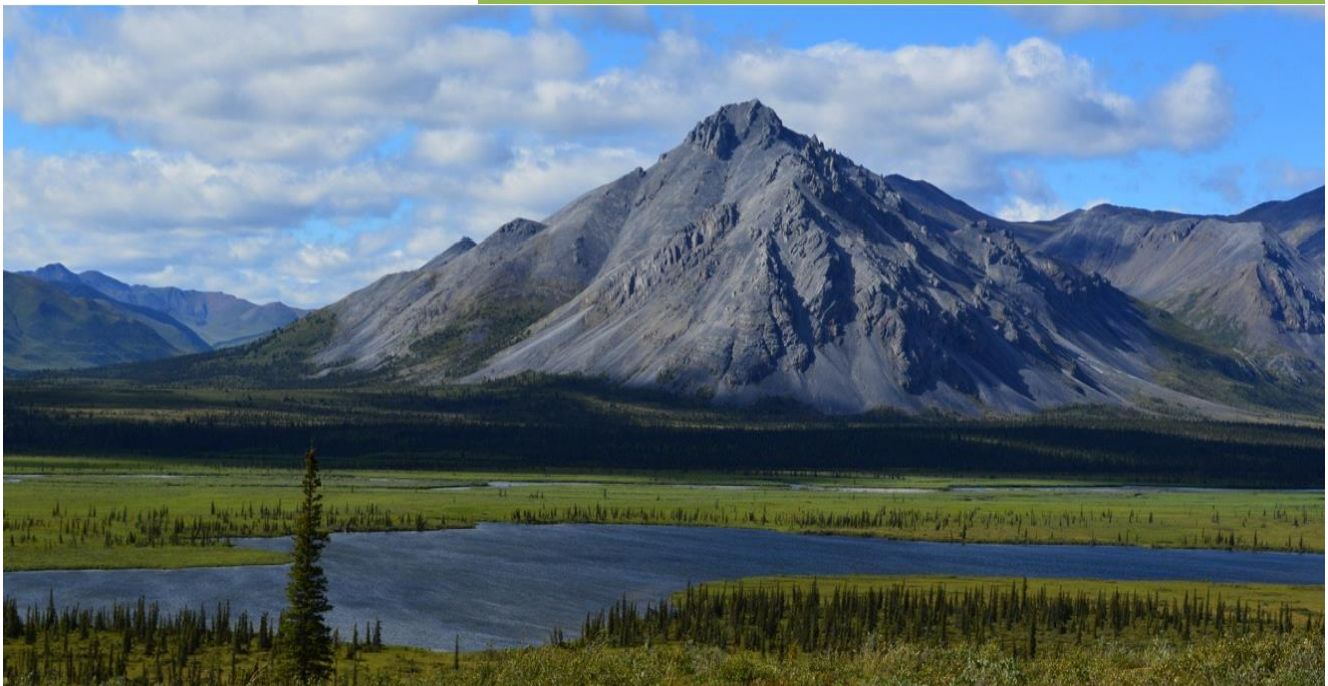


U.S. Fish and Wildlife Service
U.S. Department of the Interior

National Wildlife Refuge System



Survey Protocol Framework for Monitoring Wilderness Character on National Wildlife Refuges



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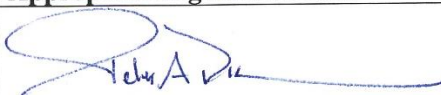
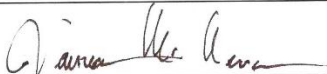
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ON THE COVER

Description of image/photo used on front cover: The photo taken in 2013 is near the site where Olaus and Mardy Murie camped and photographed in 1956. Photograph by: Franklin Dekker

NWRS Survey Protocol Signature Page

Protocol Title: Survey Protocol Framework for the Monitoring of Wilderness Character on National Wildlife Refuges				
Version¹ : 1.0				
Station Name: Natural Resource Program Center			Authors and Affiliations: Peter Dratch, Nathan Phipps, Cindy Hoang, Marissa Edwards (all FWS staff or contractors).	
Approvals				
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Survey Coordinator² Submitted by:				Feb. 26, 2019
Zone I&M³ or equivalent Approval:				
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Version¹	Date	Author	Change Made	Reason for Change

¹ Version is a decimal number with the number left of decimal place indicating the number of times this protocol has been approved (e.g., first approved version is 1.0.; prior to first approval all versions are 0.x; after first approval, all minor changes are indicated as version 1. x until the second approval and signature, which establishes version 2.0, and so on). Only two signatures are required: one from the submitter (lead author)² one from the approving official, which is dictated by the scope of the protocol^{3,4,5}.

² Signature of station or I&M representative designated lead in development of a site-specific survey protocol.

³ Signature signifies approval of a site-specific survey protocol.

⁴ Signature by Regional I&M Coordinator signifies approval of a protocol framework to be used at multiple stations within a Region.

⁵ Signature by National I&M Coordinator signifies approval of a protocol used at multiple stations from two or more Regions.

Survey Protocol Summary

This protocol provides the framework for assessing the character of wilderness areas that occur within the National Wildlife Refuge System (Refuge System). The framework is intended to help U.S. Fish and Wildlife Service (FWS) employees carry out routine wilderness character monitoring (WCM) on their refuges. The measures of wilderness character have been determined by refuge staff and the data are often obtained routinely as part of refuge operations, as for example, the number of permits issued, or the miles of trail maintained. The purpose of this monitoring is to provide people with a tool to assess how attributes of wilderness character are changing over long time periods, and to improve wilderness management in compliance with the mandates of the 1964 Wilderness Act (Public Law 88-577). We describe how an overall trend in wilderness character is determined for each wilderness area using a series of site-specific measures which address nationally consistent indicators, monitoring questions and qualities. This protocol framework is based on *Keeping It Wild 2: An Updated Interagency Strategy to Monitor Trends in Wilderness Character across the National Wilderness Preservation System* (Landres *et al.*, 2015). This protocol framework provides a foundation and guidance for consistent development of site-specific survey protocols with detailed instructions for wilderness character monitoring throughout the Refuge System. The content and structure of the protocols described follow the standards and methods set forth in the U.S. Fish and Wildlife Service guidance, *How to Develop Survey Protocols: a Handbook (Version 1.0)*. Each of the eight elements outlined in the handbook is addressed, and include the protocol introduction, sampling design, field methods and data processing, data management and analysis, reporting, personnel requirements and training, operational requirements, and references. A series of standard operating procedures provide additional details on recommended methods and technical aspects for carrying out the protocol. It also describes the national wilderness character monitoring database that serves as a repository for all four government agencies responsible for managing wilderness character monitoring data. Each of the eight regions of the U.S. Fish and Wildlife Service has designated wilderness areas, and all of these areas have selected measures for wilderness character monitoring. Implementing this protocol helps ensure consistency for this monitoring across the Refuge System and the National Wilderness Preservation System. This protocol is 508c compliant to assist its use by those who are visually impaired.

Suggested citation:

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FWS National Wildlife Refuge System Wilderness Fellows

2011: Ben Edwards, Ben Weiss, Corey Anco, Erin Clark, Kelly Lockman, Matt Strausser, Monica Patel, Molly McCarter and Rachael Carnes
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2013: Anna Peterson, Franklin Dekker, Nyssa Landres, Paul Haverkamp and Sarah Shpak
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2016: Allison McCluskey, Lauren Slater, Marissa Edwards and Nathan Phipps
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This protocol underwent extensive internal and external review that was adeptly organized by Mary Grant. We appreciate the formal reviews contributed by Mary Emerick, Beth Hahn, Adrienne Lindholm, James Sippel, Roger Kaye, Kevin O'Hara, Khem So, and Tim Fotinos.

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Narrative

Element 1: Introduction

Background

Section 2(a) of the Wilderness Act's Statement of Policy states that wilderness areas "shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character" (Public Law 88-577; Wilderness Act 1964). In other words, in order to assure the protection and future use of these areas as wilderness, their wilderness character must be preserved.

This affirmative legal mandate was developed into policies by the four federal agencies managing wilderness areas. For the U.S. Fish and Wildlife Service (FWS), the Wilderness Stewardship Policy (610 FW 1-5, 2008) provides an overview and foundation for implementing the Wilderness Act in the National Wildlife Refuge System. Among other provisions, the policy states that the FWS will administer wilderness consistent with the Nondegradation Principle, which specifies that "at the time of wilderness designation, the conditions prevailing in an area establish a benchmark of that area's wilderness character and values. We will not allow the wilderness character and values of the wilderness to be degraded below that benchmark."

Decades after the Wilderness Act became law, and after Congress added many areas as designated wilderness, the federal agencies realized that they could not confirm that they were preserving wilderness character throughout the National Wilderness Preservation System (NWPS). To uphold the statutory mandates of the Wilderness Act, agencies needed to agree on the meaning of wilderness character, and determine how its preservation could be measured.

Under the leadership of the Aldo Leopold Wilderness Research Institute, representatives of the agencies produced *Keeping It Wild: An Interagency Strategy for Monitoring Wilderness Character across the National Wilderness Preservation System* (Landres et al. 2008). The authors described wilderness character through the primary tangible qualities that it encompassed directly from the language in the law: Untrammeled, Natural, Undeveloped, Solitude or Primitive and Unconfined Recreation, and Other Features of Value.

The 2014 FWS Inventory and Monitoring Policy requires that refuges monitor wilderness character, which is defined as the "the combination of biophysical, experiential, and symbolic qualities that distinguishes wilderness from all other lands" (701 FW 2, 2014).

Why do we need an interagency protocol for wilderness character monitoring?

All wildernesses – independent of their managing agency – are guided by the same enabling legislation that lays out their common objectives. Managing them all in a similar manner ensures that the Wilderness designation carries the promise of a certain standard of quality.

The first nationally consistent interagency strategy for the assessment of wilderness character preservation was set forth through *Keeping It Wild: An Interagency Strategy for Monitoring Wilderness Character across the National Wilderness Preservation System* (Landres et al. 2008).

As agencies implemented the new strategy in their planning and management, adjustments were made to better fit the particular objectives, capabilities and restrictions particular to each agency. While some of these agency-specific changes were improvements over the original monitoring strategy described in *Keeping It Wild*, they also detracted from the central goal of maintaining consistency across all wildernesses. In response, *Keeping It Wild 2* was published in 2015 to address and remedy shortcomings in the original strategy. That publication, *Keeping It Wild 2: An Updated Interagency Strategy to Monitor Trends in Wilderness Character across the National Wilderness Preservation System* (Landres et al. 2015) provides the definitive reference for this framework. It is generally cited as *Keeping It Wild 2* rather than by author and date.

Who will use this protocol framework?

This protocol framework will be used by National Wildlife Refuge System staff, volunteers and others for wilderness character monitoring on refuges throughout the United States. The basic survey protocol is applicable to all refuges with wilderness areas, either designated or proposed, and is intended to help inform and aid the development of management actions for preserving wilderness character at the local and regional levels.

This standardized protocol framework will explain the underpinning of WCM plans, promote management continuity, and help ensure that degradation of wilderness character, no matter how gradual, does not go undetected. The data gathered from wilderness character monitoring will be valuable in future analyses that will assess regional or national trends in wilderness character.

When it comes time to write site specific protocols for wilderness areas on refuges, this framework will inform that process and greatly streamline the writing. In combination with the Baseline Report on and the Update Summary, this framework should expedite work by refuge staff on the site-specific protocol.

What is the terminology associated with wilderness character?

Since the initial description of wilderness character in 2005, there has been some confusion among agency staff, non-government organizations, and the public regarding the language used in discussions of wilderness character. To remedy this confusion, *Keeping It Wild 2* defined key terms, clarified how certain terms are used, and explained why some terms are no longer used.

Terms used in the description and discussion of wilderness character in this protocol:

Wilderness character: A holistic concept comprised of qualities that distinguish wilderness from all other lands, “based on the interaction of (1) biophysical environments primarily free from modern human manipulation and impact, (2) personal experiences in natural environments relatively free from the encumbrances and signs of modern society, and (3) symbolic meanings of humility, restraint, and interdependence that inspire human connection with nature.”

Wilderness qualities: Any of the five qualities of wilderness character derived from the statutory definition of wilderness in the Wilderness Act and further described in *Keeping It Wild 2*: Untrammeled, Natural, Undeveloped, Solitude or Primitive and Unconfined Recreation, and Other Features of Value.

Wilderness resources: Any of the particular resources (natural or cultural) inside a wilderness.

Wilderness values: Any of the meanings, benefits, or values, people or society derive from wilderness.

Wilderness character monitoring: The process of assessing the specific and overall trends in wilderness character using the interagency strategy described in *Keeping It Wild 2*.

Terms not used in this protocol:

Wilderness characters: This term causes confusion because it has alternately been used to refer to either “wilderness character” or “wilderness qualities.”

Wilderness characteristics: This term also causes confusion, as it may be interpreted to denote wilderness qualities or some other aspect of wilderness. This term was originally used in BLM and FS laws and policies, but should be avoided within the FWS.

Wild character: It has been used as shorthand for wilderness character, but wild has many interpretations that are broader and can lead to an unclear application of wilderness attributes.

Characters: As shorthand for wilderness characters or wilderness qualities, this phrase is vague and can lead to confusion.

Commonly Used Acronyms:

KIW: *Keeping It Wild* (2008)

KIW2: *Keeping It Wild 2* (2015)

FWS: United States Fish and Wildlife Service

NWRS: National Wildlife Refuge System

WCM: Wilderness character monitoring

WCMD: The interagency Wilderness Character Monitoring Database

What are wilderness character monitoring measures?

Measures are the specific elements under each indicator for which data are collected to assess trend in that indicator. They are chosen by refuge personnel, usually with the advice of Wilderness Fellows who spend time in residence at the refuge to help develop the measures. They are first proposed in the refuge wilderness Baseline Report and confirmed in the refuge Update Summary. In general, measures are human-caused threats to the indicator which degrade wilderness character.

A sampling design requires clear objectives. For this survey protocol framework, the objective is to consistently assess how the attributes of wilderness character are changing over long time periods in order to inform and improve wilderness management on wildlife refuges.

Wilderness Character

Qualities

Monitoring Questions

Indicators

Measures

Nationally Consistent

Locally Relevant

Qualities of wilderness character: Untrammelled

4

Managerial restraint any time a trammeling action is evaluated will result in an upward trend for this measure.

The Untrammelled Quality is addressed by one monitoring question: what are the trends in actions that intentionally control or manipulate “the earth and its community of life” inside wilderness? *Keeping It Wild 2* defines a trammeling as “an action that purposefully alters, hinders, restricts, controls, or manipulates the earth and its community of life, including the type, quantity, or distribution of plants, animals, physical resources (such as air, water, or soil), or biophysical processes (such as fire) inside a designated wilderness.” Small actions such as hand pulling a few weeds can be considered and discounted as not of sufficiently large scale, but all proposed actions should be evaluated. Intention is a key component for measures of the Untrammelled Quality. Accidental events that alter ecological elements or biophysical processes as an unanticipated consequence of their intended effect, do not count as trammeling actions. Appendix 6 in *KIW2* has a detailed discussion and many examples of what would or would not typically be considered trammeling actions.

There are two indicators for this monitoring question: Actions authorized by the federal land manager that intentionally manipulate the biophysical environment, and Actions not authorized by the federal land manager that intentionally manipulate the biophysical environment.

Indicator 1: Authorized actions that intentionally manipulate the biophysical environment

In *Keeping It Wild 2*, this indicator is specified to encompass all significant trammeling actions authorized by the managing agency of the wilderness, including those allowed under Section 4(d)(1) of the Wilderness Act. It states “measures may be taken as may be necessary in the control of fire, insects and disease, subject to such conditions as the Secretary deems desirable.” This indicator includes trammeling actions performed by other agencies or private citizens if those actions are authorized by the FWS. Significance of a trammeling action, as with any measure, is defined by a threshold, further elaborated in the “Assessing wilderness character trends” section of Element 4. Examples of measures for this indicator include the decision to act to suppress naturally occurring fires, actions to ignite controlled burns, and actions to remove invasive species. An increase in authorized federal actions that intentionally manipulate the biophysical environment results in a downward trend for this measure.

Indicator 2: Actions not authorized that intentionally manipulate the biophysical environment

Although most trammeling is the result of actions taken by the federal managing agency, unauthorized actions to intentionally manipulate a wilderness often have a significant impact on wilderness character. Measures of this indicator should track any significant trammeling actions not covered by the first indicator, including any actions by other government or private agencies or citizens that have not received authorization from the FWS. Examples of possible unauthorized trammeling include a person stocking wilderness lakes with fish, or a photography group leaving food as a lure to assure animals were in a particular place. An increase in actions not authorized by the federal land manager that nonetheless do manipulate the biophysical environment results in a downward trend for this measure

Qualities of wilderness character: Natural

The Natural Quality addresses effects of modern civilization on wilderness areas. A central concern in the 1964 Wilderness Act is the threat of “an increasing population, accompanied by expanding settlement and growing mechanization” (Section 2(a)). This quality targets the preservation of a wilderness’ ecological systems in a natural state, including all biological and physical processes. While the Untrammeled Quality monitors *actions* taken within the wilderness that intentionally manipulate the environment, the Natural Quality monitors the *effects* of modern human civilization on the wilderness as an ecological system. Those impacts can be intentional or unintentional, including sources outside the wilderness that have an effect on the wilderness.

There is one monitoring question for the Natural Quality: what are the trends in the natural environment from human-caused change? Unlike in the Untrammeled Quality, management intent is not relevant in measures of the Natural Quality. Effects on the biological or physical wilderness environment caused by humans degrades this quality of wilderness character. Measures under all four indicators of the Natural Quality should be relevant to known human-caused threats, based on reliable and repeatable measurements, and should not be based on historical conditions or the prevention of change from current conditions.

The four indicators for this monitoring question are Plants, Animals, Air and Water, and Ecological Processes.

Indicator 1: Plants

One major effect of modern human civilization is the alteration of ecological systems. Indigenous plant species and communities are foundational elements of a wilderness ecosystem. Significant changes in plant community composition may result in cascading effects on the larger biotic community and its physical environment. This indicator monitors the primary threats to native plants, which are usually the introduction of invasive, non-indigenous plants in the wilderness. Non-vascular plants (e.g. bryophytes and lichens) and fungi are included in this indicator. Example measures for this indicator include the number, distribution and abundance of invasive plant species. An increase of non-indigenous plant species results in a downward trend in this measure.

Indicator 2: Animals

Indigenous animals are an essential part of a wilderness ecosystem, and are important in the regulation of wildlife populations, species diversity, and community structure. This indicator monitors the primary threats to indigenous animals: the addition of non-indigenous animal species and human disturbances to indigenous species. Example measures for this indicator include the number, distribution, or abundance of invasive animal species. An increase of animal taxa that are not indigenous to the wilderness results in a downward trend in this measure.

Indicator 3: Air and Water

Clean air and water are obviously essential to multiple ecological functions, and may be altered by outputs of human industry and development outside of a wilderness. This indicator monitors the quantity of selected pollutants in close proximity to a wilderness, as well as measurable physical effects of pollution on visibility and the diversity and abundance of pollution-sensitive indigenous species. It also tracks the effects inside the wilderness of physical manipulations of

free-flowing water both inside and outside the wilderness area. Four standard measures of air quality form one foundation of this indicator, while unique measures of water quality can be selected that are specific to a wilderness. Air quality comprises four standard measures for this indicator: ozone air pollution, total nitrogen wet deposition, total sulfur wet deposition, and visibility. An example of a water quality measure would be altered flow rates. An increase in the effect of pollution or water flow alteration results in a downward trend for this measure.

Indicator 4: Ecological Processes

This indicator tracks changes in any major ecological process that impact multiple components of natural systems within a wilderness. Watershed condition, migration patterns, and stream bank erosion are examples of such processes. Even slight changes in these interconnected processes often result in wide-reaching consequences at multiple levels of the natural system. Because ecological processes are constantly changing, many measures of this indicator register the magnitude or intensity of factors that cause the processes. Examples of measures that may be included in this indicator are average watershed condition class and connectivity index. Measures of anthropogenic climate change, when adopted, also belong under this indicator. An increase in connectivity results in an upward trend for this measure.

Qualities of wilderness character: Undeveloped

The Undeveloped Quality, cited in Section 2(c) of the Wilderness Act, is described as “an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation,” and with “the imprint of man’s work substantially unnoticeable.” *Keeping It Wild 2* summarizes the Undeveloped Quality for this monitoring strategy: “wilderness is essentially without permanent improvements or the sights and sounds of modern human occupation.” The level of development and use of mechanized transport, motorized equipment, and structures made by people prior to the establishment of the wilderness are included in the baseline. An increase in development and mechanization results in a downward trend in this quality.

There are two monitoring questions for this quality. The first question is: what are the trends in non-recreational physical development? Permanent physical structures and modifications take away from the wilderness experience because they are evidence of modern civilization and human occupation. This monitoring question is concerned only with *modern* human occupation; developments made by indigenous peoples are therefore excluded from this quality. Only modern physical developments, or installations not primarily intended for a recreational purpose are included in the Undeveloped Quality. Structures and modifications that provide for recreational activities such as trails and camping facilities are included in the Solitude or Primitive and Unconfined Recreation Quality.

The two indicators for this monitoring question are Presence of non-recreational structures, installations, and developments, and Presence of inholdings.

Indicator 1: Presence of non-recreational structures, installations, and developments

There are many types of physical structures and modifications to a wilderness that may be relevant to this indicator, including the following: dams, pipelines, road beds, mines, and permanent communication, sanitation or research instrumentation facilities. There may also be

structures and modifications that remain from before wilderness designation that may be allowed to continue functioning by legal provision. However, all permanent structures, installations and developments are encompassed by this indicator, including those that are defunct or that predate wilderness designation, as well as scientific installations and historic structures. Additionally, large trash objects (e.g. vehicles, aircraft, operational equipment, mining debris, and trash dumps) are included in this indicator, despite not encompassing some definitions of structures, installations or developments. Examples of measures for this indicator include the number, size, and type of developments within the wilderness area. Measures of the number of tagged animals and the number of nest boxes would also fall within this indicator. While putting radio-collars or ear-tags on animals would be trammeling actions, their continued presence is recorded under this indicator. An increase in the presence of non-recreational structures, installations, and developments results in a downward trend for this measure.

Indicator 2: Presence of inholdings

Although inholdings within refuge wilderness areas are not owned or managed by the FWS, they represent a degradation to the Undeveloped Quality of the wilderness. Inholdings may be sold or developed for a wide variety of purposes that may be out of line with the wilderness mission. Therefore, the acquisition and assimilation of inholdings by the FWS is often a priority. Examples of measures under this indicator are the acres or number of inholdings in wilderness. An increase in the acreage or number of inholdings, or legal agreements with inholding owners to limit development, results in a downward trend for this measure.

The second monitoring question for the Undeveloped Quality addresses mechanization. Under the Wilderness Act, the managing agency of a wilderness may authorize a variety of mechanized activities insofar as they are the minimum requirement necessary for the administration of the area for the purpose of the Wilderness Act. Mechanized use may also be permitted in emergency situations and in special cases where a wilderness law provides for specific mechanized activities. In both cases, these uses are counted. The indicator for this monitoring question is Use of motor vehicles, motorized equipment, or mechanical transport.

Indicator 3: Use of motor vehicles, motorized equipment, or mechanical transport

Keeping It Wild 2 specifies that this indicator tracks the use of motor vehicles, motorized equipment, and mechanical transport, collectively called mechanized uses for “administrative, emergency, and other non-emergency purposes such as access to mineral rights, state land, and private land, and provision of other laws.” Examples of measures for this indicator include administrative authorizations of mechanized uses, motorized equipment, or mechanical transport, and the number of unauthorized mechanized uses per unit of effort or time. An increase in use of mechanized equipment or motor vehicles results in a downward trend for this measure.

Qualities of wilderness character: Solitude or primitive and unconfined recreation

The purpose of wilderness designation is not only to preserve the integrity of the natural environment as expressed in the previous three qualities, but also to serve the public as an area for personal interaction with nature. According to section 2(c) of the Wilderness Act, one key purpose of wilderness is to provide “outstanding opportunities for solitude or a primitive and unconfined type of recreation.” Solitude encompasses a number of experiential benefits, including privacy, inspiration, a sense of timelessness, and separation from civilization. Primitive

recreation predominantly refers to travel by non-motorized and non-mechanical means, with the benefit of reinforcing one's connection to our shared ancestral heritage. Unconfined recreation is defined by a freedom from managerial guidance or restriction on recreational activities.

Holistically, this quality is monitored to ensure that wilderness visitors may experience the physical and psychological benefits derived from self-reliance, personal challenge, and the freedom of mind and body from the constraints of civilization. There is an inherent tension between the Wilderness Act's outdoors recreational objectives and the quality of preserving the solitude or primitive and unconfined recreation. When more visitors are allowed into an area, opportunities for solitude are reduced and increased managerial restrictions on recreation are often required to preserve the wilderness in perpetuity. Properly considering the consequences of potential managerial actions on visitor opportunities for solitude or primitive and unconfined recreation is essential to ensure that this aspect of wilderness does not degrade over time.

There are two monitoring questions for this fourth quality. The first monitoring question is: what are the trends in outstanding opportunities for solitude? Solitude is degraded by any aspects of the wilderness setting that serve to remind visitors of human civilization. These characteristics include increased visitation, the growth of nearby human populations, or areas of concentrated visitor use within the wilderness.

The two indicators for this monitoring question are Remoteness from sights and sounds of human activity *inside* the wilderness and Remoteness from sights and sounds of human activity *outside* the wilderness.

Indicator 1: Remoteness from sights and sounds of human activity inside the wilderness

This indicator allows managers to track the conditions that are within the boundaries of the wilderness unit, and therefore more subject to management control. To achieve a sense of solitude, it is important to find remoteness from evidence of modern human civilization and activity. Seeing or hearing the presence of many other people within the wilderness detracts from this sense of solitude and therefore degrades this quality. Solitude can be found on established travel routes when visitation is low, or by entering undeveloped areas where fewer visitors are likely to travel. This indicator should track the number, density, and sensory or physical evidence of visitation, which includes trash and debris that degrade most people's sense of remoteness. Examples of measures for this indicator are the number of visitor encounters on travel routes; number of occupied campsites within sight and sound of one another; area of wilderness away from access and travel routes or developments; index of user-created campsites; and miles of user-created trails. Increases in the number for any of these measures results in a downward trend for this measure.

Indicator 2: Remoteness from sights and sounds of human activity outside the wilderness

This indicator tracks human activity outside the wilderness boundary that is evident within the wilderness. Despite being largely outside the managerial authority of the wilderness unit, such activity may nonetheless degrade the sense of solitude found within the wilderness. Significant signs of human activity outside the wilderness that may be measured for this indicator include sights and sounds of automobiles and off-road vehicles on nearby travel routes; airplanes flying over wilderness; development and use of inholdings; air and light pollution from nearby developed areas; and urbanization. These sights and sounds are often measured from high ridges

and peaks within the wilderness. Examples of measures for this indicator are: area of wilderness not affected by travel routes and developments outside the wilderness; night sky visibility; and number of user-created facilities adjacent to the wilderness. Increases in the number of outside developments and user-created facilities results in a downward trend for this measure.

The second monitoring question is: what are the trends in outstanding opportunities for primitive and unconfined recreation? This monitoring question addresses the importance of providing opportunities for non-motorized and non-mechanized travel, self-reliance and discovery, and freedom from social pressures and constraints. Self-reliance through the development of independent wilderness skills is an integral part of primitive recreation. Therefore, this quality is degraded by the presence of facilities that make wilderness travel easier, such as high-standard trails, bridges, and campsites. Unconfined recreation refers to recreational opportunities which allow visitors a high degree of freedom over their own actions and decisions. Opportunities for unconfined recreation are decreased by management restrictions on visitor travel and activity.

The two indicators for this monitoring question are Facilities that decrease self-reliant recreation and Management restrictions on visitor behavior.

Indicator 3: Facilities that decrease self-reliant recreation

There are a variety of different structures, installations, and developments that may be constructed to facilitate wilderness access and use, improve visitor safety, or protect wilderness resources from cumulative visitor activity. Facilities constructed for these purposes are considered recreational in the wilderness character monitoring strategy of Keeping It Wild 2. Such facilities include, but are not limited to bridges, system trails and trail signs, toilets, aircraft landing strips, hardened and designated campsites, sleeping platforms in swamp biomes, and food storage lockers or bear poles in areas with bear activity. This indicator tracks all such durable or relatively permanent facilities provided by the managing agency that affect primitive recreation opportunities. It also extends to facilities or services without a physical presence but which nonetheless diminish self-reliant recreation, such as cell-phone coverage. Example of measures include miles of developed trails, number of trail signs, an index of authorized recreational facilities and the area of cell-phone coverage. More facilities that decrease self-reliant recreation results in a downward trend for this measure.

Indicator 4: Management restrictions on visitor behavior

This indicator tracks the number, type, or extent of management restrictions on visitor behavior. In the context of wilderness character monitoring, such management restrictions refer to agency regulations or policies that govern the behavior, travel, or equipment of wilderness visitors. Examples of measures for this indicator include the number of restrictions on a backcountry camping permit, and an index of visitor management restrictions based on area size, duration, and intensity of the restriction. More management restrictions on visitor behavior results in a downward trend for this measure.

Qualities of wilderness character: Other features of value

In Section 2(c), the Wilderness Act states that in addition to the four qualities previously described, wilderness “may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.” The Other Features of Value Quality encompasses

unique wilderness features that significantly contribute to the character of a particular wilderness but do not readily fit under any of the other four qualities. Although such features may be valuable for a number of different reasons, monitoring for this quality focuses on the physical condition of these tangible features. Wilderness managers have some ability to directly protect or improve the physical condition of a given feature, whereas intangible values of these features are very difficult to quantify. Therefore, monitoring of this quality does not attempt to track the scientific, educational, scenic, or historical values derived from these features. The determination of which features belong to the Other Features of Value Quality is nuanced. Intangible resources such as spiritual values, traditional practices, and traditional historic stories are aspects of this quality, but are not included in monitoring. Instead, they may be addressed in the narrative section of wilderness character monitoring reports. The document titled [All Common Measures](#) has further guidance and discussion on which features are appropriate for wilderness character monitoring.

Three important distinctions differentiate the Other Features of Value Quality from the other four qualities:

1. Monitoring of this quality is not required. Unlike the other qualities that must be monitored at every wilderness, Section 2(c) notes that other features of value may be present, but are not required to be present. This quality should be used only when there are features that are integral to the character of the wilderness.
2. This quality focuses on site-specific features, while the other four qualities apply to the entire wilderness area. Keeping It Wild 2 notes, however, that some features of this quality occupy a larger area, including cultural landscapes, geological and paleontological formations.
3. Where this quality is included, it is also calculated in the overall trend in wilderness character. Measures developed for any Other Features of Value will determine that this quality carries the same weight as the others in determining the overall trend in wilderness character. Careful consideration must be used to determine whether a feature is integral to the wilderness character and whether the available data quality for the measure is sufficient to justify its inclusion. Especially when few other features of value are used as measures, they may disproportionately affect the overall trend in wilderness character.

There is a single monitoring question for this quality: what are the trends in the unique features that are tangible and integral to wilderness character? This question assesses the trend in site-specific features that are unique and integral to the character of the wilderness. There are two indicators for this monitoring question. If the Other Features of Value Quality is used, either one or both of the indicators may be considered depending on the types of relevant integral features. A decline in the physical condition of any feature chosen for this measure indicates a downward trend in wilderness character for this quality.

Indicator 1: Deterioration or loss of integral cultural features

This indicator tracks the physical condition of cultural features that have been deemed integral to the character of a particular wilderness, as well as authorized and unauthorized actions that damage or disturb these features. In this monitoring strategy, the term cultural includes both

prehistoric and historic features. Example measures for this indicator include: condition index for integral cultural features, and number of authorized or unauthorized actions that damage or disturb integral cultural features. A decline in the condition or an increase in actions that damage or disturb selected cultural features results in a downward trend in this measure.

Indicator 2: Deterioration or loss of other integral site-specific features

This is a catch-all indicator that tracks the physical condition of other site-specific features of value that have been deemed integral to wilderness character. Most wildernesses will not have other unique, integral, site-specific features outside of the first indicator. However, this indicator provides flexibility to include any other locally relevant information that captures iconic geological, paleontological, and other features of value. Example measures for this indicator include: condition index of integral geological, paleontological, or other features; and number of authorized and unauthorized actions that damage or disturb integral geological, paleontological, or other features. A decline in the condition or an increase in actions that damage or disturb other integral site-specific features results in a downward trend in this measure.

Element 2: Sampling Design

Wilderness character monitoring relies on measures that are generally census data or complete counts and are not gathered by typical sampling a subset of locations in a wilderness. Rather the administrative or management record is assumed to apply to the entire wilderness being described. In such cases, the principles of sampling do not apply and sample units, sample frame, selection and sample sizes do not apply as in typical population monitoring. Any selected measures that are sampled to estimate the value of an indicator, should describe the sampling design in a Site-specific Survey Protocol.

Sampling units, sample frame, and target universe

The target universe for this protocol framework is the National Wilderness Preservation System. While most measures are chosen locally at the refuge wilderness, all of the 15 indicators, the monitoring questions and the five qualities are consistent across the Wilderness System. For most measures, the sampling frame is the designated or proposed wilderness on the refuge. The wilderness is usually not the entire refuge, and in seven cases (e.g. Alaska Maritime, Moosehorn NWRs) a refuge has more than one wilderness. For some measures, the sample frame is a specific region of importance within the wilderness, such as a lake or the area of a burn.

The sampling unit is the defined station or event at which data for a study is collected and analyzed. The sampling units for wilderness character depend on the measure, but for most will be the entire wilderness. An example of the sampling unit for a measure in the Undeveloped Quality that is the count of authorized, administrative actions would be the whole wilderness, whereas the sampling unit in the Natural Quality of the miles of wilderness boundary serving as an entry point for invasive species would be the total wilderness boundary in miles. Objectives and data analyses should specify and take into account the sample unit of each measure.

Sample selection and size

All of the measures that monitor wilderness character were selected in direct consultation with refuge staff and many of the measures are administrative (i.e. number of permits issued or number of inholdings) requiring little or no field work for verification. Wilderness character monitoring is comprised of a suite of measures for a refuge, and generally samples the wilderness area, unless otherwise stated in the site-specific protocol instructions for that measure. The site-specific protocol should include a table with the measures that comprise wilderness character monitoring of the refuge and a narrative describing how the data are to be collected. That information is derived largely from the Baseline Report and the Update Summary and as was the case with those documents is usually drafted for the refuge by a Wilderness Fellow.

Survey timing

Wilderness character monitoring generally follows the federal fiscal calendar year unless a refuge stipulates that it will use the calendar year. The number of measures to be collected in a given monitoring year depends on the measure frequency and the variation in the year-to-year data value. Measures with a low variation in annual values may be collected and reported at a frequency greater than annually. However, if it is an average of data from multiple years, then collection is done annually and reported in the final year of a monitoring period, unless it is a rolling average which data will be reported annually. For example, data collection for a 5-year

average is reported in the fifth year of data collection. The frequency of a measure is determined in the measure selection process between the refuge staff and the Wilderness Fellow.

Sources of error

Data adequacy will differ for specific measures. The range of measures used requires a variety of data and data sources, with corresponding differences in data quality. The key is to use the best available scientific information for each measure and then document data adequacy and the implications for interpreting change in the measure (*Keeping It Wild 2*). Data adequacy for a measure is classified as Low, Medium or High. This is determined by comparing the Data Quantity and Data Quality (see below).

Table 2.1. Data quantity is the level of confidence for all data that have been gathered for a measure.

Data Quantity	Definition
Complete	This category indicates a high degree of confidence that all data records have been gathered. For example, in determining the number of invasive species, surveys were conducted over the entirety of the wilderness. This means invasive species are less likely to go undetected.
Partial	This category indicates that some data are available, but the data are generally considered incomplete (such as with sampling). For example, in determining the number of invasive species, surveys were conducted over a portion of the wilderness. This means some invasive species may go undetected.
Insufficient	This category indicates even less data records have been gathered or perhaps this measure is not dependent on actual field data. For example, in determining the number of invasive species, surveys were not conducted in any portion of the wilderness. Without surveying the wilderness, the exact number of invasive species may be very different from what is recorded.

Table 2.2. Data quality is the level of confidence in the data source to reliably assess trends in a measure.

Data Quality	Definition
High	This category indicates a high degree of confidence that the quality of the data can reliably assess trends in the measure. For example, in determining the number of invasive species, refuge staff completed ground surveys in the wilderness. This is the most accurate way to assess the presence of invasive species in the wilderness.
Moderate	This category indicates a moderate degree of confidence about the quality of the data. For example, in determining the number of invasive species, data from national datasets was utilized. While national datasets may utilize surveys, they are completed on a large scale and will most likely not include data from the wilderness.
Low	This category indicates a low degree of confidence about the quality of the data. For example, in determining the number of invasive species, professional judgement is the primary data source. This does not utilize any type of inventory or monitoring surveys.

Element 3: Field Methods and Processing of Collected Material

Organizational framework

This survey protocol framework is designed to be carried out by a limited refuge staff. Wilderness character monitoring is intended to be conducted at the local level without an increase in refuge personnel, with some assistance from regional and headquarters staff. The measures chosen by the refuge are generally information collected for use in refuge management or have been selected as a priority in the refuge Inventory and Monitoring Plan.

Keeping It Wild 2 outlines the following key principles that inform the refuge wilderness character monitoring strategy:

- The FWS is responsible for developing its own procedures to ensure implementation of this monitoring strategy.
- Wilderness character monitoring will provide credible data that will be directly useful for tracking the outcomes of wilderness stewardship.
- The baseline for evaluating trend in wilderness character is the time of wilderness designation or the time of initiation of this monitoring program.
- Trend in wilderness character is determined by change within an individual wilderness.
- This monitoring balances national consistency with local relevance.
- Trend in wilderness character is reported every 5 years for every wilderness.
- Not all monitoring done in a wilderness is wilderness character monitoring.
- Existing data are used whenever appropriate and available

Matching a measure with the appropriate quality of wilderness character

There are some measures where it is not immediately apparent under which quality they belong. Most often this happens when deciding whether a measure should be included under the Untrammeled Quality rather than the Natural or Undeveloped Quality. One rule of thumb is to consider *action* versus *effect* versus *presence*. Untrammeled measures track actions to manipulate the biophysical environment. Natural measures track the *effects* of human civilization on the biophysical environment. Undeveloped measures track the *presence* of human structures in the biophysical environment. Some wilderness threats could be monitored under multiple qualities, depending on how the measure is designed. Each measure for a wilderness character attribute usually should be used for only one indicator in order to avoid double counting. Therefore, the primary concern behind the tracking of a particular threat to wilderness character should be considered before designing a measure and assigning it to the appropriate quality.

While duplicate measures are discouraged, it is sometimes possible for multiple measures to track the same threat, as long as each measure targets a different aspect of that threat. To put it another way, a single action or condition can significantly threaten two wilderness qualities. For example, if nest boxes are constructed with sufficient frequency to warrant long-term monitoring in order to encourage population growth of an endangered bird, it would be an intentional manipulation of the biophysical environment, and could be monitored as a measure under the Untrammeled Quality. However, the boxes themselves could also be monitored as a measure of the Undeveloped Quality as man-made structures. If both aspects were considered significant threats to wilderness character, two measures could be used: 1) the number of actions to deploy

nest boxes (Untrammeled) and 2) the number of nest boxes within the wilderness (Undeveloped). Moreover, as the threat to the endangered bird decreases, nest box deployment could be curtailed thus not further degrading the Untrammeled Quality, while the boxes remain as installations.

Processing of collected materials

In most cases there are no physical materials collected in measures for wilderness character. In the Natural Quality, material may be collected for identification, as for example with non-native plants. When this occurs, materials will be saved or disposed of as determined by the established procedure for such materials on the refuge. The principle of *Leave No Trace* applies to wilderness character monitoring as it does for other wilderness activities. Therefore, all marking of monitoring sites for particular measures should be minimized.

End-of-season procedures

There is no field season associated with most wilderness character monitoring measures. Annual measures generally follow the federal fiscal year unless the refuge stipulates that it will use the calendar year.

Element 4: Data Management and Analysis

Data entry, verification and storage

The survey of wilderness character monitoring is a data extensive exercise; the data collection and storage in any single year generally takes a day or less, but the dataset over decades, gives a powerful picture of changes occurring in the refuge wilderness. A typical wilderness character monitoring survey averages 25 measures, selected by the refuge working with a Wilderness Fellow. Data from some measures are collected annually, some over longer periods.

The measures that comprise the wilderness character monitoring survey were developed by a Wilderness Fellow working on the refuge with refuge staff. Between 2011 and 2015, all refuges with designated wilderness, and half of those with proposed wilderness, selected measures, and conducted a baseline inventory of those measures. Those measures and data are in ServCat in the Baseline Report for each wilderness refuge.

Starting in 2015, Wilderness Fellows contacted refuges again to review the wilderness character monitoring. Recognizing changes that reflected the guidance in *Keeping It Wild 2* as well as the capacity of the refuge, some measures were eliminated and others modified. These changes were documented in the refuge wilderness character monitoring Update Summary, signed by the management leader at the refuge and the National Wilderness Coordinator. The Update Summary details any new measures and provides initial data in an inventory of those measures. In subsequent years, the annual data are stored as a ServCat record under the wilderness character monitoring project associated with a refuge.

Data security and archiving

Stations conducting wilderness character monitoring record it into PRIMR as a single annual survey, and can use the Wilderness Character Monitoring Template for this purpose. In the first year, the survey type is *Baseline Monitoring (BM)*, and in subsequent years it is *Monitoring to Inform Management*. The protocol and products are linked to the PRIMR record; the PRIMR record is updated by refuge staff annually to note annual activity, usually data entry.

The annual data are stored as a product in ServCat, following the instructions in [SOP 2](#). Storing WCM data there fulfills two purposes. First, ServCat is the digital repository for important FWS documents, including all relevant documents associated with wilderness. It provides a backup in the event that locally stored files are lost. Second, it meets the accountability mandate of the Inventory and Monitoring Policy, 701 FW 2: section 2.4 E, 2014.

The survey data are also stored in the interagency wilderness character monitoring database accessible through wilderness.net. It provides redundancy to secure this long-term data, and it also enables comparison of results among the four federal agencies that manage wilderness. Instructions for uploading data to wilderness.net are in the addendum [SOP 1](#), and can be performed either by a refuge data steward or by regional or headquarters staff with access to the data in ServCat.

Metadata

There are different data files associated with wilderness character monitoring, and each file type has specific metadata to ensure that it is readily retrievable. The methods for storing WCM

Baseline Reports, Update Summaries, and dataset records in ServCat, are in [SM 2: ServCat Organization and Metadata template for WCM Projects & Products](#)

Assessing wilderness character trends

The trend in wilderness character is derived hierarchically “to provide a readily interpretable assessment for local, regional, and national staff” (*Keeping It Wild 2*). Trends in the qualities, monitoring questions, indicators and measures of wilderness character are relevant to wilderness managers, who may use this information to improve management at the local level. The following guidelines explain how data are used to assign trends at each level of the wilderness character hierarchy (**Figure 2.1**).

Determining significant change and trend in a measure

Significant change in a measure is defined by a threshold, which can be determined by regional or local staff depending on the relevant spatial scale of the measure. The trend in each measure is determined by the direction of significant change. In each reporting year for a given measure, a trend can be assessed by comparing the most recent monitoring data with the earliest available baseline data, as shown in **Figure 4.1** (*Keeping It Wild 2*) or by regression analysis. Each measure is assigned a trend corresponding to this direction: upward (↑ significant improvement), stable (↔ no significant change in the data), or downward (↓ significant degradation). Existing legacy data that may be available for a measure would be the baseline for determining a trend. Specific instructions to determine the trend of a given measure are associated with the measure description.

Measure	Year of data collection								Trend derived
	2008	2009	2010	2011	2012	2013	2014	2015	
Measure 1			●	○	○	○	○	●	2010–2015
Measure 2		●	○	○	○	○	●		2009–2014
Measure 3	●		○		○		●		2008–2014
Measure 4			●					●	2010–2015
Measure 5	●			○		○	●		2008–2014

Figure 4.1. Five hypothetical measures from a refuge showing how trend is determined by comparing the most recent data with the earliest available data (called legacy data if they pre-date the WCM Baseline Report). The shaded column under 2010 shows the year of the refuge's WCM Baseline Report. Circles identify each year data were collected. Black circles identify the data values used to calculate trend. For each measure, trend is assessed from the earliest available date for the measure (in this example legacy data was used for measures 2, 3 and 5) to that measure's most recent year of data collection. The last column shows the years used to determine the trend for each measure reporting in 2015.

Determining trend in an indicator, monitoring question, quality, and wilderness character

As explained in Element 2, the trends in all measures for a given indicator determine the trend in that indicator; the trends in all indicators of a given monitoring question determine the trend in that question, and so forth. Beginning with indicators, the overall trend in each hierarchical component is given as the average of all trends in the sub-components. That is, each upward-trending component offsets one downward-trending component, while stable-trending components are neutral. The overall trend for the component is upward (↑) if there are more

upward- than downward-trending sub-components; downward (↓) if there are more downward-trending sub-components; “offsetting stable” (↕) if there are an equal number of upward and downward trends; and stable (↔) if all sub-components are stable. These rules are used to derive the trend in each component from indicators through qualities, as shown in **Figure 4.2** (taken from *Keeping It Wild 2*).

Qualities	Trend				
	Measure	Indicator	Question	Quality	
Untrammeled Quality					
Authorized actions	↓	↑	↑	↑	
Fires suppressed	↑				
Lakes stocked with fish	↑				
Unauthorized actions	↑	↑			
Natural Quality					
Invasive non-indigenous plants	↔	↔	↓	↓	
Invasive non-indigenous animals	↓	↓			
Visibility	↔	↑			
Ozone	↑				
Water quality	↔				
Landscape fragmentation	↓	↓			
Undeveloped Quality					
Authorized development	↑	↑	↑	↑	
Inholdings	↔	↔			
Authorized motorized/mechanized	↑	↕	↕		
Emergency motorized/mechanized	↓				
Solitude or Primitive and Unconfined Recreation Quality					
Visitor use	↔	↓	↓	↕	
User-created campsites	↓				
Area away from developments outside wilderness	↓	↓			
Night sky light pollution	↓				
Recreation facilities	↑	↑	↑		
Visitor restrictions	↑	↑			

Figure 4.2. A hypothetical example showing how trend in the qualities is derived from trends in the measures, indicators, and monitoring questions. A subset of measures is used in the example and the Other Features of Value Quality is not shown.

The overall trend in wilderness character is derived from the trends in the five qualities in nearly the same way as described above. There is one difference: if there are an equal number of upward and downward trending qualities, the overall trend in wilderness character is determined by the trend in the Untrammeled Quality, as demonstrated in **Figure 4.3**. This was agreed upon by the authors of *Keeping It Wild 2* because the Untrammeled Quality is more prominently featured than the other qualities in the statutory definition of wilderness, as well as in historical wilderness literature, and because no other federal land designations include a legal mandate to prevent trammeling, making it a unique attribute of wilderness.

Two qualities with an upward trend, two qualities with a downward trend; Untrammeled Quality as “tiebreaker.”

Quality	Trend in the quality	Trend in wilderness character
Untrammeled	↓	↓
Natural	↑	
Undeveloped	↑	
Solitude or Primitive and Unconfined Recreation	↓	
Other Features of Value	↔	

Two qualities with an upward trend, two qualities with a downward trend; Untrammeled Quality as “tiebreaker”; the trends in the other qualities offset each other, so the overall trend in wilderness character is stable—offsetting, rather than the simple stable trend in the Untrammeled Quality.

Quality	Trend in the quality	Trend in wilderness character
Untrammeled	↔	↕
Natural	↑	
Undeveloped	↑	
Solitude or Primitive and Unconfined Recreation	↓	
Other Features of Value	↓	

Figure 4.3. Two hypothetical calculations of trend in wilderness character from Keeping It Wild 2, using the Untrammeled Quality as a tie breaker. Measures and indicators for these qualities are not shown.

Element 5: Reporting

WCM Baseline Report

The WCM Baseline Report details the measures and collection protocols specific to a refuge wilderness. They were developed by a Wilderness Fellow working with refuge staff to define the initial measures that constitute WCM on the refuge wilderness. It is the initial report for a refuge that used KIW as guidance to select measures and represents the first year of WCM for a wilderness. In addition to the measure descriptions and collection protocols, the WCM Baseline Report provides the historical and biophysical setting of the wilderness. Putting that monitoring into effect resulted in learning by all four agencies involved; it led to new interagency guidance, *Keeping It Wild 2* which updated the methods for conducting wilderness character monitoring. To consider the guidance from KIW2 and review the relevance of measures after the initial refuge wilderness character monitoring, the Baseline Report has been supplemented with an Update Summary.

WCM Update Summary

The WCM Update Summary, is consistent with the KIW2 guidance and details the modified measures and collection protocols specific to a refuge wilderness. Wilderness Fellows worked with refuge staff in writing the Update Summary that defined the final WCM measures carried out by refuge staff. The WCM Update Summary provides details about any modified or replaced measures from the WCM Baseline Report, with the rationale for those changes. It also provides collected data values for the final measures since the time of the WCM Baseline Report.

WCM Dataset

The WCM Dataset is created by the wilderness data steward after the WCM Baseline Report and WCM Update Summary are completed. It provides an annual report of data values for the scheduled measures of a wilderness, across a 5-year period. The wilderness data steward will use the WCM Dataset Template every monitoring year to enter data values for their wilderness and will archive the dataset into the FWS Service Catalog (ServCat). The 5-year ranges start with 2015-2019. The collected data values in the data report will also be referenced for data entry into the WCM Database at the end of every monitoring year.

Reporting on trend in wilderness character

Agencies can produce three types of standardized reports to summarize wilderness character monitoring data; they are designed for local, regional, and national audiences, respectively. These reports are intended to help managers understand the ongoing changes in wilderness character, as well as the regional and national trends in the wilderness stewardship strategies of the wilderness-managing agencies. The three monitoring reports are created in the interagency WCM Database. Although the Refuge System is responsible for determining its own report content and format, sufficient interagency consistency should allow for the production of a single NWPS summary report.

Local wilderness report

This wilderness-specific report promotes understanding of wilderness conditions and facilitates discussion among refuge and regional staff about preserving wilderness character. *Keeping It Wild 2* suggests two types of agency-specific local reports. A summary report would present trends in wilderness character and the qualities to a broad audience of decision makers and

interested citizens, and would be used for upward reporting within the Fish and Wildlife Service. A detailed report would present all the wilderness character monitoring information from the data for each measure and then provide the overall trend in wilderness character. The refuge staff can generate and use this report to compare current conditions with locally established thresholds.

Regional wilderness report

The goal of this report is to promote communication and discussion of monitoring results among the agency's regional managers. A standardized reporting format would show trends in wilderness character – that is trends in the qualities, monitoring questions and indicators – for all of the wilderness areas in a region. Refuge regional reports will not include information on the measure level because each wilderness will have some unique measures. The regional wilderness report will include a map to show the percentage of wildernesses within each region that are preserving or improving wilderness character. This report will provide the level of detail regional program managers need to help with accountability for wilderness stewardship and policy review.

National wilderness report

This report promotes communication and discussion of wilderness stewardship among national wilderness program managers and coordinators within each agency, key national non-governmental partners, and congressional staff. A standardized reporting format will show, in approximately two pages, the agency-specific national summary of monitoring results suitable for high-level briefings. This report will present the overall percentage of wildernesses in the NWPS in which wilderness character is improving, and the national trend for each of the qualities of wilderness character.

Report content recommendations

Keeping It Wild 2 suggests that a monitoring narrative is included in each report. It provides relevant information about the local, regional, and national conditions, circumstances, and context that affect the interpretation and use of the trends reported.

Objectives and methods

All survey reports include information about the objectives and methods to communicate the justification and purpose for conducting WCM. This text can be summarized from Element 1 and 2 and should be included in the site specific protocol, cited appropriately. Document any changes in methodology during the monitoring year, including trend reporting and analysis resources.

Summary of results

A summary can identify the trends for the qualities and the data sources that contribute to those results. The depth of the summary depends on the scale and audience. The refuge level detailed report would include data from each measure of the indicators, the qualities and the overall trend in wilderness character. This section can include tables or graphs such as the wilderness reports generated from the WCM Database.

Important findings

This portion of the report gives staff the opportunity to add qualitative information and insights from their professional judgment to complement and help interpret trends as appropriate for local, regional, and national reporting. This text would be a valuable part of the legacy information passed to future wilderness managers and would help ensure consistency in reporting over time. The following questions could serve to structure this narrative: Is there confidence in the data generated by this monitoring? Does the trend in wilderness character accurately reflect recent conditions in the wilderness? How should the trend in wilderness character be interpreted if some of the qualities are showing an upward trend while others are showing a downward trend? Have decisions been made (for example, to not take certain actions) that are not reflected in this monitoring but that affect the interpretation of the trend in wilderness character?

Reporting schedule

WCM datasets

Measure data values for each measure are reported annually at the end of each monitoring year as defined in the specific refuge collection protocol and entered in ServCat as described in [SOP 2: Entering Wilderness Character Monitoring Data in ServCat.](#)

Local wilderness reports

Standardized monitoring reports for the local level can be produced annually or biannually. The reports can be used to compare results from previous years and generate discussion of management actions affecting particular indicators. They can also be used to compare a wilderness refuge to other wilderness areas, some managed by other agencies, to gauge how a refuge contributes to the National Wilderness Preservation System.

Regional and national wilderness reports

Regional and national standardized monitoring reports are produced once every five years. Regional reports are a collaboration of the Regional Wilderness Coordinator and regional I&M personnel. National reports are the responsibility of the National Wilderness Coordinator working with headquarters I&M personnel.

Element 6: Personnel Requirements and Training

Wilderness character monitoring is accomplished through collaborative efforts of FWS personnel at the refuge, regional and national levels. Following are the roles and responsibilities for particular positions that are critical to the initiation and implementation of wilderness character monitoring.

Roles and responsibilities

Inventory and Monitoring (I&M) Branch

The I&M Branch is part of the Natural Resource Program Center and is responsible for the data integrity and tracking of surveys conducted on refuges in the National Wildlife Refuge System. The Branch maintains the Planning and Review of Inventory and Monitoring at Refuges (PRIMR) Database, which describes and archives the surveys conducted on each refuge, including wilderness character monitoring. The I&M Branch also manages the Service Catalog (ServCat), the digital repository for complete documents associated with those surveys. It is the responsibility of Regional I&M Data Managers to ensure that wilderness character monitoring surveys and the data derived from them are consistently entered into ServCat and PRIMR.

National Air Quality Specialist

Responsible for collecting nation-wide air quality data and distributing it to the refuges at five year intervals that comprise the four air quality measures (visibility, total sulfur wet deposition, total nitrogen wet deposition, and ozone air pollution) for the Natural Quality of wilderness character.

National Wilderness Coordinator

As the person with overall responsibility for WCM on refuges, the National Wilderness Coordinator works with the Inventory and Monitoring Branch, the Refuge Manager and often a Wilderness Fellow to determine relevant measures for the wilderness character monitoring survey on a particular refuge. The National Wilderness Coordinator and Refuge Manager or Project leader sign off on the Update Summary stating the WCM measures for the refuge. The National Wilderness Coordinator is responsible for checking with Regional Wilderness Coordinators to assure the wilderness character monitoring survey data are collected. Working with the I&M Branch, the National Wilderness Coordinator is responsible for a national Wilderness Character Monitoring report summarizing the data every five years.

Regional Wilderness Coordinator

The Regional Wilderness Coordinator helps to assure that wilderness character monitoring is carried out on the wilderness refuges of that region. The Regional Wilderness Coordinator maintains a list with point-of-contact for each wilderness refuge to inquire about the completion of WCM data entry and tracking in PRIMR. Regional Wilderness Coordinators work with regional I&M staff to ensure a common understanding of the WCM data collection process. Working with the Regional I&M Coordinator, data managers and other staff, each Regional Wilderness Coordinator is responsible for a regional Wilderness Character Monitoring report summarizing the data every five years.

Refuge Supervisor

Refuge Supervisors are responsible for providing guidance and ensuring compliance with our policies on wilderness stewardship and inventory and monitoring. Supervisors will work with their Regional Wilderness Coordinator to assure that wilderness character is regularly monitored and the data are regularly entered.

Project Leader or Refuge Manager

The Project Leader is responsible for the selection and final approval, with the National Wilderness Coordinator, of all measures for the wilderness character monitoring survey for the refuge. Working with a Wilderness Fellow, measures are selected and updated in the Update Summary. The Project Leader is a signatory of the Update Summary, and is responsible for ensuring that the data for final measures selected are reported accurately and on time.

The Survey Coordinator

The Survey Coordinator is responsible for executing the WCM survey and entering the data for the measures in the Update Summary into ServCat. He or she serves as the Wilderness Data Steward unless other refuge or regional personnel has been assigned that role. If any changes in WCM measures are warranted, the Survey Coordinator proposes those changes to the refuge Project Leader and National Wilderness Coordinator for approval.

Wilderness Data Steward

The person, designated in the Update Summary, responsible for annual WCM data entry into ServCat and the Wilderness Character Monitoring Database.

Wilderness Fellow

A person trained in the theory and application of wilderness character monitoring who helps develop the WCM measures for a refuge. Wilderness Fellows work with refuge staff to develop both the WCM Baseline Reports and Update Summaries that define the WCM measures for the refuge. Working with Project Leaders, Refuge Managers, the National Wilderness Coordinator and the I&M Branch, Wilderness Fellows determine locally relevant measures for wilderness character monitoring.

Qualifications

Wilderness Fellows all have college degrees, usually in the natural sciences and are selected through a competitive process of resume evaluation and interviews. All of the other personnel involved in wilderness character monitoring are qualified through selection as part of their Fish and Wildlife Service duties.

Training

Wilderness Fellows receive in-person training by agency wilderness authorities in the history and application of the Wilderness Act. They are specifically taught about the tenets of *Keeping It Wild 2*, and how to develop and conduct wilderness character monitoring. Other personnel with a role in wilderness character monitoring at the national, regional and refuge levels have different training options. They can apply to attend the in-person Wilderness Fellows' WCM training; they can access the Wilderness Character toolbox and find general information on wilderness

character, and a PowerPoint on monitoring at [Wilderness Connect](#). Also, the Carhart Center offers periodic webinars on specific wilderness monitoring topics; and the Refuge System I&M Branch presents periodic webinars on WCM, as needed.

Element 7: Operational Requirements

Budget

Wilderness character monitoring has been developed primarily by headquarters staff of the National Wildlife Refuge System. It has been among the primary responsibilities of the National Wilderness Coordinator and has taken significant staff time of the I&M Branch.

Wilderness Fellows are contract employees usually hired for 5-6 month term positions with American Conservation Experience by the Natural Resource Program Center. The budget for Wilderness Fellows for the 8 years of wilderness character monitoring development has averaged \$100,000 per year. When Update Summaries and site specific protocols are completed, the number of Wilderness Fellows and I&M staff time will be reduced, but there will still be support to refuges for data entry and report writing.

Staff time

The time spent by refuge staff working with Wilderness Fellows on developing the measures that constitute wilderness character monitoring is highly variable. Once an Update Summary and site specific protocol are in place, then data collection and entry annually should take no more than one day of staff time. Report writing, aided by WCMD output, should also take about one day.

Schedule

Whether a specific measure follows the fiscal year or calendar year, completion of WCM data collection and entry into ServCat and the WCM database is reported into PRIMR annually.

Coordination

Primary coordination to carry out wilderness character monitoring is between the National Wilderness Coordinator and the wilderness refuges, the I&M Branch in Fort Collins and the Regional Wilderness Coordinators.

During the development of WCM Baseline Reports and Updates Summaries, there are usually weekly conference calls between Wilderness Fellows, the National Wilderness Coordinator and the I&M staff members with wilderness responsibilities.

Because wilderness character monitoring is part of the I&M strategic plan, coordination for this effort is done with the I&M Branch with the Regional I&M Coordinator and Data Managers.

Wilderness character monitoring is coordinated with the other three federal agencies responsible for wilderness areas through the National Wilderness Character Monitoring Steering Committee.

Element 8: References

Landres P, Barns C, Dennis JG, Devine T, Geissler P, McCasland CS, Merigliano L, Seastrand J, Swain R. 2008. Keeping it wild: an interagency strategy to monitor trends in wilderness character across the National Wilderness Preservation System. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Gen. Tech. Rep. RMRS-GTR-212.

Landres P, Barns C, Boutcher S, Devine T, Dratch P, Lindholm A, Merigliano L, Roeper N, Simpson E. 2015. Keeping it wild 2: an updated interagency strategy to monitor trends in wilderness character across the National Wilderness Preservation System. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Gen. Tech. Rep. RMRS-GTR-340.

[FWS] U.S. Fish and Wildlife Service. 2008. Part 610 FW 1-5: Wilderness Stewardship. Washington, D.C.: USDI, U.S. Fish and Wildlife Service.

[FWS] U.S. Fish and Wildlife Service. 2014. Part 701 FW 2: Inventory and Monitoring in the National Wildlife Refuge System. Washington, D.C.: USDI, U.S. Fish and Wildlife Service.

Wilderness Act of 1964, Pub. L. No 88-577, 16 U.S. C. 1131-1136 (September 3, 1964).

Standard Operating Procedures (SOP)

SOP 1: Entering Measure Values in the Wilderness Character Monitoring Database

This standard operating procedure (SOP) provides instructions on how to enter the collected measure values in the interagency WCM Database (WCMD). For a more in-depth use of the database, refer to The Wilderness Character Monitoring Database: A Guide for Data Entry Users ([ServCat 97242](#)).

Materials

1. Refuge WCM Baseline Report for the refuge
2. Refuge WCM Update Summary
3. Refuge WCM Dataset

The materials referenced for data entry will depend on what data are not already in the WCMD.

Obtaining access to the WCMD

The person responsible for entering the collected measure values, usually the refuge Data Steward, must have permitted access to the interagency database. Contact the FWS WCM Database Administrator for data entry permissions and instructions. If the administrator is unknown, contact the National Wilderness Coordinator for the current Point-of-Contact. The request includes your name, position title, and the name of the specific wilderness for which you are doing the data entry.

Identifying the scheduled measures for data entry

1. Sometime early in the monitoring year (either the fiscal or calendar year as determined by the station), log into <https://wc.wilderness.net> with your username and password.
2. From the WCMD home screen, click **Select a wilderness** and from the dropdown menu (**Figure SOP 1.1**) select the wilderness for which you are entering WCM data. If the wilderness is not accessible, contact the FWS WCM Database Administrator.

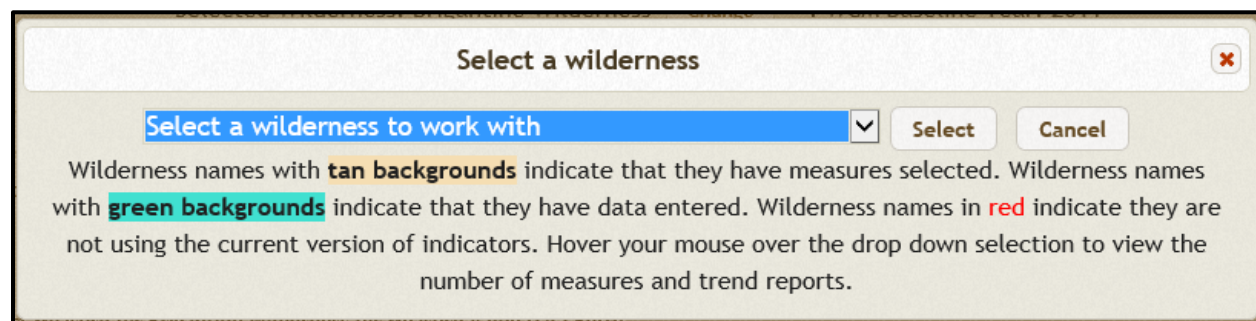


Figure SOP 1.1. The wilderness selection dropdown menu.

3. Click **Select Measures/Enter Data** to open the three option tabs for the selected wilderness.

- Click the second tab, **Enter/Edit Measure Values**, to identify the expected years for data reporting by referring to the **Year of Measure Value** column (Figure SOP 1.2). The year referenced in **Next** is the year the measure is due for reporting.

Selected Wilderness: Brigantine Wilderness Change - ? WCM Baseline Year: 2011

Select Measures/Enter Data Export Data Reports Admin Tasks Logout

DATA ENTRY: Brigantine Wilderness - FWS

Select Measures Enter/Edit Measure Values Trend Report

Select Measure for Brigantine Wilderness for Measure Value Data Entry

Select Measure for Brigantine Wilderness for Measure Value Data Entry

Show Measures for which Indicator? Natural/Animals

Showing 1 Measures

Quality	Indicator	Measure	Measure Baseline Year	Year of Measure Value	Trend Report Years
Natural	Animals	Index of human disturbances to nesting shorebirds and waterfowl	2012	First: 2012 Last: 2016 Next: 2017	Add/Edit Data Starting 2015

Figure SOP 1.2. The **Enter/Edit Measure Values** tab shows the active measures for data reporting using Brigantine Wilderness as a hypothetical example. The **Next** reporting year for the “Index of human disturbances to nesting shorebirds and waterfowl” Measure is 2017.

- Identify all of the measure values due for reporting in the monitored year before logging out of the database.
- Collect the measure values throughout the monitoring year following the station’s protocol for collecting WCM data.

Entering data in the interagency WCM Database

- When the measure values have been collected at the end of the monitoring year, log into <https://wc.wilderness.net> with your username and password.
- Select your wilderness for data entry from the WCM home screen.
- Click **Select Measures/Enter Data** then in the third row, click the second tab **Enter/Edit Measure Values**.
- On the **Enter/Edit Measure Values** tab, find the expected measure and click **Add/Edit Data**. If this is the first data value entered for the measure, it will automatically open the **Add Measure Value** screen that will allow you to enter data. If this is for additional data values, it will open the **Data Entry** home screen (Figure SOP 1.3).

Select Measure for Brigantine Wilderness for Measure Value Data Entry

Enter/Edit Measure Values for Brigantine Wilderness

Return to the main data entry screen

Measure Index of human disturbances to nesting shorebirds and waterfowl

Unit of measure Index

Frequency 1

Data type Number (whole number)

Minimum Value: 0 Maximum Value: 999,999,999

Significant change type: Percent Significant change amount: 20

An increasing change in the data correlates to a Downward trend.

All measure value records that are available for the selected measure and wilderness in the database will be displayed here. Click the edit/view button next to a record to see all of the details for a measure value. To add a new measure value, click the Add Another Year button. You should have already finished choosing measures for the selected wilderness.

Showing 5 Measure Values

Year	Measure Value	Data adequacy	Condition	Trend	Comments	Measure History	Add Another Year
2016	189	Low	Unknown	Downward ↓	Show	Show	Edit/View
2015	195	Low	Unknown	Downward ↓	Show	Show	Edit/View
2014	51	Low	Unknown	Upward ↑	Show	Show	Edit/View
2013	76	Low	Unknown	Stable ↔	Show	Show	Edit/View
2012	69	Low	Unknown	Baseline ☆	Show	Show	Edit/View

Figure SOP 1.3. The **Data Entry home screen** for the selected measure shows the measure values that have been entered with the option to **Add Another Year** or **Edit/View** an existing measure value.

1. From the **Data Entry home screen**, click **Add Another Year** for the **Add Measure Value screen (Figure SOP 1.4)** to enter another year of data.

Measure Value for Brigantine Wilderness

Add Measure Value

Populate form with data from last monitored year

* Required field

Cancel

Measure Index of human disturbances to nesting shorebirds and waterfowl

? *Year of Data Collection

? Data Collection Comments

Unit of Measure Index

Allowable Values Minimum: 0 Maximum: 999,999,999

? *Value

Value Comments

*Data adequacy Select a data adequacy

Data Adequacy Comments

Condition Select a condition

Condition Comments

+ - Link

Save

Cancel

Figure SOP 1.4. The **Add Measure Value** screen for the selected measure can be populated with the measure value and information for the year of data collection.

2. Enter your data for the measure, including the following required fields:

- Year of Data Collection
- Value
- Data Adequacy

If the information is similar to the previous monitoring year, clicking **Populate form with data from last monitored year** will save time in data entry. When using this function, check all fields for accuracy.

3. After entering all pertinent information, click **Save** to complete data entry for the measure. This will redirect you to the **Enter/Edit Measure Values** tab showing all of the active measures.
4. Confirm data entry was completed for the monitored year by checking the Last year shown in the **Year of Measure Value** column for the measure (**Figure SOP 1.5**).

Select Measure for Brigantine Wilderness for Measure Value Data Entry

Show Measures for which Indicator?

Showing 1 Measures

Quality	Indicator	Measure	Measure Baseline Year	Year of Measure Value		Trend Report Years
Natural	Animals	Index of human disturbances to nesting shorebirds and waterfowl	2012	First: 2012 Last: 2017 Next: 2018	Add/Edit Data	Starting 2015

Figure SOP 1.5. In reference to **Figure SOP 1.2**, this figure shows the **Next** collection year for the selected measure has changed from 2017 to 2018 and the **Last** measure value entered changed from 2016 to 2017.

- To confirm the value for the measure was entered correctly, click **Add/Edit Data** to view the **Data Entry home screen (Figure SOP 1.6)**.

Measure Index of human disturbances to nesting shorebirds and waterfowl

Unit of measure Index

Frequency 1

Data type Number (whole number)

Minimum Value: 0 Maximum Value: 999,999,999

Significant change type: Percent Significant change amount: 20

An increasing change in the data correlates to a Downward trend.

All measure value records that are available for the selected measure and wilderness in the database will be displayed here. Click the edit/view button next to a record to see all of the details for a measure value. To add a new measure value, click the Add Another Year button. You should have already finished choosing measures for the selected wilderness.

Showing 6 Measure Values

Year	Measure Value	Data adequacy	Condition	Trend	Comments	Measure History	Add Another Year
2017	190	Low	Unknown	Downward ↓	Show	Show	Edit/View
2016	189	Low	Unknown	Downward ↓	Show	Show	Edit/View
2015	195	Low	Unknown	Downward ↓	Show	Show	Edit/View
2014	51	Low	Unknown	Upward ↑	Show	Show	Edit/View
2013	76	Low	Unknown	Stable ↔	Show	Show	Edit/View
2012	69	Low	Unknown	Baseline ☆	Show	Show	Edit/View

Figure SOP 1.6. In reference to **Figure SOP 1.3**, this figure shows the **Data Entry home screen** for the selected measure and the added measure value of 190 with a Downward Trend for monitoring year 2017.

- Continue the data entry for all scheduled measures in the monitoring year.
- Log out of the WCM database. When data entry for the WCM measures for the monitoring year is completed, it can be noted on the Enter Annual Activity page of the PRIMR database.

SOP 2: Entering Wilderness Character Monitoring Data in ServCat

Materials

1. Refuge WCM Baseline Report
2. Refuge WCM Update Summary
3. WCM Dataset Template ([ServCat 98174](#))
4. ServCat Organization and Metadata Template for WCM Projects & Products ([SM 2](#))

Gathering the WCM data values

Consult the WCM Baseline Report and Update Summary, if completed, for data collection protocols for individual measures. These reports can be downloaded from ServCat in the respective wilderness-specific project associated with the [Wilderness Character Monitoring Initiative Program 5706](#).

1. Use the WCM Summary Table provided in the Update Summary, to identify the final selected measures for the wilderness.
2. Refer to the Narrative of the Update Summary for details of the measures that have been modified, added, or removed from the WCM Baseline Report.
3. Measures that differ from the WCM Baseline Report are found in the Measure Description section of the Update Summary. Likewise, measure descriptions and collection protocols that are not found in the Update Summary can be found in the WCM Baseline Report.

Pay close attention to the Measure Description and Collection Protocol section for each measure.

Data reporting frequencies for the individual measures are outlined in the WCM Baseline Report and Update Summary. Some WCM measures will have data reported annually, and some measures require data reported at 5 or 10 year frequencies. The frequencies for all of the measures are in the WCM Summary Table of the refuge Update Summary. If a data value has not been reported in five years for a measure with a 5-year frequency, then that data value is collected in addition to all of the annual measures. **Table SOP 2.1** shows an example of three measures in the Natural Quality. Each measure has a 5-year frequency, but the baseline year for the measures “Number of invasive plants species” and “Number of invasive animal species” is 2012, while the baseline year for “Ozone air pollution” is 2009. Therefore, in 2017 data are reported for the first two measures, but not for the last measure, which will be reported in 2019.

Table SOP 2.1. Example of how to use the WCM Dataset Template for measures that are not scheduled for data reporting based on a measure's frequency and baseline year.

XXXX Wilderness WCM Baseline Year: 2012					
Quality	Measure	Frequency	Baseline Year	Baseline Value	2017 Value
Natural	Number of invasive plant species	5 years	2012	2	1
	Number of invasive animal species	5 years	2012	3	3
	Ozone air pollution	5 years	2009	77 ppb (Significant concern)	N/A

Filling out the WCM Dataset Template

Once the measure description and collection protocols are consulted, collected data values are entered in the WCM Dataset Template (see [SM 1: WCM Dataset Example](#)). As a convention, the titles of columns are in bold and the contents of columns are in italics.

1. Download the latest [WCM Dataset Template](#) from ServCat and use the most current measure description and collection protocols for template details.
2. Fill in the name of the wilderness and the baseline year for WCM in the top row of the template.
3. In the **Measure column**, fill in the measure titles based on the measures identified in the most current measure description and collection protocols. Additional rows can be added to the template where needed.
4. In the **Frequency column**, fill in the identified frequency for the individual measures. Some typical frequencies are annually, 5 years, and 10 years.
5. In the **Baseline Year column**, fill in the baseline years for each individual measure.

Measure baseline years are not always the same as the baseline year of wilderness character monitoring for an individual wilderness. For example, if the WCM Baseline Report was completed in 2012, the wilderness character monitoring baseline year is 2012. Exceptions to this are the four standard air quality measures: "Ozone air pollution," "Total nitrogen wet deposition," "Total sulfur wet deposition," and "Visibility." Because these measures come from a national monitoring initiative, the years of data reporting are set by that initiative. In this case, the baseline year for these four measures is 2009.

6. In the **Baseline Value column**, fill in the baseline values for each measure. The baseline values will be found in the WCM Baseline Report and the Update Summary.

- If a measure uses categorical data values, include both the value and the category that value falls in. For example, if the baseline value is 5, and this falls in the category “Caution,” enter 5 (Caution).
 - Because the baseline values will not change, a completed WCM Dataset Template can be re-saved in future years to avoid re-entering the baseline values each year the data are reported.
7. In the **Year Value column**, replace **Year** with the numerical year for which the data value is being reported and fill in the collected data values. There are five **Year Value columns** for the 5-year periods of 2015-2019, 2020-2024, 2025-2029, etc.
 - For example, if 2017 data values are being reported, column E is renamed 2017 Value. After renaming the column, the expected data values for 2017 are filled in and will include all annual and other frequency measures due in 2017.
 - If a measure has a 5-year frequency, and the last data value reported was in 2012, the next value is collected for 2017. If a value is not expected for a measure, fill in N/A and move on to the next measure.
 - If a measure uses categorical data values, include both the value and the category in which that value fall. For example, if the value is 5, and this falls in the category Caution, then enter 5 (Caution).
 8. In the **Comments** column, fill in any pertinent information about individual data values.
 - For example, for a measure that lists the number of invasive species, you can use the **Comments** column to provide the names of the invasive species.
 - If an aspect of the data collection procedure was changed from previous years that information should be included here.

Uploading the Dataset in ServCat

1. Once the WCM Dataset Template is filled out for the wilderness and monitoring year, save the file as a .csv format and name the file following the format:

Refuge Name, Wilderness Name (if different) Data Report, Year 1-Year 5

 - Example: Mille Lacs NWR Wilderness Data Report, 2015-2019
 - Example: Hart Mountain NWR, Poker Jim Ridge Wilderness Data Report, 2015-2019
2. Upload the file in ServCat, using the ServCat Organization and Metadata Template for WCM Projects & Products ([SM 2](#)) as a guide.
3. The dataset will be a compilation of five years; however, it is entered and uploaded into ServCat every year and the ServCat record is versioned up to the fifth year. For example, when data are reported for 2015, it will be the first version in ServCat. When 2016 data are available, it is added to the same 5-year dataset for the 2015-2019 interval and uploaded as another reference in ServCat as the second version. This is repeated consecutively up to the

fifth year. By 2019, there will be four older versions of the same 2015-2019 dataset and one current version for the last year. Guidance for versioning can be found on the [ServCat Help](#).

Entering Data in the interagency WCM Database

The dataset created in the previous steps can be referenced for data entry in the interagency WCM Database. Instructions on how to enter the data in the database are in [SOP 1: Entering Measure Values in the Wilderness Character Monitoring Database](#). Verify that the information such as data values, significant changes, and measure trends are consistent in the data report and the database. If there is an error or mistake in the WCM Database, notify a FWS WCM Database Administrator.

References

[FWS] U.S. Fish and Wildlife Service. 2014. Part 701 FW 2: Inventory and Monitoring in the National Wildlife Refuge System. Washington, D.C.: USDI, U.S. Fish and Wildlife Service.

SOP 3: Development of Wilderness Character Monitoring Update Summaries

This standard operating procedure (SOP) presents the method for developing a Wilderness Character Monitoring (WCM) Update Summary for a wildlife refuge. The Update Summary is considered as an addendum to a refuge WCM Baseline Report and is an opportunity for refuge staff to reexamine their WCM measures.

Materials

1. Refuge WCM Baseline Report
2. WCM Update Strategy Template ([ServCat 98174](#))
3. WCM Update Summary Template ([ServCat 98546](#))
4. All Common Measures ([ServCat 98661](#))
5. ServCat Organization and Metadata Template for WCM Projects & Products ([SM 2](#))

Preliminary procedures

This section describes the work that should be carried out in preparation for the Update Summary process, prior to initial contact with the refuge. If necessity dictates, the refuge can be contacted to schedule a conversation before completing this work, but generally, the initial conversation with the refuge will be more productive if this work has already been done.

Review the WCM Baseline Report

The WCM Baseline Report for every wilderness refuge is in ServCat and can be downloaded from the wilderness-specific Project associated with the Wilderness Character Monitoring Initiative Program 5706. The WCM Baseline Report will display the following standard title:

Refuge Name, Wilderness Name (if differs): A Report on Wilderness Character Monitoring

When reading the WCM Baseline Report, look for missing details or measures that do not align with KIW2. Reading the WCM Report can be done simultaneously with preparing the WCM Update Strategy. Baseline measures most often needing modification are in the Untrammelled or Natural Qualities. The rationale for changes can include:

- Measures that are too specific to a project or resource and are not broad enough for long-term monitoring.
- Trammeling measures that are not based on actions or decisions, but magnitude or effect.
- Trammeling measures that are no longer considered trammeling in KIW2, for example, littering, escaped campfires, and small-scale trail building.
- General invasive species measures with vague descriptions that do not clarify whether plants, animals, or both are being measured.
- Species measures that were formerly combined under the Plants and Animals Indicator that in KIW2 need to be separated into distinct measures under either Plants or Animals.
- Native species measures that rely on simple population counts or the presence of habitat and are not focused on human-caused threats to those species.
- Climate change measures that show a change, but do not contribute to an upward or downward trend in wilderness character or take too long to generate a reliable trend.

- Cultural resource measures that used to be required under the old indicator called Loss of Statutorily Protected Cultural Resources but are now optional under the Other Features of Value Quality. These measures are evaluated for inclusion, if they are integral features to the refuge, not if they were created to satisfy the old indicator.

Prepare the WCM Update Strategy

The Update Strategy is used to identify and discuss measures in the WCM Baseline Report that do not align with the guidelines in KIW2 or need clarity in the measure descriptions. An example of a completed WCM Update Strategy is provided in [SM 3](#).

1. When reading the WCM Baseline Report, document the suggested modifications for the identified measures for revision in the [Wilderness Character Monitoring Update Strategy Template](#), which can be downloaded from ServCat.
2. The Update Strategy will provide:
 - A logical reorganization of the selected measures to satisfy the updated KIW2 indicators.
 - Comments detailing the questions, comments, or concerns of measures and indicators that may not align with KIW2. The comments generally include text taken or paraphrased from KIW2 to support the measure of concern. This can also include other comments or questions to discuss with the refuge for clarity. Include notes for the measures and indicators in the comment column of the Update Strategy. Share the completed strategy with the National Wilderness Coordinator and a designated member of the I&M Branch.

Initially contacting the refuge

Emails

The person making the initial contact should provide the background for the Update Summary Process after the WCM Update Strategy is complete.

1. To begin an Update Summary, the National Wilderness Coordinator usually sends an email to the Refuge Manager or Project Leader. The email will introduce the Wilderness Fellow or technician and provide a brief overview of the WCM Update Summary process.
2. Following this email, ideally within 24 hours, send an email to the Refuge Manager or Project Leader to schedule the initial phone call. The email can contain this content:

I am following up on [National Wilderness Coordinator's Name] earlier email regarding the wilderness character monitoring update at XYZ Refuge. It would be great if we could have a short phone conversation so we can go over the background and logistics of this process. Please let me know when would be a good time to call. Also, if there is someone else at the refuge that would be more appropriate to contact concerning wilderness character monitoring please let me know.

3. Attachments to the email can include the [Wilderness Character Monitoring Overview \(85643\)](#) to provide the refuge with the background of WCM and KIW2.

Phone calls

The initial phone call with the refuge is usually 10-15 minutes or less. Depending on the availability of the refuge, the initial call and the second call to provide the overview of WCM and discuss the update strategy can be done at the same time. However, in the initial call:

1. Assess the familiarity of the refuge staff member with WCM and Keeping It Wild. It can sound something like:
 - *It looks like you were at the refuge when XYZ Fellow was there for the baseline assessment. Did you work with them and are you familiar with WCM?*
 - *If I say that WCM is broken down into a number of indicators and we need at least one measure to quantify each of those indicators, does that sound somewhat familiar?*
2. If the staff member is not familiar with WCM, provide a short summary of the monitoring. It can sound something like:

For wilderness character monitoring efforts within the Refuge System, in 2011-2015, Wilderness Fellows worked with the refuges in developing their baseline reports such as this one for XYZ wilderness, using principles from the first Keeping It Wild. The baseline reports describe all of the refuge-selected measures and include the baseline values. Since then, the four agencies with wilderness (FS, BLM, NPS, and FWS) received feedback from those Fellows and made modifications for clarity and added or updated indicators that would produce measures with reliable trends for long-term monitoring. These changes are reflected in the new guidance, Keeping It Wild 2, published in 2015.

3. Explain that the main goal of this process is to reorganize the WCM measures to make them comply with the new set of KIW2 indicators. It can sound something like:

With the new guidance in KIW2, the main objective of this process is to update measures that are no longer appropriate. We are going through the baseline reports and working with the refuges in updating their measures to the new KIW2 principles.

As a Wilderness Fellow, I will assist the refuge by writing the Update Summary that will be the addendum to your WCM Baseline Report, with your comments and feedback. At the end of this process, after the Refuge Manager or Project Leader and the National Wilderness Coordinator have a chance to review the final draft and everyone is in agreement with the Update Summary, both parties will sign the cover page to acknowledge the acceptance of the document and the measures moving forward for the wilderness.

4. Explain that the process can require the creation of some new measures. It is helpful to have the pre-work completed to see if this is relevant for the refuge or not.

Depending on whether the original measures are appropriate per KIW2, we may need to create new measures that would provide reliable data long-term.

5. Explain that there is an interagency database to house WCM data and that updating this database will be part of this process. Therefore, values that are due for collection based on the measure's frequency are collected during the Update Summary process. The wilderness Data Steward will have access to this database. It can sound something like:

As part of this process, we will also help collect any missing data values for the final measures so they can be entered into ServCat and the Interagency WCM Database. This data will be used to monitor and generate trends for wilderness character. A Data Steward should be selected by the refuge who may perform this data collection and entry in the future.

6. Explain that there has been much discussion about WCM in the last few years, so this process could involve modifying some measures for clarity, feasibility and reliability for conducting WCM. It can sound something like:

As we are modifying measures, this is the opportunity to think about the final measures moving forward that the refuge will use for long-term monitoring.

7. Explain the content of the WCM Update Strategy and that it will be emailed to them following the call. In the meantime, schedule another conversation to discuss the Update Strategy; allow the refuge enough time to review it. It can sound something like:

In preparation for XYZ Wilderness, I have read the WCM Baseline Report written by Wilderness Fellow XYZ. I have put together the Update Strategy for XYZ Wilderness and it provides the potential reorganization of measures and comments or suggestions for revised measures. I will email this strategy and I would like to set up the second call to discuss it after the refuge has had some time to review it.

8. Open it up to any questions.

Following up with the refuge

Follow-up calls can last 30-60 minutes, but vary based on the number of modified measures and comments.

Scheduling the first follow-up call

As it requires some work on the part of the refuge to review the Update Strategy, this phone call can be more challenging to schedule. Give the refuge a week to do the review and then send a follow-up email asking if they have any additional questions, reminding them that you would like to have another conversation to discuss the strategy. If the email does not elicit a response, follow up with a phone call later in the week.

Conducting the first follow-up call

The main purpose of this call is to discuss the Update Strategy in detail with the refuge, so the exact structure of the call may vary from refuge to refuge.

1. Open the conversation to answer any questions from the previous call or the Update Strategy.

2. After questions are addressed, remind the refuge of what the Update Strategy is.
3. All salient issues concerning the WCM Update Strategy are discussed to meet some level of agreement on how measures will be changed or adjusted. The conversation will provide enough information to complete a rough draft of the WCM Update Summary. Any questions or concerns that cannot be addressed during this call are referred to the National Wilderness Coordinator and addressed at a later time. It can be in a separate email, another call, or as a comment in the drafted Update Summary.
4. At the end of the call, inform the refuge of the timeframe in which they can expect a rough draft of the WCM Update Summary from you for their review. Refuges are given at least one week to review the Update Summary, before a follow-up email is sent for their questions and feedback.

Writing and editing the WCM Update Summary

Writing the WCM Update Summary

The WCM Update Summary is written using the Wilderness Character Monitoring Update Summary Template. Examples of completed WCM Update Summaries can be found in wilderness-specific projects in the [WCM Initiative](#) as:

Refuge Name, Wilderness Name (if different), Wilderness Character Monitoring Summary

Download the latest [WCM Update Summary Template](#) from ServCat. The Update Summary contains the:

- **Cover Page:** This is signed on the final version of the Update Summary by the Refuge Manager or Project Leader and the National Wilderness Coordinator and signifies the approval of the Update Summary.
 - **WCM Summary Table:** This table identifies all of the official measures and the specifications moving forward for the wilderness to carry out WCM.
 - **Narrative:** This section addresses measure modifications, additions, or removals to the WCM Baseline Report.
 - **Measure Descriptions:** This follows the narrative section when there are new or modified measures. It provides the detailed description and method of data collection of new measures or any significant revisions to old measures.
 - **WCM Data Update:** This table is the last section and reports the collected data values of the final measures since the WCM baseline year to the Update Summary year.
1. If new measures need to be added to the wilderness' monitoring efforts, refer to the document [All Common Measures](#) for the measure description structure and content.
 2. If additional questions or concerns come up after the Update Strategy conversation and in the Update Summary drafting process, highlight the text with the 'New Comment' function on the 'Review' tab in the Word document.
 3. After the first draft of the Update Summary is complete, send it to the refuge for review.

Editing the WCM Update Summary

After the completion of the first draft, the timeframe for exchanging additional drafts depend on the amount of changes made to the original measures and the refuge staff availability.

1. Drafts are emailed back and forth to the refuge until there is agreement with the contents. Depending on the refuge, additional phone calls can be preferred over email correspondence.
2. Once there is an agreement on the final draft, email it to the National Wilderness Coordinator and a designated member of the Inventory and Monitoring Branch for their review. Their feedback can result in additional correspondence with the refuge.
3. Address any requested changes, if necessary.

Identifying the Data Steward

Throughout the review process and especially approaching the final draft, it is helpful to remind the refuge of the need to collect data values for each measure. Otherwise, completing the WCM Data Update Table may delay the approval of the Update Summary.

1. Ask the refuge to identify the Data Steward who will be given access to the interagency WCM Database. The Data Steward will continue the monitoring effort through data collection of refuge-selected measures, data reporting into ServCat and data entry in the interagency WCM Database. Guidance is available in [SOP 2: Entering Wilderness Character Monitoring Data in ServCat](#) and [SOP 1: Entering Measure Values in the Wilderness Character Monitoring Database](#), respectively.
2. After a Data Steward or other WCM Database users are identified, notify the National Wilderness Coordinator with the contact information for the refuge personnel.
3. Note the Data Steward and other individuals who will have access to the WCM Database in the Update Summary, immediately following the WCM Summary Table.

Finalizing the WCM Update Summary

The final steps for completing a wilderness' WCM Update Summary include:

- Obtaining signatures from the Refuge Manager or Project Leader and the National Wilderness Coordinator.
- Entering the approved Update Summary into ServCat, described in [SM 2: ServCat Organization and Metadata for WCM Projects & Products](#).
- Updating the interagency WCM Database to reflect measure changes and collected data values, as detailed in [SOP 1](#).

Closing out the WCM Update Summary

When the Refuge Manager or Project Leader, the National Wilderness Coordinator, and the Inventory and Monitoring Branch member agree on the measures and all aspects of the Update Summary, it is ready for signature approval.

1. Send the Signature Cover Page to the Refuge Manager or Project Leader for their signature acknowledging his/her approval of the final Update Summary and selected measures.
2. Upon receipt of the signed Signature Cover Page from the Refuge Manager or Project Leader, email it to the National Wilderness Coordinator for the final signature and approval.
3. After the Signature Cover Page has been signed by both parties, insert it into the final version of the WCM Update Summary and send both the Word and PDF formats, to the National Wilderness Coordinator and the Inventory and Monitoring Branch Lead Biologist.

Adding the WCM Update Summary into ServCat

The PDF of the WCM Update Summary is entered into ServCat as an Unpublished Report Reference Type and associated with the wilderness-specific project within the [WCM Initiative](#).

Updating the Interagency WCM Database

The contents of the final Update Summary and values from the WCM Data Update Table are used to update the interagency WCM Database. For detailed database use, see the [Wilderness Character Monitoring Guide \(ServCat 97242\)](#).

1. Before working with the refuge in adding the data values, update the measure definitions and information in the WCM Database for all modified, added, or removed measures.
2. Contact the National Wilderness Coordinator and the designated member of the I&M Branch in providing the wilderness Data Steward with Data Entry permissions.
3. After the Data Steward has access to the online database, offer a demonstration of the WCM Database and data entry by entering a few of the wilderness' data values. The refuge can decide to enter the values on their own and then follow-up with you after their data entry is complete. Check the measure values for quality assurance and quality control (this is recommended).
4. If the refuge does not have the available staffing or time, the Update Strategy writer can perform the data entry, unless this task is delegated to another person in the region.
5. Following the WCM Database demonstration, email the refuge Data Steward and other WCM database users from the refuge Data Steward guidance in [SOP 1](#) and [SOP 2](#) for future reference.
6. Remind them that for future monitoring, the Data Steward is responsible for data collection, recording and entry into the appropriate databases.

Supplemental Materials (SM)

SM 1: WCM Dataset Example

This supplemental material is an example of a completed dataset for data collected in 2017 for a wilderness. This template can be downloaded as an Excel file in ServCat ([98185](#)). The WCM Dataset Template is used to record data values in a given monitoring year.

XXXX Wilderness WCM Baseline Year: 2012										
Quality	Measure	Frequency	Baseline Year	Baseline Value	2015	2016	2017	2018	2019	Comments
Untrammeled	Actions to manipulate plant, wildlife, insects, fish, pathogens, soil, water, or fire	Annually	2012	1	1	1	2			2 control treatments of invasive plants
	Unauthorized actions to manipulate plant, wildlife, insects, fish, pathogens, soil, water, or fire	Annually	2012	0	0	0	0			
Natural	Number of invasive plant species	5 years	2012	2	N/A	N/A	1			Common reed
	Number of invasive animal species	5 years	2012	3	N/A	N/A	3			Feral hog, nutria, fire ants
	Ozone air pollution	5 years	2009	77 ppb (Significant concern)	N/A	N/A	N/A			
	Total nitrogen wet deposition	5 years	2009	1.1 kg/ha (Moderate)	N/A	N/A	N/A			
	Total sulfur wet deposition	5 years	2009	0.8 kg/ha (Good)	N/A	N/A	N/A			
	Visibility	5 years	2009	3.3 dv (Moderate)	N/A	N/A	N/A			
	Index of connectivity	5 years	2014	2.4	N/A	N/A	N/A			

XXXX Wilderness WCM Baseline Year: 2012										
Quality	Measure	Frequency	Baseline Year	Baseline Value	2015	2016	2017	2018	2019	Comments
Undeveloped	Authorized structures, installations, or developments	5 years	2012	4	N/A	N/A	3			1 - enclosure 2 - scientific installations
	Inholdings within the wilderness	10 years	2012	0	N/A	N/A	N/A			
	Authorized administrative uses of motor vehicles, motorized equipment, or mechanical transport	Annually	2012	6	5	5	8			4 - chainsaw use 2 - atv use 2 - motorboat use
Solitude or Primitive and Unconfined Recreation	Number of visitors in the wilderness	Annually	2012	11,050	10,500	10,600	10,200			
	Agency-developed campsites adjacent to wilderness	5 years	2012	3	N/A	N/A	3			
	Agency-provided facilities in the wilderness that decrease self-reliant recreation	5 years	2012	0	N/A	N/A	0			

XXXX Wilderness WCM Baseline Year: 2012										
Quality	Measure	Frequency	Baseline Year	Baseline Value	2015	2016	2017	2018	2019	Comments
	Index of management restrictions	5 years	2012	10	N/A	N/A	10			
Other Features of Value	Unauthorized removals of cultural resources	Annually	2012	0	1	0	1			

SM 2: ServCat Organization and Metadata for WCM Projects and Products

This supplemental material provides the metadata information for the various WCM Projects and Products stored in the ServCat [Wilderness Character Monitoring Initiative Program 5706](#). Metadata may be copied and pasted in the ServCat Reference fields and text in blue should be replaced accordingly. This is to maintain metadata consistency and improve data quality for the following references.

Wilderness Project records

Reference Type: Project

Title: [Refuge Name, Wilderness Name \(if different\)](#) Wilderness Character Monitoring – Proposed (if applicable)

- [Example 1](#): Okefenokee National Wildlife Refuge Wilderness Character Monitoring
- [Example 2](#): Bitter Lake National Wildlife Refuge, Salt Creek Wilderness Character Monitoring
- [Example 3](#): Chincoteague National Wildlife Refuge, Assateague Island Wilderness Character Monitoring – Proposed

Description: The Wilderness Act of 1964 mandated the preservation of wilderness character. The five qualities of wilderness character – untrammeled, natural, undeveloped, solitude or primitive and unconfined recreation, and other features of value – are based on the statutory language of the Wilderness Act. These qualities were further defined in the 2008 technical report, “Keeping it Wild: An Interagency Strategy to Monitor Trends in Wilderness Character Across the National Wilderness Preservation System.” In 2015, the technical report was amended in the creation of “Keeping it Wild 2: An updated Interagency Strategy to Monitor Trends in Wilderness Character Across the National Wilderness Preservation System”. Key monitoring questions were also developed from the five qualities. Indicators consistent across areas were developed from the questions and at the refuge level measures were P1hranag8@WR developed for each indicator.

Permissions: Currently permissions to edit records are given to Nancy Roeper, Peter Dratch, and Marissa Edwards. They will eventually extend to data managers at the regional level and wilderness data stewards are the refuge level.

- Public Reference, Public Files

Organizations and Geography: The location of the wilderness

Subjects and Keywords:

- Keywords: WCM, Wilderness Values, Wilderness Act, Wilderness Area Monitoring, Natural Resource Management, Climate Conditions, Air Quality
- Subject Categories: Inventory, Monitoring, Wilderness Recreation Experience, Undeveloped, Natural, Solitude or Primitive and Unconfined Recreation, Untrammeled

WCM Baseline Report records

Reference Type: Unpublished Report

Title: [Refuge Name, Wilderness Name \(if different\)](#): A Report on Wilderness Character Monitoring

- See Refuge and Wilderness Name Examples under [Wilderness Project Records](#).

Date Produced: Year of the Fellow's Report

Pages: # Pages

Description: This document is the completed effort of the U.S. Fish and Wildlife Service, Wilderness Fellows program to develop a monitoring strategy and evaluate the status of the [Name](#) Wilderness of the [Name](#) National Wildlife Refuge. This document gives context to the status of the [Name](#) wilderness and identifies the major management challenges associated with maintaining wilderness character. This document is intended to be a reference source for readers interested in understanding the wilderness and to detail the natural and anthropogenic impacts that threaten the state of wilderness character. The [Name](#) Wilderness Character Monitoring Plan was developed using ## distinct measures that assess the following: untrammled quality, natural quality, undeveloped quality, and solitude or primitive and unconfined recreation quality.

Notes: This report has an addendum to comply with the updated technical report [reference code #####] ***Add this metadata after the Update Summary is added to ServCat***

Permissions: Currently permissions to edit records are given to Nancy Roeper, Peter Dratch, and Marissa Edwards.

- Public Reference, Internal Files – when the complementing Update Summary is incomplete or not available
- Public Reference, Public Files – when the complementing Update Summary is signed and complete, the internal file access needs to be updated to “Public”
- Do not pinpoint T&E species locations

Files and Links:

- Digital holding description: Format – [Refuge Name, Wilderness Name \(if different\)](#) Wilderness Fellows Report
 - [Example 1](#): PDF – Okefenokee NWR Wilderness Fellows Report
 - [Example 2](#): PDF – Bitter Lake NWR, Salt Creek Wilderness Fellows Report

Organizations and Geography: The location of the wilderness

Subjects and Keywords:

- Keywords: WCM, Wilderness Values, Wilderness Act, Wilderness Area Monitoring, Natural Resource Management, Climate Conditions, Air Quality
- Subject Categories: Inventory, Wilderness Recreation Experience, Undeveloped, Natural, Solitude or Primitive and Unconfined Recreation, Untrammled

WCM Back-end Database records

This metadata exists for reference purposes for existing wilderness-specific projects that have WCM Back-end Database Records. These records are no longer used for monitoring purposes.

Reference Type: Generic Dataset

Title: [Refuge Name, Wilderness Name \(if different\)](#) Wilderness Character Monitoring Back-end Database

- See Refuge and Wilderness Name Examples under [Wilderness Project Records](#).

Description: This is the back-end data file for the [Wilderness Name](#) Wilderness Character Monitoring Application. User interface and lookup databases are required for use (see reference code 5725). The Wilderness Act of 1964 mandated the preservation of wilderness character. The NWRS has 18% of designated wilderness, comprising 21 million acres. After over 40 years there is still a lack of consistent inventory and monitoring of wilderness as well as the ability to measure how it is affected by stewardship. To ensure the last remaining wilderness is not lost, monitoring can maintain the preservation and true wild nature of these areas for present and future generations. Monitoring provides an assessment of the trends of wilderness character to develop refuge wilderness stewardship. This also provides the ability to evaluate impacts of proposed actions on wilderness character and allows defensible stewardship decisions. By preserving wilderness character, the FWS demonstrates leadership in wilderness stewardship across the National Wilderness Preservation System.

Notes: This Access database has been replaced with an online database [reference code [69834](#)]

Permissions: Currently permissions to edit records are given to Nancy Roeper, Peter Dratch, and Marissa Edwards. They will eventually extend to data managers at the regional level and wilderness data stewards are the refuge level.

- Public Reference, Internal Files

Files and Links:

- Digital holding description: Format – Refuge Name, Wilderness Name (if different)
WCM Back-end Database
 - [Example 1](#): Access – Okefenokee NWR, WCM Back-end Database
 - [Example 2](#): Access – Bitter Lake NWR, Salt Creek WCM Back-end Database

Organizations and Geography: The location of the wilderness

Subjects and Keywords:

- Keywords: WCM, Wilderness Values, Wilderness Act, Wilderness Area Monitoring, Natural Resource Management, Climate Conditions, Air Quality
- Subject Categories: Inventory, Monitoring, Wilderness Recreation Experience, Undeveloped, Natural, Solitude or Primitive and Unconfined Recreation, Untrammelled

WCM Update Summary records

Reference Type: Unpublished Report

Title: [Refuge Name, Wilderness Name \(if different\)](#) Wilderness Character Monitoring Summary

- See Refuge and Wilderness Name Examples under [Wilderness Project Records](#).

Date Produced: Date the update summary was signed by the National Wilderness Coordinator

Pages: # Pages

Description: The table and the report that follow are part of a national initiative to establish a baseline wilderness character assessment for all of the National Wildlife Refuges with designated wilderness. The measures for each wilderness were developed with refuge staff and reviewed at the national level. This addendum document complements the [insert year](#) report on wilderness character monitoring for [Name](#) National Wildlife Refuge.

Notes: This report is an addendum to the following baseline report [reference code - #####]

Permissions: Currently permissions to edit records are given to Nancy Roeper, Peter Dratch, and Marissa Edwards. They will be extended to data managers at the regional level and wilderness data stewards are the refuge level.

- Public Reference, Public Files – when both signatures are provided by the Refuge Manager or Project Leader and National Wilderness Coordinator

Files and Links:

Digital holding description: [Format – Refuge Name, Wilderness Name \(if different\)](#) WCM Update Summary

- [Example](#): PDF – Okefenokee NWR, WCM Update Summary
- [Example](#): PDF – Bitter Lake NWR, Salt Creek WCM Update Summary

Organizations and Geography: The location of the wilderness

Subjects and Keywords:

- Keywords: WCM, Wilderness Values, Wilderness Act, Wilderness Area Monitoring, Natural Resource Management, Climate Conditions, Air Quality
- Subject Categories: Inventory, Monitoring, Wilderness Recreation Experience, Undeveloped, Natural, Solitude or Primitive and Unconfined Recreation, Untrammelled

****After the Update Summary is stored into ServCat, visit the WCM Baseline Report record to update the **Permission** level and the **Notes** metadata
(See [WCM Baseline Report Records](#))****

WCM Dataset records

Reference Type: Generic Dataset

Title: [Refuge Name, Wilderness Name \(if different\) – Proposed \(if applicable\)](#): WCM Dataset, Year 1 – Year 5

- Example: Mille Lacs National Wildlife Refuge: WCM Data Report, 2015-2019
- Example: Hart Mountain National Wildlife Refuge, Poker Jim Ridge Wilderness: WCM Dataset, 2015-2019

Date Produced: Year of the dataset created

Pages: # Pages

Description: This WCM Dataset provides the data values for the measures selected to monitor wilderness character at [Wilderness Name](#). Monitoring provides an assessment of the trends of wilderness character to improve refuge wilderness stewardship. Monitoring also provides the ability to evaluate impacts of proposed actions on wilderness character and allows defensible stewardship decisions. By preserving wilderness character, the FWS demonstrates leadership in wilderness stewardship across the National Wilderness Preservation System.

Content Begin Date: Enter the first year of the data available in the dataset

Content End Date: Enter the last year of the data that was entered in the dataset

Notes: This dataset is referenced for data entry in the online database [reference code [69834](#)]

Permissions: Currently permissions to edit records are given to Nancy Roeper, Peter Dratch, and Marissa Edwards. They will be extended to data managers at the regional level and wilderness data stewards are the refuge level.

- Public Reference, Internal Files

Files and Links:

Digital holding description: [Format – Refuge Name, Wilderness Name \(if different\) Dataset](#), Year

- Example 1: Excel – Okefenokee NWR WCM Dataset, 2015-2019
- Example 2: Excel – Bitter Lake NWR, Salt Creek WCM Dataset, 2015-2019

Organizations and Geography: The location of the wilderness

Subjects and Keywords:

- Keywords: WCM, Wilderness Values, Wilderness Act, Wilderness Area Monitoring, Natural Resource Management, Climate Conditions, Air Quality
- Subject Categories: Inventory, Monitoring, Wilderness Recreation Experience, Undeveloped, Natural, Solitude or Primitive and Unconfined Recreation, Untrammelled

SM 3: Supporting Documents

Refer to [SOP 3: Development of Wilderness Character Monitoring Update Summaries](#), for guidance on using the template. This template can be downloaded as a Word document in ServCat ([98174](#)). The update strategy is used to identify and discuss measures that may not align with the principles of KIW2 or need clarity in the measure descriptions

EXAMPLE - MOLLIE BEATTIE WILDERNESS (2013)

Potential restructuring of wilderness character monitoring measures

The purpose of this strategy is to provide a way to summarize the suggested changes to wilderness character monitoring (WCM) for Mollie Beattie Wilderness to be compliant with changes made to the interagency strategy *Keeping It Wild* (2008). Measures selected in the 2013 Baseline WCM Report implemented guidance in the original strategy and needs to be updated to reflect the new strategy, *Keeping It Wild 2* (KIW2) (2015). There are three major changes:

1. KIW2 clarifies that measures in the Untrammeled Quality should track the individual actions that intentionally manipulate wilderness and not the magnitude of those actions (pp. 34-35). This shift in focus allows measures in this quality to get at the decision to manipulate a wilderness.
2. The Natural Quality, which previously had three indicators in *Keeping It Wild* (“plants and animal species and communities,” “physical resources,” and “biological processes”), now has four indicators in KIW2: “plants,” “animals,” “air and water,” and “ecological processes.” Additionally, KIW2 clarifies that measures should look at human-caused threats to native species and communities (p. 40). KIW2 encourages wildernesses to move away from native species population dynamic measures, since native species cannot be a threat to the Natural Quality.
3. The Other Features of Value Quality was added to account for cultural sites, paleontological sites, or other features of value integral to wilderness character. Measures in this new quality and its associated indicators will replace the measures that were used in the “Loss of statutorily protected cultural resources” indicator previously under the Undeveloped Quality. The Other Features of Value Quality is the only **optional** quality, as these types of features may or may not be present in a wilderness.

Below is a table displaying a potential strategy for reorganizing the existing Mollie Beattie wilderness character monitoring measures to comply with KIW2.

During this process, data values for these measures will be collected for data entry into the interagency Wilderness Character Monitoring Database.

QUALITY	INDICATOR	MEASURES	COMMENT
Untrammeled	Actions authorized by the federal land manager that intentionally manipulate the biophysical environment	Number of actions to manipulate plants, wildlife, insects, or fish (2013 Baseline Report, p. 20)	N/A
Untrammeled	Actions authorized by the federal land manager that intentionally manipulate the biophysical environment	Index of fire management actions in wilderness (2013 Baseline Report, pp. 21-22)	This measure takes into account the magnitude of the suppression response, which KIW2 moves away from (p. 35). Suggest counting all actions equally. Suggested measure: Number of actions to manage fire in wilderness
Untrammeled	Actions authorized by the federal land manager that intentionally manipulate the biophysical environment	Number of research, survey, and monitoring projects that manipulate plants, wildlife or habitat (2013 Baseline Report, p. 23)	N/A
Untrammeled	Actions not authorized by the federal land manager that intentionally manipulate the biophysical environment	Number of unauthorized actions to manipulate plant, wildlife, insects, fish, pathogens, soil, water, or fire (2013 Baseline Report, p. 24)	N/A
Untrammeled	Actions not authorized by the federal land manager that intentionally manipulate the biophysical environment	Number of hunting regulations with clear intent to manipulate predator populations inside wilderness (2013 Baseline Report, pp. 25-26)	Suggest counting the actions instead of regulations. Suggested measure: Number of actions to manipulate predator populations
Natural	Plants	Number of non- native plant, animal and pathogen species (2013 Baseline Report, p. 28)	The indicators were changed in KIW2. This measure can be split up so that each indicator is represented. Also, the terminology we are using is invasive, can we add that to the title? Suggested measure: Number of non-native, invasive plant species
Natural	Animals	N/A	Suggested measure: Number of non-native, invasive animal species
Natural	Air & water	N/A	Measures need to be developed.

QUALITY	INDICATOR	MEASURES	COMMENT
Natural	Ecological processes	Vegetation greenness and length of growing season indicator of climate change (2013 Baseline Report, p. 29)	Moved from Biophysical Processes. Suggested measure to add to Ecological Processes: Number of non-native, invasive pathogens
Undeveloped	Presence of non-recreational structures, installations, and developments	Index of authorized physical structures, installations, or developments (2013 Baseline Report, p. 31)	N/A
Undeveloped	Presence of non-recreational structures, installations, and developments	Index of Collars, and both visible and not visible transmitters in the wilderness (2013 Baseline Report, p. 32)	
Undeveloped	Inholdings	Index of inholdings within wilderness (2013 Baseline Report, p. 33)	N/A
Undeveloped	Use of motor vehicles, motorized equipment, or mechanical transport	Number of authorized helicopter uses (2013 Baseline Report, p. 34)	N/A
Undeveloped	Use of motor vehicles, motorized equipment, or mechanical transport	Air Taxi and Transporter fixed wing aircraft use (2013 Baseline Report, p. 35)	N/A
Undeveloped	Use of motor vehicles, motorized equipment, or mechanical transport	Number of fixed wing aircraft landing sites (2013 Baseline Report, pp. 36-37)	N/A
Undeveloped	Use of motor vehicles, motorized equipment, or mechanical transport	Authorized motor and mechanical use (2013 Baseline Report, p. 38)	N/A
Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation	Remoteness from sights and sounds of human activity inside of wilderness	Visitor Study Count of other groups encountered by visitors (2013 Baseline Report, p. 41)	Suggest reducing or combining measures in this indicator. Could be combined with "Visitor Study Count of encounters with refuge staff or other law enforcement".
Outstanding Opportunities for Solitude or	Remoteness from sights and sounds of human activity inside of wilderness	Visitor Study Count of the # of air planes Encountered (2013 Baseline Report, p. 42)	Suggest reducing or combining measures in this indicator.

QUALITY	INDICATOR	MEASURES	COMMENT
Primitive and Unconfined Recreation			Suggest replacing “#” with “Number”.
Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation	Remoteness from sights and sounds of human activity inside of wilderness	Visitor Study Count of Evidence of other visitors’ impacts (2013 Baseline Report, p. 43)	Suggest reducing or combining measures in this indicator.
Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation	Remoteness from sights and sounds of human activity inside of wilderness	Visitor Study Count of encounters with refuge staff or other law enforcement (2013 Baseline Report, p. 44)	Suggest reducing or combining measures in this indicator. Could be combined with “Visitor Study Count of other groups encountered by visitors”.
Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation	Remoteness from sights and sounds of human activity inside of wilderness	Number of abandoned property or trash sites inside the wilderness (2013 Baseline Report, p. 45)	Suggest reducing or combining measures in this indicator.
Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation	Remoteness from sights and sounds of human activity inside of wilderness	Visitor use days at select high traffic sites (2013 Baseline Report, p. 46)	Suggest reducing or combining measures in this indicator.
Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation	Remoteness from sights and sounds of human activity inside of wilderness	# of commercial guides in wilderness (2013 Baseline Report, p. 47)	Suggest reducing or combining measures in this indicator. Suggest replacing “#” with “Number”.

QUALITY	INDICATOR	MEASURES	COMMENT
Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation	Remoteness from sights and sounds of human activity outside of wilderness	Viewshed impacts from developed areas outside the wilderness (2013 Baseline Report, p. 48)	N/A
Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation	Facilities that decrease self-reliant recreation	Agency-provided facilities in the wilderness that decrease self-reliant recreation (2013 Baseline Report, p. 49)	N/A
Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation	Facilities that decrease self-reliant recreation	Number of sites with obvious visitor created trails in wilderness (2013 Baseline Report, p. 50)	N/A
Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation	Management restrictions on visitor behavior	Management restrictions on non-commercially guided visitors (2013 Baseline Report, p. 51)	N/A
Other Features of Value	Deterioration or loss of integral historical or cultural features	N/A	
Other Features of Value	Deterioration or loss of other integral site-specific features of value	N/A	

U.S. Fish and Wildlife Service
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National Wildlife Refuge System

