	
☐	Alternative 8:	

Explain Rationale for Selection:

The FIA project significantly impacts wilderness character while also significantly benefiting NPS staff's knowledge of the forested areas of DENA. The "No Action" alternative would best preserve wilderness character in DENA . Alternative 2 allows for all proposed project work to be completed with a smaller level of impact than Alternative 1. Alternative 2 does a better job of balancing impacts to wilderness character with benefits to science.

Describe Monitoring & Reporting Requirements:

1) An archeologist will accompany crew to monitor any sites that have likelihood (as determined by a Denali-specific GIS model) for archeological resources being present and require soil samples.
2) The USDA Forest Service will submit an Investigates annual report describe the work accomplished and challenges encountered during each operating season. Once the field data is entered and quality controlled, FIA will provide Denali National Park with access to the full data set following the FIA program's data sharing policy and the data sharing MOU with Denali National Park
3) All monumentation will be removed by FIA should the project cease
4) All monumentation will be removed as technology becomes available to relocate plots without requiring monumentation.

Approvals

Which of the prohibited uses found in Section 4(c) of the Wilderness Act are approved in the selected alternative and for what quantity?

	Prohibited Use	Quantity
☒	Mechanical Transport:	Helo transport approved for 53 of 64 plots.
☒	Motorized Equipment:	Battery-powered drill used for soil samples approved. Soil sampling will be monitored by archaeology staff.
☐	Motor Vehicles:	
☐	Motorboats:	
☒	Landing of Aircraft:	Landing of fixed wing aircraft approved for 6 plots. Landing of helos at unimproved landing sites approved for 53 plots.
☐	Temporary Roads:	
☐	Structures:	
☒	Installations:	Crews may bury 8-inch-long steel Mag Spike survey nails at 4 subplot centers and 4 microplot centers for 64 plots.for a total of 512 below-ground installations. No above-ground installations are approved.
☒	After Action Reviews:	Following the completion of the first round of FIA field work in Denali National Park and Preserve, the NPS, in collaboration with the USDA Forest Service will conduct and review of the aviation and monumentation impacts to park operations and wilderness character. In addition, a statistical analysis of focused on sample size, variation in plot metrics, and an assessment of plot distribution adequacy in representing plant community and soil attribute variation will be conducted. A brief

report will be written and added to the IRMA record in the NPS research permit reporting system for the benefit of future managers' when FIA submits a request to re-read the plots.

Record and report any authorizations of Wilderness Act Section 4(c) prohibited uses according to agency policies or guidance.

Refer to agency policies for the following review and decision authorities:

Prepared	Name	Position	
	Kristin K. Pace	Wilderness Planner	
	Signature		Date
	/s/ Kristin K. Pace		1/24/2018

Recommended	Name	Position	
	David Schirokauer	Science and Resources Team Leader	
	Signature  Digitally signed by DAVID SCHIROKAUER Date: 2018.03.21 09:03:41 -08'00'		Date 3/21/2018

Recommended	Name	Position	
	Signature		Date

Approved	Name	Position	
	Denice Swanke	Deputy Superintendent	
	Signature DENICE SWANKE Digitally signed by DENICE SWANKE Date: 2018.03.21 13:27:29 -08'00'		Date